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New Developments in the Foreign Licensing Project

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SUMMARY

THE PROJECT ON FOREIGN LICENSING has been expanded as a result of the successful completion of the exploratory study. Additional information is being sought through a revised questionnaire sent to a larger sample of U. S. licensors.

A short questionnaire is also being sent to a sample of foreign licensees.

In order to analyze more effectively the results of the questionnaires and the problems which are faced in the licensing operation, the staff is working on the construction of a framework which will encompass business and government policy, and the foreign economic implications of licensing.

THE PRELIMINARY EXAMINATION OF THE RELATION of the patent and trademark systems to the licensing abroad of American-owned foreign patents, trademarks, and techniques has shown a very great need for further examination of several aspects of foreign licensing:[1] (1) the nature and scope of foreign licensing (2) the impacts of U. S. antitrust legislation and of anti-monopoly laws abroad (3) the effects of U. S. taxation and the appropriate use of tax incentives (4) the contribution of foreign licensing (including the transfer of know-how) to the broader national objectives of economic growth and development.

While we realize that a complete examination of these areas would lead to a series of sizable projects over several years, our preliminary examination has been expanded, and we have embarked on a study of certain aspects of each. We are hoping to point the way for other researchers in the field. Thus, we cannot expect to investigate the full impact of licensing on all foreign countries; but, if we can develop a methodology for such studies and indicate the required information, we may encourage others to attempt similar research in their own countries.

Equally, the Foundation cannot hope to gather complete and detailed information on the activities of all U. S. licensors abroad; but better information than we currently have is desirable.

I. NATURE AND SCOPE OF LICENSING

A major expansion of the study has been made through the decision to seek information from foreign licensees on limited aspects of their experiences in requesting or accepting licenses from U. S. corporations. The Foundation hopes, through a mailed questionnaire, to obtain some of the views of the "other side," thus re-

[1] *PTC J. Res. & Ed.*, 2, No. 2 (June 1958), pp. 181-277.

moving the bias resulting from looking at licensing from only one side of the operation—that of the licensor.

A. Foreign Licensees

It was recognized that foreign companies might be reluctant to provide the extensive and intensive information which American companies are frequently willing to make available to researchers. Thus, the licensee questionnaire, reproduced at the end of this report, is restricted in coverage, both topically and geographically. The topics were restricted because we considered that a questionnaire longer than two pages would deter responses and raise air mailing costs too greatly. The intent is to obtain information on the problems of discovering potential licensors, of negotiating a license, and of obtaining its fulfillment. The motives of foreign licensees for seeking licenses were considered to be fairly evident. We have asked for data on the number of the licensee's agreements with U. S. companies, what obstacles to negotiation he has encountered, and what he considers to be the impact of antitrust legislation. Also, if negotiations failed to produce an agreement with an American firm, we wish to know whether licensors in competitive countries came forward to provide the desired rights or know-how. Such information will provide an insight into the degree of competition in foreign licensing and the "loss" which follows failure to gain a desired agreement.

Geographically, we are initially directing these foreign questionnaires to a selected list of companies in the British Commonwealth and France since these appear to be the dominant licensee countries. If we find the returns significant, we will feel warranted in making the additional expenditures necessary to reach licensees in several other countries.

B. U.S. Licensors

The Foundation has also recently sent out a revised licensor questionnaire to a selected list of U. S. corporations with the objective of making a more thorough analysis of the practices used and the problems faced in foreign licensing.

The companies questioned are composed of three different types: (1) those among the one-thousand largest U. S. manufacturing companies having several foreign subsidiaries, (2) companies among the twenty-five hundred known to have foreign organizations, and (3) companies having advertised for licensing arrangements.

The revised questionnaire, reproduced at the end of this report, has been tooled to gain information on the size, direction, nature, and profitability of U. S. licensing abroad; on effects of antitrust laws; and of the precise practices which are employed under the agreements. The pilot licensor questionnaire (sent in 1957) was directed at some of the same questions but was also heavily slanted toward discovering the nature of the licensing agreement. The results of the prior responses were checked against information available to consultants and legal counsel in the field and through personal interview of corporate officials. We believe that the picture of the licensing agreement given in the June 1958 issue of the *Journal* is sufficiently accurate so that we need not further pursue the character of the license contract. In

addition, two very valuable guides to the licensing agreement have recently been published. (See reviews page 53 in this issue.) We can now turn our interest to the practices which have evolved in fulfilling agreements, problems of protection, and the over-all impacts of these transfers.

This attention to actual practice under the agreement will, we hope, provide information on the legal, political, and economic problems which require resolution if the benefits from foreign licensing are to be maximized. Thus, the results will help us understand the various licensing practices which may have significant effects on foreign and American economic growth; they will assist corporations to understand more fully the ways in which others are employing the technique; and they will provide essential facts for the development of effective public policies toward foreign licensing and its companion, direct investment; for example, on the use of tax incentives.

In order to obtain more accurate information, we have divided the current questionnaire sent to U. S. licensors into four parts. The first seeks to determine the extent and nature of the foreign rights which are available for licensing; from this information (which we hope will be given by those who do not license as well) we will have a clearer idea of the extent to which such rights are transferred to others and the proportion of U. S. licensing capacity which is utilized. We will not, of course, know the size or the source of know-how transfers; this gap can be filled only by a more extensive study of research and development activities of U. S. corporations than is currently available—a project currently beyond our objectives, though certainly within our interest.

A variety of estimates have been made as to the extent of licensing, but it is apparent that no estimate has covered all the relevant types of licenses nor tapped all available sources of information. We are attempting to expand the size of our previous sample of the licensing patterns of U. S. corporations. However, our interest is not in the distribution of licenses among individual foreign countries, but in a better idea of the over-all magnitude of licensing, its distribution among the basic types, and the degree to which licensing is concentrated in the industrialized as compared to the non-industrialized nations. Since there is considerable interest in the growth of direct investment, and since there appears to be a close tie between direct capital outflow and the transfer of skills and proprietary rights, we are seeking also to determine the practices of companies in licensing firms with which they have a financial relation. Where such a relation exists in the form of a subsidiary tie, we have formed a set of questions (the fourth part of the questionnaire) to discover the method of licensing of subsidiaries, the motives behind that licensing, and the nature of the returns therefrom.

The first part of the questionnaire also seeks information as to the negotiation and fulfillment experiences of U. S. licensors. For example, the extent to which negotiations resulted in agreements, the obstacles to successful negotiations, and the impact of antitrust laws on the successful completion of negotiations. The general measurement of profitability of the licensing program is the subject of the last questions in the first part of the questionnaire.

Two remaining parts of the questionnaire concern, separately, the licensing of

trademarks and of patents and know-how. Respondents to our pilot study stressed the fact that there were practices and problems with reference to these two major types of licensing which were not common to both. We have, therefore, separated our questioning and simplified the responding procedure for those who have only one type of license. Since it is impossible to expect that a respondent would be able to take the time—even if willing—to reply with reference to the experience under *each* agreement, we have set out questions which can be answered on a "frequency" basis. This eliminates some of the questions which we consider important to ask, especially qualitative questions, but these will be examined in depth interviews with corporate officials during the coming months.

The replies to the questionnaires, both domestic and foreign, will be collated with the data received through interviews; the results will be analyzed and published in a subsequent issue of the *Journal.* This procedure of questioning by mail is costly in terms of both time and money, with the time cost being counted by far the heaviest when that expended by corporate officials is added. Yet, there is no substitute for gathering empirical information in this fashion. Personal interviews are of the utmost importance, but they do not allow the licensor to reflect on his answers, and they must be limited because of the cost involved. In addition, it is sometimes more difficult to obtain quantitative information "on the spot" than by a method which permits a questionnaire to circulate among the several officials who are capable of answering it.

II. TAXATION

The impact of taxation on international business has recently been emphasized through the Boggs Bill [2] to provide tax incentives for overseas operations. A survey by the Department of Commerce of company attitudes indicated that "more companies are citing tax concessions as being necessary to encourage a greater participation in foreign investments than any other inducement."[3] From our investigations, we believe that the same attitude prevails as to encouragement of licensing, especially licensing which accompanies foreign investment.

We, therefore, have included within our expanded project on licensing a study of some of the major aspects of taxation of foreign income. While advice on existing tax law and its implications for a given business operation is best sought from tax counsel, we feel that there are wider issues involved than impact of taxes on specific types of investment or overseas operations. Additional problems to be examined are those of (a) whether and how best to assist development of underdeveloped areas through tax or subsidy incentives to U. S. business, (b) inequities in the treatment of one type of foreign business as compared to another, (c) how to stimulate activity in one area without warping the direction and scope of business enterprise in another, (d) whether income from exports should be given the incentive also, and (e) justifications for unequal treatment of domestic and foreign business.

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[2] H.R. 5 of the First Session of the 86th Congress.

[3] "Private Foreign Investment," Hearings before the Subcommittee on Ways and Means, House of Representatives, 85th Congress, 2d Session, December 1958, p. 33.

Behind these issues, which must be given full and careful examination, are problems of foreign tax structures, desirability of the expansion of private enterprise abroad, relation of private business expansion to governmental assistance, and the appropriate use of other techniques of encouraging such enterprise. These questions are closely tied to the economic aspects which we are also examining.

III. ANTITRUST IMPACTS

A representative of the U. S. Government has stated candidly that its policy toward international business in several areas "is not yet completely satisfactory." Among these areas was included that of antitrust: "There is still some uncertainty as to the scope and meaning of the antitrust laws which may be discouraging certain types of private economic activities abroad."[4] Two major contributions to the examination of the impact of antitrust law on foreign commerce recently have been published; those by Fugate[5] and Brewster.[6] The former is reviewed in this issue.

Our interest in these laws is both narrower and broader than the approaches taken by these writers. It is narrower in the sense that we are mainly concerned with licensing agreements and the ways in which antitrust laws and court decisions have affected the negotiation and provisions of such agreements, rather than all types of foreign commerce. Our approach is also broader in the sense that it is concerned with the economic implications of the legal interpretations given on licensing cases, rather than merely "what the law is."

In order to determine the trend of court interpretations as well as the position of the Justice Department, we intend to study the antitrust decrees where foreign licensing was involved and thus to analyze what relationships have been challenged. Then, from an economic standpoint, we intend to examine the implications of these restrictions and to relate the theory on which they are based to the existing conditions of production and competition abroad. While the Foundation seeks only to lay bare the problem and provide information, the results of such studies will be of considerable use to policy-makers.

IV. ECONOMIC ANALYSIS

The economic aspects of foreign licensing which require analysis fall mainly into three categories: (a) the causes of foreign licensing (b) the effects of foreign licensing on the wealth and income of the United States; on the economic growth of the countries receiving licenses, the indirect effects on third nations, and (c) the impact on foreign licensing of alternative public policies in various fields (taxation, antitrust, commercial, and financial) and thus, on the income and wealth of the various countries concerned.

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[4] Assistant Secretary of Commerce Kearns, *Ibid.*, p. 29.

[5] Wilbur A. Fugate, *Foreign Commerce and the Antitrust Laws* (Boston: Little, Brown & Co., 1958), 447 pp.

[6] Kingman Brewster, Jr., *Antitrust and American Business Abroad* (New York: McGraw-Hill, 1958), 510 pp.

A. Causes of Foreign Licensing

The investigation of the causes of foreign licensing is essential for the prediction of the likely size and pattern of development of this expanding instrument of international business. Knowledge is required of the major determinants of the total flow of business, the balance between various types of business, or of special features of each. Without such information, little can be said, for example, on the extent to which foreign licensing can accelerate the economic advance of those particular nations in which the United States has substantial political and economic commitments; and knowledge of the factors affecting the decision to license is required to guide the selection of appropriate policies which would alter the magnitude and pattern of the international transfer of skills and proprietary rights, should that be judged desirable.

We have already obtained some empirical information on incentives to license, but it is difficult to weigh the data without an analytical framework. Such a framework will be useful in evaluating data received through the new questionnaire and should help businesses to assess their own policies better. Thus, our analysis of the causes of foreign licensing will proceed along two complementary lines: (1) the investigation of those factors which licensors indicate to be important in determining their decisions, and (2) the application of economic theory to the underlying forces which determine the strength of those factors on which the licensors rely heavily in reaching their decisions.

1. Factors Determining Decisions

Ideally, a full analysis of the causes of foreign licensing should seek to explain why businessmen consider certain factors to be of *special* importance in their decisions, and why they hold one or another general view toward licensing in comparison with alternative methods of international business. Various factors, such as the organizational structure of the business enterprise or the position of the person or department in charge of foreign licensing, have affected the weights given to different incentives. A basic determinant of this ranking, which must be given careful consideration, is the basic policy position of business management on foreign licensing; in particular, whether it is regarded as a long-term instrument of international business or a short-term modus vivendi, designed to meet what are hoped to be passing problems of international economic relations. A full profile of the basic factors is probably unattainable, but some gaps may be filled through personal interviews.

The analysis of the causes of foreign licensing cannot be limited to determining these factors which bear heavily on the decision of the licensor to license an existing proprietary asset abroad. A prior decision, namely, the initial decision to file for a patent or register a trademark abroad, also requires analysis since the factors which affect this decision determine the basic supply of knowledge which can be transferred abroad through licenses. What considerations are involved in this decision? What is the ranking of the motives? How much attention is given to legal and administrative costs? Have the attitudes of American firms changed in regard to this initial decision, so that one might attribute the growth of licensing in recent

years largely to the growth of the proprietary assets abroad; or is the remarkable expansion of licensing primarily a shift in the attitude of businessmen (affected by changing circumstances) toward the licensing of assets which they would have had abroad in any event?

Finally, because licensing involves the acceptance of a contract by the licensee, the attitudes of potential licensees toward foreign licenses, and their motives in accepting them, are an essential part of the description of the causes of foreign licensing. The same inventory of licensor practice and policy must also be made of licensees.

2. Theoretical Analysis

The second line of inquiry on the causes of licensing will involve the application of economic theory with its usual simplifying assumptions and abstraction from some of the details of business practice. The aim is to delineate those basic forces which determine the magnitudes of the variables which are critical in the licensor's decision. More specifically, the purpose is to cast up the key factors out of many forces which determine the location of production.

Foreign licensing, in principle, is one of several methods of producing a product or applying a process abroad. Since the same product or process can be applied in the country of initial patent to supply foreign markets through export, the decision to license or not is but one aspect of the broad question of the forces determining the international division of labor. A large body of economic theory exists which can cast light on the fundamental forces determining the location of production. With adjustments for the institutional and procedural facts, this theory can be applied to foreign licensing, looked on as one choice among means of exploiting the value of the proprietary asset abroad: exporting, licensing, on foreign investment, or a combination of these, or the sale of the assets. Modern economic theory can also be applied to determine those factors which are conducive to the selection of one method in preference to another.

Ideally, the analysis of the causes of licensing would consider the fundamental factors which determine the location of invention, for without some unequal distribution in the capacity to invent, there would seem to be little basis for the international exchange of know-how. By treating invention as an industry, it is possible to fit this area of inquiry into an economic model. But, so little is known of the economic characteristics of this part of industrial activity—especially by way of international comparisons—that little progress can be made now through the application of economic reasoning to this question. However, more extensive study of research and development operations in U. S. and foreign businesses than is presently available should throw considerable light, not only on the topics we are currently studying, but also on foreign investment, economic growth rates, and over-all foreign economic policies.

An approach to the causes of foreign licensing through economic theory complements the approach which consists of analyzing the factors which businessmen report as being especially relevant in their decisions. In a sense, the businessman deals with surface phenomena: costs of production, prices of products, profit opportunities. An analysis solely in terms of the factors considered important by businessmen

would only reflect their assessment of the surface phenomena. But, underlying the costs of production, the prices, and the profit opportunities, which are the proximate bases for business decision, there are fundamental economic forces which a theoretical approach helps to delineate. A more complete picture of the causes of foreign licensing can be gained by analyzing its relation to those broad economic factors which determine wages, interest rates, and the absorptive capacity of a country for American know-how.

The theoretical approach also serves to center attention on the long-run forces at work in determining the size and pattern of foreign licensing. It permits the analysis to escape those variables which are momentarily critical and whose effect on the businessman's decision is transitory and passing. For example, previous research indicates that exchange and trade controls have been an important stimulus to international licensing. With the steady relaxation of such controls in recent years in many countries, are we to suppose that the drive behind licensing will diminish at an equal pace? Or has there been a basic shift in the structure of the international economy which suggests that licensing no longer requires the unhappy stimulus of trade restrictions? Economic theory provides the initial basis for answering this kind of question since it focuses attention on the long-run forces at work.

One advantage of searching for the causes of foreign licensing, both by employing theory and by describing the forces emphasized by businessmen, is found in the knowledge which each approach can contribute to the other. Any substantial deviation between the results predicted by theory and business practice suggests that one or the other can be improved. If the theory errs, reflection is cast upon our modern theoretical techniques or assumptions. It is not inconceivable that such theory, which was developed in a period when foreign licensing showed little of the vigor it has today, needs adjustment for the implications of this instrument of international business.

Equally, if the assumptions of rational behavior on the part of businessmen and of profit maximization are accepted as relevant, a substantial deviation between the results and practices implied by theory and the policies and actions of businessmen may suggest lines for improving business policy. For example, a complete theory should include a discussion of the best pricing policy for licenses. Previous research indicates a heavy reliance on output or sales as the base for royalty payments, but modern theory suggests that this base will not, under certain circumstances, maximize the long-run profits gained from a foreign asset.

In a similar way, a theoretical analysis may cast substantial light on the effects of exclusive licenses on the royalties of licensors. While it is evident that exclusive licenses bring higher royalties per unit of output than non-exclusive licenses, it is not obvious that more widespread licensing at lower rates would lower the gross royalties obtained since the output on which the royalties would, perhaps, be significantly larger. The precise conditions under which the gross receipts would be smaller or larger need investigation; our theoretical analysis will be a start in this direction. Still another area in which business policy may learn something from economic theory concerns the treatment of research and development costs in set-

ting minimum acceptable royalty rates which, by excluding certain potential licensees, would seem to play an important role in determining the extent of licensing. Any substantial differences between the method which theory suggests for maximizing profits and business practice may produce some interesting recommendations for improvement of pricing policies.

B. Effects of Licensing on Income and Wealth

The second general area of economic analysis concerns the effects of foreign licensing on the national income of the United States, of the countries receiving licenses, and of third nations. So far as the effects on the United States are concerned, the analysis requires a comparison of the costs to the United States of licenses with the royalties and other benefits received from them. Some data can be developed on both sides of this equation, particularly through interviews. An equally fruitful line of inquiry will concern the accuracy of the accounting procedures used by businessmen in costing licenses. Only if these can be shown to be reasonably accurate reflections of true costs, can business responses be relied upon to establish a prima facie case that foreign licensing contributes to U. S. national income. Some criteria must be developed, through theory, as to the basis on which to determine what the true costs of licensing are.

One facet of the effect of foreign licensing on the United States, which also seems amenable to factual and theoretical analysis, concerns the inter-relation between exports, licensing, and foreign investment. Are they competitive or complementary? The twenty-billion-dollar export industry, which is America's, obviously should be interested in the potential effects of licensing on its growth and development. Our earlier research suggests that the American firms most interested in licensing are those heavily involved in exports. Does this mean that licensors are likely to license only where U. S. export potential is not going to be damaged? Or does it mean that U. S. exports are particularly vulnerable because foreign licensing offers a method by which a foreign nation can gain the results of American know-how without the loss of foreign exchange implied by imports? There is some suggestion that licensing is used to test markets for subsequent development through exports and investment; but the obverse has been more generally the case: exports have provided a test of the marketability of an item and thus for subsequent investment and licensing.

Economic theory can help to determine whether licensing is likely to accelerate exports, or exports to expand licensing, and whether there is an essential complementary or competitive relation between the two. Here, again, a substantial body of economic theory exists which purports to explain the inter-relation between international trade and international movements of labor and capital. This theory has usually abstracted from changes in the "state of the arts." With appropriate adjustments, the theory can be expanded to cast light on the competitive or complementary relationships among international trade, the international exchange of know-how, and the movement of other factors among countries.

The same analysis can be applied to the relation between licensing and foreign investment. With roughly twenty-five billion of American direct private investment

overseas (book value), the implications of the growth of foreign licensing for U. S. investment are substantial. On the one hand, one can readily see that the decision to license a product or process to an independent company abroad reduces the attractiveness of foreign investment in the same market by absorbing part, or all, of the demand. However, the substantial role which licensing plays in transferring American know-how to subsidiaries of U. S. corporations might suggest an alternative conclusion; so would the growing tendency of licensors to invest their royalty receipts in their licensees' enterprises. Economic theory should be useful in bringing these conflicting implications together into a single picture which will permit some conclusions about the general long-term relations between licensing and foreign investment.

The analysis of the effects of foreign licensing on the countries receiving licenses must also compare benefits and costs. The benefit is obvious in that technical knowledge is gained by the receiving nation, but so is the cost; the licensee must pay royalties to the licensor, and these royalties give the licensor (or more generally his country) a claim on goods and services produced by the nation receiving the license. It is the task of economie analysis to specify, with the aid of economic theory, the conditions under which the benefits to a recipient nation exceed the costs. Various royalty systems must be examined to determine if they have differential impacts on the net benefit gained; so must different types of licenses: cost-reducing versus product-adding licenses, and exclusive versus non-exclusive licenses. The competitive character of the industry to which the license goes may also have a substantial effect on the magnitude of impact.

Any analysis of the effects of foreign licensing on the rate of economic advance of the *recipient* nation must comprehend what would have happened in the absence of licensing. In particular, the question of the competitive or complementary relation between licensing, trade, and foreign investment must be considered in detail. If licensing substitutes for imports or foreign investment, a question arises of whether or not the licensee country would have been better off without the license and with imports or foreign investment in its place. There is some evidence that foreign governments have treated the foreign exchange requests for royalty payments more favorably than those for the return on capital. It is not inconceivable that foreign licensing has made trade restrictions more tolerable for foreign countries so that, in a back-handed way, foreign licensing has allowed them to further restrict their imports. Whether or not such consequences or actions are desirable depends significantly on the comparative merits of licensing, trade, and investment, and their interrelations—factors whose weight theory will help to specify.

Bearing closely on the issue of the competitive or complementary relation between licensing, trade, and foreign investment is the question of the balance-of-payments effects of foreign licensing. On the one hand, it would seem that licensing, by permitting a reduction in imports, would save foreign exchange; but, on the other hand, by absorbing markets which otherwise might attract foreign capital, licensing may reduce foreign exchange receipts. Neither of these possibilities reveals, however, anything more than the superficial consequences of licensing. A grant of license may well involve the mobilization of additional resources for the

production of the licensed product. If these resources are drawn from export or import-competing industries, the net effect of a license on the balance of payments, even though it appears to save imports, may be unfavorable. Using the conclusions of the previous results of our theoretical analysis combined with modern balance-of-payments analysis, it may be possible to point the way toward some useful conclusions.

C. Public Policy

Finally, the economic analysis will provide a firmer foundation for discussion of the effects of present public policy on the real income of the United States and other nations by virtue of the way in which that policy effects licensing. Using the facts and models developed to explain the causes and affects of licensing, new arguments in the pros and cons of various issues in current policy may arise, or former arguments be given different weights. The differential treatment of licenses and investments by foreign governments alluded to above is one policy which might be considered; the area of antitrust is another. From the broad issue of whether or not any legal restraint should be placed on the elements of the license agreement, to the narrower issue of whether or not the licensor should be allowed to promise not to compete with his licensee, the convergence of fact and economic analysis should serve those seeking sound policies. Finally, given U. S. objectives in stimulating foreign economic development, the analysis of causes and effects of the different ways of carrying on international business (licensing, trade, and foreign investment) should help to pinpoint the areas where public policy can have the most desirable effects.

APPENDIX A

QUESTIONNAIRE TO FOREIGN LICENSEES

Nature and Extent of Licensing

1. How many of each type of license has your company obtained from U. S. companies since 1945?
   Trademarks only.....
   Patents only.....
   Know-how only.....
   Patents and trademarks combined.....
   Patents and know-how combined.....
   Trademarks and know-how combined.....
   Patents, trademarks, and know-how combined.....
2. If you have no licenses from U. S. companies, have you been *offered* any by them since 1945? Yes..... No....., and have you *asked* any specific U. S. company for a license since 1945? Yes..... No.....
3. In what year did you receive your first license from any U. S. company?.....

4. What types of products or processes are involved in the major licenses you have received from U. S. companies?.....

5. What percentage of negotiation, successfully completed or not, for licenses from U. S. companies did you initiate? 0%..... 25%..... 75%..... 100%.....

6. Approximately how many negotiations for licenses from U. S. companies failed to result in a license?.....; in how many of these instances did you later obtain a similar license from another U. S. company?.....; or from a firm in another country?..... Which countries?.....

7. What were the chief reasons for these failures?.....
.....

8. What sources of information do you usually rely on to learn of opportunities to obtain licenses from U. S. companies? (e.g., technical journals, foreign representatives, etc.).....

9. Since 1945, have you failed to renew any licenses from U. S. companies? Yes..... No..... If so, why?.....

10. Have any licenses from U. S. companies been cancelled since 1945? Yes..... No..... If so, why?.....

11. If you have licenses from U. S. companies which include patents and know-how in the same agreement, in how many cases would you have taken a patent license only (without know-how)?....., know-how only (without patents)?
.....

12. If you have licenses from U. S. companies which include trademarks and patents in the same agreement, in how many cases would you have taken a patent license only (without trademarks)?....., a trademark license only (without patents)?.....

Governmental Policies

13. What special encouragements has your company received from your government to seek or conclude a license from any foreign company?.....
.....

14. What impediments has your government imposed on your negotiating or fulfilling a license with any U. S. company?.....
.....

15. Do you think that the U. S. dollar reserve position of your country has been improved because you have taken licenses from U. S. companies? Yes..... No..... If so, what leads you to this conclusion?.....
.....

16. Have U. S. antitrust laws deterred you from accepting a license? Yes..... No.....

17. What provisions of existing licenses from U. S. companies have been altered as a result of U. S. antitrust laws?.....

.....

Licenses to U. S. Companies

18. Approximately what percentage of your inventions since 1945 have you patented in the United States.....%. Approximately what percentage of these inventions patented in the United States have you licensed to U. S. companies?.....%.

19. How many U. S. companies have you licensed since 1945 to use your:
    Trademarks only.....
    Patents only.....
    Know-how only.....
    Patents and trademarks combined.....
    Patents and know-how combined.....
    Trademarks and know-how combined.....
    Patents, trademarks, and know-how combined.....

COMPANY NAME.....

RESPONDING OFFICIAL.....

APPENDIX B

QUESTIONNAIRE TO U. S. LICENSORS

THE PATENT, TRADEMARK, and COPYRIGHT FOUNDATION
of
THE GEORGE WASHINGTON UNIVERSITY
Washington 6, D. C.

Instructions for Answering:

If you do not license abroad, please answer questions 1-7 on page 1 of the WHITE sheets.

If you license the use of any assets abroad, answer questions on WHITE sheets, then answer questions on
GREEN sheet if your licenses extend rights to *trademarks,*
YELLOW sheet if your licenses extend rights to *patents and know-how,*
PINK sheet if any licenses are extended to *subsidiaries abroad.*

* COMPANY NAME:.....

ADDRESS:.....

RESPONDING OFFICIAL:.....

TITLE:.....

---

* If you would prefer to reply anonymously, you may do so and still tell us to whom to mail the draft report by returning this sheet separately and mailing the questionnaire in a plain envelope.

FOREIGN PROPRIETARY RIGHTS AND THEIR LICENSING ABROAD

Foreign Assets

1. At present, and approximately:
   a. on how many inventions does your company hold U. S. patents?.....
   b. how many of these inventions are the subject of patents or applications for patents in one or more foreign countries, including Canada?.....; excluding Canada?.....
   c. in how many foreign countries do you generally file for a patent?.....
   d. how many trademarks registered in the United States does your company own?.....
   e. in how many foreign countries (including Canada) are your trademarks generally registered?.....

2. Is the possibility of licensing important in the decisions to patent abroad? All.....; Majority.....; Minority.....; None.....; in the decision to register your trademarks abroad? All.....; Majority.....; Minority.....; None.....

3. How many inventions are licensed by your firm under foreign patents to one or more companies abroad (including Canadian)?..... If none, please state why:
   .....
   .....

4. How many of your trademarks registered abroad (regardless of the number of countries in which each is registered) are licensed to foreign companies? ..... If none, please state why:.....
   .....

5. Have you licensed or offered to license your firm's know-how to any foreign countries since 1945? Yes..... No..... If not, please state why:.....
   .....

6. Do you sell managerial services to foreign licensees? Yes..... No.....; to *non*-licensees abroad? Yes..... No..... Do you agree to sell technical services *in* the license contract but not as part of the royalty arrangement? Yes..... No..... Do you sell technical services to *non*-licensees? Yes..... No.....

7. Have you ever granted another U. S. company the right to sublicense abroad? Yes..... No..... If so, why did you decide not to license abroad directly in this instance?.....

.....

Extent of Licensing

8. How long have you been licensing abroad? .....years. If you began since 1945, how many years were required before your licensing program became profitable?.....

9. Please indicate by area the approximate number (or percentage) of current agreements which your company now has, granting licenses of its know-how, foreign patents and/or trademarks:

Area	Patents Only	Know-how Only	TM Only	Patents & Know-how	Patents & TMs	TMs & Know-how	Patents, TMs & Know-how
Industrialized Countries—*Total*	.....	.....	.....	.....	.....	.....	.....
a) British Commonwealth (incl. Can.)	.....	.....	.....	.....	.....	.....	.....
b) Continental Europe (incl. Scandinavia)	.....	.....	.....	.....	.....	.....	.....
c) Japan	.....	.....	.....	.....	.....	.....	.....
Non-industrialized Countries—*Total*	.....	.....	.....	.....	.....	.....	.....
a) Latin America	.....	.....	.....	.....	.....	.....	.....
b) All others	.....	.....	.....	.....	.....	.....	.....

10. In how many licensees do you have a financial interest of less than 51% equity?.....

11. How did you obtain this financial interest? capital investment....., royalties received in equity shares....., lump sum payment taken in equity shares.....

12. Do you insist upon having a financial interest in all of your licensees? Yes..... No..... If so, why?.....

.....

13. Do you have a policy against taking a financial interest in a licensee? Yes..... No..... If so, why?.....

14. Have you adopted a policy of licensing abroad before investing directly? In all instances.....; Majority.....; Minority.....; None.....

Negotiation Experience

15. Since 1945, what has been the ratio of unsuccessful.....to successful..... negotiations relative to your extending a license? What approximate percentage of the successfully completed negotiations were initiated by the licensee? .....%

16. If, since 1945, you did not extend licenses to some foreign companies which applied please indicate whether the following factors were generally important (I) or unimportant (U) in your decisions:

.....Inadequate market abroad
.....Exchange restrictions
.....Political instability abroad
.....Foreign taxes
.....Unfavorable economic conditions abroad
.....Disagreement over terms of contract
.....Integrity of executives of applicant firm
.....Credit standing of applicant firm
.....Expense of adapting item or know-how to licensee's requirements
.....Other (please specify).....
.....

17. How many licenses that you wanted to extend since 1945 did you lose to a foreign competitor because of U. S. antitrust laws?.....; to firms in which countries?..... If any, has the loss of return information which would have flowed under the license been significant in any way? Yes..... No..... If yes, how?.....
.....

18. What have you had to sacrifice, if anything, in your agreements to gain acceptance of provisions which comply with antitrust legislation?.....

19. Have recent applications of these laws led you to clarify provisions in your existing or standard contracts? Frequently..... Infrequently..... Never.....

Licensing Experience

20. Do you consider that your foreign licenses are directly profitable? All..... Most..... Few..... None..... Have your exports in the licensed field (components and complementary items) increased as a result of your foreign licensing? All cases.....; Majority.....; Minority.....; None.....

21. Do you receive all or part of the compensation in form of a license under U. S. patents or foreign know-how? All cases.....; Majority.....; Minority.....; None.....

22. Are you seriously considering a foreign base corporation out of which to operate your licensing program? Yes..... No.....

23. What has been the general order of magnitude of your firm's average annual gross income from foreign licenses over the past three years, in thousands of dollars? $1-5.....; 5-25.....; 25-50.....; 50-100.....; 100-500.....; 500-1000.....; over 1000.....

24. What was the ratio of your firm's annual average foreign receipts from managerial and technical services sold *outside* of license contracts to returns from foreign licenses during the past three years. Sales.....: License receipts.....

25. Are you a licensee of a foreign firm? Yes..... No..... If so, what is the ratio of your current annual receipts from licenses to your current annual payments to foreign countries under licenses? Receipts.....: Payments.....

TRADEMARK LICENSING TO INDEPENDENT OR ASSOCIATED COMPANIES ABROAD

1. How many independent companies are currently licensed to use your company's trademarks?.....; how many associated companies (less than 51% voting stock)?.....

2. What is the usual period for which your trademark licenses are written?..... years.

3. What types of products (or services) are covered by your licensed trademarks?

.....

4. How often have you defended by litigation your licensed trademarks against foreign infringement since 1945?.....; how often were you successful?.....

5. How often have you been a defendent under an infringement suit brought by foreign third parties against your licensed trademark since 1945?.....; how often were your successful?.....

6. Please indicate the frequency of the following practices and provisions with respect to your licenses:

	All cases	Majority	Minority	None
a. Do you write separate trademark contracts when you also license patents or know-how to a foreign firm?	.....	.....	.....	.....
b. Do you supervise or control the licensee's production or quality?	.....	.....	.....	.....
c. Does the licensee have exclusive rights to the trademark in his own country?	.....	.....	.....	.....
d. Does he have rights under your trademarks in countries other than his own?	.....	.....	.....	.....
e. Does he have exclusive rights outside his country?	.....	.....	.....	.....

f. Does he sell outside his own country? ....
g. Does he sell outside his licensed territory? ....
h. Is provision made for the licensee to pay your distributor in a third country a commission if he sells in the territory of your distributor? ....
i. Is provision made to pay the licensee a commission if you sell in his territory? ....
j. Do you maintain the foreign trademarks? ....
k. Have your licenses been renewed on expiration? ....

7. Are you a licensee under a U. S. trademark owned by an independent or associated foreign company? Yes..... No.....; if so, under how many trademarks?.....

PATENT AND KNOW-HOW LICENSING TO INDEPENDENT OR ASSOCIATED COMPANIES ABROAD

1. How many independent companies abroad are currently licensed under your know-how and/or foreign patents?.....; how many associated (less than 51% voting stock)?.....

2. What types of products (or processes) are covered by your licenses?.....
.....

3. What is the usual contractual duration of your agreements covering know-how? .....years.

4. Where exchange or trade controls were initially important in stimulating the license, is it now your judgment that most ( ), few ( ), of your licensees are currently in a position to undersell you in their own market without these controls? Would they be if the licenses were terminated? Yes..... No.....

5. Please indicate the frequency of the following practices and provisions with respect to your licensing of patents and/or know-how abroad:

	All cases	Majority	Minority	None
a. Have you licensed the manufacture of an item abroad without having already exported it to that market?	.....	.....	.....	.....
b. Have you licensed the manufacture of an item abroad and later manufactured it yourself in that country?	.....	.....	.....	.....
c. Have you had to adapt substantially your item to meet the licensee's requirements?	.....	.....	.....	.....

d. Have you manufactured abroad prior to licensing a foreign firm to manufacture in the same territory?	.....	.....	.....	.....
e. Are new developments in know-how transferred throughout the life of the agreement?	.....	.....	.....	.....
f. When know-how is transferred, is the licensee given access to all relevant know-how you use?	.....	.....	.....	.....
g. Does the licensee return to you improvements in the licensed invention?	.....	.....	.....	.....
h. If so, royalty free?	.....	.....	.....	.....
i. Do you extend those improvements to all other licensees of the same item?	.....	.....	.....	.....
j. Is the licensee given an exclusive right to manufacture in his own country?	.....	.....	.....	.....
k. Is he given an exclusive right to sell in his own country?	.....	.....	.....	.....
l. Does he have exclusive rights outside his own country?	.....	.....	.....	.....
m. Does he sell outside his own territory?	.....	.....	.....	.....
n. Does he sublicense to others in his territory?	.....	.....	.....	.....
o. Does the licensee have to pay your distributor in a third country a commission if he sells in your distributor's territory?	.....	.....	.....	.....
p. Do you agree to pay the licensee a commission if you sell in his territory?	.....	.....	.....	.....
q. Have your licenses been renewed at expiration?	.....	.....	.....	.....

6. Under how many U. S. patents are you a licens*ee* of a foreign firm?.....

7. Under how many licenses extended to you do you receive know-how from independent or associated foreign firms?.....

LICENSING OF KNOW-HOW, FOREIGN PATENTS AND TRADEMARKS TO FOREIGN SUBSIDIARIES

1. Please indicate the percentage of your *wholly-owned* foreign subsidiaries which you license to use your foreign registered trademarks.....% ; your foreign patents.....% ; and your know-how.....%.

2. Please indicate the percentage of your controlled (51% or more voting stock), but *not wholly-owned* foreign subsidiaries which you license to use your foreign registered trademarks.....% ; your foreign patents.....% ; your know-how.....%.

3. What proportion of your total licenses to all foreign firms are to subsidiaries? .....%.

4. Please explain, for each type of right, why you extend a license (formal or informal) rather than simply permit your foreign subsidiaries to use the rights:
Trademarks:.....
.....
Patents:.....
.....
Know-how:.....
.....

5. Have you assigned patents or trademarks to foreign subsidiaries? Many.....; Few.....; None..... Why?.....

6. Do your foreign subsidiaries have the right to sublicense? All.....; Majority.....; Minority.....; None..... Why?.....

7. Are licensed foreign subsidiaries required to make royalty payments to you? All.....; Majority.....; Minority.....; None.....

8. Do subsidiaries return improvements to you without charge? Yes..... No..... If not, by extending you a license? Yes..... No.....

9. How many of your subsidiaries have extended one or more licenses to you covering patents and/or know-how?.....

CONTRIBUTED ARTICLES

Positive Competition and the Patent System

L. JAMES HARRIS *
IRVING H. SIEGEL **

THIS PAPER HAS TWO PURPOSES. The first is to introduce the concept of "positive competition." The second is to discuss the patent system as an instrument of such competition. It should be stated at the outset that the concept of "positive competition" is intended in this paper primarily to have expository value although it could also serve analytical purposes. A principal object is to call attention to the pervasiveness of "competitive" behavior even though "non-competitive" behavior naturally receives greater public notice. The authors do not claim to be presenting a new theoretical standard for economic evaluation or test of legality; rather, they are attempting to describe the dominant features of economic-legal behavior generally neglected in favor of the more colorful instances of legally questionable activities and arrangements. Other students may, however, wish to incorporate this concept as a standard for evaluating economic performance or as an element in a general theory of business regulation.

KINDS OF COMPETITION

IN LEGAL AND ECONOMIC LITERATURE and in political, business, and ordinary parlance, the term "competition" is frequently used with or without a modifier. When it is not preceded by an adjective, its meaning may be clear enough for general communication; the context and the reader's or auditor's experience help the user to convey his message, which may not be intended as very precise. Often, however, the user of the noun adds an adjective in order to distinguish one connotation from all others. Thus, he may employ such adjectives as pure, perfect, atomistic, imperfect, monopolistic, nonprice, workable, effective, significant, hard, soft, fair, unfair, cutthroat, oppressive, destructive, wasteful.[1] Furthermore, the vocabu-

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[1] *Economic Concepts of Competition.* See appendix to a paper by Jules Backman, reproduced in Hearings on Relationship of Prices to Economic Stability and Growth before Joint Economic Committee, 85th Cong., 2d Sess. Washington: Government Printing Office, Dec. 15-18, 1958, pp. 610-615; and Chapter 8 on "Economic Indicia of Competition-Monopoly," in *Report of The Attorney General's National Committee To Study The Antitrust Laws* (Washington: Government Printing Office, March 31, 1955), pp. 315-342.

laries of technical and ordinary speech contain many other words and phrases that reflect on the nature and degree of competition prevailing or deemed possible in a given production or marketing situation, for example: restraint of trade, concentration of economic power, price discrimination, monopoly, duopoly, oligopoly, monopsony, and oligopsony.

POSITIVE COMPETITION

In view of these precedents and the existence of still other pertinent terms (to which we shall refer below), the introduction of another modifier for "competition" may seem to require special justification. But the very statement of the scope of "positive competition" provides a *raison d'être* for the new coinage. This scope is the vast area of behavior that is not interdicted by antitrust law and by the administrative and judicial interpretation of such law. Positive competition thus represents the preponderant activity that makes up our productive and marketing experience. The concept, of course, admits the possibility of redefinition of its boundaries by new antitrust legislation and by new interpretations of existing law.

ASPECTS OF POSITIVE COMPETITION

Why is it appropriate to call this great realm of competitive behavior "positive"? For one thing, it is the realm of economic decision-making and action representing the exercise of inherent and acquired rights, not the narrow boundary zone of legally doubtful or prohibited behavior. It is the domain developed creatively, energetically, pragmatically, by individuals and groups acting in their own and in the social interest in accordance with a general economic charter—in accordance with widely accepted rules of the game. It is the familiar province of economic normalcy that is taken for granted because "it works"—not the much smaller, more troublesome, spectacular fringe of pathological and deviant behavior. The area of interest is also positive because it in fact exists; it is not simply a hypothetical "model", approximated by reality to a greater or lesser degree or not at all. It is the broad land of *working* competition rather than the sector defined as *workable* or a still smaller parcel designated by some other less comprehensive adjective. Even as it is not the land of "thou shalt not," it is not the land of "ought to be," of ethical presumptions; it is the land of "it is." Thus, the competition discussed here is also "positive" in a sense that echoes Comte: the concept stresses the empirical and clinical, rather than a speculative or normative, approach to the investigation of economic-legal phenomena.

Clearly, the world of positive competition is practically the same as that of "economic freedom" which students of antitrust principles hope to protect and foster. It is the "competition in free markets" which antitrust law is designed to preserve and promote. It is the "private competitive economic system" upon which the "Congress has repeatedly declared its reliance . . . as the primary method by which essential energies are released for increased industrial activity and for technological development." The two major political parties have, since the Sherman Act,

"repeatedly affirmed the necessity to foster a competitive economy and to prevent business practices repugnant to economic rivalry."[2]

The practice of positive competition, over time, has been accompanied in our country by a greater abundance of goods and services per capita, an increase in the public welfare (including longer life and better health), a shorter and less arduous work week, and the maintenance of broad opportunities for choice in occupation and in the market place. For this reason Americans tend to prize incentives rather than restraints, expansion rather than limitation of participation in economic and social affairs. Our history has emphasized the conquerability of nature by man within a framework of rules that govern the relations of man to man. Our economic, political, and social organization stresses rewards for those who observe the rules more than penalties for those who break them. Our ideals emphasize enlargement of the good of the many, rather than risk diminution of the good through stern protection from possible antisocial behavior of the few. Our institutions recognize the self-interest of the individual and groups, and tolerate voluntary and open association to advance common objectives, with due regard to third parties and the public at large.

The introduction of the term "positive competition" will, it is hoped, confer a new respectability on the study of the character of the "private competitive economic system," its evolution, its performance, and its potentialities. An appreciation of the healthful state and constructive accomplishments of our society should provide a better perspective for understanding its failures and designing remedial programs.

PATENTS AS INSTRUMENTS OF POSITIVE COMPETITION

The nation's patent system, which represents one of the well traveled highways of technological advance, is an instrument of positive competition to the extent that it contributes to the public welfare and private benefit. This paper is not concerned with the adequacy and comparative importance, the frequency of obstruction or misuse, or the ideal distribution of benefits among inventors, business firms, and society. It is not concerned with criticism or evaluation, with weighing the arguments for and against any thesis regarding the system. Rather, it points out how the system actually enters into the process of creation, diffusion, and application of useful technical knowledge.

Constitutional Basis

The Founding Fathers intended patents as a protection for the inventor, for a limited time, so that he would be induced to disclose his invention and utilize it himself or through others for the benefit of society. In view of Article I, Section 8, Clause 8 of the Constitution, our system is intended to encourage advances in technology:

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[2] On this paragraph, see *Anti-Trust Laws: A Basis for Freedom*, A Staff Report to Anti-Trust Subcommittee of the House Committee of the Judiciary, 85th Cong., 2d Sess., Jan. 1, 1958, p. VII.

> The Congress shall have Power . . . to promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective writings and Discoveries.

Although the authority of Congress to grant "the exclusive right" is limited as to purpose and period of enjoyment, this authority is unrestricted as to the manner in which it is exercised. In the words of an outstanding author in the field of patents, Professor William C. Robinson:

> As to all other matters Congress is supreme. It may refuse all other privileges whatsoever. It may bestow them with or without conditions. It may establish such a period for their duration as it deems expedient. It may exhaust its powers by special grants to individual authors and inventors, or by a general law award to all a uniform protection. Its action may be retrospective or prospective, as long as vested rights are not impaired. The effect of its enactments is co-extensive with the territory of the United States, and no State can disturb or modify either the privileges which it creates or their enjoyment by the persons on whom they are bestowed.[3]

Purposes usually ascribed to the patent system include: (1) encouragement of invention[4], (2) disclosure of invention and its dissemination[5], (3) encouragement of investment in and exploitation of the invention[6], (4) provision of a means for rewarding inventors. Although a theory of reward to the inventor was sponsored by some of the Founding Fathers[7] on the basis of natural justice, the American courts have considered reward secondary to the "progress of Science and useful Arts," the explicit justification given in the Constitution. In an early case, *Kendall* v. *Winsor* 21 How. 322 (1858), Justice Daniel stated:

> It is undeniably true, that the limited and temporary monopoly granted to inventors was never designed for their exclusive profit or advantage; the benefit to the public or community at large was another and doubtless the primary object in granting or securing that monopoly. This was at once the equivalent given by the public for benefits bestowed by the genius and meditations and skill of individuals, and the incentive to further efforts for the same important objects.[8]

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[3] William C. Robinson. *The Law of Patents for Useful Invention.* Vol. 1. (Boston: Little, Brown, and Company, 1890), p. 69. [Original footnotes have been omitted.]

[4] *Ibid.* pp. 52, 53, 54, 56.

[5] *Ibid.* pp. 57, 58.

[6] The following statement was made by Judge Frank in a concurring opinion in the case of Picard v. United Aircraft Corp., 53 USPQ 563 (CCA 2) at page 573: "If that means that every kind of patent system is outworn, the idea is disturbing for, as I see it, there seems still to be room for some kind of patent monopoly which, through hope of rewards to be gained through such a monopoly, will induce venturesome investors to risk large sums needed to bring to the commercially useful stage those new ideas which require immense expenditures for that purpose."

[7] *The New Constitution*—papers by Alexander Hamilton, James Madison and John Jay; ed., with an introduction by Max Beloff. *Blackwell's Political Texts* (New York: Macmillan, 1948) pp. 484.

[8] See also, Pennock v. Dialogue 2 Peter 1, 19 (1829); Motion Picture Patents Co. v. Universal Film Mfg. Co. 243 U.S. 502 (1917).

USES OF PATENTS

The patent system contributes to positive competition in many ways. It contributes through the protection it offers patented inventions and the licensing of these patented inventions to other companies. In the first instance the utilization of new devices is encouraged for the improvement of the individual's or the company's economic position; in the second instance the use is extended beyond the licensor's own ability to exploit his property. A license is a right in the licensee to be immune from suit by the licensor for the infringement of the patent. Without a license a company that comes up with a really important improvement may prevent its competitor from employing the patent, and the competitor may act likewise with respect to its own more basic patent. The consumer or some other third party would presumably be the loser. Licensing or the exchange of licenses facilitates the conduct of business operations in the presence of adversely held patents, and third parties are enabled to share the benefits of an advancing technology. The exercise of the patent right is legally confined to the permission to or prohibition from use of the patented invention.[9]

By making advances public, the patent system facilitates further advances. Many decisions have recognized that the disclosed technical knowledge enables, if not stimulates, the public to improve technique, to invent around the previous advance. The larger the common base of technical knowledge, the greater the opportunity for inventors to strike out in new directions and toward new frontiers. Starting from this common base, companies may engage in extensive research and development programs aimed at priority in the achievement of certain goals or at profitable diversification of their activity. Furthermore, the availability of new materials, processes, and products offers opportunities for, although it does not guarantee, the

[9] The imposition of "extra-patent" restraint on competition by means of limitations in patent licenses has presented questions under the antitrust laws. See the Attorney General's Report Note 1, *supra*. 1. (p. 233) "Absent any concert or arrangement aimed at or resulting in industry-wide price fixing, most members believe that a patentee who is engaged in manufacturing and marketing the patented product may fix the prices at which his manufacturing licensee or licensees may sell. . . . sale of a patented article puts control of the purchaser's resale price beyond the patentee's power. . . . licensor cannot fix prices on unpatented products resulting from the operation of a patented process or of a patented machine, or where only part of the product is covered by patent claims. Nor can the price of an unpatented component of a patented combination be fixed. . . . Some members of the Committee believe that . . . price fixing clauses in patent licenses should be proscribed by the anti-trust laws under any circumstances" 2. Field of use, quantity, and territorial limitations are permissible. Louis B. Schwartz referring to the TNEC investigation commented that (p. 236) "there has been responsible criticism of the practice of licensing with restrictions on use, quantity or territory" 3. (p. 238) "From an anti-trust standpoint, a tying clause in a patent license is like a tying clause in any other contract" 4. (p. 239) "Non-ancillary restrictions [on the patentee] should be adjudged as if there were no patent present. . . . Package licensing should be prohibited only where there is a refusal, after a request, to license less than a complete package." (p. 240) "so long as the 'per piece' rate is not . . . disproportionate as to amount to a refusal to license less than the complete package."

establishment of new businesses.[10] As Judge Evans has well stated, the idea of "inventing around" is implicit in our patent system:

> To illustrate, an inventor brings forth an apparatus which is better and made at less cost than anything heretofore made or used in this field. All competitors are threatened with loss and perhaps ruin if an equally good product is not made and sold at prices which meet the new patented product. At once, the inventive and creative talents of competitors are aroused. They are spurred to their best efforts to produce, not nearly as good, but a better product, by a new, non-infringing method or apparatus. Thus, instead of displaying monopolistic traits, the patent fosters competition among inventors and begets new and better products at lesser costs. As a result the public is the beneficiary.[11]

FOUNDATION RESEARCH PROGRAMS

The Foundation is engaged in empirical studies which illustrate many additional ways in which the patent system serves as an instrument of "positive competition" in our economy.[12] For example, the Patent Utilization Study has shown that a

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[10] On this paragraph see Motion Picture Patents Co. v. Universal Film Mfg. Co., 243 U.S. 502 (1917). "In O'Reilly v. Morse, 15 How. 62, 121 (1853), the Court pointed out that when the patentee attempts to enlarge his grant beyond the invention, he prevents others from attempting to improve upon the manner and process which he has described in his specification . . ." There is a striking demonstration of the impetus to research provided by patents in the report of the Federal Trade Commission on antibiotic manufacturers published in 1958. At page 226 the report states that "there has been a strong impetus to research and development in the antibiotics industry as a result of the competition among rival pharmaceutical houses in the race to obtain patents on individual antibiotic products."

[11] Chicago Steel Foundry Co. v. Burnside Steel Foundry Co. (CCA 7) 56 USPQ 283, p. 288.

[12] See the following in *The Patent, Trademark, and Copyright Journal of Research and Education,* 1 (1957) and 2 (1958):

Patent Utilization (1, No. 1, June 1957, p. 74; 2, No. 1, March 1958, p. 1; 1, Conference Supplement, p. 66; 2, No. 3, Sept. 1958, p. 340; 2, Conference Supplement, 1958, p. 179).

The Value of the Patent in the United States (1, No. 1, June 1957, p. 20; 1, Conference Supplement, 1957, p. 108).

Role of Patents in the Creation and Growth of Small Industrial Units (1, No. 1, June 1957, pp. 57, 112, 119; 1, No. 2, Dec. 1957, pp. 216, 218; 1, Conference Supplement, 1957, pp. 44, 84, 134; 2, No. 2, June 1958, p. 278; 2, No. 3, Sept. 1958, pp. 363, 366; 2, Conference Supplement, 1958, pp. 51, 156).

Effects of Certain Antitrust Decrees Involving Patents as a Major Factor (1, No. 1, June 1957, p. 127; 1, Conference Supplement, 1957, p. 17; 2, No. 1, March 1958, p. 61; 2, No. 3, Sept. 1958, p. 376; 2, Conference Supplement, 1958, p. 66).

Relation of American Patents, Trademarks, and Techniques and American-Owned Foreign Patents to Foreign Licensing (1, No. 1, June 1957, p. 145; 1, No. 2, Dec. 1957, p. 220; 1, Conference Supplement, 1957, p. 128; 2, No. 1, March 1958, p. 137; 2, No. 2, June 1958, p. 181; 2, Conference Supplement, 1958, p. 131).

Taxation and Patents (1, No. 2, Dec. 1957, p. 244; 1, Conference Supplement, 1957, p. 137; 2, No. 4, Dec. 1958, p. 505; 2, Conference Supplement, 1958, p. 21).

Public Attitudes Toward Patents, Trademarks, and Copyrights (1, No. 1, June 1957, p. 159; 1, No. 2, Dec. 1957, p. 243; 1, Conference Supplement, 1957, p. 130; 2, No. 3, Sept. 1958, p. 319; 2, Conference Supplement, 1958, p. 58).

Attitudes of American Inventors Toward Defense Invention (1, No. 1, June 1957, p. 168; 1, No. 2, Dec. 1957, p. 185; 1, Conference Supplement, 1957, 130; 2, Conference Supplement, 1958, p. 198).

The Role of Patents in Executive Decisions (1, No. 2, Dec. 1957, p. 265; 2, Conference Supplement, 1958, p. 171).

surprisingly large proportion of patented inventions is used commercially. This project also indicates, that with few exceptions, patentees are willing to license; that 27% of the assigned patents in a scientifically selected sample of patents issued in three recent years (1938, 1948, 1952) have actually been licensed. These findings are vastly different from opinions that have been commonly expressed and repeated in the literature without any substantial factual foundation.

Another line of Foundation inquiry casts light on the role of patents among other factors in the creation and growth of small industrial units. These studies are designed to show, for example, the modes in which firms in different industries utilize patented inventions in their commercial activities. Although it is too early to make broad generalizations, it appears that companies acquire an increasing interest in the commercial potentialities of patents as they become larger and better established. Another illustrative finding is that, even on the fringe of industries characterized by large firms, patented inventions may provide a means for the development of vigorous companies engaged in supplying services or equipment.

Another group of Foundation studies illuminates the practical significance of certain key antitrust decrees involving patents as a major factor. These studies are designed to show to what extent such patents have influenced the structure of the pertinent industries and markets before and after the decisions.

Still another Foundation project inquires into the ways in which patents, trademarks, and unpatented techniques enter into foreign licensing arrangements. Through such arrangements many American companies have been extending the the geographic scope of their operations.

The implications of tax laws for the economic behavior of inventors and firms are also being studied by the Foundation's research staff. The taxation project is particularly concerned with the behavior and actions of individuals and companies under the Internal Revenue Code provisions and other tax law affecting, among other things, income derived from patents and inventions and expenditures for research and development.

Since little is known concerning executive decisions with respect to patents, the Foundation is developing studies in this area too. These studies are the outgrowth of an exploratory effort to ascertain the "value" of the patent system.

It is not enough to determine the modes in which inventors and business firms utilize patented inventions; it is also important to know public attitudes toward the patent system. Accordingly, the Foundation has undertaken surveys of the state of public information and opinion. One of these surveys has provided the basis for an educational program directed toward the improvement of the knowledge that young people have of procedural and other aspects of the patent system. Another survey, undertaken at the request of the National Inventors Council, has cast light on the incentives and deterrents to participation by competent American inventors in inventing for defense.

PATENTS AS "BENIGN MONOPOLIES"

Although the above remarks concentrate on the contributions to "positive competition," it is well known that patents like other forms of property can, and some-

times are, employed in a restrictive manner. It is not our purpose in this paper to elaborate this fact, which has been so extensively treated in the literature. Instead, we wish to devote the remainder of this paper to a discussion of the patent as a species of "benign monopoly," as a limiting device which nevertheless contributes to positive competition.

The growth of economic power is the result of the striving of firms for advantage and is a measure of the success of such striving. This striving will go on whether there is a patent system or not. Furthermore, it has been held that, "mere accumulation of patents, no matter how many, is not in and of itself illegal." [13] It should also be noted that the patent is often used to establish a "symbiotic" vertical relationship between large companies and small companies. In other words, large and small companies may economically supplement each other rather than jostle each other with small ones being elbowed out.[14]

Historical Background

Although patents are in the nature of "monopolies" they were conceived as instruments of positive competition even before our Constitution was adopted. The United States patent system stems from the "monopolies" conferred by the English crown [15] on certain subjects, providing these subjects with the exclusive privilege of practicing an art or making or using or selling a particular product. These monopolies were originally presented as a reward for advancing mechanical knowledge or extending the utility of natural resources. Eventually they were also

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[13] Automatic Radio Mfg. Co., Inc. v. Hazeltine Research, Inc., 339 U.S. 827, 834 (1950). With respect to the legality of various methods of acquiring patents, see Attorney General's Report, note 1, *supra*. By Grant (p. 226) "Hence, violation of the Sherman Act should, as the cases suggest, require abuse of the patent grant or proof of intent to monopolize beyond the lawful patent grants." By Purchase (p. 227) "Impropriety will arise only where such aquisition is part of an illegal purpose or plan." By Grant Back (p. 229) ". . . in determining the legality of grant backs, their purpose and effect is relevant." In the section on the "Non-Use of Patented Inventions" on page 230, the report states: "To achieve its ends, the patent system, like free enterprise, relies on the incentive to profit from using a patented invention for which there is public demand. Where these ends are deliberately defeated, there usually is present some anticompetitive design. Then non-use becomes abuse and anti-trust comes into play."

[14] See PTC J. Res. & Ed., 1, No. 2 (Dec. 1957), p. 218 and 2, Conference Supplement (1958), p. 157. Generally, symbiotic coexistence is manifested in the following two ways: 1. Small firms may work on the fringes of the activities conducted by larger industrial units. See PTC J. Res. & Ed., 1, No. 1 (June 1957), p. 112; 1, Conference Supplement (1957), p. 44; 2, No. 2 (June 1958), p. 278. 2. Large firms may license freely to small firms, encouraging them to take on new product lines. On the assistance rendered by Bell Telephone Laboratories (and Western Electric Company) to Texas Instrument, Inc. in transistor production, see R. W. Olson, "Case History: Building A New Business Via The Patent License Route," *Proceedings of the President's Conference on Technical and Distribution Research for the Benefit of Small Business,* Washington: U.S. Department of Commerce, 1957, pp. 56-59.

[15] Most authorities are agreed that there were patent systems in Italy at least as early as the 15th Century. See Prager, "A History of Intellectual Property from 1545 to 1587," 26 *Journal of the Patent Office Society,* 711 (1944).

bestowed on royal favorites in return for service to the crown and led to abuses.[16]

Some of the early cases at common law upheld monopolies of this kind only when they were granted in the public interest to introduce new inventions and new manufactures.[17] The Statute of James I [18] was specifically directed against these abuses and enacted into law the doctrines of these cases. Thus, the roots of the modern patent system were developed in an environment of individual liberty and restraint of royal usurpation.[19]

Despite this background, authorities have often debated the question as to whether the patent is a grant of a "monopoly" in the usual sense. According to one leading American scholar:

> . . . all the citizen's fundamental personal rights represent simply the State's promise to exclude other persons from the thing which is the object of the right, i.e., a grant of a

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[16] Robinson distinguishes between legal and illegal monopolies, including patents in the first category: "The monopolies created by the British crown before the statute of James I. may be divided into two great classes, which differ from each other in their legal and in their intrinsic character. To the first class belong all those which were conferred on the inventors of a new manufacture or the introducers of a new trade into the realm, and which secured to them the exclusive privilege of carrying on such trade or manufacture for a certain period of time. The second class embraces those by which the exercise of some well-known branch of industry or commerce was restricted to particular individuals or corporations, and the liberty of other subjects to employ themselves in these pursuits was correspondingly abridged. The earliest monopolies were of the former class, and were bestowed as a reward and an encouragement on those who, at their own expense or by their personal efforts, were engaged in advancing the mechanical knowledge or the commercial resources of the public. Such monopolies were always sustained by the courts, and their creation was regarded as a legitimate exercise of royal power. The crown was properly considered as the patron of deserving artisans and merchants; and the development of trade and commerce, through their enterprises and inventions, was recognized as a sufficient reason for temporarily restricting the freedom of the people. But as monopolies became more numerous, and were bestowed as a return for service or pecuniary aid rather than as a recompense for benefits conferred upon the public, the character of the monopoly itself was less and less regarded, and the oppressive privileges of the second class were freely granted. These were, however, always treated by the courts as contrary to common right and void at common law; but since no power existed by which the king could be prevented from creating them, the judges could apply no remedy except by punishing the monopolist for procuring and asserting them. In one case under Elizabeth in A.D. 1602, and another under James I. in A.D. 1614, this difference in the character and legality of these two classes of monopolies was clearly stated, and the nature of the controversy on this subject, between the courts and people upon one side and the crown upon the other, was accurately defined. [Darcy v. Allin Noy, Rep. 173; The Clothworkers of Ipswich (Godbolt 252)] The statute of James I. simply enacted into a law, which bound the sovereign, the doctrines that the courts had always maintained, and reiterated those principles of Magna Charta which declared that the liberties of the citizen were to remain forever unrestrained by royal usurpation." Robinson, p. 9. [Original footnotes have been omitted.]

[17] See note 16, case cited in brackets, *supra.*

[18] *Statute of Monopolies* 21 Jac. 1, Ch. 3. (1624). This statute declared monopolies void. One of the exceptions was "any letters patent . . . for the term of fourteen years . . . of the sole working or making of any manner of new manufactures . . . to the true and first inventor . . . which others . . . shall not use . . ."

[19] See Fox, *Monopolies and Patents* (Toronto: The University of Toronto Press, 1947), and A. A. Gomme, *Patents of Invention* (London: Published for The British Council by Longman's, 1946).

> monopoly of use of the thing; that the rights of industrial and intellectual property (patent rights and trade-marks) are herein no different from the other rights; that the other rights, as monopolies, are not for that reason looked upon with popular aspersion or disparagement, but rather are cherished; and that therefore the patent right and its associate rights should not be looked upon any differently.[20]

The question is an important one because the courts and the public look with disfavor on "monopolies."[21] These are often believed to restrict the rights of citizens and limit their liberty to compete.[22] The courts in this country, unlike early English courts, have generally been liberal toward inventors and early adopted the theory that the patent right is not quite a true monopoly because it does not involve a restriction on pre-existing public rights.[23] Our courts have, for many years, tended to depart from this liberal interpretation and to consider the patent right almost in the nature of the Elizabethan "odious" monopoly,[24] but the more recent decisions appear increasingly to reflect an appreciation of the social benefits derivable from the patent system.

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[20] Wigmore, "The Patent Monopoly," 25 *Journal of the Patent Office Society,* 687 (1943).

[21] "Monopoly is always an odious word." See Birrell, *Seven Lectures on the Law and History of Copyright in Books* (1899).

[22] Hearings before the TNEC, 76th Cong., 1st Sess., 840 (1939). "Americans generally detest monopolies in the true sense of the term because it makes possible the ruthless exercise of power. Indeed, the American Revolution was precipitated by popular resentment of the monopoly on tea held by the East India Co. It would, therefore, have been exceedingly strange if, only a few years later, the delegates sent to the Constitutional Convention by Massachusetts and the other Colonies had been willing to sanction an equivalent form of monopoly under the new government they were creating." Statement of Conway P. Coe, Commissioner of Patents.

[23] See Seymour v. Osborne, 11 Wall. 516 (1870); United States v. Dubilier, 289 U.S. 178 (1933). "An inventor deprives the public of nothing which it enjoyed before his discovery."

[24] Cuno Engineering Corp. v. Automatic Devices Corp., 314 U.S. 84 (1941); W. Huston Kenyon, Jr., "Why Challenge the Court's View of 'Invention'?" 35 *American Bar Association Journal* 480 (1949); William H. Davis, "The Impact of Recent Supreme Court Cases on the Question of Patentable Invention," 44 Illinois Law Review 41 (1949); Disposition of Patent Cases by the Courts, a letter to the Patent Bar of Chicago from Hon. Evan A. Evans, late member of the United States Court of Appeals for the Seventh Circuit, reprinted at p. 96 of the Hearings on H. R. 5248 of the 80th Congress; Graham Paper Co. v. International Paper Co., 46 F.2d 881, 885 (8th Cir. 1931); Jacuzzi Bros. Inc. v. Berkeley Pump Co., 191 F.2d 632, 634 (9th Cir. 1951); Motion Picture Patents Co. v. Universal Film Mfg. Co., 243 U.S. 502 (1917); Carbice Corp. of America v. American Patents Development Corp., 283 U.S. 27 (1931); Leitch Mfg. Co. v. Barber Co., 302 U.S. 458 (1938); J. C. Ferguson Mfg. Works, Inc. v. American Lecithin Co., 94 F.2d 729 (1st Cir. 1938); American Lecithin Co. v. Warfield Co., 105 F.2d 207 (7th Cir. 1939); Morton Salt Co. v. G. S. Suppiger Co., 314 U.S. 488 (1942); B.B. Chemical Co. v. Ellis, 314 U.S. 495 (1942); Mercoid Corp. v. Mid-Continent Investment Co., 320 U.S. 661 (1944); Mercoid Corp. v. Minneapolis-Honeywell Regulator Co., 320 U.S. 680 (1944). See also, L. James Harris, "Some Aspects of the Underlying Legislative Intent of the Patent Act of 1952" 23 *The George Washington University Law Review* (1955), pp. 658-99.

Role of Courts

Although the patent system is primarily a creature of statute in this country, the courts have played the major role in conditioning its mode of growth and development. The courts have, in reality, decided how the law would recognize and protect the patent property. This flexibility, as expressed in the cases, has modified the character of the patent system in accordance with the changing technological, economic, and social features of our society. The judges, in the final analysis, interpret the statutes and decide what the law is. In their decisions the standards established in the statutes have been interpreted and expanded.[25] These standards express, in essence, the potential benefits that the invention must afford society to be worthy of protection. If the inventor immediately practices the patented invention, an actual benefit immediately flows to society. After 17 years the invention becomes the property of the public and can be utilized without restraint. Another actual immediate benefit is the disclosure of systematically organized knowledge to the public, knowledge important enough to warrant the grant by the government of an exclusive right. This knowledge is made available to the public when the patent issues, long before the expiration of the 17-year period; and the practice of licensing the invention, furthermore, has become rather common in recent years.

Possibility of Abuse

It is clear that "monopolies" limited, like the patent, in scope and derivation are compatible with positive competition, which in our country has contributed to the achievement of an unequalled level of well-being. These "monopolies" provide opportunities for both social advance and individual profit. They may, of course, be abused, but it is the abuse which must be remedied, not the "monopoly." In the words of an eminent scholar:

> Any monopoly may be abused. But the point is that what is wrong is not the monopoly, but the abuse of it. If two or more citizens between them own all the pepper or all the molybdenum in sight, and pool their control to put up artificial prices, there is cause for remedying this abuse. So, too, for two or more patent owners. But the important thing

[25] The major criteria for patentability specifically set forth in the statutes until the Patent Act of 1952 were novelty and usefulness. The third major criterion, invention, incorporated in the statutes by the Patent Act of 1952, was originally introduced into the law by the courts in 1850. See Hotchkiss v. Greenwood, 11 Howard 248 (U.S. 1850) Sec. 103; Reckendorfer v. Faber, 92 U.S. 347 (1875); Atlantic Works v. Brady, 107 U.S. 192 (1882); The Barbed Wire Patent, 143 U.S. 275 (1891); Singer Manufacturing Co. v. Cramer, 192 U.S. 265 (1904); Eibel Process Co. v. Minnesota & Ontario Paper Co., 261 U.S. 45 (1923); Kirsch Mfg. Co. v. Gould Mersereau Co., 6 F.2d 792 (2d Cir. 1925); Paramount Publix Corp. v. American Tri-Ergon Corp., 294 U.S. (1935); Cuno Engineering Corp. v. Automatic Devices Corp., 314 U.S. 84 (1941); Marconi Wireless Telegraph Co. of America v. United States, 320 U.S. 1 (1943); Goodyear Tire & Rubber Co. v. Ray-O-Vac Co., 321 U.S. 275 (1944); In re Shortell, 31 C.C.P.A. (Patents) 1062, 142 F.2d (1944); Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327 (1945); Hutzler Bros. Co. v. Sales Affiliates Inc., 164 F.2d (4th Cir. 1947); Funk Bros. Seed Co. v. Kalo Inoculant Co., 333 U.S. 127 (1948); Jungersen v. Ostby and Barton Co., 335 U.S. 560 (1949); Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corp., 340 U.S. 147 (1950).

> nowadays, for clear thinking and correct remedy, is to distinguish—alike in the case of pepper and patents—between the original monopoly rights—which are alike in merit—and the abuse of them.[20]

The same point of view has also been pungently stated by Judge Frank in the case of *Eastern Wine Corp.* v. *Winslow Warren, Ltd., Inc.*, 57 USPQ 433 at page 436:

> There are some persons, infected with monopoly-phobia, who shudder in the presence of any monopoly. But the common law has never suffered from such a neurosis. There has seldom been a society in which there have not been some monopolies, i.e., special privileges; the legal and medical professions have their respective guild monopolies; the owner of real estate, strategically located, has a monopoly; so has the owner of a valuable mine; and so have electric power companies. No one seriously questions whether there should be some monopolies; the only question is as to what monopolies there should be, and whether and how much they should be regulated legislatively or curbed judicially.

It is important to distinguish between the patent "monopoly" as a limiting device and the manner in which it is exercised. It is the latter and not the former which determines the extent to which the patent serves as an instrument of positive competition.

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[20] See note 20, *supra*.

See also Attorney General's Report, note 1, *supra*. (p. 241) "In short, to the extent that such [multiple patent] licenses are entered into as individual licenses, and are legal as such, they may stand. To the extent that they involve horizontal agreement between the licensees, antitrust violation follows." (p. 242) [a cross-license agreement] "By itself . . . entails no antitrust problems." (p. 243) "Patent interchange ['pooling'] may thus promote rather than restrain competition . . . If created with illicit purpose, or misused, it may lead to unreasonable restraints of trade and monopolization."

The United States Patent System in Historical Perspective

H. R. MAYERS*

INTRODUCTION

THIS PAPER APPROACHES ITS SUBJECT through an examination of the action of the courts in adjudicating the validity of patents.

It is found that there have been significant and recurrent variations in the statistics of validity adjudication between 1850 and the present date. In the period before 1870, and again in the first quarter of the twentieth century, the appellate courts sustained as valid over half the patents presented to them for examination on this issue. On the other hand, during intervals in the 1890's and in the 1940's, less than 25% of the patents tested as to validity at the appellate level were upheld.

In the following there is an attempted analysis of the possible causes of these fluctuations. It is suggested that a major factor, although certainly not the only operative one, has been the variance with time of public opinion concerning the beneficence of the patent system as an economic institution.

The views put forward on the last-mentioned point are obviously neither self-proving nor inarguably proven. They are advanced as hypotheses which, if true, may have interesting implications, not only in the administration of patent programs, but also in suggesting questions as to the quantitative sensitivity of the courts to varying trends of public opinion in other areas than the patent field. Regardless of the correctness of the specific rationalization advanced, the undoubted fact of a generally cyclical fluctuation in the patent adjudication data poses a challenge for the further examination of its causes so that those concerned with the administration of the patent system and with its adaptation to its proper ends may be guided accordingly.

The rise and fall of patents in judicial favor obviously has significance for the patent owner who must decide at any given time whether to submit his patent to the arbitrament of litigation. To proceed as a patent plaintiff in a time when over 50% of litigated patents are being sustained as valid, if tested on that issue, is obviously a more encouraging prospect than similarly to proceed when the average favorable result is less than 20%. Even the undertaking of technical development in circumstances in which the prospect of enforceable patent protection would be a plus factor in justifying the contemplated expenditure, might well be affected by recognition of a current judicial trend in the respect referred to.

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These effects undoubtedly exist without regard to the reasons underlying the ups and downs of judicial attitude. Nevertheless, from the standpoint of one concerned to know what the courts are apt to do next, or what considerations are apt to determine their taking a patent-favoring action as distinguished from a patent-destroying one, some understanding of the reasons behind the historical fluctuations would clearly be helpful. The following is an attempt to contribute to such understanding.

PATENT VALIDITY ADJUDICATIONS FROM 1850 TO 1958

THROUGH the period 1850 to 1958, the action of the appellate courts on patents coming before them for determination of validity has varied radically. Appendices A and B appearing at the end of this paper present in tabular form the results of a study of the validity holdings of the Supreme Court and of the Circuit Courts of Appeals during the period referred to. Figure 1 presents the same information graphically by separately plotting against time the variance in the proportion of litigated patents held valid by the upper court in the one case and by the totality of the intermediate courts in the other.

The data concerning the Supreme Court have been derived from direct examination of the decisions of that Court. For the periods 1891 to 1915 and 1950 to 1958, this is also true as to the decisions of the Courts of Appeals. Where there has been such direct examination, the rule has been applied that a decision holding any claim of a patent valid shall be counted as favorable to the patent, even though other claims may have been held invalid and even though some or all claims may have been held not infringed. This is on the rationalization that a holding of partial validity, without more, recognizes the presence of invention in the questioned patent and promises the patentee *pro tanto* judicial protection, regardless of further holdings on collateral issues. A decision holding a patent infringed without discussion of validity has also been counted as favorable to validity on the ground that a finding of validity is implicit in such a decision. On the other hand, any decision holding a patent not infringed without specific consideration of validity has been discarded from count for the reason that no implications concerning validity are contained in this kind of holding.

Circuit Courts of Appeals figures for the interval 1915 to 1950 have been derived from secondary sources[1] whose rules of construction may conceivably have differed in minor respects from those announced above. It is believed, however, that the effect of such possible discrepancies is not great enough seriously to distort the total picture presented.

[1] Evans, *Disposition of Patent Cases by the Courts*, 24 JPOS 19 (1942); Federico, *Preliminary Survey of Adjudicated Patents*, 1929 to 1934, 18 JPOS 685 (1936); *Patents in the Circuit Courts of Appeal*, 1925 to 1936, 20 JPOS 72 (1938); Lang and Thomas, *Disposition of Patent Cases by Courts during the Period 1939 to 1949*, 32 JPOS 803 (1950).
Supplementary data not specifically utilized in this paper appears in Federico, *Adjudicated Patents, 1948-54*, 38 JPOS 233 (1936).

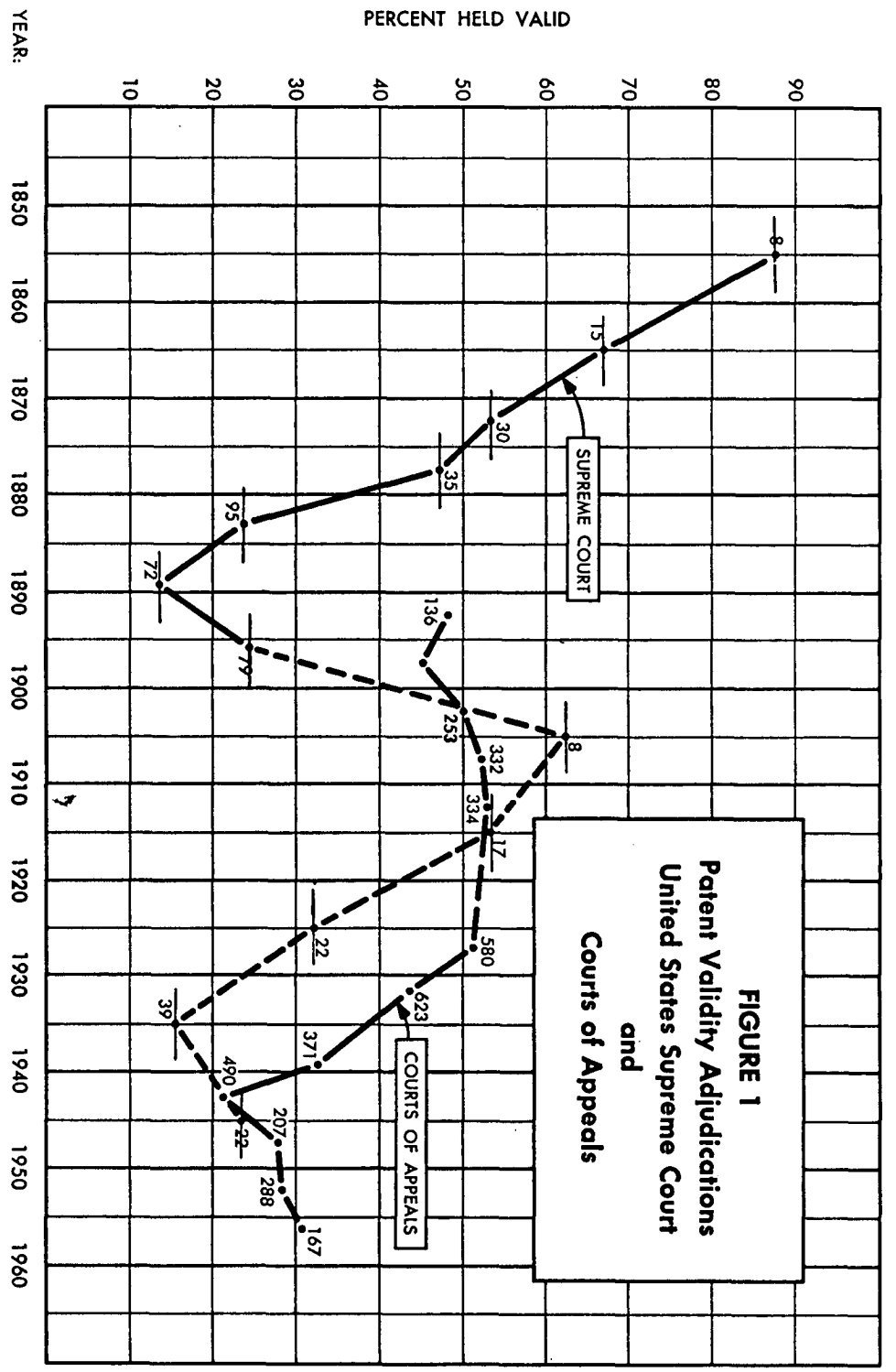

FIGURE 1
Patent Validity Adjudications
United States Supreme Court
and
Courts of Appeals

In the presentation of Supreme Court trends in Figure 1 each horizontal line intersecting the trend line shows the bracket of years over which the data has been averaged in obtaining the percentage figures actually plotted. The number above each horizontal line represents the number of validity adjudications occurring during the period in question. Intervals of five and ten years have been selected for averaging as required to provide statistical samples of sufficient magnitude to be meaningful. The special bracket 1887 to 1891 was chosen as covering the period of greatest Supreme Court antipathy to patents in the pre-1900 era.

In the presentation for the Courts of Appeals, periods of five or six years (corresponding to the source material available) have been totaled to obtain the points plotted, and each point appears at the center of the period which it represents. The number of validity determinations during the period is indicated by the figure placed adjacent to each point.

It is important to note that direct appellate jurisdiction in patent cases was vested in the Supreme Court until 1891, but that in that year such jurisdiction was transferred to the newly created Courts of Appeals.[2] Accordingly, since 1891 substantially the only patent cases which have reached the Supreme Court have done so by the discretionary path of grant of certiorari. While holdings of the Supreme Court in the relatively few patent cases which it now accepts undoubtedly exert a doctrinal influence on the courts below, it is clear that the Courts of Appeals, by virtue of their greater exposure to adjudicating opportunity, really set the day-to-day tone of the patent law.

The diminished significance of Supreme Court participation in the shaping of the patent system is reflected in Figure 1 by the dotted line representation of that court's validity decisions subsequent to 1895. The dotted line gap which occurs in the graph of Courts of Appeals cases from 1915 to 1925 recognizes that the data for that period has not been specifically analyzed either by the present author or by any of the sources from which he has drawn.

ALTERNATIVE EXPLANATIONS OF VARYING COURT ACTION

A number of possible causes for the variations shown in Figure 1 may be suggested. Those discussed in the following paragraphs are presumably the leading contenders for recognition, and each of them probably has at least some relevance. It is the thesis of the present paper, however, that it is the last factor which is to be referred to below, namely, the impact of public opinion, which is entitled to be considered the predominant cause of the fluctuations under study.

It is tempting to assume that the quality of American invention has varied with time in a pattern correlated with the disposition of patents by the courts. Considering specifically the period of increasing patent mortality in the last quarter of the nineteenth century, significance might tentatively be attached to the fact that this has been said to be a period of low scientific creativity. It would

[2] Act of March 3, 1891, 26 STAT. 826, c. 517.

appear, however, that this statement can be justified only with respect to matters of fundamental thought in the basic sciences and that it is not demonstrably true as to applied science of the kind to which patent systems are addressed.

Professor A. N. Whitehead has said that "the greatest invention of the Nineteenth Century was the invention of the method of invention."[3] Accordingly, while he was able to assert that the century "closed with one of the dullest stages of thought since the time of the First Crusade," he was addressing himself to matters of fundamental scientific insight and was obliged to add that "In every branch of science, there was effective progress, indeed rapid progress, although it was confined somewhat strictly within the accepted ideas of each branch." The realism of the rapid practical progress to which he refers is confirmed by recollection that this was, for example, the age of Edison and his great co-inventors in the electrical arts. For this reason, although the matter might benefit from more exhaustive research, it is here concluded that variance in quality of invention is not reasonably explanatory of significant shifts in court attitude toward patents.

Secondly, one could argue for the existence of radical shifts in the effectiveness of the United States Patent Office in its task of examining applications for patent and rejecting those which fail to meet an assumed absolute standard of inventiveness. Such shifts, if they have occurred, might obviously be reflected in correspondingly increasing and decreasing mortality rates of patents in the courts—assuming the latter to continue to apply a relatively constant standard. On this premise, the Patent Office would have done a good job in the middle of the nineteenth century, a poor job near its end, a good job in the first quarter of the twentieth century, a progressively worsening job subsequent to about 1925, and again somewhat improving in recent years.

This thesis is appealing and impossible fully to rebut because of the impracticability of determining in any meaningful terms the quality standards of those responsible for the patent-examining function in the indicated period of time. It is rejected, however, because of the non-discovery of any evidence to support the idea of radically varying standards and because of a conviction that the standards actually applied by the Patent Office at any time are either (1) substantially constant or (2) insofar as variable, determined by standards set by the courts in acting upon patents previously granted. If either of the foregoing grounds of conclusion is correct, it is obviously the position of the courts which is the independent variable in the situation, and this paper proceeds on the premise that this is the most plausible of the available alternatives.

The reasonableness of assuming a capacity in the court system to vary in response to external stimuli the standard of severity with which it judges patents is supported by the inherently subjective quality of the validity-determining process. Many reasons arise for rejecting a contested patent as invalid and some of these,

[3] Alfred N. Whitehead, *Science and the Modern World* (N.Y.: Mentor, 1948), p. 98.

such as proof of identical anticipation, involve objective tests which provide no substantial opportunity for judicial discretion. Others, however, and these are the ones that prevail in the preponderant number of cases, involve concepts such as "lack of invention" and "improper claiming" which are wholly without fixed metes and bounds and which allow full play for the courts momentary inclinations for or against patents and patent-holders. If, in the aggregate of all courts, these inclinations are variable with time, then corresponding shifts in the average outcome of patent cases may be anticipated. It is here proposed that such variability of predilection exists, and that our main problem is to find the causes of variation which constitute the underlying reason for the cycling of the patent litigation data.

THE INFLUENCE OF PUBLIC OPINION

A first statement of the main hypothesis of this paper might be that the action of the courts with respect to patents is a reflection of public opinion toward business. However, when an attempt is made more closely to visualize the public opinion referred to, it is quickly recognized that this is an oversimplification. As one writer[4] has noted:

> There is, then, not one public, 'the public' of the politician, nor are there several publics, but literally an infinite number of publics in any country.

And further,

> For the purpose of analysis of public opinions as they relate to political dynamics, we may safely interest ourselves only in the publics which are large enough and cohesive enough to manifest their interest in politically significant action.

We move, therefore, to the restatement that when a politically influential segment of the public comes to distrust business in its role of supplier of technical products, that distrust will reflect itself in increased reluctance of the courts to sustain patents.

Why should distrust of business as supplier of technical products involve a reaction adverse to patents? The answer lies in the fact that patents are quite correctly regarded by the public and the courts as valuable franchises given to their holders to induce more effective performance in originating and producing technical goods. Where, as is ordinarily the case, the patent-holder appears in court as a manufacturing corporation and where, as in the case we are assuming, he already stands accused of dereliction in performance of the goods-supplying function, a cold reception may be anticipated.

The concordance of these suppositions with reality needs to be tested in connection with the two principal inflection regions of the validity determination curve—that centering around the year 1890 and that comprising the span from 1930 to 1958. In a previous paper[5] the author has marshalled the considerations

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[4] Marbury B. Ogle, *Public Opinion and Political Dynamics* (Boston: Houghton Mifflin Co., 1950), p. 44.

[5] *Patents and Public Opinion*, 55 General Electric Review 48 (1952).

which seem to him relevant and reasonably satisfying as to the effectiveness of changes in public attitude in molding the approach of the courts toward patents during the depression of the 1930's and in the post-depression years. Briefly stated, they include (1) the recognized disposition of the general public to make organized business the whipping boy of the recession[6] (2) the conversion of this tendency into a generalized suspicion of business objectives and contributions in a declining economy (3) reflections of this suspicion in mounting hostility toward patents, viewed as an instrumentality of business[7], and (4) a demonstrably concurrent reversal of these trends as a result of the contributions of manufacturing companies to the winning of the war and to establishment of a period of post-war prosperity (see Figure 1 for the patent side of the last-mentioned development). It is proposed to devote the following primarily to examination of nineteenth century events to determine whether these equally sustain a causal connection between opinion-influencing developments and the fate of patents in the courts. A critical interval to be scrutinized is that of 1850 to 1890, which, like the 1925 to 1940 period, saw a markedly unfavorable judicial trend with respect to patents.

During the 40 years in question, the most cohesive and articulate political force in the country was undoubtedly the farm group, then still representing nearly 50% of the national population. In examining retrospectively the probable viewpoints of this group concerning business as a producer of technical goods, it needs to be recalled that in the last half of the nineteenth century an outpouring of farm-oriented inventions radically transformed the practices of agriculture. This period saw the development of the reaper, the mower, the grain drill, the threshing machine, the twine binder, and many other devices the use of which became increasingly indispensable to the competitive practice of farm husbandry. But the period also saw the development of important agricultural equipment concerns, all largely founded upon inventions[8] and commonly addicted to the use of patents for purposes of price maintenance.[9]

It is finally necessary to recall that the years 1870 to 1897 saw progressive

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[6] "It may be hard for younger men of the present day to realize the degree to which business confidence and prestige were shaken by the events of 1931 to 1933." Cochran, *Business and the Democratic Tradition*, 34 Harv. Bus. Rev. 39 (1956).

[7] "There are practices which most people believe should be ended. They include (among other things) the use of patent laws to enable larger corporations to maintain high prices and withhold from the public the advantages of the progress of science." Message of President Roosevelt to Congress, January 3, 1938, *Public Papers and Addresses of Franklin D. Roosevelt* (N.Y.: Macmillan, 1941). VII, 10. See also Kane, *Patentable Invention and Our Political Economy*, 32 JPOS 89 (1950).

[8] "Invention of harvesting implements was not confined altogether to the machine-shop of the industrialist between 1855 and 1885. In fact, the half-dozen most significant of the hundreds of patents for improvements in self-raking reapers, harvesters and binders during these years were granted to farmers or small-town mechanics. Nevertheless, the control of the inventions tended quickly to gravitate to the big manufacturers." William Thomas Hutchinson, *Cyrus Hall McCormick* (N.Y.: Century Co., 1930), II, 362.

"One who seeks to trace the rise of the harvesting-machinery industry in the United States must discuss at some length the never-ending patent war of the years following 1855. . . . From the standpoint of money involved, energy and time expended, interests at stake, and results for the future, this phase of the history of the business is second to none." *Idem*, p. 366.

[9] Cf., Bement v. National Harrow Co., 186 U.S. 70 (1902).

deterioration in the purchasing power of the farmer brought about by post-Civil War depression[10] and a decade of drought and unfavorable weather extending from 1886 through 1896.[11] Farm difficulties were enhanced by the fact that the wages of unskilled labor were relatively unaffected by the downward pressures which controlled the farmer's price structure.[12] Accordingly, the relative position of the farmer sank discouragingly.

For these reasons it is not surprising to be told that:

> Farmers complained that their costs were too high and the prices too low. They attributed these conditions to the greediness of those in the price-and-market system with whom they had most immediate contact: the mortgage lender, so they argued, charged arbitrarily high interest rates; the railroad high transportation rates, and the merchant high prices for machinery and equipment.[13]

In the area of its concern with the prices of machinery this complaint unquestionably directed itself against the producers of such machinery, and under the conditions of patent dominance then prevailing necessarily had in it specific elements of protest against the operations of the patent system.

One student of the period[14] has reported as follows:

> During the eighties there spread over the southern and western section of the country another great farmer's organization, known as the National Farmers' Alliance, which by 1890 claimed a membership of between three and four million farmers. Several hundred thousand farmers were also organized in a Northwestern Farmers' Alliance. These organizations demanded, among other measures, government regulation of railroads and restriction of patent rights.

An analyst of the sources of nineteenth century antitrust developments, after describing agrarian resentment against the tariff, adds:

> Not appreciably less bitter was the farmer's complaint against misuses of the patent system. Patents approaching expiration were extended by fake or insignificant improvements, he felt, thereby perpetuating legal monopolies in a manner never intended by the legislator. Severe criticism was leveled at the careless issuance of patents for devices which had long been in public use.[15]

Another writer concerning the period in question mentions the probable effectiveness of the rural constituency in persuading Congress to refuse Cyrus McCormick's petition for extension of his basic reaper patent.[16]

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[10] The depression which began in 1873 is thought by some to have exceeded in severity even that of the 1930's. After two and one-half years of steadily declining business activity, nearly three more years elapsed before a significant upturn occurred. Even this failed to benefit the farm community in a proportionate fashion.

[11] Thomas Cochran and William Miller, *The Age of Enterprise* (N.Y.: Macmillan, 1942), p. 218.

[12] *Idem*, p. 261.

[13] Samuel P. Hays, *The Response to Industrialism: 1885-1914* (Chicago: U. of Chicago Press, 1957), p. 28.

[14] Jones, *Historical Development of the Law of Business Competition*, 36 Yale L.J. 216 (1926-27).

[15] Hans B. Thorelli, *The Federal Antitrust Policy* (Baltimore: Johns Hopkins Press, 1955), p. 62.

[16] "Farmers became more and more vocal against patent-extensions on agricultural machinery as the years passed. . . . It is difficult, if not impossible, to prove that political pressure from the rural constituencies of many members of Congress led to a policy in regard to McCormick of compliment *(sic)* and refusal to support. But certainly this is the most obvious and likely explanation of his failure to win his long fight." Hutchinson, *Cyrus Hall McCormick*, I, 299.

Admitting any degree of judicial sensitivity to the outcries of politically potent groups, pressures described above as having been exerted by the farm community on the legislative front must almost inevitably have resulted in greater severity of the courts in their approach to patent claims. The data concerning patent adjudications indicates that this was in fact the case. Figure 1 shows a continuous downward trend in patent-favoring decisions from 1870 to 1890.

It remains only to point out that 1896 was followed by a long period of favorable weather developments which, combined with other factors, including the incidence of a world war, made the first two decades of the twentieth century an era of relatively high prosperity for the American farmer. This undoubtedly assuaged his bitterness against business institutions and very probably substituted for it a feeling of general satisfaction with the total working of the economic structure.[17] This course of events, coupled with the concurrent absence of any other politically cogent force inclined to be specifically and continuously critical of business enterprise ought, according to hypothesis, to have improved the status of patents in the courts. This is precisely the result that seems to have followed. The data concerning Supreme Court and Court of Appeals validity holdings (Figure 1) clearly evince a more favorable approach to patents after the turn of the century than that which prevailed before 1900.

DECISIONAL EVIDENCE OF EVOLVING JUDICIAL SENTIMENT

Where a philosophical generalization appears in a Supreme Court decision without attendant repudiation in a concurring or dissenting opinion, there is a basis for assuming that it represents a viewpoint reasonably congenial to a majority of the Court. On this premise, a survey of the Court's decisions from 1840 to 1900 yields acceptable evidence of a shifting judicial sentiment concerning patents consistent with the argument of this paper.

In *Wilson v. Rousseau,*[18] decided in 1846, there was a determination, dissented from by one justice, that the right to extension of a patent does not inure to the benefit of assignees under the original patent. In spite of their differing conclusions as to the point in issue, the majority and dissenting opinions concurred in describing in laudatory terms the policy consideratons underlying the concept of an extendible patent. The general bias of the Court may be gauged from the following excerpt from the dissent:

> To be liberal, then, in the protection of patentees, is only to be just towards the rights of property. To stimulate them in this and other ways to greater exertions of ingenuity and talent is to increase the public wealth, and hasten the progress of

[17] "Up to 1929 businessmen shared an increasing confidence in the future of America as they conceived it. While they had been under attack in the early part of the century from socialist groups and from progressives in both major parties, the criticism had spent itself and subsided. Meanwhile, business successfully weathered the panic of 1907, and was raised by war orders from the depression of 1914. 'Back to normalcy in 1920' meant to business a return to the ideas of McKinley with the approval of the American people." Cochran, *Business and the Democratic Tradition,* 34 Harv. Bus. Rev. 39 (1956).

[18] 45 U.S. 646.

> practical improvements, as well as of science. And to discountenance encroachments on their rights, and defeat piracies of their useful labors, is calculated in the end to better the condition of every rank in society, and introduce wider and faster all the benefits of a superior state of civilization and the arts. (p. 709)

Similar sentiments concerning the beneficent attributes of the patent system seem to have dominated the Court in its 1870 decision in *Seymour v. Osbourne*[19] in which five patents relating to reaping machines were sustained. Mr. Justice Clifford prefaced his opinion by the following remarks:

> Letters patent are not to be regarded as monopolies, created by the executive authority at the expense and to the prejudice of all the community except the persons therein named as patentees, but as public franchises granted to the inventors of new and useful improvements for the purpose of securing to them, as such inventors, for the limited term therein mentioned, the exclusive right and liberty to make and use and vend to others to be used their own inventions, as tending to promote the progress of science and the useful arts, and as matter of compensation to the inventors for their labor, toil, and expense in making the inventions, and reducing the same to practice for the public benefit, as contemplated by the Constitution and sanctioned by the laws of Congress. (p. 533, 534)

Twelve years later, however (and was it or was it not a reflection of rising public antipathy?), a measure of skepticism in the Court revealed itself in *Brady v. Atlantic Works*[20] through the often-quoted dictum of Mr. Justice Bradley concerning the patent laws that:

> It was never the object of those laws to grant a monopoly for every trifling device, every shadow of a shade of an idea, which would naturally and spontaneously occur to any skilled mechanic or operator in the ordinary progress of manufacture. Such an indiscriminate creation of exclusive privileges tends rather to obstruct than to stimulate invention. It creates a class of speculative schemers who make it their business to watch the advancing wave of improvement, and gather its foam in the form of patented monopolies, which enable them to lay a heavy tax upon the industry of the country, without contributing anything to the real advancement of the arts. It embarrasses the honest pursuit of business with fears and apprehensions of concealed liens and unknown liabilities to lawsuits and vexatious accountings for profits made in good faith. (p. 199)

And in 1891, when, as Figure 1 shows, the prospects of patent owners reached an all-time low, the following language appeared in the first[21] of a series of four decisions, each titled *Pope Mfg. Co. v. Gormully* and each strongly unfavorable to the position of patentee-plaintiff:

> It is as important to the public that competition should not be repressed by worthless patents, as that the patentee of a really valuable invention should be protected in his monopoly. . . . (p. 234)

The fourth of the *Gormully* decisions[22] found a specific application for this viewpoint in invalidating two patents, of which it said:

> Indeed, the objects of these patents, and the same remark may be made of all, or nearly all, involved in these suits, seems to have been principally to forestall competition, rather than to obtain the just rewards of an inventor. (p. 260)

The quotation of casual excerpts is obviously subject to the danger of undue selectivity, and there is little doubt that exhaustive research would turn up

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[19] 78 U.S. 516.
[20] 107 U.S. 192 (1882).
[21] 144 U.S. 224.
[22] 144 U.S. 254.

contemporaneous pronouncements not as clearly indicative of unidirectional evolution of judicial viewpoint as those given above. It is believed, however, that the deprecatory language of *Pope v. Gormully* would have been anachronistic in either 1850 or 1870, and that its appearance in 1891 is a true reflection of a modification in public viewpoint which had developed in the intervening years.

SOME SECONDARY NINETEENTH CENTURY FACTORS:

THE REISSUE ERA AND THE CREATION OF THE COURTS OF APPEAL

A factor which provably increased the extent of the Supreme Court's invalidation of patents in the period 1880 to 1895 was the rapid growth of the reissue practice in the preceding decades.

The Court had initially endorsed the procedure of applying for reissue of a patent found to be defective in some respect as consistent with "that sense of justice and of right . . . which pleads strongly against depriving the inventor of the compensation thus solemnly promised because he has committed an inadvertent or innocent mistake."[23] Based on this view of the reissue patent as a beneficent device, it sustained a high proportion (over two-thirds) of the reissues coming to its attention in the period 1850 through 1874.

Thus encouraged, counsel for patent owners quickly adopted the practice of reissuing patents freely, generally with the object of enlarging claims to encompass competitive products not within the scope of the patents as originally drawn. The abuse of this procedure became notorious, and beginning in about 1880, the Supreme Court set about destroying the Frankenstein monster which it had, in effect, created.

In the 15 years commencing in 1880, the Court sustained only one of 49 reissue patents brought before it on the issue of validity, the common basis of invalidation being that the reissue did not pertain to the same invention as the original patent. The net effect of this almost universal repudiation of reissue patents upon the validity statistics of the period was greatly to exaggerate a trend already made unfavorable by causes discussed above. This effect is established by Appendix C and is presented graphically in Figure 2.

In Figure 2 the solid line shows validity data for original (unreissued) patents and the dotted line presents comparable information for reissues. The numbers appearing adjacent to the two curves represent the number of patents adjudicated in each five-year period. It is significant that for the years 1860 to 1879 the reissue figures are actually more favorable (from the patentee's standpoint) than are those for original patents. After 1880, however, the relationship is reversed, and it is clear that reissue adjudications are in part explanatory of the extremely low dip in the totalized Supreme Court validity statistics pictorially illustrated in Figure 1 at the outset of this paper. It is important to note, nevertheless, that

[23] Grant v. Raymond, 31 U.S. 218 (1832).

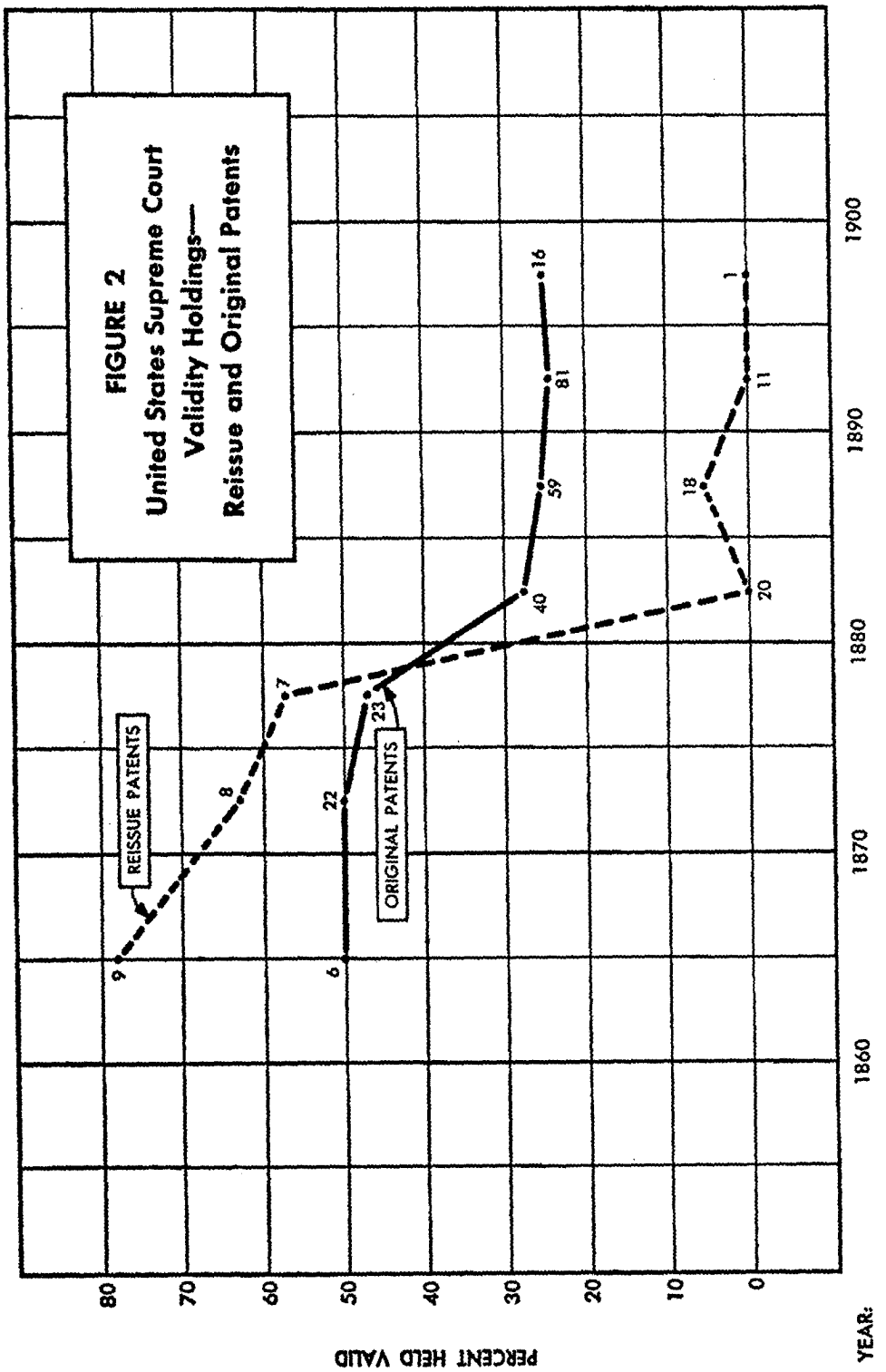
FIGURE 2
United States Supreme Court
Validity Holdings—
Reissue and Original Patents
REISSUE PATENTS
ORIGINAL PATENTS
PERCENT HELD VALID
YEAR:
80
70
60
50
40
30
20
10
0
1860
1870
1880
1890
1900
9
8
7
6
22
23
40
59
81
16
1
11
18
20

the solid line of Figure 2 shows a downtrend with respect to decisions concerning original patents which in itself is enough to establish the existence of a patent-depreciating force quite independent of the reissue story. This force the present paper ascribes to public opinion for reasons stated above.

After 1895, the number of reissue cases reaching the courts rapidly subsided, due presumably to the adoption of more salutary reissue practices consistent with the views expressed in the decisions of the 1880's. From 1900 onward, decisions involving reissue patents are both relatively few in number and generally consistent with original patent decisions in their outcome.

In 1891, the Circuit Courts of Appeals were established[24] to relieve the Supreme Court of parts of its appellate burden. Direct appellate jurisdiction in patent cases was included in the cognizance of these newly formed courts, and from 1891 forward, the shaping of the patent law has been predominantly in their hands. While granting of certiorari in appropriately selected cases has enabled the Supreme Court to exert a continuing influence, that influence has been so random and evanescent that the freedom of the Circuits to develop their own philosophies of validity determination can hardly be doubted. For this reason the curve of Circuit Court determinations (Figure 1) is of predominant interest to students of the patent system for the period after 1895. It is significant, however, that even for this period there is general consistency of configuration as between the curves which respectively measure the actions of the two judicial levels.

There are interesting questions posed by the considerable contrast between the relatively favorable action of the Circuit Courts toward patents in the first years of their being and the highly unfavorable action of the Supreme Court in the immediately preceding interval. Between 1886 and 1891, the high court had rejected 87% of the 72 patents which it adjudicated as to validity. The Circuit Courts of Appeals on the other hand sustained nearly 50% of the first 136 patents to come before them on the same issue.

Explanation for this contrast is not easy to achieve and undoubtedly involves many factors. It is to be noted, however, that the curve of Supreme Court cases was already signaling some upturn in favorable judicial sentiment toward patents, and the causes of this, whatever they were, may have had even greater impact on the lower courts. Assuming, as this paper has suggested, that public opinion exercises a controlling influence in such matters, it is entirely plausible that a burgeoning change in public viewpoint may have been more prompt in reaching the ears and minds of circuit judges distributed throughout the country than in reaching the isolated sanctuary of the Supreme Court.

There is also basis for interesting speculation as to significance in the observation that the initial disposition of the Circuit Courts to sustain their district courts on patent issues suffered a marked change within the first five years of existence

[24] Act of March 3, 1891, 26 STAT. 826, c. 517.

of the higher courts. This is shown by Figure 3, which presents the percentages of affirmation of validity adjudications for the years 1891 through 1899. It will be noted that from an initial affirmance of 85% in 1891 there was steady decline to an affirmance of only 50% in 1898.

The suggestion which may be derived from these data is that the Circuit Courts started with a preternaturally strong disposition to presume the correctness of prior determinations, including, for example, the correctness of Patent Office findings of patentability. As their own standards of value evolved, on the other hand, the earlier presumptions may have seemed less binding.

PATENTS AND THE ANTITRUST LAW

It would be of interest in the present context to consider what other major political developments in the United States might be correlated or compared with developments in the patent field. However, because of practical limitations, it is proposed to examine from this standpoint only the development of the antitrust law, this being an area which in recent years at least has had an observable overlap with the evolution of the patent law.

The fact that passage of the Sherman Act in 1890 coincides roughly with the first point of major severity in the action of the courts with respect to patents suggests prima facie a correlation between the forces producing the two phenomena. Such a correlation probably existed, but as will be pointed out later, its discovery affords no basis for inferring a continuing parallelism between anti-patent developments and antitrust developments in all manifestations of the latter. This is particularly true with respect to the effect of public opinion on the two lines of development.

Just as there are an infinity of "publics," so any given "public" may hold a variety of opinions—and frequently about the same subject. Thus, the authors of a report derived from an opinion survey conducted in 1950 observe the following:

> Differences in opinion among segments of the population on these issues [profits, wages, relations, efficiency] are common and individual respondents themselves often express both pro and con attitudes toward big business on various sub-issues.[25]

Accordingly, "public opinion," broadly viewed, may at any given time be producing a variety of political effects, some cumulative, some divergent, depending upon the particular concerns and biases from which they spring.

As to the pre-1890 situation, researchers have encountered great difficulty in tracing into roots of public sentiment the proposal and passage of the Sherman Act. A recent authoritative writer[26] has summarized his conclusions as follows:

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[25] Fisher and Withey, *Big Business As People See It*, The Survey Research Center Institute for Social Research (Ann Arbor: University of Michigan Press, 1951), Introduction, p. viii.

[26] Thorelli, *The Federal Antitrust Policy* (Baltimore: The Johns Hopkins Press, 1955), p. 162.

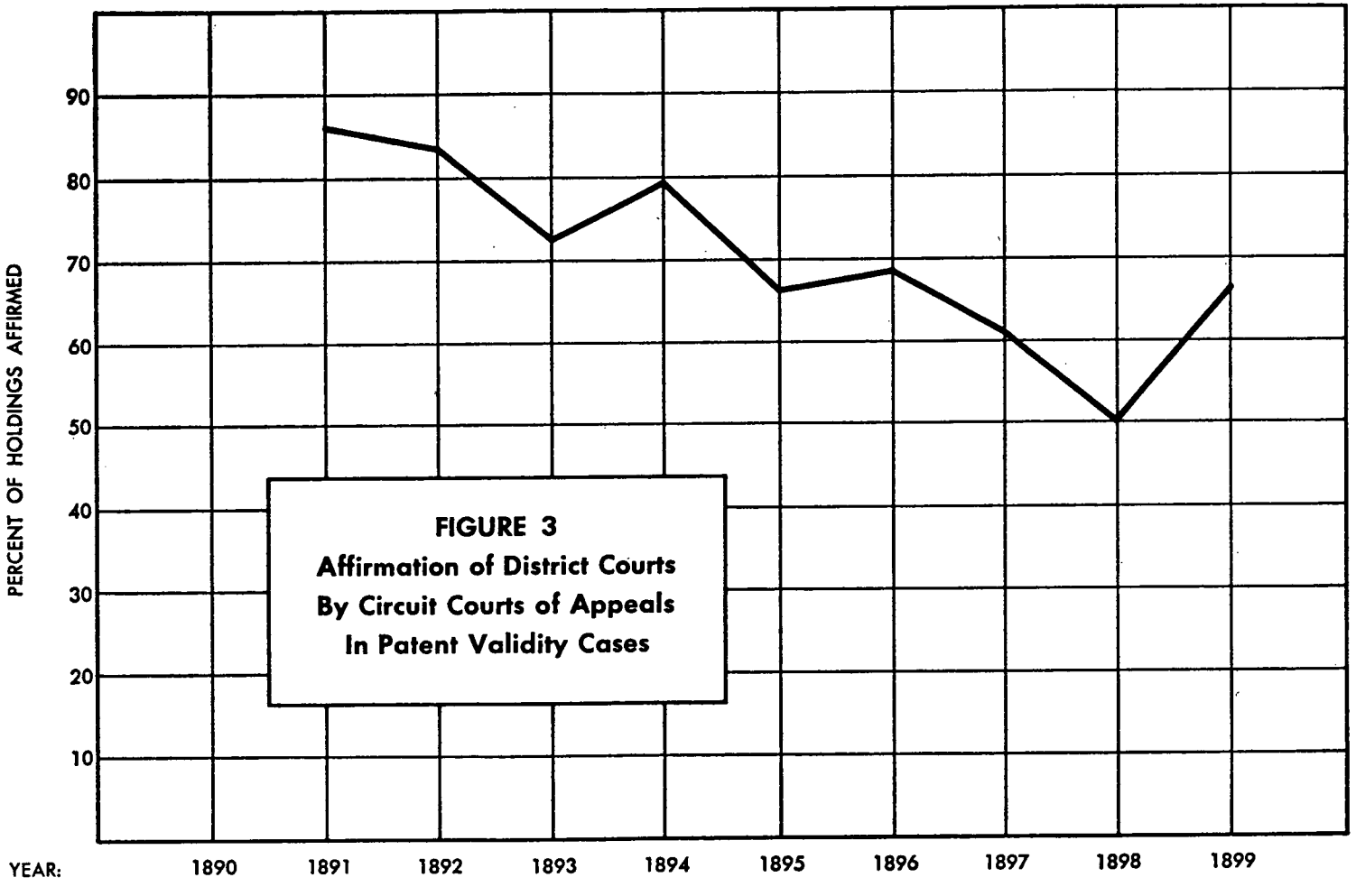

FIGURE 3
Affirmation of District Courts
By Circuit Courts of Appeals
In Patent Validity Cases

> [Clark][27] . . . is deeply convinced that opposition, if widely dispersed, was not very pronounced and that the passage of the Sherman law was due rather to tactical considerations of partisan politics than to a popularly conditioned determination of legislators effectively to solve the trust problem. Most of the materials presented by the 'Clark school' as well as by authors representing the traditional view [i.e., of popular demand for antitrust legislation] have been discussed and a host of primary and secondary sources not drawn upon by earlier writers analyzed. Yet owing to the inconclusiveness of reasonably accessible data the author is unable to make an evaluation of public opinion which would be at once definite and precise. In the light of the present study it is beyond question, however, that Clark underestimated both the strength and the deeprootedness of anti-monopoly opinion. Conversely, this study hardly sustains Oswald W. Knauth and other representatives of the traditional school of thought. Thus, it seems probable that the truth of the matter—as not unoften happens—lies somewhere between the two extremes. In any case, it would seem that public concern, as conditioned by developments in the economic, social, constitutional and political fields, at the end of the 1880's had become serious enough to make federal action against the trusts a clear desideratum, if not an absolute necessity.

It can hardly be doubted that the farm community in its position of continuing relative depression had adequate psychological motivation to press its political representatives (whether judicial or legislative) to curb any powers of the manufacturing corporations which enhanced the latter's ability to maintain prices. Citation has already been made of the farmer's three-pronged complaint against the money market, the railroads, and the manufacturing community with respect to the unfavorable price-cost trends encountered in the last third of the nineteenth century. These considerations probably justify a conviction that whatever major forces were pressing for antitrust regulation just prior to 1890 were in a position and frame of mind to exert similarly directed pressure against the patent institution. As to the events of the succeeding two decades, however, a different line of reasoning is indicated.

These decades saw, of course, the so-called Roosevelt trust-busting crusade and the Wilson-guided legislation which resulted in the Clayton Act and the Federal Trade Commission Act. On the other hand, they also saw a period of general business optimism, and in most important contrast to the pre-1900 era, a condition of continuously favorable farm prices. Under these conditions, a rationalization of improving judicial attitudes toward patents has already been presented based upon general satisfaction with business as an effective producer of technical goods at prices acceptable to politically dominant segments of the public. It remains to examine whether this rationalization is incompatible with observed developments in the antitrust field, gauged in terms of correlation with the forces of public opinion working in both fields.

Politically, one of the most portentous occurrences of the turn-of-the-century years was the acute intensification of the merger movement. Thus, it has been noted that by 1893 only 12 large corporate aggregates, with a total capital of less than a billion dollars had emerged from all the organizational activity of the previous two decades. In contrast, by 1904, 11 years later, there were no fewer than 318 major industrial combinations—one of them United States Steel Corporation with a capitalization of $1,400,000,000.[28] This development could hardly

[27] Clark, *The Federal Trust Policy* (1930).
[28] Cochran and Miller, *op. cit.*, p. 190.

have been ignored by any political leader with the slightest philosophical concern with major economic trends—regardless of the state of overt public opinion. Clearly, both Theodore Roosevelt and Woodrow Wilson were men with such a concern.

Of Roosevelt in particular it has been said that "beyond any other man of his time . . . [he] had the capacity of speaking the public judgment on public issues even before it was fully formed. And no more had he spoken this judgment than in a surprising number of instances he was already in the midst of formulating, or even executing a public policy in accordance with it."[29] In spite of his reputation as a "trust-buster," Roosevelt's position on antitrust is a somewhat ambiguous one and can even be construed as a repudiation of the public viewpoint which resulted in passage of the Sherman Act. Thus, in his first message to Congress he said concerning growth of corporate enterprises:

> The process has aroused much antagonism, a great part of which is wholly without warrant. It is not true that as the rich have grown richer the poor have grown poorer. On the contrary, never before has the average man, the wage-worker, the farmer, the small trader, been so well off as in this country and at the present time. . . . Much of the legislation directed at the trusts would have been exceedingly mischievous had it not also been entirely ineffective.[30]

Consistent with this viewpoint, it has been suggested[31] that Roosevelt's activity in pressing the *Northern Securities* case[32] and others which occurred during his administration was not so much to enforce the Sherman Act as to establish beyond question the power of the Federal Government to act in the area in which that law purported to act. His views as to the nature of the optimum action to be taken leaned more in the direction of regulation by commission than toward prohibitive legislation such as the Sherman Act represented.

In any event, there is nothing in the occurrences of the Roosevelt regime inconsistent with the assumption of a condition of public opinion generally content with performance of the business enterprise as a fair-price supplier of technical goods—the postulated special touchstone of patent-favoring tendencies. Assuming a continuing underlying concern with corporate business as a wielder of excessive over-all power, there is abundant evidence that such concern can (although it is not inevitable that it does) coexist with preponderant satisfaction with business in its more specific roles.[33] While concern with corporate power may at certain times override all other viewpoints and demand restrictive action at all possible points of power application—including, on this premise, the exercise of patent power—it may alternatively take a much more specific direction, such as resistance to merger trends. To the extent that the activities of the first Roosevelt must be

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[29] Pinchot, *Theodore Roosevelt, State Papers As Governor and President: 1899-1909* (The Work of Theodore Roosevelt Series, Nat. ed. 1926), Vol. XV.

[30] *Messages and Papers of the Presidents,* "Theodore Roosevelt, Message to Congress, Dec. 3, 1901" (Bur. of Nat. Literature, Inc.), Vol. XV.

[31] Thorelli, *op. cit.,* Note 28, *supra.*

[32] 192 U.S. 197 (1904).

[33] Cf. Fisher and Withey, *Big Business As the People See It,* Institute for Social Research (Ann Arbor: University of Michigan Press, 1951).

ascribed to public pressures, it is suggested that they were pressures of the specific rather than the generalized kind and not in any way inconsistent with the non-existence of forces hostile to the functioning of the patent system in the area of corporate enterprise.

Many of the same arguments could be adduced as to the non-relevance of Wilsonian antitrustism to the public opinion concept of patent trends. Clearly, Wilson was a leader of or even deviant from public opinion rather than its pliant tool. The fact of his election in 1912 by a mere 42% proportion of the popular vote (i.e., as a result of the Taft-Roosevelt contest) precludes any assumption that he considered himself guided by a universal public mandate in his ensuing administration. His unswerving loyalty to his League of Nation concepts in the face of mounting evidence of public repudiation argues his preference for principle over political expediency and consequently his lack of insistence upon public opinion pressures as a prerequisite to action. Finally, there is evidence that he interpreted his own views on antitrust in a way entirely compatible with underlying respect for corporate business in its contemporary discharge of its creative role.[34] This latter viewpoint, if accepted, would of course support the premise of this paper that during the Wilsonian era and its aftermath, business had the benefit of a general sentiment favorable to the maintenance of profit incentives, including the incentive of enforcement of reasonably sustainable patent claims.

CONCLUSION

A fact not subject to question is that in the last century there have been major and recurrent fluctuations in the tendency of the courts to invalidate patents. These fluctuations have been far too great to be attributable to chance or to purely statistical considerations. They must, therefore, have quite definite underlying causes.

The intention of this paper has been to explore the hypothesis that a principal reason for the observable variations in judicial action concerning patents has been an antecedent shifting of ground roots opinion concerning organized business as an effective and efficient producer of technical goods, made available at reasonable cost. The argument has been that in periods of high satisfaction with the performance of industry there has been no popular reluctance to reward innovating activity in appropriate ways, including assurance of reasonable patent protection. Conversely, in periods of dissatisfaction with the functioning of business as a supplier of reasonably priced goods, popular sentiment has tended to demand curtailment of its special franchises, rewards and perquisites. Sensitivity of

[34] Wilson's concern with antitrust in a specific sense, as distinguished from hostility to successful enterprise as such, is suggested by the following quotation from a book of his authorship:

". . . a trust is an arrangement to get rid of competition, and a big business is a business that has survived competition by conquering in the field of intelligence and economy." *The New Freedom* (Garden City: Doubleday, Page & Co., 1914), p. 165.

judges to these tides of general opinion has been reflected in variances in the severity of their attitude toward patent claimants.

It is believed that the evidence brought forward is enough to impart more than mere plausibility to the theory offered. Good correlation is found between the data on patent validity determinations and the historically determinable attitudes of influential public groups toward industrial manufacturers. There is enough reflection of the latter in the specific pronouncements of judges to show a causal connection. The main premise of the paper seems reasonably established.

On the other hand, it is arguable that not enough attention has been given to the possibility of other dominant causes of the effects under study. The suggestion that there have been cyclic variations in the level of American inventiveness has been rejected more because of failure to discover any evidence supporting the suggestion than in the light of evidence rebutting it. Rationalizations of the observed course of events in addition to those discussed can perhaps be conceived. If the present paper shall provide the starting point of a further search for the basic causes of the interesting judicial phenomenon which prompted it, it will have served its purpose.

APPENDIX A

SUPREME COURT VALIDITY DETERMINATIONS
1850 TO 1950

PERIOD	NO. OF PATENTS ADJUDICATED AS TO VALIDITY	NO. HELD VALID	PERCENT HELD VALID
1850-59	8	7	87.5%
1860-69	15	5	66.7
1870-74	30	16	53
1875-79	35	17	47
1880-86	95	22	23.2
1887-91	72	9	13
1892-99	79	19	24
1900-09	8	5	62.5
1910-19	17	9	53
1920-29	22	7	31.8
1930-39	39	6	15.4
1940-49	22	5	22.7
1950-57	2	0	0

APPENDIX B

COURTS OF APPEALS VALIDITY DETERMINATIONS
1891 TO 1957

PERIOD	NO. OF PATENTS ADJUDICATED AS TO VALIDITY	NO. HELD VALID	PERCENT HELD VALID
1891-94	136	65	48%
1895-99	253	114	45
1900-04	253	126	50
1905-09	332	173	52
1910-14	334	177	53
1915-24	(Data Not Available)		
1925-30	580	292	50.4
1929-34	623	273	43.9
1936-41	371	121	32.6
1940-44	490	106	21.6
1945-49	207	57	27.6
1950-54	288	80	27.8
1955-57	167	51	30.5

APPENDIX C

SUPREME COURT VALIDITY HOLDINGS RESPECTING
REISSUE AND ORIGINAL PATENTS

1860 TO 1900

PERIOD	REISSUE PATENTS ADJUDICATED	PERCENT VALID	ORIGINAL PATENTS ADJUDICATED	PERCENT VALID
1860-69	9	78%	6	50%
1871-74	8	62.5	22	50
1875-79	7	57	28	47
1880-84	20	0	40	27.5
1885-89	18	5.6	59	25.5
1890-94	11	0	81	23.4
1895-99	1	0	16	25

Guides to Foreign Licensing

J. N. BEHRMAN*

SINCE THE INCEPTION OF THE FOUNDATION'S project on foreign licensing, there has been a growth of materials on the pitfalls and successful approaches to the international transfer of proprietary rights and technical skills. Most of these have been in the nature of "guides" to business policy, presented in speeches and short articles in trade journals. Recently, however, two extensive volumes have been published by experts in the field, Joseph S. Cardinale and Lawrence J. Eckstrom, which synthesize and collate existing knowledge on the techniques and problems of foreign licensing to a degree not before available.[1]

A third volume relating to international transfers of business skills resulted from a study for the International Bank for Reconstruction and Development made by J. S. Fforde.[2] The study was the result of personal interviews with British companies which were providing managerial and technical services for the operation of industrial enterprises in underdeveloped countries. It sought to determine the role which British enterprise has played and can play in the growth of the less industrialized countries. Its orientation is largely toward foreign economic policy although it examines specific business policies so as to provide the necessary empirical framework.

The three volumes deserve review by the Foundation since they complement its examination of foreign licensing and provide information and analysis in areas in which it has neither the authority nor the resources to investigate: viz., guides to business policy, which are best provided by legal and business consultants; and experience of other countries in their overseas operations, which is best obtained by researchers in those countries. Since the Fforde volume is more nearly comparable to the work the Foundation is doing for U. S. licensing abroad, more attention is given to it in this review. The books by Cardinale and Eckstrom are more in the area of business practice and policy where the Foundation cannot "judge," although it can investigate. The reader interested mainly in these manuals on U. S. licensing abroad may turn to the sections so titled below; but the authors of these manuals themselves would be first to stress that licensing is most effective when it is understood in its place within the entire picture of overseas commercial and economic relations.

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[1] Joseph S. Cardinale, *Manual on the Foreign License and Technical Assistance Agreement*, (New York: Thomas Ashwell & Co., 1958), 128 pp. $12.50.

Lawrence J. Eckstrom, *Licensing in Foreign Operations* (Essex, Conn.: Foreign Operations Services, Inc., 1959), 1500 pp. (mimeo.), $18.50.

[2] J. S. Fforde, *An International Trade in Managerial Skills* (Oxford: Basil Blackwell, 1957), 151 pp. 18s. 6d.

More studies of the experience of U. S. and European enterprises abroad are needed. As Fforde asserts in his book, the contribution of private enterprise through managerial and technical assistance needs much greater publicity, especially as a counter to efforts at nationalization, to Russian penetration, and to arguments that larger and larger governmental assistance is desirable: "If there is anything to be learnt from experience it is that we must regard the skill-transmitting aspect of our ordinary commercial dealings with the underdeveloped countries as of quite unusual importance. By comparison, technical assistance, rendered under special non-commercial schemes, is probably of relatively minor if not marginal importance."[3]

BRITISH EXPERIENCE

THE PROBLEMS FACING A BRITISH COMPANY in its operations in the underdeveloped areas are signally different from those which an American, German, or Russian unit encounters for the reason that the British have "been there before" and must accommodate themselves to a rising nationalism. This nationalism takes a form of anti-foreign antagonism directed largely at foreign owners of enterprise; it is expressed in the varied forms of "localization" ("Ceylonization," "Indonesiazation") of production and trade which have at times seemed to dominate the commercial policies of the newer nations. The most striking cases in recent history have been the nationalization of the former Anglo-Iranian Oil Company and the Suez Canal Company. Fforde argues that such actions are not new and they should normally result in a new relationship built mostly on transfers of technical and managerial skill. "Yet in both cases we appeared to act as if taken by surprise and, subsequently, to have lacked the informed self-confidence in our position which would come from national awareness, and national agreement, concerning our long-run relationship with these enterprises and *the services* we could rightly expect to provide for their operation."[4] Accommodations to the new view of enterprise in India are being made each day and without fanfare or angry reactions; the problem, he asserts, is to discover what relation the British firms may expect as profitable and suitable to the foreign country and seek ways of achieving it. The gradual withdrawal of equity investment in certain areas can be readily substituted with continued technical and managerial services. Such services might be shifted from enterprise to enterprise, with British capital providing more medium-term financing than long-term equity.

The need for a new British policy towards the flow of technical skills is evidenced by the fact that British enterprise is frequently involved in foreign policy problems. Fforde concludes that "We might make things easier for ourselves in all these respects if public policy and private action were more related to each other, or if public policy, despite contrary utterance of a generalized nature, did

[3] Fforde, *op. cit.*, p. 149.
[4] *Ibid.*, p. 149; italics in the original.

not sometimes seem to mean 'whatever our commercial interests happen to be doing at any one time or in any one place.' In other words, when we talk in general terms about helping underdeveloped countries in this managerial and technical field, we must better inform ourselves of our actual environment and begin examining the possible and appropriate."[5]

Fforde provides a framework for the examination of the "possible and the appropriate" in his own book. He admits that it is not the only useful framework, but it does at least set forth the alternate approaches and illustrate the relative advantages and disadvantages. Some of the methods are unfamiliar to U. S. business, having been developed to meet specific problems in the development of colonial economies—such as the "managing agency." In his framework, licensing is not a specific activity but is part of several alternative approaches distinguished according to ownership and control relations; each alternative involves the transfer of managerial and/or technical skills.

Four routes (organizational relations) for the transmission of managerial and technical skills are delineated.[6]

1) *The Individual Route*

Individual managers or technicians from abroad are hired by the company which is wholly owned by local interests. Fforde considers that this should normally be the most appropriate technique for the company having no foreign owners since it means less involvement in finance and control. But, capable British personnel are not readily available to go overseas and expert British personnel which are already on the foreign scene are not readily transferable into new types of enterprises. In addition, there are problems of language, customs, hiring practices, and business policy which make it difficult for an individual foreigner to assist in the growth of a local enterprise with which he has little more than an employee relation. Misunderstandings occur, which lead to delays and inefficiency.

These disadvantages could be largely corrected by establishment of agencies to recruit and prepare personnel for overseas assignments. There are large numbers of persons who think they would enjoy overseas service; they could be culled and trained for the mutual benefit of both Britain and the developing country.

2) *The Joint Venture*

Fforde's use of this term is broader than the American. It covers any collaboration which establishes a working partnership between a local and a British con-

[5] *Ibid.*, p. 150.

[6] Whatever the organizational relation established, Fforde stresses, the arrangements with foreigners "must constitute a working economic partnership between equals, one that is freely entered and freely revocable (on agreed terms), with equality of opportunity admitted... the concept of partnership refers to states of mind . . . a manufacturing enterprise that is wholly foreign-owned may be an excellent instance of successful partnership rather than of the junior-assistant phenomenon. It depends upon states of mind and upon policies determined thereby which may be largely independent of the outward form of organization." *Ibid.*, p. 6.

cern in any of the areas of growth, extraction, manufacture, generation, or marketing of the goods and services produced. This would include, therefore, not only joint-ownership but also consultation on construction and design, engineering or production, marketing or management. The technical assistance contract, licensing, and direct investment are all considered as "joint ventures," for the essential feature is merely that there be "an agreement between two organizations, two active self-governing entities, for the provision of certain services by one to the other or for the joint provision of all the facilities necessary to the construction and operation of a third." Duration of the agreement does not effect its classification as a "joint venture."

3) *"Product Specialized" Foreign Investment*

The investment of British capital in production of a specific product type abroad leads to this relationship. The duration is long-term, and it is always with British control. Such investments are represented by three types of British organizations: (a) the very large international type corporations, exemplified by petroleum, cigarettes, banking and insurance (b) the smaller manufacturers with several foreign subsidiaries (c) the British company with one or two foreign companies, such as a public utility, a mine, or plantation. Its operations are restricted almost wholly to a specific industry-class, which differentiates it from the fourth route.

4) *"Trader-industrialists"*

The trading or agency house "can be both a *general* foreign entrepreneur resident in the underdeveloped country and a foreign emporium containing a great variety of other managerial and technical services on sale for fee or commission." Equity investment in a client may or may not be involved. The services of the agency run the gamut of business services, from consultation on specific problems, such as selling, to the entire general management of an enterprise (either private or governmental). Services may be promoted by the agency or it may wait on the request of a company previously not a client. This particular type of organization grew out of the necessity of British trading companies to enter manufacturing or planting in order to supply their customers with goods of high quality and at regular periods. It is also the source of much discontent among the newer nations towards foreign enterprise, for it lends itself to varied abuses as a result of its widespread interests and control over many aspects of the local economy.

The choice of approach to the transfer of skills will, under Fforde's framework, depend upon (a) the nature of the organization requiring the skills, (b) certain characteristics of the skills to be transferred, and (c) the length of time over which they are to be supplied.

LOCAL CONTROL OF THE ORGANIZATION

Fforde takes as his model for discussion the demand for skills by an organization wholly locally owned, since this conforms to the "facts of nationalism" and

separates the examination from the problems of capital flow. If local control is not to be diminished through a closer partnership with a foreign firm, the organization will have to buy foreign skills that it needs on an individual or *ad hoc* basis. That is, it cannot easily buy into a "package" of skills such as normally accompany any exchange through the various joint-venture routes.[7]

Although Fforde may be given the benefit of the doubt in his classification since he is working with underdeveloped areas, it is essentially because of the framework he has chosen that he comes to such conclusions as the one above, giving a "presumption in favor of the individual route" when there is a high degree of local control. The experience of American companies may be different from those of Britain, not having had the same colonial stigma, but the licensing arrangement does not seem to involve any significant loss of local control, save possibly under trademark licensing. This channel for the transfer of skills, therefore, is not subject to the same criticism that other "joint venture" techniques are *if* local control is as important in the underdeveloped countries as Fforde asserts. Classifying it with the other "joint ventures" blurs its important differences.

SEPARABILITY OF SKILLS FROM THEIR ORIGINATOR

The individual route is applicable only when the skills required are so general that they can be separated from the company within which they were developed and do not need to be continuously fed from company research and development. However, such *general* managerial skill and technical education may not be appropriate to the needs of the unskilled company. To obtain its needs, it will have to accept a closer partnership to the foreign company originating the required skills. The degree to which the skills may be effectively separated from the originating company determines the degree of partnership required.

The ability to separate skills from their originators depends on three main factors: technological progress, product or process differentiation, and the number of foreign staff required to transmit the skills requested. Where continuous technological progress is important in the growth of a company or industry, it will be more desirable to achieve a fairly close working partnership with the originating company; the import of individual foreigners would not be sufficient. (Fforde does not distinguish, however, the desirability of licensing as compared to a subsidiary

[7] Fforde definitely includes as a type of "foreign control" the licensing arrangement and avows that it suffers from the disadvantage of diminishing the degree of local control. Where skills are required from abroad, he argues, the *individual* foreigner must be imported "unless the advantages of association or partnership with a foreign firm are great enough to compensate for any diminution of control that may follow—a diminution undesired in itself and at once productive of another set of problems. Moreover, any such association with a foreign firm will involve regular payments abroad over and above the foreign exchange cost of individual staff supplied; these payments will be *fees, royalties, or dividends.* This almost certainly means much closer governmental scrutiny before the relevant licenses or permits are granted. Sanction is not likely to be given; such is the typical pressure on foreign exchange resources and the political desire to avoid such overseas commitments, unless it can be conclusively demonstrated that the required 'know-how' can be obtained in no other way within reasonable time." (*Ibid.*, p. 15; italics added.)

relationship in this event, since he considers the problems of capital flow to be distinct from those of the transfer of skills.) When processes or products are markedly differentiated, the originating company is the only source of the required information or skill; when this is not the case and processes or products are standardized (as in jute weaving) the skills may be obtained on a one-shot basis from sources such as the machinery manufacturer. When the required skills involve the transfer of fifty or one hundred technicians or managers (as in the construction and operation of a petroleum refinery or steel mill), the individual route is not as desirable as a package deal with one foreign company. The foreign organization, then, does all the recruitment, provides continuity, and assumes the special administrative duties involved in employing and transferring foreign personnel.

TIME FACTOR

The underdeveloped countries are attempting generally to cut short the time required in their development. Foreign entrepreneurs are, generally, more cautious in disbursing time, energy, and financial resources, requiring ample justification for their expenditure, and they frequently desire substantial control. The question of "How long" the association of "junior-assistant" is to endure is highly important to the local company. Although some countries are currently antipathetical to the foreigner remaining within the country for any length of time, Fforde avers that most are desirous only that the relationship with the foreigner become "adult and respectable." "If, therefore, any given association with the foreigner can be seen by both parties as one which will evolve steadily into an arrangement between adult equals for the operation of joint interests or for the mutual provision of the result of research, development, and experience, then youthful ambition and *amour-propre* can be satisfied."[8]

Once again, Fforde fails to distinguish between the various "joint ventures" and does not call attention to the fact that licensing provides a satisfactory answer to the questions of how long foreigners are to be established in the local industry and how long before the local company is to become "adult." Under licensing the licensee is immediately treated as adult, and most agreements provide for ready termination at the volition of the licensee. But, Fforde stresses, British experience has a long historical background and questions are directed at the British firm which are not at American, or German, or Russian units—such as, "How long are these people going to stay?" rather than "What are they going to do for us next?" The rancor over alleged or real British exploitation has placed a premium on the British firm's finding a way to detach its interests, which others in the South Asian countries, at least, are not required to face.

The restriction of Fforde's study to British experience is certainly justifiable, but the framework of his examination is so restricted to that experience that it cannot be used appropriately in the study of transfers of skills from other indus-

[8] *Ibid.*, p. 23.

trialized countries. For this purpose, the following framework is suggested:

1. **The types of exchange of skills or rights**
   (a) managerial (b) technical (c) proprietary rights
2. **Ability of the receiving company, or country, to develop substitutes**
   (a) secrecy or protection by law
   (b) time and cost required in research
   (c) extent of dependence on skills and rights originating abroad
3. **Necessary complementary of foreign capital**
   (a) capital financing from the transferor of skills or rights
   (b) capital sources abroad from third parties
   (c) extent of "partnership" in equity ownership
4. **Ancillary benefits of "partnership"**
   (a) selling territories and advice, advertising, etc.
   (b) assistance in purchase of materials and equipment
   (c) flow of *general* managerial and technical skills
5. **Wider impact of import of skills**
   (a) transmission through other companies in the receiving country
   (b) effect on educational levels within the country

Fforde himself exhorts others to direct their efforts toward "revealing the limitations placed by the actual or likely facts of life upon what can exactly be meant by technical assistance of the operational or managerial kinds. Such revelation seems to me valuable and timely." This examination is especially desirable in view of the fact that there is a tendency among various sectors of the Western countries to disparage Western efforts and to worry unduly at the entrance of Russia into the field. In the eyes of many Britons, Fforde asserts, the U.S.S.R. *ex hypothesi,* must be doing new, spectacular things which it is automatically assumed we are *not* doing, ought to be doing, cannot do, and must fail if we tried. But, in fact, what we *can* do is not so very different from what we *are* doing already and what we are doing is in a very great many cases highly satisfactory and very competitive with Russians or with anyone else. Yet some people seem to leave what we are doing out of account because it is too much associated with what we used to do and is something of which they do not always wish to be reminded."[9]

If the objectives for which we "stand" are to be furthered, he argues, we must tell more effectively the story of what we are doing to gain those objectives. But the bringing together of what we "are doing" with what we "stand for" is not easily accomplished because of institutional differences between the means of pursuing the objectives of business and the objectives of government: " 'What we are doing' is often the internal affair of private business. Hence, it is something that is private and confidential, markedly uncontrolled, and which it is not expected need automatically reflect official policy or public feeling. This is all very well in times normal to such social conventions or habits. But it is rather odd when private business must very largely be the chosen instrument of foreign policy concerning certain vital politico-economic issues of the current decade."[10]

Our investigation must, therefore, be directed toward telling the day-to-day story of technical assistance rather than regarding such assistance as only "the

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[9] *Ibid.*, p. 147.
[10] *Ibid.*, p. 148.

very special version rendered under special international schemes, as if all the rest would not bear too close an inspection—forgetting that if it does not bear inspection then action is required to reform it, while if it does bear inspection there is nothing to hide. We sometimes seem to regard 'Aid' and 'Capital investment overseas' as if they were so different as to be mutually exclusive. . . ." Efforts to extend technical assistance to the underdeveloped areas will undoubtedly require a policy on the part of governments: the government of the receiving country to either encourage or facilitate such transfers through the mass of existing controls or plans, and the government of the transferring country if it is in the national interest to encourage growth in the less developed countries. Such policies do not require, however, "the performance of unremunerative services from a fear-ridden sense of guilt." Rather, what is required is an understanding of the ways in which managerial and technical skills are and can be effectively transferred abroad under the new socio-political conditions of today *and* an appreciation by the new nationalized areas of the need to understand the ways in which private enterprise can contribute to their growth and progress.

MANUALS ON TRANSFER OF SKILLS AND RIGHTS ABROAD

THE U. S. COMPANY IS NOT ENCUMBERED by a long history of operation in foreign lands. But by the same fact, it is not enlightened by long practice in the alternative approaches to overseas operations. International business is still something "foreign" to the majority of U. S. companies: even those which have been in the field for some time are developing procedures for more effective operation. The growth of foreign licensing has been comparatively recent and has been accelerated by the very factors which have caused British businesses to re-evaluate their positions in the new nations of the world.

United States companies are in the fortunate position of having a clear field and no institutional impediments to choosing the appropriate technique of doing business abroad, and thus, to make certain that they are in a flexible position to meet changing circumstances. The manuals which have recently been published by Cardinale and Eckstrom provide much-needed information in making the most effective use of licensing, with or without foreign investment.

Cardinale's *Manual* is intended as a check list of the multitudinous aspects of licensing which should be considered by the prospective licensor. It omits no significant element which the reviewer could think of relative to the incentives, problems, modes of negotiation and operation of licensing abroad. The broad scope of licensing (with or without equity investment) is immediately pointed up by a three-page listing of the various rights and types of assistance and services which the licensor may extend to a foreign licensee. Consideration is directed also to the registration of trademarks and patents abroad, which is required in order to have such assets to license.

Once the assets are at hand, a decision must be made as to whether or not to license; Cardinale presents four chapters of points to consider. He cautions

especially against a hasty determination to license merely because it is the "easiest" means of getting a product manufactured abroad; more extensive investigation might favor direct manufacture. The same caution is made against continuing to license after capital resources at home and conditions abroad would indicate the desirability of a subsidiary relationship. Contrary to the admonitions of Fforde to the British company, Cardinale sees for American licensors a movement from exporting to licensing, to direct manufacture. The opposite moves of some British firms from direct involvement, to licensing, to individual advisors result from problems not faced by American companies even in the less developed areas. The American, therefore, has a choice between investing, exporting, or licensing and a combination of these. Cardinale points out the advantages of licensing over investing: lack of capital, desire to reduce business and political risks, difficulty of getting import licenses, preclusion of competition through existence of existing strong firms, small local market, preference given to remittances of royalties over dividends, shortage of management and personnel, and where a government is the foreign partner. The specific advantages and disadvantages of licensing (without regard to other types of operation abroad) are spelled out. The major disadvantages seem to be those of lack of control over the foreign company and the possibility of establishing a competitor abroad. The attitude of the foreign government, and other economic and political conditions are significant in the choice of licensing, however, and these are detailed in succeeding chapters by Cardinale. He includes also a determination of the suitability of the product for licensing abroad and a checklist of the items needed in a study of the foreign market.

A hasty association with a particular foreign company which requested American skills has often led to tying up assets which could be worth much more had the licensor been careful in his selection of the licensee. The sources of information which should be tapped to check on the potential licensee, the factors to look for, and the means of evaluating and selecting him are enumerated also by Cardinale. His presentation of the approaches to "closing the deal" through negotiations with the licensee and the drafting of the agreement is exceptionally good.

Several of the major factors which Fforde stressed as bearing on the choice of route in providing technical assistance are detailed by Cardinale under sections on the obtaining of an "equity interest" in the licensee, the size and experience of a company as a factor in developing a licensing program (rather than merely providing one-shot advisory services), and on means of developing a "partnership" relation with the licensee and of keeping close surveillance on the activities and progress of the licensee. These last include an extension of the licensor's services into a training program for foreign personnel; sending of the licensor's personnel and data; prompt handling of inquiries; frequent personal visits; full consideration of suggestions by the licensee to adapt the item or process to his needs; assistance in procuring materials and equipment, etc. In performing these services, Cardinale stresses, it is of the utmost importance to develop effective "liaison and

coordination between the international division and department and the research, engineering, traffic and purchasing divisions, etc." This coordination is necessary because of the wide variety of services which the licensor may be expected to extend to the licensee.

Since the American licensor is not in the position of having to "cut losses" abroad by moving out of an existing position, profitability calculations are of high importance. Although such calculations are somewhat more difficult abroad than at home, Cardinale indicates the areas of investigation required to determine cost factors, to allocate expenses, to calculate growth expectations, and to assess the non-royalty benefits of licensing; these last include the potential expansion of exports, the development of a licensing program, which because of its geographical coverage will make it economic to service several licensees, and the development of a potential source of supply in the event of a stoppage of U.S. operations.

The attitude of the U. S. government can be equally as stimulating or retarding to licensing as the attitudes of foreign governments. An examination of the impacts of the various practices and policies employed by the several U. S. agencies has yet to be made with reference to either licensing or investing abroad; Cardinale provides, however, an extensive outline by which a satisfactory examination for company policy can be made in the light of existing government attitudes. The *Manual* is concluded with an exhortation to continual review of the licensing program and maintenance of flexibility so that advantage may be taken of new developments, such as the Common Market. The inherent flexibility of the technique of licensing is emphasized by the fact that it can be used successfully by large and small firms, manufacturers or research units, with or without capital flows, and over short or long periods of time. It is essentially a technique of association between "equals," who might be highly unequal if measured by size or competitive strength.

While Cardinale's *Manual* is exhaustive in its lateral coverage on licensing, it would require a book of substantial volume to treat each topic in detail. Eckstrom has examined a few of these same issues and approaches more closely in his volume on *Licensing in Foreign Operations*. As the title suggests, the volume is, broadly, a discussion of foreign operations, and, minutely, an analysis of licensing. Emphasis is given to the growing importance of licensing in the changing pattern of overseas operations. But, the volume is much broader in scope than a discussion of foreign licensing. While it also provides several checklists, its more than 1500 pages (mimeographed and loose-leaf) explain and illustrate some of the major issues and techniques used in foreign operations, including licensing. Being a reference volume, it is not written to be "read through"; rather, each chapter is mainly self-contained and, thus, includes material which may also appear in another chapter. To merely present the detailed table of contents requires ten pages. The second half of the volume reproduces in detail thirty-five different licensing contract forms and contains an extensive bibliography of source materials relative to foreign operations. Included in the bibliography are sources on antitrust, arbitration, copyright law, foreign license agreements, foreign markets,

legal forms, patents and trademarks, profit sanctuaries, research and statistics, and taxation. A variety of additional sources of information are indicated as available from advertising agencies, bank and financial institutions, embassies, lawyers, libraries, the U.S. Government, etc. Finally, a list of U.S. tax conventions is appended. In all, it is an auspicious work and will long be a standard reference for operators and consultants in the field.

The first chapter is devoted to terminology in foreign operations, with special emphasis on concepts related to licensing. The second chapter provides an extensive review of the requirements for a preliminary study of the foreign market, including sources of information, appropriate uses of market research agencies, etc., but devotes a section to those items in a market study which are peculiar to licensing.

Chapters III and IV are directed wholly to licensing operations. The former examines the types of company organizations used in licensing programs, for example: company departments, divisions, international companies, or export companies, and the use of third party negotiators. The latter defines carefully the various terms and concepts employed in licensing agreements.

The various assets which are licensed are the subjects of the succeeding chapters (V and VI). Here again, the scope is broader than licensing; the types of patents, use of patent agents, working requirements, and compulsory licensing regulations are discussed. In addition, the types of trademarks, international conventions covering patents and trademarks, and the protection given by foreign countries to patents and trademarks are given attention. To relate the discussion to licensing, certain guideposts in the licensing of trademarks are offered, and the requirements of various countries concerning trademark licensing are presented. Chapter VI analyzes the advantages of the Know-How Agreement. The analysis is broadened by review of a variety of definitions of trade secrets and of know-how as evidenced in law cases and by discussion of the protection offered through court action and by administrative and legislative provisions against "unfair competition." A catalog of the types of know-how and services which have been included in "technical assistance agreements" and suggested guideposts for successful formulation of such agreements concludes this chapter.

The remaining chapters devoted specifically to licensing are VII, VIII, and XII. The last covers the form of licensing which occurs when equipment is leased rather than sold, indicating the types of agreements which have been concluded in this area. Chapter VIII argues the pros and cons on the types of provisions which may be included in the licensing agreement—such as exclusivity or non-exclusivity, various payments provisions, responsibility for litigation in event of infringement suits, arbitration clauses, etc. This follows an extensive review of the major features of U. S. licensing agreements in Chapter VII, a discussion of the royalties and fees to be charged in licensing, the costs of licensing, the length of time required to make licensing profitable, and the governmental approvals and controls relative to licensing agreements.

The remaining chapters (IX, X, and XI) are devoted to problems which affect any international operation: antitrust, legal assistance, and taxation. Mr. Eckstrom has first-hand information on these problems, especially on the impact of antitrust in international operations, and he provides some insights into the trend of U. S. courts interpretations. He discusses the growing attention abroad to anti-monopoly legislation but remarks on the general laxness with which it has been applied to date. He discusses the existing U. S. legislation which affects any restraints on overseas business, and reviews the cases and consent decrees which indicate the trend of judicial action and approach which impinge foreign licensing operations. From these reviews, he summarizes the acts which he believes are considered unlawful by U. S. courts; others which are "dangerous," some which are "not clarified," and finally those which may be considered "safe" from the viewpoint of antitrust.

While it is not possible even to review the restraints falling under antitrust legislation and the acts deemed permissible (much less to examine the arguments), some idea of the significance of this chapter is given by the following excerpts from the acts deemed *offensive* under antitrust:

(a) restriction of a licensee to selling outside the United States
(b) restriction that licensor will not sell in the licensee's home country
(c) fixing or maintaining resale prices or other commercial terms
(d) restriction of licensee to use only trademark of the licensor
(e) prevention of exportation of products into third countries
(f) pooling of patents or profits, etc.

Restraints which stem wholly from the patent monopoly or flow from the trademark are safe from antitrust complaints, thus: "Most antitrust experts in the foreign field hold that exclusive simple licenses to manufacture granted by either party under current and sometimes future patents in any one country are safe." Where no patents or trademarks are concerned, "Exclusive know-how and technical assistance agreements should be safe if not considered a part of a larger pattern of monopoly, dominance, or restriction. . . ." In order to guard against antitrust complaints (or successful action by the Government), Eckstrom warns against "gentlemen's agreements" and side deals, against destruction of records or materials, conspiracy, and any association with competitors, plus several other actions which spell "danger" in the terms of antitrust.

The need for continuous legal advice in the formation and fulfillment of licensing programs leads to a discussion (in Chapter X) of the state of "private international law," and of the relative abundance of counsel on foreign operations. A survey of the availability of counsel in foreign countries is provided as well as an examination of practicing conditions in foreign countries and the type of legal aid available from foreign firms and U. S. lawyers abroad.

The ever-pressing problem of taxation is given extensive treatment in Chapter XI. Besides the discussion of tax credits and U. S. taxation of foreign income, a careful discussion of the appropriate use of the foreign base company is provided. Countries which make good locations for such companies are also examined.

The advantages of the Western Hemisphere Trade Corporation are discussed. And, finally, the impact of double taxation on foreign operations is analyzed.

As can be seen from the cursory review of Mr. Eckstrom's work, it provides not only several valuable check lists but also wider information on a variety of aspects of foreign operations. Where problems remain, the various approaches are presented and suggested means of resolution presented. Between the check lists provided here and those given by Cardinale, the official approaching licensing has ample guidance in ferreting out the required information and securing the most competent advice; he is left to balance the factors and plunge ahead.

Apart from business relations in the negotiations and fulfillment of the agreement, several problems will remain such as in the areas of taxation and antitrust. These Cardinale surfaces and Eckstrom discusses, but both argue that much more is required before clarity and "sound policies" will be achieved. On both of the aspects, the Foundation is proceeding to investigate the existing conditions so as to provide empirical foundation for more appropriate policies if they are required. The desirability of changing existing policies can be weighed accurately only if there is also empirical evidence as to the importance of licensing itself in U. S. overseas operations, as Fforde stressed in his writing. There is evidence pointing toward the conclusion that transfers of know-how, proprietary rights, and skills built into machines are value-wise as important as U. S. private foreign investment, measured on a capitalization basis and as important as U. S. exports measured by value of goods produced under U. S. licenses (through and outside of U. S. foreign subsidiaries). If these estimates can be given quantitative significance, as the Foundation is now attempting to do through a questionnaire on operations of U. S. corporations, a greater justification will exist for a re-examination of government policies of encouragement.

There are other facets of foreign licensing, however, which if examined would be useful also in formulating adequate policies—such as the impact of the transfer of proprietary rights and managerial and technical skills on the development of the less industrialized countries of the world. It is hoped that researchers abroad will undertake such studies along the lines of the Fforde framework or some alternative one.

EDUCATIONAL ACTIVITIES

Program for Young People

OUR NEW UNFOLDING EDUCATIONAL PROGRAM is tentatively organized in the form of two projects: Project E-1 (E for Education) is a project based on the studies we conducted. This is a direct effort of the Foundation involving the preparation and dissemination by the Foundation of materials. Project E-2 is an "energizing" project with and through other groups, and local people. This project we have organized to work through our Area Committees and to cooperate with any other groups and individuals who have parallel interests. The Foundation's Area Committees have been asked to draw up and assemble model materials on a decentralized basis suitable for the geographic areas in which they are located. They also have been asked to confer with school authorities on how best to use the material locally. We hope to benefit from the exchange of ideas with the Area Committees and develop a pool of information which might be applicable to more than one area and assist us in the establishment of a unified program.

At the same time we are in the process of developing material for Project E-1 which involves the preparation and dissemination by the Foundation of Educational Literature.

PAMPHLET SERIES (E-1)

The Foundation has recently distributed the first of a series of pamphlets on the patent and related systems as part of the Educational Program For Young People. This pamphlet, printed in an attractive format, describes briefly the purposes of the patent system and the ways in which it touches, directly and indirectly, the life of every young person. The series, which is entitled *The Patent System All Around You,* has as its objective the creation of an awareness among the youth of this country of the purposes, procedures, problems, and accomplishments of the patent and related systems and their relation to our economy and cultural life.

Since it would be impractical to attempt to reach all the nation's secondary schools until we have had an opportunity to gauge and assess the program's reception by educators and students, the first pamphlet was distributed to schools in selected areas. The District of Columbia and the following states, which comprise both urban and rural communities, and include the cities in which our Area Com-

mittees are located, were chosen: California, Illinois, Massachusetts, Missouri, New York, Ohio, Pennsylvania, Wisconsin.

Foundation members and *Journal* subscribers will also receive a copy, and their suggestions and comments on the pamphlet and the program are invited.

AREA ACTIVITIES (E-2)

The pamphlet series is also intended to produce an awareness on the part of secondary school authorities of our educational activities and to create an atmosphere of understanding for our Area Committee members, who have been asked to develop ideas for programs in their localities and may have occasion to contact school officials.

The following communication from our St. Louis Area Committee may have illustrative value for our other area committees and groups which have similar objectives.

Professor L. James Harris
The Patent, Trademark, and Copyright Foundation
of The George Washington University
Washington 6, D. C.

Dear Mr. Harris:

Enclosed is a preliminary draft of a proposed manual on purposes, procedures and problems of the patent and related systems suitable for use in high schools and colleges in this area.

The enclosed actually is not a manual in itself, but teaches the preliminary thinking of our Committee. We submit this draft for purposes of your review. We would like to know whether we are working along the line you have in mind or whether we are far off target and should make a new start. If the enclosed is along the lines of your thinking, we would appreciate your comments as to how much further you think we should go, and anything else which you may care to say on the subject. On the other hand, if we are entirely "out in left field," please do not hesitate to say so.

Cordially,
ALFRED W. PETCHAFT, *Chairman*
St. Louis Area Committee

Proposed Manual on Purposes, Procedures, and Problems of the Patent and Related Systems Suitable for Use in High Schools and Colleges

INTRODUCTION

A manual on the patent, trademark, and copyright system cannot, we believe, be developed in an ivory tower. Its purposes must be informative, educational, and vocational. This means that it can only be prepared after consultation with educators and vocational guidance people. However, a recognition of this need

also creates a further problem which involves a certain amount of logical feed-back. Educators themselves cannot approach the preparation of such a manual as herein contemplated, even in an advisory capacity, without themselves being somewhat oriented in the field.

It, therefore, seems wise to suggest that The Patent, Trademark, and Copyright Foundation take the lead in convening area seminars to be conducted by some members of the Area Committee and selected teachers in the science and social studies departments of secondary schools within the area under the leadership of the Superintendent of Education, or some comparable person. In the St. Louis area, we are fortunate in having a number of outlying suburban communities with excellent school systems of a fairly compact, but, nevertheless, ample size to mount one or two experimental seminars. Your Area Committee respectfully suggests that a large metropolitan school system, such as the St. Louis school system, would be unwieldy for the purposes contemplated.

We have appended hereto an outline for the proposed seminar, and also an outline of the proposed manual so that the educators will have something upon which to comment and as to which suggestions may be made.

I. Proposed Seminar

We suggest a three-unit seminar as follows:

A. HISTORICAL BACKGROUND OF INVENTION IN THE UNITED STATES AND ITS CONTRIBUTION TO THE TECHNOLOGY OF THIS COUNTRY

This phase of the seminar should be conducted by a panel of two or three members of the Area Committee, who will present the subject matter in two phases, as follows:

1. *Technological History:* This segment of the subject matter should consist of a presentation of four or five industries of outstanding importance in the economy of this country and should trace the contributions of invention to the present day status of the industry. The introductory remarks might outline the wide variety of industries which contribute to the total technology of the United States and indicate that a discussion of the contributions of invention to each of these industries would be impossible within normal limits of time. For this reason, a few representative industries have been chosen so that the pattern of inventive contribution to each can be clearly discerned, and a sufficient understanding of the subject matter obtained for purposes of discussing how this material can best be represented to high school students. We suggest as possible examples such industries as rubber, steel, synthetic resins, radio and television communication, textiles.

2. *Biographical History:* The second phase of this subject matter would be to present biographical sketches of great figures in the field of American invention. Here, also, it would be impossible to present this phase of the matter by an exhaustive and complete biographical review of all the great American inventors. Therefore, a few leading inventors could be selected and their biographies presented. Obviously, for purposes of greatest coverage, the inventors who are selected for biographical treatment should probably be taken from fields other than those fields which are used as examples of the technological treatment of the subject matter under sub-paragraph one above.

3. *Discussion:* The foregoing presentations, of course, should emphasize the basis which is provided by the patent system, and comment should be invited as to how this may best be brought out and emphasized in present high school curricula. Manifestly, there are two areas in which this emphasis can be given. One is in the teaching of history of the United States. It is traditional in history curricula to emphasize certain inventions, such as the invention of the cotton gin by Eli Whitney, and the invention of the telephone by Alexander Graham Bell. A review of textbooks presently in use in this area indicates that no mention is made of the patent system or the relation of the patent system to the activities of inventors, such as Whitney and Bell. When the curriculum reaches into the field of civics and deals with the organization of government, no mention is made, so far as we can ascertain, in any of the textbooks or workbook materials as to the Patent Office. At this point, it might be well to note that the entire field of administrative law, which has become so important in the affairs of our nation, seems to be neglected; and, of course, the Patent Office falls in this general category. The same observation is true of science curricula. It seems that the whole approach in the teaching of science is to develop the notion that science and scientists stand on a pseudo-philanthropic plateau where everything is done for glory and humanity with no thought for personal gain. Discussions of this subject with numerous high school students revealed that most young people of high school age believe that scientists are saints in rubber gloves, whereas inventors are simply lucky crackpots.

B. LEGAL AND PROCEDURAL ASPECTS OF THE PATENT SYSTEM

We suggest that a second seminar be held, also on the panel system basis, by two or three members of the Area Committee dealing very briefly with the following subjects:

1. *Constitutional History of the Patent System:* This should include some philosophical treatment of the concept of invention, the concept of monopolies, and some brief popular treatment of the history and develop-

ment of the patent systems as legal mechanisms in the principal countries of the world.

2. *A Description of the Patent Office:* This should deal with the Patent Office as it is presently constituted and a rather brief popularized presentation of the manner in which patent applications are processed and handled.

3. *The Administration of the Patent System in the Courts of the United States:* This should deal with the manner in which patent litigation is conducted and the treatment accorded to patents by the Courts. Many people have the impression that patents are always held invalid or, contrariwise, that patents are always sustained. Some effort should be made to place these notions in proper perspective.

4. *Corporate Patents:* The presentation within this seminar should be more directed to the civics teacher and the teacher of political science material in the high schools. However, the presence of the science teacher should not be overlooked, and some effort should be made to develop an approach by which science teachers can create an awareness on the part of high school students in the science courses as to the means by which the patent system can be utilized to implement scientific research and development. For example, budding young scientists should know that many of the things which they may later on discover would be inventive in character and form the proper subject matter for patent protection. These young people should also understand how they go about protecting themselves if they are working as individuals, and they should also be made aware of the rights of corporate employers if, later on, they become members of a corporate research staff.

C. PATENT LAW AS A VOCATION

This phase of the subject matter, it seems to us, is somewhat important. Inquiry made of high school students indicated that none of them recognize the field of patent law as a vocational opportunity. In fact, they are totally unaware of it. In this connection, it would be interesting to conduct a survey among all of the young patent examiners in the Patent Office to find out how it happened that they came to the Patent Office in the first place. As a result of inquiries made in connection with this subject, indications were received that would suggest a highly accidental and fortuitous manner of career selection. It is not sufficient to say that this problem should be dealt with at the law school level, because patent law requires an engineering education, and a young man who intends to become a patent lawyer would be well-advised to go through engineering school first as a preparation for law school. Hence, it is believed that some awareness of vocational possibilities of patent law should be created in the minds of high school students as they move in the direction of college education.

II. Proposed Manual

Introductory Comment. We believe that this project cannot be compressed within a single book. Of course, it is presumptuous to assume that the subject matter should be developed in any one particular way without first carrying through the seminar procedure and developing discussion from trained educators, which will serve as a valuable guide in the development of manuals, workbooks, and related curriculum materials. However, on the basis of preliminary consideration of this matter, it is believed that probably some material must be developed for use in the science curricula. Additional and different material must be developed for use in the social studies and history area of the curricula and, finally, further material should be developed for use by high school officials and teachers in terms of vocational guidance and vocational testing incident to development of college-oriented students.

Moreover, the preparation of curriculum materials cannot be intelligently carried out without first knowing the age level to which such materials are being addressed. We believe that the Foundation should actually develop outlines of these manuals in full detail for submission and comment in the seminars. Following these seminars, the Area Committees could transmit to the Foundation for analysis the comments, suggestions, and criticisms growing out of the seminars. On the basis of this, a comprehensive development of materials could be undertaken.

We recognize that all of the proposed manuals will have to be written by someone. They do not exist. Your Area Committee is not capable, and most certainly does not have time, to write these manuals, but if there is any validity to the program which you propose, this would be a good job for the Foundation. We merely have appended hereto certain titles and what might be referred to as a Table of Contents, all of which would form a suggested skeleton for this purpose.

First Manual

History of Invention of the United States

We visualize this as a simple, paper bound book or manual, preferably of about 8½ x 11 sheet-size, and containing a series of chapters showing how invention and patents helped these industries, as follows:

1. Steel and Iron.
2. The Story of the Electric Light.
3. The Storage Battery.
4. Inventions Relating to Sound.
5. What We Wear.
6. What We Eat and Drink.

7. How We Keep Well.
8. Inventions Relating to Travel.
9. Moving Pictures and Television.
10. Printing and the Written Word.
11. Inventions That Have Made Life Comfortable—Heating, Plumbing, Refrigeration, Air Conditioning, and the Like.
12. Machines That Almost Think—The Story of Machines, such as: Adding Machines, Bookkeeping Machines, Computers, and the Like.
13. Machines That Make Machines—The Story of Automation.
14. Synthetic Chemistry—How Man Has Endeavored to Equal and Improve Upon Nature.

Bibliography: It is obvious, of course, that an extensive bibliography can be prepared to implement the foregoing manual. In this connection, it also should be noted that the foregoing list of subjects is not intended to be complete, but is merely illustrative in scope.

SECOND MANUAL

Great Inventors and How They Lived

1. Eli Whitney. Here emphasis should be laid upon the fact that Whitney was the father of interchangeable parts, and his life story should bring this fact out, rather than to leave Whitney merely as the father of the cotton gin.
2. Charles Goodyear.
3. Morton, and the inventors who followed him in the fight against pain.
4. From Gutenberg to Mergenthaler.
5. Newcomen, Watt, and the men of steam.
6. Mr. Bessemer, and how he blew.
7. Samuel F. B. Morse—his dots and dashes.
8. Elias Howe, Jr.—a stitch ahead of his time.
9. Richard A. Tilghman—fats and glycerine.
10. Joseph L. Glidden—barbed wire.
11. Thomas A. Edison.
12. Elihu Thompson—centrifugal creamer, electric welding.

13. Alexander Graham Bell.
14. Hertz, Marconi, and deForest.
15. Mr. Lake, and his submarine.
16. Dr. George Baekeland.
17. Selden and Ford.
18. The Wright Brothers.
19. Vladimir Zworykin.

THIRD MANUAL

Patent System of the United States

Introductory Comments. This should be a brief manual dealing with the constitutional history of the patent system and the organizational set-up of the Patent Office. It probably would be wise to include trademarks and copyrights and extend the subject matter to the Library of Congress with its jurisdiction over copyrights. We suggest the following chapter headings:

1. The Constitution As a Basis for the Patent and Trademark Systems.
2. The Patent Office of the United States.
   (a) Where it is located.
   (b) The Commissioner of Patents and what he does.
   (c) How patents are prepared by the inventor and his attorney.
   (d) How the patent application is handled in the Patent Office.
   (e) The Examiner and his work.
3. How Patents Are Handled in Principal Foreign Countries.
4. How Patents Are Handled by the Courts.
5. Corporate-owned Patents.
6. Copyright Law.
7. The Register of Copyrights (The Library of Congress).
8. Trademarks: What They Are and What They Mean.
9. How Trademarks Are Registered.

FOURTH MANUAL

Vocational Guidance Manual for the Field of Patent Law

Introductory Comment This manual is intended to be addressed to teachers and other people who may guide students in the selection of vocations and we believe, should be written on the adult level. We suggest the following chapter headings:

1. *Patent Law as a Vocation.* This chapter should describe the activities of the patent lawyer, how he serves his client, and what he does in his daily work. We believe this chapter might also include some statistical information on the economic position of patent lawyers in relation to other lawyers and in relation to other professional groups.

2. *Necessary Educational Preparation for the Field of Patent Law.* This chapter should include a discussion of the scientific and legal education required in order to effectively function as a patent lawyer. Emphasis should be laid upon the need for a broad and comprehensive scientific background, as well as a quick and ready ability to grasp scientific subject matter and visualize the parameters of an inventive concept. At this point, some discussion should be devoted to the testing of high school students for general aptitudes in this field; and it should be noted that scientific aptitudes and the aptitudes usually assimilated to the legal profession are not the entire problem, because a patent lawyer is actually, in some respects, engaged in a literary pursuit. The writing of a patent application is a form of literary exposition and this job, to be done well, requires that the patent lawyer have something of a literary talent. It is also desirable to stress, in the area of aptitudes, an ability to handle language, acquire an extensive vocabulary, and become something of a semanticist.

3. *The Ways in Which One Can Acquire Education for the Field of Patent Law.* This chapter should discuss the alternatives of going to engineering school, going to law school, and then specializing in the field of patent law, as compared with the alternative process of graduating from engineering school, becoming a Patent Examiner, going to night law school, and ultimately becoming qualified in the field.

Alfred W. Petchaft, Esquire
314 North Broadway
St. Louis 2, Missouri

Dear Mr. Petchaft:

The preliminary draft of the proposals of the St. Louis Area Committee is rich and full of constructive ideas. In thinking about them, we feel that the proposals can be most expeditiously carried out at this stage of the educational program by utilizing the material as it is being developed. With this in mind, we would like to make the following suggestions:

1. It occurs to us that a judicious selection and rewriting of material from the

transcript of the seminars should produce suitable manuals for use in the schools.

2. *The transcripts, especially if school officials participate in the seminars, should provide useful* teaching *and* reference *materials for the St. Louis area.*
3. *A speaker from the national office of the Foundation should be made available to participate in the area seminars.*

The preparation of volumes of a kind you mentioned would seem to be too ambitious an undertaking for the very modest resources which we have available at the present time for the purpose of the educational program. The many smaller scale manuals resulting largely from the seminars could quickly and at relatively low cost achieve the objectives that we have in mind. Of course, this does not rule out the preparation of comprehensive volumes, but the small manual approach will facilitate the achievement of our aims more easily, more quickly, and with a smaller initial investment.

We are considering publishing excerpts from your thoughtful proposals in the Educational Activities section of the Journal. *A presentation of these excerpts should provide helpful suggestions to our readers in other areas of the country. This will encourage a healthy cross fertilization of ideas.*

Again, let me say how pleased I am to see how really productive the St. Louis Area Committee is under the leadership of its very capable chairman, and I am looking forward to hearing from you further.

Cordially,
L. JAMES HARRIS, *Executive Director*
The Patent, Trademark, and Copyright Foundation of The George Washington University
Washington, D. C.

TEXTBOOK SURVEY (E-2)

Dean O. S. Colclough, Director
The Patent, Trademark, and Copyright Foundation
The George Washington University
Washington 6, D. C.

Re: High School Textbooks

Dear Dean Colclough:

With further reference to my letter of December 8, 1958, I have now had an opportunity to review the fifteen high school textbooks dealing with Economics, Social Studies, and American History and Government. Of these, I find that only six make no reference at all to patents or the patent system although a few do discuss the role of invention in our economic evolution. Two contain a very brief but inadequate reference to the patent system while only five contain a

description of the patent system which is adequate in the light of the scope of the subject matter covered by the book as a whole. On the other hand, one of the textbooks [name omitted] contains a horrible misstatement about patents. A copy of this misstatement is enclosed [copy not reproduced and following sentence omitted].

I have drafted and enclose herewith a brief description of our patent system which I propose to send to the publishers of each of the books which contains either no reference or an incomplete reference to our patent system. However, before doing so, I should like to clear this statement with you and get the benefit of your comments and suggestions.

It has always seemed to me that the Report of the National Patent Planning Commission, referred to at the end of the statement, was an authoritative and most convincing document. In transmitting the enclosed statement to the publishers I intended to elaborate a little more, both upon the makeup of the Commission and some of its other conclusions.

I would appreciate your comments and suggestions.

With kind regards,

Sincerely,
LAURENCE B. DODDS,
Advisory Council
The Patent, Trademark, and Copyright Foundation

THE PATENT SYSTEM

Laurence B. Dodds

Our patent laws stem from the provision of the Constitution, Article I, Section 8, granting Congress the power "to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." Their purpose is to stimulate invention and encourage the development of new products. The industrial leadership of our country is due, to a great extent, to these laws.

The patent system accomplishes their purpose in two ways. First, because of the protection given an inventor by a patent, an incentive exists for him, or for a company for which he works, to spend time and money developing new products without fear of a competitor immediately taking advantage of his efforts by copying his invention. Without the prospective protection of a patent grant, few individuals or companies could afford to spend vast sums of money in research and development and the people would thus be deprived of many things that are now taken for granted.

Second, competition is stimulated by patents. As soon as one man patents and puts on the better product, his competitor is at a disadvantage. To overcome the handicap, that competitor must in some way improve his product. The result is that in trying to overtake his rival he often makes a better invention himself. This cycle repeats and repeats, with the result that products get better, each successful invention contributing toward raising the standard of living.

A patent grants to the inventor the right to exclude others from making, using, and selling the invention covered by the patent for a period of 17 years, in return for which the inventor is required to describe the invention fully so that anyone may understand and be able to practice it at the expiration of the 17 years. In the meantime, the inventor may license others to use the invention or may sell the patent outright to anyone willing to spend the necessary money to put the invention on the market.

The patent system is the chief bulwark for many small businesses whose very existence depends upon the use of patents to protect their developments against piracy. The merits of the patent system are attested by the First Report of the National Patent Planning Commission appointed by the President in 1941, a Commission composed of national leaders in the fields of education, research, business, and labor. That Report included the following conclusion:

> The American patent system established by the Constitution giving Congress the 'power to promote the progress of science and useful arts,' is over 150 years old. The system has accomplished all that the framers of the Constitution intended. It is the only provision of the government for the promotion of invention and discovery and is the basis upon which our entire civilization rests.
>
> The strongest industrial nations have the most effective patent systems, and after a careful study, the Commission has reached the conclusion that the American system is the best in the world.

Laurence B. Dodds, Esquire
Advisory Council
The Patent, Trademark, and Copyright Foundation

Dear Mr. Dodds:

I was very happy to receive your letter of March 5, 1959 and the enclosed drafts.

We plan to make excerpts for inclusion in the Educational Activities Section of the Journal. *We also plan to send copies to the Chairmen of the Area Committees of the Foundation for their suggestions and comments. We hope to benefit from the exchange of ideas with them.*

I am quite pleased with the progress you made on your survey and will write you again after we have received area comment.

With best wishes,

Sincerely,

O. S. COLCLOUGH, *Director*

The Patent, Trademark, and
Copyright Foundation
The George Washington University
Washington, D. C.

MEMORANDUM

TO: Chairmen of the Area Committees

SUBJECT: Educational Program For Young People

The enclosed copy of a letter from Mr. Laurence B. Dodds of March 5, 1959 and his accompanying drafts are being sent to the Chairmen of the Area Committees of the Foundation for their suggestions and comments.

Mr. Dodds, a member of the Advisory Council of the Foundation, has been engaged on a project complementary to our Educational Program to improve the knowledge of young people with respect to the patent and related systems. He has undertaken a limited survey of his local high schools to determine the types of references to the patent system in the textbooks they use, sociology, economics, etc.

We hope to benefit from the exchange of ideas with our Area Chairmen and plan to report on this activity in the Educational Activities Section of the *Journal.*

PROGRAMS BY OTHER ORGANIZATIONS

A number of other educational activities for young people have come to our attention:

Philadelphia Public Information Program on the Patent System

A communication has been received from Mr. Howard I. Forman, Chairman of the Public Relations Committee of the Philadelphia Patent Law Association, who informs us of the current status of an educational program being developed by the Association in cooperation with The Franklin Institute, the Administration Office of the School District of Philadelphia, and the United States Patent Office. The program includes an open house for Philadelphia high school students at The Franklin Institute, with guided tours of the Patent Office mechanical exhibit which will be on display. The feature talk will be given by Virgil E. Woodcock, prominent local patent attorney and past president of both the American and Philadelphia Patent Law Associations. It is planned to make this an annual, or semi-annual, event. The Committee is also making arrangements to give talks on the patent system in schools and colleges throughout the city.

Visits to AEC Laboratories

More than four thousand high school editors and science students observed the birthday of Thomas A. Edison on February 11 with visits to Atomic Energy Commission laboratories and production facilities throughout the United States. Special programs at eleven of the Commission's key facilities supported the Science Youth Day observance of the 112th anniversary of the famous inventor's birth. Students observed the complex scientific equipment in operation and talked

to the men who operate it. This provided an opportunity for on-the-spot impressions of actual nuclear science projects. Most of the student visitors were selected for their aptitude in science or ability to report what they saw. Almost all the groups were accompanied by faculty advisors who thus had an opportunity to see the principles they had demonstrated in the classroom employed on a large scale in the AEC laboratories.

Thomas Alva Edison Foundation Institute

The Thomas Alva Edison Foundation held its Ninth Institute appraising "Science Education" at the University of Cincinnati in November 1958.

Panel topics surveyed in the two-day conference on high school science and mathematics programs included:

Problems in the Guidance of Science Students
Educational Television and Science Education
New Developments in Science Curricula
New Developments in Mathematics Curricula

The late Dr. Charles F. Kettering, who was a member of our Advisory Council, participated in the Institute as president of the Thomas Alva Edison Foundation.

Final Report of the President's Committee on Scientists and Engineers

In its final report to the President, the President's Committee on Scientists and Engineers (December 1958) makes reference to a continuing program of emphasizing science activities among the nation's secondary schools to bring the attractions, opportunities, and educational requirements of careers in science and engineering to the attention of high school students. This program was launched in October 1958, and October was designated National Science Youth Month. A large number of educational, professional, civic, and governmental organizations are cooperating in this program, which is designed to inspire and inform Young America to meet the challenge of science and engineering careers and to enable the government to compete for its share of young people in these career fields.

BOOK REVIEW

FOREIGN COMMERCE AND THE ANTITRUST LAWS by Wilbur Lindsay Fugate. The Trade Regulation Series, ed. S. Chesterfield Oppenheim. Boston: Little, Brown and Company. 1958. 384 pp. $16.00.

Reviewed by EPHRAIM JACOBS*

UNQUESTIONABLY MR. FUGATE'S BOOK will be of tremendous assistance to any lawyer who has a problem or an intellectual interest in the foreign commerce aspects of antitrust law. In this carefully organized and footnoted treatise, Mr. Fugate probes painstakingly into practically every significant antitrust case relating to foreign commerce. This is an undertaking of considerable magnitude, as the period starting in the 1940's has been the golden era of antitrust enforcement in the foreign commerce field.

In a sense this is more than a book on foreign commerce, since the author on many occasions analyzes the state of the law in the domestic field as a background for his discussion of foreign commerce problems. Thus, on a number of subjects we are given a thumbnail sketch of the application of the antitrust laws to practices in domestic as well as in foreign commerce. For those who believe that different antitrust standards should apply in the foreign commerce field, Mr. Fugate's method of reasoning from domestic to foreign problems may not be acceptable. But he is more concerned with outlining what he thinks the law is, not what it should be. This is one reason lawyers should find the book so helpful. As the author states in his introduction, "It is better to face the fact of the application of the antitrust laws to foreign commerce than to indulge in wishful thinking that they apply only to purely domestic situations." He is careful to emphasize, however, especially with respect to activities conducted abroad, that they are subject to our antitrust laws only if they have a substantial effect upon our foreign commerce or operate within United States territory. "Our courts have assumed jurisdiction under the antitrust laws," he states, "over acts and contracts substantially and directly affecting, or interfering with, United States foreign trade even though such acts were done, or contracts executed, outside of our borders."

After initial chapters which deal with the basic philosophy and general interpretation of the antitrust statutes and with fundamental jurisdictional problems, the book then considers the legal pros and cons of the principal practices and devices involved in court opinions and in cases instituted by the Government and private

* Mr. Jacobs is a member of the firm of Hollabaugh and Jacobs, Washington, D.C. He was formerly Chief, Legislation and Clearance Section, Antitrust Division, Department of Justice.

parties. Discussed specifically are pricing and market-sharing arrangements, foreign distributorships, refusals to deal, and monopoly in foreign trade. Problems relating to the use and licensing of patents, technology and trademarks are fully presented, as are the cases which delineate the metes and bounds of permissible foreign activity through subsidiaries, joint exploitation and other methods of foreign investment.

A chapter on the nature of antitrust relief in foreign trade informs us, through a discussion of particular cases, how courts have made the punishment fit the crime. We learn that in appropriate cases courts will order American defendants to compete in foreign markets; will decree divestiture of stock in foreign corporations; will require the licensing of foreign patents; and will direct that American defendants give immunities under their foreign patents to permit exports by other American companies to the countries in which such patents exist. Special problems may arise with respect to relief against foreign corporations over which our courts have obtained jurisdiction. Typical decree provisions, taking into account some of these problems, were included in the final judgment entered in *United States* v. *Imperial Chemical Industries, Ltd., et al.,* 100 F.Supp. 504, 105 F.Supp. 215. There, paragraphs 3 and 4 of Article IV of the judgment provided:

> 3. No provision of this judgment shall operate against ICI for action taken in compliance with any law of . . . any foreign government or instrumentality thereof, to which ICI is at the time being subject, and concerning matters over which, under the law of the United States, such foreign government or instrumentality thereof has jurisdiction.
>
> 4. In their application to ICI and ICI (NY), the provisions of this judgment are intended to relate exclusively to acts, agreements, arrangements or understandings which concern the foreign or domestic commerce of the United States.

Provisions such as these indicate that our courts carefully attempt to avoid impinging on the sovereignty of foreign governments, and will subject foreign corporations to an antitrust decree only with respect to activities which affect the foreign or domestic commerce of the United States.

The chapter on patents and technology is typical of the author's careful and logical handling of his subject matter. He explains that much of his discussion relates to a description of the scope of United States patent rights and to permissible restrictions and conditions which may be included in licenses of United States patents. This procedure is necessary because a knowledge of the principles enunciated in domestic cases is a prerequisite to appraising the relationship of United States patents to foreign trade. The constitutional basis for the issuance of patents is discussed, as well as the nature of the grant under United States patents. Thereafter, Mr. Fugate takes up in detail the antitrust problems that may arise, and have in fact arisen, in the utilization and licensing of patents in domestic and foreign commerce. He notes that the Supreme Court has stated that the "progress of science and useful arts" is the primary purpose of the patent grant, and reward to the inventor, though important, is a secondary consideration. A patentee does not have carte blanche with respect to activities relating to his patent; he must remain within the scope of his legal monopoly, or else he might find that he has subjected himself to the hazards of the antitrust laws.

Mr. Fugate refers to a case many years ago in which it was argued that, since a patentee might legally withhold his patent from public use, he should be permitted to impose any condition he desired in the event he chose to license it. The Supreme Court would not accept this reasoning, and stated:

> The defect in this thinking springs from the substituting of inference and argument for the language of the statute, and from failure to distinguish between the rights which are given to the inventor by the patent law and which he may assert against all the world through an infringement proceeding, and rights which he may create for himself by private contract, which, however, are subject to the rules of general, as distinguished from those of patent, law.*

The character of the restrictions or conditions embodied in an agreement relating to patents, or in patent licenses, is, therefore, of great significance antitrustwise, and the author undertakes a full analysis of the practices that have been the subject of scrutiny by the courts in antitrust cases. He includes restrictions on price, territorial limitations, licensing of future patents and grant-backs, restrictions on field of manufacture and use after sale, tying or tie-in clauses, cross-licensing problems, and patent pools. In his discussion of territorial limitations, he includes examples of practices that would, in his opinion, fall outside the scope of legal patent protection. He says (p. 199):

> When we come to territorial restrictions as to imports, a patentee may grant an exclusive license under his foreign patents and state therein that no license is granted under his corresponding United States patents. Thus he would reserve his right to sue for infringement should any patented articles be imported, and to invoke the provisions of the Tariff Act of 1930 to keep out such imports. If he goes further and obtains a covenant by the foreign licensee not to ship goods made abroad to the United States, this goes beyond patent rights, since, irrespective of the validity of the United States patents, the license alone would prevent imports. Conversely, a patentee may grant a license under his United States patents and reserve all rights under his foreign patents. By so doing, he can sue for infringement in the foreign countries where patents have been obtained if articles covered thereby are imported, and in some countries, he can also keep such articles from even coming into the country. An agreement exacted from the United States licensee not to export, however, would appear to go beyond the bounds of the patent monopoly and to substitute contract restrictions for patent restrictions.

This book is based upon a thesis which the author submitted in fulfillment of the requirements for his S.J.D. degree at The George Washington University Law School. As part of the Trade Regulation Series, edited by Professor S. Chesterfield Oppenheim, its goal is to "present the law with the greatest possible clarification, as a guide for the general practitioner who has little experience in this field, for the economist or business executive who wants to be quickly oriented in one of the areas covered, and for the specialist who desires a ready reference tool." Mr. Fugate's book admirably achieves its goal. If it understandably does not discuss every question that might arise, it nevertheless comes as close to doing so as anyone might reasonably expect. The author, who has been a trial attorney in the Antitrust Division for 11 years, points out that he has generally taken a "conservative" view as to what may be done in foreign commerce under the antitrust laws. But he has not been conservative in his willingness to face and discuss many of the difficult problems to which there are no pat answers.

* Motion Picture Patents Co. v. Universal Film Co., 243 U.S. 502, 514 (1917).

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NOTES

Director to Receive Jefferson Medal

O. S. Colclough, Director of the Foundation, has been named recipient of the Jefferson Medal, awarded by the New Jersey Patent Law Association. Director Colclough will be honored at the annual Jefferson Medal Dinner to be held May 7 at the Hotel Robert Treat, Newark, New Jersey.

The Jefferson Medal is awarded annually to an individual who has made notable contributions to the American Patent System. Director Colclough has, since its inception, furnished the guidance and effective leadership for "this unique organization, which today is virtually universally supported by those public institutions, private enterprises and individuals interested in the American Patent System."

In addition to his Foundation responsibilities, Director Colclough is also serving as Dean of Faculties and Acting President of The George Washington University.

Director Colclough, who holds the rank of Vice-Admiral (ret.), served during World War II as Commander, Submarine Division 101; Commander, Submarines, North Pacific Force; Chief of Staff and Aide to the Commander, North Pacific Force; and Commanding Officer of the battleship *North Carolina*. He was also the Judge Advocate General of the Navy.

Jefferson Medalists in previous years have been Dr. Charles F. Kettering, Judge Learned Hand, Dr. Vannevar Bush, Professor S. Chesterfield Oppenheim, Mr. P. J. Federico, Judge Giles S. Rich, Mr. George E. Folk, and United States Commissioner of Patents Robert C. Watson.

Note on Surveys and Sampling in Unfair Trade and Trademark Litigation

JOSEPH ROSSMAN*

The interdisciplinary development of psychology, statistics and trademark law has received stimulation in recent years. The courts and the Patent Office are more favorably inclined to accept as evidence properly conducted public polls and surveys. The literature on this subject is meager and scattered. The following bibliography may be helpful to students of this topic.

* Dr. Rossman is a member of the Research Staff.

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Chun King Sales, Inc. v. Oriental Foods, Inc., (S.D. Calif. 1954) 108 USPQ 400.

The Coca-Cola Co. v. Snow Crest Beverages, Inc., 162 F.2d 280, 73 USPQ 518 (CCA1, 1947).

The Coca-Cola Co. v. Victor Syrup Corp., 97 USPQ 478 (Pat. Off. 1953) aff'd. 116 USPQ 176 (CCPA 1958).

Hawley Products Co. v. U.S. Trunk Co., 118 USPQ 424 (CCA1, 1958).

Great Atlantic & Pacific Tea Co. v. A. & P. Corp., 118 USPQ 560 (N.J. Sup. Ct. Appellate Div. 1958).

Household Finance Corp. v. Federal Finance Corp., 94 USPQ 222 (D.C. Ariz. 1952).

International Milling Co. v. Robin Hood Popcorn Co., 110 USPQ 368 (Pat. Off. 1956).

Philco Corp. v. F. & B. Mfg. Co., 170 F.2d 958 (CCA7, 1948) 79 USPQ 376.

S. C. Johnson & Son, Inc. v. Gold Seal Co. 90 USPQ 373 (Pat. Off. 1951).

Laskowitz v. Marie-Designer, Inc. 119 F. Supp. 541 (S.D. Col. 1954) 100 USPQ 367.

Sears, Roebuck & Co. v. All States Ins. Co., 114 USPQ 19 (CCA5, 1957).

Sears, Roebuck & Co. v. Johnson, 219 F.2d 530 (CCA3, 1955) 104 USPQ 289.

Standard Oil Co. v. Standard Oil Co., 110 USPQ 122 (D.C. Wyo. 1956) aff'd. 116 USPQ 176 (CCA10, 1958).

Sunbeam Lighting Co. v. Sunbeam Corp. 183 F.2d 969 (CCA9, 1950) 86 USPQ 240.

Annual Public Conference

THE THIRD ANNUAL PUBLIC CONFERENCE of The Patent, Trademark, and Copyright Foundation will be held on June 24 and 25, 1959, at the Mayflower Hotel, Washington, D. C.

The Conference is an occasion for the presentation and discussion of the research findings of the Foundation, and discussion of current issues important in the fields of the Foundation's interest from which the Foundation itself may derive guidance on the planning of its future work. The Conference also provides an opportunity for people from different branches of learning and fields of endeavor who have a common interest in the patent and related systems to meet and enlarge their perspectives by participating in the stimulating and productive exchanges and contacts of the Conference.

The research work of the Foundation represents the first university attempt at a comprehensive study of the patent, trademark, copyright, and related systems in the United States. This study is systematically planned and coordinated, inter-disciplinary in nature and utilizes a combination of specialities such as economics, statistics, psychology, sociology, and law; and empirical, that is, based on the facts gathered by the staff on the actual operation of the systems.

In attendance at this third Annual Public Conference will be key representatives from the different fields of activity throughout the nation; commerce, education, science, manufacturing, labor, finance, and the professions.

The program follows:

WEDNESDAY, JUNE 24, 1959

7:30 p.m. RECEPTION

8:30 p.m. DINNER honoring ROBERT C. WATSON, United States Commissioner of Patents, the recipient for 1958 of the "Charles F. Kettering Award for Meritorious Work in Patent, Trademark, and Copyright Research and Education."

PRESENTATION OF THE AWARD: address by COMMISSIONER WATSON

THURSDAY JUNE 25, 1959

8:00 a.m. REGISTRATION

LAWRENCE R. HAFSTAD, *Moderator*

9:30 a.m. REPORT ON THE FOUNDATION'S PROGRESS *

O. S. COLCLOUGH, *Director*; S. CHESTERFIELD OPPENHEIM, *Advisor on Research*; L. JAMES HARRIS, *Executive Director*

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* Reports cover Foundation work in progress.

10:00 a.m. PRICING, ANTITRUST, EUROPEAN COMMON MARKET, AND OTHER PROBLEMS IN FOREIGN LICENSING *

Report presented by J. N. BEHRMAN, *Principal Investigator* and WILSON E. SCHMIDT, *Associate Investigator*

Discussants

JOSEPH S. CARDINALE, Momsen & Freeman, New York

PAUL N. WEIL, *President*, Pegasus International Company, New York

10:50 a.m. TAX PROBLEMS OF THE INDIVIDUAL INVENTOR *

Report presented by ROBERT B. BANGS, *Principal Investigator* and JOHN F. CREED, *Research Associate*

Discussants

SCOTT P. CRAMPTON, Prince, Taylor & Crampton, Washington, D. C.

RALPH H. DWAN, Sharp & Bogan, Washington, D. C.

11:40 a.m. PATENTS AND OTHER FACTORS IN THE CREATION AND GROWTH OF SMALL FIRMS: A PRELIMINARY SYNTHESIS *

IRVING H. SIEGEL, *Principal Consultant*

12:05 p.m. VARIATIONS IN PATENT UTILIZATION BY DIFFERENT TYPES OF COMPANIES *

JOSEPH ROSSMAN and BARKEV S. SANDERS, *Co-Principal Investigators*

12:30 p.m. LUNCHEON

2:00 p.m. COMPULSORY LICENSING AND COLOR MOVIES: EFFECTS OF TECHNICOLOR AND EASTMAN ANTITRUST DECREES *

Report presented by S. CHESTERFIELD OPPENHEIM, *Principal Consultant* and GEORGE E. FROST, *Principal Investigator*

Discussants

JOHN T. CHADWELL, Snyder, Chadwell, Fagerburg & Keck, Chicago

HAMMOND E. CHAFFETZ, Kirkland, Ellis, Hodson, Chaffetz & Masters, Chicago

3:00 p.m. SPECIAL SESSION DEVOTED TO DISCUSSION OF CURRENT ISSUES

This session will be so organized as to encourage maximum participation from the floor.

MODERATOR: JOHN C. GREEN, *Consultant to the Foundation*

SPEAKERS: DONALD L. BROWN, *Vice President*, Polaroid Corporation, Cambridge, Massachusetts

HENRY E. FORD, *Director of the Development Department*, E. I. du Pont de Nemours & Company, Wilmington, Delaware

DAVID S. KANE, Kane, Dalsimer & Kane, New York

COLSTON WARNE, *Professor of Economics*, Amherst College; *President*, Consumers Union of the United States, Mount Vernon, New York

WALLACE WATERFALL, *Secretary and Treasurer*, American Institute of Physics, New York

5:30 p.m. Adjournment of Conference

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* Reports cover Foundation work in progress.

The Role of the Law in Research Competition

GEORGE E. FROST*

"I can invent only under a powerful stimulus.
No competition means no invention."—*Thomas Edison*[1]

COMPETITION IN INVENTION—research competition—is a vital and sometimes overlooked aspect of American free competitive enterprise. Its importance has increased as the economy as a whole has depended more and more on technical development. Today both our material progress and the national defense rest on the nation's success in this field. It is accordingly of vital importance that the bar be cognizant of the basic laws that guard and encourage this competition. Let us turn first, however, to a consideration of the competitive process itself.

Evidence of research competition appears on every hand. Newspapers and magazines abound with comment on new products and processes developed through competitive research and with announcements of the construction of new laboratory facilities. Stock analysts carefully study not only the traditional accounting and sales figures, but also the extent of research and development effort and accomplishment in relation to competitors. Annual reports likewise reflect the change. No longer do they boast of profits made on the tried and true products of the past. Instead they speak proudly of the new products and processes of the present and point to the proportion of sales volume in products developed through recent research.

But this is only part of the story. Pioneering research and development activity has left an impressive record in the creation and growth of new business enterprise. This is a record of competition at its best. Time and again, newcomers—armed with a fresh approach and not burdened with a false sense of the impossible—have challenged the old line concerns with new products and new processes. Polaroid Corporation, which entered the camera and film field in 1948 with the "Land" camera, is a conspicuous recent example.[2] Another is Thiokol Corporation, now in the limelight as the source of solid rocket propellant. In 1933 this company commenced production of the first synthetic rubber in the United States, a prod-

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* Mr. Frost is a member of the Research Staff. A more detailed exposition of the views of the author on the role of patents in stimulating research competition is given in *The Patent System and the Modern Economy*, S. Doc. 22, 84th Cong., 2d Sess.

[1] Harold C. Passer, *The Electrical Manufacturers: 1875–1900* (Cambridge: Harvard University Press, 1953), p. 322.

[2] See e.g., Hearings before the Subcommittee on Patents, etc., Committee on the Judiciary, United States Senate, Oct. 10-12, 1955, pp. 265-7.

uct developed by Dr. Joseph G. Patrick of Kansas City.[3]

These newcomers are conspicuous for their record of doing what the "pros" thought impossible. The cellophane adhesive tape was brought into being by a chemist in a small concern after a giant chemical manufacturer—despite its much larger staff—had failed to develop the product.[4] It was a small lamp manufacturer who saw the possibilities in the wire type photoflash lamp and successfully invaded this market against the established larger concerns.[5] It was Edison—not the established gas utilities or the manufacturers of equipment for gas distribution—who saw the possibilities of central station electric system operation and developed the first distribution system.[6] Then Edison —now one of the "pros" himself— misjudged the possibilities of alternating current and for a period lost out to Westinghouse.[7] We could continue with endless examples—all demonstrating the preoccupation of established industry with existing techniques, failure of the "pros" to recognize the worth of radical developments, and the value of fresh business enterprise in bringing about important new developments.

Competitive research is important for another reason—its effectiveness. As Edison put it "no competition means no invention." His canny observation accords with modern experience—for nothing stimulates successful research as much as knowledge that others are seeking the same end. The competitive process rewards success and penalizes failures. It gives maximum opportunity for the pursuit of long-shot chances that so often lead to major technological breakthrough.[8] It allows minimum room for the bureaucratic planning that may substitute impressive project plans and profound reports for practical results. These considerations have led students of government research and development to urge that strong commercial incentives such as manufacturing orders be provided when such research and development is performed well, and that penalties

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[3] *From Rubber to Rockets,* Thiokol Chemical Corp., 1956. See also, Thompson, "The Rocketing Fortunes of Thiokol," *Fortune,* June 1958, p. 106.

[4] Technical Tape Corp. v. Minnesota Mining and Mfg. Co., 143 F. Supp. 429, 432 (S.D. N.Y. 1956), aff'd 247 F. 343.

[5] Arthur A. Bright, *The Electric Lamp Industry* (N.Y.: Macmillan, 1949), pp. 340-1.

[6] Passer, *supra* note 1, pp. 78-128.

[7] *Id.,* pp. 129-150. Edison—despite his initial pioneering developments—also missed key second generation developments in the phonograph and the motion picture.

[8] There are, of course, numerous examples to illustrate the ever-present risk that research will not pay off. See e.g., "The Poignant Tale of A Miracle Fibre Named Vinyon HH," *Wall Street Journal,* August 5, 1957. Standard Oil of New Jersey invested some $1,500,000 in a process that proved worthless. See Hearings before the Senate Committee on Patents, on S. 2303 and S. 2491, 77th Cong. 2d Sess., p. 5199. And see "White Elephant," *Business Week,* September 21, 1957, p. 27.

be provided for substandard results.[9]

The synthetic rubber industry provides a revealing contrast between the efficiency of competitive research and unimpressive results likely to be obtained with non-competitive research. The government invested from four to eight million dollars a year for a period of time in a synthetic rubber research and development program. Concurrently, a small group of companies operating outside the program engaged in research and development on a normal competitive basis. The aggregate outlays of these companies were probably under one and one-half million dollars per year. Yet it is reported that nearly all of the major technical developments in the industry came from the companies operating outside the government program.[10]

Like all forms of business competition, research competition requires both the freedom to compete and a compulsion to compete. The antitrust laws are directed to maintaining the freedom to compete. Happily, the courts in antitrust cases have been conscious of the importance of research competition and have struck down practices found prejudicial to such competition.[11] On the positive side, the patent system provides the compulsion to engage in research competition, both in terms of rewarding outstanding research accomplishment and in terms of penalizing business concerns whose research results are below par. The patent system has, however, been the subject of debate and controversy that has obscured its important place as the major legal device to assure that businessmen really do compete in technical matters.[12]

The newcomer entering an existing industry with a new product or new process represents competition in its finest form. To him the patent grant is of key importance. His established rivals have the advantages of going concern, existing reputation, established customer and supplier relations, and many others. In most instances an established concern can sit by and watch the newcomer go through all the problems in perfecting and marketing the

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[9] Schlaifer and Heron, *Development of Aircraft Engines and Fuels* (1950), pp. 60, 83; "Penalty is Urged for Defense Lags—Quesada Tells Contractors That 'Guaranteed Reward' Is Given for Mediocrity," *New York Times*, September 26, 1958, p. 5. The problem of injecting competitive forces has prompted one commentator to call for a more competitive atmosphere at all levels of military research. In his words "we need more competition, duplication and 'confusion' in our military research and development programs." Klein, "A Radical Proposal for R. and D.," *Fortune*, May 1958, p. 112.

[10] Solo, "Research and Development in the Synthetic Rubber Industry," 68 Quart. Jl. Econ. (1954) p. 61.

[11] E.g., United States v. National Lead Co., 332 U.S. 319, 359 (1947); United States v. Aluminum Co. of America, 91 F. Supp. 333, 409-410 (S.D. N.Y. 1950); United States v. General Electric Co., 82 F. Supp. 753, 814-816 (D. N.J. 1949). However, a number of consent decrees in antitrust cases condition the availability of royalty free license under the decrees on a like license from the applicant. These decree provisions appear to favor the indolent enterprise that has neither strived nor succeeded in contributing to technical progress. It is difficult to reconcile these decree provisions with the competitive objective of the Sherman Act.

[12] The conflicting viewpoints are summarized in Oppenheim's *Cases on Federal Antitrust Laws* (1948), pp. 464-496.

new product or process. Then, when success is assured, it can move in with its greater resources to displace the innovator. Time and again these considerations have prompted representatives of small business to object to compulsory licensing and other legislative proposals believed to weaken the patent system.[13]

The problems of the newcomer are especially acute when he is an individual pursuing a revolutionary development. This does happen. It happens today. It has become the fashion to discount the "attic inventor," and, indeed, in the traditional form of uninformed tinkerer, he is a thing of the past. But we still have a small class of technically informed individualists who pursue scientific work and derive support in one way or another from patent rights. The importance of this group is out of all proportion to its small numbers as compared to employed research personnel. A sobering example is found in Commander Whittle of England. His individual efforts in the face of an indifferent government and an indifferent industry put England well ahead of the United States in the turbojet aircraft engine development.[14] The German air forces had turbojet planes in being toward the end of the war. It was only good fortune and belated efforts based on Whittle's pioneering that prevented Allied military catastrophe. At one low point, Commander Whittle was able to procure the finances to build a crucial experimental engine only because of his British patent rights. Characteristically, the turbojet engine was developed in several countries more or less simultaneously, but in no instance did an established aircraft engine or turbine manufacturer pioneer in the development.

Another example of an individual engaged in research is Samuel Ruben.[15] In recent years he has developed the magnesium copper-sulfide dry rectifier, the dry electrolytic capacitor, the mercury battery and other products. His income is derived from patent licenses.

But this is only one side of the coin. The newcomer—and the prospect of a newcomer—is an ever-present threat to established business concerns. Failure to maintain the technological pace opens the door for a newcomer or smaller competitor to exploit a fruitful technology and obtain patent rights foreclosing the established industry leader or requiring the payment of substantial royalties. Time and again the profits in antitrust cases have brought out the efforts of large business enterprise to prevent this from occurring—and the courts have quite properly criticized such efforts.[16] To be sure, there are some giant concerns that do not conduct research with the objective of obtaining patent rights, but these concerns must nevertheless maintain their research pace to avoid dis-

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[13] E.g., Hearings before Committee on Patents, House of Representatives, on H.R. 9259, H.R. 9815, and H.R. 1666, 75th Cong., 3rd Sess., March 21-25 and 28-31, 1938.

[14] Schlaifer and Heron, *supra* note 9, pp. 333-348; Jewkes, Sawers, and Stillerman, *The Sources of Invention* (1958), p. 315.

[15] *Progress . . . in electrochemistry*, P. R. Mallory & Co. (1956).

[16] E.g., United States v. General Electric Co., *supra* note 11.

placement by their smaller competitors, armed with patent rights.[17] The pharmaceutical industry provides an illustration of how the patent system both encourages outstanding research and compels business concerns at least to match the research pace of their rivals. Here we have an entire industry founded on research. It exists only because chemical and biological research has led to the vast variety of pharmaceutical products sold today. After extensive study of a major branch of this industry, the Federal Trade Commission reported in June 1958 that:

> . . . there has been a strong impetus to research and development in the antibiotics industry as a result of the competition among rival pharmaceutical houses in the race to obtain patents on individual antibiotic products.[18]

A commentator on the industry has observed:

> . . . Changes come thick and fast. Demand for each new wonder drug as it hits the market is tremendous. Fierce competition springs up overnight. Research moves ahead at breakneck speed. The drug is improved and modified; production time is cut; costs are slashed; the price of the drug drops like a plummet. Then, before the smoke has cleared, somebody comes out with another antibiotic—and the cycle starts all over again.
>
> . . . shouldering a big part of the burden—if not most of it—are research scientists.
>
> . . . not only are they under pressure to beat existing competition on existing drugs; they're under pressure to beat the field to new drugs. . . .[19]

The patent system is nevertheless frequently criticized. Foremost among the criticisms is that a patent is a "monopoly" because it gives the right to exclude others from making, using, and selling the invention. Semantic contentions can be made in support of or against this contention, all depending upon how one defines "monopoly." But when we think in terms of actual market power associated with patents, it becomes evident that such power almost always falls far short of trade monopoly.

A practical illustration of the competitive effect of patent rights is found in the Ray-O-Vac litigation.[20] Prior to the war, Ray-O-Vac placed a steel-jacketed flashlight battery on the market. The company guaranteed that the new cell would not leak and offered to replace the entire flashlight if damaged by such leakage. By 1944 the Patent Office had issued a patent on the new cell,

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[17] One analyst has translated the expressed indifference of some giant concerns in patents as the goal of research to an indictment of the patent system. (Melman, *The Impact of the Patent System on Research,* Study No. 11, Senate Subcommittee on Patents, 85th Cong., 2d Sess.) This thesis overlooks the importance of the patent system to normal-sized business, the value of the system in compelling research effort by these giant concerns to avoid displacement by competitors with patents, and the significance of the patent system in offsetting some of the numerous advantages of large established enterprise *vis à vis* the small concern or newcomer. It is interesting to note that despite the expressions that patents are not the goal of their research, representatives of these giant concerns have consistently endorsed the patent system. See e.g., Part 2, TNEC Hearings, p. 344 and Part 3, TNEC Hearings, p. 974.

[18] Federal Trade Commission, *Economic Report on Antibiotics Manufacture* (1958), p. 226.

[19] *Business Week,* September 26, 1953, p. 186.

[20] The Goodyear Tire & Rubber Co. v. Ray-O-Vac Co., 321 U.S. 275 (1944).

the District Court had held the patent valid and infringed by a competitor, and the Court of Appeals and the Supreme Court had both affirmed the judgment of patent validity and infringement. The improvement was the utmost in simplicity, and one of the kind that invites debate on whether it really was beyond "the skill of the art" as required for a patent. The effects on the industry, however, leave no room for argument. Ray-O-Vac moved from a secondary to a primary position in the field of flashlight battery manufacture. But the competition continued to sell substantial quantities of batteries. Within a few years after the Supreme Court decision, the major concerns had devised their own leakproof cells for which they were able to make the same flashlight replacement guarantee as was exploited by Ray-O-Vac. As the manufacturer of the infringing battery testified:

> . . . having been enjoined didn't mean that we were going to stop our work. We were trying to develop another cell that did not infringe in any way.[21]

The Ray-O-Vac patent gave the company a substantial competitive advantage, but during its entire life, there was the most active competition in flashlight battery manufacture and sale.[22] Whatever Ray-O-Vac had, it certainly was not "monopoly."[23]

Friends of competitive free enterprise can take pride in the emphasis placed on research competition by American business today. The law has played a significant role in protecting, encouraging, and compelling this competition. Small and medium-sized businesses are being formed and are growing—in many instances upon the basis of a patented new product or process overlooked by the larger rivals. Large business faces the risk of displacement by smaller competitor or newcomer armed with patent rights and is accordingly forced to maintain its own level of research. The resources of competitive enterprise have been harnessed to carry on vitally important technical programs. This has been properly termed "the most desirable form of competition."[24]

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[21] General Dry Batteries v. Ray-O-Vac Co., Patent Office Opposition No. 30,041, Deposition of Walter A. Onerato, p. 164. And see 104 USPO 347,353 (Comm'r. of Patents, 1955).

[22] It is particularly significant to note that all of the leading pre-war flashlight battery manufacturers are still in the business, and that there have been significant new entries into the field, particularly Mallory with the Ruben mercury battery. See *Progress . . . in electrochemistry,* P. R. Mallory & Co., 1956; *Business Week,* March 8, 1958, p. 64; *Business Week,* May 29, 1958, p. 5. Moreover, the prices of flashlight batteries have increased substantially since April 1957, when the Ray-O-Vac patent expired. Ray-O-Vac granted no license under the patent.

[23] The Supreme Court, after a number of decisions seemingly based on the proposition that a patent necessarily gives substantial market power, now apparently rejects any such generalization. In the words of Mr. Justice Black in Northern Pacific R.R. v. United States, 356 U.S. 1, 10 (1958)—"Of course it is common knowledge that a patent does not always confer a monopoly over a particular commodity. Often the patent is limited to a unique form or improvement of the product and the economic power resulting from the patent privileges is slight."

[24] United States v. E. I. du Pont de Nemours and Co., 118 F. Supp. 41, 214 (D. Del. 1953), aff'd 351 C.S. 377 (1956).

Early Patent Records

Mr. L. James Harris, Executive Director
The Patent, Trademark, and Copyright Foundation
The George Washington University
Washington, D. C.

Dear Mr. Harris:

During your recent visit you requested information about records of the Patent Office in our custody. The enclosed Reference Service Report, prepared by Walter W. Weinstein of our staff, describes briefly these records.

I examined recent issues of your *Journal.* Is there a way to borrow each issue to find whether we should purchase copies?

Sincerely yours,

MEYER H. FISHBEIN
Archivist in Charge
Business Economics Branch
National Archives and Record Service

REFERENCE SERVICE REPORT

Inquiry: Description of Patent Office records in the custody of the National Archives.

Report: These records are comprised of the following series:

1. PATENT APPLICATION CASE FILES *("Patented Files") 1836-1900, 5949 linear feet.*

"Patented Files" is a title used by the Patent Office records staff to identify the case files relating to successful applications for patents. A typical file includes the petition for a patent, the petitioner's authorization of power of attorney to the Commissioner, specifications, and claims regarding the invention, a photoprint of the invention (the original drawing is filed separately), a fee receipt, a report by the examiner accepting or rejecting each claim, a rejoiner by the inventor or his attorney containing amended claims, additional reports and rejoinders, the examiner's report allowing claims which have not been rejected, notice of allowance, notice of fee payment, and a printed copy of the patent. The jacket in which these documents are wrapped contains the serial number of the petition; the patent number; the name of the inventor and his address; a brief title of the invention; the dates of the receipt of the petition, affidavit, specification, drawing, model, and fees; and the date the patent was granted. The back of the jacket contains a list of the contents of the jacket: i.e., the application papers, and the title of the invention or improvement. The designation of the class into which the invention or improvement falls is usually stamped on the jacket.

These case files are arranged numerically, beginning with Patent No. 1, issued July 28, 1836, to Patent No. 664,787, issued in 1900.

2. DRAWINGS OF NUMBERED PATENTS. *1836-70. 248 linear feet.*

The Patent Office considers these drawings an integral part of the application. Because of their various sizes they could not conveniently be placed in the dossiers or jackets. In some cases there are reduced copies of the drawings in the jackets, but the reducing process before 1870 often failed to show the inventions in sufficient detail. (After 1870 there are reduced copies of the drawings in each jacket.) Arranged numerically from 1 to 110,499, for the numbered patents described in (1) above.

3. RECONSTRUCTED PATENT APPLICATION *("Name and Date" Patents). ca. 1836-47. 10 linear inches.*

A fire in the Patent Office in December 1836 destroyed the early patent records for the years 1791 through 1836. An Act of March 3, 1837 (5 Stat. 191) provided that ". . . patents issued and assignments executed prior to December 15, 1836, may be recorded anew together with the description, specification of claim and drawings annexed or belonging to the same. . . ." These "Name and Date" patents are the extant textual records that were submitted in accordance with the Act. A typical file includes a written copy of the specification and claim, and a printed copy of the specification and drawing. The jacket in which these documents are wrapped contains date of patent grant, name of patentee, and title of invention. Together with the restored drawings described in (4) below, they constitute all the "restored" files of the Patent Office for the period before June 28, 1836 and relate to some patents issued from 1808-36. Included in this series are occasional requests by patentees for the restoration of patents lost prior to the fire of December 1836. Arranged chronologically by date of original patent grant.

4. DRAWING OF "NAME AND DATE" PATENTS *1837-45. 10 linear feet.*

These drawings of patents for the period 1791-1836 were prepared under authority of the Act of March 3, 1837, from available models and records. A list of these drawings, prepared by the Patent Office, shows the assigned number, name of patentee, and the date of the patent. Arranged numerically, 1X to 9903X.

5. DRAWINGS OF ADDITIONAL IMPROVEMENTS TO PATENTED INVENTIONS *1838-61. 10 linear feet.*

This series is similar to that described in (2) above. Arranged numerically from AI 2 to AI 318.

6. DRAWINGS OF REISSUES OF PATENTS. *1838-70. 10 linear feet.*

This series is similar to that described in (2) above. When patents were reissued, the drawings were re-

moved from the original patent file, renumbered, and placed in a special reissue file. A numerical list of the reissue drawings has been prepared by the National Archives. Arranged numerically from 1 to 4105, with gaps.

7. "REGISTERS" OF RESTORED PATENTS. *Dates Unknown. 10 volumes.*

Forms used for recording patent grants ("Heads of Patents"), apparently prepared during the nineteenth century to duplicate the restored copies of the original grants. Each form contains the name of the patentee, a brief description of the invention, the date the patent grant was signed by the President and the Secretary of State, and the date it was certified by the Attorney General. The information relates to patents granted in the years 1794-1835. Included are photographic reproductions of three Letters Patent submitted in the twentieth century for recording. The volumes are arranged in rough chronological order, and each is indexed alphabetically by name of patentee.

8. "INCOMPLETE PETITIONS". *ca. 1837-54. 5 linear inches.*

These petitions were found scattered among the incoming letters described in (10) below. They were rejected because the petitioner failed to comply with Patent Office procedure. They are now arranged alphabetically by name of petitioner. Similar records were disposed of by the Patent Office under authority of an Act of April 11, 1930 (46 Stat. 156) which authorized the Commissioner of Patents to ". . . annually destroy or otherwise dispose of all the files and papers belonging to all abandoned applications which have been on file for more than twenty years."

9. MISCELLANEOUS CORRESPONDENCE. *ca. 1837-54. 2 linear inches.*

Incoming letters addressed to the Commissioner of Patents from private individuals, petitioners, and patent attorneys, relating to protests with respect to the reissue of patents, the extension of patent rights, reconsideration of specifications submitted, assignment of power of attorney, improvements on patents granted, the recording of caveats, and to patent matters generally. Several outgoing letters of acknowledgement appear in the series. Arranged alphabetically by name of correspondent.

10. LETTERS RECEIVED. *1872-82. 1 linear foot.*

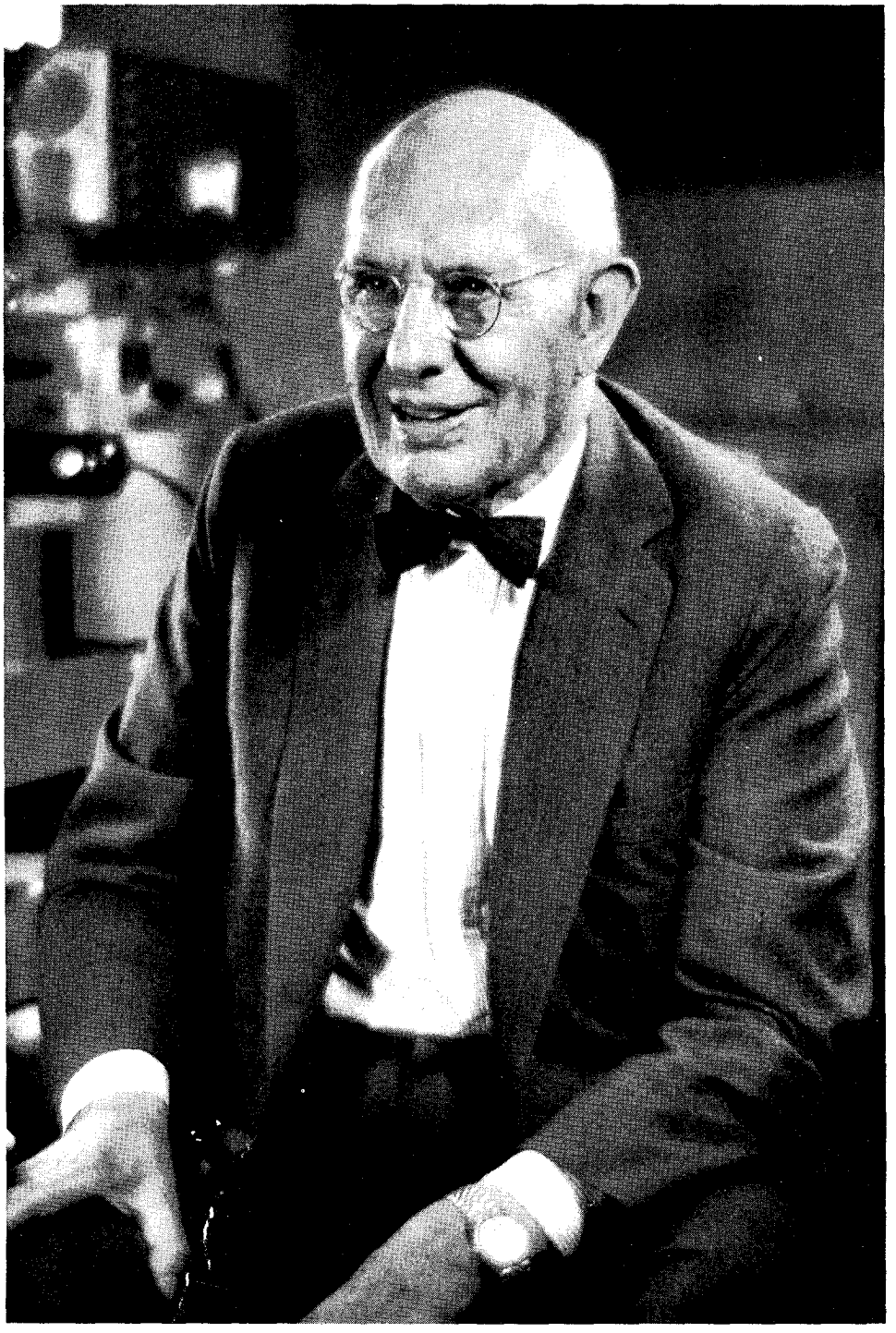
Letters addressed to the Commissioner of Patents from private individuals, patent attorneys, Members of Congress, and officials of other agencies of the Government. They consist chiefly of inquiries about patent law and application procedures, as well as requests for copies of specifications, drawings, and Patent Office publications. Arranged alphabetically by name of correspondent.

New Historical Society

A newly-formed Society for the History of Technology was established at Case Institute of Technology at Cleveland during 1958.

Among the objectives of the Society for the History of Technology are the study of the development of technology and its relations with society and culture.

Meetings are contemplated to investigate the problems of the impact of technology on society, and the Society is preparing to publish a quarterly, *Technology and Culture.*



With willing hands and open minds, the future will be greater than the most fantastic story . . . .

My Father, Charles F. Kettering

EUGENE W. KETTERING

RESPONSIBILITY WAS ONE OF MY FATHER'S principal characteristics and one which he did his best to impart to me. It was his belief that a sense of personal responsibility is one of the most vital things for a young person to acquire—responsibility for his job, for his family, and for the welfare of the community.

He believed in the importance and dignity of work. Speaking from his own experience, he advised me and other young people with whom he talked that, in so far as possible, they should make work a hobby. He would have a fellow choose a kind of work in which he had a vital interest, something for which he could have enthusiasm and to which he would want to devote every possible minute of his time and thought—which is just what he himself did.

Dad was an extremely kind and a very democratic man. He liked to talk to all kinds of people. He thought it important to do that, and he treated a ditch digger as graciously as a banker. One day there came to his office a mail carrier with a letter requiring his personal signature. Although deeply engrossed just then in an important wartime conference, he asked his secretary, Mrs. Mabel Clancy, to show the mailman right in. As was his habit, he greeted the man cordially, chatted pleasantly with him for a moment, and thanked him for his kindness. He sent the mailman on his way with a glow of satisfaction at having been able to serve such a kindly man.

In his dealings with me, Dad was never what he called a heavy father. He never said, "You must do this or that, or you've got to do thus and so, because I tell you." He had a way of guiding by suggestion and example. If I told him that I wanted to do something, he would likely say, "Have you thought it through, and are you sure it is something you want to do? Once you undertake a thing your integrity calls for going ahead until you have accomplished it, and not drop it if it proves difficult. The greatest thing that most fellows are lacking," he would say, "is the fool trait of jumping into something and sticking at it until they come out right."

Out of his boyhood on the farm and his experience as an engineer and scientist, Dad had the greatest interest in and admiration for things in nature. "There is something wrong with the man who is egotistical in the face of nature," he would say. He tried to foster in me the same interest in nature and nature's creatures as he had. I recall that once, as a part of that effort, we kept some crawfish in a bathtub in our home for a while. We put a pile of stones in the tub as a home for the crawfish, and observed them and their habits of life.

Dad commented one time about people going out to the Grand Canyon to see that wonderful work of nature. Yet, he said, the simplest bug has the Grand

Canyon and all such spectacles backed off the map. There is an *organism* in the bug.

When I was a member of the Boy Scouts, Dad would sometimes go with our troop when we went out to the woods and take part in our activities. He had the ability to make those trips more interesting for us since he was always trying to arouse our interest in the commonplace things because—as he said—it is the commonplace things that go to make up the universe. He had a knack of making everything simple. "Personally, I believe you can simplify anything you understand," he would say. Visiting me at the camp one time, he taught us a little bit of simple chemistry by showing us that putting some wood ashes in our frying pan after use would make it easier to wash afterward.

Dad believed that it is important to train the hand as well as the mind. And as a boy I got much of that training by working with him. However, since he led such a full life, a fellow had to catch him on the run. Of the mechanical things Dad got for me, it was always understood that they were for me to tear down and reassemble and to experiment with as I saw fit. His constant encouragement and approval has been an everlasting benefit to me.

I realize that I am most fortunate to have been the son of such an exceptional man and to have had the opportunity to grow up under the spell of his great personality. But it was part of his genius that he did not overshadow me nor anyone else who lived or worked with him.

Dad was as gifted in conversation as he was in public speaking. I never saw him in a group of which he did not soon become the center, not because he insisted on playing first fiddle at all, but because what he had to say was so interesting that soon everyone was listening and encouraging him. The late Julius Stone, who was one of Dad's guests on the cruise to the Galapagos Islands in 1930, remarked that he would have given a fortune if only he could have a recording of the inspiring conversations the group had after dinner each evening.

Dad was honored by receiving many distinctions from his contemporaries. These included more than thirty honorary degrees. None of the citations read when he was being given one of those degrees seemed to me more descriptive or appropriate than the first one he received, Doctor of Science from the University of Cincinnati in 1928. Written and read by his friend Dr. Martin H. Fischer of the Medical College of the University, that citation was as follows:

> CHARLES FRANKLIN KETTERING; for fifty-one years a piece of the fiber of which American civilization is made; farmer's son, erstwhile student in a sister university, and its graduate with honors; erstwhile second man in a telephone company; by vocation an electrical engineer, by avocation a mechanical, civil, chemical, gas, automotive and aeronautical engineer; his inventions have brought light into the night, cold into the tropics, and silence into motors.
>
> Because he has never complained of life's handicaps, because he believes that the problems of nature are to be met and not sidestepped, because he has theories of education and faith in its possibilities, because he has learned from wise men and fools and taught them both; above all, because as a small boy he noted that steam yielded snow crystals of different shapes as it condensed at different distances from the family washtub, and because as grown man he fathers and ventures millions upon the skittish colts of the new in science—for these reasons, I have the honor to present to you, Mr. President, for the honorary degree of Doctor of Science, CHARLES FRANKLIN KETTERING.

Man of the 'Tomorrow Mind'

His Place in Research and Education

T. A. BOYD*

RESEARCH AND EDUCATION WERE THE TWO prime interests of the late Charles F. Kettering. They were also the two fields in which he made his major contributions to industry and to the people of the nation. And those contributions were many and large.

As an Ohio farm boy in the 1880's and '90's Charlie Kettering went first to the one-room country school and then attended and graduated from the high school in the village of Loudonville. After that, before going to college and in financial preparation for it, he taught a country school and later the village school of Mifflin, Ohio. That early teaching experience laid the foundation for his lifelong interest and activity in education.

Then he went off to The Ohio State University to study electrical engineering. And this led him before long to his first activity in experimentation.

His eyesight then was bad—so bad that he would often lie on his back on the bed and listen to his classmates read the assignments. Recalling that experience in later years, he made the joke that he could always tell how much studying he had done at night by how hoarse his roommate was in the morning. But in actuality it was luck, he said too, that thus forced him to work things out in his head. It sharpened his imagination. "The opportunities of man are limited only by his imagination," he would say. "But so few have imagination that there are ten thousand fiddlers to one composer."

Early in Kettering's sophomore year in college, his eyes failed him so completely that he had to leave the university. He then got a job digging holes for telephone poles for the Star Telephone Company of Ashland, Ohio. The telephone was new then, having been invented the year Kettering was born. During his two years of service for the telephone company he did everything in the construction and maintenance of telephone facilities in a small city and surrounding country.

His crowning achievement was to install, on an 18-mile country telephone line, a central or common-battery system with selective ringing on the line. This replaced the system in which there was a magneto and two dry cells in each telephone and in which all the telephones on the line rang simultaneously. Kettering conceived a better system than that. He sold it to the owners of the little company. And, by a great deal of experimentation with a pilot system first, he worked out the details needed to make the scheme a success. He did it in spite of the

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circumstance that the wires of that country telephone line were of iron which had five times the resistance of copper wires.

That experimentation, done mostly at night and under primitive conditions, was fun for Kettering. That was the practical and successful start of his career as an experimenter, and it was just the kind of pioneering endeavor which throughout his later life gave him his greatest pleasure and usefulness.

After two years with the telephone company, he went back to the university to finish his schooling. Upon graduation, he went to the National Cash Register Company and spent five years there as a development engineer.

IN RESEARCH

When he began at the National Cash Register Company in 1904, Kettering was by no means the usual new college graduate. Almost twenty-eight, he was already a self-taught but experienced experimenter. He had also the enthusiasm, the intensity of interest, and the boundless energy essential to success in the tough business of developing new products. The National Cash Register Company became what he called his graduate school.

In only a little more than five years there, he made four major contributions to the products of the concern. One of these was to develop an electric drive for the cash register. This consisted of a new type of electric motor of high turning power and a clutch for engaging the mechanism of the register and then releasing it at just the right time. A few years later he used that clutch and principle of a small motor with high torque in his electric self-starter for the automobile. "More than once," he said later, "we have seen research accomplishments fit together, like the words of a crossword puzzle, to aid us in solving other problems." Of another of Kettering's developments at the National Cash Register Company—an accounting machine which became the backbone of the concern's sales—one of the company's later publications said that it was "an outstanding illustration of ability to look into the future and to plan adequately for the coming years."

During his long career after leaving the National Cash Register Company to become at first an independent inventor and development engineer, Kettering organized and directed five research laboratories, as well as giving aid to some others. The first of the five was the very modest one he set up in 1908 in the hayloft of the Deeds barn in Dayton, and which was named the Dayton Engineering Laboratories Company, or Delco for short. It was there that he developed an improved battery ignition for automobiles and the electric self-starter. In making those useful developments available to people, he found it necessary to convert Delco, which he had intended only as a concern to develop new products, into a manufacturing company, and it soon became a large one. But the experimental laboratory, which was then moved from the Deeds barn, came to occupy one whole floor of the main building of the Delco factory.

Then, in 1917 he established a new and independent research laboratory. This was his second attempt to set up one devoted solely to pioneering research, free from the hindrances and interruptions always present in a manufacturing concern.

"Your factory man," he said, "is apt to take the slant that a research laboratory is a kind of fire department that should rush up and squirt water on the fires of all his troubles. That is the wrong approach," he said. "If you are trying to do a long-range research job, you can't be constantly trying to fix things that are wrong today. The research man ought to be the fellow you keep up in the crow's nest to see beyond the horizon, to tell you where there is another prize ship to be taken or a man-o'-war to be avoided."

In 1919, soon after World War I, during which he developed the predecessor of the guided missile, Kettering received an insistent invitation to organize and direct a central research laboratory for General Motors Corporation. Stipulating that the research laboratory should have no direct responsibility for the products of General Motors but be free to do forward-looking research, he accepted that invitation. He organized the General Motors Research Corporation around the small laboratory he had set up in 1917, and for the 27 years following he served as vice-president and head of research for General Motors.

The tangible contributions to progress made under Kettering's guidance during his years of research for General Motors were far too many to be listed. But among them were high octane gasoline and the high compression automobile engine; the nontoxic and noninflammable fluorocarbons as refrigerants; better and longer lasting finishes for automobiles; and many other advances, including the improved diesel engine which has revolutionized the powering of railroads.

But what was perhaps the greatest of all Kettering's contributions to progress in industry and the nation was an intangible one. This was his role as a dedicated and eloquent advocate of revitalizing changes in industry, not in his own General Motors Corporation alone, but in other concerns also. During his career in research, and especially during the early years of it, the need for technological progress in industry was not nearly as well accepted as it is today. Kettering lived and practiced through the period when, out of an increasing understanding of the importance of advances in technology, there was a big upsurge in research, especially in industry. And his own preaching and practice was a factor of no small importance in bringing about that advance.

"I am not pleading with you to make changes," he kept saying in his many public speeches. "I am telling you you have got to make them—not because I say so, but because old Father Time will take care of you if you don't change. . . . Advancing waves of other people's progress sweep over the unchanging man and wash him out. . . . Consequently, you need a procurement department for new ideas."

"So many men in industry are looking for park benches along the road where they can sit down and rest," he would say. "But the only park benches I know of are immediately in front of the undertaker's place. There is no spot in an industrial situation where you can sit down and rest. It is a question of change, change, change all the time. And it is always going to be that way."

Even in the depression years of the 1930's, Kettering continually preached the need for progress. "We have a great many people who are talking about dividing up what we have. We don't want to study division. We want to study

multiplication. Give research a chance in this country," he said, "and it will start the wheels."

It was during that depression period that Kettering himself was doing in the General Motors Research Laboratories his important research on the improvement of the diesel engine. As one of its several benefits, that engine was soon to transform the powering of railroads by superseding the century-old steam locomotive.

In a recent speech, President James M. Symes of the Pennsylvania Railroad said this: "The greatest single contribution to the economic and efficient operation of our railroads during my forty years of association with the industry has been the development of the diesel locomotive. . . . I would guess that this development alone is saving the railroads a minimum of 500 million dollars a year."

After Kettering retired in 1947 from his years of service with General Motors, he set up, directed, and himself experimented in, two more research laboratories. Both of these were built to conduct further and more rigorous research on subjects which already for a good many years he had been investigating on his own account. The first of the two was the solar energy research laboratory constructed at Yellow Springs, Ohio. There, with a staff of about thirty persons, he was trying to discover a better and more efficient way to capture the energy of sunshine—or, as he often expressed it, to find out why the grass is green. "There is no reason why we cannot convert sunshine without growing plants," he said. "We looked at birds until we learned how to fly. But there aren't any feathers on airplanes."

"We are going to have to learn more about how to catch this energy from the sun," he said too. "If we starve to death or run out of fuel, it's our own fault."

The other laboratory which Kettering built after his retirement is the magnetics laboratory constructed recently not far from his home near Dayton. There he was trying to find "what the fingers with which a magnet reaches out and pulls a piece of metal to it are made of."

He wanted to discover how it is that magnetism—or gravitation, or radiation, or electrostatically charged particles—can act through what appears to be empty space, although in his view space is not empty and cannot be. The study of magnetism, he thought, offered the simplest and most promising route to such an understanding. And, with an understanding of just one of those four factors, we might then understand all. He often worked nights at his magnetics laboratory, and was doing so until just a few days before his death.

He did not succeed in solving either the problem of how better to capture the energy of sunshine or that of understanding magnetism. But his efforts did add considerably to knowledge in both of those fields. And through the Charles F. Kettering Foundation, which he established in 1927 to search out new knowledge for the benefit of mankind—and of which his son, Eugene W. Kettering, is chairman of the board of trustees—his program of research in both those fields is still going ahead under the continuing direction of Howard A. Tanner.

Kettering said that, when in 1930 he first set up at Antioch College a group of young men to study the miracle of photosynthesis, "I told them to get married

and have a lot of children, because I think this is about a three-generation job. I shall not be disappointed," he said then too, "if I have to die without knowing because I think some generation soon will know."

With Kettering, as with others consecrated to it, the search for new knowledge was a religion. "You have to be 'sold' on research before you can hope to get anywhere in it," he said. "You need to be bitten by the research bug." He himself was bitten by that bug early in life. Ever afterwards, research was for him both vocation and avocation—and even, as he once said, vacation as well.

Two eminent men of science who were contemporaries of Kettering gave these evaluations of him and of his exceptional fitness in his field. The late Robert A. Millikan said of him: "He is unique in that he combines in one individual interest in pure science with the practical ability to apply knowledge in useful devices." The late Willis R. Whitney, too, said of Kettering: "We have never had another man like him in America. He is the most willing man to do things I have ever seen. Benjamin Franklin was a little like him. Both had horse sense and love of fun. If a fellow goes to school long enough, he gets frozen in his thinking. But Ket has always been free."

Of the principles of research, especially of research in industry, formulated out of Kettering's experience he often spoke. But here it is possible to give no more than a mere glimpse of some further aspects of his constructive thinking in that area.

Never was there a man with more patience and persistence in the search for new knowledge. "It doesn't matter if you try and try and try again, and fail," he said. "It does matter if you try and fail, and fail to try again. . . . It is the 'follow-through' that makes the great difference between failure and ultimate success, for it is so easy to stop. . . . Failures, repeated failures are finger posts on the road to achievement. . . . The only time you don't want to fail is the last time you try."

One of Kettering's great gifts was a wondrous ability to boost the enthusiasm of others. He could sit down with a discouraged investigator when he was ready to quit and recharge his battery, so to speak, until he would grit his teeth and make a new and determined attack on his problem.

Kettering thought that to be productive in research a person must have some well-defined objective. He believed that research, especially research in industry, not aimed at contributing in some way to human needs, is not justified. In his view, the most important thing in industrial research is picking the problems to work on. And doing that intelligently, he said, requires a certain amount of contact with people or with those from whom the needs or the problems arise. With a little exaggeration perhaps, he said that research in industry is made up of about 40% working on material and 60% working on people.

The man in the university doing what may be considered pure research "has only two factors to deal with," he said, "material and energy relationships. When you go into industry you have four factors—material and energy relationships plus economics and phychology. I don't know whether the complications go up as the square or the cube of the factors involved. . . . But there is no question that

they do increase." In industry therefore "research must partake as much of economic horse-sense as science," he said.

"The only difference between pure science and commercial research," he said too, "is that in commercial research you dig out a fact because you need it. . . . I cannot see any difference in importance between digging out a fact when you need it and digging out one when you don't need it. . . . You can't cut it off clean and say 'this is pure science and this is industrial.' "

The difference between the scientist and the engineer or inventor, he would sometimes picture thus: "If you are looking at a great loom, the warp threads, those that run lengthwise, represent the contribution of the scientist. The engineer or inventor is the fellow who carries the woof threads across and ties the warp threads together. If you don't think the inventor has a useful part," he joked, "just try to sleep in a purely scientific hammock."

One of Kettering's primary principles for the successful development of new products was that the job must be the boss. "What does the engineer think of this experimental piston? That doesn't matter," he would say. "What does the engine think about it? That does matter. The engineer's opinion is worth very little. The engine's opinion is worth a great deal. . . . After all, the only reason for all this expensive research is that it corrects our ignorance factor so that we can see the problem in its true light." Often he said that problems are not solved in the laboratory. They are solved in some fellow's head.

"Quit butting in with your theories and let the engine do the talking," he said to one man. "You are a good engineer, to be sure; but were you ever a piston in a diesel engine?"

The direct method of "asking the engine itself" Kettering called experimental evaluation. He recognized that some investigators look down on that procedure and call it the cut-and-try or the trial-and-error method. But why don't the critics talk instead about the "trial-and-*success*" method? That is what it really is.

In illustration of the circumstance that in research a problem has to be accepted as it is and a start toward its solution made from there, he sometimes told this story of having once got lost when driving through the hills of Kentucky. Coming upon a native of the place, he asked him how to get to Cincinnati from there. "Well," was the hesitant reply, "you go up here to the forks of the road. There you turn . . . there you turn . . . let me see. Hang it all, sir, if I had to go to Cincinnati, I wouldn't start from here!"

"I have always wondered," Kettering once remarked, "why it is that the thing that won't work often seems so much more logical than the thing that does work." That was why, in his opinion, an ounce of experimentation is worth a pound of theory.

Not that he did not believe in theories at all. "You have got to set up a theory," he said, "right or wrong. Let's call it a working postulate. Such a postulate can be an important one of the stepping stones leading up to the cathedral of success." But allowing theory to limit rather than guide the experimental work of an investigator is, he thought, like putting hobbles on a horse.

"A certain amount of intelligent ignorance is essential to progress," he said, "for if you know too much you won't try the thing."

Introducing Kettering as speaker at a medical meeting concerned with cancer, Dr. C. P. Rhoads, director of the Sloan-Kettering Institute for Cancer Research, said that, although Kettering had supported and guided a great deal of medical research of his own, his greatest contribution to progress in medicine was perhaps this: In speaking to medical men he had talked so often and so convincingly about the importance of not putting too much trust in existing knowledge or theory to guide their investigations, but of systematically trying things, even things which did not appear promising, that he had persuaded many medical investigators to accept his view. And, said Dr. Rhoads, such trail-blazing efforts have been highly productive in the discovery of things the existence of which had not been suspected. What Kettering kept saying was that "theorizing is not nearly as effective as trying. . . . For we think we are further along the path of knowledge than we actually are."

When dealing with new ideas Kettering took an especially dim view of committees. In his view, the surest way to kill a new idea is to submit it to a committee. Propose a new idea before any committee and they will say it is no good, he would say. When Lindbergh flew the Atlantic in 1927, Mrs. Kettering remarked to her husband how wonderful it was that he did it all alone. "It would have been still more wonderful," he replied, "if he had done it with a committee."

IN EDUCATION

"I have been in education all my life," said Kettering in 1955. "I started out as a schoolteacher and I have been associated with educational institutions ever since."

Something of what manner of teacher Kettering was was related by the late Frank D. Slutz, for ten years head of the Moraine Park School which Kettering had a part in organizing, guiding, and supporting. He was a born teacher, said Slutz, and a great one. He had a remarkable facility for making things simple and understandable to people, and especially to young people. This was in part because he saw to the bottom of things so clearly himself, and in part because of his capacity for telling what he knew in common terms, and because he was interested in people also. His skill in phraseology was so great that he put things in rather unforgettable ways, said Slutz. A thermometer, he would say, is merely a molecular speedometer. What the Second Law of Thermodynamics means to me, he would say too, is that you can't push on something that is going faster than you are.

Kettering thought that showing *why* is of great importance in teaching. There is often too much precept in teaching, he thought, and not enough explaining why. In his view, a young person cannot be expected to understand a thing, nor to remember it well, unless he knows the 'why' of it.

This in part is why Kettering was so greatly interested in cooperative education—the plan by which the student alternates between going to college and working in industry or elsewhere at some activity related to his college course.

With his gift for graphic speech, he often said that in cooperative education we lap-weld a fellow on to life instead of butt-welding him on. That, he thought, creates a weld that is much stronger than getting a college degree first followed by employment, the two touching at only one line of contact.

His activity and interest in respect to cooperative education began in the early days shortly after 1906 when it was inaugurated by Dean Herman Schneider at the University of Cincinnati. He gave active support to Dean Schneider in his efforts; he had a part in establishing the cooperative plan at Antioch College and at the General Motors Institute. He had an especially large part in the founding of Northwestern Institute of Technology, and over the years he was an influential advocate of the cooperative system of education. This last was true especially in right recent years through the activities on behalf of the cooperative plan by the Thomas Alva Edison Foundation, of which Kettering was president.

"All education will eventually have some of the features of Dean Schneider's cooperative plan," he predicted in 1944. "If you want to learn to play a violin, you start with a violin as well as the reading of music. We must have that principle in all education—the theory and practice together."

So, not long before he died in 1958 Kettering said this: "I would like to see a far broader use of cooperative education. Under it the student learns more than rote. He goes out and joins the practice of industrial or social or professional life."

Relating in oversimplified fashion his views on engineering education—and oversimplification was a device he often employed to add emphasis—Kettering said this: "If I were writing the engineering course, I would write only three things—four years of physics, four years of chemistry, and three years of mathematics—and then you might fill in with anything else you want, including a little economics and history. . . . The 'how' and 'why' of fundamentals should be inculcated to form the foundation for the approach to any problem. . . . With that foundation I can take a man and teach him about a gas engine if he has never seen one. But I cannot take a specialist, if he has not had a basic education, because I cannot get it over to him if I work until doomsday."

Speaking along this line at the time he received the Award of Merit from the American Alumni Council in 1948, Kettering related this story about his creative associate, Thomas Midgley, Jr. In college Midgley took the course in mechanical engineering. In the effort to find a way to overcome knock in engines, which stood in the way of higher engine compressions and better fuel economy, Midgley made the discovery that a pinch of iodine in the fuel was an effective suppressor of knock. So, thinking that the problem was chemical and having been not a chemist but a mechanical engineer, Midgley suggested to Kettering that they get a chemist and put him on the job.

But Kettering said he thought they ought to go a little further in the analysis of the problem themselves before getting any specialists, because this was a subject nobody knew anything about. If they brought in specialists they would try to make the problem conform to known facts. "This is like a group of fellows who are going on a long trip," he said, "and don't want to start out with

packs on their backs which contain a lot of things they will not use. . . . Let's you and me go up and survey the road first without any packs on our backs."

Because the problems Midgley thus had to solve during his career in research proved to be so largely chemical, he himself turned chemist. By intense application and practice, he educated himself to be a research chemist. He did that in such effective fashion that over the years he achieved eminence for creativeness in chemical research, and when he died in 1944 he was president of the American Chemical Society.

Kettering then related that to the Dean of Engineering at Cornell University, Midgley's school, he had once said: "Dean, I have a young friend who wants to become an electrical engineer. What course do you recommend that he take? I am asking because Tom Midgley took mechanical engineering and turned out to be a chemist. Another friend took electrical engineering and became a financier. So what course should my young friend take to become an electrical engineer?"

Answering in the same tongue-in-cheek vein, the dean came back by saying, "If you have a degree from Cornell, Ket, you can do anything."

"And that," concluded Kettering, "is what I think an engineering education, or *any* education, ought to be." On another occasion he said, "My definition of an educated man is the fellow who knows the right thing to do at the time it has to be done. . . . You can be sincere and still be stupid."

"I am a strong believer in teaching both physics and chemistry as informational physics and informational chemistry," said Kettering in 1933, presenting his views on technical education. "My contention is that you shouldn't have a course in radio engineering or automotive engineering or some other kind of engineering, but that you should give a boy a good thorough knowledge and understanding of what I call *informational* physics and *informational* chemistry. In other words: basic facts, knowledge about practical applications, not a lot of arbitrary formulae. . . . I think we must have facts and understanding before a 'formula' education means anything at all. . . . Formulas are dangerous because they lead us down a very narrow road. . . .

"Give a young man a thorough ground work and then turn him loose to solve his own problems. I would make of him a real research man; teach him to question everything, never to be satisfied; instill in him the creative type of mind. If he knew the laws back of physics and chemistry, he wouldn't be held by specific or 'grooved' thinking. He would not be controlled by formulae, nor by handbook information. . . . Most professionals are slaves to precedent, and it's hard to get a man out of a rut, once he is in it. That's one of the reasons why I like to talk with all kinds of people, and do all sorts of things. It keeps your thinking flexible. It helps to dissolve your prejudice. It keeps you young mentally."

One of the men Kettering meant here was Hiram Sweet, wagon-maker in the village of Mifflin, Ohio, when as a young man Kettering was a schoolteacher there. But Sweet was far more than a wagon-maker, Kettering recalled. "You would no more think of running across such a man in a small town than you would of flying without a flying machine," he said. For one thing, Hiram Sweet had

invented and built a self-computing cash register that was in daily use in the drugstore of the town.

"'Now, Mr. Sweet, where did you find out all this?' I asked him," recalled Kettering. "He replied, 'I work in this wagon shop ten hours a day. . . . And, when I have no wagon work to do, I work on Sweet's head.' . . . I stayed two years in that little town, and most of my spare time was spent in Sweet's wagon shop, letting him work on my head. . . . I learned more from that old wagon-maker than I did in college. . . . He never did grow old at all, outside of his physical make-up. The world was so wonderful and he knew so little about it that he hated to sleep.

"I often think what a pleasant world this would be if everybody could live from day to day and week to week as that old gentleman did. . . . He was . . . never lonesome for a minute because he never had time to be lonesome. He would go home and eat, and go back to the shop without waiting for the whistle to blow."

In a little further expression of his philosophy, Kettering said: "The more we can learn, the more our mental development, the happier we are going to be. . . . The thing that will bring real satisfaction, real happiness is accomplishment. . . . It is enthusiasm for the future, the things we are going to do next year and the year after next. . . . If you do not get mental expression, you are going to miss one of the greatest happinesses of the world."

In spite of all we have learned, Kettering often spoke about how little we do know as yet. "In reality," he said, "we have only begun to knock a few chips from the great quarry of knowledge that has been given us to dig out and use. We are like the two fellows who started to walk from New York to San Francisco. When they got over into New Jersey, one said: 'We must be pretty nearly there. We have been walking a long, long time.' That is just how we are in what we know technically," he said. "We have just barely begun."

Furthermore, some of the present stock of what we call knowledge will later have to be revised, he said. "Our educators should simply say to the student that this is the best package we can give you today, and that some is going to fall out tomorrow, some is going to stay longer, and some will be in there when the world is finished. . . . A friend of mine who teaches general medicine in one of our large universities once told me this story about education," recalled Kettering. "He is an old hand at teaching medicine. He lectures to the classes, teaching the boys to be general practitioners. His system is sound and doesn't differ radically from similar courses in other universities, except for the last lecture he gives to the group. That lecture is unique. On this occasion he says in part:

"'Young men, we are together for the last time. We have had a very pleasant time. You have been a good class, and I have enjoyed working with you. I have given you the best information available—the best case histories I could find. The textbooks we have used are the most widely accepted and reliable. But, before we part company, I want to caution you that the science of medicine is developing so rapidly that in a few years from now perhaps half of the things I have taught you won't be so. Unfortunately, I don't know what half that will be.'"

Often Kettering made this comment: "The only incurable diseases are those the

doctors don't know how to cure. . . . I don't believe the Lord ever put in his deck any 'jokers' like incurable diseases."

He thought that education should emphasize the future more than it does and the past a little less. At a meeting of academic and scientific honor societies, Kettering once spoke as follows: "If we drove an automobile the way we try to run civilization, I think we would face backwards, looking through the back window, admiring where we came from, and not caring where we are going. If you want a good life, you must look to the future. . . . I think it is all right to have courses in history, but history is the 'gonest' thing in the world. . . . Let's keep history, but let's take a small part of the time and study where we are going. . . . We can do something about the unmade history. . . . But we must look where we are going and not where we've been. . . . We must use the past as a guidepost, not as a hitching post."

"I object to people painting the future with a black brush," he said, too. "I expect to spend all the rest of my life there, and I would like it to be a nice place, polished, bright, glistening, and glorious."

Out of his vital interest in education, Kettering gave active support to it in many ways—at the University of Cincinnati, at the College of Wooster, at Earlham College, at Ashland College, at Wilmington College, at Berea College, and at many other schools, including especially Antioch College, and at his alma mater, The Ohio State University. For years he served as a trustee of Antioch College, of the College of Wooster, and of The Ohio State University.

When years ago Senator John W. Bricker, then Governor of Ohio, asked Kettering if he would not serve a second seven year term as trustee of the University (he was in his fourth term when he died), he answered: "Yes, Governor. I would stand on my head at the corner of Broad and High Streets, if it would help the University."

When, just twenty-five years after his graduation from Ohio State, Kettering was speaker at Commencement there, he closed his address with this epitome of his philosophy of education and life:

> There are two things, there are three things, which if you get your point of view right, you will have no trouble with. The first is that you are going to be a servant to somebody or something. . . . The next is that to be a good servant implies two things, willingness to work and willingness to learn, because no one of us knows very much. . . . And if, when you pack your bag for this eventful journey . . . you will pack egotism and selfishness and all that sort of thing down in the bottom of the bag, and if you will lay your servant's uniform on top, the passports will not have to be opened, and they will pass you through the line.

An Objective Look at Boss Kettering

J. RALPH FEHR

CHARLES F. KETTERING was quite a man.

The writer first met Mr. Kettering in the year 1920, soon after he arrived in Dayton, Ohio to accept a position as patent lawyer for one of Mr. Kettering's companies. Mr. Kettering acted in a very down-to-earth and friendly manner—just the same as the other "boys"—and there was nothing in his demeanor to indicate the exalted position he held in the community.

Yet at only forty-four years of age, Mr. Kettering was renowned and highly esteemed, and some of the reasons for this were soon apparent from the number of industries in Dayton, the presence of which were directly attributable to the genius of Mr. Kettering. First and foremost, there was The Dayton Engineering Laboratories Company, known as Delco—a large and prosperous company manufacturing starting, lighting, ignition, and generating equipment for automobiles. This was Kettering's first company and it was organized to manufacture his original starter.

Then there was the Delco-Light Company (later to become Frigidaire Corporation) which was in the business of manufacturing and selling 32-volt farm lighting and generating plants, together with water pumps and other appliances for use with such generating plants. This farm lighting plant was a direct outgrowth of the Delco auto starter, since it contained the same basic elements of engine, starter, generator, and battery, but was designed primarily for the production of electrical energy at 32-volts suitable for farms, instead of as an auxiliary for automobile engines.

Another of Kettering's enterprises was The Dayton Research Laboratory, giving wider scope to his research activities. Here had already been developed "ethyl" gasoline to improve the operation of internal combustion engines.

As an institution, there was the Dayton Engineers' Club which was housed in a beautiful building built jointly by C. F. Kettering and E. A. Deeds, his business associate, for the use and encouragement of Dayton's engineers. Some years later, and after the Engineers' Club became soundly established, this building was donated to the club by Messrs. Deeds and Kettering.

Boss Ket, as he was affectionately known, had the viewpoint of the common man, saw the things that most anyone could see needed to be done, and then set about doing them. As an employee of the National Cash Register Company in Dayton, Mr. Kettering had developed an electric motor for cash registers—then considered a difficult job. Now, with sprained backs resulting from hand-cranking of automobile engines and broken wrists resulting from their back-firing, it was clear that a starter for automobile engines was badly needed. So this was the first job Boss Ket tackled, and it was done at nights and on his

own time. The problem was a simple one and, in the end, the solution also was fairly simple—at least in its basic concept. So, although others had been working in this field, Kettering succeeded in developing a practical electrical starting and generating system. And because it was practical—though not perfect at the outset—about 1909 it was adopted by Cadillac, one of the higher-priced cars, and reached the market on the 1912 model.

Kettering was very fortunate at this, a critical point in his career, by becoming associated with Mr. Edward A. Deeds, then general manager of the National Cash Register Company in Dayton and a fine business man. Deeds must have had great confidence in Kettering and his work, for the development of the starter was carried on in the old barn of the Deeds residence, and when the starter was ready for the market, Deeds resigned his position with the National Cash Register Co. and joined with Kettering in the organization of The Dayton Engineering Laboratories Co. to manufacture the starter. As the starter was proved and improved, it soon was adopted by other automobile manufacturers, and, of course, its manufacturer, The Dayton Engineering Laboratories Co. (Delco) grew and prospered under its excellent management.

The success of Delco merely placed in Kettering's hands the seed money for other developments, and soon he became interested in doing something for the farmer. As a farm boy, he knew the hardships and inconveniences of life on the farm with nothing better than oil lamps for light and hand pumps for pumping water.

So, Boss Ket undertook the development of a small power plant for the farm. Again the need was obvious and the solution fairly simple in its concept, for, as already pointed out, the farm-lighting plant embodied the engine-starter-generator-battery elements of the automobile—all redesigned for the generation of electric power at 32-volts as its main function.

As is usually the case when companies are formed around products (as was Delco with its auto starters and as was Delco-Light with its farm lighting systems), the managements of such companies, being responsible for the success of their respective enterprises, are not for long interested in absorbing the high cost of research, experimentation, and development of products that do not directly contribute to the success of their business. Consequently, unrelated activities are best carried on under separate auspices.

By 1920 Kettering's broadened interests were centered in such an organization, known as The Dayton Research Laboratory, operating under his leadership. And at that time their efforts had already resulted in the discovery of what makes an internal combustion engine knock; and as a corollary they had invented "ethyl gasoline," a fuel containing tetraethyllead, to reduce the explosive burning of gasoline when compressed inside an engine cylinder, and hence to impart higher efficiency and anti-knock characteristics to the fuel. This invention was to have a profound influence upon motor transportation.

At about this time, or perhaps a little later, Boss Kettering sparked the development of a lacquer finish for automobiles, known as "Duco." This revolutionized the production of automobile bodies because, by the use of a lacquer spray paint,

a body could be finished within a few hours, whereas the old process of applying and then baking enamel finishes required several days and was not as good.

As we have noted, Boss Kettering had, by the year 1920 and the age of only forty-four, achieved notable success and a high distinction in his chosen field.

General Motors Corporation had just the year before purchased The Dayton Engineering Laboratories Co., the Delco-Light Co., the Research Laboratory, and all the rest of Kettering's interests. Apparently General Motors was fully aware of Boss Kettering's brilliance and of his equally great future potential. There was no logical connection between the transportation business of General Motors and the farm lighting and generating systems sold by Delco-Light Co., but common rumor in Dayton had it that General Motors wanted to have Boss Kettering's services along with Delco. However, it was said that Kettering was not agreeable unless General Motors bought all of his interests. So, as a consequence, General Motors acquired Delco-Light Co. and found itself in the farm power plant business.

As a matter of historical interest, the acquisition of Delco-Light Co. did not prove to be a bad purchase for General Motors for soon thereafter Delco-Light entered the mechanical household refrigerator business, a business which had a ten year history of high-priced unreliable products, defunct manufacturers, and dissatisfied customers. With its excellent management and the refrigeration engineers taken over from Kettering's Research Laboratory, where a household refrigerator had been under development, Delco-Light Co. soon began manufacturing, under the tradename "Frigidaire," a household refrigerator which it considered sufficiently reliable to be sold nationally. Already having a highly trained specialty sales and service organization, Delco-Light Co. rapidly, and for the first time in history, brought about broad acceptance of the household refrigerator and transformed a lame industry into a large, vigorous, high-production industry.

It is interesting to note that about ten years later Boss Kettering was to make another significant contribution to mankind, this time in the refrigeration industry. He placed a research team to work to find a new refrigerant. The refrigerants then known were poisonous, or explosive, or presented other hazards dangerous to life and property and were retarding the full growth of the refrigerating industry. The results of this research amazed the chemical world. From the element fluorine, considered to be one of the most corrosive and poisonous of elements known, the researchers developed light compounds which are the safest refrigerants now known; in fact they developed a whole family of fluorine compounds having a wide range of properties, making them suitable for many uses outside the field of refrigeration. Certain of these compounds, marketed under the tradename "Freon" are in universal use as refrigerants. One of them, now marketed as "Teflon" became a top-secret miracle plastic material during World War II because of its importance in the production of fissionable materials.

As is well known, the Research Laboratory was moved from Dayton to Detroit, housed in tremendously enlarged quarters and its work greatly expanded. There, known as General Motors Research Laboratory, and under the leadership of

Boss Kettering, it has for over thirty years been making notable contributions in many fields, with particular emphasis, of course, on the field of transportation.

But Mr. Kettering's interests were not limited to the work of the Research Laboratory. He carried on a variety of projects privately, and he did not hesitate to use his own fortune to nourish them. In colleges he established many fellowships and he underwrote much important medical research. After the death of Mrs. Kettering by cancer, he joined Alfred P. Sloan in the endowment of the Memorial Hospital for Cancer and Allied Diseases in New York in an effort to find a cure for this disease.

As a result of his early experiences, Mr. Kettering was keenly aware of the importance of patent protection for infant industries. As time went on, his interest in patents and the patent system appeared to grow, possibly because of his consciousness of the close link between the field of patents and his beloved research. He well knew that research and development of new ideas was expensive, and often unfruitful. Since the money to carry on private research comes only from the profit of something previously sold, it is important that the products of research and development of new ideas be given patent protection so that when they are commercialized, they in turn may provide the money for further improvement and progress.

These convictions led Boss Kettering to become actively associated with research into the influence of patents in promoting the progress of science and the useful arts. He was one of six national leaders in research who became honorary members of The Patent, Trademark, and Copyright Foundation at the time of its inception in 1954 and he served as a member of its Advisory Council up to the time of his death. The "Charles F. Kettering Award for Meritorious Work in Patent, Trademark, and Copyright Research and Education" given annually by the Foundation is named in honor of him.

For twenty years one of Ket's most challenging projects was what he called "What makes the grass green?" Since all animal life on earth depends in the end upon plant life, and since plants grow only by converting the sun's energy into plant life, Boss Ket felt he would learn one of nature's important secrets if he could discover the process by which green grass converts the sun's rays into plant life. While the results were inconclusive, it was still in progress at the time of Mr. Kettering's death and even now is being carried forward by other researchers.

There seemed, indeed, no limit to Boss Ket's interests. He maintained private laboratories in both Dayton and Florida so that he would never be out of touch with his many undertakings.

Mr. Kettering was in great demand as a speaker, and his talks were always interesting as well as informative. He never tried to give the impression of being a profound engineer—that is, one whose greatest interest lay in solving some intricate or mysterious problem, although, doubtless, he had such engineers on his staff. On the contrary, he tried to make everything sound simple and commonplace.

He often surprised his audience by making a statement apparently at variance with something the engineers had learned at college; for example, that running

a bearing bone dry with only gas as a lubricant would out-perform, five to one, a bearing lubricated with the finest oil. He had dozens of similar examples over the years. He seemed especially to enjoy taking and relating all the details of how he had assigned a simple test to a couple of bright engineers, fresh out of college and fully equipped for big things, the menial experiment of rubbing a couple of dry blocks together until something should happen. He enjoyed the reactions of the engineers who—he said—thought the Boss must be crazy, until, to their amazement, the experiment proved otherwise, as it did in this particular case. The Boss publicly stated, apparently with pride and, perhaps with some exaggeration, that he was wrong ninety-nine times out of a hundred with these experiments, but the one time he was right was worth it.

Such anecdotes, while extremely interesting and amusing to an audience, gave an insight into the character of Boss Ket. He was not trying to brag or demonstrate superior intelligence, for he was far above that level. He was demonstrating the workings of an inquiring mind, one that questions some of the most commonplace and apparently well established facts. He was interested in discovering the more basic truths, for these are the building blocks upon which future progress is built; and he was dramatizing the value of perseverance and the satisfaction experienced from even an occasional success coming after many failures in bucking conventional engineering thought.

In so doing, he was encouraging others to do likewise. His thesis was that colleges teach a lot of misinformation, and they do not teach the students really to think. By his example he hoped to inspire young men to think and act boldly instead of accepting as gospel everything that was handed down to them.

Boss Ket repeatedly poked fun at the slide-rule engineers; that is, the experts who, he said, were fellows that with slide-rules would prove that something could not be done, while inventors or amateur engineers like himself, not knowing that something could not be done, went ahead and did it. He spoke of meetings at which he posted a sign that slide-rules should be parked on the table outside. He was not interested in having one of these fellows whip a slide-rule out of his pocket, make a rapid calculation, and then announce that something could not be done.

Mr. Kettering even joked about the work of his own General Motors Laboratory. At a meeting in Dayton a few weeks before his death, we were given a preview of a film to be presented at the General Motors Auto Show in New York. It was about a General Motors car-of-the-future which had everything in the way of automatic controls and drove itself down the road at high speeds guided only by a wire imbedded beneath the surface of the roadway. Pictures under the hood and elsewhere showed the car absolutely loaded with electronic and other equipment of various types. The car represented a spectacular engineering accomplishment, and doubtless its successful operation was a very exciting experience for the engineers who developed it. At the conclusion of the showing, Boss Ket remarked, "They didn't do this sort of thing when I was there!" And, after the laughter had subsided, he added, "It just goes to show what these fellows will do when you don't keep your eye on them." Boss Ket's position

required him to be familiar with all types of engineering, and he knew that engineers of this type are necessary and do very important work. But he also knew that engineers like to work on spectacular things, so it was not at all uncommon for him to detract from the spectacular in his effort to glamorize the unspectacular, and often tedious, type of basic research that he liked so much.

Mr. Kettering frequently has been acclaimed as a genius. Boss Ket himself said it was mostly hard work. If we add to this the qualities of a great common sense, a keen observation, a highly analytical intelligence, and perseverance, then the appellation is well deserved. And, if we add to the example of his personal achievements, his inspiration to youth and his many decades of speaking before educational and other groups on engineering subjects and in the interest of better education, then he must also be acclaimed as a great educator.

No wonder, then, that Charles Franklin Kettering was showered with honors by scientific and engineering societies, by business and civic groups, and by institutions of learning; nor that he was called for service on university and college boards, and in various capacities by government and other organizations. His many-faceted character, brilliant yet profound, his vigor and curiosity, attracted irresistibly all the rewards, the burdens, and the challenges of greatness.

Exponent of Explanation

ALLEN ORTH*

IT PROBABLY STARTED AT THE LITTLE one-room Bunker Hill schoolhouse where young Charles Kettering's first job was to teach the three R's to thirty offspring of the neighboring farmers. It may have been there he realized how important it was to sift out the fundamentals from the camouflage of rhetoric and non-essentials. He must have been successful because in one dispute a nearby farmer who had three children at Bunker Hill, said in his defense that his children learned more with Kettering than with any other teacher they'd had there.

It was some thirty years later that I first came face to face with Boss Ket and his philosophy. My first job after graduation was the testing of various types of cylinder heads on a single cylinder gasoline engine. We had mentally built up a theory as to how changes in the shape of the combustion chamber might affect the efficiency of the engine. However, test after test after test was knocking our nice theory into a cocked hat.

While poring over the data from our latest disappointment, I became aware of a tall, lanky individual peering over my shoulder. "What's new?" he wanted to know. I pointed out where our test data didn't jibe with our theory and Boss Ket made this comment: "All that this proves is that your theory is wrong, so you've made some progress—now you *know* one more thing that isn't so. If we could figure out all the answers without trying anything, there wouldn't be much need for a research laboratory, would there?"

Some years later I took part in a project that marked the beginning of a long and close association with Boss Ket. For some years General Motors had annually been putting on a display of its new products in a New York hotel. This particular year it was to be at the new Waldorf-Astoria which had just opened. Boss Ket thought it might interest the public if we exhibited some of the tools of GM research we used in our efforts to improve our products. You must remember this was 1931, and the car makers, in the mind of the public, were seldom associated with *scientific* advances.

We were assigned a little corridor space off the main ballroom to exhibit our wares. Back in Detroit, we proceeded to collect apparatus—a stroboscope, a small induction furnace, an oscilloscope, and a carbon stack pressure indicator. To the researchers the significance of those things was obvious, and they proceeded to write up suitable identifying signs to go with them. For instance, under the caption "Stroboscope" a sign read "Neon gas when electrically excited possesses the property of rapid cut-off. This cut-off when synchronized with a rapidly

* Mr. Orth is a member of the Public Relations Staff of General Motors Corporation in Detroit.

moving mechanism has the ability of apparently freezing, or reducing the speed of the part in motion." And then Boss Ket stepped into the picture. The stroboscope became "Frozen Motion"; the induction furnace, "The Magnetic Stove"; the microphone and oscilloscope "See Your Voice"; and the application of the carbon stack indicator had above it a sign which asked "Can You Bend a Railroad Rail?" It was the first time I came into contact with this man's ability to translate technical jargon into layman's language—the faculty to cut through the insulation between the scientist or engineer and the man on the street.

Under his guidance the requests for our technical displays grew and grew as was evidenced by the prominent position given our Research exhibits at the Chicago Century of Progress in 1933 and 1934. One of our displays was a collection of exhibits lining the main entrance hall of the General Motors building there. These had as their theme the development of the automobile, each exhibit portraying some phase of automotive progress. In fact this area was called the Hall of Progress.

One day while chatting there with Boss Ket, I happened to mention that it would be a shame to put the exhibits in cold storage after the fair. "Why do we have to?" he asked. "Why not take some of these things around the country so people can see them?" And so was born one of the most ambitious projects to popularize science and engineering—the General Motors "Parade of Progress."

Fired by the idea, he personally supervised the planning and construction of this circus of science. There were to be huge specially-designed trucks to carry the displays, a large auditorium tent equipped with a stage from which would be given popular science shows, and our own mobile power plant to supply light and power. We planned to play the fairly small communities, setting up in a local park or playground. But most important, the show would be free and under no condition would anything be sold on the grounds.

Late in January 1936, we had completed our construction, and our caravan of about forty vehicles left Detroit on its long trek southward. Around the first of February we arrived in Lakeland, Florida, and proceeded with our first set-up. On February 6, we opened to the public for the first time. During the rehearsal period Boss Ket was writer, producer, and lot boss; in fact, he offered to put on the first science show in the tent.

I'll never forget that first performance, which Mrs. Ket always referred to as "Charlie's Amateur Night." One incident sticks in my mind. Boss Ket in his Will Rogers' way was taking the mystery out of the telegraph by a simple demonstration. He wrapped a piece of wire around a nail and connected one of the ends to a dry battery. By holding a piece of metal near the head of the nail and touching the other wire intermittently to the other battery terminal, he duplicated the tap, tap of the telegraph sounder with the piece of metal and nail head.

As he completed this demonstration, two boys in the front row got up and abruptly left the tent. The next day one of the local citizens found Boss Ket on the lot and offered an explanation: "Mr. Kettering, I want to apologize for the

actions of those boys last night at your show. You see, one of them is my son and the other one lives next door. For a long time they have wanted to set up a telegraph system between their houses but they could never get together enough money to buy the apparatus. Last night when you showed them how simple it was to build the equipment, they couldn't wait to get home to start work. They finished the set-up this morning and right now they are sending messages back and forth. I am sorry they didn't wait until you had finished your talk, but they'll be back tonight."

The Parade of Progress proved one thing indisputably: most people are interested in scientific and engineering accomplishments, if—and this is most important—they can understand them. We spent hours with Boss Ket trying to simplify our exhibits, signs, and demonstrations. That we were fairly successful was attested to by the fact that in the next year or two our attendance increased by leaps and bounds. We had to increase the number of displays and provide a larger tent to accommodate the crowds.

Along came World War II and our show went into storage, but after the war, a new and larger version with a crew of sixty men took to the roads and in the next couple of years was shown in 98 communities to over five million people. An offspring of the large caravan was a miniature one-truck affair which carried a copy of the caravan tent show to high school assemblies. This traveling science show—the Previews of Progress—was also very successful and at the present writing we have seven units touring the country.

But Boss Ket's efforts to take the fascinating story of science and engineering into the backyards of America were not confined to the traveling Parade and Previews. In the fall of 1943 General Motors sponsored, under Maestro Toscannini's direction, the NBC Symphony of the Air. Alfred P. Sloan, Jr., GM's guiding genius, thought some of the time devoted to the usual commercials on this program might be used in an educational way to tell the part played by scientists and inventors in building our civilization. Thus it came about that Boss Ket every Sunday for the next three years came into the homes of millions of Americans with his interesting little five-minute talks on science and invention.

Obviously a man as busy as Kettering could not devote all of the time necessary to preparing these talks, so he asked me to give him a hand. Although I thought I was pretty well acquainted with his way of expressing himself, my association with him on this project was an eye-opener.

After our first trial balloons, we formed the habit of going over the mail prompted by the broadcasts. He wasn't interested in the flattering letters, only those taking exception to something he had said or, more importantly, the way he had said it. He once told a friend the quality of a talk varied inversely as the number of letters we received.

He was never satisfied with the wording of our scripts—a polysyllabic word, particularly a technical one—was anathema to him. I have seen him in front of a microphone a couple of minutes before air time cutting out unnecessary words, simplifying, and rearranging sentences. I have some of those scripts in my files

that would defy interpretation, but when those words went out over the air they made sense. Every one seemed to understand and appreciate them.

After Boss Ket had given his last talk in this series, in answer to numerous requests we bound together some of the most popular ones in a little booklet bearing the title, "Short Stories of Science and Invention." In the years that have followed, we have distributed well over half a million copies upon request. Educators constantly use them in their classes, in fact over three-fourths of them have gone to teachers. Just as a matter of interest the authors of *Current Thinking and Writing* chose one of the talks to include in their 1946 edition. In this connection it may be pertinent to quote from the Foreword of this book, "Two criteria were applied to the choice of each selection: that it be good writing of its kind and that it be interesting to students of normal intellectual curiosity and reasonable artistic appreciation."

For nearly forty years Boss Ket was in great demand as a speaker. The universality of his appeal is attested to by the character of his audiences over the years. A glance through our file of his talks gives an inkling of this versatility—such audiences as technical societies, universities, colleges, and high school graduating classes, medical associations, advertising clubs, agricultural groups and press associations. Recently his biographer T. A. Boyd and I were trying to estimate how many talks he gave during his career and came to the conclusion it must have been somewhere around four or five thousand.

It is difficult to attribute his success to any one thing: his sincerity, his unfailing humor, or his ability to size up his audience and pitch his talk accordingly. If I had to pick any of these, I believe the last is probably the key to his appeal. Down through the years I have gone over dozens of transcripts of his talks to edit them for reprinting. Anyone who has seen one of these transcripts could not help but wonder how such a talk would make sense; there were so many gaps and uncompleted sentences. But this apparent weakness was in reality one of his trade secrets. He was a master of impressionism—the technique of the unfinished statement. With bold strokes he would build up a word picture and with a descriptive gesture turn the idea over to your imagination to fill in the details.

He enjoyed gently poking fun at his audience, especially if it was a professional one such as scientists, engineers, or doctors. For instance, take this statement he made last year on how the usefulness of millions of aged people can be extended:

> We can begin that right now if only the organic chemists and nutritionists who have developed the still largely unused weapons of synthetic vitamins and hormones to supplement the world's inadequate diet can break down the communication block that separates them from the doctors.
>
> They are kept apart from really starting on this wonderful enterprise by a lamentable medical lingo. They're blocked by formal medical education. They're stopped by the very name of the specialty—geriatrics—that deals with mere palliation of the breakdowns of senility, instead of the now possible return to working vitality among older people. Perhaps someone should start a magazine that could be read by both doctors and patients.
>
> Then they would understand the promises that the organic chemists' and nutritionists' vitamins and hormones have in store for them. Then, together, doctors and citizens could start a real fight to make old age wait, to push it back, instead of appeasing it.

> This language difficulty afflicts engineers as well as doctors. For example, some years ago a report on an important research project was brought to me. I read it and was mystified, though I had fathered the project myself. I told the writer, "Please just strike out all the words in this that Mr. Sloan (president of General Motors) and Mr. Grant (in charge of sales) don't understand.
>
> "Now read the report out aloud with all those big words left out," I suggested when the writer returned. The report, as then read, was meaningless. And yet on the basis of the original report Sloan and Grant were expected to make decisions vital to General Motors.

Somewhat in the same vein Boss Ket in one of his talks came up with this anecdote:

> A friend of mine was complaining about the technical fellow who doesn't know how to talk intelligibly. Then he cited the case of an English teacher he knows:
>
> "Now, George," he said, "has the greatest command of English in the world."
>
> So I asked, "Well, what does he say?"
>
> He answered, "Oh, he says absolutely nothing, but he does it superbly well."

Boss Ket's communication facility, of course, was not limited to his personal appearances and radio broadcasts. Down through the years, numerous articles have appeared in print being his signature. Some of them, such as "Get Off Route 25, Young Man," which appeared in *Collier's* are classics and have been reprinted time and time again. They are valuable records of the man's instinct for cutting through the insulation of redundancy and technical cant which separates an idea from comprehension. Take for instance this excerpt from the *Collier's* article:

> I used to put up some money for the summer symposiums in theoretical physics at one of our great state universities. The physicists there often asked, "Why are you so interested in this advanced course in physics?"
>
> I said, "Because we don't know anything about physics, and anything we learn will help along."
>
> They said, "Why don't you come to us? We know the equations for every phenomenon of nature."
>
> I said, "Can you solve the equations?"
>
> "No," they said, "but what are some of the things you'd like to know?"
>
> I said, "I have always wondered why I could see through a pane of glass. Does the light come through the pane of glass, or is it rebroadcast from molecule to molecule?"
>
> "Well," they said, "that's because it's transparent."
>
> Well, if you open Webster's dictionary it will tell you a thing is transparent if you can see through it.
>
> I said, "When you say you can see through a pane of glass because it is transparent, you are actually saying you can see through a pane of glass because you can see through a pane of glass."

During my years of association with Boss Ket, I often had the rather dubious honor of acting as the middleman between the professional writers and the Boss. I say "dubious" because these interviews were often potentially explosive, mainly because Boss Ket made a fetish of accuracy and the reporting was sometimes rather imaginative such as in this case the Boss describes:

> I had a writer come to me about six months ago, who had written up one of my inventions. He wanted me to okay it. I asked, "Where did you get that much misinformation in such a short time? There isn't a single fact in there." "I know," he replied. "But facts certainly do make an article stupid."

When Kettering was put in charge of the first automotive research laboratory in 1920, he had a dual job to do. He not only had to run the General Motors Research Laboratories, but he also had to sell the idea of research to a lot of people both within and without the organization. So, in the ensuing years he spent much of his time convincing the unbelievers and the disinterested that organized research was the only logical way of guaranteeing progress in the future. Here are a few of his well-known aphorisms he employed in this education effort:

> Research is an organized method of finding out what you are going to do when you can't keep on doing what you are doing now.
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> * * *
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> Research is an organized method for keeping you reasonably dissatisfied with what you have.
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> * * *
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> Research is the science of making changes in a scientific way.
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> * * *
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> Research is industrial prospecting.
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> * * *
>
> Research is a job creator.
>
> * * *
>
> Research is another type of insurance policy.

Kettering was a man ahead of his time. Only fairly recently, in an increasingly scientific and technical age have the leaders of American thought at last realized the supreme importance of bridging the gap between the scientists and engineers and the average citizen. We live in a world of technical marvels, and the complexity of our civilization is increasing daily. All of us, particularly our youth, must have an increasing understanding and appreciation of the signficance of this new world of the atom, space vehicles, electronics, antibiotics, photosynthesis, and all those things that are transforming our way of life.

Never was there such a need for the educator, the interpreter, the Kettering type of mind that can divest the most profound scientific discovery of its complexities and expose, for all to see and understand, its fundamental significance. If, on the other hand, our great minds fail to make themselves understood or interpreters are lacking, their greatest contributions may be unnoticed or unappreciated. And Kettering had an apt simile for this:

> It is something like sitting in front of a huge imaginary switchboard turning this wheel and pulling that lever only to find out, when you get up and walk around to the other side, that they aren't connected to anything.

Charles F. Kettering
The Inventor's Inventor

JOHN C. GREEN*

FEW INVENTORS HAVE EVER analyzed and understood their breed so intensively and accurately as did the late Dr. Charles F. Kettering. In explaining the lot of the inventor, he once said, "We are simply professional amateurs. We are amateurs because we are doing things for the first time. We are professional because we know that we are going to have a lot of trouble. But the price of progress is trouble and I don't think the price is too high."

A man of Ket's sympathy for the inventor, coupled with his own inventive genius, was ideally suited to take charge in 1940 of a newly-created Government-industry group designed to capitalize on the brainpower of the civilian inventor to give our defense forces the best weapons and equipment in the world. Kettering's simple but succinct philosophy, his sympathy for the brilliant but sometimes inarticulate tinkerer, his comprehension of the world of science, guided the work of the National Inventors Council from its organization in 1940 to his death in November 1958.

Kettering deplored the relatively low opinion most laymen held of inventors. He felt that Yankee ingenuity had been highly responsible for the successful development of our democracy. He felt also that the creative, unorthodox thinking in our nation was diminishing because our society was becoming increasingly critical of unorthodox ideas. Past generations were more receptive to the Edisons and the Franklins than is the present generation. He traced the cause to the exorbitant value our society now places on success. From kindergarten through the rest of life, it is considered scandalous to "flunk." It was no wonder, he felt, that there were fewer persons who were willing to venture into the field of invention where success was a rarity. The inventor who succeeds in even five percent of his attempts is truly unusual. What our society fails to fathom, he felt, was that even in failure the inventor progresses and adds to his knowledge.

Failures never bothered Kettering. He used them as milestones on the road to achievement. He felt that the important thing in failing was "to determine why you failed so that you can learn to fail intelligently."

In his own life, Dr. Kettering's perseverance and intensive inquisitiveness led him past many failures to success in many areas of invention. But in success, he never forgot the problems and needs of inventors of less renown. He remembered the difficulty that he had experienced in overcoming the accepted textbook

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"proof" which indicated that his ideas were unsound. He remembered, too, that often the inventor's chief problem was not in getting his apparatus to work but in getting it to work in tune with what the public happened to think at the time. Invention and progress resulted when the public encouraged a free and open market place for ideas. Throughout his life he meant to aid the inventor in providing this market place and improving his product.

In 1940, with Europe already squared off in war and with the realization that the United States would probably become involved, a proposal was presented to President Roosevelt whereby the collective talent of the civilian inventors of our nation could be mustered to aid our military forces in overcoming their many technical problems. The proposal called for a liaison unit between the military and the inventor.

To organize and administer such a venture, the President knew he needed a man of extreme and varied talents. He needed an individual who could surmount the insurmountable problems involved, a man broad minded enough to understand the problems of both the military and the inventor.

The President turned to Dr. Kettering, who was already immersed in several researches essential to our nation's preparation for the impending war. He was then Director of Research of General Motors Corporation. He was on call too as an adviser to the office of the Secretary of War and to the Commanding General of the Army Air Forces, an old friend H. H. Arnold. But he immediately realized the service that such liaison could be to the nation and to the inventors who were eager to offer their talent. Such a program had never been tried before and the unknown was his familiar stamping ground. He accepted the call of the President.

His methods of organizational and procedural genius represent only part of his contribution to the National Inventors Council. Throughout his chairmanship, Kettering took a keen interest in the Council and its activities. He seldom missed the Council meetings, which were held monthly during the war and semi-annually after cessation of hostilities. He gave invaluable inspiration and guidance to its staff, and his far reaching prestige gave the Council stature which it might not otherwise have enjoyed.

The Council was formed as an industry-government organization designed to assure maximum efficiency and minimum delay in processing civilian inventors' suggestions for the solution of perplexing military problems. Even yet information concerning the technical puzzles is periodically supplied to the inventors through the Council's publication "Inventions Wanted by the Armed Forces." Under the procedures established by Kettering, the Council screens all ideas submitted to it and routes those with possible merit to the proper military agency. The regular staff does the initial screening, after which the potential problem answers are submitted to the separate Council committees covering the entire field of military needs. Kettering, himself, was always reluctant to turn down any man's idea no matter how far-fetched it might be, so this task was left to the individual committees. He once likened an idea to a flower. "Just as a flower needs care and nourishment, so must an idea be nourished and helped along. If

you step on either a flower or an idea, it will die. If after you have given the flower or the idea the assistance needed for it to flourish it should die, you are none the worse off for trying."

The National Inventors Council was designed to give the ideas of inventors this nourishment which is necessary to bring ideas to life. At the first meeting of the Council, he told its members, "I want you fellows to establish an open door in Washington for inventors so that they can receive the help they need to help their government. I want you to see that any idea that has any possible merit is not frozen out."

In the establishment of the Council, Ket relied on two basic facts:

(1) Science and technology are of increasing importance not only in war, but in maintaining a strong defense to deter aggressor nations.

(2) Most revolutionary war inventions have originated in the minds of civilians. Ericsson, a private engineer, built the Monitor, the first revolving turret warship. Colt, a roving inventor, whittled from wood the model for the first revolver. Independent inventors devised the first submarine torpedo, and the screw propeller, as well as the first rifle with interchangeable parts.

Kettering, himself, was among the contributors of inventions and developments to our national defense. In a secret World War I project, he and the Air Force had fathered, if not invented, the world's first pilotless aircraft which was the forerunner of the buzz bombs used by the Germans in World War II.

In the fall of 1917, Dr. Kettering's Delco firm, working with the Sperry Company and the Air Force, had successfully tested two such pilotless aircraft. Within a year the 300 pound craft were able to carry an equal weight of explosives 40 miles and hit within 100 yards of the target. The papier-mache aircraft, reinforced with wooden members, took off from a four-wheeled carriage mounted on a portable track which was designed by Henry Ford. The entire cost of the "Bug," as it was called, was $400.

With the Armistice, work toward developing the "Bug" decreased although various improvements were made to the craft as they could be permitted under the strict attention to "economy in government." The idea was revived in World War II but was later abandoned because of the distance from England to the interior of Germany.

With his uncommon zeal, Dr. Kettering was able to acquire the services of many distinguished scientists, engineers, industrialists, and research administrators for membership on the Council, all of whom, like Kettering, served without pay. It has been said that the only problem he was unable to resolve during the Council's formulation period was when he attempted, at his expense, to air condition the Council's office space located within the Department of Commerce. Even with his vast experience and success in inventing, he was unable to find the means to cut the red tape involved in such an endeavor.

In Council meetings Kettering was able to bring his intimate knowledge of the auto, power, and transportation industries, among others, into play in dealing with current problems. His recommendations for the selection of other Council members were presented to insure the utmost competence for the proper evaluation

of the numerous other problem areas concerned with meeting the requirements of our Armed Forces.

Soon after the Council was organized, Kettering invited representatives of the military services to attend the meetings. This proved to be another of his "firsts" because the military and the civilians had always kept their distance. The same separation of interests existed within the military also. The value of such a radical idea soon became apparent when it was determined that the services had been working on similar problems with no knowledge of what the other was doing and without benefit of the findings of the other branch. Kettering was ideally suited for the position of go-between for the military and the inventors. He had often worked with representatives of the Army and Navy and had maintained these contacts all during the time both the military officers and he had progressed toward leadership in their respective fields of endeavor. This experience had provided him with an understanding of the peculiar problems of the military which always seemed so difficult for most civilians to fathom.

It was inevitable that the civilian members and the military members of the Council would reach areas of disagreement concerning the value of submitted ideas. When the civilian Council members would complain to Dr. Kettering that the military had a closed mind on too many suggestions presented, he would resort to the typical Kettering philosophy to explain away the problem: "We only have one Navy and one Army, and since there is only one of each, we have to learn to get along with them." And get along they did for, under his direction, there was always the utmost cooperation within the Council meetings.

When inventors became impatient with the time taken by the military in considering and adopting various inventions, Kettering would ease their feelings by explaining the difficulties the military encountered in taking an invention one day and having it on the fighting front the next. "There is a timing and a natural method by which these things have to be done. There is a terrible step between model and a satisfactory fighting apparatus and if you try to force your inventions on either the military or industry, you won't get very far."

It was this type of philosophy that made him the Will Rogers of science. Possibly it was his experience in the teaching profession that made it so easy for him to explain in the clearest detail the most intricate problems. Many believed that this was a natural attribute of this great personality.

He used this quality of logic in explaining the difference between the inventor and the average person. "What is the difference between most people and inventors? For one thing, most people are interested in where they came from. Inventors are interested in where they are going."

People who had dealings with the National Inventors Council learned that humility was another of Dr. Kettering's attributes. The work of the Council often required the members to visit the various military bases. On learning of the visit of such a respected and celebrated personality, the military would roll out the red carpet. But such treatment was of little concern to Dr. Kettering. Often he would stray from the group and be found looking over the shoulder of a

man at the workbench, offering advice from his experience. He was never one to be impressed by title or rank.

During his chairmanship of the Council, nearly a quarter of a million ideas and inventions had been received and evaluated of which more than a hundred had been put into production for use by the armed services or other war agencies. The success of the Council is a tribute to the man who believed that, with all our inventions and advancements, we had only begun to scratch the surface of discovery.

For his work in forming and guiding the Council, President Truman presented Dr. Kettering the President's Medal For Merit. It was one of his most highly prized possessions and was displayed most prominently at his 75th birthday celebration. The medal was a fitting tribute to a great man, a great inventor, and a great citizen.

Memories of Forty Years of Association with Charles F. Kettering

FRANK A. HOWARD*

IT WAS SNOWING IN DAYTON on the last Friday in November 1958, when his friends from many cities met there for the funeral of Charles Franklin Kettering. On another snowy day, forty years before, I had first come to Dayton to meet this remarkable American. The four decades between these snows spanned only the latter half of his life, and it is of this period only that I can write as an observer. In a rough way his earlier career might be said to have followed the ancient Hindu life-calendar, quoted by Kipling, twenty years a youth and twenty years a fighter. When I met him his economic fight had been won in the sense that his fortune had been made, and he was free to do what he loved best—to experiment.

His genetic inheritance and formative environment was best summarized, I believe, by our mutual friend, the late Robert A. Millikan. It was Millikan's theory, which he had expounded to us many years ago, that our common birthplace, the Ohio River Valley country of the 19th century, was the breeding ground of an especially true strain of typical Americans. He thought this was accounted for by several factors: the west-European origin of most of the population, the immediately-preceding processes of natural selection in which the more adventurous and independent of each generation had first left Europe for eastern America and then left eastern America for the Ohio Valley, the food, water and climate of this middle-American region, and finally, its then status as a young country with corresponding social habits and institutions.

Certainly these or other factors which had produced Lincoln, the Wright brothers, and an unusually large share of other "greats" and American Presidents had combined to make Charles Franklin Kettering a model of the physique and temperament the world calls "American." He was well over six feet tall, slender, loosely put together in a frame which in youth is called "gangling," and his open countenance generally reflected interest and good will. His biographer, T. A. Boyd, had dubbed him "The Professional Amateur," which is one apt characterization, but his range of interests was so wide and his character so many-sided that I hesitate to attempt any short cuts. Rather it seems best to let the image of his personality be developed through sketches showing him in the many different conditions under which we worked together over the last half of his life.

As background for these sketches, it may be helpful to note that he was a farm

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boy who worked his way through a college education in electrical engineering, delayed en route by the combined effects of low funds and troublesome eyes, so that when he received his degree from Ohio State University in 1904 he was nearly 28 years old. By this time he had become an experienced telephone engineer and the advantages of an interrupted education in which periods of working, especially in fields related to his profession, alternated with college training, were so impressed upon him that he became in later life a generous supporter of Antioch College in Ohio, which operated on this plan.

His first job after graduation was in the Inventions Department of the National Cash Register Company at Dayton, where he proceeded to invent a steady succession of improved cash registers and accounting machines. It is interesting to note that when I first met him in 1919, the Inventions Departments or Experimental Departments which had once been quite common in our larger manufacturing plants, had just about ceased to exist under these names, and had become instead research laboratories. In part, these changes in name for the same industrial function reflected the trend toward greater reliance of industry upon laboratory work in the basic sciences of physics and chemistry. In part they may have been, however, a response to some national urge toward inflation of titles. Kettering himself was completely immune to this disease. His personal reaction as he climbed the ladder of fame through the presidency of the Society of Automotive Engineers and the American Association for the Advancement of Science, into Fellowship in the National Academy of Sciences and the post of Chairman of the National Inventors Council, was to down-grade continuously his description of himself and his attainments. While he had started his career as a graduate engineer and professional inventor, his own description of himself often became abbreviated to "a screw-driver and monkey-wrench inventor."

THE COOPERATIVE DEVELOPMENT OF FUELS AND ENGINES

Perhaps the preceding comments are all that is needed to give a first impression of the personality I first encountered in an old mansion which had been converted into a make-shift engine and chemical laboratory in snow-covered Dayton in the winter of 1919. I came to that meeting in response to an open invitation Kettering had extended to the oil industry in a paper he had just presented at the New York meeting of the Society of Automotive Engineers, of which he was the retiring President. The title of the paper was "More Efficient Utilization of Fuel." He had presented data showing that the knocking sound often heard in an automobile engine was not caused by pre-ignition of the charge in the cylinder as had been generally believed, but rather was the result of a "detonation" occurring well after the flame initiated at the spark plug had begun its steady travel through the charge. Most important of all, he showed that the chemical structure of the gasoline greatly affected this tendency to knock, and that small amounts of iodine compounds added to the fuel could stop even the most severe knocking. His concluding paragraph read: "This problem can never be solved by any one individual. It is going to be solved by cooperation between the oil and engine people and everyone else."

The ultimate consequences of this 1919 plea for cooperation between the automobile and oil industries can be described briefly—a new billion dollar industry of producing and distributing antiknock fluid for motor gasoline and guiding lines for the future technical development of automobile engines and oil refining.

The immediate consequences of his 1919 paper were to start cooperation between General Motors Company and Standard Oil Company (N.J.) in the study of engines and of gasoline, looking upon them for the first time in industrial history as a team which must pull together if they were to provide the best substitute for a team of horses.

Mr. Kettering, whom I shall hereafter refer to as "Ket", the name by which he was commonly addressed by an enormous circle of friends and associates, took me almost at once from his modest office in the old converted Ludlow Street residence in Dayton—then his laboratory headquarters—into a room in which there had been set up a small Delcolight engine. There I met Thomas Midgley, Jr., the young mechanical engineer who was in direct charge of this project. While Midgley handled the engine throttle and the electrical loading, making the engine "knock" as though it were about to break into pieces, Ket dipped a small piece of rag in an open beaker of liquid and then held it near the air intake of the engine carburetor. The knock stopped at once, only to begin again the instant Ket moved his rag a few inches further away. He repeated this legerdemain until I could not question the effect—a mere whiff of vapor from his wet rag would infallibly stop the engine knock without decreasing the power of the engine. They told me the rag was wetted with ethyl iodide, a volatile liquid compound of iodine. The amount of vapor picked up from the rag by the air entering the engine was actually quite substantial—several per cent gasoline being currently injected into the air stream by the carburetor—but the effect nevertheless seemed miraculous.

We then examined together some of the indicator cards turned out by a new form of high speed engine indicator which Midgley had developed so that he and Ket could see what was happening in the engine cylinder. This new indicator, carrying the homely descriptive name of "the bouncing pin," was to become the universal tool of the oil and automobile engineers for the study of the engine knock problem. By the use of this simple new tool, which in its first primitive form had been thrown together by Midgley and Ket in a few hours, it was possible to establish the fundamental relations between gasoline quality and engine knocking.

The main use of the bouncing-pin indicator was to determine the differences in the knocking tendencies of various types of commercial gasoline. Some of these gasolines—the sweet-smelling type produced in Pennsylvania was the worst—would knock in an engine of compression ratio as low as 4 to 1 when the engine was hot and pulling at full load. Other gasolines—those made from California crude were usually the best—could be used in engines of 5 to 1 ratio without giving any trouble from knocking. The same engine, when raised from 4 to 1 to 5 to 1 compression ratio by merely substituting a cylinder head with smaller

clearance volume over the piston, would produce more power and also give more miles per gallon. This sounded impossible, but it was the simple truth.

These were the background facts which had led Ket to start his search for some magic substance that could be added in small proportions to bad gasolines to make them perform as well as the best gasolines. By an accident which can only be thought of as providential, it had happened that one of the first substances tried, iodine itself, had proved effective in a limited way. For many reasons the use of iodine in gasolines was impractical, but from that moment Ket had set his teeth firmly into the antiknock problem; and Midgley, who can best be described as having been Ket's alter ego in the active conduct of much of his chemical research work, had dedicated his career to its solution.

Ket's hope for cooperation between the oil and automotive industries in the solution of their common problem was realized during the year following our first meeting in Dayton. Without any commitment or agreement at all between us, my own newly established research and development group in Standard Oil Company (N.J.) and Ket's group in Dayton began to exchange regular visits and information, each helping to educate the other on the relations between engine and fuel. While Ket and Midgley continued their efforts to find an antiknock compound for gasoline, we did the same, and also tried to make better gasolines. We even worked on a new engine cycle, originating in Millikan's laboratory at California Institute of Technology, which reduced knocking by cooling the engine charge during compression.

It soon became apparent, however, both to General Motors and my own people that we were in for a long struggle to find any practical solution of the engine knock problem. We therefore began to talk of contract arrangements for sharing the burdens and the rewards—if any—of continued research along these lines. A proposal of this kind, which I had drawn up, was under consideration in Standard and General Motors when Ket's breakthrough came in 1921. By reasoning processes, in part rational chemistry, but in major part the result of Ket's own inspirational thinking, Midgley found that a little-known volatile compound of lead, known as tetraethyllead, seemed indeed to be the miraculous substance so long sought. Less than one-tenth of one per cent by volume of this compound added to gasoline was effective to make the worst types of natural gasoline better than the best types. Very soon after Midgley also found that the lead deposits in the engine cylinder resulting from the use of even this small amount of the lead compound in gasoline could be prevented by the addition of minute amounts of volatile chlorides and bromides, which were not objectionable. Ket's vision of an antiknock compound which could make all gasolines equal—and good in antiknock properties—therefore seemed to have become a reality through the unaided efforts of his little Dayton research group headed by Midgley. Ket at once organized the General Motors Chemical Company which began to prepare and sell the antiknock fluid for gasoline, in a small way, in Dayton. The antiknock compound itself was called Ethyl Fluid and the gasoline carrying it was sold as Ethyl Gasoline. The business began to expand rapidly and General Motors Chemical Company contracted with the du Pont

Company to build a new plant and to supply the much greater quantities of Ethyl Fluid that were needed. Just as the road ahead seemed clear, however, the expanding business ran into a blank wall—a world shortage of bromine. This halogen, which had heretofore been in the class of a drug rather than an industrial chemical, was consumed in great quantities in the production of the tetraethyllead by the only known commercial process, and world bromine production was hopelessly unequal to this great demand. Ket's fertile imagination tackled this bromine problem at once, and he talked of erecting a great bromine recovery plant on the shores of the Dead Sea in Palestine where the water was reported to be exceptionally rich in bromine. Political and other problems made any such solution years off, however, and at Standard Oil we turned our faces in the other direction, looking for a method of producing the tetraethyllead which would not require the use of bromine. Within a very short time this approach was successful. A modified process was developed for us by Professor Charles A. Krauss at Clark University. It not only eliminated the bromine consumption in the manufacture of tetraethyllead, but greatly decreased the cost of the product. It breached the wall and opened up an unlimited future for low-cost Ethyl Fluid.

Our thoughts turned again toward a formal cooperation of General Motors and Standard Oil of New Jersey, and in August of 1924 these two great industrial companies joined in organizing the Ethyl Gasoline Corporation, which took over all the patents of both parties on the production and use of gasoline antiknock compounds. Ket became the President of the new company, I became Vice President, and Midgley became Vice President and General Manager. Although Ket and I soon resigned to make room for full time operating officers of the rapidly-growing business, we continued our association as Directors of the Company and usually spent at least a day together there each month.

We soon faced other problems which brought us both into active contact for the first time with the world of medical research. Lead had long been classified as a cumulative poison. This circumstance was erroneously interpreted by some physicians to mean that continuing human exposure to any source of possible lead intake could eventually result in lead poisoning. Ethyl Corporation suspended business long enough to establish, mainly through the work of Dr. Robert A. Kehoe of Cincinnati, that our normal food and water carried some lead which the human metabolism eliminated continuously. Lead poisoning ensued only when the rate of intake exceeded the rate of elimination. A committee of distinguished scientists, appointed by the Surgeon General of the United States, found that the margin of safety here was so large that use of gasoline carrying less than one-tenth per cent lead compound as automobile fuel could not possibly become a public health hazard. Incidentally, Dr. Kehoe developed simple urine tests by which workers in the lead industries, who by accident or carelessness sometimes exceed safe rates of lead intake, could be checked regularly and kept well on the safe side. Ket was so impressed by Dr. Kehoe's work and by the obvious need for better medical research on health problems arising out of new chemical industries, that he sponsored and secured the necessary outside support for The Kettering Laboratory at the University of

Cincinnati, where Dr. Kehoe continued and enlarged his service in this field for Ethyl and many other chemical industries.

Through affiliated companies the Ethyl business expanded to embrace the entire civilized world. Very little gasoline was sold anywhere which did not contain at least a small amount of the Ethyl Fluid. Dr. Graham Edgar of Ethyl devised a simple method of defining the antiknock quality of gasoline by its "octane number." The oil industry made its direct contribution by continuously improving its methods of manufacturing gasoline so as to make it more resistant to knocking, that is, to raise the "octane number" before the Ethyl Fluid was added to finish off the job. These improvements in gasoline quality permitted the engines to be improved, and in a step-by-step fashion the compression ratios of automobile engines were more than doubled, that is, from about 4 to 1, to the present average ratio of about 9.5 to 1. The overall economic effect of this progressive improvement in gasoline and engines, initiated and maintained by Ket's 1919 vision of cooperation of the engine people and oil people and of a miraculous substance which could be added to any gasoline to prevent it from knocking, was so enormous as to be almost without precedent. As of 1957 less than two gallons of gasoline were doing the same amount of work for which three gallons would have been required but for this vision. In statistical terms, the ultimate consequence of this vision was a saving of more than two million barrels of gasoline every day, to say nothing of the gains in land and air transportation, in agriculture and in industry, we have all enjoyed from high-compression engines and fuels giving both power and efficiency far higher than that obtainable with the engines and fuels of 1919.

Ket attended the regular Board Meeting of Ethyl Corporation on November 5, 1958. His health seemed good, and his death from a cerebral accident three weeks later was wholly unforeseen. The feelings of his fellow Directors are best summarized by a resolution presented to the Ethyl Board by Frederick G. Donner, Chairman and Chief Executive of General Motors Corporation.

> RESOLVED, that this Board record its deep sorrow on the death of our fellow member, Charles Franklin Kettering on November 25, 1958, at the age of 82. Mr. Kettering had served Ethyl Corporation with great distinction as a director for thirty-four years.
> Charles Franklin Kettering belonged in an unusual way to Ethyl Corporation, perhaps more uniquely than in the case of the many other scientific and industrial organizations with which his name has been associated. Ethyl Corporation is a monument to his pioneering. Fired by his genius and guided by his unusual ability to combine the creative with the practical, the long search for a successful antiknock compound which he sponsored and directed culminated in the discovery of the antiknock effect of tetraethyllead and the essential complementary effect of alkyl halides in preventing lead deposits in automobile engines. To these discoveries, Ethyl Corporation owes its existence. They played a decisive role in the growth and development of the petroleum and automotive industries and through them made a significant contribution to the economic life of our country.
> Mr. Kettering was the first President of Ethyl Corporation. Those early years saw the Company confronted with many critical problems, some of which threatened its existence. His wise counsel, penetrating understanding of the problems involved and steadfast courage in their resolution brought the Company safely past that critical period and helped lay the foundation for the great organization that is Ethyl Corporation. His unique ability to examine each new question with characteristic originality, his gentle and illuminating humor, his gracious approach in all discussions, made each meeting with him during this long period a rewarding experience that will always be treasured.

In paying our sorrowful tribute to the memory of Charles Franklin Kettering, we honor one who was truly a founder of Ethyl Corporation and whose name is revered by all in the Corporation.

OTHER INDUSTRIAL DEVELOPMENTS AND RESEARCH PHILOSOPHY

While the antiknock development was our first and longest association, my memories of Ket are filled with other scenarios in which he was one of the principal characters and which will help to show what manner of man he was. Some of these stories had happy endings, some equivocal endings, and others appeared to end in complete failure. But from his own standpoint each of them was a useful, even invaluable, experience.

As is well known, Ket's fame and his personal fortune were mainly the result of his development of the first successful electric self-starter which appeared on the Cadillac automobile of 1912. This in turn was an outgrowth of his earlier development for Cadillac of an improved battery ignition system. Both lines of development were based primarily upon his own inventions, but in both cases these inventions were found, at the last minute when commercial production was imminent, to be dominated by earlier patents held by others. Either of these experiences could have spelled the end of his budding career as an industrialist, but in both instances the indispensable licenses were negotiated without delay or difficulty and his Delco Company continued on its meteoric course. It was soon merged into a group of automobile parts manufacturers called United Motors Corporation, and thence into the General Motors combine which was just then being put together by W. C. Durant. Through this route Ket became one of the largest individual shareholders in General Motors Company and also its Vice President for Research. Mr. Alfred P. Sloan, Jr., who can be said to have been the actual builder of the present day General Motors, has said many times that this acquisition of Ket's company was of little importance compared with acquisition of Ket himself.

Ket had taken on the executive responsibility for General Motors' research program not long before I first met him in Dayton in 1919. At the same time that he was directing through Midgley the search for an antiknock compound, he was giving most of his own time to the attempt to develop for General Motors a satisfactory air-cooled engine to replace the water-cooled engines then in almost universal use. His basic approach on this problem was to cover the surface of the engine cylinder with air-cooling aids in the form of copper fins fastened to the cylinder wall firmly enough to make the copper flow, and thus form a joint of low thermal resistance. On this foundation there was designed a line of "copper-cooled" engines to replace the water-cooled engines of the General Motors automobiles. The expenditures made under Ket's direction on this line of development were, for those days, tremendous—much higher than any preceding research and development effort in the automobile field. The result was complete frustration. Although the new air-cooled engines were certainly good and seemed to Ket and his engineering crews to be better than the water-cooled engines, there were so many new problems involved that not a single one of the General Motors car divisions could be persuaded to make the substitu-

tion. The "copper-cooled" engine development was scrapped as a total loss from a financial standpoint, and had it not been for his successful antiknock development, which was active over the same period, this costly commercial failure might have led him to terminate his industrial research career. But out of—or perhaps in spite of—this experience he developed instead the basic philosophy which he never tired of expounding in his later life: In the world of research and development the only failure is the last one, when you give up; if you don't give up, everything which precedes it is a part of the road to the final successful experiments.

Another pair of offsetting developments—one a failure, the other a success—were the subject of frequent conversations between us in later years. The failure was General Motors' effort to find a method of producing synthetic rubber commercially. This work was intensive and sound but produced no commercial results. The economic pressure on General Motors which underlay it was the high and variable cost of natural rubber. At times when rubber was especially high, the tire cost was a large part of the original cost of the car and the largest single item in the cost of maintenance. Ket's early vision encompassed an American synthetic rubber industry which would make us independent of imported natural rubber and give us a low and stable cost for tires. The vision of such a development was, of course, a sound one and of tremendous importance, but it was not fulfilled in America until the war. The first practical development began with the Bayer Company in Germany. Through my oil interests I came in contact with this German development in 1926. Ket and Midgley contributed greatly to Standard Oil's understanding of the basic nature of this national need, and the final agreements which Standard made with the German chemical trust in 1929, and which related mainly to synthetic oils, were extended to include limited rights under the new German processes for producing from oil such chemical products as synthetic rubber. The rubber process was commercialized on a large scale in Germany as a part of Goering's program for German economic self-sufficiency, which preceded the war, and became available at a very advanced stage of development as the foundation of America's own synthetic rubber program when the Japanese cut off the world's supply of natural rubber in 1941.

While there was never any formal cooperation between my own research group in Standard Oil (N.J.) and Ket's group in this field of synthetic rubber, I have always regarded Ket and Midgley as among the most knowledgable and far-sighted men in the country in their appraisal of the world's rubber problem. Ket, in turn, always felt that the time, money, and effort which he had put in on this earlier, unsuccessful attempt to find a basis for an American synthetic rubber industry was not lost but rather a definitely useful experience.

Offsetting the failure of the synthetic rubber development, there was complete success in another chemical development on which Ket and Midgley worked together. This was the synthesis of a new class of refrigerating compounds called "Freon," new compounds of chlorine, fluorine, hydrogen, and carbon. Up to that time the normal commercial refrigerants had been ammonia, employed for ice manufacturing and large cold storage plants, and sulfur dioxide for small plants

such as electric refrigerators. Liquefied hydrocarbon gases were also used in some special cases. None of these was well suited to the growing field of domestic refrigeration and air conditioning in which General Motors was heavily interested through Frigidaire. Midgley, who had by that time given up all operating responsibilities in the Ethyl Corporation, tackled for Ket this new job of producing a refrigerant for these needs and created another new chemical industry. The Freons possess excellent physical properties for low-pressure, moderate temperature, refrigeration cycles, and are non-inflammable and non-toxic. They could be used with complete safety in any type of domestic refrigeration or air conditioning. It can be said with reasonable accuracy that the present designs of household refrigerators and freezers and small air conditioners rest upon the Freon refrigerants.

In the field of internal combustion engine design and utilization, which, of course, was Ket's direct responsibility in General Motors, fortune sometimes smiled and sometimes frowned. His major and permanent interest was to increase engine efficiency and power by continually raising compression ratios, a course of development which was slow and difficult but always productive. For some years however during the '30's, he also devoted himself intensively to an effort to develop valveless 2-cycle gasoline engines good enough to replace the conventional 4-cycle automobile engines. While there had originally been a few 2-cycle engines used in American automobiles, they had lost favor and became obsolete about 1910. Ket and his engine design group came up with a new type 2-cycle engine in which the cylinders were arranged in pairs along the length of the crankshaft, each pair of cylinders having twin pistons connected to the same crank pin. At the end of the working stroke the exhaust gases passed out of a port at the lower end of the piston travel in one of the twin cylinders, while the fresh charge entered a similar port in the other cylinder. This eliminated all valves and gave a smooth, continuous flow of fresh charge, pushing the burned gases ahead and out through a U-shaped space made up of the twin cylinders and the common combustion chamber connecting them at the top. It was a fascinating design which lent itself to practically every gasoline engine. Model 2-cycle engines of this and other types were constructed for the principal General Motors cars and trucks, and designs were also developed for radial aircraft engines. Ket's enthusiasm for the possibilities of 2-cycle engines communicated itself to all of us who were associated with him at the time, but in the end no form of 2-cycle gasoline engine was satisfactory to the General Motors car divisions. The experience was not a loss, however. Rather, it served only to prove again Ket's basic principle that the only failure is the last one. Out of this fruitless effort to develop a 2-cycle engine for general automobile use there came the final concentration by General Motors on light 2-cycle Diesel engines for trucks and buses, and in a parallel course, the heavier 2-cycle Diesel engines which formed the foundation for the first popular Diesel locomotives. Other large companies had previously worked in this Diesel locomotive field, but General Motors 2-cycle Diesel engines quickly outdistanced all competition and were credited with having been the main factor in the Dieselization of American railroads. While Ket's 2-cycle gasoline

engine development seemed at the time to be a complete failure, it formed part of the root system of the enormous General Motors 2-cycle Diesel engine development which followed; and this development in turn made great economies in railroad operations, deferring for many years the railroad financial crisis which now confronts most of our railroads.

Over the years preceding and during the war, my memories of Ket are mostly related to our common interests in industrial research and development. My own operating responsibility in this field came to an end as the war approached its last days when, to mark the 25th anniversary of its organized research, development, and engineering program, and my own retirement as its leader, Standard Oil Company (N.J.) arranged a forum or symposium on the Future of Industrial Research. Ket undertook the chairmanship of the first section of this symposium, of which the theme was "What should be the guiding principles and objectives for the commercial programs of industrial research and development organizations?" His lengthy extemporaneous remarks at the end of this session were recorded in the printed record and give an insight into much of his philosophy and temperament. Like many technical executives in industry he was constantly annoyed by the tendency of each different scientific or engineering discipline to develop a vocabulary of its own, when they might better have expressed themselves in common terms. His characterization of this habit of scientists and technologists was: "We are getting into the Tower of Babel as far as technological lingo is concerned and we need to get down into common words. . . . I think that the nomenclatures, methods of teaching, etcetera, have produced useless division of the same subject . . . they are all material and energy relationships—and calling them different sciences and adding a lot of Latin and Greek doesn't help the situation." Although he did not say so, everyone present knew that his training as an electrical engineer and Midgley's training as a mechanical engineer had in fact been only a prelude to their chemical research.

Another one of Ket's major criticisms of conventional research thinking, on which he is often quoted, was expressed as follows: "One of the fundamental courses that industrial researchers have to follow is to let the problem be the boss. . . . When poor Dr. Diesel made his engine forty or fifty years ago, he had to put it in the place of a steam engine, so it had to be like a steam engine. Then when we came out with the automobile, the Diesel had to be like gasoline engines. So let these things be what they want to be. If I had to set up a forward looking program for industrial research I would say 'pick out the problem, pick out the best men you have, and let the job be the boss from then on'."

CANCER RESEARCH

I had become interested in cancer research in 1939 and soon became Chairman of the Research Committee of the Memorial Hospital for Cancer and Allied Diseases in New York. By 1945, our mutual friend, Mr. Alfred P. Sloan, Jr., then Chairman of General Motors Corporation, had also become interested in

cancer research and presented an ambitious plan for the creation of a cancer research organization which would have its own separate laboratory and staff but would continue to work as a team with the Memorial Cancer Hospital. Through the Alfred P. Sloan Foundation, he provided the millions of dollars necessary to put his plan into effect, and at the same time invited Ket to join him in the project, so that the new cancer research institute would carry both names—the Sloan-Kettering Institute for Cancer Research.

Following the formal organization of the Sloan-Kettering Institute in August 1945, Ket became active in the policy phases of our new research program. One of the first questions we faced was whether our scientific policy should follow the classical line of concentrating upon the basic nature of the cancer cell and of the life processes which give rise to it, or whether we should take as well—and perhaps more importantly—the other approach of trying to follow up diligently, by whatever type of research was appropriate, a few existing clues on possible new means for actually controlling the growth of cancers. None of us had any doubt where Ket would stand on this question, and his weight was thrown enthusiastically into the scales on the latter side. There had never been any sustained, well-organized effort to apply all the resources of science to the detailed examination of this and many other phases of the cancer problem. Since no one had ever tried such a broad approach, and there was no existing organization able to try it, it was adopted by the Sloan-Kettering Institute. At the outset, the scienific prestige of the Institute suffered to some extent through misunderstanding of this policy, a misunderstanding which in the main reflected distrust of any "organization" approach on cancer research. These initial misunderstandings were soon cleared up, however, and over the succeeding period of nearly fifteen years a broad integrated research attack on the cancer problem—a composite of basic research, rational applied research, and scientific empirical research—has become the accepted order of the day. The federal government and the pharmaceutical industry, as well as our Sloan-Kettering Institute and others, are now spending tremendous sums in cancer chemotherapy research work which is still based mainly upon the empirical testing of thousands of new compounds in the effort to find some that will advance further the present very limited but useful effects of a few drugs which we and others have found which have already gone into use against cancers not susceptible to treatment by surgery or X-rays.

It is quite fair to assign to Ket a real place in this evolution of cancer research. His indirect influence began as early as 1930 when I first came into contact with Dr. Cornelius P. Rhoads, a pioneer in this movement who was then heading an anemia research program at the Rockefeller Institute for Medical Research. Dr. Rhoads was keenly interested in the philosophy and procedure of industrial research as contrasted with the philosophy and procedure of medical research, and was fascinated by my description of Ket's long uphill fight, mainly through empirical research, to find the miraculous substance which would prevent the engine from knocking. The fact that no one knew how or why the tetraethyllead worked to accomplish its results had many precedents in the field of medicine. In truth, Dr. Rhoads said, it was the rule rather than the exception to find first the

new remedy for a disease and then try to discover why it worked. The foundation for any scientific empirical research program of this kind was to work out equipment and methods by which reproducible, reasonably quantitative experiments or tests could be carried on in limitless numbers if necessary, by skilled, but not necessarily professional, personnel. This was the course which had been pursued in Ket's Dayton laboratory and my own, to test every compound we could lay our hands on in the cheap little Delco engines and to determine with the aid of the bouncing-pin indicators whether there was any appreciable effect on the knock. The same methods, used in a crude but effective way by Edison, had given us the original incandescent lamp, and the empirical method itself was sometimes called "Edisonian". It had been pursued with every scientific refinement in the German catalyst research on oil synthesis and refining with which I had become familiar and also was used regularly by a few of the great German pharmaceutical companies; but in the world of biological science in general, this concept of endless repetitious laboratory testing as a means of finding a few grains of positive data in a mass of negative data had not been accepted by most American medical researchers prior to the war. Of necessity this approach, now often called "screening," had been resorted to as the only practical approach on new biological research problems of war, and as war-time Director of the Chemical Warfare Service Research Laboratory, Dr. Rhoads became well versed in the conduct of this type of research. He, therefore, took up his new duties in 1945 as Director of the Sloan-Kettering Institute with a long indoctrination in the theory and practice of the same empirical scientific research methods which Ket and myself had of necessity been using in much of our industrial research. He and Ket quickly became close friends, and through this friendship, perhaps even more than through his formal responsibilities as a Trustee of the Institute, Ket exerted up to the time of his death a strong and useful influence upon the development of the rapidly-growing field of pharmaceutical research in which cancer chemotherapy was one of the most important parts.

PATENTS

Beginning with his first job in the Inventions Department of National Cash Register Company in Dayton, Ohio, Ket was a most prolific inventor. One hundred and eighty-seven patents have been issued upon his sole or joint inventions. It was therefore quite natural that he should have been selected in 1941 to head the National Inventors Council, and through this official government responsibility which he held for so long, as well as through his own wide experience with patents, he became well aware of the complexities of our patent system and the need for better public understanding of the patent laws and of their actual operations. When the plan for a Patent and Trademark Foundation was first conceived by Dean Colclough of the Law School and President Marvin of The George Washington University in 1950, it was inevitable that they should think of Kettering as a national figure who should be among the leaders in thinking and planning for the proposed foundation. I agreed wholeheartedly and was very happy to help them bring this new proposal to Ket's attention. His subse-

quent active identification with The Patent, Trademark, and Copyright Foundation culminated in the establishment of "The Charles F. Kettering Award for Meritorious Work in Patent, Trademark, and Copyright Research and Education."

I recall one other very important project growing out of the complex operations of the patent system in which Ket took an important part. This was the creation of the Petroleum Research Fund of the American Chemical Society, which provides currently two million dollars annually to support non-profit chemical research. This story began about 1915 when the Universal Oil Products Company was organized in Chicago as a holding and development corporation for new petroleum refining processes. Liberally financed by Mr. J. Ogden Armour, this company developed a number of improvements in oil refining, especially cracking of heavier oils to produce gasoline, but it also became engaged in numerous law suits with the leading oil refiners of the country. By 1931 this litigation had become so burdensome that some method had to be found to terminate the patent warfare in the oil industry. A group of large oil companies bought all the stock of Universal Oil Products Company and simultaneously made settlement agreements terminating the litigation in which they were involved. The Universal Oil Products Company was left with its original management, which continued its aggressive campaign to develop and license further improvements in oil refining. Its operations were on the whole quite profitable, and its oil company owners had recovered most of their original investment of some 26 million dollars, when new problems arose. The Universal Oil management was accused of unethical practices in the conduct of some of its litigation, and at the same time the Department of Justice began to question the propriety of the continued ownership of a company serving so many small refiners by a group of major oil companies. Since the excess profits tax was then in force, it was evident that there would be very little cost to its owners in giving away the Universal Oil Products Company for philanthropic purposes if a constructive plan for accomplishing this could be worked out. I discussed this with Ket who agreed with our suggestion that the oil company owners of the Universal Oil Products Company should consider giving the company to the American Chemical Society, in trust, with the net earnings to be used by the Society for the support of chemical research of interest to the petroleum industry. At that time our old friend Thomas Midgley, Jr., although trained as a mechanical engineer, had become Chairman and President of the American Chemical Society. Ket and I met informally with Midgley, several of the Directors of the Society, and a few other interested men, and presented the plan, which was favorably received by all present. The working out of the plan involved many people and many legal complications, but it finally became effective in 1944 when the Guaranty Trust Company of New York accepted ownership of all the outstanding securities of Universal Oil Products Company as Trustee for the American Chemical Society, the terms of the gift requiring that the income be used under the direction of the Society for the support of non-profit chemical research related to petroleum.*

* The Guaranty Trust Company has now sold the Universal Oil Products to the public, for about $75 million, and will invest this sum in a diversified portfolio to insure a permanent steady income to the Chemical Society.

Ket's penchant for presenting himself as completely ignorant on most subjects was perhaps best displayed in his habitual disclaimer of any business or financial sense or judgment. Actually very few people were his equal in this field. The Winters National Bank of Dayton, of which he was the controlling shareholder, had one of the best records of successful banking in the community. Under his leadership, it not only survived the great depression in which most of the Dayton banks succumbed, but resisted strong pressure to make mergers at that time with institutions which would only have pulled it under. By maintaining its own solvency and the confidence of the public, it was able in the end to render the best service to other local banks. These financial policies were Ket's own policies. He also resisted over a period of more than forty-five years, well-intentioned pressures to diversify his personal investment holdings, consisting mainly of General Motors stock, and as a result saw his fortune increase at a rate several times as great as the recommended diversified portfolios could possibly have given.

Through his Foundation and through a personal holding company and family trusts, he made early and unusually skillful disposition of his large fortune long in advance of his death. His favorite description of this aspect of his affairs ran about as follows: "When it got to the point where I found myself spending my time signing papers, I said to the head of the bank (his own bank), 'How would you handle these things if I were dead?' When he told me how they could be handled, I said to him, 'Well, from now on we are going to work it just as though I were already dead.'" These were not idle words. He succeeded many years ago in getting all of his personal affairs so well organized that he no longer had to devote any appreciable amount of time to the handling of a fortune of perhaps $200 million. He seldom even used personal checks or burdened himself with cash to any substantial extent. His routine for many years was to carry Travelers' Checks sent to him by his bank, with which he used to pay his current personal expenses and provide his pocket money. His positive genius for unburdening himself of unnecessary cares was exhibited in all of his arrangements for living. By preference he traveled in a Chevrolet because he found this produced less comment and trouble for him on the road than a more expensive car. In Detroit and in New York where he spent much time, he kept permanent hotel suites instead of apartments or houses. Instead of maintaining a winter home in Florida, with the inevitable need for supervision which it would have created, he used commodious special apartments built to his own specifications in the Surf Club in Miami where everything was taken care of for him.

He was in great demand as a speaker. His style was spontaneous and informal, and his personality became familiar to much of the nation through a series of television talks on a General Motors program. The content of his talks was predominantly the gospel of technical progress through research, and to him research meant action—experiment as well as study. As he put it, "You have to try things—action without intelligence is a form of insanity, but intelligence without action is the greatest form of stupidity." He wrote a number of technical

papers, usually in collaboration with others on his staff, but the public knew him best through his television talks and a few popular articles which combined to make him our best recognized "Prophet of Progress."*

To complete this portrayal of his habits of life, perhaps the most effective way is to give an account of my last visit with him in Dayton not long before his death. He met me at the Municipal Airport where he had arrived a short while before in one of several planes he owned. His pilot was still with him and was asked to come to breakfast with us the next morning at eight o'clock so we could make our plans for the day. Leaving the airport, we motored to his home on a hillside in suburban Dayton. After his wife's death, he had begun using part of this large house as a laboratory and administrative headquarters for his personal research ventures, which for some thirty years had been centered in very large part upon the mysteries of photosynthesis—"What makes the grass green," in his words. This work had grown so important that he had recently transferred it to a large, new research laboratory just off the campus of Antioch College in Yellow Springs, Ohio, about one hundred miles from Dayton. He regularly commuted to this new laboratory by air. His son Eugene, a General Motors engineering executive and a trustee of the Sloan-Kettering Institute for Cancer Research, joined us soon after we reached his home and we spent the evening discussing long-term problems of the Institute, which in less than fourteen years had grown into a research operation with a staff of about 700. We also discussed the latest plans for some new cancer experiments in the Ohio State Penitentiary at Columbus. Ket, who had long been a trustee of his alma mater, Ohio State University in Columbus, had been in touch by telephone that same day with Dean Charles Doan of the Medical College. Dr. Doan was cooperating with Dr. Rhoads of the Sloan-Kettering Institute in arrangements which Ket had helped to work out, under which a group of courageous volunteer prisoners were working with the doctors to provide the experimental evidence on what happened when living cancer cells were transplanted from cancer patients to subjects free of cancer. There was no longer any doubt. The Ohio Penitentiary experiments had shown that these cells would die if the subjects to whom they were transplanted were free of cancer. Since we had shown earlier in Memorial Hospital that the transplanted cancer would usually live and continue growing if the subject already had cancer of his own, these Ohio tests were fundamental to cancer understanding. But it was true here as it usually is that "as you ascend the mountain of knowledge, the horizon of your ignorance widens." Much more work was needed at the Ohio State Penitentiary to determine how far man's natural immunity to cancer, shown by these first tests, followed the general rules of immunity to disease. We discussed this new approach on cancer understanding at some length.

After this talk, we laid out the next day's program which Ket planned almost to the last minute. The pilot joined us at breakfast and was instructed to have the small twin-engine plane ready for us at ten o'clock at a new airport Ket had sponsored near a flourishing Dayton suburb its population had chosen to call

* From T. A. Boyd's article in *Science.*

"Kettering." Ket, his son Eugene, and I then departed in a new Chevrolet to inspect a small research laboratory carrying on some special work in which Ket was interested that was located in the country a few miles away from his home. On the road, Eugene Kettering had an opportunity to show us the remarkable acceleration at high speeds provided by the new design of Chevrolet camshaft. The special laboratory we visited had required a remote location, far from any possibly disturbing outside influences. We spent something less than an hour there, noting progress on some new equipment in which Ket had a personal interest, and then proceeded to the nearby airport where his pilot was about five minutes late in meeting us. This was the longest delay we suffered during the entire day. The plane took us in about forty minutes to a tiny country airport near Yellow Springs, Ohio. Ket was not handling the controls himself, although he very often did so, and in fact had been a pioneer flier who had flown his own plane nearly every day for a year at one time, just to show that it was possible. From this airport, we motored through the town, especially examining the buildings of Antioch College, which had been the beneficiary of generous support by Ket. Its program was built upon interrupted schooling like that which Ket himself had experienced, many of its courses being laid out to permit students to alternate periods of schooling and full-time outside work. Ket's Yellow Springs laboratory was built on a site adjoining the Antioch College campus. It had been designed as a flexible all-purpose laboratory, and although presently used almost exclusively for the photosynthesis work, it could be later adapted to any normal form of chemical and physical laboratory research. We compared the design of this new laboratory and its low unit cost figures with the designs and estimates we had in hand for a new suburban laboratory near New York, then being projected for Sloan-Kettering Institute. Our return trip by motor and plane to the Dayton Municipal Airport was completed on schedule, to the minute, and our little private plane discharged us almost under the wings of the 4-motor passenger liner on which Mr. and Mrs. Eugene Kettering and I were proceeding to Chicago. Ket's final injunction to me as we parted was to examine particularly the German plastic "transparent woman" in the museum of a new medical center in Hinsdale, Illinois, which was being sponsored by Mr. and Mrs. Eugene Kettering. This injunction I followed faithfully later that afternoon and returned to New York on an early evening plane, following Ket's schedule for me.

Like Benjamin Franklin, whose surname he bore quite by chance, as his own middle name, Ket was not only an inventive genius but a thoroughly well rounded man—a quality not often associated in the public mind with the word "inventor." He was gifted in high degree as an engineer, an industrialist, a philanthropist, and as a leader in national and community causes. He was also wise in the conduct of his own business affairs, the management of his life, and the conservation of his time and energies to permit him to engage in the manifold activities in which he was active to the week of his death. His voluntary assumption of a great load of public and humane responsibilities was always followed by the faithful performance of any duties he assumed. It is impossible to summarize a life such

as his or its results. But where circumstances required him to describe himself in one word, that word was "inventor." By his life this word has re-acquired a luster it has sometimes seemed to lose. The dominant traits of independence and originality for which it stands are peculiarly characteristic of this nation. The end of his career is a timely reminder that our patent system maintains the one basic principle of law by which the inventor is able to survive and continue his independent and original contributions to a civilization which tends increasingly toward organization and conformity.

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UNITED STATES PATENTS ISSUED TO CHARLES F. KETTERING

PATENT NUMBER	DATE OF ISSUE	CO-INVENTOR	INVENTION
910,690	1–26–09	———	Driving mechanism for registering-machine
923,857	6– 8–09	———	Mechanical clutch
924,616	6– 8–09	———	Driving mechanism for cash-registers
939,267	11– 9–09	———	Store-service credit-system apparatus
959,059	5–24–10	———	Adding and subtracting machine
959,548	5–31–10	———	Electric driving device for registering-machines
975,533	11–15–10	———	Store-service credit-system apparatus
976,577	11–22–10	———	Driving device for registering-machines
1,004,881	10– 3–11	———	Cash-register
1,005,555	10–10–11	———	Cash-register
1,011,966	12–19–11	W. A. Chryst	Cash-register
1,025,277	5– 7–12	W. A. Chryst	Cash-register
1,037,491	9– 3–12	———	Ignition apparatus for explosion-motors
1,037,492	9– 3–12	———	Ignition system
1,040,349	10– 8–12	———	Ignition system
1,041,802	10–22–12	———	Recording-key
1,046,605	12–10–12	———	Electric railway-gate
1,066,432	7– 1–13	———	Control for electric lighting systems
1,089,771	3–10–14	———	Binding-post
1,102,593	7– 7–14	———	Ignition system
1,108,185	8–25–14	———	Store-service credit-system apparatus
1,109,763	9– 8–14	———	Registering mechanism
1,110,392	9–15–14	W. A. Chryst	Cash-register
1,116,440	11–10–14	———	Indicating mechanism
1,122,605	12–29–14	———	Store-service credit-system apparatus
1,131,426	3– 9–15	W. A. Chryst	Illuminated cash-register indicator
1,137,061	4–27–15	W. A. Chryst	Cash-register
1,137,062	4–27–15	W. A. Chryst	Cash and autographic register
1,142,102	6– 8–15	———	Store-service credit-system apparatus
1,144,418	6–29–15	W. A. Chryst	Cash-register
1,150,523	8–17–15	———	Engine-starting device
1,151,190	8–24–15	W. A. Chryst	Multiple cash-register and recorder
1,154,025	9–21–15	———	Electric meter
1,162,073	11–30–15	———	Current-interrupter
1,163,092	12– 7–15	———	Timer or current-interrupter
1,166,527	1– 4–16	———	Registering mechanism
1,167,762	1–11–16	———	Ignition system
1,168,314	1–18–16	———	Ignition system
1,170,275	2– 1–16	———	Ignition system
1,171,055	2– 8–16	———	Engine starting, lighting, and ignition system
1,183,074	5–16–16	———	Engine-starting device
1,184,858	5–30–16	———	Engine-starting device
1,190,175	7– 4–16	———	Ignition system
1,191,083	7–11–16	———	Electric machine
1,191,976	7–25–16	———	Current-interrupter
1,192,906	8– 1–16	———	Current-interrupter
1,196,243	8–29–16	———	Engine-starting device
1,211,378	1– 2–17	W. A. Chryst	System of selective electrical distribution
1,223,180	4–17–17	———	Ignition system

PATENT NUMBER	DATE OF ISSUE	CO-INVENTOR	INVENTION
1,225,820	5–15–17	R. S. DeMaree	Electric switch
1,229,754	6–12–17	W. A. Chryst	Electric machine
1,231,264	6–26–17	———	Ignition device
1,231,265	6–26–17	———	Control for electrical systems
1,231,266	6–26–17	———	Engine-starting device
1,233,369	7–17–17	———	Ignition system
1,233,370	7–17–17	———	Control for electrical systems
1,240,348	9–18–17	———	Engine-starting device
1,241,990	10– 2–17	W. A. Chryst	Engine-starting device
1,243,422	10–16–17	W. A. Chryst	Engine-starting system
1,250,188	12–18–17	W. A. Chryst	Engine-starting system
1,253,389	1–15–18	W. A. Chryst	Ignition system
1,254,811	1–29–18	———	Engine starting, lighting, and ignition system
1,255,177	2– 5–18	———	Ignition system for combustion-engines
1,258,785	3–12–18	W. A. Chryst	Engine-starting system
1,259,995	3–19–18	W. A. Chryst	System of selective electrical distribution
1,264,943	5– 7–18	W. A. Chryst	System of selective electrical distribution
1,265,454	5– 7–18	W. A. Chryst	Ignition system
1,272,055	7– 9–18	W. A. Chryst	Electrical system for engines
1,272,056	7– 9–18	———	Ignition system
1,273,870	7–30–18	W. A. Chryst	Engine starting device
1,273,871	7–30–18	W. A. Chryst	Engine starting system
1,284,365	11–12–18	W. A. Chryst	Electric machine
1,284,707	11–12–18	———	Electrical storage system
1,293,467	2– 4–19	W. A. Chryst	System of selective electrical distribution
1,293,468	2– 4–19	———	Engine starting device
1,301,851	4–29–19	———	Ignition system
1,303,831	5–13–19	W. A. Chryst	Engine starting system
1,311,402	7–29–19	W. A. Chryst	Electrical system for engines
1,311,403	7–29–19	W. A. Chryst	Electrical system for engines
1,312,549	8–12–19	W. A. Chryst	Engine starting system
1,331,649	2–24–20	———	Ventilating system
1,336,142	4– 6–20	———	Circuit-breaker indicating device
1,336,143	4– 6–20	———	Circuit-breaker indicating device
1,337,363	4–20–20	———	System of electrical distribution and control
1,337,364	4–20–20	———	System of electrical generation and control
1,338,987	5– 4–20	———	System of electrical generation and control
1,341,327	5–25–20	W. A. Chryst	System of electrical generation
1,351,910	9– 7–20	———	System of electrical control
1,380,974	6– 7–21	———	Internal-combustion engine
1,380,975	6– 7–21	W. A. Chryst	Power plant
1,391,194	9–20–21	W. A. Chryst	Engine-starting system
1,401,337	12–27–21	W. A. Chryst	Electrical system for engines
1,401,479	12–27–21	———	Ignition system
1,404,152	1–17–22	———	Fuel-supply system
1,405,519	2– 7–22	W. A. Chryst	Brush mounting
1,410,682	3–28–22	———	Fuel-supply device
1,430,524	9–26–22	———	Engine

PATENT NUMBER	DATE OF ISSUE	CO-INVENTOR	INVENTION
1,434,013	10–31–22	———	Engine-control system
1,435,966	11–21–22	———	Ignition system
1,441,430	1– 9–23	———	Hydrometer circuit closer
1,448,749	3–20–23	———	Electrical system
1,463,958	8– 7–23	———	Magneto ignition system
1,453,358	5– 1–23	———	Joining metals
1,454,644	5– 8–23	———	Electric speedometer
1,456,851	5–29–23	———	Binding element
1,464,908	8–14–23	———	Steering-post lock
1,465,644	8–21–23	W. A. Chryst	Ignition apparatus
1,479,432	1– 1–24	———	Battery-charging system
1,489,324	4–18–24	———	Internal-combustion engine
1,491,989	4–29–24	———	Liquid storage and supply system
1,501,491	7–15–24	———	Spark plug
1,501,561	7–15–24	———	Engine construction
1,501,852	7–15–24	———	Engine-starting system
1,501,853	7–15–24	W. A. Chryst	System of electrical generation
1,507,292	9– 2–24	W. A. Chryst	System of gas control
1,507,293	9– 2–24	W. B. Earnshaw	Cylinder construction
1,508,700	9–16–24	———	Protecting device
1,511,201	10– 7–24	———	Internal-combustion engine
1,512,029	10–21–24	G. A. Buvinger	Water system
1,514,970	11–11–24	———	Hydrometer
1,529,188	3–10–25	———	Internal-combustion engine
1,529,189	3–10–25	———	Internal-combustion engine
1,529,190	3–10–25	———	Condenser
1,529,191	3–10–25	———	Magnetic clutch
1,552,170	9– 1–25	C. L. Lee	Weighing machine
1,557,205	10–13–25	———	Automatic switch
1,557,206	10–13–25	———	Fuel-supply device
1,561,083	11–10–25	———	Vehicle frame
1,585,994	5–25–26	G. A. Buvinger	Water system
1,599,899	9–14–26	G. A. Buvinger	Diaphragm pump
1,605,663	11– 2–26	T. Midgley, Jr.	Motor fuel
1,605,664	11– 2–26	T. Midgley, Jr.	Motor fuel
1,607,200	11–16–26	C. L. Lee	Fuel supply system
1,618,439	2–22–27	C. R. Short	Vehicle
1,622,153	3–22–27	J. H. Hunt	Electrical system for motor vehicles
1,622,154	3–22–27	J. H. Hunt	Electrical system for motor vehicles
1,623,121	4– 5–27	———	Control apparatus
1,624,139	4–12–27	———	Fuel-supply device
1,635,216	7–12–27	T. Midgley, Jr.	Using low-compression fuels
1,642,034	12–13–27	W. A. Chryst	System of electrical distribution and control
1,644,731	10–11–27	C. R. Short	Internal-combustion engine
1,644,732	10–11–27	———	Internal-combustion engine
1,650,523	11–22–27	J. C. Federle	Electrical apparatus
1,650,524	11–22–27	———	Electrical apparatus
1,663,709	3–27–28	———	Cooling device for valves and the like
1,664,366	3–27–28	———	Fuel-supply system
1,665,307	4–10–28	———	Cooling system for internal combustion engines

PATENT NUMBER	DATE OF ISSUE	CO-INVENTOR	INVENTION
1,668,508	5- 1-28	———	Making air-cooled cylinders
1,690,341	11- 6-28	———	Air cleaner
1,697,818	1- 1-29	———	Air-cooled engine
1,698,265	1- 8-29	G. A. Buvinger	Water system
1,707,732	4- 2-29	C. R. Short	Frame construction for automobile chassis
1,710,991	4-30-29	———	Automatically-controlled transmission for motor vehicle
1,718,238	6-25-29	W. A. Chryst	System of gas control
1,721,808	7-23-29	———	Heat-exchange apparatus
1,760,845	5-27-30	C. R. Short	Drive-shaft for motor-driven vehicles
1,783,921	12- 2-30	———	Container for removing carbon
1,793,857	2-24-31	Otto M. Summers	Refrigerating apparatus
1,795,865	3-10-31	———	Hydraulic slack adjusters
1,815,315	7-21-31	———	Refrigerating apparatus
1,886,339	11- 1-32	———	Refrigerating apparatus
1,913,887	6-13-33	Orin E. Marvel	Motor starting device
1,948,818	2-27-34	———	Method and means for making air cooled cylinders
1,955,192	4-17-34	———	Refrigerating apparatus
1,978,463	10-30-34	———	Refrigeration
2,007,608	7- 9-35	———	Two cycle engine
2,080,487	5-18-37	———	Synchronous control of clutch servos
2,093,968	9-21-37	———	Refrigerating apparatus
2,098,295	11- 9-37	Edwin C. Sittler	Method of apparatus for creating an artificial fever
2,130,092	9-13-38	———	Refrigerating apparatus
2,130,093	9-13-38	———	Refrigerating apparatus
2,150,880	3-14-39	———	Control means for refrigerating apparatus
2,159,741	5-23-39	Edwin C. Sittler	Bed air conditioning apparatus
2,294,036	8-25-42	———	Refrigerating apparatus
2,377,633	6- 5-45	———	Variable pitch propeller control
2,377,698	6- 5-45	Albert W. Fischer	Automatic control
2,399,640	5- 7-46	———	Temperature sensitive means
2,407,555	9-10-46	———	Automatic control
2,417,112	3-11-47	———	Electrical control system
2,432,667	12-16-47	Albert W. Fischer	Automatic control
2,456,198	12-14-48	Albert W. Fischer	Controls
2,458,784	1-11-49	Albert W. Fischer	Automatic control
2,543,500	2-27-51	Wesley S. Erwin	Means for suppressing transverse modes of oscillation in a piezoelectric crystal
2,563,341	8- 7-51	———	Humidity control
2,566,212	8-28-51	Eugene Williams	Locomotive ventilating and cooling system
2,688,056	8-31-54	Frank J. Roselandt	Humidistat
2,760,023	8-21-56	Kauno E. Sihvonen & Thomas C. Van Degriff	Humidistat

Tax Experience of Individual Inventors

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SUMMARY

IN A LIMITED MAIL SURVEY of the tax experience of individual inventors, it was found that only 13% of the respondents had ever received capital gains tax treatment on proceeds from their inventions. Both captive and independent inventors were covered in roughly equal numbers; and experience before as well as after 1954 was asked for. Greater willingness to sell or license inventions exclusively since 1954 for more lenient tax treatment was reported by responding inventors, although no trend toward these arrangements is apparent in the sample results, due mainly to the limited time since 1954. Many individual inventors apparently do not fully understand Section 1235 of the Internal Revenue Code.

Only 15% of the inventors surveyed had been able to expense research and development costs, while 11% had been able to allocate income from inventions to prior years.

A MAJOR PURPOSE OF PROJECT 7a, Taxation and Patents, has been to gather first hand evidence as to how inventors have responded to the prevailing tax situation. Have they been motivated strongly by tax considerations when making arrangements for the use of their inventions? Have they taken full advantage of the special tax rules legislated for their benefit?

The results obtained from a sample survey of individual inventors who responded to a mail questionnaire dealing with their tax experience indicate that comparatively few individual inventors have received compensation for their efforts in the form of preferentially taxed, long-term capital gains. Most captive inventors have received no specific compensation other than regular salary from inventions assigned to their employers. Even independent inventors have not made full use of the special tax provisions for their benefit.

SPECIAL TAX TREATMENT OF INVENTORS

As earlier reports on this project have explained, the income tax rules applicable to individual inventors were modified by the Internal Revenue Code of 1954. Prior to that time only amateur inventors could treat proceeds from outright sale or exclusive licensing of a patented invention as capital gain rather than as ordinary income. Since that time all individual inventors, professional

and amateur, as well as unrelated investors in inventions not yet reduced to practice, have had this privilege.

The present survey sought to determine whether, as a result of the 1954 tax changes, inventors generally have made any significant changes in their customary arrangements for use or exploitation of their patented inventions and whether they have taken full advantage of the tax saving arrangements open to them. For this purpose we needed both pre and post 1954 tax experience from an identical group of inventors.

Various methods might have been employed to reach a sample of inventors for information about their tax experience. The method actually chosen was designed to minimize expense and still obtain reasonably representative results. This was done by using a quasi sub-sample of a larger sample previously employed in the Patent Utilization Study, also conducted by the Foundation.

NATURE OF SAMPLE AND OF PRESENT MAIL INQUIRY

To obtain first hand tax experience from individual inventors for the present study, a detailed questionnaire was designed and sent to 200 known inventors who had previously responded to another questionnaire distributed in connection with the Patent Utilization Project. A copy of the questionnaire dealing with tax problems is appended to the present report.

Readers of this *Journal* will recall that the Patent Utilization Study was based on a 2% sample of all patents issued during the years 1938, 1948, and 1952—thus covering a full 17-year cycle of patent life. The number of patents issued in those three years was 105,639; therefore, somewhat in excess of 2,100 patents were in the potential utilization sample. The number of inventors was somewhat larger (about 23%) than the number of patents issued since some patents have more than one inventor. On the other hand, a few inventors may have received more than one patent in the three years from which the sample was drawn.

Selection of the 2% sample was done by patent serial numbers. Inventors who did not receive a patent in one of these three years, therefore, had no opportunity of being represented in the utilization sample from which our sub-sample was drawn.

For purposes of the utilization study, which sought to determine whether and to what extent patents were actually used commercially, it was essential to have represented in the sample some patents already expired or about to expire. To collect tax experience it was necessary that we reach inventors who had patented both before and after 1954.

Our questions, unlike those in the utilization survey, were not limited to experience in connection with particular patents or certain years. Rather the tax questions covered the whole of each inventor's experience to date. The utilization sample merely provided a convenient mailing list of known inventors.

At the time the tax sub-sample was selected, approximately 800 responses to the utilization questionnaire had been received. Of these 800 inventors about 600 had assigned their patents, either to their employers or to others; about 200

inventors had not assigned their patents. To make certain our tax questions reached both groups we distributed the tax questionnaires as follows: One hundred, or one out of every six prior respondents with assigned patents, were sent the tax questionnaire. Another one hundred, or every other prior respondent with unassigned patents, were also sent the tax questions. Undelivered questionnaires among the 200 originally mailed were replaced with new names. No other follow-up in the form of supplementary letters or telephone calls to non-respondents was undertaken.

ANALYSIS OF RETURNS RECEIVED

Eighty returns were received containing some tax information, a 40% response rate which is unusually high for a single time mail questionnaire. The nature of our sample, based as it was on prior respondents to another questionnaire, undoubtedly accounted for this high response rate. The 80 inventors in our sample had received somewhat more than 1,100 patents.

Because of the technical nature of the tax questions on which information was sought, our form had to be fairly detailed. Moreover, because individuals are understandably reticent about disclosing their tax experience, special care had to be taken to preserve the anonymity of respondents. This was done by asking that the returns be unsigned and by taking pains that no individual return could be traced back to the original mailing list.

We are grateful to those 80 inventors who took the trouble to complete and return the necessarily complicated tax questionnaires and would like to acknowledge our indebtedness to them for whatever factual basis the present study contains.

Not all our 80 respondents answered all the tax questions put to them. In good part this may be attributed to the fact that more than half our total response came from captive inventors. Such inventors—employed as they are under contracts that require them to assign all patents they receive to their employers—had, in general, very limited experience with the special tax provisions that govern independent inventors. Most captive inventors did not sell or license patents for a lump sum or for royalties.

The geographical distribution of our 80 returns with some tax information is of interest in appraising the representativeness of our sample results; accordingly it is set forth in the following table.

TABLE 1

GEOGRAPHIC DISTRIBUTION OF 80 RETURNS FROM 200 QUESTIONNAIRES SENT TO INVENTORS RECEIVING PATENTS IN 1938, 1948, AND 1952

STATE	NUMBER OF RETURNS RECEIVED	
California	11	11
Pennsylvania	10	10
New York	9	9
Ohio	7	7
Tennessee, District of Columbia, Michigan	5 each	15
Massachusetts, Illinois	3 each	6
Maryland, Kansas, Indiana, Wisconsin, Colorado, New Jersey	2 each	12
Oklahoma, Hawaii, N. Carolina, Delaware, Wyoming, Minnesota, New Hampshire, S. Dakota, Texas, Washington	1 each	10
Total	80	80

In all, returns were received from 23 states, 1 Federal District, and 1 Federal Territory—giving fairly good geographical coverage of various sections of the United States. The geographic distribution of returns reflects the fact that inventors tend to be concentrated in the more industrialized areas of the country; but they are to be found in all regions and in all walks of life.

OCCASIONAL VS. CONSISTENT INVENTORS

Our respondents included both occasional and consistent inventors. Before 1954 the tax treatment of inventors depended on whether they were amateurs or professionals at the business of invention; this distinction was frequently made on the basis of the number of patents obtained and the amount of time devoted to pursuits, such as research and engineering, that frequently lead to invention. Since 1954 these considerations have been irrelevant to tax treatment—producing fewer inequities in tax results and fewer problems of tax administration.

However, as an indication of the breadth and depth of tax experience among the inventors in our sample, the number of patents actually obtained is of some importance. We have 64 returns on which respondents indicated precisely the number of patents they had obtained. These returns were distributed as follows:

TABLE 2

NUMBER OF PATENTS ISSUED TO RESPONDENTS ANSWERING TAX QUESTIONNAIRE AND INDICATING PRECISELY THE NUMBER OF PATENTS RECEIVED

NUMBER OF PATENTS RECEIVED	NUMBER OF RESPONDENTS
1 Only	14
2	10
3	4
4	3
5	2
6 to 9	8
10 to 19	10
20 to 29	5
30 to 49	3
50 to 74	2
75 to 100	1
Over 100	2
Total	64

Defining occasional inventors for present purposes as those to whom five or fewer patents had been issued, we have 33 returns, or 52% of our sample of respondents in that category. Defining consistent inventors as those with 20 or more issued patents, we have 13 returns or 20% of our total response in that area.

The sample indicates that, in general, captive inventors tend to be somewhat more prolific, in terms of the number of patents obtained, than do independent inventors. This probably reflects chiefly the fact that captive inventors devote a larger part of their time to activities leading to invention, and also that only known prolific inventors have opportunities to become captives.

The evidence contained in our sample that may be cross-classified by number of patents issued and captive or independent status of the inventor is as follows:

TABLE 3

NUMBER OF PATENTS ISSUED TO CAPTIVE AND INDEPENDENT INVENTORS RESPECTIVELY

NUMBER OF ISSUED PATENTS	CAPTIVE INVENTORS	INDEPENDENT INVENTORS
Under 5	9	26
5 to 10	10	1
More than 10	17	4
Totals*	36	31

Thus, among our respondents only four of the independent inventors, or 13%, had obtained more than 10 patents whereas 17, or 47% of the captive inventors, had received this many or more. For this and other purposes throughout the present study, a captive inventor is defined as one who regularly assigns all or nearly all of his inventions to his employer.

Even more striking evidence of greater "productivity" among captive inventors is available if we take our group of so-called "consistent inventors"—those having 20 or more issued patents. In this group all 13 returns in the sample are from captive inventors and none come from independents.

One should, of course, be extremely cautious about the temptation to measure an inventor's productivity solely by the number of patents he has received. This at best gives a very superficial index. Some patents have little if any value while others have highly important and far reaching commercial applications. One basic patent may be worth more than a hundred others that are simply detailed refinements on an established device or process.

It should perhaps be emphasized once more that, although as a consequence of the method by which the present sample was selected, only inventors receiving patents in one of three specific years could be included, our responses contained information not limited to those three years. Thus, for example, the number of patents received by our respondents and shown in Tables 2 and 3 was not limited to the three years in question but covered the whole of each inventor's experience up to the time his response was filed.

It is relevant to inquire what sort of bias arises in the present inquiry from surveying only inventors who received patents in one of three selected years, and excluding other inventors who received patents in some other years. We cannot be sure either of the direction or the magnitude of this bias without surveying another group of inventors who patented in other years. To do this would have involved additional questionnaires and expense. There appears, however, to be no a priori reason why patent recipients in one particular group of years should be significantly different from recipients in some other group of years.

* The reason there are 67 returns represented in this table, and only 64 in Table 2, is that some inventors with less than 5 patents did not give the exact number and therefore were omitted in compiling Table 2.

In the utilization study, where certain tabulations were made by year of patent issue, the results do not vary sharply from one year to another.

Our sample is also subject to bias because we included only respondents to a previous questionnaire in our mailing list and excluded non-respondents. Again we can speculate about the character of the resulting bias, but can hardly measure it. Because our tax questionnaire was fairly detailed and complete, it might be expected that those inventors with the most tax experience would be most reluctant to answer it, whereas those with the least experience would answer most readily. This may be the case, but we doubt that this factor (ease of response) has significantly affected the results obtained. On the other hand the more extensive the tax experience an inventor receiving one of our questionnaires has had, the more he would be likely to profit from an exchange of experience with others in similar circumstances. Among the returns we have received, some quite extensive experience with both tax and patent problems is represented. No evidence of reluctance to answer questions is apparent when the answers are within the inventor's own experience.

EXTENT OF CAPITAL GAINS TAX EXPERIENCE

The most striking result revealed by the present survey is the apparently limited extent to which inventors have actually benefited from the special tax provisions giving them capital gains treatment. Among the replies directly to this question we found that in only 10 cases or 13% of the total response had advantage actually been taken of the right to treat proceeds from invention as capital gain. Forty per cent of the respondents who had received capital gains treatment were captive inventors at the time they filed their responses although they may have been independent earlier. The remaining 60% were still independent.

No marked trend toward increased use of outright sales or exclusive licenses in order to get capital gains treatment after 1954, as opposed to the situation prevailing before that date, is evident in our sample. In fact, we have in the sample more inventors who received capital gains treatment before 1954 than who did so after that date. This result, however, is believed to be more accidental than significant, and a result of the greater exposure of inventors to pre rather than post 1954 tax rules. It is inconsistent, for example, with the response obtained in one-third of our total answers to the question about greater willingness to use sales or exclusive licenses since 1954. This third of total respondents did see a positive tax advantage in present law; they would have been willing to take advantage of it, although the opportunity to do so had not arisen.

The majority of those who were not more willing to use outright sales or exclusive licenses since 1954 were captive inventors—presumably with limited opportunities to use these methods of tax saving.

These results confirm to a substantial degree our earlier expectations, based solely on qualitative evidence, to the effect that enactment of Section 1235 probably did not produce any radical shift in the customary methods of exploiting patent rights. Although evidence is not directly available from the sample, the

increasing frequency of cases coming before the Tax Court, in which inventors have been claiming the benefits of this Section, does indicate some gradual, if not yet marked, trend toward increased use of the sale or outright license.

In the present sample may be found a number of cases, amounting to nearly 20% of the total apparently eligible, in which inventors did not take advantage of the capital gains provisions, although the form of their arrangements for patent use apparently had opened this tax advantage to them. This suggests that a considerable number of inventors either may be unaware of the special tax provisions for their benefit, or for some other reason they have failed to take advantage of these provisions. In all these cases the inventor had either sold his patent outright or had granted an exclusive license to use it—yet had failed to claim the proceeds as capital gain. One is forced to conclude that inventors as a class are in need of better information about our tax laws, and could use better advice as to how to arrange their business affairs.

The majority of independent inventors who did not sell or license their patents exclusively were either unaware of the tax advantages in these arrangements, or else they preferred to make other arrangements despite their tax disadvantages. The most common arrangement apparent in our sample was to retain the patents in a company or a business enterprise which the inventor himself owned or controlled. This may well be the most advantageous use for certain patents; in other cases it may simply indicate an unwillingness for the inventor to give up control. Since our responses did not include any information about the technical nature of the inventions surveyed, we cannot reach any firm conclusions about whether inventors made the right use of their patents after they had received them.

The importance attached by most inventors to patent protection may be seen in the fact that our returns did not include a single case in which an unpatented invention had been sold, although we have numerous cases in which no commercial use could be found for patents actually obtained. This would indicate that inventors are well aware of the advantages to them of obtaining patent grants—even though the value of their inventions may be questionable.

Our sample did not produce any evidence of overstrict administration of Section 1235 by the Internal Revenue Service. Only one inventor in the sample reported that his claim for capital gains treatment had been disallowed. In this case he had sold less than an undivided interest in the patent and had retained too many rights himself to qualify under the Section.

RESEARCH AND DEVELOPMENT

To gain some insight into the ability of inventors to deduct research and development expenses when arriving at taxable income, we inquired specifically about this problem. Only 15% of our respondents indicated that they had been able to take this deduction, while 85% reported they had not. The majority of captive inventors—according to our returns—had made no effort to deduct research and development costs since these were borne entirely by their employers.

Among the independent inventors 50% had been able to take research and development deductions and 50% had not. Among those unable to take the

deduction, the principal reasons were that the development work had been unrelated to their main trade or business or that their patents had found no commercial use and therefore had produced no income.

These results point to the fact, already well-known, that invention for many individuals is the result primarily of hobby or other spare time activities. Any proposal to liberalize the provisions for research and development deductions would therefore run the risk of underwriting hobby activities with tax revenue.

As had been pointed out in our earlier reports, the Internal Revenue Code of 1954 provided, in Section 174, a statutory basis for the deduction of research and development costs; but it did not attempt to change the existing practice with regard to these costs—merely to clarify the prevailing situation. Prior to 1954, such costs had been generally deductible when regarded as ordinary and necessary to the taxpayer's trade or business. This rule is still followed.

Our returns did not indicate that enactment of Section 174 had made any significant difference in the ability of inventors to deduct their research and development costs. This was in accordance with our expectation. Likewise our returns did not indicate any tendency for taxpayers who had business-related research costs to use the option provided in Section 174 to capitalize these research costs instead of expensing them currently. Generally speaking, only new businesses operating at a loss, or those who expect future tax rates to be significantly higher than present rates, will find it advantageous to exercise this option. Our returns included no cases where capitalization had been preferred to a current deduction if the latter could be obtained.

INCOME SPREADING

In addition to Section 1235, which provides capital gains treatment to those inventors who sell their patents or license them exclusively, there is another income tax relief provision of advantage to inventors. Section 1302 of the 1954 Code provides that where work on an invention has occupied a period of 24 months or more, the proceeds of this work, if not treated as capital gain, may be carried back to the period in which the work was performed rather than the income received. This reallocation of income for tax purposes may not extend over more than 60 months.

This provision is valuable to inventors who may work a long time on an invention and then receive in a single year a large sum as ordinary income for their work. A similar provision existed before 1954 in Section 107 (b) of the 1939 Code. The changes made in 1954 shortened the period necessary to qualify for this tax modification from 36 to 24 months and increased the period over which income might be spread in certain cases from 36 to 60 months.

Under a progressive rate schedule such as we have in the Federal individual income tax, a large lump of income in one year may be taxed more than the same sum would be if allocated to a series of years. Relief was therefore provided to any group of income recipients, including inventors, who were apt to receive compensation for several years' work in one year.

Among our returns only 11% of the responses indicated that advantage had been

taken of this limited right to reallocate income to earlier years. The remaining 89% had not used Section 1302, either because it would have meant no tax saving or because they were unaware of the provision. We did not receive enough details with our responses to know which reasons were more compelling in individual cases. It is encouraging, however, to discover that at least some inventors were taking advantage of income averaging to lessen their tax liabilities.

FOREIGN PATENTS

Although designed merely to obtain background information about any unusual tax problems inventors may have encountered in licensing their inventions for international use, our questionnaire asked for the number of foreign patents that had been obtained in support of basic U. S. patents. The result obtained may be of some interest in indicating how usual it is to support American patent rights with at least some foreign patents.

Our returns indicated that in nearly 50% of the experience of the reporting inventors, no foreign patents had been secured, chiefly because no opportunity for exploitation of the invention abroad had been apparent. In the case of 18% of the reporting inventors, somewhat less than 25% of their American inventions had been supported by foreign patents in one or more different countries. Another 18% had more than 25% but less than 50% of their American inventions supported by foreign patents. Only in the case of 8% of our reporting inventors had 50% or more of the American inventions been backed up by foreign patents. Some captive inventors did not know which of their assigned inventions had been covered by foreign patents, but most of them who answered had at least a general idea.

These results are generally in accord with expectations since many inventions are specific to American technology and have only a limited usefulness outside this country.

Not all of the foreign patents secured by our reporting inventors had produced any income from foreign sources. In a high percentage of the cases the foreign patents had evidently been secured for defensive or protective reasons rather than because of any intention to exploit them abroad.

Our survey did not provide much useful information about the specific tax problems American inventors had encountered in the course of exploiting their foreign patent rights. Only two cases, representing 5% of the total response to this question, indicated that any special problems had been encountered. In neither case were enough details given to determine precisely the nature of the difficulty. One case involved a difference in rules between the United Kingdom and the United States income taxes. The other turned on a similar difference between the United States and France.

SERVICES ACCOMPANYING PATENT ASSIGNMENTS

One question in our survey dealt with the extent to which patent assignments were accompanied by agreements to render services to the assignee and how these

services were taxed. This is an area of some uncertainty in present law. Some cases have evidently been found in tax practice where all the proceeds from assignment of an invention, including the compensation for related services rendered, have been taxable as capital gains. A few inventors have apparently been advised to enter into such arrangements with no separate compensation for services in the hope of lessening their tax liabilities. There is considerable doubt whether such arrangements can stand scrutiny.

To test whether this apparent opportunity for tax minimization was being utilized, we inquired specifically about it. Our returns showed that in only 16% of the patent assignments covered had special services been required. In the remaining 84% of cases the inventor rendered no additional services.

In the cases where services were rendered, the most common arrangement was for general advice and consultation extending over a period of several years. In none of the cases where the question was answered did the inventor indicate that these services had been taxable as capital gain. This would indicate that the tax minimization opportunity, if it exists at all, is hardly a large one.

REPRESENTATIVENESS OF SAMPLE RESULTS

The foregoing pages have discussed substantially all the usable results obtained from our sample inquiry. The question remains as to how representative are the results we have obtained, given the smallness of the sample and the possible elements of bias that enter into the sample results. It is difficult to give exact judgments to this question.

We must judge our sample largely by those characteristics in respect to which it may be compared with a known universe. If these measurable characteristics are representative, the probability is increased that those findings of the sample that cannot be compared with a universe will be fairly accurate also.

One possible test is the distribution of issued patents between individuals and corporations. Patent Office records indicate that year after year about 60% of the patents issued in the United States are assigned to corporations and about 40% are retained by individuals. The comparable percentages in our sample are 58 and 42, respectively. This is in spite of the fact that we deliberately made an effort to over-represent independent inventors and under-represent captives in our sample in order to obtain more extensive tax information.

The Patent Utilization Study conducted by the Foundation has indicated that about 40% of unassigned patents ultimately find some commercial use and that about 60% of assigned patents are eventually used.

The figures on commercial use in our sample are somewhat higher than in the utilization study, but the distribution of use as between assigned and unassigned patents in our results is consistent with the larger study.

These few indications, while far from conclusive, do indicate that the present survey may have produced tolerably representative results.

COMPENSATION OF THE CAPTIVE INVENTOR

The other noteworthy feature of the information collected in this survey of

inventors has to do with the ways in which captive inventors are compensated. Of the 36 captive inventors from whom reports were obtained, only four indicated that they had ever received any compensation except a regular salary from their employers. Typically this extra compensation in these few cases had been some sort of bonus arrangement not necessarily related to use of the patent or patents assigned.

This result would seem to indicate that American industry has an opportunity to deal more generously with its employed inventors by offering them extra compensation in forms on which tax savings are possible. Very possibly future developments will lie in this direction.

It is difficult to know, however, to what motivation an inventor responds with his best creative work. Often it is not desire or expectation of financial reward but mere curiosity to solve a problem plus the opportunity to work on it free of other responsibilities that is most likely to lead to new products or processes. At any rate, only limited use has apparently been made of special financial rewards to stimulate invention within American corporations.

QUESTIONNAIRE
TAXATION AND PATENTS (PROJECT #7a)
QUESTIONS FOR INVENTORS

Please reply only to those questions which apply to you.

1. In round numbers, what is the total number of patent applications you have made? (Please check.) (a) Under 5.....; (b) 5-9.....; (c) 10-19.....; (d) 20-29.....; (e) 30 or more.....
2. Of all the patents you applied for, how many (a) have been issued.....; (b) are still pending.....?
3. Of the patents issued to you,
   (a) how many have you sold or assigned.....?
   (b) how many have you licensed exclusively.....?
   (c) how many have you licensed non-exclusively.....?
   (d) how many have you assigned to your employer.....?
   (e) how many have you put into commercial use* through a company which you own or control.....?
   (f) how many have you not used commercially*.....?

CAPITAL GAINS TREATMENT UNDER INTERNAL REVENUE CODE

4. Have you obtained capital gains treatment under the U. S. income tax law for proceeds from patents you have sold or licensed exclusively? Yes.....No.....
   (a) If you obtained such treatment before Section 1235** was enacted

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* Used commercially: Making or selling the patented invention, or using the patented invention in the production of goods or services, or making financial arrangement(s) with a third party(s) for the production, use, or sale of the patented invention.

** Section 1235 of the Internal Revenue Code of 1954 provides in general that, in the hands of an original inventor, or an investor in an invention not yet reduced to practice, the sale or exclusive licensing of a patent will be subject only to capital gains and not to ordinary income taxation.

(in 1954) please give the most important ground(s). (i.e., amateur inventor, sale rather than license, or you are a professional inventor but the invention was not held for sale to customers in the ordinary course of business).....

.....

.....

.....

(b) If you obtained such treatment after 1954 please give the most important ground(s). (i.e., amateur inventor, sale rather than license, you are a professional inventor but the invention was not held for sale to customers in the ordinary course of business, or pursuant to Section 1235** of the Internal Revenue Code).....

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5. Have you made any changes in your customary arrangements for commercial use* of your patents due to the enactment of Section 1235?**.....

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6. Have you ever sold or otherwise disposed of an invention for which you had not made patent application? Yes.....No..... If so, what were the financial arrangements? (Please include amounts).....

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Did you obtain capital gains treatment in these transactions? Yes.....No.....
If yes, in what year(s).....?
If no, did you make application for such treatment.....?

7. Have you been more willing since 1954 to make an outright sale or grant an exclusive license to any patent rights owned by you because you can get more favorable income tax treatment? Yes.....No.....
8. Have you ever assigned inventions or patents in return for an agreement to pay royalties measured by sales or volume during the life of the agreement? Yes.....No..... If so, in what year(s).....?
Did you obtain capital gains treatment on the income therefrom? Yes.....
No.....
9. In connection with any audit by the Internal Revenue Service, has your handling of income from the sale or exclusive licensing of a patent ever been disallowed? Yes.....No..... Explain, but disclose no names, places, or amounts. .....

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10. Have you ever, incident to sale or assignment of a patent or invention, been required to render certain services in connection with perfecting a marketable product? If so, what was the duration of these services?..... Were you accorded capital gains treatment on the income derived from such services?..... If not, did you make application for capital gains treatment.....? In what year(s) were the services performed .....?

RESEARCH AND DEVELOPMENT DEDUCTIONS UNDER INTERNAL REVENUE CODE

11. Have you ever been able to deduct research and development expenditures for your inventions? If yes, in what year(s).....? If no, in what year(s) have you been denied such deductions.....? On what ground(s)? (e.g., they were unrelated to your regular business or occupation, etc.) .....?
12. To what extent, if any, have you been allowed to allocate ordinary income (from, for example, the non-exclusive licensing of a patented invention) to the prior years in which you worked on the invention? (Please check.) Not at all.....some cases.....all cases.....

FOREIGN PATENTS

13. On how many of your inventions covered by a U. S. patent have you applied for a foreign patent.....?
14. How many foreign patents have been issued to you.....? How many of these have been used commercially* abroad.....?
15. Have you encountered any unusual tax problems in connection with income from foreign sources stemming from patent rights? Yes.....No..... If yes, discuss and please indicate whether problem(s) are under the U. S. income tax law or income tax law of a foreign country.....
.....
.....

GENERAL OBSERVATION

16. Have you any suggestions to make as to how the tax treatment of inventors might be changed so as to encourage more invention?.....
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.....
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Anomalies of Reductions to Practice of Inventions

LLOYD R. KOENIG*

SUMMARY

Inequalities between the kinds of proofs required for establishing an actual reduction to practice and those required for establishing a constructive reduction are discussed and suggestions made for studies which might lead to means for their equalization.

THERE EXISTS AN IMBALANCE BETWEEN the burdens involved in defending the sufficiency of a patent application as a constructive reduction to practice of an invention, and those involved in defending the sufficiency of an actual reduction to practice. It is the purpose of this article to point out several anomalies in the law relating to actual and constructive reductions which contribute to this imbalance and to suggest studies which might indicate corrective measures to be taken.

A necessary condition for completion of a patentable invention is that its conception shall be followed by a reduction to practice, either actually by producing a successful physical embodiment, or constructively by filing a patent application. Such an application is required to disclose to those skilled in the art to which the invention relates practical means for its embodiment. Essentials of conception and reduction are that each shall be sufficiently known to another beside the inventor so that, in the case of the inventor's death or incapacity, preservation of the invention will be assured. It is this property of the patent application that in part qualifies it as a reduction to practice and establishes the further requirement that it shall define an operative embodiment. On the other hand, an actual reduction to practice must do more than define; it must be operative per se. The following points out certain anomalies that have arisen in regard to the two cases.

Following the stated rule: For evidentiary purposes in any contest between rival inventors of utility inventions referred to in 35 U.S.C. 101 concerning processes, machines, manufactures, or compositions of matter, an invention in one of those categories is deemed to have been completed after it has been conceived and successfully reduced to practice, either actually or constructively, by filing a proper patent application. Section 101, however, makes no reference whatever to reduction to practice. On the other hand, in respect to botanical inventions,

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35 U.S.C. 161 explicitly requires for patentability not only discovery of a new and distinct variety of plant, but also asexual reproduction of the variety upon which the invention is based. Asexual reproduction corresponds to an actual reduction to practice.

In *Dunn v. Ragin v. Carlile,*[1] the differences above referred to in the provision of Sections 101 and 161 were considered. It was pointed out that the filing of a plant patent application could not complete a conception based upon the discovery of a bud sport and that an actual reduction, i. e., asexual reproduction, prior to the filing date of an application was an essential requirement. The basis of the decision was that it cannot be known whether or not a discovered bud sport will produce a new variety until actual asexual reproduction has occurred. The filing of a patent application was held to be insufficient for the purpose. The conclusion of the case rests not only upon the statute (Section 161), but upon the premise that the biological science concerned is largely experimental and that whether or not a new concept can be physically affirmed is so unpredictable in that science that mere untested ideas set forth in patent applications are unreliable guides as disclosures. It is reasonable to suppose that, in certain other equally unpredictable fields such as, for example, processes in the field of meteorology within the scope of Section 101, the same rule would apply, although Section 101 is not explicit on the point, as is Section 161.

A mere concept, i.e., thought or notion, even though of an inventive nature, does not complete a patentable invention, whether it relates to an inanimate utility under Section 101, of which the concept is the beginning, or whether under Section 161 the concept is based upon an existing animate plant. Thus a mere concept that newly discovered bud sport will in practice actually produce a new variety, and a mere concept that a utilitarian scheme will in practice actually work, are both conjectural and require either physical or logical confirmation. Under Section 161, according to the Dunn decision, *supra,* a plant patent application is insufficient as a logical confirmation, thus requiring without exception an asexual reproduction (actual reduction to practice). The burden of proof in this case, as in all cases of actual reductions of subject matter falling within Section 101, rests upon the proponent of the actual reduction. On the other hand, the burden of proof of the sufficiency or insufficiency of an application as a constructive reduction is not upon the proponent of the application if attacked, but upon its opponent. The result, as emphasized below, is an anomalous situation in the law wherein the burdens are greater upon one who actually reduces to practice than upon one who reduces to practice constructively. Incidentally, while the burdens are lighter upon an inventor in some cases than others under Section 101, they are heavier in all cases under Section 161.

The general principle of constructive reduction to practice is a fiction of law which came into being as a result of judicial interpretation of the forerunner of Section 101. According to this fiction based upon the rationale above pointed out, a valid patent application completes an invention and makes it available to the

[1] Dunn v. Ragin v. Carlile, 50 USPQ 472.

public, enabling anyone of this group skilled in the art to which it relates to reproduce or perform the invention disclosed. Because it is based upon case law, the application of the principle is flexible and, unlike the rigid provisions of 35 U.S.C. 161, is adaptable to changing conditions which may be expected in any art. However, inconsistencies have entered even into the fiction.

Except by statute in the field of plant patents, a patent application showing an invention, even though filed after a mere conception, becomes the equivalent of an actual successful reduction to practice and as such is designated as a constructive reduction to practice [2] even though it may require some amendment,[3] provided that when amended it shows the contested invention.[4] Thus, corrections in subordinate details may be made which in some instances would, if not corrected, preclude the consummation of a successful actual reduction to practice.

In the absence of other evidence in an interference, an invention disclosed in an application is said to have been made on the application filing date. The making of the invention constructively may antedate the filing date of an application in contest, as by being carried back to the filing date of an earlier unabandoned U.S. application of the applicant showing the same invention,[5] or back to the filing date of a foreign application of which a U. S. application in question is an analog filed within the Convention period.[6] Moreover, the disclosure in an application serving as a constructive reduction, unlike an actual reduction, may be diagrammatic and often is.

While the specification of a U. S. application is required to be in terms that are full, clear, concise, and exact enough to enable any person skilled in the art to practice the invention, and is required to set forth the best mode of carrying it out, the question whether or not a filed application is a sufficient exhibition of the probable successful operativeness of a concept is answered by subjective interpretation. Such interpretation varies according to the experiences of those so skilled. Even though physical tests of an actual reproduction of what is shown in an application may be resorted to in order to prove or disprove its operability, the question remains whether or not the directions given in the application have been properly interpreted in formulating subsequent tests. Thus there is considerable latitude in resolving the question as to whether an application is an effective constructive reduction to practice.

The rules are more stringent in the case of a party relying upon an actual reduction to practice. Thus an actual reduction to practice abroad is insufficient [7] and is a nullity, even though the invention was conceived in the United States.[8] Compare the Convention privileges mentioned above, as regards an application as a constructive reduction to practice.

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[2] McCreery Engineering Co. v. Massachusetts Fan Co. et al., 195 Fed. 498.
[3] Croskey v. Atterbury, 76 O.G. 163. 1896 C.D. 437.
[4] Hulett v. Long, 1899 C.D. 446.
[5] Cain v. Park, 1899 C.D. 278; Detroit Iron & Steel Co. v. Carey, 236 Fed. 924.
[6] Steel and Steel v. Myers, 205 O.G. 1021. 1914 C.D. 74.
[7] John Wilson and Harold W. Dick v. James H. Sherts and Robert E. Hamill, 28 USPQ 379; 81 F (2d) 755.
[8] Lorimer v. Erickson, 227 O.G. 1445. 1916 C.D. 200.

Moreover, the date of an actual reduction to practice is the date of demonstration of operability, not the date on which the operable construction was made.[9] Compare this with the privilege of at least to some extent amending a filed application to validate it as a constructive reduction to practice, and also with the fact that its filing date controls, even though in case of doubt of its sufficiency the doubt is only later removed by proof adduced upon an actual reduction based upon its teachings.

Mere models, even though they may be as convincing as a writing or drawing in an application, are usually considered to be insufficient in all but the simpler cases. Thus it has been said in a case of nominal mechanical complexity:[10]

> . . . While the models were clearly sufficient to disclose the invention, and enabled those skilled in the art to thoroughly understand it, *and to prepare an application for patent*, and though indicating no circuits of operation, their intended use in such circuits were understood—in brief sufficient to enable the utilization of the invention so that had death removed the inventor before an application for patent had been filed the invention would have survived—we do not think, under all the circumstances, and in the absence of any test, that they can be treated as a reduction to practice. [italics added]

It is noted that in the above case the models relied upon for an actual reduction to practice were not given the status of a reduction to practice at all, even though it appears that they had the earmarks of at least a constructive reduction to practice when judged by standards applying to applications.

It has also been said:[11]

> *Complete invention must amount to demonstration.* It must be shown to have passed the region of experiment—of possible or probable failure—and to have arrived at certainty by being embodied in the form intended, capable of producing the desired result. A model alone, no matter how complete in detail of construction, does not come within the operation of such a rule. [italics added]

It is obvious that an application is only a theoretical demonstration, yet:[12]

> . . . Seemingly perfect theoretical demonstrations are not infrequently shown to be worthless when tested by actual conditions, and it is probably for that reason that the law, save for a few exceptional cases, regards successful operation of the invention an essential point of actual reduction to practice. . . .

The effect of these and similar holdings is that the burden of proof of successful operability of an actual reduction to practice relied upon is upon its proponent; whereas a patent application relied upon is prima facie evidence of successful operability and the burden of showing inoperability is upon an opponent.

Examples could be multiplied showing that attacks upon actual reductions to practice have in general more probability of success than attacks upon constructive reductions. The reason is in the nature of the evidence required to prove the respective cases. The evidence for a successful actual reduction is

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[9] Smith v. Warnock, 1921 C.D. 186.
[10] O'Connell v. Schmidt, 1906 C.D. 662 at 664.
[11] Hunter v. Stikeman, 1898 C.D. 564 at 565.
[12] Robinson v. Thresher, 123 O.G. 2627. 1906 C.D. 743.

basically of a physical nature, as to which only a narrow range of interpretation is possible; that for a constructive reduction is in the form of a writing accorded a wider latitude of interpretation because of the ability of words, definitions, and illustrations to mean various things in various contexts to different persons. Tests for the sufficiency or insufficiency of an actual reduction are plainly objective; those for the sufficiency or insufficiency of a constructive reduction are subjective. The results of the former are usually more compelling as regards flaws in any questioned success than are arguments concerning alleged failure of disclosures in the latter. Flaws leading to physical failure are seldom amenable to repair by argument. Alleged flaws in the form of a paper disclosure are likely to be subjects for debate over mere semantics.

The result in a large number of cases is a hiatus between what is usually conceded to be sufficient as a constructive reduction to practice and what is more strictly required of an actual reduction. This reflects itself in the greater burdens cast upon an inventor relying upon an actual reduction to practice than those of one relying upon a constructive reduction. The question then arises whether there might be practicable means for equalizing the burdens. In a sense such a question is academic because an inventor may readily avail himself of the lighter burdens by filing an application. But resort to such practice is not a gain because it tends to supply the public with a smaller number of the more objective disclosures in the forms of actual reductions.

It is, therefore, suggested that a study would be useful to ascertain whether or not in strategically chosen areas of inventive activity the requirements for actual reductions are realistic in present-day settings, taking into consideration the fact that the practical applications of new concepts in the various arts become either less or more predictable as the arts progress. Usually the trend is from unpredictability requiring physical confirmation of new concepts to logical predictability requiring little or no physical confirmation. Sometimes the trend reverses in some branch of a well-developed predictable art as, for example, the experimental aspects today of the subsidiary science of ballistic missiles for operation in outer space, a branch of the generally predictable main science of dynamics. Thus, progress in an art may lead from an original urgent need for experiment in order to test success to the almost complete sufficiency of theory to predict success, or again back to the need for further experiment, as in the example last referred to. Such are the principal factors that would need to be considered in such a study.

A comparative study might also be directed in more active areas of inventive activity to types of tests that have been accepted by the courts, tests satisfactory to those skilled in the art, and tests considered to be satisfactory from a commercial viewpoint. Such a study might also weigh whether or not it is wise to legislate piecemeal upon such matters, as was done in the case of plant patents in 35 U.S.C. 161, considering the possibility in the future of more predictability in the presently experimental fields such as botany or biology, and considering also the lack of parallel requirements in Section 101.

Another field of study is suggested by the recollection that operating models

were at one time required by the Patent Office to support an application, which tended to place upon the inventor a greater burden of proof of operability of the subject matter of an application. The physical problem of dealing with such models in great numbers of course made the requirement impracticable and it was abandoned. Possibly, the advantages of this requirement in encouraging actual reduction to practice might be obtained without its disadvantages by accepting an application as a constructive reduction, but in any contest placing the burden of proof of successful operability upon the applicant or owner relying upon it rather than upon an opponent. This would tend to effect an equalization with the burden carried by an inventor relying upon an actual reduction to show its successful operability.

While it is probable that studies above suggested would entail planning difficulties, it is certain that resolutions of anomalies such as above discussed are not likely subjects for judgments based upon a priori reasoning.

Proof of Reduction to Practice in an Interference Contest*

JOHN A. DIENNER**

SUMMARY

WE PROPOSE HEREIN TO DISCUSS two subjects. First, we shall comment upon the requirements of the law in regard to proof of reduction to practice in an Interference contest. Second, we shall consider what changes in the procedural law relating to contests on priority of invention would appear to be desirable, and specifically whether some statutory provision, similar to Title 28, Section 1732, "Records Made in Regular Course of Business," should be made applicable to the proving of a reduction to practice in an Interference contest. Under the second head, we shall examine the question of whether present methods of trying the question of priority of invention are in keeping with the times.

THERE HAVE BEEN NOTABLE ADVANCES in the philosophy of the law in regard to both the adjective law and the substantive law of patents since the time when the rules of law which we are about to consider took form.

In the adjective law, we have much improved upon the treatment of the admissibility of evidence. See particularly Rule 43 F.R.C.P. We have greatly simplified the trial by discovery (see Rules 30-37 F.R.C.P.) and by pretrial procedure. We have liberalized the rules on the admission of evidence. The procedure on appeal has been simplified and expedited.

In the substantive law, the Patent Act of 1952 has introduced liberality of treatment of the rights of an assignee in the case of a recalcitrant inventor, Sec. 118; provided for correction of errors in inventorship, Sec. 256; provided for service of notice upon non-resident patentees, Sec. 293; broadened the benefit of earlier filed application in a foreign country, Sec. 119; defined the standard of patentability, Sec. 103; and covered other specific items.

The Interference practice which was under intensive study by the Patent Office Advisory Committee in the period of time from 1933 to 1945 has had no great benefit from the general advances above noted. To show that it needs modernization in at least the respects hereinafter noted is the task which we have here set before us.

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* A paper based upon the work of a Special Committee of the Patent Law Association of Chicago, consisting of P. L. Ahern, John A. Dienner, Jr., Ernest V. Haines, K. M. LeFever, Lyle Motley, D. E. Payne, Karl Sommermeyer, and the writer as Chairman. The writer alone is responsible for opinions herein expressed.

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WHAT IS AN INTERFERENCE PROCEEDING?

The patent practitioner is of necessity familiar with an Interference. The patent statute, Title 35, Section 135, explains the circumstances giving rise to the need for determining the question of priority of invention as between an applicant and another applicant or the inventor of an unexpired patent. The Rules of Practice of the United States Patent Office, Nos. 281 to 286, cover the declaration of the Interference and the proceedings instituted to determine the question of priority of invention.

There are preliminary and ancillary matters, such as the necessity for determining the novelty of the invention claimed, the sufficiency of the disclosure, including operativeness, and the identity of the invention claimed by the contestants which must be determined in order to arrive at the basic question of which applicant made the invention first.

The Patent Office is interested because it is necessary to determine which party is the first inventor and therefore entitled by law to the grant of patent on the invention. From the practical standpoint, the Patent Office interest is chiefly in finding out which disclosure is a reference against the other or others involved in the contest. After it is once determined that the subject matter which is in controversy constitutes patentable invention, it is then, so far as the Patent Office is concerned, mainly a question of which one becomes a reference to the other or others. Two patents on the same invention cannot be valid.

The question of whether a patentable invention has been properly disclosed and claimed is a matter of concern to the general public. The decision of the Patent Office on that question determines whether the subject matter will or will not be made the subject of a patent monopoly. But, so far as concerns the question of which one of a plurality of rival claimants shall be possessed of that patent monopoly, the public has no particular concern. The question of who was the first inventor is a private quarrel. The public is interested to see that justice under the law is done, and that the patent be issued reasonably promptly. The proceedings in a patent application in the Patent Office, which proceedings had previously been conducted between the private interest of the inventor and the public interest under the patent law as represented by the Examiner, is interrupted by the Declaration of the Interference and a private controversy between rival inventors takes place with the Patent Office acting as judge or referee.

The controversy is unique in that it is not instituted by either of the parties, but instituted by the Patent Office upon a finding by the Examiner that two or more applicants, or an applicant and a patentee, are claiming the same invention.

In the formative stage of the Interference, the proceedings are adversary. That is to say, on the question of novelty, on compliance with the other statutory requirement, and on the question of identity of invention disclosed involving the right to make a claim, one party takes the position of the affirmative on the question, and the other party takes the negative position on the same question. After those questions are disposed of, then comes the question of priority of invention which is not a truly adversary proceeding, but rather a proceeding for developing

the facts as to the making of the invention in each case, and then a comparison by the Patent Office of the facts developed by each party in order to determine who is entitled to the award of priority.

In brief, in the formative stages of an Interference where the issues are formed, the contest is like a boxing match. In the trial stage on the question of who made the invention first, the contest is like a weight lifting contest. Each does the best he can, and then you compare the results.

THE BURDEN OF PROOF ON PRIORITY OF INVENTION

It is a generally accepted proposition of law in the Interference practice that a party may prevail on the preponderance of evidence. This rule, if it ever meant anything, is now meaningless.*

The pendency of an application which the Examiner accepts as disclosing the invention would appear to constitute proof beyond a reasonable doubt that the applicant made the invention. But that is not the case for the reason that it is a self-serving document verified by no more than the impositive oath of the applicant that he "believes himself to be the original and first inventor" and that oath is not corroborated by a supporting witness. In brief, an application is no more than one man's word; but except there is a challenge on the question of inventorship, the pending application is regarded as proof carrying thorough conviction of a reduction to practice by the applicant named as inventor.

Only when the contest rests solely upon the question of originality does the rule of preponderance of the evidence apply. The doctrine of requiring a corroborating witness to testify in support of the inventor's statements before the proofs are regarded as competent (the de Schweinitz rule) is not applied where the question is that of originality of invention. Where the question at issue is the comparative dates of two inventors established by evidence other than a record date, the de Schweinitz rule and not the preponderance of evidence rule applies.

The tribunals that decide Interference cases frequently refer to the alleged rule that preponderance of the evidence controls in an Interference without realizing that the rule applies only on the question of originality and not on the question of priority of invention.

WHAT IS "MAKING THE INVENTION"?

The Statute 35 USC 102(g) says:

> In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice from a time prior to conception by the other.

Therefore, "making the invention" involves essentially conception and reduc-

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* Where an applicant files after a patent has issued, and copies a claim from the patent, he must prove his case by evidence which is highly persuasive. Practically, he has to do the same thing in an Interference between two copending applications.

tion to practice, and if a reduction to practice be preceded continuously by reasonable diligence back to the date of conception, it may be regarded as a continuous act having the benefit of the latter date for purposes of priority. Likewise, if diligence from the later reduction to practice relative to another, is continuous back to a date antecedent to the conception by the rival, the reduction to practice, as a continuous act of making the invention, may be dated back to the said date preceding the conception of the rival inventor where such continuous diligence began. Obviously, under the statute, the one who is first to conceive and to reduce to practice does not need to stand examination on his diligence.

The cases hold that filing an application for patent disclosing the invention which is claimed constitutes a constructive reduction to practice which, because it is recognized by the granting thereto of an official filing date, is self-proving as of the date of filing. Thus, filing an application for patent enables the applicant to prove his date of "making the invention" as of the filing date, much easier than in the case of an actual reduction to practice, particularly where the inventor lacks complete corroboration. This inequity is tolerated because it puts a premium on early filing which is assumed to be a desirable factor in the operation of the patent system. This conclusion is subject to considerable controversy. Why should a self-serving application have greater dignity than an actual reduction to practice, even though the latter is backed only by the inventor's "self-serving" testimony and his "self-serving" laboratory notebook? The proposition that an inventor must first reduce to practice before filing has been vigorously debated, but it has not found general acceptance.

PROOF OF REDUCTION TO PRACTICE

As pointed out above, filing an application for patent constitutes a reduction to practice and official proof of the date of the same. For the junior applicant, the problem immediately is to overcome by proof the filing date of the senior applicant. Obviously, also, if he is to prevail, he must overcome whatever date of invention the senior applicant may be able to prove. Hence, the junior applicant is at the outset under the necessity of proving as early a date of "making the invention" as possible. The proof of conception, if it is evidenced by a written record, generally presents no great problem of proof. An applicant can rarely establish the date of an oral disclosure of his invention. A record of the concept, or an embodiment of the concept must be produced, and the date thereof established. A written description or drawing evidencing conception allows conception to be easily proven by establishing that the document on which such disclosure appears was in existence as of the date alleged. But when it comes to proof of reduction to practice, the applicant finds himself in a sea of trouble. He is faced with a rule that is inflexible and unrealistic. He is assured at the outset that he needs only a preponderance of evidence to prevail, but when he inquires as to what evidence he should assemble, he then finds that, as a matter of fact, he is actually required to prove his case almost beyond a reasonable doubt. Suppose he is a chemist working in his laboratory, and he discovers some important reaction which gives him a new and important product. He writes

it all down faithfully in his notebook, and next morning reports to his colleagues the nature of his invention, and asks a number of them to read and sign and date the page of the notebook on which an entry of his experimental work appears in his own handwriting.

Then suppose he promptly publishes his invention in a scientific journal, and his company puts the device into commercial use. Before any statutory bar has arisen, he files his application, and we will assume he is called upon in Interference to prove his date of making the invention. He submits his own testimony, his notebook records, the testimony of his colleagues, evidence of the publication, and of commercial use of the invention. Does he prove his case? He does not. His proofs are flatly rejected because he has not complied with the Patent Office rule that he cannot establish reduction to practice without a corroborating witness who has visually observed every phase and limitation of the reduction to practice corresponding to every phase and limitation of the count in Interference.

If you think the above case is overdrawn, you will be jolted upon reading *Kear v. Roder,* 115 F.(2d) 810, decided by the Court of Customs & Patent Appeals December 9, 1940, rehearing denied February 3, 1941. If you think that decision was an accident, read *Senkus v. Johnston,* 77 USPQ 113, by the same Court.

HOW DID THE LAW GET THAT WAY?

The Court of Customs and Patent Appeals in *Kear v. Roder* fell back upon the authority of an ancient but totally insignificant case, namely, *Petrie v. De Schweinitz,* 19 Appeals D.C. 386, 1902 C.D. 534. The original rule of the De Schweinitz case has been so completely altered that its original fact basis is completely unrecognizable from the present version of the rule. The rule of the De Schweinitz case supplemented by decisions, beginning with *Harris v. Stern,* 1903 C.D. 612, and coming down through *Collins v. Olson,* 102 F. (2d) 831, and as now interpreted, is that the inventor's testimony, or any evidence for the making of which he has had any responsibility, must be disregarded except as and in so far as a live witness testifies that he saw every feature of the alleged reduction to practice which is called for in each and every limitation of the claim in Interference. Now the original case of *Petrie v. De Schweinitz* called for no such requirement. The inventor in that case claimed to have worked alone in secret. He elected to keep his acts secret. He claimed to have refrained carefully from telling anybody what he was doing. Even his own family was kept in ignorance. He had no evidence—repeat! *no evidence*—corroborating his oral statement based on his own unaided memory that on a certain date he had made a certain invention. The Court of Appeals of the District of Columbia handed down a momentous decision which has come down the corridors of justice. (*Petrie v. De Schweinitz,* 1902 C.D. p. 534). A cross-roads justice of the peace would have disposed of the case in one sentence:

> Petrie claims to have invented something, but his self-interest is so strong and his evidence so weak that you can't believe him; call the next case.

The decision was over-elaborated in the first place. The Court should have gone no further than to say that to prove reduction to practice, the inventor must produce something more than his own statement supported solely by his unaided memory. The later decisions have inflated the rule of the *Petrie Case* to the point where everything in the way of evidence which had any connection with the inventor is treated as though it carried the plague and is fit only for burning.

When one inquires into the reasons why such a harsh requirement has arisen, he must be prepared to find old human nature at the root of the matter. Somebody seems to have figured that it is easier to dispose of a tough case by throwing out the evidence than by studying the case and deciding on the merits.

WHAT IS PROOF?

Everyone familiar with the Courts and with judicial procedure quickly comes to recognize the problem of proof. What the facts were and what proof of the facts establish may not coincide. The lawsuit turns on the latter, namely, proof of the facts, and where proof is lacking, the advantage (or disadvantage) flowing from the facts will not be realized. The test of what is proof lies in the effect of the evidence on the mind of the fact finder. In the Anglo-Saxon system of jurisprudence, resort to the juryman as the finder of facts is a basic tenet. Proof is that which the juryman accepts, that which he believes. It is a subjective test. In an objective world such as ours, the rationality and appropriateness of a subjective test grows less and less, but we hang onto it and are stuck with it.

A remarkable feature of these Interference cases in which the *Petrie v. De Schweinitz* rule is applied to defeat the case of an inventor is that they are frequently characterized by a comment of the presiding judge, Examiner, or Board of Interference Examiners that there is no question as to the credibility of the witness, namely, the inventor. The Court in effect said that it believed the inventor's story. But in each case, the decision goes off on the De Schweinitz rule. The Court, if it admits that it believes the inventor, or even if it goes so far as to say that the credibility of the inventor is not in question, is certainly stultifying itself and the administration of justice, since the test of successful proof is the belief of the trier of the facts that the story told by the witness is true. How is it possible for a Court to sit on the bench, listen to a witness' story and in its opinion say it does not disbelieve him, and then decide to the contrary? If that is the way Interferences are being decided, something will have to give. After all, an inventor is entitled to justice as much as any other contestant in a judicial proceedings.

TRIAL IN OPEN COURT

If the inventor, though failing to have a live visual corroborator for every step and limitation of his claim, nevertheless is able to produce on an experienced judge through the semi-transparency of a deposition, the conviction that he is telling the truth, why is he not entitled to a decision in his favor? He should

have an opportunity to appear before such a judge and to present his story in person. The judge could view the witness, and interrogate him, and form an opinion of his veracity. The demeanor of the witness under cross examination is highly significant.

At present, there stand in the way of that possibility two barriers. The first is the work-saving rule of the De Schweinitz Case which the Patent Office has mistakenly adhered to; and second, is the present procedure involving the submission of the proofs by way of depositions. Giving his testimony in open Court has no fears for a truthful witness.

Any judicial proceedings in which the disposition of a contested case rests upon a rule of evidence and not upon a fair and thorough weighing of the evidence submitted and unhampered consideration of the facts as they may be deduced from the evidence, is incorrectly tried and decided. A court inherently has the power to decide what it will regard as proof or the lack of the same in a particular case, but when a Court begins to write a rule for deciding cases before they are submitted, something is wrong. A work-saving rule is always a millstone around the neck of justice. A court must consider the facts of a case or admit its incompetence to sit in judgment. The monstrosity which has grown out of the facts in the De Schweinitz case should be abated. The courts should accept as a reasonable base of decision what reasonably prudent business men accept in business, laboratory workers in laboratories, shopkeepers in shops, and inventors in regard to making inventions.

A scathing self-indictment for which the Court of Customs and Patent Appeals is responsible, appears in *Senkus v. Johnston, 77* USPQ 113, at page 115. In that case, it appears that the corporate owners of the respective interfering applications were satisfied to rest the question of priority of invention upon the laboratory notebooks, since they were both convinced that such records are adequately reliable for a decision on priority of invention. But would the Court listen to common sense? Here is what it said:

> Appellant contends that that data in connection with the tests constitute sufficient corroborative evidence when considered in connection with the other evidence.
>
> Strangely enough appellee seems to agree with the contention of appellant with respect to the corroborating effect of analytical reports, analyses of preparations, and so forth, stating as follows:
>
> "One suggested method of resolving this question would be to start with the analytical reports. Most industrial laboratories maintain an independent analytical section, whose duties are confined to the analysis of preparations received from the entire laboratory. Ordinarily the supposed composition is given to the analyst along with each sample so that he may know the correct analytical method to apply. Also, the order for the analysis usually specifies the particular elements to be determined such as carbon, hydrogen, nitrogen, etc. It would seem that one or more analyses of this kind, made on a product identified by the laboratory notebook records of the inventor, should be considered at least as good a corroboration as the independent vesting of a mechanical invention by a corroborating witness."

Undoubtedly the Court is aware that chemistry has advanced from the age of the alchemist, but will jurisprudence still insist upon the trial by ordeal?

Our proposition here is that if a man can put forward a good enough story to

convince the mythical average juryman of the truth of his assertions, he is entitled to trial in open court where the appearance of the witness and the probability of his telling the truth may be judged. Under Anglo Saxon jurisprudence, he is entitled to that right. Second, we recommend that the Court of Customs and Patent Appeals and the Patent Office abandon once and for all the rule of *Petrie v. De Schweinitz* in the preposterous form into which it has developed. The Court should look at the facts in each case and determine the truth as nearly as can be, aside from any preconceived rule of what constitutes sufficient proof. At present, the Court says, "If the evidence does not weigh ten pounds when it comes in the door we will not look at it." Our proposition is that the Patent Office and the Court of Appeals must look at the evidence and weigh it, if it is properly presented, whether or not it turns out to be adequate.

IS PROCEDURE A SUBSTITUTE FOR PROOF?

Proof is variously defined. For example:

> Proof is the conclusion drawn from the evidence.
>
> It is the effect of the evidence.
>
> Proof is the conviction or persuasion of the mind of a judge or jury by the exhibition of evidence of the reality of a fact alleged.

A great difficulty in technical cases is that the Court probably cannot in every case understand the record of a complex chemical reaction, or similar complex technical matter. At least it probably cannot understand it enough to form a judgment in its own mind of whether or not the record actually demonstrates a successful reduction to practice. So it lays a requirement for a certain quantum of evidence, no matter what the intrinsic value of the evidence adduced. Since at present the testimony of the witnesses comes in the form of depositions, the court has no opportunity to view the witness and to judge of his credibility. There are several consequences of this. First, the one who passes on the depositions cannot "believe" the witnesses, he can only weigh the recorded statement. The judge cannot ask for information to assist his understanding, and he cannot question the witness to arrive at a judgment of his credibility.

It is an old and well-known test of a witness to determine whether he is probably telling the truth to ask him a few questions to which you know the answers and observe how he answers them. But the judge passing on recorded testimony has no opportunity to ask a few pointed questions and observe the demeanor of the witness in answering them. And certainly the judge has no opportunity to observe the demeanor of the witness in giving his testimony.

Instead of judging the credibility of the witness as a basis for decision, the Court substitutes a minimum requirement, that is, a rule of procedure. The statement of the inventor and the evidence of his own making which he presents is below the minimum and cannot be believed. Proof is a subjective matter, and the rules of evidence are designed to exclude matters which tend to sway the emotions or which do not bear upon the question.

When you attempt to substitute a rule of evidence or rule of procedure for an honest examination of the facts themselves, you set up false standards and false requirements. Also, you create an inefficiency and produce a needless loss in the conduct of research directed to invention. If, instead of conducting the research laboratory in the normal manner, you must include the requirement of the Patent Office to have a live witness to each limitation of the claim, you are in effect "feather-bedding" the job. The rule requires the research laboratory to employ workers as witnesses. That is wasteful and unnecessary. Business is conducted on less wasteful methods on matters of equal importance. The rules of the laboratory should be of some weight in the decision on the question of the workers activity.

WHAT IS THE ESSENCE OF REDUCTION TO PRACTICE?

Various reasons are given for requiring strict proof of reduction to practice. The most obvious reason is to determine whether the idea is actually operative for the purpose intended. The phrase "for the purpose intended" includes the concept of being useful under the conditions in which it needs to operate. This has now generally been interpreted as a requirement that the reduction to practice be an operation conducted under service conditions. Many situations arise in which service conditions are difficult of realization and planned laboratory conditions must be substituted. Such substitutes for actual service conditions are rarely accepted by the Patent Office as fulfilling the requirement for reduction to practice. Each case must stand on its own facts. The reduction to practice need not be 100% efficient, but it must result in the desired result or function in kind and to a useful degree. Recently, the requirement has come into the law that a reduction to practice demonstrate the reproducibility of the result or function. *Conner v. Joris,* 113 USPQ 56. There might be special cases in which this would be a factor, but it should not be made a general requirement of the law relating to Interferences. Each one of these qualifications of what is required for a reduction to practice must be covered by the testimony of the corroborating witness, since the testimony of the inventor alone or with records made by him is not accepted as proof.

CIVIL ACTION IN CASE OF INTERFERENCE, 35 USC 146

The question arises as to whether it would not be desirable to follow the procedure of Section 146 (formerly R.S. 4915) in trying all Interference cases. It has been proposed that the Patent Office should declare the Interference and hear motions to form the issues, and then turn the question of actual trial of the issue of priority of invention over to the nearest District Court. Except for the delay which might be involved, this would appear to be highly desirable.

At present, a party dissatisfied with the decision of the Board of Interference Examiners has the opportunity to take his case into the District Court in which venue can be obtained and try the question of priority of invention presumably

de novo. While this gives the opportunity of submitting additional evidence and of giving testimony in open Court, such a case has two strikes against it from the adverse decision of the Board of Interference Examiners and the rule of law of the so-called De Schweinitz decision against you. See *Morgan v. Daniels,* 53 US 120, where the Supreme Court said:

> Upon principle and authority, therefore, it must be laid down as a rule that where the question decided in the Patent Office is between contesting parties as to priority of invention, the decision there made must be accepted as controlling upon the question of fact in any subsequent suit between the same parties, unless the contrary is established by testimony which in character and amount carries thorough conviction.

That case is still the law. It means that Section 146 (old 4915) is nothing but a "wailing wall," for while the proceedings is regarded as a trial *de novo,* the rule of *Morgan v. Daniels* tips the scales in advance. Whereas only a preponderance of the evidence would have sufficed before the Patent Office, it is clear that before the District Court under Section 146 the burden on the plaintiff is to establish his case "by testimony which in character and amount carries thorough conviction." The decision of the Patent Office based on depositions of the witnesses stands as a finding of fact, and apparently has an effect similar to that of a finding of fact in the lower court under Rule 52 FRCP. Thus it is clear that Section 146 is not a substitute for initially trying the issues in open court on the question of priority of invention. The original trial should be before the court or a master.

REASONS GIVEN FOR THE DE SCHWEINITZ RULE

The Court of Customs and Patent Appeals which has been the guardian of the De Schweinitz rule gives several reasons for insisting upon corroboration by a live visual witness of every limitation of the claim. In *Senkus v. Johnston,* 77 USPQ 113, the Court of Appeals expressed the opinion that to allow the testimony of the inventor, plus his laboratory notebook records and other corroboration short of the present De Schweinitz rule, would unduly favor large research laboratories. The Court said, at page 115:

> . . . Indeed, if we were to relax the sound rule now existing with respect to corroboration merely because of the research systems in large industrial concerns, it would result, in our opinion, in having no corroboration rule at all as far as large industrial business is concerned, but would still require the present rule of corroboration with respect to others.

Obviously, the Court had not received testimony on the point of whether large industrial business would be unduly favored, but evolved the reason which it gave out of something other than the evidence in the case. In the case of *Israel v. Cresswell,* 77 USPQ 594, at 597, presiding Judge Garrett gave the reasons as follows:

> In many of the interference cases which have come before this court during the last few years those representing the parties upon whom the burden of proof rested have complained that the rule is a harsh one which should be modified. Now and then it has been suggested that application of the rule carried with it a reflection upon the veracity of one

> claiming to be an inventor. It is true that the requirement of corroboration probably removes a temptation which would otherwise exist but it has never been our supposition that the underlying reason for the rule is lack of faith in the credence of those who seek the benefits of the patent laws. It has been our theory that it is based upon the recognized necessity of so guarding the integrity of the patent system that there will be as little doubt as possible that the actual inventor receives the award.

That brings squarely into focus the question of actually how important it is to the public that the "integrity of the patent system" be safeguarded by this rule. First we must observe that the rule is intended not to look the facts in the face nor to let inventors, research laboratories, and business act in the normal manner and keep the normal records, but requires that not only a man make an invention, but that he must also produce disinterested evidence to accompany his claim of invention or he is automatically barred in a contest on priority of invention from establishing his earliest date.

We say he must, under current practice, anticipate the need for disinterested, corroborative evidence although it would be the normal course of research and development for the inventor to set up his equipment, run his experiment, recording the results as he goes along, and finally coming up with a successful performance of the process of production of the product, with no one who looked over his shoulder at every turn able to corroborate each limitation of the claim as a corroborating witness. He must, in addition to his normal procedure in making the invention, resort to the abnormal procedure of having someone shadow his every act and observation when he is likely to make an invention. That is an abnormal and wasteful requirement, not an express requirement of statute. It is a self-serving rule of judge-made-law.

WHAT IS THE PUBLIC INTEREST IN AN INTERFERENCE CASE?

Obviously, since the statute requires the patent to be granted to the first and original inventor, and since the moral basis for the statutory requirement that the patent be granted to the first inventor is the value contributed by the first inventor in giving the invention to society, the public is interested in seeing the actual prior inventor prevail in a contest on the question of priority. In other words, as a matter of policy, to give maximum incentive to the inventor, care should be taken to see that the Commissioner of Patents picks the right man as first inventor and grants the patent to him. Since the question of inventorship is a complex mixture of fact and law, the requirements of proof as to what is inventorship and when an invention has been made should be carefully adjusted. That is to say, if the requirements are so set that the true first inventor is excluded on a technicality in more than an insignificant percentage of the cases involved, the system is not being operated properly. The Court of Customs and Patent Appeals thinks that the De Schweinitz rule is a safeguard of the integrity of the patent system, but as it results in awarding priority of invention on a pure technicality in more than an insignificant number of cases, it threatens the integrity of the system far more than it safeguards it. As modern conditions are developing it appears to many of us that the De Schweinitz rule is no longer in the public interest.

The chief interest of the public in the work of the Patent Office is concerned not so much with the technicality of who is the inventor as it is with the question of whether the patent, once granted, covers an actual invention.

The primary duty of the Patent Office, after all, is to determine whether an application for patent reveals a patentable invention and to see that the document complies with certain formal requirements as to disclosure and formal matters. Now if it is once determined that an invention has been produced and is to be the subject of a patent which excludes everyone but the inventor and his assigns from practice of the invention, it is immaterial to the public whether that patent was granted to Jones or to Brown. The important thing is that there is a patent on the invention which the public must respect. The patent serves its useful function as a basis for an enterprise designed to supply the public with the particular thing covered by the patent whether the ownership is that of Jones or that of Brown.

THE 1953 STATUTE RECOGNIZES THIS FACT

It was formerly the case that in the case of a patent granted to a sole inventor when the invention actually was a joint invention or vice versa, the patent was void and there was no possible way to correct the error even though it was innocently made.

It began to be recognized quite early in the Patent Office that an innocent mistake in inventorship should be able to be corrected during the pendency of an application. See *In re Roberts* 1920 C.D., 458. Aside from the statute permitting reissue as a result of the Supreme Court decision in *Grant v. Raymond,* 31 US 218, this was the first relaxation of the rigid enforcement of compliance with statutory requirements. The 1953 Act, however, has made one thing most plain, and that is, that the important thing about the patent is not the inventor nor the insignificant requirements of procedure, but the presence of invention and proper disclosure and claiming of the same. That the inventor is not the important thing so far as the public is concerned is now quite obvious. In Interferences between applications of common ownership, the Patent Office calls upon the owner to determine the question of priority of invention. This shows conclusively that the matter is essentially a private controversy. Section 118 of the Statute makes it possible for an assignee to file an application where the inventor refuses to cooperate. Section 116 of the Statute permits one of a number of joint inventors to make the application, and later the other joint inventor or inventors may be included in the grant. Section 119 giving the benefit of earlier filed foreign applications has been liberalized. Section 256 makes provision for correction of a patent where there has been misjoinder of inventors. Section 293 makes provision for service and notice to a non-resident patentee through a resident agent or publication.

All of these noted provisions are indicative of the shaping of the law to the realities of the times. They show further that the question of inventorship is not a matter of public concern, although it may be of great interest to the individuals

concerned. Their interest is a private interest. They should be permitted to dispose of the question on a basis satisfactory to them as private interests. The Court should not put its heavy thumb upon the scales of justice as it did in *Senkus v. Johnston, Teter v. Kearby,* and *Crane v. Carlson* cited above. See also, *Meissner v. Hoeschke,* 131 F.2d 865.

RECORD MADE IN REGULAR COURSE OF BUSINESS 28 USC 1732

The statutory provision in regard to records made in the regular course of business reads as follows (p. 473):

> In any court of the United States and in any court established by Act of Congress, any writing or record, whether in the form of an entry in a book or otherwise, made as a memorandum or record of any act, transaction, occurrence, or event, shall be admissible as evidence of such act, transaction, occurrence, or event, if made in regular course of any business, and if it was the regular course of such business to make such memorandum or record at the time of such act, transaction, occurrence, or event or within a reasonable time thereafter.
>
> All other circumstances of the making of such writing or record, including lack of personal knowledge by the entrant or maker, may be shown to affect its weigh, but such circumstances shall not affect its admissibility.
>
> The term "business," as used in this section, includes business, profession, occupation, and calling of every kind.

This section of the statute has incorrectly been designated as the Federal Shopbook Rule. That designation is not correct, since the "Shopbook Rule" is a rule prevailing in the various States long prior to the Federal Act, Section 1732, relating to an exception to the best evidence rule. The Shopbook Rule is of long standing and of widely recognized authority in all of the State Courts. As such it would be applicable in each Federal District Court sitting in the State which has such a "Shopbook Rule." The Statute 28 USC 1732 is a product of modern times, and is not limited to the so-called "Shopbook Rule" prevailing in the law of the State Courts.

According to Black's Law Dictionary, Fourth Edition, 1951, the "Shopbook Rule" is defined as follows:

> SHOP-BOOK RULE. An exception to the hearsay evidence rule, permitting the introduction in evidence of books of original entry made in the usual course of business, and introduced from proper custody and upon general authentication. *Clayton v. Metropolitan Life Insurance Co.,* 96 Utah, 331, 85 P.2d 819, 822, 120 A.L.R. 1117.

The following is its definition of Shop-Books:

> SHOP-BOOKS. Books of original entry kept by tradesmen, shop-keepers, mechanics, and the like, in which are entered their accounts and charges for goods sold, work done, etc., commonly called "account-books" or "books of account." The term does not include the stubs of a check book and entries thereon. *McWhorter v. Tyson,* 203 Ala. 509, 83 So. 330, 333, nor the book and entries of an express messenger. *Rhoades v. New York Cent. and H.R.R.R.,* 227 Mass. 138, 116 N.E. 244, 245.

In Bouvier's Law Dictionary, 8th Edition, published in 1858, appears the following definition:

SHOP BOOK. This name is given to a book in which a merchant, mechanic, or other person, makes original entries of goods sold or work done.

2. In general, such a book is prima facie evidence of the sale of the goods and of the work done, but not of their value.

Title 28, Section 1732, is of relatively recent origin. It is an amended version of Title 28, USC Section 695, enacted June 20, 1936. It appears that the original basis for Section 1732 was the need of the Government in making proof in cases involving violation of the Revenue Act or the Anti-Trust Act. It is to be observed that the wording of the Act is broad and inclusive, and that "business" as defined "includes business, profession, occupation and calling of every kind."

There is a tremendous amount of discussion of this rule in the reports, and it is difficult to determine what place the laboratory notebook of a research laboratory should take under the decisions.

To the ultra-conservative Court of Customs and Patent Appeals, accustomed to rigid enforcement of the so-called De Schweinitz rule, any proofs submitted under Title 28, Section 1732, were anathema.

In *Teter v. Kearby,* 79 USPQ 65, 169 F. 2d 808, on page 72 of 79 USPQ, Justice Jackson delivered himself of the following:

> It is contended by appellant that the laboratory notebooks intended to support the testimony of appellant are admissible as evidence of performance of the acts recorded therein under the express provisions of the U.S. Code, title 28, Sec. 695. In this connection, appellant cites in his brief the cases of *Landay v. United States,* 108 F.2d 698, and *Johnson et al. v. United States,* 89 F.2d 913. The same contention was made before the board. In its decision, the board observed it had not overlooked that even in criminal cases original entries made in the regular course of business in the books of corporations may be properly admitted when identified by the one who superintended the making of the entries. The board then stated: "In the present case, however, observation of physical phenomena involving the acts and judgment of the observer are the matter reported upon and the only definite check on the accuracy of these observations would be the observations of another observer."
>
> We are of opinion that the code provision cited by appellant was never intended to embrace such records as are here before us. While it may be true that in the research department of appellant's company, it may be a matter of ordinary business to file such reports, nevertheless the contents thereof can not be considered legally sufficient even though they are routine with respect to their contents. We do not think that the facts or operations related in these reports can be properly held to prove themselves merely by identification by those who made the reports. That contention of appellant is frequently urged here. In connection therewith, we invite attention to our comments upon this matter appearing in the case of *Senkus v. Johnston,* 35 C.C.P.A. (Patents) 1008, 166 F. 2d 597, 600, 77 USPQ 113.

Judge Jackson's decision relies upon a similar treatment of the question in *Senkus v. Johnston,* which, however, is equally lacking in conviction. The chief reason animating the Court of Customs & Patent Appeals appears to be that the De Schweinitz rule has been in effect so long that the Court of Customs & Patent Appeals feels itself unable to overrule such an everlasting precedent, even with the Federal Statute upholding its arm. The Court of Customs & Patent Appeals, in *Crane et al. v. Carlson,* 127 F.2d 709, 1942 C.D. 323, at p. 328, said:

> In the case of *Akers v. Papst,* 27 C.C.P.A. (Patents) 1400, 113 F. (2d) 136, in discussing the question of actual reduction to practice of an invention, we said:

> "It is no reflection upon appellant's testimony to hold that corroboration is required. Such corroboration in interference proceedings is a positive rule of patent law. *George v. Karsel,* Patent Appeal No. 4355, 27 C.C.P.A. (Patents) 1063, 111 F (2d) 148; *Janette v. Folds et al.,* 17 C.C.P.A. (Patents) 879, 38 F. (2d) 361; *Fausek et al. v. Vincent,* 25 C.C.P.A. (Patents) 770, 92 F.(2d) 909."
>
> All of the observations above quoted are applicable here, and regardless of the high character of appellants and the persuasiveness of their testimony, we are bound by the well-established rule of patent law that independent corroboration of the testimony of inventors is essential to establish actual reduction to practice of an invention, and that reports, official or otherwise, which are self-serving statements, cannot be considered as corroborative evidence of such reduction to practice.
>
> It is unfortunate that many inventors are not aware of this rule of law. In the case at bar it seems that there was stationed at Wright Field a Patent Liaison Office to which appellants, as hereinbefore stated, transmitted their report respecting the invention; but apparently appellants were not informed of the requirements of the patent law with respect to reduction to practice of their invention, should a question of priority of invention arise.
>
> This rule of patent law respecting corroborative evidence to establish reduction to practice of an invention did not originate with this court, but has long been established.

In brief, the Court of Customs and Patent Appeals has said that it has inherited the precedent from its predecessor, and does not propose to transmit it in diminished form to its successors.

Apparently, the basis for the comment made by Judge Jackson in *Teter v. Kearby* regarding the entries in a laboratory notebook relating to an invention were inspired by an earlier decision by the Supreme Court in *Palmer et al. v. Hoffman, Administrator,* 318 US 109. Judge Jackson said, p. 72 of 79 USPQ:

> . . . The board then stated: "In the present case, however, observation of physical phenomena involving the acts and judgment of the observer or the matter reported upon and the only definite check on the accuracy of these observations would be observations of another observer."
>
> We are of the opinion that the code provision cited by appellant was never intended to embrace such records as are here before us.

The Supreme Court in the *Palmer v. Hoffman* Case, in passing on the merits of the admissibility under the Act (then Section 695) of records kept by a railroad of accidents reported by its engineers, held that these reports did not fall within the statute. The surprising distinction is made by Mr. Justice Douglas, as follows:

> In short, it is manifest that in this case those reports are not for the systematic conduct of the enterprise as a railroad business. Unlike payrolls, accounts receivable, accounts payable, bills of lading and the like, these reports are calculated for use essentially in the Court, not in the business. Their primary utility is in litigating, not in railroading.

We would comment that the ancient and legally recognized practice of keeping shopbooks was adopted to help the shopkeeper assert his claim, particularly in the case of litigation, and that the admissibility of shopbooks would have fallen within the condemnation of the learned Justice Douglas just as much as the railroad's report of accidents. The statute did not narrow admissibility of records, it broadened it, as is apparent on the face of the statute. Of necessity, the courts of inferior jurisdiction were constrained to follow this decision.

While, in general, the statute has been used to admit books kept in the regular course of business to *testify against the maker thereof,* the Courts have, in general, been slow to permit the use of the books to *testify for the maker thereof.* It is the baser part of human nature (not necessarily justice) to take the position that what a man writes in his books may be used against him as an admission against interest, but that when he walks into court with his books to prove his side of the case, they are to be treated as "self-serving" documents, and he is a presumptuous upstart for bringing them in to verify his claim. But there must be some second thought in human nature, some alloying element of common sense. Broadly considered, every act, writing, deed, and thought of any man is primarily self-serving, because that is how he keeps alive, and that is how he does business.

The Act as passed appears to be sound and workable. All it does is to make admissible as evidence of the acts recorded those business records made in the regular course of business. The circumstances and the weight are all to be considered by the Court, and therein lies the safeguard in the situation. No judicial wisdom is needed to tell the businessman why and how he should keep books.

The rule of trademark cases does not follow the patent Interference practice, as will be apparent from the decision of the Court of Customs and Patent Appeals, speaking through Judge Bland, in the case of *B. R. Baker Co. v. Lebow Brothers,* 66 USPQ 232. In that case, which was a trademark Interference, the Court pointed out that the rule in trademark cases did not follow the rigid De Schweinitz rule of patent cases, and in making the distinction, the Court let in a little light on its thinking that, after all, each case should be decided on its facts rather than upon a rigid requirement for a certain quantum of evidence. The Court said, p. 236:

> It is not contended by either party here that oral proof alone, even by one witness, if sufficiently probative, will not suffice in proving priority of ownership and use in a trade mark interference proceeding. While the oral testimony of a single interested witness must necessarily have its weaknesses, we know of nothing in trade mark law which justifies the rejection of such proof if it is sufficiently probative. However, such testimony is obviously strengthened by corroborative documentary evidence, and it should not be characterized by contradictions, inconsistencies, and indefiniteness but should carry with it conviction of its accuracy and applicability. *William S. Merrell Co. v. The Anacin Co.,* 27 C.C.P.A. (Patents) 847, 109 F.2d 339, 44 USPQ 366. In one respect the general principle just announced is a variance with that which obtains in proving priority of invention in patent interferences. In the latter case corroboration is indispensable, while in the former it is not an absolute requisite. When, in cases like the one at bar, the oral testimony of a single witness, testifying long after the events happened, is relied upon to prove priority, such testimony, while entitled to consideration, should be most carefully scrutinized; and if it does not carry conviction of its accuracy and applicability, it should not be permitted to thus successfully attack the presumed validity of a registered trade mark. See *Collins v. Hupp Motor Car Co.,* 4 F.2d 272; also *T. H. Symington Co. v. National Malleable Castings Co.,* 250 U.S. 383.

SIGNS OF RETURNING SANITY

The situation is not altogether without hope. Judge Learned Hand in *Sink Tool v. Automatic Devices Corp.,* 71 USPQ pointed out that in regard to the

question of reduction to practice, the evidence establishing the same does not have to conform to a fixed pattern, but can be anything which carries conviction that the invention had been brought to the point where it required no more than business or ministerial attention for it to be put upon the market.

The Court of Appeals for the District of Columbia, in *Mathison Alkali Works, Inc. v. Leo T. Crowley,* APC, 1943 C.D. 104, 138 F. 2d 281, said in regard to the question of reduction to practice:

> The Patent Office held that the corroborating testimony was merely hearsay; that, as there was no other witness than Cunningham himself who actually saw the carrying out of his process at the time claimed for it, the corroboration was insufficient. The district court expressly avoided reaching this conclusion as a matter of law, but held, neverthless, that the evidence was insufficient to sustain appellant's contention. We have warned against the arbitrary or extreme use of a rule making visual observation the test of corroboration. Even in criminal cases, where life and liberty are at stake, corroboration may be established by circumstantial evidence. While such a rule would be convenient of application in the Patent Office, it cannot be permitted to excuse the exercise of discretion or absorb the administrative function. The district court properly challenged its application as a matter of law.
>
> But we agree, also, with the conclusion of the district court that the evidence offered by appellant was insufficient to provide the corroboration which is required. Corroboration is not a fixed quantity. It varies with respect both to the evidence which constitutes it and the evidence which it is designed to corroborate. When a case is tried to a judge the requirement is that he shall, in the proper exercise of his judicial function, weigh carefully both the evidence to be corroborated and that which is offered in its support. If the first is conclusive in character, he may be satisfied with supporting evidence of less force; and vice versa.

There are two things in that pronouncement which are of interest. The first is that no rigid rule as to corroborating testimony should be insisted upon; and second, that the court passing on the question *must look into the facts* and not shirk its duty by deciding the case on failure of the junior party to provide a fixed quantity of corroboration.

In the ancient case of *Schneider v. Driggs,* 1911 C.D. p. 276, the Court of Appeals of the District of Columbia, speaking through Justice Robb, said, p. 279:

> It is insisted by the appellant that Driggs should have called as witnesses one or more of the officers who witnessed the tests at Indian Head, should have introduced further evidence as to his conception and disclosure of the invention, and that as the case stands he has not proven either conception, disclosure, or reduction to practice. In advancing these contentions it is apparent that appellant has entirely failed to appreciate the character of this case. He has attempted to apply a rule applicable to an entirely different situation. Driggs filed his application in which he made oath that he was the inventor of the claims in issue. He testified as to when he invented them, to his disclosure of them, and to the subsequent embodiment under his direction of his invention in practical form. All the circumstances tend to corroborate his claim of invention, and no one disputes this claim. We think, therefore, that the argument that he has not established conception and disclosure must fail.

In *C. S. Johnson v. Stromberg,* 242 F.2d 793, before the United States Court of Appeals for the Ninth Circuit, Circuit Judge Barnes, speaking for the Court, admitted under Section 1732 (a) written drawings and job orders taken from the file of a company whose matching plant operations were relied upon as prior public use. The evidence showed that no one could testify that these records were made in the regular course of business, since no one who had been present

when the records were made was left to do so. Sufficient foundation was laid in the case under Section 1732, and claims 1 and 5 of the Johnson patent were held invalid.

In a similar case, *Minneapolis-Moline Co. v. Massey-Harris Co.,* 208 F.2d 73, the Eighth Circuit Court of Appeals admitted in evidence under Section 1732 a laboratory notebook or diary to establish prior invention or prior knowledge by a third party.

While in such a situation there is not the identical interest that there is in a patent Interference, the difference in interest of the party who made the records is not great enough that it should disqualify the evidence. Particularly is this true in those cases where the inventor has assigned under an employee's agreement any inventions which he may make, and one of such is involved in the Interference. In other words, a laboratory worker who has agreed to assign the invention to his own company does not have such an interest in the invention that he should be disqualified in respect of records made prior to any knowledge of the later developed controversy. The Eighth Circuit Court of Appeals said, 208 F.2d, p. 76:

> . . . The testimony of the witness by whom it was produced showed that the diary represented a book provided by the company and used by the engineering department to record "any pertinent information they might have relative to machines, movement of machines, patentable mechanisms, and so forth," and, as a matter of fact also, that the witness personally knew that the sketch in the diary constituted the record made of the engineering department's concept and suggestion at the time. This plainly was sufficient to entitle the entry to be received in evidence under 28 U.S.C.A. Section 1732, as a record made in regular course of business.

HOW GREAT IS THE INVENTOR'S INTEREST?

Since the De Schweinitz Rule, as now applied, renders all testimony of the inventor and all evidence for the production of which he is in any way responsible completely valueless by itself, the rule means that the inventor could never be believed! What is it which makes it possible to say that in no case can you believe the inventor's testimony, plus his laboratory notebook, plus such other evidence as he may have had a hand in preparing? The reason that has been given is that his self-interest is so great that he could not be believed. But is not the fact as to his self-interest one of the circumstances of the case? All inventors do not have the same interest in their inventions which the De Schweinitz rule presupposes. A skilled scientist working in a research laboratory, although he has agreed as a condition of his employment to assign inventions relating to the company's business to the company, is far more interested in his professional standing and in his job and retirement rights with the company than he would likely be in falsely claiming credit for the making of an invention which, after all, goes to his company. His self-interest in the correctness of the entries in his journal is likely to be far greater than his interest in trying to claim credit for an invention which he did not make by making false entries in his notebook or journal. The likelihood of detection of a falsification of the laboratory notebook or other permanent record which passes out of his control is very great. The more

renowned the laboratory, the less likely is anyone in it to risk destroying that reputation.

The point of this discussion is that the Court must look at the facts and circumstances bearing upon the probable truthfulness of the witness and not close its mind to the evidence.

There was a time, and not too long ago, when a wife's testimony was not receivable in Court on behalf of her husband on the then conclusive presumption that she was completely under the dominance of her husband. But present times demonstrate that wives have minds of their own, and their appearance on the witness stand has created not even a ripple in the administration of justice.

OPPORTUNITY FOR CROSS EXAMINATION

The United States Court of Appeals for the District of Columbia wrangled mightily with the application of the statute (then 28 USCA, Section 695) to the evidence in the case of *New York Life Insurance Co. v. Taylor,* 147 F.2d 297.

A chief objection made by the Court was the inability of the opposing party to subject anybody to cross examination in the respect of records so introduced. Obviously, if no one could be cross examined in regard to the origin of the records, their production and so forth, then the records were not properly authenticated and would not come within the purview of the statute.

However, in the case of an Interference, in respect of testimony of the inventor as to his reduction to practice, the objection which the Court made in *New York Life v. Taylor* falls peculiarly flat. The inventor is on the stand and he can be cross examined on everything relating to his case, both as to the actual making of the invention and as to the making of the records and everything relating to them.

Frequently, where a new statutory provision opens up new methods of procedure, not only is the Court reluctant to adopt the new procedure, but counsel, like the Court, still thinks in terms of the past and do not bring forward the necessary pleadings and/or evidence to take advantage of the new provision. That appears to have been the case in numerous ones of the decisions rendered on this statute.

On its face and on its merits, the statute appears to be peculiarly appropriate as a means of corroborating an inventor on his testimony on his reduction to practice when the records have been made in such manner and under such circumstances as to carry conviction as to their reliability.

KEEPING THE RECORD IN A LABORATORY

Discussion of this matter sometimes slides off into the emotional claim that the statute (Sec. 1732) if applied as we propose, would benefit only the large corporation laboratory. That, we submit, is not the case. Everyone who keeps adequate records, including him who has previously assigned his invention to another, in fact anyone who can in any manner establish that he is telling the

truth, must have opportunity to avail himself of the provisions of the law by complying with the requirements thereof.

It is suggested that the problem of making self-proving records might be simplified by making more extensive and detailed records and having those records certified soon after the reduction to practice. For example, assume that the laboratory worker keeping his notebook in a prescribed manner submits it periodically at short intervals to a licensed engineer, chemist, architect, or whoever is a licensed professional technician competent in the particular field or industry in which the laboratory worker is operating. In his notebook or on a separate record, the inventor records the physical equipment employed in the successfully concluded experiment, and to the extent that the physical means survives, he submits it for inspection and certification.

The making of the record may well be done by a clerical assistant who is not competent from the technical standpoint of corroborating the assertions of technical fact made by the inventor, but fully competent to make a full record of statements made by or on behalf of the inventor. A full and circumstantial statement made at the time of the successful experiment, together with later cross examination of the inventor on the stand, would be a better "safeguard of the patent system" than the corroborating witness who is also an employee of the company, and whose statement is of no particular value except to take off of the inventor's neck the weight of the De Schweinitz Rule.

It may well be that with a well planned routine of making such detailed records and periodic inspection of the same at short intervals, the probative value of the inventor's notebook and records will be acceptable to the Patent Office and the Court of Customs and Patent Appeals as adequate to establish reduction to practice.

Some workable way of overcoming the unjustifiable burden of the presently applied rule needs to be devised. A system that ties up high priced, scientifically skilled manpower needs the attention of something other than the judicial mind.

RECOMMENDATIONS

We submit the following recommendations:

1. That the rule in the De Schweinitz case be revoked by rule of the Patent Office or by statute if necessary, and every interference contest be adjudged on its own facts and circumstances without regard to any requirement for a quantum of proof.

2. That a statutory provision along the general lines of 28 USCA 1732 be enacted to make admissible as evidence of the facts recorded, particularly in connection with questions of priority of invention, all laboratory notebooks and other writings or drawings kept in the regular course of business of research and/or development, by an employee of the business, or by an independent investigator conducting his own investigations.

3. That opportunity be given to any interferant to try his case on priority of invention before a trial examiner who will hear the witness in the capacity of a

Master and make findings and report the same to the Board of Interference Examiners of the Patent Office.

4. That in order to reduce the likelihood of interference arising and to promote the early communication of inventions to the art in which they lie, more attention be paid by the Patent Office to the promptness in filing after an alleged reduction to practice. A reduction to practice withheld from use or patenting for years is a concealed lien against all more diligent applicants, though coming later. A reduction to practice which is long concealed should be regarded as an abandoned experiment. There should be a statutory provision going generally to limitation in time of the carrying back of a date of invention to a reduction to practice preceding any application disclosing the invention by a fixed period, such as two years. This period might well be one year by analogy with the one year's public use within which an inventor has the option of deciding whether he will rely upon secrecy or take advantage of the patent statutes and file an application. If an inventor has a reduction to practice of an invention and lets it lie around for a period of five years, he is certainly not complying with the spirit of the patent law which does, or should, call upon him to act with reasonable promptness to bring the invention to the attention of the public. As in case of an invention employed for commercial purposes but held in secret, the inventor has the option of either relying upon secrecy or of taking advantage of the patent law. If he employs the invention for more than one year in commercial operations, even though his use of the invention is kept secret, he is presumed to have elected not to operate under the benefits of the patent law, but under the law relating to secrecy, and he cannot, after one year's use of the invention for his commercial advantage, obtain a valid patent. Some provision along this line is desirable in the patent law in order to avoid situations permitted at present under the law, where after a man has a reduction to practice, he can sit there indefinitely and retain his rights of priority in the United States until the time that a statutory bar such as public use presents itself.

Presentation of Jefferson Medal

ADDRESS BY DIRECTOR O. S. COLCLOUGH*

PRESIDENT LANDAU, TRUSTEE HOWARD, DISTINGUISHED GUESTS, OFFICERS AND MEMBERS OF THE NEW JERSEY PATENT LAW ASSOCIATION, LADIES AND GENTLEMEN:

It is with a deep sense of humility that I have accepted the Jefferson Medal this evening. If that comment sounds a bit trite, let me assure you it is not. I have no doubt that recipients in the past have felt the same and may have so expressed themselves. In my case, however, there is a particularly significant reason for feeling humble. The Patent, Trademark, and Copyright Foundation of The George Washington University, as the Director of which I have been thus honored, is a team effort in the real sense. Its accomplishments, therefore, are due to the competence and dedication of its staff whom I represent. There are many names I should mention, but certainly I must pay tribute for its success to Dr. L. James Harris, the Executive Director, and to Professor S. Chesterfield Oppenheim, the first recipient of the Jefferson Medal, who is the Foundation's Adviser on Research.

Perhaps it is only natural that I am to talk about the Foundation and its work this evening. Such an opportunity is greatly appreciated.

I trust it will be interesting if I briefly recount how the Foundation came about. I joined the University as Dean of its Law School in the fall of 1949. Very soon thereafter, Professor Oppenheim brought up the matter of the patent system, particularly its widely differing treatment by some writers and in some courts. Our early discussions were against the background of certain actions by the American Patent Law Association. Specifically, at its stated meeting on February 15, 1949, and subsequently by referendum vote, the American Patent Law Association recognized a need for research and education under university auspices in the fields of patent and related systems of laws. We, at The George Washington University, have always acknowledged with appreciation the part played by APLA toward the establishment of the Foundation. Eventually, we assembled a small group to discuss what might be done to improve understanding of the patent system. That group consisted, in addition to Professor Oppenheim and myself, of Commissioner Watson, 1958 recipient of the Jefferson Medal, Mr. Henry Ashton and Mr. Virgil Woodcock. As all of you know, Mr. Watson was practicing at that time in Washington, while Mr. Ashton and Mr. Woodcock, also distinguished members of the patent bar, practice in New York and Philadelphia, respectively.

* Delivered at the Jefferson Medal Dinner on May 7, 1959 at the Hotel Robert Treat, Newark, New Jersey. On this occasion Director Colclough was presented with the Jefferson Medal for 1959 by the New Jersey Patent Law Association for his outstanding contributions to the American Patent System.

Out of these discussions, and with the advice and counsel of others, came the decision to organize the Foundation as an integral part of the University. The Board of Trustees adopted a Declaration of Trust, recognizing the need for the Foundation and establishing it as a non-profit research and educational organization to have perpetual existence.

The University was taking cognizance of a set of beliefs concerning the patent system to which many Americans subscribe—that throughout its existence the patent system has been one of the main channels through which the United States has steadily advanced to its position of technological eminence—that from this technological position our industrial economy has drawn power to flourish—that a sound basis for the patent system was laid in the Constitutional provision by which Congress was given the power to "promote the Progress of Science and Useful Arts," by securing to inventors for a limited period the exclusive right to their discoveries—that the patent laws enacted by the Congress, pursuant to this Constitutional provision, have fostered inventive resourcefulness, technical know-how, investment of risk capital and development costs, and scientific research—all to the end of benefiting our citizenry through a progressively higher standard of living and strengthened national security.

We also recognized that this set of beliefs, at times almost in toto, and on other occasions in part, have been questioned by some. Arguments pro and con have been, and still are, presented. In keeping with our democratic processes, this clash of viewpoints has been reflected in legal and economic literature and in various branches of the Federal Government. The controversy has spread to related fields of the copyright and trademark systems. In fact, the clash embraces all systems of laws, governing the protection of ideas embodied in mental productions, flowing from the physical and social sciences.

The interactions of these viewpoints have produced conflicting bodies of opinions. There are those who see the systems in jeopardy of serious damage, if not destruction. There are those that view them, for this reason or that, as doing violence to some political or economic precept. Against this background, I submit that the need for research and education was, and is, not open to question. Also, it is clear that such research and education must be free from self-interest. They must offer a guarantee of dispassionateness, the hallmark of free inquiry, so vital to the success of such an enterprise.

We believed then, and we believe now, that to carry out our mission we must carefully avoid the abstractions of the researcher in an "ivory tower." Or to put it another way, it is basic to our philosophy that we must get the facts. Our research, from the beginning, has been based upon a plan of going to the laboratory, to the factory, to the business executive, to the professional man—in fact, to all segments of our society, in search of the facts. Only in that way can knowledge of the systems be effectively and intelligently related to the aspirations and the practical problems of those concerned.

Having gotten the facts, they must be scientifically analyzed and evaluated. Only then can valid conclusions be drawn concerning the functioning of the patent and related systems in our industrial economy.

Then, we are faced with the duty of making the results of our research usefully available. This task can be broadly characterized as the field of education. A basic element of education is, of course, the art of communication.

Up to now, our results have been communicated, in the main, in two ways. First of all, there is *The Patent, Trademark, and Copyright Journal of Research and Education.* Herein are presented the results of our research—the articles contributed by persons knowledgeable in various theoretical or practical areas—the student papers, the notes and bibliographical materials. The *Journal* is the cornerstone of our communication system. It is published five times a year. As a matter of particular interest to the New Jersey Patent Law Association, the next issue will commemorate the late Charles F. Kettering, who was honored by the award of the Jefferson Medal. It will deal with Dr. Kettering as a researcher, inventor, entrepreneur, and leader of men, in articles written by those who knew him best.

To the complaint that the research reports are a bit involved, making rather heavy reading for some, I must point out that they constitute the source material from which other means of communication must flow. We present summaries at the beginning of these reports, for the benefit of those who do not have the time or the inclination to study the full report. Nevertheless, it must be emphasized that a comprehensive and valid research report is the basic feature that differentiates the work of the Foundation from the vast amount of written material that has accumulated over the years. Much of the latter is based upon opinion, upon a partial, and hence inadequate, assembly of the facts bearing upon an issue, or upon the mere reworking of materials previously produced by other writers.

Another means of communication is the Annual Public Conference. This June, specifically on the evening of the 24th and all day on the 25th, will be held the third Annual Public Conference in Washington, at the Mayflower Hotel. These Conferences provide an occasion for the presentation and discussion of the research findings of the Foundation. They further provide the important opportunity for general discussion of current issues in the fields of the Foundation's interest. Participating in these Conferences are people from all branches of learning and all fields of endeavor that have a common interest in the patent and related systems. If you have not reviewed the *Journal Supplements* which are published after the Conferences, I commend them to your attention. They constitute an important and easily readable source of information. Of course, we believe that you would benefit to an even greater extent by attending the Conferences.

In addition to the foregoing, there are the periodic reports concerning general activities of the Foundation. Copies of these reports and the *Journal* are sent regularly, of course, to all members of the Foundation.

So much for now on communication—I will have more to say thereon later.

Now, may I review briefly the course of the Foundation's progress over the years, since the undertaking was originally decided upon. The first task, after approval by the Board of Trustees had been obtained, was to raise that amount

of funds which would justify the Board in putting the Foundation into operation. This took some time and some effort. In addition to membership contributions from individuals, firms and corporations, we received notable assistance at this stage from the Alfred P. Sloan Foundation and later from the Charles F. Kettering Foundation.

I will always remember my first visit with Mr. Max McGraw, President of the McGraw-Edison Company, about the Foundation. I finally came to the point of inquiring whether he would be interested in contributing to its establishment. Mr. McGraw assured me that he would indeed be interested, because of the role patents had played in the development of the firm of which he was President at that time, McGraw Electric Company. This reaction was most encouraging. Since then it has been repeated on many occasions, albeit not frequently enough. On other occasions contributions have been made on the basis of recognition of the importance of the Foundation's mission in its broadest aspects—that is, a continuous and unified study of the functioning of the patent and related systems by one central agency. Such an agency serves as a clearing house for the marshalling and dissemination of data of all types that will throw light upon the theory and the practice of these systems.

The Foundation was finally placed in operation by the Board of Trustees in February 1954.

The staff of the Foundation, under the immediate direction of Executive Director Harris, consists of the office staff at the University and the research staff. The latter is made up of dedicated scholars at our University, at other universities, in private practice, and in government posts. In the main, they represent, in addition to the legal profession, the fields of economics and statistics, as you might expect.

Another important group in the Foundation family is the Advisory Council. The Declaration of Trust, to which I have referred, provides that the Council shall consist of not more than twenty-one persons whose advice, assistance, and support may be deemed helpful in determining policies and in formulating and carrying out specific programs of work. The members of the Council represent various fields of activity, such as the patent bar, science, manufacturing, and education. The Commissioner of Patents is an ex officio member. The Chairman of the Council this year has been Dr. Lawrence R. Hafstad, Vice President in Charge of Research of the General Motors Corporation. The newly elected Chairman is Mr. Willard C. Asbury, Vice President of the Esso Research and Engineering Company. We are extremely fortunate in and grateful for the dedicated service to the Foundation of this group of distinguished men.

I will not prolong my talk to the extent of discussing in detail the current research projects of the Foundation. The *Journal* is available to all. It is there that one can become fully and accurately informed concerning the results of our research.

Briefly, the Foundation's work currently falls into three basic categories. The first, or general category, would be a broad inquiry into the value and nature

of the patent system. One of the projects, entitled, "Value of the American Patent System," conducted by Dr. Jesse Markham and his associates at Princeton University, was an exploratory study to check the validity of the Foundation's approaches in other fact-finding studies. It sought to determine whether data were available to which economic and accounting methods, concepts, and indices might be applied, in order to establish an overall or a partial measure of value.

Also in this category is the "Patent Utilization" study which still goes on under the direction of Dr. Joseph Rossman and Dr. Barkev Sanders. In a word, this is a statistical study of a scientifically selected sample of patents from the entire universe of patents issued by the Patent Office. This is a long and costly project. It requires all the involved procedures of reaching in person or by questionnaire, inventors and assignees, collecting a wide variety of information and analyzing it. I feel sure some of you are, and I wish all were, aware of the progress thus far of this important project. For example, many of you are familiar with publication over the years of such percentage figures of used patents as 5, 10 or 15%. On the other hand, our Patent Utilization project permits me to talk in percentages, not yet finally determined, on the order of 47 to 64%. A favorite comment by one learning of this research for the first time is, "I am amazed."

The second basic category concerns the attitudes of people, people with differing capacities and occupying different roles in our society, toward the patent system. It isolates the patent system as a central idea to which the participants in our economy react. We have engaged in two studies in this area—one involving the inventor in the study of the "Attitudes of American Inventors Toward Defense Invention" and one involving differing publics in the study on the "Public Attitudes Toward the Patent System." Then, as is typical of so much of our research, the previously mentioned project on "The Value of the American Patent System" overlaps into this category. It has recommended that information should be developed concerning the influence of patent considerations upon research, development, and production decisions. We are thinking of a series of case studies on this aspect. These studies would fall into this second category.

Perhaps you will not be surprised that the project "Public Attitudes Toward the Patent System" revealed a considerable measure of lack of attitudes—in other words—ignorance.

The third basic category concerns the relations of the patent to the various aspects of industrial organization and functioning. Projects falling in this category are "The Role of Patents in the Creation and Growth of Small Industrial Units," "Taxation of Patents," "Relation of American Patents, Trademarks, and Techniques and American-Owned Foreign Patents to Foreign Licensing," and "The Effects of Certain Antitrust Decrees Involving Patents as a Major Factor."

The temptation exists to discuss some of these projects. They have new and exciting implications with respect to a better understanding of the patent system. Nevertheless, I promised I would refrain. So again I refer you, as professional men, scientists, and engineers, to the *Journal.*

I referred earlier to the educational objectives of the Foundation. I should mention here the extension of the program of the Law School in the patent field, as a result of the Foundation's efforts. For example, Dr. Harris conducts a seminar which deals with the economic and sociological aspects of patents, in addition to their legal aspects. Members of the Foundation research staff participate in these seminars. Student papers, some of which are publishable, result from this educational effort.

As I pointed out previously, however, the educational program envisages communicating the results of our research, not just in the formal educational sense. Rather, it is recognized that the truth about the patent system must be communicated to our society as a whole. After all, the patent system is an inherent social and economic institution in our way of life. And I need not belabor the fact that, under our democratic system, institutions which are the creatures of government flourish or wither depending upon whether the people of this country understand them, and understanding them, support them. Ignorance on the part of the inividual citizen is the greatest danger.

It is with these thoughts in mind that we are now embarking upon the next phase of the educational process. Our first effort is the folder entitled *The Patent System All Around Us.* This has been developed for communicating to the high school student—the decision-maker of tomorrow. In this period, with its emphasis upon scientific development and research, it is most important that the youth of our country see the place of the patent system in the total technological complex. It may be that such materials prepared for students, either at the high school or college level, will gain attention by reason of the fact that they emanate from a university. We have further plans of this nature. As you will recognize, a different approach to the various publics must be taken, if a true picture of the patent and related systems is to be translated in an interesting and understandable manner. Committees, composed of patent lawyers, organized by the Foundation in various sections of the country are particularly helpful in this phase of our educational program.

In summary then, it is our hope and our belief that The Patent, Trademark, and Copyright Foundation is making significant progress along the road it has chosen. We have our problems, yes. One of the foremost is financial support, adequate to our needs and opportunities. Also, there have been, and will continue to be, instances when impatience has been demonstrated with respect to the time-consuming element of our work. We are sympathetic with that attitude. As charges and counter-charges concerning the systems go on, as they do, it is only natural that people, who are intensely interested and highly motivated with respect thereto, ask for the answers. We believe sincerely, however, that the prospects of a high quality end-product of authoritative and accurate character cannot be measured just in lapsed time. The prospects of such a product necessarily depend upon the scope and complexity of the problems under inquiry. In that sense, no research or educational undertaking of merit can circumvent the element of time by a delusive short-cut to the desired end.

What we have done has been recognized in a significant manner by the award to me of the Jefferson Medal. We are grateful for that. And further, as the Foundation goes forward from here, we will be conscious of this recognition, the confidence implicit therein. We shall strive to continue to justify it.

EDUCATIONAL ACTIVITIES

Program for Young People

PAMPHLET SERIES (E-1)

THE FIRST BOOKLET IN A series entitled *The Patent System All Around You* was distributed in April to selected secondary schools and to members of the Foundation. The series is directed to teenagers and young adults. The first booklet described briefly the purposes, procedures, problems, and accomplishments under the patent system. Since this was the first booklet of the series, we were most interested in gauging and assessing its reception by students and educators. Although the booklet was directed to students, we also sent copies to Foundation members for comment and suggestions. We have received a number of letters, mostly favorable.

We have given special attention to the few adverse comments that we received in the hope of learning ways to make our subsequent efforts more effective. These critical comments relate generally either to the format used or to points of detail in treatment of subject matter. Most persons agree that such a program is highly desirable, although in one instance concern was expressed that the Foundation may risk loss of prestige by issuing material in oversimplified form.

The booklet contained a number of examples of important inventions with which we felt young adults would be familiar. In discussing radio we used as an example Major E. H. Armstrong, a colorful personality and a brilliant contributor to the field. Three letters were received from members of the Foundation expressing concern that our information on Major Armstrong was inexact or misleading. Although Armstrong was a controversial figure, the information we used we believed to be authoritative and well documented. We made it clear to our correspondents that it is not the intention of the Foundation to take sides nor does the Foundation intend such material, which is prepared for general educational purposes, to be used for the much more exacting requirements of patent litigation or legal interpretation. In a subsequent issue of the *Journal* some of the documentation may form the basis of a note on the intriguing question of "who invented it first" in which the patent literature abounds. We should also point out that this will be the central subject treated in educational Booklet No. 3.

The following excerpts from letters tell some of the ways in which the booklet is being used:

> This would be excellent material for one or two lessons in our classes of brighter pupils . . . when other booklets are available, we shall be very much interested in seeing samples. [From the Chairman of Social Studies in a New York City high school, who requested 350 copies.]
>
> I would like very much to get 20 copies . . . I plan to use it in my World History class. [From a teacher in Elkhorn, Wisconsin.]
>
> I would like . . . a small number of copies sufficient to use in a class project or as supplementary reference material. [From a teacher in Chambersburg, Pennsylvania.]
>
> I have just read Booklet No. 1 entitled *The Patent System All Around You* and believe that the presentation is excellent. I note that the pamphlet has been distributed to selected secondary schools throughout the country and wonder if you can give me some additional information as to how the distribution has been handled on the West Coast.
>
> My reason for asking is that the [name of organization omitted] I believe might be interested in sponsoring or assisting in the sponsoring of distribution of the pamphlets to some of our high schools or at least to high school seniors or perhaps to students taking physics, chemistry or other similar courses. [From a patent attorney in Los Angeles.]
>
> We appreciate and believe to be valuable your first pamphlet, *The Patent System All Around You,* which is already receiving interested use here. [From a university librarian in Kansas.]

The first booklet is now in its second printing. It will shortly be mailed to Science Fair Directors all over the country by Science Service, an organization which has done much to stimulate interest in science among the youth of our nation.

This booklet is available for distribution. Up to ten copies may be purchased from the Foundation at 12 cents per copy. Bulk purchases under 5,000 copies will cost 10 cents per copy, and 5,000 and over, 6 cents per copy. The second booklet is already being prepared and deals with the procedures involved in obtaining a patent today. It also devotes attention to some of the interesting historical development of these procedures. Subsequent booklets will deal with the following subjects:

No. 3 Problems of Establishing Priority: Who Invented It First?
No. 4 The Role of Patents in the Development of an Industry
No. 5 Who Are the Inventors?
No. 6 What Can You Do with Your Patent?: How Do You Put the Patented Invention to Work?

The Foundation welcomes comments and suggestions on this series of educational booklets for young people.

NOTES

Advisory Council Meeting

The Advisory Council of the Foundation, at the annual meeting in Washington, D. C. on April 9, 1959, elected Willard C. Asbury, Vice President of Esso Research and Engineering Company, to succeed Lawrence R. Hafstad as Chairman of the Council. Named Vice Chairman was Laurence B. Dodds, President of Hazeltine Research Corporation. Theodore S. Kenyon, of the New York firm of Kenyon and Kenyon, will serve on the Executive Committee. Other members of the Executive Committee are Edward R. Weidlein, former President of the Mellon Institute of Industrial Research and William T. Woodson, of the firm of Woodson, Pattishall and Garner, Chicago. Dr. Lawrence R. Hafstad, the former chairman, will continue as a member of the Executive Committee.

New Jersey Committee

An area committee for New Jersey has been recently established. Chairman is Hugh S. Wertz, of the Bell Telephone Company; Vice Chairman is John H. Graham of Esso Research and Engineering Company. Members are Norman St. Landau of Johnson and Johnson, H. Hume Mathews of the Patent Department, Air Reduction Company; and Walter C. Anderson of the Radio Corporation of America.

New Project Information

THE ROLE OF TRANSISTOR PATENT LICENSING

We are conducting a brief survey of companies licensed by Bell Telephone Laboratories under its transistor patents. One objective of this study is to ascertain the role these companies attribute to the licenses in their growth and development and the implications of these licenses in the companies' subsequent research and patenting activities. This study is being conducted by Dr. Irving H. Siegel in conjunction with other members of our research staff.

CORPORATE ANNUAL REPORTS AS SOURCES OF INFORMATION

Following up the note published in Volume 2, Number 3 of the *Journal,* we have undertaken a

systematic review of the annual reports of corporations for the year 1958. The purpose of the study is to elicit information on patent and research activities and to indicate ways in which such reports might be made more fruitful sources of information for students of the patent and related systems.

THE ROLE OF PATENTS AND OTHER FACTORS IN THE MACHINE TOOL INDUSTRY

Dr. Murray Brown, a member of our research staff, is conducting a study of patents and other factors in the development and growth of the machine tool industry as part of Project 3a, which is concerned with the role of patents in new industries. The case method is being employed and by means of questionnaires the researchers are seeking from a large sample of companies information on, among other things, research, patents, technology, growth, and competition.

INTERPRETATION OF THE ROLE OF PATENTS AMONG OTHER FACTORS IN SMALL BUSINESS

This study consists of a synthesis of the findings in Project 3a on the role of patents among other factors in the growth and development of small industrial units and a correlation and amplification of the findings with other materials. These other materials would include government and private publications, both published and unpublished.

Note on Trade Secrets

JOSEPH ROSSMAN*

THE ROLE OF CONFIDENTIAL TECHNICAL information and trade secrets in the growth of our industrial economy has received very little attention. Little factual data is available. It is generally known that there are many existing agreements based solely on know-how and trade secrets which have been effectively administered for the benefit of the parties involved. There is a large body of court law which indicates that courts will protect the owners of trade secrets against appropriation by unfair methods or breach of confidence. Secrecy is the basis of such rights. It is not known to what extent industry relies on trade secrets today. How long do trade secrets remain secrets before going into the public domain? Is the protection of trade secrets by the courts conducive to innovation and investment by industry?

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Patent Acquisition by Corporations*

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SUMMARY

THIS INTERIM REPORT EXAMINES the patent acquisition methods of companies with assets of $100 million or more or companies which were issued 75 or more patents during the period 1939-55 (hereinafter referred to as "large" [1] companies) as compared with all other companies in our sample [2] (hereinafter referred to as "small" companies). This report also explores the interrelationships between company size, the method of acquisition, and the percentage of patents utilized.

Over the 20 years, 1936-1955, the United States Patent Office reports that nearly 59% of the patents were issued to corporations. More than 54% were issued to domestic and about 4% to foreign corporations. During this period, less than 1% of the patents were issued to the United States Government. The balance, nearly 41%, were issued to individuals. During World War II assignments to corporations increased somewhat. Following the war these assignments reverted to their prewar levels.

The predominant means used by companies to acquire patents is by the assignments of their employees' inventions, generally based on a contract to assign. Very few companies purchase patents and when they do, it is often incidental to the purchase of a company. The purchase of patents from an individual inventor is rare, particularly by companies with the largest patent portfolios.

A recent study by the National Science Foundation shows that for all industries combined, the proportion of patents owned to patent applications pending is almost the same for companies of different sizes (according to the number of employees). This relationship appears inconsistent with the allegation that large companies ex-

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* This is a research interim report on *Project 1a,* Patent Utilization. Mr. Creighton U. Mattoon and Miss Maryan Furey assisted on this project.

** The Co-Principal Investigators of this project have insisted that Executive-Director L. James Harris join them as co-author in view of his invaluable contributions beyond his duties as Executive Director at every stage of the project.

[1] *Distribution of Patents Issued to Corporations (1939-55),* Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, 84th Congress, 2d Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, 34 pp. Since this study lists companies by the number of patents issued to them, we compared groups of these companies ranked according to the number of such patents with groups of same companies where represented in our Patent Utilization sample. These listed companies are referred to as "large" and the remaining companies in our sample are referred to as "small."

[2] Since our sample consists of 2% of patents issued in 1938, 1948, 1952 each company represented in the sample must have at least one patent in one of the years.

ercise monopolistic control over the purchase of patents. This study shows, however, that for particular industries, marked diversity in the proportion of patents owned to pending applications for companies of different sizes occurs. It also shows that expenditures for research and development in 1953 per patent owned and per application pending is much higher for the companies employing 5,000 or more. Finally, the study indicates an appreciable percentage of companies that owned patents had no applications pending and others with applications pending owned no patents, thus showing an in and out flow.

Our Patent Utilization sample faithfully reflects not only the total number of patents issued in 1938, 1948, and 1952, but it also closely parallels the distribution of assigned patents in force at the end of 1955 by groups of companies. (See footnote 1 for meaning of the term "group").

As many as 30,000 American companies own one or more United States patents. The vast majority do not own patents. There are less than 400 companies with more than 100 patents. About 40 of these have 1000 or more. Only one or two have over 10,000.

The patent utilization rate is significantly higher among the "small" companies. The percentage of patents used or about to be used for the "small" companies is 75 or more, for the "large" companies about 50.

The greatest percentage of patents used by the "small" companies is reported for patents in current use. The percentages are 48 for "small" and 24 for "large" companies. For patents used in the past, the percentages are 21.5 for "small" and 18.5 for "large." For patents reported about to be used the positions are reversed, 8.5 for "large" companies and 6.1 for "small."

There is no reliable information on the proportion of unassigned patents assigned to corporations subsequent to issuance. Recordings in the Patent Office files of such subsequent assignments have decreased over years until at present less than a third of these assignments are actually recorded.

On the basis of our study, it is estimated that at the time of expiration of the patent between 12 and 13% of assigned patents were not assigned at the time of issue. This means that something between 15 and 16% of the patents unassigned at the time of issue eventually become assigned to corporations.

A very small fraction of subsequently assigned patents are assigned to "large" companies. In our sample the "small" companies received less than 36% of initially assigned patents. These companies, however, obtained 88% of subsequently assigned patents. It appears that in some of these transfers the inventor incorporated a company and assigned his patents to it.

The proportion of subsequently assigned patents for which we have received completed questionnaires is much lower than that for initially assigned patents (27.0 and 55.0% respectively). Nevertheless, our returns tend to show that the proportion of subsequently assigned patents put to industrial use is somewhat higher.

Our partial returns indicate that at the time of expiration, 55 to 65% of patents assigned to companies will have been used. The interrelationships between the utilization levels and the percentage of patents with completed questionnaires suggest that the percentage of patents used in industry might be even higher

(possibly 60 to 70%). For the "small" companies the lower limit is above 70 and the upper limit may well go beyond 80%.

About 5% of the assignees report that the sampled patent was purchased. The proportion of purchased patents would probably be higher for patents for which we have no completed questionnaires. Of the patents reported purchased the majority are obtained from other corporations. Over 94% of the assigned patents for which we have a completed questionnaire were developed by employees.

An overwhelming majority of corporately owned patents, over 85%, are developed by employees under a contract to assign. For the companies with the largest number of patents, this percentage approaches 99.

The proportion of purchased patents and the proportion of patents obtained from employees who have no contract to assign are highest among the "small" companies. Even among these, however, the predominant source of patents is from their employees under a contract to assign.

The per cent of patents used in industry is higher for patents developed by employees who have no contract to assign. This is particularly true among the "small" companies. The percentage of patents used is lowest for patents reported purchased.

The information in this interim report is derived primarily from assignee questionnaires. Where inventor questionnaires provide comparable information, this has been analyzed and they, in general, corroborate the findings based on assignee information. This analysis is presented in an unpublished Appendix A. *This is one of three appendices available on request.* Appendix B shows the sharp increase in chemical, as compared with a decline in mechanical, patents. Appendix C provides detailed information regarding the characteristics of patents reported by assignees as purchased in response to our questionnaire. The findings in Appendix C are corroborated by information derived from inventor questionnaires analyzed in Appendix A.

INTRODUCTION

CORPORATIONS MAY ACQUIRE patents through purchase from individuals or other corporations, or by patenting inventions developed by their own employees. Patents may also be acquired by mergers of corporations or by the purchase of one corporation by another.[3]

Most companies today, particularly with research laboratories, enter into written agreements with their research and development employees to assign all inventions relating to the company's business.[4] It is not unusual, however, for employees without a contract to assign to patent inventions and assign them to their employers, initially or subsequent to the issuance.

Question 1 in the assignee questionnaire reads: "How did you acquire your

[3] *The Research and Development Factor in Mergers and Acquisitions.* Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, 85th Congress, 2d Session, Pursuant to S. Res. 236, Study No. 16, Washington, 1958, 35 pp.

[4] Jasper Silva Costa, *The Law of Inventing in Employment,* Central Book Co., New York, 1953.

right(s) in the sampled patent? (check) (a) Purchased, (b) Developed by own employee, (1) Under contract to assign _____, (2) Not under contract to assign _____, (c) Other (specify)." [5] In addition to question 1, there are a number of supplementary questions in the assignee questionnaire that bear on this topic. Some of these have been analyzed in Appendix A (available on request).

Analysis of the replies received to question 1, casts light on the frequently asserted view that large companies acquire patents, not only through their own research, but often through purchase from outsiders. It is asserted that, because of financial power, large corporations are in a unique position to purchase patents from individuals and smaller companies that lack the necessary resources to develop their own patented inventions. Dr. Corwin Edwards, for instance, stresses this point:

> A large business enterprise may own hundreds or even thousands of patents, for it not only obtains patents upon the results of research by its employees but also buys patents from inventors who find the large patent owner the best or even the only market for their inventions.[6]

The alleged advantages of *large* corporations (without defining large) to purchase patents generally on their own terms is emphasized in the following quotation:

> In many lines of activity neither the inventor nor the small company controlling the the invention has the resources to exploit the invention commercially. Capital, market connections, or access to other patented technology may be lacking. Thus the invention must remain unused or be sold, often to a *big* company which controls related patents. By buying inventions, a *big* company usually acquires patent control of considerably more of the new technology than it has originated. Thus, *its leadership in invention is partly derived from its financial power.*[7]

One object of this report is to ascertain the different means by which companies acquire patents, and particularly the frequency with which companies of different sizes purchase patents. The utilization status of patents acquired by different means, and by companies of different sizes, will also be analyzed.

PROPORTION OF INITIALLY ASSIGNED PATENTS [8]

The available evidence indicates, and our own data affirm, that the overwhelming majority of patents assigned to companies are assigned before the issuance of the patent. We will, therefore, in considering the extent of initial patent assignment not restrict ourselves to our own sample.

Study No. 3, prepared by Mr. P. J. Federico for the Subcommittee on Patents, Trademarks, and Copyrights,[9] shows the assignment status of all United States patents at the time of issue for the 20 year period 1936-1955, inclusive. We have prepared Table 1 from this publication.

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[5] Joseph Rossman and Barkev S. Sanders, "The Patent Utilization Study," *PTC J Res. & Ed.*, Vol. 1, (June 1957), p. 109.

[6] Corwin D. Edwards, *Big Business and the Policy of Competition*, 1956, p. 51. See also, *Maintaining Competition: Requisites of A Governmental Policy*, 1949, pp. 216-248, by the same author.

[7] Corwin D. Edwards, *Big Business and the Policy of Competition*, p. 89. Emphasis is added.

[8] Initially assigned patents are those assigned at time of issue.

[9] *Distribution of Patents Issued to Corporations (1939-55)*, Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, 84th Congress, 2d Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, 34 pp.

TABLE 1

NUMBER AND PERCENTAGE DISTRIBUTION OF PATENTS BY TYPE OF RECIPIENT AT THE TIME OF ISSUE FOR EACH YEAR 1936 THROUGH 1955.[1]

Year of Issue	Total Number[2]	Number					Per Cent[3]				
							Corporations			Individuals	U.S. Government
		U.S. Corporations	Foreign Corporations	Total to Corporations	Total Individuals	U.S. Government	U.S.	Foreign	Combined		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Total	698,954	378,399	31,189	409,588	283,685	5,681	54.1	4.5	58.6	40.6	0.8
1936	39,782	21,207	1,903	23,110	16,639	33	53.3	4.8	58.1	41.8	.1
1937	37,682	19,831	1,824	21,655	15,994	33	52.6	4.8	57.5	42.4	.1
1938	38,060	19,635	2,063	21,698	16,303	59	51.6	5.4	57.0	42.8	.2
1939	43,072	21,800	2,640	24,440	18,582	50	50.6	6.1	56.7	43.1	.1
1940	42,235	22,165	2,406	24,571	17,624	40	52.5	5.7	58.2	41.7	.1
1941	41,109	22,632	2,112	24,744	16,322	43	55.0	5.1	60.2	39.7	.1
1942	37,901	22,019	1,286	23,305	14,534	62	58.1	3.4	61.5	38.4	.2
1943	30,248	18,022	524	18,546	11,654	48	59.6	1.7	61.3	38.5	.2
1944	27,156	16,769	645	17,414	9,636	106	61.8	2.4	64.1	35.5	.4
1945	25,313	15,665	580	16,245	8,981	87	61.9	2.3	64.2	35.5	.3
1946	21,662	13,486	585	14,071	7,444	147	62.3	2.7	65.0	34.4	.7
1947	20,056	11,448	669	12,117	7,784	155	57.1	3.3	60.4	38.8	.8
1948	23,916	13,124	628	13,752	9,812	352	54.9	2.6	57.5	41.0	1.5
1949	35,105	18,536	1,127	19,663	14,957	485	52.8	3.2	56.0	42.6	1.4
1950	43,024	21,782	1,660	23,442	18,960	622	50.6	3.9	54.5	44.1	1.4
1951	44,319	22,305	2,163	24,468	19,192	659	50.3	4.9	55.2	43.3	1.5
1952	43,608	22,340	2,035	24,375	18,538	695	51.2	4.7	55.9	42.5	1.6
1953	40,466	21,230	2,294	23,524	16,284	658	52.5	5.7	58.1	40.2	1.6
1954	33,809	18,319	2,301	20,620	12,531	658	54.2	6.8	61.0	37.1	1.9
1955	30,431	16,084	1,744	17,828	11,914	689	52.8	5.7	58.6	39.2	2.3
1937–53	594,932	322,789	25,241	348,030	242,601	4,301	54.3	4.2	58.5	40.8	.7
1938–54	591,059	321,277	25,718	346,995	239,138	4,926	54.4	4.4	58.7	40.5	.8
1939–55	583,430	317,726	25,399	343,125	234,749	5,556	54.5	4.4	58.8	40.2	1.0

[1] *Distribution of Patents Issued to Corporations (1939–55)*. Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, 84th Congress, 2d Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, p. 12, Tables 6 and 7. See also figures 3 and 4, pp. 14–15.

[2] The figures in this column may be somewhat different from those in the original, but they are internally consistent. That is, the column 2 figures represent the sum of those given in columns 3 to 7 inclusive, and these figures were taken from Table 6, *supra*.

[3] The percentages were computed from the frequencies shown in columns 2 through 7 inclusive.

Table 1 shows that for the entire 20 year period, 1936 through 1955, the United States Patent Office issued 698,954 patents. Of these, nearly 59% were assigned to corporations, both domestic and foreign. Nearly 41% were granted to individuals [10] at the time of issue, and less than 1% were assigned to the United States Government.[11]

Within this 20 year period the percentage of patents issued and initially assigned to corporations has not changed greatly. It shows no secular trend. The lowest was 54 to 55% in 1950, and the highest 65% in 1946. In the early years of this period the percentage of assigned patents was between 57 and 58 and in the later years between 55 and 61. During the war years they were at their highest—in the low sixties.

Patents issued to domestic corporations accounted for 54% of the patents issued in these 20 years. This percentage shows somewhat wider variation from year to year compared with patents issued to corporations, domestic and foreign. The lowest percentage of patents issued to domestic corporations is about 50 for 1951, and the highest over 62, in 1946. As expected, the percentage of patents issued to these companies during the war years is well above the average. The percentages in the postwar years, however, are not appreciably above the levels observed in the prewar years. There is no evidence that over this period there was any consistent shift toward a larger proportion of patents being issued to corporations. During these 20 years, however, such shifts have occurred in other segments of our economy. Thus, the proportion of the labor force employed by corporations has increased markedly in comparison with the self-employed.[12]

The proportion of patents issued to individuals, resident and foreign, has diminished slightly. In the initial 5 years of the 20 years period, patents issued to

[10] The 2% sample of all the patents issued in 1938, 1948, and 1952 obtained for the Patent Utilization Study shows that 7.7% of all the patents issued to resident inventors were assigned to one or more individuals other than the inventors, i.e., patents assigned to individuals. In our previous interim reports we have included these with our assigned patents. The assigned patents in this report will include only those assigned to private United States corporations.

[11] The category of assigned patents in our previous interim reports have also included patents assigned to the United States Government as well as those assigned to individuals. These will not be included in this report.

[12] One of the most conspicuous changes in our ecomony is the phenomenal shift in our labor force from self employment to employment by a corporation or government—Federal, state, or local. In 1910, one-third of our labor force was self-employed, in 1950 this proportion was 17%, and at present it probably is less than 15. In 1910, the self-employed constituted over 10 million, in 1950 less than 9 and, at present, perhaps 8 million.

The sharp increase in corporate and government employment over these 20 years (1936-55) finds no comparable shift in the proportionate distribution of patents issued to the so-called "captive inventors." This anomaly has two possible explanations or a combination of these: (1) The segment of the self-employed to which inventors belong has remained essentially constant—a possible, though not probable, assumption. (2) Inventive capacity, or more accurately the output of patented inventions per inventor, is reduced with the transfer of inventors or potential inventors from self-employment to corporate or government employment. It would seem that as the size of the organizational unit increases, on the average, the inventive efficiency of each individual is reduced. This is a plausible hypothesis, worthy of further exploration. Efforts to explore it may yield significant knowledge of how to accelerate inventions in general, and specifically those for national defense.

individuals constituted 42.4% of the total. In the terminal 5 years, 1951-55, this percentage was 40.7.

Columns 7 and 12, showing the patents issued to the United States Government as the assignee, are the only columns with consistent and marked secular increases. This trend reflects in part the change in policy with respect to patenting of inventions by government employees. It also reflects the sharp increase in the number and composition of federal employees. Perhaps the most important cause for the continued increase of the proportion of patents assigned to the government is the phenomenal growth of federal research and developmental expenditures by the government through contracts with industry as well as in government laboratories.[13] Federal expenditures for research and development have increased from an estimated $74 million in 1940 to an estimated $3,538 million in 1959.[14]

Of this total $1,320 million was spent intramurally.[15] In 1953, Federal expenditures for research and development exceeded one-half of all expenditures for research and development.[16] It appears that while industry's research and developmental expenditures account for an annual crop of 15,000 to 20,000 patents, patents assigned to the government are less than 700, though its aggregate expenditures for research and development have exceeded those by industry.[17] This apparent contrast is surprising despite the considerable number of government contracts for R & D which permit the contractor to retain title to patents resulting from the contract.[18]

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[13] Howard I. Forman, *Patents, Their Ownership and Administration by the United States Government,* 1957, pp. V-XVII, 352, specifically, Ch. II, pp. 7-25.

[14] According to *Business Week* (March 21, 1959, p. 104). "The Subcommittee notes government spending on research has risen from $1 billion in 1949 to $5 billion in the 1960 budget. But, it says there is no uniformity of policy, on who gets the profits on new patents."

[15] *Federal Funds for Science VII. The Federal Research and Development Budget, Fiscal Years, 1957, 1958, 1959,* National Science Foundation, NSF-58-30, pp. 16-18, Tables II and V, and Chart 8.

[16] *Proceedings of a Conference on Research and Development and its Impact on the Economy,* National Science Foundation, NSF-58-36, p. 172.

[17] This striking contrast in the number of patented inventions resulting from the expenditures for research and development in industry vis a vis the expenditures by the government extramurally and intramurally provides a unique opportunity for a study of the factors which are associated with research input and patented and unpatented knowledge as output. Such a study may yield insights into circumstances and conditions that stimulate and sustain inventive activity as reflected in patents, and those which inhibit and frustrate such activity. The study may help to explain the progressive decline in per capita patenting observed in the United States and elsewhere since the beginning of the century.

[18] There is evidence to suggest that relatively few contractors patent inventions resulting from government financed R & D contracts. See the first quotation on page 220 of this report; "Proprietary Rights Hassle . . ." *American Machinist,* 102, No. 20, (Sept. 22, 1958) p. 79. The low productivity of Federal expenditures in terms of patents becomes equally apparent if assignments by Federal employees are considered. Intramural expenditures amounted from 1/4 to almost 1/3 of the total R & D expenditures by government. The number of patents issued to the government based on employee inventions in recent years has averaged considerably less than 300 and in earlier years, less than 200. (See Howard I. Forman, *Patents: Their Ownership and Administration by the United States Government,* New York, 1957, p. 63.)

There were 583,430 patents in force at the end of 1955. Of these, 54%, almost 318,000, were patents assigned to domestic corporations at the time of issue; 4% were issued to foreign corporations. Forty per cent were issued to individuals. These are usually issued to the inventors themselves, though in a small fraction of cases (about 8%) these patents were assigned to individuals. Finally, 1% of the patents in force were assigned to the United States Government.

Table 1 also shows the patents in force at the end of 1954 and those at the end of 1953. The number of patents in force at the end of 1954 are somewhat larger than those in force at the end of 1955, and patents in force at the end of 1953 are still larger. The percentage distribution across the table indicates that patents in force at the end of 1954 and 1953 are not markedly different from those at the end of 1955, though some decline in the total is apparent from year to year.

PATENT OWNERSHIP VS. PATENT APPLICATIONS

In Study No. 3 (see footnote 9), company ownership of patents is in terms of initial assignments. However, as noted earlier, patents owned by companies will include acquisitions by purchase subsequent to issue, mergers, or other means. In a study of expenditures for research and development, the National Science Foundation provides information on the number of patents owned and the number of pending applications for patents by a large number of companies. The companies are grouped according to their size on the basis of the number of employees and in broad industrial categories.[19]

The information on patents obtained by the National Science Foundation represents the estimated total number of patents owned by 2,950 companies and the patent applications held by these companies. The number of companies employing less than 1000 persons was an estimate since only a fraction of the companies were sent questionnaires asking about their patent ownership.[20] In estimating the number of patents owned and the number of patent applications pending, no attempt was made to adjust for companies included in the sample which failed to provide such information. Patent information was sought from approximately one-fourth of all companies engaged in research and development in 1953. The 2,950 companies from which the sample was derived performed more than half the company-financed research and development, at a total cost of $1.2 billion. Patent information was not sought from any company that did not report research and development expenditures for 1953. Of the companies providing information on patents, 55% reported they owned patents and had applications pending; 15% owned patents but had no applications pending. Nearly 5% of those providing information reported applications pending but no patents owned. These percentages suggest a dynamic situation—the entry of companies without previous patents into the patent

[19] *Science and Engineering in American Industry, Final Report on a 1953-1954 Survey*, National Science Foundation, NSF-56-16, pp. 37-38, 83-85, Tables A-33 and A-35.

[20] The study is limited to companies with 8 or more employees. See footnote 4 on page 6 in the NSF publication cited *supra* note 19.

field.[21] About 25% of the companies providing information indicated that they neither owned patents nor had patent applications pending.

Before considering the patent statistics collected by NSF that are of special interest to us at this time, there are certain observations in the report with respect to patents which appear significant. One of these concerns patent policies of 200 of the largest companies interviewed with respect to research and development.

Regarding these companies, the report stated:

> Well over three-fourths of the large companies supplying information on this point [patent ownership] indicated that they patent a substantial proportion of their newly developed products and processes—in general, everything that is patentable or worthwhile; almost all these companies cited protection of production rights rather than a desire for royalties or licensing income as the chief reason for taking out patents. Of the relatively few companies in this group which do not obtain significant numbers of patents, most explained their failure to do so on one of two bases; either they develop few patentable items, or *Government projects constitute a large percentage of their research effort, and on such projects the Government agencies involved restrict patent rights.*[22]

Another observation made in the report reads as follows:

> The concentration of patent ownership in large companies is also less than that of RD cost, in all industries taken together. Thus, companies with 5,000 or more employees held half of all the patents owned by its reporting firms, but they accounted for over two-thirds of the total 1953 cost of research and development work performed and financed by these companies. Conversely, firms with under 1,000 employees owned 1 out of every 5 patents [see Table 2 of this report] though the cost of their RD activities represented only one-eighth of the total cost figure for companies supplying data on patent ownership.[23]

NSF cautions, however, against any quick conclusion from the above, since patents owned represent the cumulative results of many years of research and the comparison given is with respect to R&D expenditures in 1953. The observation is concluded:

> Nevertheless, these statistical findings emphasize *the importance of patents to great numbers of small business organizations,* as well as to the leading corporations in all industries with significant research and development programs.[24]

The conclusion of NSF based on first hand information from many companies does not seem to support the undocumented generalization of Dr. Edwards to

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[21] It would be revealing to study these new entrants into the patent field to ascertain how many of these are companies that are newly formed for the exploitation of one or more pending patents.

[22] NSF-56-16, p. 37. The emphasis is ours. We have referred to this apparent dampening effect on the number of patents resulting from Government participation in research and developmental work. On the basis of our limited information, it would appear that very few of the patents issued to the Government are actually used in industry. This might be because information on use for such patents is not available, or since no company can have exclusive claim to such a patent, no one is willing to venture the needed developmental expenditures commonly required to develop a patent. In the Patent Utilization Study, we have defined "use" as: "Making or selling the patented invention, or using the patented invention in the production of goods or services, or making financial arrangement(s) with a third party(s) for the production, use or sale of the patented invention." *PTC J Res & Ed,* Vol. 1, No. 1, (June 1957), p. 108.

[23] *Ibid.,* p. 37-38.

[24] *Ibid.,* p. 38. The emphasis is ours.

which we have referred earlier in this report. Their conclusion runs diametrically counter to that of Professor Melman which is based on a study of 4 industrial laboratories.[25]

The 2,000 or so companies (70.4% of the 2,950 total) are reported as owning some 233,300 United States patents. The NSF report is not specific as to the date these companies owned these patents. If we assume the date was at the beginning of 1954, this number would represent about 39.2% of all patents in force at the end of 1953. If the replies were received mostly in the latter part of 1954 and early in 1955 and the information related to the time the questionnaire was completed, the date of ownership would be closer to the end of 1954. At that time there were 591,059 patents in force. The patents of the companies would represent about 39.5% of these patents in force. In terms of patents assigned to American companies when issued, the percentages would range between 72.4 and 72.6. In other words, the proportion of patents owned is almost the same whether the patents were reported owned at the end of 1953 or 1954.

An estimated 1,778 companies reported a total of 65,200 pending applications As of the end of 1953 there were 185,785 pending patents in the United States Patent Office. If we assume the number of pending patents were reported as of that time, they would have constituted 35.1% of all the patents pending. If we assume most of the reports were as of the end of 1954, the patent applications reported would represent 31.1%. At that time, there were 209,477 patent applications pending. The higher proportion of patents owned by these companies to applications pending probably in large part reflects the acquisition of patents by companies subsequent to issuance.[26]

One cannot, however, make a definitive inference from these figures of the percentage of patents acquired by these companies subsequent to issuance as being 8 to 13% of those that were assigned at the time of issue. To do this one must make a number of assumptions, some of which are perhaps not valid.[27] These

[25] *The Impact of the Patent System on Research,* Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, 85th Congress, 2d Sess., Pursuant to S. Res. 236, Study No. 11, Washington, 1958. Prepared by Seymour Melman.

[26] One, perhaps minor contributing factor might be that the NSF study excluded companies with less than 8 employees. Such companies on the average may have a relatively higher proportion of pending patent applications to patents owned.

[27] Among the important assumptions one has to make in order to attribute the observed differences entirely to the subsequently assigned patents are:

a. Proportion of patents granted per 100 patents pending is
   1. the same for assigned and unassigned patents.
   2. not much different for foreign as compared with American patentees.
b. Average duration between time of application and time of granting is
   1. the same for initially assigned and unassigned patent applications.
   2. not much different for foreign in comparison with domestic applicants.
c. The patent acquisition rate for subsequently assigned patents is the same for the companies in the sample as for other companies.

The joint effects of these variations may be offsetting, leading to the same essential end result as though the assumptions were satisfied.

figures do suggest, however, that the proportion of subsequently assigned patents cannot far exceed 13% of those initially assigned.

With respect to the comparative acquisition rate of patents by companies of different size, the evidence supplied by the NSF study is much more definitive, and is summarized in Table 2.

TABLE 2

COMPARATIVE PERCENTAGES OF PATENTS OWNED, PATENT APPLICATIONS PENDING, AND RESEARCH AND DEVELOPMENT EXPENDITURES IN 1953 BY COMPANIES WITH SPECIFIED NUMBERS OF EMPLOYEES.[1]

Size of Company	Percentage		Index	Percentage	Index
	Patents owned[2]	Patent Applications pending[2]	(3)÷(2)×100	1953 R&D[3] expenditures	(5)÷(2)×100
(1)	(2)	(3)	(4)	(5)	(6)
All companies: Number.....	233,300	65,200	—	$1,171.8	—
Per Cent.....	100.0	100.0	100	100.0	100
Less than 1,000 employees...	19.3	18.5	96	12.5	65
1,000–4,999 employees.....	29.9	30.7	103	18.5	62
5,000 or more employees.....	50.8	50.8	100	69.0	136

[1] *Science and Engineering in American Industry Final Report on a 1953-1954 Survey*, National Science Foundation, NSF, 56-36.
[2] *Ibid*, p. 84, Table A-34.
[3] *Ibid*, p. 85, Table A-35.

Table 2 shows the percentage distribution of owned patents by companies of different size in the NSF sample in comparison with the percentage distribution of patent applications held by these same groups of companies and also the percentage of total R&D expenditures by them. The companies are grouped according to size based on number of employees.[28]

If we assume pending patent applications are a reliable index of the relative proportion of initially assigned patents, this comparison gives no indication that subsequent acquisition of patents is relatively higher for larger than for smaller companies. The slightly lower index for companies with less than 1,000 employees and the excess for companies of intermediate size are probably accounted for by sampling variation. There is no evidence, however, in these comparisons in support of the allegation made by Dr. Edwards of the propensity that larger companies acquire a higher proportion of patents through purchase from individual inventors or from small companies. On the basis of Table 2, one is led to the opposite conclusion, to the extent that the research and development expenditures of larger companies are much higher in relation to patents owned as well as applications pending in comparison with small companies. Column 6 indicates that R&D expenditure per patent application pending or per patent owned by companies with 5,000 or more employees is on the average more than twice that for smaller companies. This suggests a higher input of R&D per patent acquired by large in comparison with small companies.

[28] "The Fortune Directory: the 500 Largest U. S. Industrial Corporations," *Fortune*, July 1958, pp. 131-150. Shows company size according to numbers of employees closely matches other indexes of size, such as total assets, sales etc.

TABLE 3

COMPARISON BETWEEN NUMBER AND PROPORTION OF PATENTS OWNED, PENDING PATENT APPLICATIONS, AND PERCENTAGE OF EXPENDITURES FOR RESEARCH AND DEVELOPMENT IN 1953 BY BROAD INDUSTRY TYPE AND COMPANY SIZE IN TERMS OF THE NUMBER OF EMPLOYEES.[1]

Industry and Size of Company	Numbers		Percentages					Indexes		
	Patents owned	Applications pending	Patents owned	Applications pending	(3):(2)	R&D Expenditures		(5):(4)	(7):(5)	(7):(4)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
All Industries	233,300	65,200	100.0	100.0	27.9	100.0[2]		100	100	100
Machinery	50,300	11,000	21.6	16.9	21.9	14.2	100.0	78	84	65
Less than 1,000 employees	22,200	4,300	9.5	6.6	19.4	3.1	22.0	70	47	33
1,000–4,999 employees	14,900	3,200	6.4	4.9	21.5	3.9	27.2	77	80	61
5,000 or more employees	13,200	3,500	5.7	5.4	26.5	7.2	50.8	95	133	126
Chemical and allied products	33,400	12,200	14.3	18.7	36.5	22.2	100.0	132	119	155
Less than 1,000 employees	5,000	2,300	2.2	3.5	46.0	2.2	9.9	159	63	100
1,000–4,999 employees	3,600	1,700	1.5	2.6	47.2	3.5	15.9	173	135	233
5,000 or more employees	24,800	8,200	10.6	12.6	33.1	16.5	74.2	119	131	156
Electrical equipment	27,900	8,400	12.0	12.9	30.1	13.9	100.0	108	108	116
Less than 1,000 employees	4,900	1,700	2.1	2.6	34.5	2.3	16.4	124	88	110
1,000–4,999 employees	8,100	2,700	3.5	4.1	33.3	2.9	20.8	117	71	83
5,000 or more employees	14,900	4,000	6.4	6.1	26.8	8.7	62.8	95	143	136
Petroleum products and extractions	18,700	8,100	8.0	12.4	43.3	9.3	100.0	155	75	116
Less than 1,000 employees	1,400	300	.6	.5	21.4	.3	2.8	83	60	50
1,000–4,999 employees	4,400	2,200	1.9	3.4	50.0	1.6	17.0	179	47	84
5,000 or more employees	12,900	5,600	5.5	8.6	43.4	7.4	80.2	156	86	135
Professional and Scientific instruments	16,300	3,300	7.0	5.1	20.2	6.8	100.0	73	133	97
Less than 1,000 employees	4,000	1,300	1.7	2.0	32.5	1.8	25.9	118	90	106
1,000–4,999 employees	2,500	700	1.1	1.1	28.0	.9	12.7	100	82	82
5,000 or more employees	9,800	1,300	4.2	2.0	43.3	4.2	61.4	48	210	100
All other industries	86,700	22,200	37.2	34.0	25.6	33.6	100.0	91	99	90
Less than 1,000 employees	7,600	2,200	3.3	3.4	28.9	2.9	8.6	103	85	88
1,000–4,999 employees	36,200	9,500	15.5	14.6	26.2	5.8	17.2	94	40	37
5,000 or more employees	42,900	10,500	18.4	16.1	24.5	24.9	74.2	88	155	152

[1] *Science and Engineering in American Industry Final Report on a 1953–1954 Survey*, National Science Foundation, NSF 56-36, Tables A-34, and A-35.
[2] Total expenditures for R&D by these companies in 1953 was $1,171.8 million.

Combining all industries, as done in Table 2, no material differences between patents owned and patent applications pending is evident between large and small companies. In different industrial groupings, however, we find marked differences in this respect. The relationship between number of patent applications pending and patents owned also appears to be related to R&D expenditures. These relationships are shown in Table 3.[29]

Considering industries, the comparison of the proportion of patents owned to patents pending shows marked variation. See columns 4, 5, 6, and 9—especially 9. The variations are best reflected by the index based on a ratio of percentage of patents pending to patents owned times 100 [(column 5/column 4) 100]. The highest index of 155 is for petroleum products and extraction. Second in rank is chemical and allied products with an index of 132. The third, far below the preceding two, but still above 100, is electrical equipment: 108. All other industries have a higher than average proportion of owned patents as against pending applications. The industry with the lowest index (the lowest relative proportion of pending patents to owned patents) is professional and scientific instruments, with an index of 73. This is followed by machinery industry, index 78. The odds and ends, grouped under all other industries, has an index of 91. These broad industrial groups are still highly heterogeneous. Each probably has components with relatively high indexes and others with low indexes. Because of this moderating fact, the level of the index is perhaps only a rough measure of current growth. In other words, a plausible hypothesis would be to assume that industries with a high index—that is, a higher proportion of patent applications to patents owned—are those with higher rate of growth and current activity. These industries are petroleum products and extraction, followed by chemical and allied products. Our own patent data (see Appendix B, available on request) supports this hypothesis and is in general agreement with the NSF findings that in recent years the relative growth of patents has been high for chemical, while mechanical, and to a lesser extent electrical, patents have shown a relative decline.

Column 11 shows the relationship between patents owned and 1953 R&D expenditures. A comparison of Column 9 with 11 abstracted below suggests certain relationships.

	Index of Patent Applications to Ownership (Column 9)	Index of R & D Expenditures to Ownership (Column 11)
Professional and scientific instruments	73	97
Machinery	78	65
All other industries	91	90
Electrical equipment	108	116
Chemical and allied products	132	155
Petroleum products and extraction	155	116

[29] Table 3 is a fine illustration of the effectiveness of sampling technique and the danger of conclusions from an empirical study that fails to start with an appropriate sample. Though the conclusion that the ratio of patent ownership to patent applications pending is quite constant for industry at large according to size of company, a study of any industry would have led to a different conclusion, which would have been at best only a partial truth.

There is some parallelism between these two indexes. This is to be expected since patent ownership is a common denominator. There is, however, a definite tendency toward a mixed relationship between the index of patents pending to patents owned and that of current expenditures to patents owned. There are at least six important variables impinging on these indexes: one, the comparative maturity of the industry; two, the capital requirements of the industry affecting the amount available for R&D; three, the ratio of patents applied for to patents granted; four, the period of patent pendency; five, the differential cost in different industries per patent application; and six, the extent to which different industries rely on trade secrets in lieu of patents. In view of the multiplicity of variables the interrelationships between the two indexes are mixed.

The patent pending to patent owned index for companies of different size varies widely for different industries. In the petroleum industry, the overall index in favor of patents pending is the highest. In this industry the relative position of companies with less than 1,000 employees is least favorable, the largest companies more favorable, and those of 1,000-4,999 employees most favorable. In general this is the pattern for the chemical industry. For the electrical industry the index is highest for companies with less than 1,000 employees, and lowest for 5,000 or more employees. In the residual "all other industries" this latter pattern is apparent. The same pattern is characteristic of professional and scientific instrument companies, which had the lowest industry-wide index. The very low relative position is due to the low index for companies of 5,000 or more employees. In the machinery industry, which has a relatively low index, all the components are low. In this industry the lowest is for companies with less than 1,000 employees and highest for 5,000 employees. The index for 5,000 employees is below 100.

The preceding analysis of the patent data obtained by NSF in relation to company expenditures for research and development provides no evidence that larger companies purchase most of the patents. For industry at large there is a surprising uniformity in the proportionate distribution of patents owned to new patents applied for among companies with varying numbers of employees. The patterns for different industries of the relation to company size of the ratio of new patents to old patents differ widely. The evidence shows a much higher expenditure for research and development by larger companies in relation to patents owned or patents applied for in comparison with that for smaller companies. These data suggest that industries such as petroleum and chemicals are growing more rapidly. This is reflected in the relative frequency of patent applications in these industries. In professional and scientific instruments and machinery industries, the opposite prevails. The relationship between research and developmental expenditures in 1953 and the index of patent applications to patents owned is not clear.

We now turn to a more intense study of acquisition patterns of companies of different sizes. The basis will be our sample of patents obtained in the Patent Utilization Study.

TABLE 4

NUMBER AND PERCENTAGE DISTRIBUTION OF PATENTS ISSUED TO DOMESTIC CORPORATIONS, FOREIGN CORPORATIONS, TO RESIDENT AND NON-RESIDENT INDIVIDUALS AND TO THE UNITED STATES GOVERNMENT FOR THE THREE YEARS SAMPLED AND FOR EACH YEAR COMPARED WITH ALL THE PATENTS ISSUED IN THESE YEARS AS GIVEN BY THE PATENT OFFICE. [1]

PRELIMINARY

Year of Issue	Total Patents		Issued to U.S. Corp.[2]		Issued to Foreign Corp.		Total to Corp.		Issued to U.S. Individuals[3]		Issued to Foreign Indiv.[4]		Total Issued to Indiv.		Issued to U.S. Gov.	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Patents included in the two per cent sample for the Patent Utilization Study																
Total for the Three Years	2,114	100.0	1,110	52.5	112	5.3	1,222	57.8	768	36.3	110	5.2	878	41.5	14	.7
1938	762	100.0	387	50.8	41	5.4	428	56.2	280	36.7	54	7.1	334	43.8	—	—
1948	479	100.0	263	54.9	23	4.8	286	59.7	172	35.9	15	3.1	187	39.0	6	1.3
1952	873	100.0	460	52.7	48	5.5	508	58.2	316	36.2	41	4.7	357	40.9	8	.9
Total number of patents issued by the United States Patent Office																
Total for the Three Years	105,584	100.0	55,099	52.2	4,726	4.5	59,825	56.7	n/a	n/a	n/a	n/a	46,653	42.3	1,106	1.0
1938	38,060	100.0	19,635	51.6	2,063	5.4	21,698	57.0	n/a	n/a	n/a	n/a	16,303	42.8	59	.2
1948	[5]23,916	100.0	13,124	54.9	628	2.6	13,752	57.5	n/a	n/a	n/a	n/a	9,812	41.0	352	1.5
1952	[5]43,608	100.0	22,340	51.2	2,035	4.7	24,375	55.9	n/a	n/a	n/a	n/a	18,538	42.5	695	1.6

[1] *Distribution of Patents Issued to Corporations (1939–55)*, Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, 84th Congress, 2d Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, p. 12, Table 6.
[2] Includes patents in the name of foreign inventors issued to American companies.
[3] Includes patents of inventors residing in the United States that are assigned to individuals residing in the United States.
[4] Issued to inventors not residing in the United States, includes patents assigned to individuals residing in the United States, and also individuals (other than the inventor) residing abroad.
[5] These totals are slightly different from the totals shown in Table 6 (*supra* footnote). The totals in Table 6 exceed slightly the sum of the subgroups.

THE QUALITY OF THE PATENT UTILIZATION SAMPLE

Table 4 compares our 2% sample with the Patent Office count of all the patents by type of ownership issued in the three years sampled.

The table shows close agreement between our sample and the Patent Office count. For the three years 52.5% of the patents in the sample were assigned at the time of issue. The Patent Office percentage is 52.2.[30]

According to the sample 5.3 were patents assigned to foreign companies, the Patent Office figure is 4.5. According to the sample 41.5% of the patents were issued to individuals. The Patent Office figure is 42.3. Finally, according to the sample, .7% of the patents were government owned. The Patent Office percentage is 1.0.

This evidence of the representativeness of the sample, though strong, may not be sufficient to warrant conclusions from our sample, based on three selected years, to be applicable to all patents in force. The limitation to three years constitutes a preliminary study. It would be of value to determine the differences between certain specific characteristics in our sample and all the patents in force at the end of 1955 issued to U. S. corporations. Mr. Federico's publication for the Senate Subcommittee, Study No. 3, facilitates such a comparison.[31] This study lists 595 American companies and the number of United States patents assigned to them before issuance, in force at the end of 1955. With respect to this listing the opening statement indicates:

> The main object of this report is to present data with respect to the number and distribution of patents, unexpired on December 31, 1955, which were issued to corporations. . . . The data presented relate primarily to two questions which were asked, namely:
>
> (1) Which companies have taken out the largest number of unexpired patents?
>
> (2) How many unexpired patents have been issued to a related group of the largest corporations?
>
> These two questions are not identical since some companies to which a large number of patents have been issued might not be in the large corporation group, and some companies in the large corporation group might have very few patents.[32]

The sources and methods of compiling the list of companies are described in the publication. Also, various comparative tables and charts are given showing the number of patents issued to companies in specified categories. Our main interest at this time is the list of individual corporations and the number of patents issued to them in 1939-1955 given in the appendix. These are described as follows:

> There are three lists:
>
> List I gives the names of 394 corporations which obtained more than 100 patents. This list was believed to be substantially complete.

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[30] The Patent Office and our percentage include patents of foreign inventors that are assigned to domestic corporations. (The questionnaires mailed to inventors and assignees in the Patent Utilization Study were restricted to patents issued to resident inventors only, and patents of resident inventors assigned to domestic companies.)

[31] *Distribution of Patents Issued to Corporations. (1939-1955), supra* note 9. This publication has been used in preparing Tables 1 and 4 of this report.

[32] *Ibid.*, p. 1.

List II is a partial list of corporations which obtained from 75 to 100 patents. These names have been tabulated for the purpose of listing the names of the corporations in the selected group of large corporations referred to in section 5, which are not on the first list, and to preserve the counts for other companies included. Since the effort was made to find the corporations with more than 100 patents, this latter group would be incomplete.

List III continues the names in the selected group of large corporations by tabulating the names of those which received less than 75 patents.[83]

Of the companies with assets of $100 million or more, only those companies were listed to which one or more patents had been issued. The selection of these companies excluded financial institutions and the like which have very few, if any, patents. One hundred of the companies with assets of $100 million or more had less than 75 patents issued to them during 1939-1955, inclusive.[84] From these lists we have compiled the cumulative total of patents issued to American companies [85] that were in force at the end of 1955. We have compared assigned patents in our sample with the distribution of patents in Study No. 3 ranked in deciles according to the number issued to companies. These comparative results are shown in Table 5.

Table 5 provides a comparison of the distribution of companies arrayed according to the number of patents issued to them in the 17 years 1939-1955 with the patents in the sample of the Patent Utilization Study assigned to these companies.

Column 1 shows the number of companies grouped cumulatively. Column 2 provides the cumulative number of patents issued to these companies based on the list in Senate Subcommittee Study No. 3, giving the number of patents in force at the end of 1955 issued to these companies. The breaking points in grouping were selected to the nearest decile, i.e., the 10th percentile, and to the first quartile

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[83] *Ibid.*, p. 19.

[84] Wide corporate ownership of patents can be observed in the NSF study. The more than 2,000 companies which reported owning patents, accounted for only about 72% of patents issued to corporations in the years 1937-1953. The total number of patents owned by all companies issued in 1937-1953 will be larger than the number assigned to companies at the time of issue. It follows, therefore, that the percentage of patents owned by companies in NSF sample was less than 72% of patents owned by all American corporations at the time when the study was made. In relation to such a larger base the proportion of patents owned by these 2,000 companies with research and development expenditures in 1953, might be only 64 to 65% of the total. The large number of companies owning patents is reflected more clearly in the following quotation from Study No. 3:

> In the study made in 1938, all the patents issued to corporations during a period of 7½ years were counted and this count showed a total of 21,257 corporations receiving patents, the majority receiving an average of 1 or less patent per year and nearly half receiving only one patent in the 7½ year period involved (p. 5).

This would suggest that for a 17 year period—during which patents remain in force—the number of companies receiving one or more patents far exceeds 22,000.

[85] We have excluded foreign companies from the lists. Therefore, the number of American companies in the list with 100 or more patents is 368, with a total of 191,453 patents. This represents 60.3% of all patents issued to American companies and in force at the end of 1955. The comparable number of patents issued to any of these 368 companies represented in our sample is 678, constituting 61.1% of the total number of patents assigned to corporations at the time of issue.

TABLE 5

COMPARISON OF THE PATENT UTILIZATION SAMPLE OF PATENTS WITH THE TOTAL NUMBER OF INITIALLY ASSIGNED PATENTS IN FORCE AT THE END OF 1955 ARRAYED FOR "LARGE" COMPANIES[1] RANKED ACCORDING TO PATENT OWNERSHIP AND GROUPED APPROXIMATELY IN DECILES AND FIRST QUARTILE.

PRELIMINARY

Number of Patents Issued to Companies 1939-1955[1]	Patents Issued		Patent Utilization Study					Patents with Completed Questionnaires			
	No.	%	No.[2]	%[2]	(4)+(2) X1000	No.[3]	%[3]	No.[4]	%[4]	(9)+(7) X100	Index
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
4 companies with highest number of patents	34,757	10.9	130	11.7	3.7	129	12.1	58	9.8	45.3	81
12 companies with highest number of patents	64,689	20.4	238	21.4	3.8	237	22.2	153	25.9	59.8	107
19 companies with highest number of patents	78,600	24.7	301	27.1	3.8	290	27.2	187	31.7	64.7	116
30 companies with highest number of patents	95,028	29.9	346	31.2	3.6	328	30.7	211	35.8	64.5	116
69 companies with highest number of patents	126,895	39.9	456	41.1	3.6	426	39.9	286	48.5	67.4	121
160 companies with highest number of patents	158,634	49.9	567	51.1	3.6	538	50.4	349	59.2	65.2	117
358 companies with highest number of patents	190,437	59.9	673	60.6	3.5	645	60.4	405	68.7	63.2	113
495 companies with 75 or more patents	202,372[5]	63.7	708	63.8	3.5	679	63.6	420	71.2	62.3	112
All companies listed	204,592	64.4	717	64.6	3.5	688	64.5	427	72.4	62.5	112
Remaining companies	113,134	35.6	393	35.4	3.5	379	35.5	163	27.6	43.5	78
Total: Per cent		100.0		100.0			100.0		100.0	55.8	100
Number	317,726[6]	317,726	1,110	1,110	3.5	1,067	1,067	590	590		

[1] *Distribution of Patents Issued to Corporations (1939-55)*, Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, 84th Congress, 2d Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, pp. 19-34.

[2] Comprised of patents initially issued to American corporations, including patents of non-resident inventors. Based on Company ownership as of the time of completing the questionnaire, mostly in 1957.

[3] Patents issued to resident inventors and assigned to American companies, initially or subsequently. Excludes patents issued to companies for which a current address could not be found. These are the patents with respect to which questionnaires were mailed to assignees.

[4] Parallels in definition patents described in footnote 3. It is restricted to patents assigned to American companies for which a completed assignee questionnaire was received on or before 3/1/59.

[5] The report indicates that the list for companies with more than 100 patents is probably complete. This includes 368 American companies with a total of 191,453 patents issued to them. The list of companies with 100 to 75 patents is believed to be incomplete (except for companies with assets of $100 million or more). The companies with less than 75 patents listed are the remaining large companies with 1 or more patents and with assets of $100 million or more.

[6] Obtained by subtracting the total for listed companies from the total for all patents assigned to American companies that were in force at the end of 1955.

[7] The total number of patents assigned to American companies at the time of issue. See Table 1 of this report.

of all patents issued to American companies. The four United States companies with the highest number of patents issued to them accounted for 34,757 patents, the nearest number to the first decile (the 10th percentile). The 34,757 patents constitute almost 11% of the total number of patents in force at the end of 1955 issued directly to American companies. The twelve companies with the highest number of patents, the leading four plus eight others, accounted for 64,689 patents, the closest breaking point to the 20th percentile. Nineteen companies, including the 12 referred to and 7 others, accounted for 78,600 patents, the nearest breaking point to the first quartile—25th percentile. Similarly 30 companies, ranked according to the number of patents issued to them, accounted for 95,028 patents, the nearest point to the 30th percentile. This is continued to 358 companies with the highest number of patents issued between 1939-1955, constituting 190,437 patents, close to the 60th percentile. The 368 companies to which a minimum of 101 patents were issued, in the seventeen years under consideration, had received in the aggregate 191,453 patents, representing 60.3% of all patents issued to American companies during this period. Inclusion of the additional 127 companies that received 75 to 100 patents totals 202,372 patents. The remaining large companies (those with assets of $100 million or more, but with less than 75 patents) as defined in Study No. 3, that had received one or more patents, enlarges the list of companies to 595, and the number of patents issued to them to 204,592, 64.4% of the total patents issued to companies in force at the end of 1955. The balance, 113,134, is assumed to represent patents issued to all other companies—representing 30,000 or so different companies.[86]

In column 4 we have shown the distribution of patents for these same companies in our sample. To make the two groups comparable we have excluded from our total, patents assigned to companies subsequent to issue. We have included patents issued to foreign inventors assigned to American companies prior to issue. The percentage distribution of our sample is given in column 5. It is phenomenally close to that shown in column 3 for all patents initially assigned and in force at the end of 1955. This close parallelism is surprising since column 3 is in terms of patents issued over 17 years, while our sample is for three years, one of which, 1938, falls outside of the 17 years. The agreement between our sample, and that for all initially assigned patents, could be improved if we were to disentangle acquisitions by mergers or purchases that must have taken place between 1954 when the information on company affiliations on which the data of Study No. 3 were compiled, and 1956 and 1957 when most of our questionnaires were answered. This difference in timing probably accounts for the slight excess of patents in our sample for companies with the largest number of patents. Column 6 indicates this comparative excess is highest for companies in the 10th through

[86] Study No. 3 indicates that for 1955, 4,405 different American companies received one or more United States patents. In footnote 34 we indicated that in 1938 a count of patents showed that 21,257 different companies had been issued one or more patents for the preceding 7½ year period. From this and other related data it appears that the total number of such companies over the entire 17 year period may well exceed 30,000. This would represent less than 10% of the corporations in the United States. The average number of patents issued to the companies and in force at the end of 1955 would be about 4.

the 25th percentile. It is reasonable to assume that mergers could swell the holdings of the largest companies because the mergers and purchases of companies are generally made by the larger companies.

Columns 7 and 8 give the number and percentage distribution, respectively, of assigned patents in the Patent Utilization sample, with respect to which we have tried to obtain information from assignees and inventors. We have excluded patents of foreign inventors and patents of American inventors assigned to American companies for which we have been unable to obtain current addresses. We have included the subsequently assigned patents which are not included in columns 2 or 3, 4 or 5. The elimination from our sample in columns 7 and 8 of the patents of companies without current addresses, tends to swell artificially the percentages of patents owned by companies with large portfolios. In spite of this, and the effect of mergers and purchases, there is close parallelism between the percentages of columns 8 and 3.

The remaining columns of Table 5 relate to assigned patents for which we had received completed assignee questionnaires on or before 3/1/59. These columns indicate that on the average our returns represent 55.8% of assigned patents for which questionnaires were sent to assignees. The range of percentage returns is from a low of 43.5% for companies not listed in Study No. 3, to a high of 67%. This range will be higher if we depart from the cumulative percentages (see Table 6). The plus and minus departures from the average response rate of 55.8% is shown by the indexes of column 12. The highest return is for companies in the 30-40 percentile group, and the lowest among the non-listed companies. The group of 4 companies with the highest number of patents issued has also a relatively low return rate, second only to companies with the smallest number of patents.

Column 10, giving the percentage distribution of patents with completed questionnaires grouped according to companies arrayed by the number of patents issued, shows considerable parallelism with column 3.

UTILIZATION STATUS OF PATENTS

In Table 6 we give the utilization status of patents for which we have assignee questionnaires for assignees arrayed according to number of patents issued to them in the 17 years 1939-1955.

The stub of Table 6 shows the distribution of companies with approximate percentile rank of the number of patents assigned to them initially. The exact percentile breaking points may be obtained from Table 5. Column 2 shows the percentage of all assigned patents with mailed questionnaires returned on or before 3/1/59. The table shows that the lowest proportion of completed questionnaires has been received from assignees with total patent holdings for some of less than 101 per assignee, and most less than 75, exclusive of companies with assets of $100 million or more in 1954, i.e., the non-listed companies. Almost as low is the percentage of returns from companies with the greatest number of patents. The highest ratio of returns was received from companies in the 11th to 20th per-

TABLE 6

NUMBER AND PERCENTAGE DISTRIBUTION OF PATENTS WITH COMPLETED ASSIGNEE QUESTIONNAIRE BY UTILIZATION STATUS FOR ASSIGNEES GROUPED IN PERCENTILE RANKS ACCORDING TO THE NUMBER OF PATENTS ISSUED TO THEM DURING THE PERIOD 1939–55,[1] BASED ON ASSIGNEE RETURNS RECEIVED ON OR BEFORE 3/1/59.

PRELIMINARY

Percentile Rank of the Number of Patents Issued 1939–55.[1]	% of Questionnaires Returned	In Current Use		Past Use		Used Patents		Future Use		Used or About To Be Used		Never Used		Questionnaires	Ques. Mailed
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.[2]	No.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
4 Co.'s, top 11 percentile	45.3	7	12.1	11	29.3	24	41.4	3	5.2	27	46.6	31	53.4	58	128
8 Co.'s, top 11–20 percentile	88.0	22	23.2	14	14.7	36	37.9	10	10.5	46	48.4	49	57.6	95	108
18 Co.'s, top 20–30 percentile	63.8	16	27.6	6	10.3	22	37.9	8	13.8	30	51.7	28	48.3	58	91
39 Co.'s, top 30–40 percentile	77.4	14	18.9	15	20.3	29	39.2	7	9.5	36	48.7	38	51.3	74	97
91 Co.'s, top 40–50 percentile	56.8	18	29.0	15	24.2	33	53.2	1	1.6	34	54.8	28	45.2	62	111
198 Co.'s, top 50–60 percentile	52.8	19	33.9	6	10.7	25	44.6	7	12.5	32	57.2	24	42.8	56	106
Remaining listed companies	52.4	6	27.3	4	18.2	10	45.4	—	——	10	45.4	12	54.6	22	42
All listed companies	62.5	102	24.0	77	18.5	179	42.1	36	8.5	215	50.6	210	49.4	425	683
Non-listed companies	43.5	78	47.9	35	21.5	113	69.4	10	6.1	123	75.5	40	24.5	163	375
Total: per cent	55.8		30.6		19.1		49.7		7.8		57.5		42.5	100.0	
number	590	180	180	112	112	292	292	46	46	338	338	250	250	588	1,058
Theoretical total[3]		344	32.5	209	19.8	553	52.2	78	7.4	630	59.6	428	40.4	1,058	

[1] *Distribution of Patents Issued to Corporations (1939–55)*, Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, 84th Congress, 2d Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, pp. 19–34.
[2] Excludes 2 cases with unknown utilization status.
[3] Compiled on the assumption that completed questionnaires for each group represent an unbiased sample of patents in that group with respect to utilization status.

centile, followed by companies in the 30 to 40 percentile group. The overall return rate is about 56%.

Column 4 gives the percentage distribution of the patents with completed questionnaires that were reported in current use at the time of response. The percentages range from a low of 12 for the companies with the largest number of patents to 48 for companies with less than $100 million assets and less than 101 patents—the non-listed companies. The percentage of patents in current use for non-listed companies is twice that reported by the companies listed in Study No. 3. This unusually high rate of patents in current use associated with a low proportion of completed returns might suggest some selective bias, the possibility that the "small" companies that have returned questionnaires may have been the companies more often successful with their patents. However, there seems to be a tendency for the utilization percentage to increase with decreasing number of patents per company. Conversely, there is no indication of an association between a low response rate and a high proportion of patents in current use. The largest companies, those with the highest number of patents, also have very low returns and the lowest proportion of patents in current use. In view of these considerations there does not appear to be a bias in favor of the "small" companies, those not listed in Study No. 3.

Assuming that in each group the completed questionnaires were a representative sample of all the patents held by those companies, then it is estimated that the patents in current use would be 32.5%, nearly one-third.

Column 6 gives the percentage of patents reported as having been used in the past. The highest percentage is for the companies with the largest number of patents, companies which reported the lowest proportion of currently used patents. This would suggest that these companies are not as vigorous in their patent activity today as they once were. The lowest percentage is for companies in the 20 to 30 percentile group, followed closely by those in the 50 to 60 percentile group. If we assume no bias in the returns, the percentage of patents used in the past would be 19.8 or nearly 20.

Column 8 shows the proportion of used patents, whether used currently or in the past. In comparison to the percentage of patents in current use, or used in the past, the combined percentages show less variability for the different groups of companies. The lowest percentage is about 38 for companies in the 20 to 30 percentile group and the highest, 69 for the non-listed companies. The average for listed companies is 42 and the general average is nearly 50%. If we were to assume that in each percentile group those with returned questionnaires represent the same utilization proportion as those with no returns, the overall average estimate of used patents would be 52.2%.

Column 10 shows the percentage of patents reported about to be used. The range of variation for this column is the greatest of all, from zero for one group to a maximum of 14% for the group of companies representing the 20th to 30th percentile. The average for all completed questionnaires is 7.8 and would be

slightly lower (7.4%) if we assumed all questionnaires returned would have yielded the same percentages in each group as we have shown in column 10.

Column 12 gives the percentage distribution of patents used or about to be used, on the basis of questionnaires returned. The lowest percentage of used or to be used patents were reported by the largest companies (those with assets of $100 million or more) with less than 75 patents issued to them (about 45%). The percentage for the largest companies with the highest number of patents issued is not significantly greater. They show a percentage of less than 47. In general, there is some indication that the utilization rate increases with decreasing number of company patents and gross assets. For the companies listed in Study No. 3, the highest utilization rate shown is about 57 for those in the 50 to 60 percentile group. The average rate for all the companies listed is nearly 51%. The average for "small" companies (not listed) with less than 100 (and probably less than 75) patents per company and assets of less than $100 million is almost 76%. This indicates that patent utilization is much higher in the "small" companies. One would expect to find, among these, many young and vigorous companies formed primarily to expolit certain patents.[37]

Columns 13 and 14 give information regarding the number of patents not used in which there was no prospect of immediate use at the time our questionnaire was being answered.

Subject to the uncertainties of incomplete returns, the overall conclusion based on Table 6 might be summarized:

a. The overall utilization rate of patents in current use, used in the past, and reported about to be used is 57 to 58%. If we assume some bias tending to inflate this rate, the true rate might be somewhat lower.[38] On the other hand, if we assume that there is no bias and in each group the patents with completed questionnaires are representative of the patents in that group, then the utilization rate would be 60% or higher.[39]

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[37] From the nature of our sample the chances of a company being represented is proportionate to the number of patents issued to such a company in the three years included in our study.

[38] In prior reports we have employed the consistency of completed questionnaires returned over a period as one indication of an absence of bias. Of greater probative value has been the evidence of the consistency of utilization rates when patents with completed inventor questionnaire only and those with completed assignee questionnaire only, are compared with patents having completed inventor and assignee questionnaires, respectively. See *PTC J. Res. & Ed.*, Vol. 1; Conference Supplement, (1957); pp. 73-74, 150-151, Tables A and B.; Vol. 2, No. 1, (March 1958); Vol. 2 Conference Supplement, (1958), pp. 183-190, 224-225, Tables 9 and 10.

Appendix A of this report employs this internal analysis to check the validity of the higher utilization level of patents by "small" non-listed companies as compared with large companies listed in Study No. 3.

The decisive evidence of the absence of bias would be the interview of a properly designed sub-sample of non-responding assignees and inventors, to remove any question of bias in the utilization rates of patents. We hope to do this eventually.

[39] From our experience, it appears that the most active companies are least likely to return a questionnaire. It is plausible, therefore, were we to recive replies from all companies in our sample, that the utilization rate would be higher than the 60% shown in the last line of Column 12.

b. It appears that the patent utilization rate is highest among the "small" companies.[40]

INITIALLY VERSUS SUBSEQUENTLY ASSIGNED PATENTS

It is surprising that, in the past and current discussions and disputes regarding patents, no reliable data have been produced regarding the number of patents owned by corporations and how they acquire them. At the TNEC hearings some data were brought together, though incomplete and deficient.[41]

In the Patent Utilization Study we sought such information. Due to the incompleteness of our returns, however, we can only estimate the magnitude of patents acquired by companies subsequent to issue.

The dearth of information has made it possible for critics of the patent system to charge it with two mutually incompatible faults. One, that big corporations because of their financial strength monopolize the purchase of patents from individuals and smaller companies. This is the view expressed by Dr. Corwin Edwards. Another group charges that the patent system is ineffective because large companies do not purchase outside patents and, therefore, inventors and smaller companies are discouraged from inventive activities. The evidence contradicts the assertion that there has been a diminution in inventive activities by individuals and smaller companies.[42]

Our information regarding the number of patents assigned to corporations before issue was obtained from the face of the patent.[43] From time to time (e.g., TNEC Study, Senate Subcommittee Study No. 3, etc.) the Patent Office has made such data available. We are not aware, however, of any analysis ever having been made of such data before. The TNEC report shows that during the

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[40] Even if one were to make the improbable assumption, that all the assigned patents in our sample for which we had not received an assignee questionnaire on or before 3/1/59 represent "never used" patents, the patent utilization rate would still be lower for the "large" companies.

[41] "Investigation of Concentration of Economic Power," *Hearings before the Temporary National Economic Committee,* Congress of the United States, 76th Congress, 1st Sess., Pursuant to Public Resolution No. 113 (75th Cong.) Part 3, Patents, Proposals for Changes in Law and Procedure, 1939, pp. 845-848, and Exhibits, pp. 1125-1129.

[42] During the years 1936 through 1955 there has been a very sharp increase in corporate employment and a decrease in self-employment. Despite this fact the Senate Subcommittee's Study Number 3 shows no appreciable diminution in the proportion of patents issued to individuals in these 20 years.

Our Patent Utilization Study indicates a significantly higher industrial use of patents by "small" companies.

The NSF study shows that patents owned and applications filed by smaller companies materially exceed their proportionate expenditures for research and development (see Table 2 Column 5).

[43] According to Mr. P. J. Federico, Examiner-in-Chief of the United States Patent Office, in a few instances the company may elect not to record the assignment to it. This, however, is rare.

period 1921 to 1938 the proportion of patents issued to American corporations increased from approximately 27% to nearly 52%.[44]

The TNEC report also shows that, of the 334,970 patents issued between January 1, 1931 to June 30, 1938, 48,427, or 14.5% were issued to large corporations. By "large" is meant corporations with financial assets of $50 million or more, presumably in 1937-38. Within the same period, 117,101 patents, or 35.0% were issued to other American corporations. Thus, the proportion of patents issued to all American companies, large or small, was 49.5%. Foreign corporations were issued 15,403 patents, or 4.6% of the total in these years. The balance, 154,039, or 46.0% were issued to individuals.

The report shows that large American companies "purchased" 1,124 patents issued within the period. These patents represented 2.3% of all the patents owned by these companies. All other American companies "purchased" 7,448 patents. Therefore, the "purchased" patents represented 5.9% of all the patents of companies other than large. Combining the two groups of companies, the statistics for patents issued in the 7½ years indicate that American corporations owned perhaps 174,000 patents (or 52.0% of those issued) at the end of that period. Of this total, 8,572 (or 4.9%) were said to have been "purchased."[45]

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[44] *Ibid.* Exhibit No. 187, p. 1127. The proportionate rate of increase in corporate employment in this period was probably much greater than that reflected in the proportionate increase in patents.

[45] *Ibid.* Exhibit No. 188, p. 1127. The Patent Office figures also suggest possible transfer of title from companies to individuals. The figures show 976 patents "purchased" by individuals. It is not clear whether these "purchases" were from American or foreign companies or other individuals. We have assumed that company "purchases" were made from individuals, and possibly foreign companies. The "purchases" by individuals probably, in many instances, represent assignment of patents from inventor to other individuals (e.g., transfers of title as a result of death).

Mr. Coe, the then Commissioner of Patents, who presented these and other statistics to the TNEC hearings, does not say how this information was obtained. They were probably based on the Patent Office assignment files, since no reference is made to outside information. It appears that the term "purchased" as used by the Commissioner, meant acquired by companies after issue. It was assumed that they must have been purchased.

There is a lack of clarity as to the nature and meaning of the statistics presented. Some of the exhibits, notably No. 189 and 190, reveal gross methodological errors. In these exhibits, an attempt is made to show the distribution of the patents in force among companies owning specified numbers of patents. No explanation is offered as to how the total number of companies owning patents, (359,114) was obtained. Above all, it is assumed that all of these patents were owned by the 21,257 companies that received 1 or more patents in the 7 1/2 years, January 1, 1931 to June 30, 1938. This is an erroneous assumption. Since almost half of the 21,257 corporations received only 1 patent in these years, if this period was extended to 17 years (the life of the patent), the number of corporations with one or more patents would probably have exceeded this figure considerably. If the pattern of distribution were available, one could make a reasonably close estimate of the probable total number of companies involved. An informed guess, not an estimate, is 30,000.

Our information on the number of subsequently assigned patents comes from two sources, (1) the Patent Office files and (2) inventors and related sources. We searched the Patent Office files in the spring of 1955 for all patents in our sample issued to inventors residing in the United States not assigned at the time of issue.[46] Our data relates to patents issued to United States resident inventors which later became assigned to domestic companies by purchase or otherwise. The total ownership is slightly understated, to the extent that some non-resident inventors have assigned to domestic companies. This factor is negligible. The more serious deficiency of our data is that we have had returns from less than a third of the inventors with initially unassigned patents. Our information with respect to the relative magnitude of the initially and subsequently assigned patents is shown in Table 7.

In Table 5 we have demonstrated the reliability of the number of initially assigned patents in our sample by comparing our percentages with those in the Senate Subcommittee Study No. 3. For subsequent assignments, there is no guide. The partial information already cited from the TNEC hearings (exhibit no. 188) to the contrary notwithstanding. Table 7 indicates that on the basis of our three year sample, of the 1,117 patents known to be assigned to American companies, over 95% were assigned to them initially and the balance were assigned subsequently. The percentage of subsequently assigned patents, 4.7, is not markedly different from the TNEC figure, 4.9. This resemblance would suggest a decline in the subsequent assignment of patents since 1938, as compared with the practice prevailing in the period 1931-1938. Our assignment figures for the three years, derived from the Patent Office assignment files, however, is only 2.7%, and for 1948 and 1952, 1.1 for either year.[47]

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[46] Our search in the Patent Office files yielded the information that 28 patents were assigned to individuals subsequent to issuance (60 patents had been assigned to individuals before issuance). This constitutes 3.6% for the 3 years we sampled. This percentage drops to 2.2 if we exclude 1938 and 1.6 if we restrict it to patents issued in 1952. Even the later percentage appears considerably higher than the percentage of "purchased" patents by individuals cited in the TNEC hearings. The figures cited there related to patents issued between 1931 and the middle of 1938. Within that period, 154,093 patents were issued to individuals, both resident and foreign. In addition, it is indicated that individuals "purchased" 916 patents. As we have stated earlier, (see footnote 45) the source of these "purchases" is not specified. We assume they probably represent the transfer of title from the patentee to another individual. The 916 patents represent about .6% of the patents issued to individuals in the 7 1/2 years. This percentage might perhaps be increased to .7 if non-resident inventors were excluded. The percentage would still be far below the percentages that we derive from our study for the sampled years 1948 and 1952 combined, and even for 1952 alone. This marked difference may mean that in the TNEC figures, transfers to executors as a result of death may not have been counted. It is possible also, wide as these differences appear, that they may be due to random variation.

[47] This apparent discrepancy in subsequent assignment since 1938 compared with those reported at the TNEC hearings may be explained by either an actual decline in subsequent assignments, or a gradual falling off in the proportion of subsequently assigned patents that are recorded in the Patent Office. Table 7 appears to confirm the latter hypothesis. For the three year period we obtained assignment information for 58% of the subsequent assigned patents from the Patent Office files. But this proportion is far different for patents issued

TABLE 7

NUMBER AND PERCENTAGE DISTRIBUTION OF PATENTS ASSIGNED TO COMPANIES INITIALLY VERSUS THOSE SUBSEQUENTLY ASSIGNED FOR THE THREE YEARS AND FOR EACH YEAR SEPARATELY ACCORDING TO SOURCE OF INFORMATION REGARDING THE SUBSEQUENT ASSIGNMENTS.

PRELIMINARY

Assignment Status	Three Years		Year of Issue					
			1938		1948		1952	
	No.	%	No.	%	No.	%	No.	%
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Total: Number	1,117	1,117	391	391	266		460	460
Percent		100.0		100.0		100.0		100.0
Initially assigned	1,065	95.3	364	93.1	258	97.0	443	96.3
Subsequently assigned	52	4.7	27	6.9	8	3.0	17	3.7
Patent Office Files	30	2.7	22	5.6	3	1.1	5	1.1
Inventor and other sources	22	2.0	5	1.3	5	1.9	12	2.6

One of the conclusions to be derived from Table 7 is that the Patent Office assignment records do not include the total number of initially unassigned patents that are subsequently assigned to corporations. That is, not all transfers of title in patent ownership are recorded.[48] More important for our immediate interest is the fact that the figures given in Table 7 undoubtedly understate the number of assigned patents. We have indicated that it is our best estimate that of the patents in our sample about 1,175 are assigned. Of this total, about 9 to 10% are subsequently assigned. If true, this is about three to four times the number recorded in the Patent Office files for patents issued in 1938, '48, and '52. We estimate that at the time of expiration, of all the patents held by American corporations, between 12 and 13% are patents acquired subsequent to issuance. Fifteen to sixteen per cent of the patents not assigned at the time of issue become assigned to a corporation prior to expiration. The probability of an unassigned patent becoming assigned, therefore, appears to diminish at a relatively high rate.

In this interim report we are not only interested in the proportion of subsequently assigned patents, but more in the comparative frequency of such acquisitions by companies according to their financial assets and the number of patents issued to them initially. Even though we have indicated some deficiency of our statistics with respect to the proportion of subsequently assigned patents,

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in the three different years. It is 82% for patents issued in 1938, 38 for those issued in 1948, and only 29 for those issued in 1952. This shift in the proportion of patents with information from inventor and related sources could be attributed to a third factor—the proportion of inventors with initially unassigned patents from whom we have received a questionnaire or other information. These proportions are approximately 16, 36, and 45 for patents issued in '38, '48, and '52, respectively. If we assume that the proportion of subsequently assigned patents for inventors from whom we have had no information is the same as those who replied, the total number of subsequently assigned patents for 1938 would be as large as 68, or 15 to 16% of all the assigned patents. For patents issued in 1948, 6 to 7% were assigned subsequently, and for those issued in 1952, 8 to 9%. The total number of patents assigned to American companies should thus be about 1,175, of which about 110, or 9%, are patents assigned subsequently. The balance represents the initially assigned patents.

The differences between our figures given in Table 7 and those presented to the TNEC may be due to the inclusion of some purchases of initially assigned patents by a different company. In our definition, on the basis of which the figures in Table 7 were compiled, such a change in ownership is not regarded as a subsequent assignment and does not affect our percentage of subsequently assigned patents. The TNEC figures are for patents issued in 7 1/2 years, and the proportion of subsequently assigned patents would have been higher for 17 years.

[48] It is not mandatory to record patent assignments with the Patent Office. Title 35, Sec. 261, merely states an assignment shall be void as against a subsequent purchaser without notice, unless it is recorded within three months from its date or prior to the date of such subsequent purchase. Suits may be brought by the owner of an assigned patent, even though the assignment is not recorded. Since 1940 there have been at least 6 litigated cases in which the assignment of the patent subject to litigation was not recorded:

Jepco Corp. v. Green, 120 USPQ 525 (So. D.C.N.Y. 1959)
John Tuman & Sons v. Basse 46 USPQ 302 (CCA2, 1940)
S. R. Leon, Inc. v. Parfums 47 USPQ 226 (*design* pat.) (S. D. N. Y., 1940)
U. S. v. Krasnov 110 USPQ 411 (D. C. E. D. Penn., 1956)
F. A. R. Liquidating Corp. v. McGranery 96 USPQ (D. C. Del., 1953)
Taylor Engines, Inc. v. All Steel Engines, Inc. 92 USPQ 35 (CCA6, 1951)

TABLE 8

NUMBER AND PERCENTAGE DISTRIBUTION OF INITIALLY AND SUBSEQUENTLY ASSIGNED PATENTS OWNED BY COMPANIES RANKED ACCORDING TO NUMBER OF PATENTS ISSUED TO THEM IN 1939–55 AND THEIR CAPITAL ASSETS.

PRELIMINARY

Percentile Ranking of Companies by Number of Patents Issued to Them, 1939–1955 and by Capital Assets.[1]	Initially Assigned		Subsequently Assigned						Total
			Combined		Patent Office		Inventor & other		
	No.	%	No.	%	No.	%	No.	%	No.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Companies in top 11 percentile	127	99.2	1	.8	1	.8	—	—	128
Companies in top 11–20 percentile	106	100.0	—	—	—	—	—	—	106
Companies in top 20–30 percentile	93	100.0	—	—	—	—	—	—	93
Companies in top 30–40 percentile	106	99.1	1	.9	1	.9	—	—	107
Companies in top 40–50 percentile	111	100.0	—	—	—	—	—	—	111
Companies in top 50–60 percentile	103	97.2	3	2.8	3	2.8	—	—	106
Remaining listed companies	41	97.6	1	2.4	1	2.4	—	—	42
All listed companies[1]	687	99.1	6	.9	6	.9	—	—	693
Non-listed companies	378	89.2	46	10.8	24	5.7	22	5.2	424
Total	1,065	95.3	52	4.7	30	2.7	22	2.0	1,117

[1] *Distribution of Patents Issued to Corporations (1939–55)*, Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, 84th Congress, 2d Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, pp. 19–34.

their usefulness is not impaired for the purpose of indicating the relative frequency with which such patents go to different types of companies. There is no reason to assume a bias for inventors who have made an assignment to one type of company to respond more often in comparison to those who have made an assignment to another. The sole problem is the high sampling error, because of the small number of subsequently assigned patents.

Table 8 shows the distribution of initially and subsequently assigned patents for companies grouped in rank in accordance with the number of patents issued to them (including all companies with assets of $100 million or more in 1954 with one or more patents issued to them).

Table 8 indicates that of the 52 patents in our sample known to be assigned subsequent to issuance, the companies with the highest number of patents initially assigned to them collectively accounted for only 5. This is less than 10% of the subsequently assigned patents known to us. This same group of companies accounted for 60.7% of all the initially assigned patents in our sample.[49]

If we include all the listed companies in Study No. 3 that are represented in our sample, they would account for 6 of the 52 patents known to have been assigned subsequently, that is, less than 12% of such patents. Of the initially assigned patents these same companies account for 64.5%.[50]

Inspection of Table 8 indicates that the greatest concentration of subsequently assigned patents among companies listed is found among those with the smallest number of patents. This relationship is confirmed by the marked concentration of subsequently assigned patents among unlisted companies.

The "small" companies collectively account for over 88% of the subsequently assigned patents. Their proportionate share of the initially assigned patents is only 35.4. The probability of a company not listed in Study No. 3, but which is represented in our sample, of owning a subsequently assigned patent is 15 times greater than for the companies listed and represented in our sample. This appears to be additional evidence that the criticism of the "monopolistic" powers of the large companies for purchasing patents is without foundation.

We infer from Table 8 that it is the companies with relatively few patents and small assets that are more apt to acquire subsequently assigned patents. Often

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[49] This refers to patents issued to U. S. resident inventors that were initially assigned to an American company. Of the 358 companies only 199 were actually represented in our sample, that is, had one or more patents. Of the 19 companies with the highest number of patents (those in the upper quartile) issued to them in 1939-1955, all are represented. Of the next 11, only 9 are represented. Of the next 39 companies, accounting for approximately 30-40th percentile of the patents issued to companies, only 36 are represented in our sample. Of the next 91 companies, which accounted approximately for 40-50th percentile of all patents issued to companies in 1939-1955, only 61 are represented in our sample. Of the remaining 198 companies, accounting for 50-60th percentile of patents issued to corporations, only 74 are represented in our sample.

Only 40 of the remaining 237 listed companies, which accounted for 4.5% of patents issued to corporations in 1939-1955, are represented in our sample. Thus, of the 595 companies listed in Study No. 3, only 239 are represented in our sample.

[50] These are the 239 American companies in our sample that are also listed in Study No. 3. See footnote 49.

these are relatively young and newly formed companies that acquire their patents to initiate new businesses. This supposition is strengthened by the higher utilization rate of patents by "small" companies, as demonstrated by Table 6.[51] We do not have conclusive evidence for this, but the hypothesis is of sufficient importance, and the evidence we possess is sufficiently suggestive to justify an appropriately designed study to test its validity. That is, a study based on a sample designed to compare the establishment, growth, and stability of new corporations which own patents and those which do not.

THE UTILIZATION OF INITIALLY AND SUBSEQUENTLY ASSIGNED PATENTS

If the hypothesis suggested above has any merit, it would lead us to expect a higher utilization rate for subsequently assigned patents.

Unfortunately, the information we have on the utilization status of subsequently assigned patents from completed assignee questionnaires is scant. The information appears of sufficient importance, however, to warrant presentation.[52]

The information regarding the comparative utilization rates of initially and subsequently assigned patents for companies ranked according to the number of patents issued to them and their financial assets is presented in Table 9.

Information on utilization status is available for only 14 patents out of the 52 known to have been assigned subsequent to issuance. This is equivalent to a response rate of less than 27%. The response rate for initially assigned patents is 54%. This very low response rate increases the hazards of selection. Furthermore, the handful of cases make the estimates subject to a large sampling error even if the returns were unbiased. Therefore, the most that can be said is, the evidence on its face does indicate a higher utilization rate of subsequently assigned patents.

Because of the importance of determining the comparative utilization rate of initially and subsequently assigned patents, as well as for further confirmation of the higher utilization rate of patents by "small" companies, we have tabulated our information for patents with inventor questionnaires. Table 10 presents this

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[51] There is much *ad hoc* evidence in support of this inference. For instance, in the April 1959 issue of *Fortune Magazine* there is a striking illustration with respect to the establishment and development of the Polaroid Corporation. In the same issue, there is a reference under the caption "Filtering in the Profits" to a patented process of making filters by sintering metal powders. The inventor, a Dr. Paul, is credited with forming the corporation bearing his name to exploit the patented invention.

[52] This deficiency emphasizes the need for an appropriately designed study to determine the differential characteristics of companies that acquire subsequently assigned patents. The relatively smaller number of completed questionnaires in our sample from this group of companies with subsequently assigned patents may be due to the fact that these younger and newly-formed companies are probably finding it more difficult to respond to our questionnaire because of the many more pressing problems with which such companies are apt to be faced. The underrepresentation in our sample for which we have completed questionnaires from companies with subsequently assigned patents suggests that the utilization rates derived from our sample, may be an under rather than an over estimation. In this connection, we have received some letters from patent attorneys advising us that their utilization levels exceed those we published in previous reports. This is to be expected since our figures are overall averages.

TABLE 9

NUMBER AND PERCENTAGE DISTRIBUTION OF PATENTS BY UTILIZATION STATUS FOR COMPANIES RANKED BY NUMBER OF PATENTS ISSUED 1939–55, FOR INITIALLY AND SUBSEQUENTLY ASSIGNED PATENTS, RESPECTIVELY. BASED ON ASSIGNEE REPLIES RECEIVED ON OR BEFORE 3/1/59.

PRELIMINARY

Companies Ranked by Number of Patents Issued to Them 1939–55[1] Separately for Initially and Subsequently Assigned Patents	Numbers						Percentages						
	Current Use	Past Use	Used (2) + (3)	Future Use	Used or to be Used (4) + (5)	Never Used	Current Use	Past Use	Used (8) + (9)	Future Use	Used or to be Used (10) + (11)	Never Used	Total Number
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Initially assigned patents—Total....	172	108	280	46	326	248	30.0	18.8	48.8	8.0	56.8	43.2	574
First quartile in patents issued....	38	32	70	17	87	100	20.3	17.1	37.4	9.1	46.5	53.5	187
Second quartile in patents issued..	38	35	73	12	85	74	23.9	22.0	45.9	7.6	53.5	46.5	159
Remaining companies listed.....	24	10	34	7	41	35	31.6	13.2	44.8	9.2	54.0	46.0	76
All listed companies[1].....	100	77	177	36	213	209	23.7	18.3	42.0	8.5	50.5	49.5	422
Unlisted companies.....	72	31	103	10	113	39	47.4	20.4	67.8	6.6	74.3	25.7	152
Subsequently assigned patents—Total.....	8	4	12	—	12	2	57.1	28.6	85.7	—	85.7	14.3	14
First quartile of patents issued....	—	—	—	—	—	—	—	—	—	—	—	—	—
Second quartile of patents issued..	1	—	1	—	1	0	100.0	—	100.0		100.0	—	1
Remaining companies.....	1	—	1	—	1	1	50.0	—	50.0	—	50.0	50.0	2
All listed companies[1].....	2	—	2	—	2	—	66.7	—	66.7	—	66.7	33.3	3
Unlisted companies.....	6	4	10	—	10	1	54.6	36.3	90.9	—	90.9	9.1	11

[1] *Distribution of Patents Issued to Corporations (1939–55)*, Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, 84th Congress, 2d Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, pp. 19–34. Companies listed included all those with 101 or more initially assigned patents, some companies with 75–100 patents, and all companies with one or more patents, and with assets of $100 million of more.

information first with respect to comparative utilization rate of patented inventions that are initially assigned followed by those subsequently assigned.

In Table 10 we have combined assignee replies with inventor replies with respect to utilization for those patents for which we have inventor replies only.[53]

Table 10 provides further evidence that the proportion of used patents is substantially higher for subsequently assigned patents. If one considers the overall percentages, the difference between 58.9 (the average for all initially assigned patents) and 81.1 (the average for subsequently assigned patents) is statistically significant.[54] This difference, however, partly reflects the differences between the utilization rate for "large" companies and "small" companies. More of the initially assigned patents are held by "large" companies.

The comparison of these percentages for unlisted companies as such shows 74.3 as against 81.2%. This difference is not statistically significant, perhaps because of the small size of the sample. The size of the sample of the listed companies with subsequently assigned patents is even smaller. The percentages for the patents of these companies are 52.6 and 80.0.[55] In both instances the apparent difference is in favor of the subsequently assigned patents.

FURTHER EVIDENCE ON UTILIZATION OF PATENTS BY "LARGE" AND "SMALL" COMPANIES

In Table 6 it was shown that there was indication that patent utilization rate increased for companies with relatively smaller number of patents. Clearly there

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[53] As of April 1, 1959 we had received 242 questionnaires from inventors of assigned patents for which no assignee questionnaires had been received. These represent 219 different patents. For a number of patents with multiple inventors two or more inventors have returned completed questionnaires. In some instances the replies of these multiple inventors do not agree with respect to utilization. In these, by a random process, only one of the replies was selected for the tabulation summarized in Table 10. Thus, for compiling Table 10 we used only one questionnaire for each sampled patent.

Of the 219 returns, 144 or 65.8% indicated the sampled patent was being used, had been used, or was about to be used. These have been added to used or about to be used patents based on assignee replies. In 36 cases, the inventor indicated he did not know whether the patent was used. In estimates used in Table X, we have combined these 36 with the 39 other cases in which the inventor indicated that the patent was not used and there was no immediate likelihood of its use. In this estimate, we have used the most conservative figure with respect to the percentage of patents utilized. The true figure of the per cent utilized for these patents is probably somewhere between 65.8 and 79.7. The latter percentage, 79.7, is obtained by excluding from the total the 36 questionnaires in which the utilization status was unknown. For further discussion and consideration see Appendix A. (Available on request.)

[54] The standard errors of the difference of these two percentages is 7.68 while the observed difference is 17.8, significant at the 2% level.

[55] A chi square test shows that these differences could result from sampling variation. This conclusion will not be altered even if we apportioned the patents with unknown information evenly between those who replied affirmatively and those who replied negatively. The adjusted percentages for the listed patents would become 54.5 as against 70.0 for the initially and subsequently assigned, respectively. The corresponding percentages for unlisted companies will be 76.4 and 87.8. These are statistically not significant and, therefore, inconclusive. The evidence suggests a higher utilization rate for subsequently assigned patents even when the patent ownership and the size of capital assets are held constant.

TABLE 10

NUMBER AND PERCENTAGE OF PATENTS USED OR ABOUT TO BE USED COMPARING THE INITIALLY ASSIGNED WITH SUBSEQUENTLY ASSIGNED PATENTS FOR COMPANIES RANKED BY NUMBER OF PATENTS ISSUED TO THEM DURING 1939-55 [1] BASED ON ASSIGNEE OR INVENTOR REPLIES. [2]

PRELIMINARY

COMPANIES RANKED BY NUMBER OF PATENTS ISSUED TO THEM 1939–55 [1] SEPARATELY FOR INITIALLY AND SUBSEQUENTLY ASSIGNED PATENTS INCLUDED IN THE SAMPLE WITH COMPLETED QUESTIONNAIRES.	USED OR ABOUT TO BE USED		QUESTIONNAIRES RETURNED [2]
	No.	%	No.
(1)	(2)	(2)	(4)
Initially assigned patents: Total	456	58.9	774
First quartile of patents issued	120	49.8	241
Second quartile of patents issued	110	54.7	201
Remaining listed companies	58	54.7	106
All listed companies	288	52.6	548
Unlisted companies	168	74.3	226
Subsequently assigned patents: Total	30	81.1	37
First quartile of patents issued	—	—	—
Second quartile of patents issued	2	100.0	2
Remaining listed companies	2	66.7	3
All listed companies	4	80.0	5
Unlisted companies	26	81.2	32

[1] *Distribution of Patents Issued to Corporations (1939-55)*, Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, 84th Congress, 2d Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, pp. 19-34. Companies listed included all those with 101 or more initially assigned patents, some companies with 100 to 75 patents, and all companies with assets of $100 million or more with one or more patents issued to them during 1939-55.

[2] Inventor replies were used only for patents for which we have had no assignee return. In this tabulation, in all cases where the inventor said he did not know the utilization status or did not make any entry we have assumed that the patent was never used. That is the most conservative assumption possible. Had we excluded these, the percentages given would have been 62.6 for all of the initially assigned patents and 84.7 for the subsequently assigned.

was an appreciably higher utilization of patents for non-listed companies in comparison with listed companies. Table 6 shows that the proportion of completed questionnaires was lowest for non-listed companies.

In previous reports we have indicated that an appreciable proportion of inventors of assigned patents who have returned questionnaires indicate they have no information regarding the utilization status of the sampled patent.[56] We have called attention to the fact that if one uses the assignee replies as a criterion, the inventor replies show an undue concentration of currently used patents, a relative deficiency of patents used in the past, and even sharper deficiency of patents about to be used. Further comparative analysis of this type is presented in Appendix A (Supplied on request). The combined rate of used and about to be used patents reported by inventors closely approximates the rate reported by the assignees.

[56] *PTC J. Res. & Ed.*, Vol. I, No. 1, (June 1957), pp. 91-96; 1, Conference Supplement, (1957), pp. 72-74, 150-151; Vol. 2, No. 1, (March 1958), pp. 55-60; Conference Supplement, 2, (1958), pp. 224-225.

TABLE 11

PERCENTAGE OF ASSIGNED PATENTS USED OR ABOUT TO BE USED REPORTED BY INVENTORS—SEPARATED FOR PATENTS WITH INVENTOR AND ASSIGNEE QUESTIONNAIRES AND THOSE WITH INVENTOR QUESTIONNAIRE ONLY, BASED ON ALTERNATIVE DISPOSITION OF CASES WITH NO ENTRY REGARDING USE, OR AN ENTRY OF "DON'T KNOW," GROUPED FOR COMPANIES RANKED BY NUMBER OF PATENTS ISSUED TO THEM DURING 1939–55 [1]—BASED ON INVENTOR REPLIES RECEIVED ON OR BEFORE 4/1/59.

PRELIMINARY

Companies ranked by number of patents issued to them 1939–55 including all with assets of $100 million as listed.[1]	Inventor and assignee			Inventor only			Combined		
	Percentages		Total No.	Percentages		Total No.[4]	Percentages		Total No.
	Minimum[2]	Probable[3]		Minimum[4]	Probable[3]		Minimum[2]	Probable[3]	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Upper 11th percentile	58.4	73.6	36	63.2	73.6	38	60.8	73.6	74
Next 11–20 percentile	38.6	54.4	57	66.7	66.7	3	40.0	55.0	60
Next 20–30 percentile	42.6	48.9	47	56.2	78.2	16	46.0	56.4	63
Next 30–40 percentile	37.2	54.7	43	64.7	70.6	17	45.0	59.2	60
Next 40–50 percentile	71.1	78.9	38	56.6	67.4	23	65.6	74.6	61
Next 50–60 percentile	50.0	57.9	38	54.2	56.2	24	51.6	57.3	62
Remaining listed companies	55.6	66.7	9	71.4	71.4	7	62.5	68.8	16
All listed companies	48.5	60.4	268	60.2	69.1	128	52.3	63.3	396
Non-listed companies	73.6	78.6	91	73.6	80.8	91	73.6	79.6	182
Total	54.9	67.8	359	65.8	74.0	219	59.0	68.4	578

[1] *Distribution of Patents Issued to Corporations (1939–55).* Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, 84th Congress, 2d Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, pp. 19–34. Companies listed included all those with 101 or more initially assigned patents, some companies with 100 to 75 patents, and all companies with assets of $100 million or more with one or more patents issued to them in 1939–55.

[2] Of the 359 patents with one or more inventor questionnaires, for which we also have an assignee questionnaire, 73 inventors failed to reply to questions on utilization or answered it by saying "don't know." In column 2 we have regarded all of these as never used.

[3] We have divided those inventors who failed to answer the question on utilization, or said they did not know, into two halves. One-half we have assumed had patents which were used, or will be used, and the other half we have included with the never used. It is believed the percentages thus obtained will be closer to reality than those in which we have regarded all these as "never used."

[4] Of the 144 patents with inventor questionnaires only 36 failed to answer the questions on utilization or said that they did not know. The percentages of this column were computed on the assumption that all of these are never used patents.

In Table 11, we show for assignees grouped according to initial patent assignments as derived from Study No. 3, the utilization status of patents with inventor replies in our sample.

Table 11 confirms strongly the higher utilization rate of patents by non-listed companies. It does not support Table 6 to the effect that in the listed companies the proportion of used patents tends to increase with decreasing rank according to the number of patents issued to them.

The average utilization rate of patents in column 2 is somewhat lower than the comparable percentages of used or about to be used patents based on assignee replies (see Table 6, column 12). This is because we have taken the extreme view in obtaining these percentages by assuming that in all instances where the inventor failed to answer the question whether the sampled patent was used or about to be used, or said he did not know, we regarded the patent as not used.[57]

On the other hand, the utilization rates shown in column 3 are appreciably higher than those based on assignee returns (see Table 6). In obtaining column 3, we assumed half of the patents without responses regarding utilization or a response of "don't know" were used or about to be used and the other half "never used." The fact that these percentages are consistently higher than those in Table 6 could mean that our assumption that about one half of the patents for which the inventor failed to answer the questions on utilization, or answered it by "don't know" were perhaps patents used or about to be used, is an overgenerous assumption. But a different explanation might also have validity. In many instances, the corporate respondent may have been extra conservative compared with the inventor as to what constituted the use of a patent. It is possible that an inventor may know of a limited use of a patent, though the patent department, which often answered our questionnaires, might have been ignorant. Therefore, it is possible that the percentage of patents utilized may actually exceed 60. This possibility is strengthened by the fact that the utilization rate of patents with inventor questionnaires only is higher in comparison to those with inventor and assignee questionnaires. This excess probably means that the utilization rate for companies which have not returned completed questionnaires is higher in comparison to those that have done so. It has been assumed that there is a greater propensity for inventors, and perhaps also assignees, to return a completed questionnaire when the sampled patent is used. But the generally higher utilization status reported by inventors of patents without assignee replies suggests the opposite may be the case. We find the lowest questionnaire return rate both for inventors and assignees is with respect to patents held by "small" companies. However, these are the companies with significantly higher utilization rates as shown by Table 6, and confirmed by Table 11. This evidence appears to suggest that companies most active patent-wise more often fail to return a questionnaire. Therefore, the overall utilization rate may be actually higher for the entire sample than for patents with completed questionnaires.

[57] See Appendix A for a comparative analysis of inventor and assignee replies as to the utilization of the sampled patent. (Available on request).

We can consolidate patents with inventor questionnaires only, with those with assignee questionnaires, as our best estimate of differences in utilization rate of companies grouped according to the number of patents issued to them and according to assets. This consolidated picture is shown in Table 12.

TABLE 12

PERCENTAGE OF PATENTS USED OR ABOUT TO BE USED BASED ON ASSIGNEE OR INVENTOR REPLIES WITH ALTERNATIVE DISPOSITION OF INVENTOR QUESTIONNAIRES WITHOUT RESPONSE ON UTILIZATION OR WITH A RESPONSE OF "DON'T KNOW" FOR COMPANIES RANKED BY NUMBER OF PATENTS ISSUED TO THEM DURING 1939–55.[1] BASED ON ASSIGNEE RETURNS, IF ONE AVAILABLE, AND IF NOT, ON INVENTOR RETURNS.

PRELIMINARY

Companies Ranked by Number of Patents Issued to Them 1939–55 Including All with Assets of $100 Million or More As Listed.[1]	Percent Used or About To Be Used Patents		Patents with Assignee or Inventor Questionnaire		Number in Sample
			No.[4]	%	
(1)	(2)[2]	(3)[3]	(4)	(5)	(6)
Upper 11th percentile	53.5	63.0	96	74.7	128
Next 11–20 percentile	49.0	58.2	98	90.8	108
Next 20–30 percentile	52.7	61.4	74	81.4	91
Next 30–40 percentile	57.6	61.0	91	93.8	97
Next 40–50 percentile	55.3	61.8	85	76.5	111
Next 50–60 percentile	56.2	60.6	80	75.5	106
Remaining listed companies	51.7	55.2	29	69.0	42
All listed companies	52.8	60.7	553	81.0	683
Non-listed companies	75.2	79.5	258	59.4	434
Total	59.9	66.7	811	72.6	1117
Theoretical total[5]	61.6	68.4	1117	100.0	1117

[1] *Distribution of Patents Issued to Corporations (1939–55).* Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, 84th Congress, 2d Session Pursuant to S. Res. 167, Study No. 3, Washington, 1957, pp. 19–34. Companies listed include all those with 101 or more initially assigned patents, some companies with 100 to 75 patents, and all companies with assets of $100 million or more with one or more patents issued them in 1939–55.

[2] Assignee returns or inventor returns for patents with no assignee questionnaire. Of these patents we consider as used or about to be used only those patents for which this was specified. All the other patents with inventor questionnaire are regarded as unused.

[3] Adds to used or about to be used patents in column 2 half of those inventor returns where there was no response to questions on utilization or the response was "don't know."

[4] All patents with one or more assignee or inventor questionnaire returned on or before 4/1/59.

[5] Assumes unbiased returns for patents in each category. On that basis it estimates the percentage of used or about to be used patents if we had 100% returns. In view of the fact that the unlisted groups include some companies that are dissolved, the highest estimate is perhaps too high. The top percentage may be as high as 65 or two-thirds.

Table 12 combines the information on utilization status for patents known to be assigned for which we have a questionnaire from either the assignee or the inventor. The table indicates that the combined returns represent about 73% of the assigned patents in our sample.

On the basis of column 2, about 60% of these are used or about to be used. In this column, we have taken the inventor returns at their face value.[58] We have counted as used or about to be used only those patents for which there was a

[58] In previous reports we deflated the inventor replies somewhat to conform with replies of assignees. We did this because the differences between inventor replies, with assignee questionnaires, failed to show a statistically significant difference from those for which we had no assignee

reply. Where the inventor failed to answer, or said that he did not know, we have considered the patents as never used. On this basis, the utilization rate for patents with completed questionnaires would be 60%. If we assume that in each category the utilization level of patents without a questionnaire would be, on the average, the same as those for which we have a questionnaire, the average utilization rate for all assigned patents would be about 62%.

In column 3, we made the assumption that for half of the patents in which the inventor failed to record the utilization status or said he did not know, would be patents that were used or about to be used. On this basis, the utilization rate for patents with completed questionnaires would be two-thirds. Assuming the utilization rate for patents with completed questionnaires is about the same in each category for patents without questionnaires, the estimated rate would be 68%.

In the past we have conservatively generalized that the proportion of used or about to be used assigned patents range between 50 to 60%. The indications are that this range is probably 55 to 65 or possibly 60 to 70%.

Table 12 shows very little variation in the proportion of patents used or about to be used among the listed companies, grouped according to percentile rank of the number of initially assigned patents. The minor variations are irregular and could be accounted for by sampling variation. The difference in utilization rate between listed companies and those not listed, however, is marked and statistically significant for both column 2 and column 3.[59]

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questionnaires. They have consistently, however, shown a somewhat higher utilization ratio. We made this downward adjustment because we felt that the assignee replies were "correct" and should be looked upon as the criterion. Our main reason for these adjustments were (1) to remain conservative in our estimates, in the light of their unexpectedly high levels, and (2) because of the preliminary nature of our findings. It is plausible that some over-conservative corporate respondents failed to consider a patent as used where its use was marginal. The inventor may not have used such a restricted criterion. Finally, it is possible that a restricted use may be known to the inventor and not in the main corporation office to which our questionnaires were directed. These could explain the anomalies pointed out in "The Economic Impact of Patents" (Barkev S. Sanders, Joseph Rossman, L. James Harris, *PTC J. Res. & Ed.*, Vol. 2, No. 3, 1958, pp. 353-358, Table 9). We there showed a certain proportion of patents classed as about to be used and never used for which no net losses were reported.

In the analysis for the present report, there are strong indications that on balance the patents for which we have received no inventor or assignee questionnaires may be, on the average, patents with even higher utilization status. They are predominantly patents of "small" companies for which the utilization rates appear to be appreciably higher than that found, on the average, among "large" companies. We have had very few questionnaires returned for patents that are subsequently assigned. The utilization rate is much higher for these than that observed among the initially assigned patents. While it is possible that both the excess utilization rate for "small" companies, and for subsequently assigned patents, may suggest a selective bias in the replies in favor of used patents, we are inclined to favor the contrary view. The more active, patent-exploiting small companies, which are the ones that acquire most of the subsequently assigned patents, are the ones that have failed to answer. These are the companies that have the highest patent utilization ratio.

[59] For column 2 the standard error of the difference is 3.69 and the observed difference 12.4—3.4 times the standard error. It is highly improbable that such a difference could be the result of chance variation. For column 3, the standard error of the difference is 3.55 and the observed difference 18.8. It is less likely that such a difference could result from chance variation.

TABLE 13

NUMBER AND PERCENTAGE DISTRIBUTION OF ASSIGNED PATENTS BY ACQUISITION STATUS ACCORDING TO WHETHER ASSIGNED BEFORE OR AFTER ISSUANCE. FOR THE SUBSEQUENTLY ASSIGNED PATENTS THE SOURCE OF INFORMATION REGARDING THE ASSIGNMENT.

PRELIMINARY

Method of Acquisition	Total		Type of Assignment							
			Initial		Combined		Subsequent			
	No.	%	No.	%	No.	%	No.	%	No.	%
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Total: Number	588	588	574	574	14	14	8	8	6	6
Per cent		100.0		100.0		100.0		100.0		100.0
Purchased	31	5.3	28	4.9	3	21.4	3	37.5	–	——
Developed by own employees [1]	551	93.7	542	94.4	7	64.3	5	62.5	4	66.7
Under contract to assign	460	78.1	454	79.3	5	35.7	2	25.0	3	50.0
Not under contract to assign	72	12.2	68	11.8	4	28.5	3	37.5	1	16.7
Other [2]	6	1.0	4	.7	2	14.3	–	——	2	33.3

[1] Includes patents developed by employees without additional information whether there was a contract to assign or not.

[2] For the four initially assigned patents, one reported the inventor as a consultant not under contract to assign, another reported the inventor as a customer who assigned without any consideration, a third was acquired under an improvement clause with the inventor's employer, a fourth was donated. With respect to the two subsequently assigned patents: for one the title passed under a letter of agreement, and the assignee had been given an exclusive right to sell the other.

The assignee returns and returns from inventors with assigned patents indicate that "small" companies have a higher patent utilization rate, as well as a much higher proportion of subsequently assigned patents. In this report, we have shown a marked difference in the mean utilization rate of "small" and "large" companies. Of course the utilization levels will vary widely from one industry to another and from one company to another in a given industry.[60]

PURCHASED PATENTS

It was indicated at the outset that question 1 in the assignee questionnaire was designed specifically to ascertain the method by which the company acquired the sampled patent (see p. 219 of the present report). It was our assumption that patents acquired subsequent to issue would generally be purchased. Initially assigned patents would very seldom be purchased. The replies of assignees to question 1 do not conform with these assumptions. This is demonstrated by Table 13.

Table 13 shows that on the basis of completed assignee questionnaires 5% of the sampled patents are reported purchased. We had expected that most of the "purchased" patents, if not all, would be those that were subsequently assigned. The question was intended to elicit information with respect to the purchase of patents by a company from an individual inventor. Question 1 was not therefore formulated in such a way as to differentiate precisely purchases from a corporate entity or the purchase of a whole firm, from the purchases of one or a small number of patents from an individual inventor.[61]

Of the 31 patents reported purchased, only 3 are patents that were subsequently assigned. These 3 are patents recorded in the Patent Office files. The other 28, if purchased after issuance, must have been purchased from another corporation.

Of the initially assigned patents, about 5% are reported as having been purchased. Almost all of the balance were invented by the assignee's own employees.[62]

[60] We have received letters from patent attorneys advising us that they have checked the patent utilization rate of their companies and that these equal or exceed our averages. Of course, many companies will find their utilization rates lower than our averages, since these are averages.

[61] It is possible, therefore, that some purchases involving an entire company would not be reported, since our question is not explicit in this respect. Moreover, on the basis of replies to Question 1, we cannot always be certain whether the purchase was from another corporate entity or from an individual inventor.

[62] As will be pointed out later, some of the patents reported as "purchased" by assignee were apparently purchased from employees. See the listing in Appendix C (Available on request) which shows that of the 28 initially assigned patents reported purchased; in 3 the inventor was said to have been an employee of the purchaser. In one of these, the inventor was the president of the company (#23 in the listing). The inventor of one of the subsequently assigned patents is also shown to be the president. This suggests that these corporations must have been formed around these patents. In at least 8 other instances the transfer of title appears to have involved two companies, and the inventor of the sampled patent was an employee of the other company. Thus, of the 26 initially assigned patents, in which the question on relationship to inventor was answered, in at least 11 the inventor was an employee of one or the other company involved, and not free lance.

For a few of these, the assignee reply failed to indicate whether the employees were under contract to assign. Limiting the consideration to the initially assigned patents developed by employees for whom contract status was reported, 87% were under contract to assign and the remaining 13% were not. The corresponding percentages for all the patents with completed questionnaires, whether initially or subsequently assigned, is almost the same, 86.5 and 13.5, respectively.

There are very few completed assignee questionnaires for subsequently assigned patents, 13 in all. Of these, 3—or about one-fifth—were reported purchased. We had expected that all of the subsequently assigned patents would be purchased. This is not what we found. While the proportion of subsequently assigned patents reported purchased is statistically significantly higher than that for those initially assigned, the number of cases are too few to warrant generalization.[63] What appears anomalous is that 9 of the 14 subsequently assigned patents are said to have been developed by employees, 4 of these under contract to assign. Unless the entries are erroneous, these would signify individual inventors who incorporated and assigned their formerly unassigned patents to their own newly formed corporation. If true, this emphasizes our previous findings that patents are an important impetus to the development of new business enterprises.[64]

If our returns of patents reported as purchased are typical, they indicate that very few patents are purchased by "going" corporations (especially "large" corporations) from individual inventors. Some of the information relative to the 31 patents reported purchased are given in detail in Appendix C (Available on request).

ACQUISITION METHOD RELATED TO COMPANY TYPE

The previous analysis indicates that the information we have on purchased patents is meager and not clear-cut. This may be due to our own characterization of the purchasee on which we formulated question 1 in the assignee questionnaire.[65] Nevertheless, it is important to associate the replies to question 1 to types of companies according to the number of patents issued to them. This information is given in Table 14 separately for the initially and subsequently assigned patents.

Table 14 in general shows no distinction among the listed companies as to the proportion of patents purchased. There is evidence, however, that purchased patents are more often obtained by "small", i.e., non-listed, companies.

Among the "large" companies, almost all patents were acquired from employees under contract to assign. The proportion of patents acquired from employees under contract to assign declines somewhat as one descends from listed companies with the highest number of patents to those with fewer and fewer patents. The proportion is decisively lower for the "small" companies. The difference is statistically significant.

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[63] The standard error of the difference is 6.28, while the observed difference is 18.2%, nearly three times the standard error of the difference. It is probable, therefore, that the difference is real and not attributable to chance.

[64] Of the 26 companies where it appears that the patent was assigned subsequently, in at least 12 there is definite evidence that the inventor of the sampled patent organized a company and assigned his patents to this company.

[65] Even in these instances there is usually some prior relationship between the purchaser and purchasee, who is frequently described as a friend, consultant, marketing our product, etc.

TABLE 14

NUMBER AND PERCENTAGE DISTRIBUTION OF ASSIGNED PATENTS BY METHOD OF ACQUISITION, ACCORDING TO THE TYPE OF COMPANIES IN TERMS OF NUMBER OF PATENTS ISSUED TO THEM AND TOTAL ASSETS SEPARATING PATENTS INITIALLY ASSIGNED FROM THOSE SUBSEQUENTLY ASSIGNED.

PRELIMINARY

Companies Belonging to Groups Categorized by Number of Patents Assigned 1939–55[1] by Type of Assignment	Purchased		Developed by Employee						Other		Total
			Total[2]		Under contract		Not under contract				
	No.	%	No.	%	No.	%	No.	%	No.	%	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Total initially assigned	28	4.9	542	94.4	454	79.1	68	11.8	4	.7	574
Companies in highest 25 percentile	7	3.7	180	96.3	178	95.2	2	1.0	—	——	187
Companies in next 25 percentile	6	3.8	151	95.0	136	85.5	13	8.2	2[3]	1.3	159
Remaining companies listed	3	4.0	71	93.4	58	76.2	9	11.8	2[4]	2.6	76
All listed companies	16	3.8	402	95.2	372	88.2	24	5.7	4	.9	422
Non-listed companies	12	7.9	140	92.1	82	54.0	44	29.0	—	——	152
Total subsequently assigned	3	21.4	9	64.3	5	35.7	4	28.6	2[5]	14.3	14
Companies in highest 25 percentile	—	——	—	——	—	——	—	——	—	——	—
Companies in next 25 percentile	1	100.0	—	50.0	—	——	—	——	—	——	1
Remaining companies listed	1	50.0	1	50.0	1	——	—	——	—	——	2
All listed companies	2	66.7	1	33.3	1	33.3	—	——	—	——	3
Non-listed companies	1	9.0	8	72.8	4	36.4	4	36.4	2	18.2	11

[1] *Distribution of Patents Issued to Corporations (1939–55).* Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, 84th Congress, 2d Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, pp. 19–34.

[2] Includes inventors whose relationship to the assignee was that of employee, but where there was no indication of a contract to assign. Therefore, it exceeds the sum of "employees under contract to assign," and those not under contract.

[3] In one of these it was said that the patent was donated, in the other, the patent was acquired under an improvement clause agreement.

[4] In one of these, the patent was acquired from a customer. In the other, it was said that the inventor was a consultant of the company not under contract to assign.

[5] In one, it was said that the acquisition was on the basis of a letter of agreement. In the other, apparently it was not a transfer of title, but exclusive right to sell.

The association between the rank of companies and the proportion of employer assigned patents from employees under contract to assign may be seen clearly from the percentages below:

	Under Contract	Not Under Contract
Initially assigned	87.0	13.0
Upper 25 percentile	99.0	1.0
Next 25	91.3	9.7
Remaining listed	86.6	13.4
All listed	93.9	6.1
Unlisted	65.1	34.9
Subsequently Assigned	55.6	44.4

Another relationship may be observed in Table 14. With respect to the initially assigned patents, the proportion of employee inventors without information regarding contract to assign increases as one descends from companies ranked according to number of patents issued to them. Thus, for companies in the upper 25 percentile of patents issued, this distinction is made in all cases, for those in the next 25 percentile it is provided for 99%, for the rest of listed companies the percentage is 94. For the non-listed it is 83%. Thus, in this latter group for 17% the information whether the employee was under contract to assign is not supplied. This difference may reflect the quality of attention given by these different categories of companies in filling out our questionnaires.[66]

A final observation may be made on Table 14. The 6 patents grouped under "other" are not basically different from some of the transactions which respondents have included under "purchased." The apparent distinction made for these 6, as indicated in the footnote of Table 14, is that in none of these was the inventor an employee of the company nor was there any financial consideration for the transfer of title. The list given in Appendix C (Available on request) shows that in a number of so-called "purchased" patents, the money consideration was zero or was nominal. This may have been true in others where the entry was "don't know."

UTILIZATION OF PATENTS RELATED TO THEIR ACQUISITION

The differences between the utilization status of patents differentiated by their methods of acquisition is shown in Table 15.

Table 15, among other things, underscores again the much higher patent utilization level among "small" companies which we have considered earlier. It also shows that the proportion of assignments from own employees with a contract to assign declines progressively with number of patents held. It is lowest among the "small"

[66] It seems that those who failed to indicate a contractual relationship of the employee, failed to read the entire question. They checked "(b) developed by employee(s)" without reading far enough to see that the appropriate checking points were after "(1) under contract to assign," (2) "not under contract to assign" under (b) and not (b) as such.

This strengthens our belief that smaller companies are under greater business pressure and therefore less apt to respond to our questionnaire. Thus, there is no reason to assume that the utilization level of patents owned by companies that have not returned a questionnaire is likely to be significantly different from those that have returned a questionnaire.

TABLE 15

NUMBER AND PERCENTAGE DISTRIBUTION OF ASSIGNED PATENTS DISTRIBUTED BY METHOD OF ACQUISITION FOR COMPANIES RANKED BY THE NUMBER OF PATENTS ISSUED TO THEM DURING 1939–55,[1] SEPARATELY FOR USED AND ABOUT TO BE USED PATENTS AND PATENTS CLASSED AS "NEVER USED."

PRELIMINARY

Companies Ranked According to Number of Patents Issued to Them—1939–55[1]	Method of Acquisition									
	Own employees						Other[2]		Total	
	All		Under contract		Not Under Contract					
	No.	%	No.	%	No.	%	No.	%	No.	%
(1)	(2)	(3)	(4)	5)	(6)	(7)	(8)	(9)	(10)	(11)
	Used or about to be used									
Total	317	93.8	254	75.2	53	15.7	21	6.2	338	100.0
Companies in highest 25 percentile	85	97.7	84	96.6	1	1.1	2	2.3	87	100.0
Companies in next 25 percentile	82	95.4	74	86.0	8	9.3	4	4.6	86	100.0
Remaining listed companies	39	92.9	33	78.6	5	11.9	3	7.1	42	100.0
All listed companies	206	95.8	191	89.0	14	6.5	9	4.2	215	100.0
Non-listed companies	111	90.2	63	51.2	39	31.7	12	9.8	123	100.0
	Never used									
Total	234	93.6	205	82.0	19	7.6	16	6.4	250	100.0
Companies in highest 25 percentile	95	95.0	94	94.0	1	1.0	5	5.0	100	100.0
Companies in next 25 percentile	69	93.2	62	83.8	5	6.8	5	6.8	74	100.0
Remaining listed companies	33	91.7	26	72.2	4	11.1	3	8.3	36	100.0
All listed companies	197	93.8	182	86.8	10	4.8	13	6.2	210	100.0
Non-listed companies	37	92.4	23	57.5	9	22.5	3	7.5	40	100.0

[1] *Distribution of Patents Issued to Corporations (1939–55).* Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, 84th Congress, 2d Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, pp. 19–34.

[2] Other includes "purchased" patents and those described under "other" in response to question 1 in the assignee questionnaire.

companies. "Small" companies also show a higher proportion of purchased and "other" patents in relation to those developed by own employees.

The comparison of the distribution of used or about to be used with the never used patents does not show striking differences with respect to method of acquisition. There is, however, a larger proportion of used patents among those for which the inventor is an employee without a contract to assign.[67] The overall percentages are 15.7 as used patents and 7.6 as not used. This overall difference is statistically significant.[68] This suggests possible managerial differences, but one needs much more information to confirm such an hypothesis. The differential in favor of patents of employees without a contract to assign is not uniform for companies ranked according to "large" and "small." For "large" companies this difference is small and is attributable primarily to companies ranked in the 2nd 25 percentile. The difference is most marked for the "small" companies.[69]

[67] An explanation of this difference is that the company may make no attempt to acquire a patent from an employee without a contract to assign, unless there is prospect of using it.

[68] The standard error of the difference is 2.9 while the observed difference is 8.1. This is nearly 3 times the standard error, and therefore statistically significant.

[69] This difference may arise from the fact that where an inventor organizes a company and assigns his patents to such a company, he may regard himself as an employee without contract to assign in respect to question 9. The questionnaires filled out by smaller companies were not always completed with too much care.

Patent and Other Factors in the Operations of Small Independent Instrument Firms in New England and the Middle Atlantic Area*

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NATURE AND PURPOSE OF THIS STUDY

THE SMALL, INDEPENDENT FIRMS IN THE Scientific and Other Instruments Industry were selected for study for two reasons. First, the industry supplies a wide variety of sensing, measuring, and control devices required on the frontiers of research and technology as well as in the performance of established manufacturing and service operations. These devices are of both domestic and foreign origin; scientific principles discovered in one country are often applied most effectively in another, and inventions credited to one nation are often improved elsewhere. Nowadays, many instruments are developed in the first instance for use in connection with defense or other purposes having national importance; but earlier experience shows that a significant degree of transfer to civilian applications may be expected to occur sooner or later. The second reason for studying instrument manufacture is that this industry includes many small independent firms and that economic and other circumstances of recent years have been favorable to entry. In the years ahead, the demand for instruments will remain broad and active, and some of the small independent firms of today are sure to become prominent and larger or to become divisions of successful and well-established diversified corporations.

The nature and purpose of the study, together with a description of the sampling design, were indicated in an earlier issue of the *Journal*.[1] The questionnaire, which was mailed in July 1958, sought information relating to: (1) the nature of the firms surveyed, (2) the role of owned and licensed patents, and (3) specific aspects of the firms' patent experience.[2] The 78 New England and Middle Atlantic States firms comprising the sample were selected from the scientific and other instruments firms listed in the *Conover-Mast Purchasing Directory* (33rd ed. 1957) with specific criteria of representativeness in mind.[3]

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* Dr. Nichols, Associate Professor of Economics, Simmons College, Boston, prepared this interim research project report on a case study conducted by him as part of *Project 3a*, "Role of Patents in the Creation and Growth of Small Industrial Units." Dr. Irving H. Siegel, Principal Consultant for this project, advised at various stages in the conduct of the study and on the preparation of this report.

[1] See *PTC J. Res. & Ed.*, 2, No. 4 (December 1958), p. 562.

[2] See Appendix I, p. 267 of this issue.

[3] See Appendix II, p. 270 of this issue and *PTC J. Res. & Ed.*, 2, No. 4 (December 1958), p. 562.

COMPOSITION OF THE SAMPLE[4]

Over one-third (35.8%) of the 78 firms in the sample are engaged in the production, processing, servicing, and distribution of electric measuring, testing, sorting, and recording equipment. About 14% are engaged in experimental work, and another 10% are engaged in the manufacture and processing of aeronautical equipment. The remaining 40% are engaged in some nine specialized lines of production, ranging from accessories, comprising 7.7% of all firms, to photographic, visual inspection, and meteorological equipment, comprising 1.3% each.

Geographic concentration is pronounced. Approximately 95% of the sampled firms are located within five states: New York, New Jersey, Massachusetts, Pennsylvania, and Connecticut. About two-thirds (64.1%) are concentrated in the first three of these states.

SAMPLING RESPONSE

By July 1959, twenty-five (32%) of the seventy-eight respondents had completed and returned the questionnaire. Four additional questionnaires were returned by the Post Office Department with the notation "Addressee Unknown," and four others were returned uncompleted by firms indicating that, for various reasons, they did not wish to participate in the study. A summary of responding firms by type of instrument and location of firm is presented in Appendix III (page 271).

CHARACTER OF RESPONDING FIRMS

Every responding firm but one is a corporation, and a majority (52%) were established within the last twenty-five years.[5] Indeed, about one-third (36%) were founded in the last fifteen years, a period characterized by general prosperity and major defense efforts.

TABLE 1

AGE OF RESPONDING FIRMS

Period of Firm's Establishment*	Number of Firms	Percent of Firms Responding
1–5 years ago	1	4.0
5–10 years	2	8.0
10–15 years	6	24.0
15–20 years	2	8.0
20–25 years	2	8.0
25–30 years	1	4.0
30–40 years	3	12.0
40–50 years	3	12.0
50–75 years	3	12.0
75–100 years	2	8.0
Total	25	100.0

*Time periods reckoned from July 1958.

[4] See Appendix II, p. 270.

[5] See Table 1.

Twenty of the 25 responding firms indicated that they had organized a research and development program; the others had not. Most of these were established in the last ten years.

Four-fifths of the responding firms also listed "retained earnings" as a principal basis of growth. About half of the firms reported "retained earnings" as the only growth factor.[6]

TABLE 2

RESPONDING FIRMS CLASSIFIED BY BASIS OF GROWTH

Source of Growth of Firm*	Number of Firms	Per Cent of Firms Responding
Retained Earnings	13	52.0
Retained Earnings and Good Customer Contact	1	4.0
More Goods Manufactured and Sold	1	4.0
Retained Earnings and Mergers	1	4.0
Retained Earnings and Purchased Patents	1	4.0
Retained Earnings and Sale of Securities	1	4.0
Retained Earnings and Adequate Bank Financing	1	4.0
Retained Earnings and Venture Capital	1	4.0
Retained Earnings and Sales	1	4.0
Mergers and Consolidations	1	4.0
None Given	3	12.0
Total	25	100.0

*In all cases where retained earnings was listed with another factor, the respondent indicated that retained earnings were first in importance.

IMPORTANCE ATTACHED TO PATENTS, TRADEMARKS, AND OTHER FACTORS[7]

Most responding firms listed "calibre of management" and "technical know-how" as of outstanding importance for their operations. Indeed, 85% of the companies mentioning these two factors considered them especially significant. Over half of the companies mentioning "access to capital" attribute exceptional importance to this factor.

The replies just cited refer to a total of 20 firms, but the replies concerning patents, trademarks, and trade secrets relate to a smaller number of companies. Of the 14 respondents citing owned and licensed patents as pertinent to their operations, six rated these as of outstanding importance. The respondents citing trademarks numbered 15; four considered them to be of first importance. "Contributions of patents and trademarks in terms of know-how" was cited by 13 companies; they were regarded by seven companies as having a prime significance. Trade secrets were cited by 17 firms; six firms rated these as having prime importance.

Government contracts were mentioned by 16 of the 25 responding firms. Almost half of the group, or seven firms, considered such contracts to have outstanding importance.

[6] See Table 2.

[7] See Table 3.

TABLE 3

RESPONDING FIRMS CLASSIFIED BY IMPORTANCE ASSIGNED TO FACTORS

Factor	1st Importance*		2nd Importance*		3rd Importance*	
	No. of Firms	% of Firms**	No. of Firms	% of Firms**	No. of Firms	% of Firms**
Caliber of Management	17	85.0	2	10.0	1	5.0
Access to Capital	10	55.6	4	22.2	4	22.2
Technical "Know-how"	17	85.0	2	10.0	1	5.0
Trade Secrets	6	35.3	6	35.3	5	29.4
Patents (Owned & Licensed)	6	42.8	6	42.8	2	14.3
Trademarks	4	26.7	7	46.7	4	26.7
Government Contracts	3	18.8	8	50.0	5	31.2
Contributions of Patents & Trademarks in terms of "Know-how"	7	53.8	4	30.8	2	15.4
Question not answered by 3 firms						

*(1) of extreme importance, (2) of moderate importance, (3) of little or no importance.
**"Per cent of firms" uses as a base in each case the total number of firms rating the particular factor (i.e., the horizontal total is 100 per cent).

SPECIFIC ASPECTS OF FIRMS' PATENT AND TRADEMARK EXPERIENCE

It was found that two-fifths of the firms responding owned no patents at all and almost two-thirds owned no trademarks. About seven-eighths had no patent or trademark license exchange agreements.[8] One-fourth of the firms owned, or claimed ownership of, 1-3 patents; one-eighth, ownership of 4-12 patents; and one-fourth, 13 or more patents.[9]

In the case of trademarks, one-fifth of the firms claimed ownership of 1-3 trademarks; one-eighth, 4-6 trademarks, and 4% over six trademarks.[10] With respect

TABLE 4

RESPONDING FIRMS CLASSIFIED BY NUMBER OF PATENTS OWNED

Number of Patents	Number of Firms	Per Cent of Firms Responding
None	10	40.0
1–3	6	24.0
4–6	0	0.0
7–9	1	4.0
10–12	2	8.0
13 and over	6	24.0
Total	25	100.0

[8] See Tables 4 and 5.
[9] See Table 4.
[10] See Table 5.

TABLE 5

RESPONDING FIRMS CLASSIFIED BY NUMBER OF TRADEMARKS OWNED

Number of Trademarks	Number of Firms	Per Cent of Firms Responding
None	16	64.0
1–3	5	20.0
4–6	3	12.0
Over 6	1	4.0
Total	25	100.0

TABLE 6

RESPONDING FIRMS CLASSIFIED BY NUMBER OF PATENT AND TRADEMARK LICENSE EXCHANGE AGREEMENTS

Number of Agreements	Number of Firms	Per Cent of Firms Responding
None	22	88.0
One	3	12.0
More than one	0	0.0
Total	25	100.0

TABLE 7

RESPONDING FIRMS CLASSIFIED BY PER CENT OF NET BOOK VALUE OF EQUIPMENT USED COVERED BY PATENTS

Per Cent of Net Book Value	Number of Firms	Per Cent of Firms Responding
None	9	36.0
Less than 10%	1	4.0
10–24%	1	4.0
25–49%	0	0.0
50–74%	1	4.0
75–100%	1	4.0
"Information not available"	12	48.0
Total	25	100.0

to patent and license exchange agreements, one-eighth of the respondent firms reported one agreement, and none had more than one.[11]

Over one-third of the responding firms reported that none of the net book value of equipment used was covered by patents owned by them or used under license.

[11] See Table 6.

One-eighth of the firms reported varying percentages of net book value covered by patents, ranging from "less than 10%" to "75-100%." Half of the firms reported that "such information was not available." [12]

Of the twenty-five respondent firms, about two-thirds reported that they had no legal actions growing out of patent and trademark infringements; 4% of the firms had had one such action, and 4% mentioned two. Over one-fourth of the firms returning questionnaires failed to answer the question.[13]

A supplementary note planned for the next issue of the *Journal* will present additional information and some conclusions.

TABLE 8

RESPONDING FIRMS CLASSIFIED BY NUMBER OF LEGAL ACTIONS RELATIVE TO PATENT AND TRADEMARK INFRINGEMENTS

Number of Actions	Number of Firms	Per Cent of Firms Responding
None	16	64.0
One	1	4.0
Two	1	4.0
Question not answered	7	28.0
Total	25	100.0

APPENDIX I

The Patent, Trademark, and Copyright Foundation
of The George Washington University

PROJECT 3A

ROLE OF PATENTS AND TRADEMARKS IN THE CREATION AND GROWTH OF SMALL INDUSTRIAL UNITS

"PATENT AND OTHER FACTORS IN THE OPERATIONS AND PROSPECTS OF INDEPENDENT FIRMS IN THE SCIENTIFIC AND OTHER INSTRUMENTS INDUSTRY—NEW ENGLAND AND THE MIDDLE ATLANTIC AREA"

I. Nature of the Firm:

Name of Firm_____

Address of Firm_____
Street and Number City State

Year of Firm's Establishment_____

Legal Form of Organization (Check One)

(1) Proprietorship_____
(2) Partnership_____
(3) Corporation_____
(4) Other (Indicate Form)_____

[12] See Table 7.
[13] See Table 8.

Products Manufactured or Processed:

List in order of importance (most important to least important):

(1)_____

(2)_____

(3)_____

(4)_____

(5)_____

Existence of Research and Development Program (check one):

Yes_____ No_____

If yes, year of establishment of the Program_____

Historical Evolution of the Firm:

(1) Changes in Legal Form of Organization (check appropriate item):

None....._____

Proprietorship to Partnership....._____

Partnership to Corporation....._____

Proprietorship to Corporation....._____

Other (specify)....._____

_____

(2) Principal Bases for Growth of Firm (Indicate order of importance—use the number "one" (#1) for most important, number "two" (#2) for the next important, etc.

Retained Earnings....._____

Acquisition of Subsidiaries....._____

Mergers or Consolidations....._____

Leases....._____

Other (specify)....._____

_____

II. Role of Patents, Trademarks, and Other Factors in the Operations of the Firm:

Do you rate each of the following factors as being (1) of Extreme Importance, (2) of Moderate Importance, or (3) of Little or No Importance—relative to the origin, history, and current operations of the firm? Use the code numbers (1), (2), and (3) above in your ratings.

Factors	*Origin*	*History*	*Current Operations*
Caliber of Management			
Access to Capital			
Technological "know-how"			
Trade Secrets			
Patents (Owned & Licensed)			
Trademarks			
Government Contracts			
Contributions of "know-how" accompanying Patents & Trademarks			

III. Specific Aspects of the Firm's Patent & Trademark Experience:

	During the First Year of Firm's Existence	*At the Present Time*
Total Number of Patents Owned by Firm		
Of these, the number used by Firm		
Number licensed to Other Firms		
Total Number of Trademarks owned by Firm		
Of these, the number used by Firm		
Number licensed to Other Firms		

Total Number of Patents owned by Other Firms and Used Under License..... _____ _____

Total Number of Trademarks owned by Other Firms and Used Under License..... _____ _____

Number of Patent License Exchange Arrangements in Force:

Total..... _____ _____

Of these, (1) the Number Applicable to Goods Manufactured..... _____ _____

(2) the Number Applicable to Equipment Used..... _____ _____

Number of Trademark License Exchange Arrangements in Force:

Total..... _____ _____

Of these, (1) the Number Applicable to Goods Manufactured..... _____ _____

(2) the Number Applicable to Equipment Used..... _____ _____

Per cent of Net Book Value of Equipment used by the Firm which is:

(1) Covered by Patents owned by Firm..... _____% _____%

(2) Covered by Patents used under License _____% _____%

Number of Legal Actions Growing out of Patent Infringement or Interference:

Total Number of Such Actions..... _____ _____

Number Brought by This Firm..... _____ _____

Number Brought by Other Firms..... _____ _____

Number of Findings in Favor of This Firm _____ _____

Number of Findings in Favor of Others _____ _____

Number Resulting in Joint Compromise _____ _____

Other Results (Indicate): _____

_____

_____

APPENDIX II

SEVENTY-EIGHT SCIENTIFIC AND OTHER INSTRUMENTS FIRMS, CLASSIFIED BY TYPE OF INSTRUMENT AND BY STATE WHERE LOCATED, NEW ENGLAND AND MIDDLE ATLANTIC AREA, 1957

Type of Instrument or Instrument Work	State Where Located								Total	Per Cent of Total
	Ct.	Mass.	Md.	N.H.	N.J.	N.Y.	Penn.	R.I.		
Electric Measuring, Testing, Sorting & Recording	4	5	—	—	5	7	5	2	28	35.8
Experimental	2	2	—	—	3	3	1	—	11	14.1
Aeronautical	2	—	—	—	3	2	1	—	8	10.3
Accessories	1	1	—	—	1	2	1	—	6	7.7
Scientific	—	1	—	—	—	2	2	—	5	6.4
Laboratory	2	—	1	—	—	1	1	—	5	6.4
Electro-Mechanical	—	2	—	—	1	1	—	—	4	5.1
Nuclear	—	—	—	—	2	—	1	—	3	3.8
Optical	—	—	—	—	—	2	1	—	3	3.8
Acoustical	—	2	—	—	—	—	—	—	2	2.5
Photographic	—	1	—	—	—	—	—	—	1	1.3
Visual Inspection	—	1	—	—	—	—	—	—	1	1.3
Meteorological	—	—	—	1	—	—	—	—	1	1.3
Total	11	15	1	1	15	20	13	2	78	100.0
Per cent of Total	14.1	19.2	1.3	1.3	19.2	25.7	16.6	2.6	—	100.0

APPENDIX III

FIRMS RETURNING COMPLETED QUESTIONNAIRES, CLASSIFIED BY TYPE OF INSTRUMENT AND BY STATE WHERE LOCATED, NEW ENGLAND AND THE MIDDLE ATLANTIC AREA, JULY, 1959

Type of Instrument or Instrument Work	State Where Located								Total	Per Cent Responding*
	Ct.	Mass.	Md.	N.H.	N.J.	N.Y.	Penn.	R.I.		
Electric Measuring, Testing, Sorting & Recording	3	2	—	—	2	1	3	0	11	39.3
Experimental	1	0	—	—	0	1	1	—	3	27.3
Aeronautical	1	—	—	—	0	0	0	—	1	12.5
Scientific	—	1	—	—	—	0	0	—	1	20.0
Laboratory	0	—	0	—	—	0	0	—	0	0.0
Electro-Mechanical	—	1	—	—	1	0	—	—	2	50.0
Nuclear	—	—	—	—	2	—	0	—	2	66.7
Optical	—	—	—	—	—	1	1	—	2	66.7
Acoustical	—	1	—	—	—	—	—	—	1	50.0
Photographic	—	1	—	—	—	—	—	—	1	100.0
Visual Inspection	—	0	—	—	—	—	—	—	0	0.0
Meteorological	—	—	—	0	—	—	1	—	1	50.0
Total	5	6	0	0	5	3	6	0	25	—
Per cent Responding*	45.4	40.0	0.0	0.0	33.3	15.0	46.1	0.0	—	32.0

*Per cent responding means in each case the per cent of firms in the sample grouping from whom completed questionnaires were received.
— means that the group was not represented in the sample.
0 means that, although the group was represented in the sample, no completed questionnaires have been received.

Royalty Provisions in Foreign Licensing Contracts

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SUMMARY

SINCE THE PRIME INCENTIVE of the licensor is a profitable return, and an objective of the licensee is to help keep his costs down, the provisions concerning the payments for the transferred assets are given the closest attention in negotiations. This analysis of the pricing provisions is in two parts: (I) An examination of the problems facing the negotiators in calculating and agreeing on costs and values, payments and royalties; these affect the negotiation and determination of the payments provisions in distinct ways, and they affect differently the licensing of trademarks, patents, and know-how. (II) An examination of the three major types of payments provisions (fixed payments, running royalties, and equity participations) as to the ways in which they meet these problems.

The analysis and characterization of problems and provisions is based on information obtained through our continuing interviews with U. S. licensors and answers by nearly 100 officials to mailed questions on pricing under license contracts, plus a perusal of published materials (as given in the Bibliographical Appendix on page 299).

I. PROBLEMS OF PRICING

ALTHOUGH THERE ARE A HOST of conditions which affect the final determination of payment provisions under a license contract, they can be analyzed in the ways that they are reflected in or through (1) the relation between the licensor and licensee as to profit maximization, (2) the effect of and weight given to risk and uncertainty, (3) the various market structures surrounding the product affected by the license and the type of market structure within which the license itself is offered, and (4) the various non-profit considerations which affect the willingness to take a lower direct monetary return.

A. "PARTNERSHIP" VERSUS THE "BUYER-SELLER" RELATION

Although, as we stated in the initial sentence, the prime motive for licensing is profit, it is not true that all licensors are singularly profit-motivated. The prime objective of sales in an open market is usually described as that of maximizing profit. But the market mentality underlying a sale of an asset is seldom similar to that underlying the license arrangement; rather, licensing is closer to a joint-venture. The introduction of a new process or product abroad may be a risky venture (even if fully tested at home). It may equally well be phenomenally profitable. Therefore, the licensor most frequently is willing to share the risks in the hope of further gain.

Under this partnership relation, the parties may seek the maximum return to the licensee company, but its division between them must be accomplished so as to benefit both sufficiently to *continue* the *partnership*. What might be good for *one* is not necessarily good for *both*, but what is good for both *is* good for each. For example, if the licensee were able to maximize profits after the license was received, but in so doing was obliged to pay all additional returns to the licensor, the licensee's incentive to expand operations and income would be eliminated.

Rather than attempt to squeeze out the *maximum* profit available, many licensors are quite pleased with a "reasonable" or "satisfactory" return. That return is "reasonable," in the eyes of some licensors, which covers costs plus an amount equal to what would have been earned on export sales (lost as a result of licensing). For others, the return must be a greater proportion of "costs" than expected from alternative operations of the company; for some, the return merely needs to be the "best deal available" since all licensing returns are considered "gravy" anyway (i.e., without cost); and for others, the contract is not used to squeeze the largest possible return out of the licensee, but something less that is considered "fair" to the parties (or a return which the licensing officials feel will be sufficient to gain support of the board of the company). While some officials of licensor-companies may seek "all that the traffic will bear," this criterion is employed in quite different ways, depending on how many non-monetary items are included in the "burden." But many consider such an approach inappropriate to the partnership relation.

Taking the partnership viewpoint, the licensor wishes the licensee to be satisfied not only with the price but also with the service. If the operations of the licensee are unprofitable, the licensor shares part of the blame and may feel that he should not impose a charge on the licensee until he (the licensor) has a chance to help make the business profitable. Or, he may feel that his interest lies in expanding sales by the licensee and that his help will be more readily given and received if he has a financial interest in the outcome.

From the standpoint of the licensee, he wants to be served continuously (under a know-how agreement especially) with the appropriate information. He therefore wants the licensor to be interested in ways of improving the licensee's operations—an interest which would atrophy if the return was not reasonable and tied to performance of the licensee. This interest *could* be achieved by a separate sale (for a fee) of each new bit of information or new process; but this procedure would be administratively costly and disruptive of that feeling of "partnership" which many feel is essential. A running royalty removes the repeated costs and places the contract on a long-run basis. In addition, the running royalty reflects the sharing of licensor and licensee of the risks and rewards of expanding operations, which sharing is the *essence* of most licensing agreements.

B. RISKS AND UNCERTAINTIES

The potential licensor faces four different uncertainties which surround the immediate area of pricing—plus a host of wider uncertainties extending all the way to political instability or legislative changes. These four uncertainties arise in the

areas of cost and demand. The past costs of producing or creating the right to be transferred are difficult to determine, and the future costs which will be incurred in the transfer are uncertain. On the demand side, not only is the immediate demand for the license known only vaguely but, similarly, the demand for the product covered by the license is derived from "expectations." The licensor has insufficient cost data on which to rely and insufficient information as to the demand for the asset or the final product involved. Yet, out of these uncertainties must come a contractual relationship.

Uncertainty is a natural concomitant of doing business, and if one wishes not to bear the uncertainty, he usually must "buy his way out." If the licensor wishes to avoid the uncertainties, he should be clear as to the possible cost in lower returns.

1. *Cost Uncertainty*

The method of pricing which employs a mark-up over costs is difficult for several reasons. First, the licensor's costs are not clearly known—either those already incurred or those likely to be incurred. And second, it is almost impossible to know the full costs of licensing. At the same time, there are several areas of costs which can be determined and the amounts involved estimated if not calculated. With this information, at least a reservation (or upset) price may be established below which the licensor should not offer the license if he is to prevent taking a loss.

The reservation price of the licensor should be equal to the costs incurred by the licensor *directly* in transferring the licensed rights, plus the net profits to be gained by exploiting the foreign asset through exports or direct investment. If there is no alternative of exporting or investing, the calculation reduces to merely the "out-of-pocket" costs involved in the transfer.

The indirect (or fixed) costs of gaining the knowledge (patent or trademark) which is licensed, once it is borne, are sunk costs. As such they should play no role in determining the reservation price.[1] Failure to cover such costs does not cause a "loss" since the costs were incurred for other reasons. However, know-how licenses frequently promise not just to transfer existing knowledge but also to transmit new developments as they occur. How should the cost of future developments be treated in relation to the reservation price? If the knowledge will be developed whether or not licensing occurs, then the cost of developing that knowledge is the equivalent of a sunk cost—it is going to be met anyway—and should not enter into the reservation price. Conversely, if the knowledge would be developed solely for the licensee and would have no value in any alternative market, the full cost of developing the idea should be included within the reservation price—and the "cost" is equal to the value of the inventions or knowledge which the research department could produce if it were not working on ideas for the licensee. If the ideas provided to the licensee have a value elsewhere, but were developed to license, the *reservation* price should equal the development costs less the revenue which can be gained by selling the idea elsewhere.

[1] As a well-known business consultant writes ". . . the cost of developing the patented process is wholly irrelevant. It is a sunk cost, which will be the same whether the seller licenses or does not license the patent and whether he charges little or much for it." Joel Dean, *Managerial Economics* (New York: Prentice-Hall, 1951), pp. 488-9.

In sum, the reservation price is equal to the value of the inventions which would otherwise be produced by the resources which fulfill the license, minus the value in other markets (non-license) of the idea which is produced for the licensee. In view of the uncertainty about the value of future ideas, it is perfectly understandable that licensors will use rather arbitrary rules of thumb in costing licenses which provide for future transfer of presently undeveloped knowledge.

Despite the irrelevance of some past costs or the uncertainty as to their amount, the use of cost-information helps to establish a "justification" for payments which must be made by the licensee. These past and yet-to-be incurred costs of the licensor may be broken down as follows:

(1) Research and development,
(2) Registration and filing (abroad) of trademarks and patents,
(3) Administration and negotiation,
(4) Fulfillment of the contract.

Only the last type is subject to *fairly* clear delineation of the cost incurred specifically for the licensing program. They are not fully known beforehand, however. The cost of transferring a trademark is, of course, relatively small, and little know-how is required to employ it properly. However, there may be costs of protection and litigation or costs of advertising and control over quality which are considered necessary to maintain the value of the mark. These would be out-of-pocket and easily attributed to the licensing agreement.

The costs of fulfilling a patent licensing agreement would also involve costs of maintenance and possible litigation; these are sometimes shared with the licensee. In any event, they are easily determinable and are no different in nature from those incurred in domestic operations. There are larger costs in transferring rights to a patent, however, in the sending of the patented knowledge or invention and the specifications or books necessary for effective use of the patent.

In transferring know-how, there is a considerably larger cost of informing the licensee, training his personnel, helping to solve his problems of production or use, and even adapting the process or product to different conditions of production or demand. These costs can be limited in the agreement by making certain that each party understands the extent to which the resources of the licensor can be called upon. But the actual costs which will be incurred in the future cannot be known in advance, and the real cost burden on the company will vary greatly depending on the degree to which its resources are already called upon by other operations. Thus, if technicians and researchers are fully employed on existing problems and additional problems come in from the licensee, the servicing of his needs may drain effort from pursuits equally or more important. When such resources are not already fully employed, the real burden is much less than the dollar cost allocated to the licensing program, for the men required were not fully occupied otherwise. But, whether employed or not on other projects, the cost of technicians can be charged to licensing if time-sheets are used, and even salary of traveling technicians can be readily charged to the licensing program.

In addition to these more or less direct costs of fulfilling the contract, there are likely to be a variety of others attached to meeting requests of the licensee. For

example, the licensor may be asked to become a purchasing agent for items the licensee needs (including consumer goods), arrange for visits of foreign personnel, advise on sales and marketing problems, etc.[2] While some of these may be stipulated in the agreement, others are more likely to come up incidentally.

Costs connected with administration and negotiation of licensing programs are *readily* allocable only where there is an international division in the company with a department handling licensing. The calculation of administrative costs will be more or less difficult depending on the separation of licensing operations from other types of activity. If the licensing program is a small adjunct to the business of the export manager or any other officer, it will be most difficult to attribute an appropriate portion of overhead and time to licensing. Where there is an international department, some division of overhead among exporting, investing, and licensing can be made similar to the gross receipts from each, with adjustments for time-factors and other considerations. Where licensing requires use of operating personnel, their services can be charged to the administration of the program. Negotiating expenses give rise to similar problems, in that the time of the negotiators prior to actual negotiation is not usually spent wholly on the licensing program. The actual expenses of negotiation (travel, time, etc.) can be determined fairly readily when conducted abroad (save when the executive is also on other business for the company), but not so easily when carried on at home.[3]

A portion of the costs of registering trademarks, filing of patents, and maintaining them should certainly be attributed to the licensing program when specific assets have been licensed—even though originally incurred for purposes of protection. But this covers only a minor portion of most companies' foreign patents or trademarks. Only a small portion of these foreign costs would be allocated to licensing. The procedure of allocating *only* costs of these assets *licensed* undoubtedly would understate the costs which should be attributed to licensing in companies which consider licensing possibilities when making the decision to file or register abroad. In addition, the mere fact that a company has a long list of patents abroad may make it a more attractive licensor to the potential licensee, even though not all the rights are licensed.

The most difficult area of cost to allocate is that of research and development (and, in the case of trademarks, from the activities giving rise to the present value of the mark). Most of these activities would be carried on regardless of the licensing program. Some few would be required because of a problem or request of a licensee. However, as licensing expands, more research and development will be undertaken with a view to future licensing. Even these efforts will result in prod-

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[2] A list of such possible services demanded by the licensee is given by Joseph S. Cardinale, *Manual on the Foreign License and Technical Assistance Agreement,* (New York: Thomas Ashwell & Co., 1959), pp. 80-81.

[3] There are advantages to conducting the negotiations where the licensee can see the plant and equipment which are similar to those he will be using and where he can be introduced to lower echelon personnel who will be called upon to service the agreement; this procedure may reduce costs by placing the travel expenses on the licensee, but it also confuses the licensor's costs of negotiating since they occur during normal day-to-day operation, making it difficult to calculate their amount.

ucts or processes having application at home as well. The joint-cost nature of such operations is well known and allocation among different parts of the business is usually quite arbitrary. The fact that much of the research is unsuccessful and must be carried by the successful developments makes the allocation to licensing still more arbitrary. But this arbitrary allocation is important in establishing the reservation price for a license and thus in affecting the basic decision as to whether to license or exploit the assets through exports or investment.

The decision as to how to allocate R & D costs to licensing illustrates the difficulty of separating joint costs, but it also demonstrates the usefulness of thinking in terms of *alternative* returns. Suppose the company may find it has previously been spreading R & D costs evenly over the total output, including exports. If licensing, which follows a decline in exports, is now required to carry the entire cost of research and development *previously* allocated to the exports, the license may be over-priced. The essential question is: what level of exports could be maintained in the absence of licensing? Since the former volume of exports is no longer feasible, the only alternative to licensing is a smaller volume of exports. Licensing should carry as a cost only that portion of R & D formerly attributed to the exports which it displaces. Where there is no alternative to exporting, the inclusion of costs otherwise already expended (and which would continue to be expended) would over-price the license.

Some of the "loss" from improper costing is recouped when expenses are allocated to domestic income rather than that from licensing. This action reduces domestic income which is taxed at the 52% rate (since foreign taxes on royalty payments are almost always considerably less than 52%) and leaves more foreign income where a credit is available. Tax regulations require that foreign income be netted against expenses incurred in gaining that income. The Treasury has so far not been so insistent as to licensing income; but, as licensing programs grow in importance, it can be expected that a closer scrutiny will be made. One reason that cost procedures are as loose as they are currently, despite legal requirements, is the absence of accepted accounting procedures. It is to be hoped that the Committee on Research of The National Association of Cost Accountants will turn its attention to this problem.

2. *Demand Uncertainty*

There are two areas of demand uncertainty: that with reference to the licensee's demand for the transferred rights, and that of the consuming public for the products involved. The second area is shared by the licensee and is no different from the uncertainty faced in any market by the seller. Rather than rely on the licensee's estimate of potential demand, most of the companies which have sizeable licensing programs engage in their own foreign market research and attempt to determine the long-run demand for the products involved. It is still good bargaining technique to ask the prospective licensee what he expects his potential sales will be, not only to test the extent of the market, but also to place the licensee in a position of having to claim that he can do "great things" with the license so that he will be chosen as the licensee.

The only way for the licensor to remove the uncertainty of market demand is to obtain a fixed-return agreement from the licensee. Most licensees, however, wish the licensor to share in the risks of the enterprise; seldom does the licensee buy a "sure thing." However, there are rights transferred under license which are of a one-shot nature and have been adequately market-tested so that the licensee is willing to pay a "once-for-all" sum. In general, the licensee is willing to pay a fixed sum only if he is rewarded for accepting all risks by cutting the overall royalty payment as compared to what is *expected* would be the return on a running basis. This element of demand uncertainty makes it quite difficult for the licensee to calculate the "value" of the licensed rights in terms of a discounted stream of future income. If required to make such a calculation, he will employ a discount rate higher than he might feel will actually be necessary so as to shift some of the burden of uncertainty to the licensor. Only under rather strong competition would he be forced to employ the market rate of discount, which would make a fixed sum equal to the expected future income on a royalty basis.

The uncertainty of the market demand is a fundamental reason for the uncertainty faced by the licensor in knowing the demand of the licensee for the rights to be transferred. The licensee's demand is derived from the market demand for the product; the derived demand will be a function of the structure of market for the product. If the licensee faces a strongly competitive market, his desire for the license may be intense, but his ability to pay will be limited to the cost-saving since he cannot readily raise prices because of the competition. The license may itself change the market structure, however, by giving the licensee a quasi-monopoly over a differentiated product. In this event, his demand for the license is a function of both his cost-saving and his higher prices. Finally, if the licensee already faces weak competition, his ability to pay may be high, but the pressure to obtain the license may be relatively low; his demand is thus uncertain. However, if the licensee has a business approach of staying ahead of the market, his desire for the license will be greater. This situation of high potential returns and high desire on the part of the licensee has marked licensing in Europe since World War II, and it led to a demand for U. S. licenses.

The fact that the demands which various potential licensees might have for the license are not known simultaneously makes it difficult to discover the strength or size of the demand. And there are risks in trying to discover this information over time. If one offer is passed by in hope of a better one later, a better opportunity may not arise; the former is lost, and a competing licensor may have gotten the "jump" in the market. Thus, if a proposal looks satisfactory, the fact that timing is an important factor, and the belief that "a bird in the hand is worth two in the bush," causes most licensors to settle for "reasonable" returns and not press for potentially "maximum" profits. That is, the licensor is seldom in a monopoly position and thereby able to dictate the terms; and even where he is, he frequently accepts less than he *might* have gotten.

The difficulty in knowing the demand for the license is increased where the rights transferred are used in producing two or more items, which themselves face different demands. The know-how transferred frequently affects more than one product, and

techniques are sometimes "silently" adopted in unlicensed areas (possibly not by a conscious act). Thus, the actual return to the licensee from the license is impossible to determine precisely; its "value" becomes what the licensee feels he has to pay in order to obtain the rights, and, if an exclusive license is offered, to preclude a competitor's obtaining them.

We see then that the uncertainty as to the demand for licenses is a reflection of the structure of the market for them and the products involved.

C. MARKET STRUCTURES

There would be perfect competition in the market for licensed rights only if there were numerous potential licensors and licensees—a sufficient number so that each had to be guided by the payments and provisions agreed upon also by *others*. There are relatively few situations in which several potential licensees are in the market for rights which can be provided in a similar (if not exact) fashion by several licensors, and they are mostly restricted to know-how agreements. Different patented products or processes may serve the same end and be competitive, and different trademarks may have the same value in the market to potential licensees; but the actual negotiations and bargaining in these situations take the form of bilateral monopoly rather than market competition—with the important qualification that each party knows that potential competitors stand not far away. Simultaneous negotiations with the same potential licensee are not generally countenanced by competing licensors.

The reverse situation—one licensor negotiating with several potential licensees—does occur, however, especially where non-exclusive rights are offered. This situation gives rise to a type of monopolistic competition, the monopoly having been conferred on the licensor by the patent or trademark or derived from his trade secrets. In the longer run, competition may be introduced on the side of the licensor, being replaced with an alternate; but *during* the period of negotiations, the availability of an alternative license and on what terms are not known specifically to the negotiating licensee. (There is one further limit arising from the possibility of inventing around the patents of the licensor or developing similar know-how, but these also are of indefinite cost and over an indefinite time-period.)

The *ad hoc* nature of the bargaining situation is stressed by the facts that the time available is usually short and the opportunity to reconsider is usually absent. Thus, bargaining must begin when a prospective licensee shows up for talks, and a proposition must be extended him which is at least a basis for further discussion. The licensee cannot remain indefinitely for discussion; his departure without a concrete proposition signals an approach to some other licensor. Under such pressures, the licensor hardly has time to marshal all the facts he would like. (This point is not contradicted by the fact that many negotiations take a year or more to finalize; they would not proceed into the second step unless the first produced a willingness to negotiate and some concrete proposals.)

In the instance of one licensor negotiating with several licensees, the latter have no certain knowledge of the offers and responses between the licensor and the other potential licensees. There is, therefore, a type of discriminating monopoly possible

on the side of the licensor. Different royalty rates are desirable since market conditions for each licensee differ *and* are feasible since each market is separated by patent coverage or transportation and other costs. If the licensor is offering a non-exclusive agreement, he may feel bound to extend similar contracts to each licensee in order to avoid apparent discrimination. It should be stressed that this desire for similarity may be inequitable as well as unprofitable. It is not necessarily equitable to treat unequals equally. Thus, one licensee serving a large and expanding, but competitive, market and practicing low-mark-up pricing might be given a lower royalty rate than another serving a less competitive market and using higher mark-ups with lower volume. A common royalty percentage would favor one over the other; if rates have to be equal so as not to "discriminate," different initial payments may be used to make each agreement reasonably profitable.

There is little doubt that, where several licensees will be selected to serve an area, simultaneous negotiation is desirable, nor that it is desirable to find several potential licensees from which one may be selected. Such a procedure provides information to the licensor which he cannot otherwise obtain. The procedure may be put into effect by selecting companies which might conceivably be interested and by advertising the availability of the license. From among the respondents may be selected those considered most worthy and negotiations inaugurated simultaneously. This procedure is not generally found desirable when an exclusive license is to be granted or where only one license (though non-exclusive) is to be extended within a given market territory; although information would be desirable on the relative bids from potential licensees, the disaffection of the excluded companies may make future dealings of both parties difficult. Even in this case, a preliminary market survey should be made to see which company seems most able to exploit the license.

An exclusive license is negotiated in its final stages under a situation of bilateral monopoly, which provides no determined solution. The results depend wholly on relative bargaining powers of each party. While there are no set rules of negotiation, the obvious objective is to obtain as much information from the other party as possible about his willingness and ability to pay, while extending only that information which you deem relevant to his making up his mind. For example, the licensee may be requested to indicate how well he thinks he can invade the market for the product involved; his estimate will probably be large so as to impress the licensor with his market potential. Such an estimate may then become the licensor's base for calculation of a minimum royalty. Or the licensor may base his minimum or fixed payment on his "costs" trotting out a host of statistics showing the various costs incurred and to be incurred. As indicated above, however, these are subject to a high degree of arbitrariness and will probably be so viewed by the licensee. In actual fact, the payment provisions are part-and-parcel of the entire contract. The volume of a down-payment or initial payment is affected by the height of the percentage royalty, and both are affected by the extension of exclusivity, return of developments by the licensee, tax exemption, and other provisions of the contract—as discussed in the following section.

The essential point concerning bargaining within different market structures is that the licensor wishes to know what alternative opportunities exist if he can. If he cannot know of alternatives, he will push for a return which he *thinks* is the best he can obtain. But useful knowledge would be gained if he would seek out potential licensees and discuss with them sufficiently to get a "feel of the market." Many U. S. licensors are still pursuing the practice of letting the licensee choose for himself, by taking the first likely licensee that has the initiative to come asking. They feel that this increases their bargaining strength since the licensee has come "hat in hand" to the licensor of his choice. While this view may be correct as to bargaining power, a strong offsetting factor is that this licensee may be one of the weakest firms and would not make the best licensee in the long run. Illustrations of this point are found at two extremes: one where the licensee failed while trying to promote the product, and the other where the licensee kept the item *off* the market.

D. EXTRA-PROFIT CONSIDERATIONS

The phrase "extra-profit" is employed here in two senses: that meaning "outside of the profit area," and that meaning "additional profit." The licensor will attempt to include all provisions which will increase his return and make it more certain but in such ways as not to reduce the overall rewards of production. Some contract provisions relate to the first, others to the second, meaning; and a few cover both types of "extra-profit" returns. An example of these last is the exclusivity provision.

1. *Exclusivity*

The question of whether or not to extend exclusive rights to the licensee has two facets: (1) the legal facet—whether or not U. S. antitrust officials would look at such a provision as in violation of those laws; (2) the profit-increase facet—whether exclusive rights will increase the total profits of the licensee and licensor. Both have important implications for total returns from the license.

An analysis of the economic impact of the antitrust aspects of exclusivity provisions is being made currently by the Foundation. Suffice it to assert here that if the licensor feels that there is a legal prohibition against exclusivity, the second aspect becomes academic. The central question for U. S. licensors who do not wish to extend exclusive rights is, "How much will the royalty have to be reduced in order to get the licensee to accept a non-exclusive contract?"

Most licensors extending exclusive rights find that they often double the royalty rate as compared to a non-exclusive license. The question of exclusivity under antitrust legislation may not be important when only one or two contracts are involved, but when several have been entered into, and a pattern develops, it may be found much wiser to reduce the rate and insist on non-exclusivity.

Some licensors find it feasible to extend non-exclusive licenses with the tacit or explicit understanding that only one licensee will be established in a territory unless performance is found wanting. This action avoids the possibility of formal violation of antitrust, leaving open the question as to the effect of the agreement.

In any event, where the decision of exclusivity or non-exclusivity is left to the negotiators to agree upon (i.e., not under the prohibition of U. S. law or the

requirement of a foreign government that the agreement be exclusive), the question of whether or not it would be profitable to the licensor becomes paramount. This is the "additional-profit" aspect of the question.

The economics of exclusivity are essentially the economics of monopoly, and/or the size of the market, as far as the licensee is concerned. In many instances (particularly capital goods) the market abroad is so small that one producer, using U. S. techniques, requires the *entire* market to reach an economical scale of output —i.e., one which would justify the investment. In such cases, the licensee *requires* exclusive rights (in the contract or in fact), and it would be unprofitable for the licensor to extend two licenses to serve the same market. In a more competitive situation, the licensee will also find it profitable to have an exclusive agreement. It would certainly reduce his profits if a competitor were extended the same patents, trademark, or know-how; as a result, the value of the assets to him would be less *and,* significantly, his desire to protect them from misuse would be less (since the licensor has been willing to spread them about).

The case for exclusivity is more complex from the licensor's side. The licensor may feel that he can *expand* sales of licensed items, taking more of the market, through licensing several producers. Expanded sales may be easier if the product does not have *close* substitutes. Suppose the licensor has a new product or process for which there are no *close* substitutes so that the entire market (possibly including exports by the licensee) is open for exploitation on the terms of the licensor. His question is, "Will the return from licensing be greater if there is one producer-seller or several?" The answer comes from an analysis of the extent to which one licensee can expand and keep up with the market compared to the ability of several companies. The considerations involved are those of whether the licensee with exclusive rights has sufficient interest in the product to expand the market (at low profit margins) so as to maximize returns *and* whether he has sufficient capital to expand operations to meet demand, as well as advertising, selling, and other promotional activities.

As indicated above, when the market is small, it may not be profitable for the licensor to extend a second license. Additional facilities would increase costs or outrun the market. In such a case, an exclusive license would be justified. But a non-exclusive license could equally well be extended since it will not be any advantage to the licensor (and possibly harmful) to extend a second license.

However, if the market is large and may be expanded overseas, the existence of several licensees may be precisely the force required to make each more cost-conscious and to keep prices down so that the total market is expanded. While the profit margins for each licensee may be smaller than with one licensee, total sales will in many instances be more than proportionately larger, increasing the returns to the licensor. Total sales may be larger partly because the spreading of production among several companies keeps down the per unit cost of some types of goods; whereas concentration of a large output in one firm may raise per unit costs by inducing dis-economies of scale or too high a utilization of the plant. And, with lower per unit costs, prices may be cut and total sales increased. In addition, the costs of servicing and fulfilling multiple licenses among many non-

exclusive licensees must be compared with the cost of servicing one (exclusive) license. The multiple costs may prove greater than the additional returns from fuller exploitation of the entire market through competitive licensees.

A compromise between the desires of licensee and licensor is found in the provision extending exclusive rights to manufacture in a territory, but non-exclusive rights to sell. Although it is probably not frequent that one licensee will sell in the country of another, this permission is a competitive check and a means of expanding the market through lower prices. The licensee with the lowest cost can always expand his portion of the market, keeping prices down and raising total returns to the licensor.

From our research, we must question whether all U. S. licensors are sufficiently attentive to the possibilities of multiple-licensing; many are fairly ready to take the licensee's insistence on exclusivity as evidence of the economic desirability of a single licensee. A large number, including some of the largest companies, however, insist on non-exclusive rights and even maintain the right themselves of entering the territory of the licensee.

In defense of those who do extend exclusive rights to the manufacture and sale of consumer-type products, it must be emphasized that the contract is not written solely by the licensor. He is under the necessity of *agreeing* with the licensee, who generally has a long-established tradition of exclusive rights in manufacturing and sales. *And,* the licensor is under the pressure of competition; if he does not extend exclusive rights, another licensor may do so. Or there may be sufficient existing competition from other manufacturers which has already widened the market, and all strength possible needs to be given the licensee. In some instances, the foreign government will insist on exclusive selling rights in order to reserve the home market for the licensee. Licensing of a trademark also tends to justify exclusivity, not only from the standpoint of maintaining the value of the mark, but also from that of not confusing customers by having representatives of different companies selling goods with the same mark.

2. *Other Antitrust Considerations*

There is little doubt that provisions other than that relative to exclusivity are examined by antitrust officials and that their inclusion has a direct effect upon the returns to the licensor. For example, agreement to transfer future developments and patents will undoubtedly raise the royalty rate, but it may be viewed skeptically by the U. S. Justice Department. From a strict profit standpoint, it is not always wise to include future developments in the agreement since one unborn idea may prove to be so much better than previous ones that it should be treated quite differently in licensing; or it might be better exploited through a different licensee. Economic considerations in the long run point to some flexibility in the licensing of future developments and patents. A frequent expected advantage of the tying arrangement is that the licensor will receive similar rights from the licensee (cross-license) in a volume which may completely offset the value of the rights he transfers. But, a *pattern* of cross-licenses covering future developments and patents begins to look like anticompetitive agreement or abuse of monopoly power in the eyes of the Justice Department.

The provision which attempts to gain for the licensor additional returns (through a penalty or higher rate) when the licensee exports may be justifiable in the minds of both parties from an economic standpoint—and certainly there are reasons for differential pricing by the licensee in different markets—but, if such "penalties" affect U. S. trade, they are likely to be seen as an unreasonable restraint by the Department of Justice or as undesirable by foreign governments seeking to expand export earnings. Equally, the setting of the selling price by the licensor (which is deemed justifiable under antitrust in some instances and certainly has some economic justification from the standpoint of the licensor) may be accepted by the licensee only with a lower royalty rate and possibly at the loss of some total revenue to the licensor if the licensee actually has a better feel for the market. Setting of the selling price by the licensor is economically justifiable only when the licensor considers that his knowledge of the market is better than that of the licensee; otherwise, he will sacrifice some of the returns which could be gained through optimum pricing. The licensor may wish to set prices of the licensee, however, to make certain that he is not undersold by the licensee in third markets or to maintain the value of a trademarked item in the eyes of the consuming public. The licensee would probably be equally concerned in the latter circumstance, but oppositely inclined in the first. The licensor will increase his returns by setting the prices of the licensee in competitive markets so as to exclude the licensee (or reduce his exports) *only* if the profits from his own exports would be greater than the royalty returns from the licensee. However, a low-price policy by the licensee, who has lower costs, could expand the market and raise total returns. The essential problem is for the licensor to compare the potential returns with the possible liability under antitrust.

But, it is not always the case that the economic and legal weights are on opposite sides. For example, the Justice Department looks askance at any requirement that the licensee purchase component parts from the licensor, or use his installation services, or use *only* his trademark on all items licensed under know-how or patents. The licensor may consider that profits from component sales are a necessary part of his return under the agreement, but he may, in fact, lose substantially if his prices on parts are so high as to reduce the sales of the licensee; the same applies to *any* restrictive service contract. As to restriction on use of the trademark, many feel it necessary to protect the market if the license is terminated. But in many areas, the market will absorb large quantities of goods inferior in quality to the item sold under licensed trademark. The overall returns to the licensor can be greatly increased under these conditions by differentiated products sold under separate marks.

3. *Governmental Regulations*

In some countries, the negotiating parties are really not free agents; the government may set a limit to the royalty rate or to the initial payment made by the licensee. The government may also show a preference for one means of calculating the return over another. Thus, one government is known to prohibit currency remission unless the contract contains a royalty rate no greater than 5% on sales.

Others make a similar determination but vary the ceiling according to the "essentiality" of the items licensed. Where such limitations exist, it is a part of the negotiations either to make certain that the maximum permissible amount is agreed upon *or* that other considerations which are "near-profits" are included, such as are discussed in sections 5 and 6 below.

Governmental preference for one type of remuneration over another also affects the pricing (and eventually profitability) of the license. A preference by licensors for royalty payments over dividends from subsidiary or associated companies has been created as a result of comparatively unfavorable tax and exchange treatment of dividends; this may raise the amount that is charged under the license as compared to what might be asked from an independent licensee. A few countries show a preference for lower running royalty rates, but will permit high initial payments; such a preference tends to shift the uncertainty onto the licensee; it may also reduce the return to the licensor, depending on the rate at which the anticipated future income was discounted. Most governments, however, prefer a small initial payment (to decrease the immediate drain on foreign exchange) and object less strongly to annual payments out of earnings, especially if exports are expanded.

Recently, the Japanese government has announced that no agreements having over 5-year duration will be approved; an announcement was also made that no new agreements would be approved after 1962. Such a limit will tend to raise the annual return required by the licensor, since he cannot profit from the growth of the licensee.

4. *Taxes*

The tax picture will also affect the mode and amount of returns under licensing. When the licensee is a foreign subsidiary, there is a tax advantage in obtaining more returns through the license than as dividends. The royalties are frequently considered as an expense to the foreign company and are deductible from earnings for foreign income tax purposes. So long as the royalties are kept overseas, they are a tax-free source of additional financing.[4]

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[4] The royalty may even be paid back to the parent with less tax burden than on dividends in some cases. Sec. 902(d) of the Internal Revenue Code (and Revenue Ruling 59-71) permit royalties to receive the foreign income tax credit as though they were dividends and had borne foreign income taxation when (1) the licensee is a wholly-owned subsidiary, (2) the subsidiary is engaged in manufacturing, production, or mining, (3) the royalties are received under a contract under which the parent furnishes property or services, and (4) the contract expressly states that the royalties are to be accepted in lieu of dividends and that no dividends shall be declared or paid in the year in which the royalties are remitted.

This provision permits a substantial saving in total taxes on corporate returns from the subsidiary (see the calculations made by W. R. Baker and J. F. Creed, "A Tax Credit Anomally Involving Income from a Foreign Subsidiary," *Taxes,* May 1958, pp. 329-32). However, this procedure is not open where the license already exists *without* the specific statement required in (4) above; apparently, new contracts must be written. And, limitations on the amount of royalties which may be deducted as expense of the subsidiary (such as imposed by Brazil) reduce the attractiveness of this arrangement. Such limitations are likely to increase, since the effect of Sec. 902 (d) is to raise tax revenue for the U.S. Treasury at the expense of receipts by the foreign government.

Many companies have employed a royalty provision which places on the licensee the responsibility to bear all foreign taxes. The licensee is required to remit the royalty "net of all taxes"; the licensor always receives a stipulated amount (say, equal to 5% of net sales). While it would seem immediately apparent that this provision is highly desirable from the standpoint of the licensor, this is not necessarily the case.[5] For the purpose of this analysis, it should be stressed that such a "tax-free" provision is likely to mean a lower royalty rate if there is anticipation of additional taxes on royalty income during the life of the agreement; thus, the licensor accepts a lower return to remove the risk of possible future taxes.

A third area in which taxes affect royalty provisions and the profit returns is that surrounding the use of a foreign-base company. Since it is difficult to transfer ownership of trademarks to a foreign subsidiary, separate contracts are often written for trademarks when they are licensed to a company also receiving patents and/or know-how. The trademark contract is extended directly by the parent company and royalty-free, leaving no income which can be taxed. The other licenses are extended by the foreign-base company, with income for all rights attributed to these contracts. Thus, the foreign-base company receives all licensing income and is enabled to retain it for further use, tax-free. While this procedure *should* not alter the total amount of payment received by the licensor, there may be some difficulty explaining why similar patent and know-how licenses carry different returns when trademarks are also licensed as compared to when they are not. Such a difference might indicate that the trademark license had an independent value, the return on which would be taxable as income stemming from parent company operations. So far there seems to be no tax liability in employing this procedure, however.

5. *Control*

The licensor may have reason to think that the returns from the license would be increased if he could exercise certain controls over the actions of the licensee. These controls are usually over quality of production and over marketing. They involve supervision over materials used, processes employed, specifications, and production volumes; and over advertising, selling, and distribution, including the selling price. It may be understood between the parties that the licensor has greater competence in these areas and should be given control. If the licensee considers that his own profit will be greater as a result, the royalty to the licensor may be increased, as a sort of management fee. On the other hand, if the licensee considers such control an undesirable interference, the licensor will have to take a smaller *rate* in order to obtain the controls which he considers can raise the total returns; and he will have to incur certain costs of supervision, reducing further his net return.

A different type of control is employed in the provision requiring return to the licensor of improvements in his patents (and know-how). The return of improvements is a usual provision, but it is a substitute in some degree for a royalty return.

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[5] An analysis of the impacts of this provision has been made earlier. See *PTC J. Res. & Ed.*, 2, No. 2, (June 1958), pp. 233-235.

The return may be in the form of the rights to the improvement, which the licensor then patents; or the licensee may patent the improvement, giving the licensor a royalty-free use of the patented improvement. This provision permits the licensor to continue to produce with the latest techniques in competition with his licensee. He is then not "shut-out" by his licensee and is not required to bargain or pay for the privilege of using the improvements.

There are many other control provisions in the licensing agreement covering audits, periodic payment of royalty, sharing of litigation costs, arbitration clauses, etc. Their effect on the pricing of the licensed rights is indirect and relatively weak, but they are still part of the "package."

6. *Non-royalty Income*

Besides the income which arises directly from the transfer of licensed rights in the form of royalties or payments (or return of improvements), about 7% of our respondents to mailed and interview questions derive additional income from sales of component parts to the licensee and several others through expanded exports of complementary items in the licensor's product line. For some licensors the royalty return is insignificant or nil, while the major benefit is in the sales of materials or parts to the licensee. Sales to the licensee are frequently at some discount under regular export prices, giving the licensee a positive reason for buying from the licensor; in addition, quality and terms may be attractive. When there is no alternative supplier, the component sales become of primary importance in the profitability of the agreement. In this event the licensor gains from the monopoly position he holds, but the negotiation of the sale and re-sale prices still leaves room for bargaining as to the division of the monopoly returns.

Exports of complementary items have been found by some licensors to rise rapidly once the licensee is in operation. The mere fact that some lines (e.g., the smaller machines or motors) are available domestically under the license opens the market for other products in the line (e.g., heavier machines or motors) for which the market is not large enough to support domestic production. The profits from such sales are so significant in some instances that royalty rates on licensed items are reduced, since these sales are counted by the licensor as a return from licensing.

Another form of non-royalty return from a licensing arrangement arises from reservation by the licensor of a right to purchase a certain amount (or percentage) of the licensee's output for sale by the licensor. Where the costs of the licensee are considerably lower than those of the licensor, this enables the licensor to obtain the sales profit rather than merely royalty returns, and this technique permits the licensor to gain added income through exports made possible by the existence of a non-dollar source of supply. To an extent the license becomes a "manufacturing contract" from the licensor, but the distribution of the profits is subject to bargaining.

II. ANALYSIS OF PAYMENT PROVISIONS

There are three basic types of royalty provisions of which there are numerous variations and combinations: the fixed payment, the running royalty, and the equity participation. They differ essentially in the degree to which the licensor wishes

to become identified with the business of the licensee. Fixed payments divorce the licensor as much as possible from the vagaries of success or failure of the licensee and give him a greater security in payment since the return is payable out of the entire profits of the licensee, rather than just those gained from sales of licensed items. Among nearly 100 U. S. licensors who gave us specific information on their payments provisions, 16% stated that they generally employ a fixed payment.

Running royalties place the licensor in a type of partnership with the licensee in that returns are received only from the use of the licensed assets (through sale of the product or through production whether for plant use, inventory, or sale). Elements of certainty may be injected into the running royalty, but in essence it is a royalty based on uncertain return. Among our respondents, 70% employ a percentage on sales.

Equity participation broadens the sources of income for the licensee, but also broadens the partnership, extending both to cover all aspects of the licensee's business. It leaves the royalty rate undetermined. Uncertainty is thereby increased, but control by the licensor is also increased, giving him a more decided interest in the foreign market. Only 5% of our respondents state that they have *generally* employed this type of payment, while something like three times this number take equity on occasion. (To compose the complete responses, the final 9% obtain their major return through sales of components or other items to the licensee or dividends from subsidiaries.)

A. FIXED PAYMENTS

Licensing of know-how on a one-shot basis is sometimes done for a fixed payment. Such a transfer usually does not include patents, trademarks, or future developments; it is less appropriate in the case of a trademark or a patent since the future ownership of these assets may be jeopardized. However, annual fixed payments may be accepted under the license with the same protection of the rights which a running royalty provides. Still, there is great hesitation to do anything which would indicate the release of control by the licensor over either patents or trademarks.

The conditions under which fixed payments are generally accepted indicate that it is likely to be less applicable than the other forms of payment. The major condition is that the relation between licensor and licensee be essentially that of a market seller and buyer. The risk of continuing operations or the market uncertainties in the sale of the affected product are taken wholly by the "buyer." It is precisely because of the absence of risk-sharing that some licensors have criticized this method of payment. They feel that the licensor has some responsibility to make the foreign operations successful. If he does not accept this responsibility and the licensee *fails,* the probability that the licensor could license another firm anywhere diminishes. He must care for his "sheep." Some licensors feel that a fixed payment is "inequitable" in that it does not reflect the appropriate relation between the parties—that of a partnership. And, of course, the returns would be greater under a running royalty if the sales were unexpectedly large.

It is, however, appropriate to require a fixed payment where the asset to be transferred can be treated as a single commodity, such as a patent or know-how

that has been built into a plant (such as an oil refinery). Under this situation the licensor and licensee have some guide to the value of the asset, and the degree of uncertainty is greatly reduced. Consequently, the need for a partnership relation to share risks is reduced. The resulting relationship is differentiated from a sale by the fact that the license stipulates how the asset is to be used and kept from use by others.[6]

The above comments concerning the licensor's ability to know the value of the license indicate another set of conditions which make a fixed payment suitable. That is, when there is a high degree of certainty in the licensor's operations so that the cost reduction or the added revenue resulting from the license can be determined with fair accuracy. This certainty results from fairly fixed technical coefficients and a quasi-monopoly position held by the licensee. If the licensor can estimate the extent and impact of these conditions also, he is in a better position to know what fixed payment to ask.

But even with the above knowledge, there is some uncertainty, and the request for a fixed payment indicates that the licensor has a preference for certainty and/or a preference for a quick return from licensing. If the licensor has a preference for certainty, he is willing to take a smaller certain return than a chance for a larger (or smaller) royalty. (Contrarily, the licensee must be willing to assume more of the risk, *or* the licensor must be in a monopoly position, else the licensee will turn to a different licensor.)

If the licensor prefers an immediate return, a lump-sum payment will place the returns under his control promptly, and he can then invest the funds quickly in an alternative pursuit. Since this action leaves the licensee with less capital for the expansion of his operations, he will most likely oppose this method of payment and may succeed in his opposition if there is competition among licensors—unless the licensor is willing to accept a significantly lower royalty because of his impatience for a return. Fixed payments are generally feasible only if the licensor has no close competition in extending the license. And a lump-sum is feasible only if the licensee has sufficient funds to make such a heavy remittance. Some support for the licensee's desire may arise from governmental quarters in the restriction of a large remittance or the requirement of a running royalty.

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[6] Where the value of the transferred asset is so well-known that there are a few prospective rewards for accepting any risk under the license, the fixed payment is appropriate, as discussed earlier. It is especially advantageous if the licensee uses the more advanced techniques of determining costs, prices, and production levels. If, for example, the licensee attempts to calculate the differential (marginal) costs of various levels of output—as is done by some of the more efficiently managed U. S. companies (see James Early, "Marginal Policies of 'Excellently Managed' Companies," *American Economic Review,* XLVI (March 1956), pp. 44-70)—then a royalty payment in a fixed sum form may produce larger gross royalty receipts than a payment based on sales or output. With a fixed royalty the cost of the license is independent of the level of output. The differential cost of each unit of output is therefore lower with a fixed royalty than with a running rate. Use of the fixed payment will induce the licensee to plan on a higher level of production during the negotiations. If the higher level of production in turn suggests greater profits before royalty payments, the maximum payment which the licensee *could* pay would be larger (than that which he would consider permissible with a running royalty).

B. RUNNING ROYALTIES

Running royalties may be classified according to (1) the *base* to which the royalty rate is applied, (2) the rate itself and its variability over time or with a change of circumstances, and (3) the "certainty" provisions inserted:

1. Base —output — per unit of production
   — rated characteristic of products
   —inputs — throughput of major component
   — amount of fuel, electricity, or other material or service consumed
   —value — gross sales
   — "net" sales
   — value added
   —net profits
2. Rate —percentages — decreasing rates
   — constant rate
   — increasing rates
   —changes — waiver of royalty
   — differential rates, according to areas served
   — alteration of rate if licensor sells in licensee's territory
3. "Certainty" — minimum payment
   — maximum royalty
   — terminal payments
   — momentum clause
   — special fees

1. *Royalty Base*

The choice of a royalty base is usually made for ease of calculation and/or certainty of return.

a) Output and Input

A specific royalty based on output is the easiest running royalty to calculate; about 8% of our respondents employed this base. It is especially appropriate when the licensed asset is an integral part of the whole product (since there is no sales value of the licensed item) or when the licensee uses part of the production himself (since there is no sales return on the part so used). An output base implies that the process or know-how license has a value distinct from the sales price of the product. The parties apparently consider that the asset licensed adds a given amount of value to the product (though value added is not readily calculated since there usually is no separate sale of the licensed asset involved) and that part of this gain should go to the licensor regardless of the vagaries of the market price of the entire product. Under this provision the licensor avoids the uncertainties of price changes, but shares in the risks of output changes. The licensee is not bur-

dened with a fixed payment irrespective of the volume of his output, but he is charged a constant cost per unit of output.

This method of pricing may have some adverse effects on the pricing of the product (as compared with a fixed annual payment) and thus on the willingness of the licensee to pay a high rate per unit. A fixed royalty per unit of output raises operating costs by an equal amount throughout the entire range of production. It is a higher proportion of costs if unit costs fall as output expands, and it is a higher percentage of price if price falls as output expands. It may, therefore, have a dampening effect on the eagerness of the licensee to expand output and sales through price reduction, since it will be similar to an increasing percentage royalty per unit of sales.

If prices are *rising,* however, the fixed royalty per unit is an advantage to the licensee (compared to a percentage royalty on sales) and does induce him to expand operations. The licensor then shares in the expansion, but only through increased output and not through the price rise directly. (If the rise in price is part of a general inflation in the licensee's country, any expansion of output tends to be thwarted by a rise in costs; hence, a royalty based on output does not protect the licensor's return from the losses imposed by inflation as do contracts using monetary measures).

The input base is a variation of the output formula, since the payment is calculated per unit of raw material or fuel or other service consumed. This method is an attempt to use the product base while avoiding the difficulty that arises when products of widely different *value* are being produced under license—e.g., as in the refining of petroleum, or the manufacture of different kinds of steel, etc.—which is reflected in the amount of crude oil, iron ore, electricity, etc. consumed. This technique also adds a fixed amount to the operating cost structure of the licensee. Its use is limited by the fact that there are few products for which the technical coefficients of production are so fixed that substitution of inputs is excessively costly; otherwise the licensee may attempt to reduce his reliance on the input used as the royalty base.

b) Value

Royalties paid as a percentage of the "value of sales" were employed by over 70% of our respondents. They have the converse attribute of *not* adding any fixed amount to costs, but of varying with *both* volume and price; this is considered an advantage (or a disadvantage) to the parties depending on their desire to bear (or avoid) uncertainty. A percentage of sales royalty decreases in proportion to cost if costs rise as output increases and price falls. It can be an incentive, compared to an output-based royalty, for the licensee to expand production if he feels that total sales will increase with a price drop. An adverse impact on sales occurs when prices are tending to rise from a decline in output; in this event, the royalty becomes an increasing proportion of costs to the licensee. If he has the ability to expand operations in such a situation (that is, if he is not constrained because of lack of materials or governmental controls), the royalty procedure should induce him to expand operations and cut prices to the mutual

benefit of both himself and the licensor, who would share in a larger total profit return.

The use of a "net" sales base rather than gross sales permits some adjustment in the event that there are ancillary conditions (such as a requirement concerning advertising expenditures of the licensee) or sales of materials or components by the licensor to the licensee, which make a deduction justifiable. However, it would be just as effective from a profit standpoint to adjust the rate downward as to reduce the base; the choice of where the adjustment is to be made is simply one of preference among the negotiators as to ease and accuracy of calculation.

The use of a "value added" base is generally avoided because of the difficulty of calculation. However, where the process or know-how licensed is employed at a late stage of production and the item is sold on the consumer market, calculation is easier. If the "value added" is determined by the market (as would be the case when the licensor bought supplies and parts on the market, employed only one production stage and sold in the open market), the procedure is no different essentially from a royalty on gross sales. If the "added value" to be used as a base is determined arbitrarily by the parties to the agreement, its effect is similar to a per unit royalty on output.

c) Net Profits

The provision basing royalties on net profits makes the calculation of the return more difficult than under those based on sales since procedures for calculating costs as well as revenue must be agreed upon. Its effect on the profitability of the license depends on the relative returns to the licensed item compared to unlicensed sales. Since the base on which royalty is paid includes other operations of the company, there is greater certainty that *some* return will be received (even if the major item licensed does not go well). But the licensed items might fare better than the operations of the rest of the company, reducing the royalty return as compared to one based only on licensed sales.

Justification exists for extending the rate to a percentage of total profits when the know-how or processes licensed cannot be restricted to use on the particular products involved. There is frequently a seepage throughout the plant or company into other areas, and the increased profitability there should be shared. However, if this seepage is not an important consideration and the licensed operations appear likely to be the most profitable among those of the licensee, it is desirable for the licensor to base the royalty only on the profits resulting from the licensed items. But, if there are joint costs in production of licensed and unlicensed items, the calculation becomes difficult and arbitrary.

The per cent of profits formula has some interesting effects on total returns to each party. If the licensee is pricing on a mark-up over costs basis, he will add to his mark-up a percentage to cover the license. Presuming that the license was a cost-reducing process (or know-how), the net effect on the price of the product will depend on the relative size of the percentage added for royalty and the percentage cost reduction. Unless the differential is such as to leave the licensor a larger profit than before, he has no incentive to expand operations as a result of the license.

2. *Royalty Rates*

a) Percentages

Although we have pointed out the difficulty of obtaining the "monopoly return" from the licensee through a precise calculation of the value of the license to him, there are a variety of factors which give clues as to the relative size of the return available. These factors are weighed in the licensor's requests concerning the royalty rate or other compensation. They include the market volume of sales, the unit value of the product, and the expected profit margin. Each, in turn, are related to whether the product is a capital good or a consumer good, whether the product is mass-produced or requires a large amount of handling and a high degree of fabrication, whether exclusivity of territory is extended, and whether the assets transferred provide complete information and all necessary patent rights or additional information, and/or patent rights must be obtained from other sources.

When the rights extended are "complete" in that no other outside source of information is required, the contribution of the licensed rights is considered relatively more important and valuable. If the right extended is unique, the monopoly position of the licensee is increased, and therefore the royalty rate. A large unit value of the product raises the royalty rate on the presumption that the profit rate on such items is usually higher than on products of lower per unit value; the same reasoning is applied to products which entail a high degree of individual fabrication, as compared to those which are mass-produced and to capital goods as compared to consumer goods. And, finally, a product which has a large volume of sales may receive a lower royalty as compared to one with a smaller volume; the justification again being that the smaller volume means a higher per unit value and a higher profit margin. Each of these measures is an attempt to calculate the return to the licensee and, therefore, the funds available for royalty payments.

The procedure for determining the appropriate royalty rate is, therefore, not direct but oblique. It is not possible for the parties to know the future profit margins. Various "indicators" are employed.[7] One rule of thumb is to divide the *potential* profit margin (say 25% to the licensor) as reflected in the mark-up used by the licensee; thus, a 25-75 division of the profits on a 20% mark-up would result in a 5% royalty on sales. Another indicator is the "competitive" rates others are charging for similar arrangements. A third is the knowledge of the licensor as to savings arising from use of the transferred assets. A fourth measure is provided by comparison with *expected* returns had the market been exploited in another fashion (i.e., by exporting or investing); users of this approach have sought to gain a similar return from licensing as would result from capitalizing the licensed assets as an equity contribution to the licensed company.

When an exclusive license is extended, the licensee is given a protected market. (Over two-thirds of our respondents generally extend an exclusive right to manu-

[7] The Foundation has promised anonymity to its corporate responders and quotations are not made; however, illustrations of these measures can be seen in the NICB Report on *Foreign Licensing Agreements*—II, Studies in Business Policy, No. 91, 1959, p. 52.

facture, but only 55% an exclusive right to sell). His return per unit of sales should be larger than under competition, and the licensor expects to share in that return. *But,* as suggested in the previous section, it is not at all certain that the licensor profits more by extending the exclusive license.

b) Rate Changes

Most of the royalty provisions carry a single (constant) rate for each set of rights (trademark, process, or patent) licensed, regardless of the output, volume of sales, or number of years in which the license is to be in force. But a sizable number of licensors have agreed to rates which vary with one of these factors. The variations fall into either an increasing or a decreasing pattern. For example, the licensor may agree that as the output of the licensee rises above 5,000 units during the year, the royalty will drop from 5% on the first 5,000, to 4½% on the next 5,000, to 4% on the next 3,000, and so on. (About 10% of our respondents employ this procedure). Or, the variation might be based on time so that during the first year the rate was 5%, during the second 4¼%, etc. Conversely, an increasing rate would make similar progressions upward, starting at a low level.

The justifications for these provisions depend on the particular situations surrounding the licensee's operation and market. A decreasing rate based on output or sales is appropriate when an expansion of sales by the licensee will be quite difficult unless a price drop is feasible; the cut in royalty rate provides an added incentive to expand. A royalty rate decreasing over time is justified when the license provides an asset which is unique but whose uniqueness may not last as long as the license contract; a decreasing rate keeps the licensee satisfied, reflecting the declining value of the licensed rights.

The increasing rate may be coupled with a complete waiver of royalties during the first few years of the agreement in order to permit the licensee to plow back all available earnings into the operation. As sales and profitability rise, the licensor considers that the value of the license also rises and that he should be entitled to a larger share of later returns for having foregone the earlier returns. The increasing royalty rate is also applied on volume or value of sales, rather than over time, with the justification that expanding production is done at decreasing cost, making more profit per unit in which the licensor should share.

It is, of course, not always true that expansion of production is done with decreasing costs; rather, after a point, operating costs per unit undoubtedly increase, and the profit margin per unit declines. If the licensor asks for a still larger percentage of selling price, the "break-even" point for the licensee is reached more quickly, reducing his profits. It is certainly conceivable that a lower royalty would permit even more sales and a higher total return to the licensor. In fact, a decreasing royalty rate as operating costs rise would probably increase returns to the licensor if there is competition forcing the price of the product down in order to expand sales volume.

From a strict profitability standpoint, the licensor would be justified in waiving payments under a running royalty when operations began on a very small scale, increasing the rate gradually as operations moved into the area where costs were

decreasing, and then decreasing the rate as operating costs per unit rose with the expansion of sales volume. Once the scale of operations in a given plant is raised to the projected level, variations in the royalty rates would be appropriate if based on the *level* of operations in a given period compared to the most efficient (least-cost) level, falling as costs per unit rose and rising as they fell. A variation in rates with total *sales* in a period does not necessarily make for more efficient production and therefore the maximum profit, for it takes no account of the costs incurred in production. But it must be recognized that such a method of varying rates to induce more efficient operation would be difficult to administer and open to abuses. Therefore, a constant rate is preferable once the desired *scale* of operations is reached by the licensee.

Another method of altering the royalty rate is that providing for a different rate if the licensee sells outside of his "assigned" territory. Although this provision is suspect under U. S. antitrust legislation and is frowned upon as an export restriction by the licensee's government, it is sometimes written into contracts. As far as maximizing the profits of the licensor are concerned, this penalty rate is justifiable if there is a differential profit to be made, either by the licensor or the licensee, by selling in the third area. If the licensor is not exporting and if the higher royalty forces up the price of the product and reduces export receipts, the licensor is not maximizing his returns from total sales of the product (by himself and his licensee). Even if the licensor would have served the market, his profits are increased (or *not* reduced) *only* if the additional royalty returns from the third market are equal to, or greater than, his profit on exports to the same area. Since it is highly unlikely that the licensee can export into a third market at a price considerably less than that asked by the licensor and *still* pay to the licensor a royalty equal the licensor's usual export profit, the provision becomes a means of keeping the licensee out of areas where the licensor exports by reducing the licensee's return.

A reverse situation arises when the licensor sells in the territory of the licensee. In this event, some contracts provide that the licensor shall remit a portion of the export profits to the licensee (a kind of "sales commission") which, in effect, the licensee would have received. The decision as to whether exporting and sharing the profits is better than not exporting and receiving royalties depends on (1) the relative costs to the two companies in serving the market, and (2) the royalty rate compared to export profits. If the royalty could be set so as to equal the expected returns from (lost) exports, there would be no advantage in the licensor exporting into the same territory. But in many instances only *part* of the foreign market can be satisfied by exports (because of restrictions), leaving domestic sales to fill the gap. The licensor is, therefore, unable to obtain the entire foreign market; some must be left to the licensee to serve. And, out of sales by the licensee, the licensor can ask only an amount equal to or *less* than his own profits from exports. He would not be able to command that portion of profits on sales by the licensee which resulted from cost differences between the two countries (such as transportation or labor).

In view of the larger profits expected from sales as compared to royalties, about 5% of our respondents have reserved the right to buy from the licensee a portion of his output for sale by the licensor in various markets. Other licensors have established wholly-owned foreign subsidiaries which have exclusive distribution rights, extending to the licensee only a right to manufacture. The licensee is not precluded from selling similar items under his own mark, but the licensor controls completely the distribution and export of the product under his trademark. This arrangement is similar to the "manufacturing contract," which leaves the final profitability of the arrangement to the *seller's* ability.

3. *"Certainty" Provisions*

In order to reduce some of the uncertainty as to returns from the license, over 40% of our respondents have employed the "minimum" royalty provision. It stipulates that whatever the sales of the licensee, a fixed amount of dollars is to be paid the licensor. This amount is usually calculated at between one-half and three-fourth the anticipated annual royalties for the first few years. Such a minimum gives the licensor some immediate return regardless of the fortunes of the licensee *and* it stimulates the licensee to make immediate use of the assets transferred. There is less danger that the licensee will "sit-on" the rights extended him.

The minimum provision should have no effect on the pricing of production or the profitability of the license *if* the licensee in fact produces more than enough to remit the minimum. It is only if he repeatedly earns less than the minimum that his future operations would suffer, for then the license is likely to be terminated. For the licensor, the minimum royalty introduces some of the elements of the fixed annual payment.

An initial or down payment is used by nearly 40% of our respondents to obtain a certain return. It is frequently a "disclosure" fee, covering initial costs of transmitting the information plus some of the research and development costs. It is also used as a down payment to be deducted from future royalties. This provision, plus the "minimum" payment clause, introduces many elements of a fixed payment approach yet leaves room for additional profit.

The maximum annual royalty (or maximum over the life of the agreement) serves the purpose of providing certainty plus additional profits to the licensee; about 7% of our respondents have used this provision. A justification is that the licensor feels it inappropriate to ask "all that the traffic will bear" when his costs will have been returned five times once the "maximum" has been reached. Under it, the liability for royalties by the licensee ceases after a given amount has been paid each year (or over the life of the agreement). The impact of this provision is similar to that of a decreasing royalty rate, for after the "knockout" level has been reached, the remaining output is royalty-free, progressively reducing the "average" royalty paid.

Additional measures to increase the certainty of returns to the licensor include terminal payment and momentum clauses. Under the former, the licensee must make a lump-sum settlement if he decides to terminate the agreement. (Con-

versely, the licensor may be obligated to make a terminal settlement if he terminates the contract.) The latter provides that the licensee shall continue to pay royalties on all items in process at the date of termination. Neither of these clauses is likely to have a direct effect on the pricing of the product nor the profitability of the license, though an indirect effect arises through the fact that they are part of the entire package.

A final uncertainty which may be reduced is that of how much technical assistance the licensor may be requested to provide. The contract usually stipulates the particular assistance to be extended; it may offer additional information or aid on payment of special fees—e.g., for additional technical visits, management services, advertising consultation, selling assistance, etc. Although there are a few licensors who charge such fees *under* their license agreements for additional services, most of them do so outside of the agreement or place them under the royalty provision. The advantage of keeping such services separate as far as possible is to reduce their incidence or to make certain that their cost is covered. Unless these services are strictly defined and limited, they can become quite costly to provide, in both extent and nature. A cost-plus-fee basis reduces the cost of this part of the license, but also reduces the justification for a higher royalty rate. The effect of a "cost-plus-fee" charge for such services on the prices of the licensee's product should be no different than the purchase of any other consultation service; it presumably reduces costs by more than the price of the service, either increasing profits or reducing prices or both. From the licensor's side, however, it not only increases certainty, but also reduces the costs of fulfilling the license proper.

C. EQUITY PARTICIPATION

Equity participation is the acceptance of shares in the licensee company in return for part or all of the rights transferred. The use of this method differs between "associated" companies (those not controlled by the licensor) and the licensor's subsidiaries (over 50% owned by the licensor).

1. *Associated Companies*

Equity participation, when accepted as down payment or as part of the running royalty, makes the licensee an affiliate or associated company of the licensor. In the instance of formation of a new company as licensee, equity shares may be accepted as the entire payment for the contribution of patents, trademarks, and/or know-how of the minority partner (the licensor). The minority partnership leaves the licensor with the greatest uncertainty (largest risk) among all the forms of compensation, but it leaves the licensee with the largest profit out of which to make remittances to the licensor. This is so because, when licensed assets are capitalized in the new company, there are no charges against the company which must be covered in their costs. There is, therefore, no additional fixed or operating (per unit) cost which would alter the average or differential cost used in calculating the optimum price; profits may then be "optimized" without regard to the costs of the licensed rights.

The problem of determining the value of the licensed assets is shifted to the negotiations concerning their capitalized value to the new company. This decision

is close to a pure "shot-in-the-dark" in that such negotiations do not have the benefit of objective criteria. The anticipations of the parties as to the long-run market and the relative contribution of the factors of production are the bases for the determination.

Where the equity participation is taken in an established foreign company, there is a problem of determining the amount of equity shares to be paid the licensor. Either the down payment (or royalty) can be determined in money terms as discussed previously and then translated into shares at an agreed price (market or otherwise); or an agreed percentage of the outstanding equity may be extended as an initial payment. In effect, a definite sum is turned into an indefinite future series of sums. Whether this is profitable in the long run to the licensor cannot be foretold. Two different companies will look at the same set of circumstances and adopt opposite policies.

The considerations involved in the decision to accept equities are the following: (1) the degree of control over the licensee which a minority position offers over trade secrets, quality of products, and sales efforts; (2) the potential return on the equity compared to alternative investments of the royalties (which would otherwise have been available in dollars) allowing for differences in risks; (3) lack of cash or current foreign exchange on the part of the licensee; and (4) tax advantages or disadvantages.

As to control, some licensors have obtained one or two seats on the Board of Directors and have found that this gives them sufficient influence. In some instances the licensor has been satisfied not to exercise this privilege of naming a director, feeling that the management is doing well enough. Others have found that minority representation has given them no influence and that such participation is only a nuisance. They discount completely having any control; and, being unwilling to take equity shares where they have no control, they do not license for this type of compensation. Contrarily, a few U.S. licensors have found a minority position so desirable that they have established a policy of not going overseas save through licensing for equity. They have found that the lack of capital overseas gives them an advantage in obtaining the best licensee *and* when some new capital is needed for growth, their small equity (and possibly new capital) contribution gives them a veto over expansion plans. Returns have been so high relative to domestic and direct foreign investment opportunities that they are actively seeking more minority situations.

The decision either way is not (and cannot be) made out of "cold logic," which cuts a clear path to the right approach. It is usually out of a long-established business philosophy, which itself is not the result of pure logic. The approach chosen is a result of a host of large and petty experiences which form attitudes in the minds of management. These attitudes are then rationalized into policy rules-of-thumb, which in many cases are not re-examined until some "golden" opportunities have been passed by. It is precisely this "loss of a plum" experience which is causing many companies to re-examine their attitudes toward equity participation and to licensing in general.

2. *Subsidiaries*

For many companies the equity relation arises first through a controlled or wholly-owned subsidiary, with licensing a companion or secondary contract. Some U. S. parents do not formally license their foreign subsidiaries; our investigations place such companies in the minority. Most license the foreign subsidiary formally for three reasons: (1) The contract provides a legal preciseness in the event of any litigation concerning the licensed rights and may protect ownership of trademarks and patents if the company were confiscated. (2) The license is the basis for remission of royalties in dollars, approved by the foreign government, when dividends might be restricted. (3) There is a tax advantage in that royalties are not taxed as income of the subsidiary, which is especially advantageous if they are to be used in expansion of the subsidiary or remitted to a foreign-base company.

As to the pricing of licenses to subsidiaries, the division of returns from a wholly-owned company between dividends and royalties is completely arbitrary. Many parents try to make royalties "as high as they can." The limits would be the necessity to have a "minimum" capitalization of the company to meet incorporation laws and to provide some credit-worthiness in local capital markets. An additional limit is met in the approval required in most countries for currency remission, which provides the government a chance to say whether royalties are "excessive."

Whether the parent can adopt the same procedure with a less-than-wholly-owned (controlled) subsidiary depends on the power of the minority to complain. They will likely feel that dividends (in which they should share) are being paid out as royalties. A further limit on royalties arises, therefore, in the necessity to satisfy the minority shareholders.

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STUDENT PAPERS*

Comparison of the Patent Provisions of the NASA Act and AEC Act

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SUMMARY

THE PATENT PROVISIONS of the National Aeronautics and Space Act of 1958 have been the subject of considerable criticism and opposition from representatives of industry, the American Bar Association, the American Patent Law Association, and both Government and non-Government attorneys and procurement personnel. These provisions are strikingly similar to the patent provisions in the Atomic Energy Act of 1954 which have also been heavily criticized.

A comparison of the major patent provisions of the two statutes might be helpful in attempting to recognize a trend, if there is one, in congressional sanction and encouragement of Government ownership of patents. This paper attempts to compare the major patent provisions of the two recent products of congressional action and point out and briefly comment on their similarities.

INTRODUCTION

THE SOVIET ACCOMPLISHMENTS IN PLACING the Sputniks in orbit around the earth in late 1957 provided a visible symbol and a warning that the United States may not be leading in the vital fields of research and development in space and astronautics. It was, in many ways, a very discouraging time for the United States; the prestige of the Soviet Union was high and that of the free world at a low ebb. Immediately, numerous approaches were suggested as the best way to organize the astronautics program of the United States.

* Among the objectives of the seminar and lecture series given by the Foundation in conjunction with The George Washington University Law School are the stimulation of student interest and the initiation of a source of publishable student material for the *Journal*. By making available the best papers, students receive an incentive and our readers will appreciate the evidence of scholarly development in the fields of interest. The Foundation invites educational and research institutions to submit informative student manuscripts on the patent, trademark, copyright, and related systems.

LEGISLATIVE HISTORY OF THE NASA ACT OF 1958

Perhaps the best proposal on how the United States might improve its astronautics abilities was embodied in the President's message forwarded to the Congress on April 2, 1958, which called for the establishment of a strong civilian agency to direct a national program for outer space. Accompanying the message was a proposed draft of a bill to implement the program. This bill was introduced into the House as H. R. 11881 [1] and in the Senate as S. 3609 [2] on April 14. Neither bill made any reference to patents. The bills were under constant review during the course of several weeks in public hearings [3] and executive sessions during which shortcomings in the original version became apparent as various administrative officials and outside witnesses suggested changes in the language. Numerous amendments were made in H. R. 11881 and a clean bill H. R. 12575 [4] was substituted for it. In the Senate hearings on S. 3609, the Deputy Secretary of Defense Donald A. Quarles testified that the bill had no special patent provisions and that the Department of Defense assumed that the work of the new agency would carry the same kind of patent provisions as the work of the Department of Defense.[5] The House special committee reported out H. R. 12575 [6] which was unanimously passed in the House on June 2, 1958.[7] The Senate special committee reported S. 3609 on June 11, 1958.[8] The two bills as reported out by the respective committees [9] now

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[1] H.R. 11881, 85th Cong. 2d Sess. (1958), 104 Cong. Rec. 6325, a bill to provide for research into problems of flight within and outside the earth's atmosphere, and for other purposes.

[2] S. 3609, 85th Cong. 2d Sess. (1958), 104 Cong. Rec. 6288.

[3] Hearings on H.R. 11881 Before the House Select Committee on Astronautics and Space Exploration, 85th Cong., 2d Sess. (1958); Hearings on S. 3609 Before the Senate Special Committee on Space and Astronautics, 85th Cong., 2d Sess. (1958).

[4] H.R. 12575, 85th Cong. 2d Sess. (1958), 104 Cong. Rec. 9091.

[5] Hearings on S. 3609 before the Senate Special Committee on Space and Astronautics, 85th Cong. 2d Sess. (1958), p. 78:

SENATOR ANDERSON: Now, let me ask you this. Is there any provision in this bill with reference to patents?

MR. QUARLES: I think there is no specific provision in this bill for patents.

SENATOR ANDERSON: No. So that whoever developed the project could patent it and claim it and keep it as his own; one of these private groups.

MR. QUARLES: Well, I don't think I would like to agree with that, but you are in a much better position to have an opinion about that than I am, Senator.

SENATOR ANDERSON: Only because the burnt child fears the fire, and we went through this in Atomic Energy Commission for a long, long time. Would it not be well to try to protect it as we get underway, perhaps?

MR. QUARLES: Well, I think we have been assuming in the Department of Defense that the work that this agency would carry on with Government funds and for the Government would carry with it the same kind of patent provisions that our own work carries with it, and this is well established by law and practice, and I had assumed that the same practice would apply to the new agency. I will assume it not as a lawyer, however.

[6] H. Rept. No. 1770, 85th Cong. 2d Sess. (1958).

[7] 104 Cong. Rec. 9941.

[8] S. Rept. No. 1701, 85th Cong. 2d Sess. (1958).

[9] *Supra* notes 6 and 8.

contained nearly identical patent provisions [10] which were broadly similar to some sections of the Patents and Inventions section of the Atomic Energy Act of 1954.[11] The Senate, after substituting language of its own bill, unanimously passed H. R. 12575 on June 16 and asked for a conference to discuss the differences.[12] The conferees of the House and Senate agreed on a compromise measure and reported an amended version of H. R. 12575 on July 15.[13] The amended bill was agreed on unanimously in both the House and Senate the following day and was approved by the President on July 29.[14] This Act, which has the short title "National Aeronautics and Space Act of 1958" (hereafter called the NASA Act), established the National Aeronautics and Space Administration (hereafter called NASA) to be headed by a civilian administrator (hereafter called the Administrator).

The NASA Act contains patent provisions in Section 305, entitled Property Rights in Inventions,[15] which occupies two of the twelve pages of the Act. The

[10] *Supra* note 6 (H.R. 12575), p. 25:

(a) any invention or discovery made or conceived under any contractual or other relationship with the new agency shall belong to that agency, unless the Administrator waives the agency's claim to such invention and discovery.

(b) where the Administrator waives the agency's claim to an invention or discovery made or conceived under such a relationship, he shall retain the right to use the invention or discovery in carrying out his functions and to license it to others for use in carrying out the activities authorized by the act; and in any such case he may pay or require any license to pay the inventor or discoverer a reasonable royalty for the use of the invention or discovery.

(c) the Administator is authorized in any case where the agency's claim is not waived under subsection (a) and the invention or discovery accordingly becomes its property, to pay the inventor or discoverer a cash award as compensation for the invention or discovery.

Supra note 8 (S. 3609), p. 19:

(a) any invention or discovery resulting from activity taken under any contract of the Agency, any subcontract under any such contract, or any arrangement or other relationship with the Agency, shall be deemed to have been made by the Agency unless the Director waives the claim of the United States to such invention or discovery.

(b) in any case in which the Director waives the claim of the United States to any such invention or discovery, he shall retain on behalf of the United States full right to the use of such invention or discovery in carrying out any function under the act, and, upon such terms and conditions as he may deem appropriate, to license other persons to use such invention or discovery in the conduct of any activities authorized by or under the Act. The Director may grant any such license to any other person, he may, in accordance with such standards and procedures as he may establish by regulation, provide for the payment by the Agency or by the person so licensed of a reasonable royalty to the party in whose favor such waiver was granted.

(c) in any case in which the Director does not waive the claim of the United States to any such invention or discovery, he may grant to the party who made such invention or discovery in compensation therefor a cash award in such amount as the Director may determine in accordance with standards and procedures established by him by regulation.

[11] Atomic Energy Act of 1954, 68 STAT. 919, 42 U.S.C., §§2011-2281.

[12] 104 Cong. Rec. 11,306.

[13] H. Rept. No. 2166, 85th Cong. 2d Sess. (1958).

[14] Public Law 85-568, 85th Cong. (1958).

[15] *Ibid.*, Section 305.

final patent provisions, although considerably more lengthy, are actually much narrower than either of those adopted by the special committees.[16] In essence, the Act provides (1) that inventions made as the result of contracts with NASA and which meet specified conditions shall become the exclusive property of the United States subject to a possible waiver of rights in the title back to the contractor,[17] and (2) that applicants for a certain category of patent applications must state the circumstances under which their invention was made and that such application and statement shall be forwarded to the NASA Administrator for review.[18]

CONCERN OVER PATENT PROVISIONS

While there was no opportunity for official testimonial opposition to the patent provisions prior to their enactment, there was informal opposition from various military suppliers, the American Patent Law Association, and other groups and individual attorneys. Following the publication of the legislation and approval by the President, there was widespread objection toward the patent requirements of the Act, very little of which, however, appeared in any publication. Examples of this attitude were reflected in a speech by Harry R. Mayers [19] before the Boston Patent Law Association in November of 1958 and a published article [20] by Elmer Gore.[21] Mr. Mayers said:

> No legislation more clearly designed than the Space Act to eliminate patent incentives in in a large segment of American industry has ever been proposed or passed; yet, except for the efforts of a few hard-working committees, the matter has passed almost without notice in the patent profession. My objective today is to alert any presently unalarmed individuals among you to the dangerous situation which has been thrust upon us and to suggest some measures which I think ought to be taken by industry and the organized bar to alleviate it.

Mr. Gore wrote:

> Few things have come out of Washington in recent years that have caused so much alarm in the aircraft-missile industry as the provisions of the National Aeronautics and Space Act of 1958 that have to do with patents and inventions. Whether because of intention or loose wording, the Act is so written as to permit the Government to take over, as its own property, practically any new invention or development that touches on the air and space business. Whether it would ever be administered in such a way is questionable, but of course the danger is there.

There appear to be two major reasons for this serious concern over the new legislation relating to patents: (1) loss of incentive for Government (NASA) contractors due to fear of loss of patent rights, and (2) fear of Government control of

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[16] *Supra* note 10.

[17] *Supra* note 14, subsections 305(a), (b) and (f).

[18] *Supra* note 14, subsections 305(a), (b) and (c).

[19] General Patent Counsel, General Electric Company, New York, N. Y.

[20] *Aeronautical Procurement Magazine,* January, 1959, p. 20.

[21] Asst. General Counsel, Raytheon Mfg. Co.

a new industry by controlling patents as was experienced as the result of the patent provisions of the Atomic Energy Act.[22] Mr. Gore also writes:[23]

> The earthling (writer) is puzzled as to what benefit the Government can get out of obtaining exclusive title to inventions, and is vaguely disturbed that such a provision, which before this had appeared only in the Atomic Energy Act, is now being used in an area which encompasses practically all human activity.

In one of the most comprehensive articles[24] yet written on the NASA Act patent provisions, Wilson R. Maltby states:[25]

> The AEC Act provisions, lodging with the Commission title to all inventions useful in the production and utilization of special nuclear materials in an atomic weapon, and made under contract (or other arrangement) have been extended to the non-military aspects of aeronautical and space activities in which knowledge and technology are shared by the scientific community at large.

Upon a summary comparison of the patent provisions of the Atomic Energy Act of 1954[26] and those of the NASA Act of 1958,[27] it is evident that there exists a similarity in some of the major aspects of the two Acts, particularly, (1) title in certain inventions made by a contractor shall be vested in the United States, (2) rights in title of these inventions may be waived back to the contractor, (3) authority to review certain categories of pending patent applications and statements of the applicant, and (4) provisions for the granting of awards. In view of this obvious similarity of the above aspects, and indeed, of some of the detailed language and procedures suggested in both Acts, an analysis of the patent provisions of the new NASA Act in view of those of the AEC Act would be appropriate. The Atomic Energy Act of 1954 (hereafter called the AEC Act) established the Atomic Energy Commission[28] (hereafter called the Commission) and contained its major patent provisions in sections 151 to 160.[29]

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[22] *Supra* note 11.

[23] *Supra* note 20.

[24] 27 Geo. Wash. L. Rev. 49-75 (October 1958).

[25] *Ibid.*, p. 59.

[26] *Supra* note 11.

[27] *Supra* note 15.

[28] *Supra* note 11, §§2031.

[29] It is of interest to note that while some of the provisions of the two acts are similar, the circumstances under which the acts were passed were different. The AEC Act of 1954 is the outgrowth of the AEC Act of 1946 which was the subject of voluminous Congressional hearings and eleven months of testimony and debate. The NASA Act, however, was the result of a sense of urgency in Congress which approved the final bill in less than three and one half months after the President's request for action. This hurried legislation may be one of the prime reasons for resemblance in the patent provisions. Perhaps a comparison of the "signs of the times" might also be revealing. The first AEC Act was broached soon after the firing of the first atomic bomb in 1945, whereas President Eisenhower's 1958 request for a space agency was precipitated by the successful launching of the first space satellites by the Russians in late 1957.

SUBSECTION 305(a) OF THE NASA ACT

Subsection 305(a) of the NASA Act provides that any invention which is *made* in the performance of any *work* under any *contract* of the Administration, and which is determined by the Administrator to meet either of two specific *criteria,* shall be the exclusive property of the United States (emphasis added). The most important aspect of this provision is that inventions made under a NASA contract and which meet either of the two criteria shall become the exclusive property of the United States, and that no license or other interest in the title shall remain with the contractor except that, as will be discussed later, there are procedures which permit the contractor to submit a proposal to the Administrator for a waiver of all or any part of the rights of the invention back to the contractor. Another important aspect of this provision is that not all the inventions made under a NASA contract shall become the exclusive property of the United States, but rather only those inventions which the Administrator shall determine (1) were made by a person who was assigned to perform research, development, or exploration work and the invention was in the scope of his employment duties, or (2) were made by a person who was not assigned to perform research, development, or exploration work but the invention was related to the contract or his assigned duties and was made during working hours or with a contribution from the Government. Accordingly, if an employee was assigned to perform research work in a particular area of research activity but made an invention in another area outside the scope of his assignment (no relation to the work he was assigned to perform), this invention would fail to qualify under either of the criteria and would not become the exclusive property of the United States but would remain with the contractor. The NASA Administrator has published patent regulations [30] pertaining to inventions made under NASA contracts, and has provided that certain NASA contracts shall contain a "Property Rights in Inventions" clause [31] which requires that the contractor shall grant the Government a license for those inventions as to which rights have not been vested in the Government pursuant to Section 305 but were nevertheless made during the performance of the contract. The criteria set forth in subsection 305(a) prescribing the conditions under which inventions made by a NASA contractor will become the property of the United States (NASA) is somewhat similar to (1) the conditions set forth in Executive Order 10096 [32] which prescribes the Government's rights to inventions made by Government employees, and (2) the common law of employer-employee relationship.[33]

The term "made," as used in Section 305 of the Act, is defined in subsection 305(j)(2) as "the conception or first actual reduction to practice of such invention." Therefore, under the NASA Act, an invention which may have been conceived and constructively reduced to practice by a contractor prior to a NASA con-

[30] 24 Fed. Reg. 3577 (1959).

[31] *Ibid.* note 29, § §1201.190.

[32] Ex. O. 10096, 15 Fed. Reg. 389 (1950).

[33] For discussion of the common law of employer-employee relationship and the requirements of the National Aeronautics and Space Act of 1958, see O'Brien and Parker, 19 Fed. Bar J. 255-267, Property Rights In Inventions Under The National Aeronautics and Space Act of 1958.

tract could still be considered to have been made under the contract if it is actually reduced to practice during the performance of the contract. The AEC Act does not define the term "made" but instead specifically infers in section 152 that conception is not an element of the making of the invention; here, the Act states, "Any invention or discovery . . . *made* or *conceived* under a contract . . . ." The patent provisions in the NASA and AEC Acts refer only to the question of title of the inventions "made" under their respective contracts but not to the question of priority of an invention as must be answered in an interference proceeding. The NASA definition does not attempt to change the common law [34] in this respect.

Subsection 305(a) uses the expression "made in the performance of any *work* under any contract." This is in contrast to section 152 of the AEC Act which uses only "made or conceived under any contract, etc." This specific requirement in the NASA Act that the contract must involve work would indicate that Congress did not intend that this provision should apply to all contracts but only to those in which the so-called "work" was performed. In this respect, the NASA provisions are more narrow than the AEC provisions which apply to "any contract." If this conclusion is correct, subsection 305(a) of the NASA Act would not apply to NASA contracts for procurement of "off-the-shelf" items where no work is involved, even though some inventions could possibly be made in this type of contract. The NASA patent regulations [35] require that the NASA "Property Rights in Inventions" clause shall be included in only the NASA contracts which entail technical, scientific, or engineering work and infer by exclusion that no "patents clause" will be required in production-type contracts. In contrast, however, the AEC patent regulations state [36] that the Type C Patent Provisions will be used when the work to be performed is of such character that any invention that may be made will probably result from a routine production by the contractor, and thereby give the Commission the sole power to determine the disposition of the title and rights thereunder.

Subsection 305(j)(2) of the NASA Act defines the term "contract" to mean "an acutal or proposed contract, agreement, undertaking, or other arrangement, and includes any assignment, substitution of parties, or subcontract executed or entered into thereunder." Section 152 of the AEC Act provides for any contract, subcontract, arrangement or other relationship. In the nearly five years of experience with the AEC Act of 1954, no definition to express the scope of these words has been established,[37] but the NASA Act with broader language presents even greater questions. To what extent will the NASA Administrator apply subsections 305(a) and (b) of the NASA Act in (1) proposed contracts, (2) agreements, or (3) understandings with NASA? This is, of course, another problem of interpretation which must be left to the NASA Administrator. It is of interest to note that the NASA "Property Rights in Inventions" clause [38] has been amended to include

[34] Automatic Weighing Machine Co. v. Pneumatic Scale Corp., Ltd., 166 Fed. Rep. 288, 1909 C.D. 498; 139 O.G. 991.

[35] 24 Fed. Reg. 3575, §§1201.101-2(a).

[36] AEC Manual, U.S. Atomic Energy Commission, §§9113-015, June 20, 1955.

[37] Boskey, 36 JPOS 879 (1954); Beckett, 37 JPOS 50 (1955).

[38] *Supra* note 30.

subcontractors,[39] which would tend to indicate that the NASA Administrator is limiting the word "contract" to an actual contract and subcontract.

Subsection 152 of the AEC Act requires that any invention or discovery, *useful in the production or utilization of special nuclear material or atomic energy,* made or conceived under any contract, arrangement or other relationship with the Commission shall be deemed to have been made by the Commission, except that the Commission may waive its claim. Under these requirements only those inventions which have the characteristic of being useful in production or utilization of special nuclear material or atomic energy are affected by this presumption. All other inventions not having this special characteristic would not become the property of the Commission unless the Commission exercises its right under section 159 [40] of the AEC Act, which gives the Commission the right to require that patents granted on inventions made or conceived during the course of federally-financed research or operations be assigned to the United States. This latter provision automatically gives the AEC the right to take title to every invention made under its financed research programs if it so desires to exercise the right, whereas the NASA Administrator is limited in subsection 305(a)(1) and (2) and can take title only to inventions determined to meet either of the two specified criteria.

SUBSECTION 305(b)

Subsection 305(b) of the NASA Act directs that each contract entered into by the Administration for the performance of any work shall contain effective provisions under which the contractor shall furnish to the Administrator full and complete technical information concerning any invention, discovery, improvement, or innovation made in the performance of any such work. The term "invention" is not defined in the NASA Act. In analyzing subsections 305(a) and (b), the former limits the Administrator's authority to take exclusive title to only those inventions which meet one of the two criteria therein specified and makes no mention of any discovery, improvement, or innovation which might be made in the performance of the work but which must be reported to the Administrator under subsection (b). The patent statute, 35 U.S.C. 100, 101, provides that the term "invention" means invention or discovery and that whoever invents, discovers, or makes an improvement may obtain a patent therefor. Thus, the basic patent laws of the United States imply that an invention could also include a discovery or improvement; however, the term "innovation" is not used. This slight irregularity was alleviated in the NASA patent regulations which state that the term "invention" includes any invention, discovery, improvement, or innovation,[41] but which further prescribe that the contractor is not required to report every trifling discovery, improvement, or innovation but only those which appear to have a rea-

[39] 24 Fed. Reg. 6615.

[40] *Supra* note 11, §§2189: Nothing in this Act shall affect the right of the Commission to require that patents granted on inventions, made or conceived during the course of federally financed research or operations, be assigned to the United States. (Section 159).

[41] *Supra* note 30, §§1201.190(a)(iii).

sonable probability of being patentable.[42] This circulatory route directs that only those innovations must be reported that appear to be patentable and therefore, in reality, are actually inventions.

The AEC Act does not specifically provide that its contracts shall contain provisions requiring the reporting of any inventions (discovery, improvement, or innovation) to the Commission. This requirement is implied, however, in subsection 151(c) of the AEC Act which requires that any person (not only a contractor) who has made or hereafter makes any invention or discovery useful in specific fields of atomic energy must either file a report with the AEC Commissioner or file a patent application for the invention or discovery with the Commissioner of Patents, who in turn is required in subsection 151(d) to notify the Commission of such applications and to make them available to the Commission.

The reporting provisions of the AEC Act are much broader in scope than those of the NASA Act. While the NASA Act requires only those inventions made during the performance of work under a NASA contract to be reported, the AEC Act requires all inventions, etc., useful in specific fields to be reported directly or indirectly, regardless of the origin of the invention. The NASA Act requires that full and complete technical information concerning the invention shall be furnished promptly to the Administrator. This information is essential to enable the Administrator to make his determination under subsection 305(a), and also is necessary where NASA would be required to prepare and prosecute a patent application in compliance with subsection 305(h) relating to the protection of the inventions in which the Administrator holds title. The reporting clause[43] of the AEC Act requires substantially the same complete description of the invention for substantially the same reasons.

SUBSECTIONS 305(c), (d) AND (e)

The writers of subsections 305(c), (d), and (e) of the NASA Act followed very closely the wording of section 152 of the AEC Act in providing for the respective agency to review copies of certain patent applications pending at the United States Patent Office. Subsection 305(c) of the NASA Act provides that no patent may be issued to any applicant other than the Administrator for any invention *which appears to the Commissioner of Patents to have significant utility in the conduct of aeronautical and space activities,* unless the applicant files with the Commissioner a written statement setting forth the full facts concerning the circumstances under which such invention was made, and stating the relationship (if any) of such invention to the performance of any work under any contract of the Administration. Similar provisions appear in the AEC Act[44] except the criterion is for any invention or discovery *useful in the production or utilization of special nuclear material or atomic energy.* Both Acts provide that the Commissioner of Patents shall transmit copies of the applications and statements of the applicants to the respective agency, and that the agency has 90 days to review

[42] *Supra* note 30, §§1201.101-3(a).
[43] *Supra* note 11, §§2181(c). (Section 151 [c]).
[44] *Supra* note 11, §§2182. (Section 152).

the applications and statements. If the NASA Administrator or the AEC Commission so requests or directs, respectively, the Commissioner of Patents shall issue the patent to him or the Commission, unless within 30 days the applicant requests a hearing before a Board of Patent Interferences whose ultimate decision may then be appealed to the Court of Customs and Patent Appeals.

Both the NASA and AEC Acts place on the Commissioner of Patents the burden of selecting the specific patent applications to be affected by this requirement. There is not likely to be much difficulty for the Commissioner of Patents or his representatives to select those cases as prescribed by the criteria in the AEC Act. Most of these special applications would be pending in only a few examining divisions where the cognizant patent examiners are skilled in the relatively narrow atomic energy and related arts. Such is not the case in implementing the NASA criteria, i.e., significant utility in aeronautical and space activities. Even though the field of atomic energy is relatively new, the field and technology of space and its related activities are even more recently activated. Applications for inventions which might have utility in aeronautical and space activities could conceivably be under examination in every examining division in the Patent Office. This presents the obvious difficulty in determining which applications are to be considered under these provisions of the NASA Act. It is logical that the NASA Administrator assist the Commissioner of Patents by providing him with an interpretation of what types of inventions might have this required significant utility. The writers of the NASA provisions were apparently aware of this difficulty in determining what applications would be affected because the NASA criteria specifically requires the invention to have "significant utility," while the AEC provisions require only that the invention be "useful."

The reasons for such a provision to be part of the NASA Act patent provisions are three-fold: (1) to give the Administrator an opportunity to police the reporting requirements of the NASA contracts as required in subsection 305(b), (2) to provide a means for the determination, by independent authority subject to judicial review, of any controversy with respect to the validity of the Administrator's claim of title to any invention,[45] and (3) to help bring the latest aeronautical and space technological information to the attention of the NASA scientific personnel. The only basis by which the Administrator of NASA can request the Commissioner of Patents to issue to him a patent for an application reviewed under subsection 305(c) is where it appears that the invention was made under a NASA contract and qualifies under either of the two criteria of subsection 305(a). By requesting that the patent be issued to him, the Administrator thereby shifts the burden onto the applicant to prove the true circumstances of the making of the invention. If the NASA scientist reviews a patent application transmitted to NASA under subsection 305(c) and desires to make use of the invention therein described, NASA is obligated to negotiate a license with the assignee of the application or subsequent patent.

The AEC Act contains these patent application review provisions for the same three reasons described above for the NASA Act, plus the following additional

[45] *Supra* note 13, p. 23.

reasons which are peculiar to the AEC Act: (4) an opportunity for AEC to review all applications in order to exclude the issuance of any patents for atomic weapons as prescribed in subsections 151(a) and (b), (5) an opportunity to police the reporting requirements of subsections 151(c) and (d), and (6) an opportunity for AEC to police the special AEC license requirements set forth in sections 101-110 of the AEC Act.[46]

The last paragraph of section 152 of the AEC Act provides that where the statement of facts filed by the applicant is thereafter found to contain false material statements, the AEC may have the title to any patent transferred to the Commission on the records of the Commissioner of Patents. This same provision is contained in subsection 305(e) of the NASA Act except the NASA Administrator is limited to within five years after date of issuance of such patent to file his request for the transfer of title. It is specifically stated in the NASA Act and is implied in the AEC Act that the applicant can request a hearing before a Board of Patent Interferences to determine initially whether any such false representation was contained in such statement by the applicant. The decision of the Board of Patent Interferences is subject to review by the Court of Customs and Patent Appeals.

SUBSECTION 305(f)

Subsection 305(f) of the NASA Act provides that the Administrator may waive all or any part of the rights of the United States with respect to any invention made under a NASA contract and which qualified under either of the specified criteria of subsection 305(a)(1) and (2), and in which exclusive title was vested in the United States. The Administrator may make a waiver only where he determines that the *interests of the United States will be served thereby* (emphasis added). Section 152 of the AEC Act provides that the Commission may waive its claim to any invention or discovery *under such circumstances as the Commission may deem appropriate* (emphasis added). Congress has given the AEC more latitude than it gave the NASA Administrator in determining what rights can be waived because the matter is left solely with the Commission as what it may deem appropriate, whereas the NASA Administrator must determine what will "serve the interests of the United States." It again becomes necessary under the NASA Act, however, to make a categorical determination of what is meant by this qualification placed on a particular type of invention. As in subsection 305(c), it was necessary for the Commissioner of Patents to determine which inventions have "significant utility in aeronautical and space activities"; it becomes necessary in subsection 305(f) for the NASA Administrator to determine which inventions may be waived so "that the interests of the United States will be served thereby."

The NASA Administrator has published interim regulations[47] setting forth policies and procedures concerning waiver of all or any part of the rights of the United States with respect to inventions made in the performance of work required by contracts of NASA. These regulations define the Administrator's policy con-

[46] *Supra* note 11, §§2181-2190 (Sections 101-110).

[47] 24 Fed. Reg. 1644 (1959).

cerning when the interests of the United States (1) would [48] and (2) would not [49] be served by waiver of rights under inventions.

It is difficult, if not impossible, to define explicitly what serves the interests of the United States because these interests are obviously extremely broad. Perhaps Dr. Simon Ramo,[50] during his testimony before the special House committee [51] concerning the NASA Act, touched on something that would be of interest to the United States when he said there must be some type of government control in the use of outer space for at least the sake of safety for our citizens.

The NASA Act directs that each waiver shall be subject to the reservation by the Administrator of an irrevocable, nonexclusive, nontransferable, royalty-free license. No such specific provision is necessary in the AEC Act because waivers are made as the Commission may deem appropriate. Furthermore, the Commission could at any time exercise its rights in its yet unused "reserve clause" compulsory license provision of section 153 and declare a patent affected with the public interest, and thereby be automatically licensed to use the invention under subsection 153(b).

The NASA Act provides that each proposal for a waiver shall be referred to an Inventions and Contributions Board which shall accord each interested party an opportunity for hearing, and shall transmit its findings and recommendations to the Administrator. No such elaborate procedural provisions are indicated in the AEC Act but only that a waiver may be granted by the Commission upon a majority vote.[52]

SUBSECTION 305(g)

Both the NASA Act (subsection 305(g)) and the AEC Act (section 156) grant similar authority for specifying the terms and conditions under which licenses may be granted for patents owned by them. Both Acts likewise provide additional authority for acquiring and disposing of property rights in patents. Subsection 203(b)(3) of the NASA Act authorizes the Administrator to sell and otherwise dispose of real and personal property (including patents and rights thereunder); and subsection 161(g) of the AEC Act authorizes the Commission to sell, lease, grant, and dispose of real and personal property including patents. This authority for Government agencies to license and especially to sell property rights in patents represents an opportunity for the Government to recognize a new source of revenue. The desirability for the Government to license or sell its patent rights for a fee has been the subject of much discussion.[53] The AEC has not attempted to exercise its authority to dispose of any of its rights in its patents owned by the United

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[48] *Ibid.*, §§1201.303 and 1201.304-2.

[49] *Ibid.*, §§1201.304-1.

[50] Executive Vice President, Ramo-Wooldridge Corp., Los Angeles, Calif.

[51] Hearings on H.R. 11881 before the House Select Committee on Astronautics and Space Exploration, 85th Cong. 2d Sess. (1958), pp. 498-499.

[52] *Supra* note 11, §§2031. Action of the Commission shall be determined by a majority vote of the members present.

[53] Forman, *Patents—Their Ownership and Administration by the United States Government*, pp. 157-175.

States.[54] There were provisions in the early drafts of both the AEC Act of 1954 [55] and the NASA Act [56] which provided for the imposition of royalties upon licenses under their patents. There are many difficulties and objections to the charging of royalties for use of Government-owned inventions such as (1) difficulty in fixing the proper royalty rate, (2) detection and prosecution of infringers, (3) competition with private industry, and (4) passing on to the public of the additional toll.[57] It is obvious, however, that the aeronautical and space activities of NASA are much broader than the activities of AEC, and there would be a much larger market for the patents owned and administered for the United States by NASA. The NASA Administrator might be compelled for the best interests of the United States to promulgate regulations relating to the sale or lease of the property rights in the NASA patents.

Subsection 203(b)(3) of the NASA Act gives the Administrator broad authority "to acquire (by purchase, lease, condemnation, or otherwise) . . . any real and personal property (including patents) or any interest therein." Parallel authorization in section 161(g) of the AEC Act also authorizes the Commission to "acquire, purchase, lease, and hold real and personal property, including patents."

SUBSECTION 305(i)

Subsection 305(i) of the NASA Act provides that the "Administration shall be considered a defense agency of the United States for the purpose of Chapter 17 of Title 35 of the United States Code." [58] This chapter pertains primarily to the inspection and withholding of certain patent applications, the disclosure of which in a patent would be detrimental to the national security. No specific provision is contained in the AEC Act nor is one necessary by reason that section 181 of Chapter 17 specifically provides for inspection of patent applications by "the Atomic Energy Commission, the Secretary of Defense, and the chief officer of any other department or agency of the Government designated by the President as a defense agency of the United States." This provision in subsection 305(i) of the NASA Act specifies that NASA is a defense agency for this purpose, and therefore may inspect pending patent applications, and may notify the Commissioner that the inventions be kept secret and the application withheld from issue as a patent as the national interest may require.

OBSERVATIONS

The above comparison shows that there is considerable similarity in the patent provisions of the AEC Act of 1954 and the NASA Act of 1958. Perhaps the greatest significance of the NASA Act is that its patent provisions affect a much

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[54] Speech by Roland A. Anderson, Chief, Patent Branch, AEC, at FBA-BNA Briefing Conference on Patents, Trademarks and Copyrights, Washington, D. C., May 19, 1959.

[55] Oooms, 38 JPOS 48.

[56] *Supra* note 10 at (b) of S. 3609.

[57] Report of the Attorney General, INSPECTION OF GOVERNMENT PATENT PRACTICES AND POLICIES, (1947) Vol. I, pp. 122-123.

[58] Title 35 of the United States Code, Chapter 17—SECRECY OF CERTAIN INVENTIONS AND FILING APPLICATIONS IN FOREIGN COUNTRIES, Sections 181-188.

greater segment of the American industry and enterprise than did the provisions of the AEC Act, which were restricted to the field of atomic energy.

Few, if any, Congressional acts relating to patents have received as much published adverse comment as the Atomic Energy Act. It is interesting to note, however, that there has been a noticeable absence of volunteers from among the large contractors doing business with AEC to appear before Congressional committees considering amendments to the AEC Act.[59] It must be remembered that the number of contractors doing business in the atomic energy field is only a very small percentage of the possible number that will be active in the aeronautical and space and related fields.

Perhaps not enough time has elapsed since the NASA Act was approved in July 1958 for many of its critics to document their opposition. The most effective way to learn about the Act and its ramifications is to gain experience in working with the NASA interpretations and regulations. The NASA Administrator[60] has said, "In due course, I am sure, the Congress will want to review this entire matter. In the meantime, we are going to make every effort to administer the legal requirements in the patent field fairly and objectively, with due regard for the interests of both Government and industry."[61]

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[59] *Supra* note 53.

[60] Dr. T. Keith Glennan.

[61] Speech before the Electronics Industries Association, Washington, D. C., March 19, 1959; *Aviation Week*, March 30, 1959, p. 33; "Patents and Progress—You and NASA" a pamphlet issued by NASA, 1959.

The Statutory Standard of Invention: Section 103 of the 1952 Patent Act*

GAY CHIN

SUMMARY

SINCE THE ENACTMENT IN 1952 of the present Patent Act, the various Federal Courts have made divergent interpretations of Section 103.

This paper presents a brief history and legislative background of this vital section and the treatment it is receiving by the various Circuit Courts of Appeals. While at present six of the eleven circuits indicate in their decisions that Section 103 did not change the strict standard of patentability as typified by the *A & P* case, there seems to be a definite trend toward the view that a less rigid test of invention was intended by the new act.

It is pointed out that a truly objective test of patentability is not contained in Section 103 nor does one exist! However, it is believed that this section, especially when considered in the setting of the entire act, is meant to give patents increased stature.

THE NEED FOR A STATUTORY STANDARD OF INVENTION

FOR WELL OVER A HUNDRED YEARS, the courts and the lawmakers of this country have been struggling to capture and reduce to definition the very elusive and ephemeral standard of invention. The "new and useful" requirement set forth in the early patent acts [1] was found to be inadequate by the courts in their determinations of patentability; and even before 1850 there was a recognized need for an additional criterion of patentable invention. Thus in *Hotchkiss* v. *Greenwood* [2] the Supreme

* A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made. 35 U.S.C. 103.

[1] Section 1 of the first Patent Act (1790) provided that "upon petition by any person . . . setting forth that he . . . has invented or discovered any *useful* art, manufacture, engine, machine or device, or any improvement therein *not before known or used* . . . it shall be lawful . . . for the Secretary of State, the Secretary for the Department of War, and the Attorney General, or any two of them, if they deem the invention or discovery *sufficiently useful and important* . . . to issue a patent . . ." The second Patent Act (1793), superseding the 1790 act, provided that any person who "invented any *new and useful art,* machine, manufacture or composition of matter, or any *new and useful* improvement thereon *not known or used before*" could obtain a patent.

[2] 52 U.S. 247 (1850).

Court said that to be patentable, an improvement in the prior art must involve more ingenuity and skill than would be obvious to an ordinary mechanic in the art.

However, even this "non-obvious" requirement produced inconsistent results, and it was almost impossible for one to say with any degree of certainty that a particular patent was indeed valid. In the last quarter century before the 1952 Act, there had been an alarming mortality rate for patents before the various courts of this country. The Supreme Court had rendered not a few decisions [3] holding patents invalid and the lower courts were quick to follow suit.

Because of the frequency in which patents were being struck down as not disclosing any patentable invention, many courts and writers began to say in their respective opinions and writings that the standard of invention was being raised or that the Supreme Court was setting higher standards of patentability.[4]

While there was considerable opposition denying the fact that any trend was taking place, sufficient interest was generated in this particular area and others for President Roosevelt, in 1941, to appoint the National Patent Planning Commission to examine the U. S. patent system. In a resulting report [5] of the Commission it was recommended that Congress undertake:

> . . . the enactment of a declaration of policy that patentability shall be determined objectively by the nature of the contribution to the advancement of the art, and not subjectively by the nature of the process by which the invention may have been accomplished . . .

The report further went on to give as a reason for this recommendation the need for a "definitive yardstick as to what is invention" so that the courts and the Patent Office would have a standard to go by.

EFFORTS TO ESTABLISH A STATUTORY STANDARD OF INVENTION

Congress, aware of the gravity of the situation and recognizing the weaknesses in the patent system, especially as typified by the many invalidity decisions, and further keeping in mind that if the national economy were to be preserved in the present setting of free competition, realized that patents had to maintain a respectable status in the economic scene. It was with such an awareness that Congress set about to establish a statutory standard of invention.

That the 1952 Patent Act and particularly Section 103 was the result of conscientious and diligent efforts to produce something concrete for the courts, the Patent Office, and the practitioners to rely on is indicated by reference to the many attempts to establish a statutory standard of patentability.

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[3] Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corp., 340 U.S. 147; Mandel Bros. v. Wallace, 335 U.S. 291; General Electric v. Jewel Incandescent Lamp, 326 U.S. 242; Sinclair & Carroll v. Interchemical Corp., 324 U.S. 327; Cuno Engineering v. Automatic Devices, 314 U.S. 84.

[4] Cuno Engineering v. Automatic Devices, 314 U.S. 84; U.S. Gypsum Co. v. Consolidated Expanded Metal, 130 F.2d 888; Brown & Sharpe Mfg. Co. v. Kar Engineering Co., Inc., 154 F.2d 48; Safety Car Heating & Lighting Co., Inc., v. General Electric, 155 F.2d 937.

[5] House Document 239, 78th Congress, June 1943, p. 6.

One of the legislative proposals [6] considered would have amended Section 4886 [7] of the Revised Statute (35 U.S.C. Code 31) by adding:

> Patentability of inventions and discoveries, including discoveries due to research and improvements thereof, shall be determined objectively by the nature of the contribution to the advancement of the art, and not subjectively by the nature of the mental process by which the invention or discovery, or the improvement thereof, may have been accomplished.

Some critics of this proposal were of the view that the courts might place undue emphasis on evidence of commercial success and that no yardstick had yet been proposed for determining the issue of patentability by any method which would act as a substitute for the sound judgment of a court.[8] Others also opposed the wording of the proposed amendment on the basis that it was in effect setting up a single test of patentability and that it would be difficult for the Patent Office to determine the question in those cases where the invention had not yet gone into commercial usage or enjoyed commercial success, since the question must be decided solely on the basis of the prior art.[9] Another objection raised the point that the provision that patentability "shall be determined objectively by the nature of the contribution to the advancement of the art" was not much more definite than the test provided by the word "invention" itself.[10]

Another proposal [11] recommended that the question of whether or not the subject matter amounts to invention should be a question of fact, and if there is evidence that shows by a preponderance of weight that the subject matter fills a long-felt want, then the subject matter may be said to amount to invention. Proponents of this proposal claimed that it would establish a legislative rule by which invention could be determined on an objective, factual basis. However, others opposed it on the grounds that the "long-felt want" test set up in the bill was but a single one of the traditional tests for invention, and moreover, that an applicant would be faced with the task of proving the existence of the want and failure and inability of the skill of the art to fill it.[12]

The doctrine of *Hotchkiss* v. *Greenwood, supra,* was incorporated in another proposal [13] which set up, in addition to the requirement of utility, a "routine skill of the art" test. By the latter criteria, this bill would define "novelty" as that which is "beyond what is reasonably to be expected of the ordinary person

[6] H.R. 3694 (78th Congress, 1st Session).
H.R. 5248 (80th Congress, 2d Session).
H.R. 4798 (81st Congress, 1st Session).

[7] "Any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvements thereof, . . . not known or used by others in this country before his invention or discovery thereof . . . may obtain a patent therefor."

[8] Hearings H.R. 5248 (80th Congress, 2d Session).

[9] Hearings H.R. 4798 (81st Congress, 1st Session).

[10] *Ibid.*

[11] H.R. 4061 (80th Congress, 1st Session).

[12] Hearings H.R. 4061 (80th Congress, 1st Session).

[13] S. 2518 (81st Congress, 1st Session).
H.R. 6436 (81st Congress, 1st Session).

exercising the mere routine skill of the art." This bill also proposed that the findings of the Commissioner of Patents with regard to novelty and utility, be final in all actions and proceedings involving an issued patent unless it can be shown that the determination was clearly erroneous.

Although there were no hearings or debate on the foregoing proposal, it was felt by many that the first part of the proposal at least had considerable merit as to warrant more consideration.

Finally in 1950, Representative Bryson, Chairman of the House Judiciary Subcommittee on Patents, Trademarks, Copyrights and Revision of the Laws, proposed a "Revision and Amendment of the Patent Laws." Section 23 of this proposal dealt with the test of invention, and was entitled "Condition for Patentability, Lack of Invention" reading:

> A patent may not be obtained although the invention is not identically disclosed or described in the material specified in Section 22 of this title, if the differences between the subject matter as a whole would be obvious to an ordinary person skilled in the art.
>
> Patentability as to this condition shall be determined by the nature of the contribution to the advancement of the art, and not by the nature of the mental processes by which said contribution may have been accomplished.

A look at the first paragraph of the proposal will reveal that an "ordinary skill in the art" test has been set up, not unlike the rule of the *Hotchkiss* case. The second paragraph represents attempts to establish an objective test for invention and to eliminate the "flash of genius" criteria set up in the *Cuno* case.[14] It was this basic proposal which ran the gauntlet of a series of legislative actions[15] to emerge after further study and discussion and delicate modification as the Section 103 that is presently the heart of our present patent laws.

Thus Section 103 represents the culmination of a great amount of effort from many sources. It has been said of the entire Act, of which Section 103 is a vital part, that "probably no other title incorporates the thinking of so many qualified technical men throughout the country as does this revision."[16]

INTERPRETATION OF SECTION 103 BY THE COURTS

Having seen briefly the efforts of Congress in formulating a statutory standard of invention, it would be well to see how effectively the courts are utilizing their newly acquired tool. Has Section 103 made the burden on the courts any lighter? Have the courts been ascertaining and giving effect to the true intent and meaning of the Congress in its enactment of Section 103? There seems to be considerable confusion among the circuits in this, and the Supreme Court has yet to hear an appeal in which Section 103 would necessarily be construed.

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[14] Cuno Engineering Corp. v. Automatic Devices Corp. 314 U.S. 84 (1941).

[15] H.R. 9133 (81st Congress, 2d Session).
H.R. 3760 (82nd Congress, 1st Session).
H.R. 7794 (82nd Congress, 2d Session).

[16] L. J. Harris *Some Aspects of the Underlying Legislative Intent of the Patent Act of 1952.* 23 Geo. Wash. L. Rev. 658, 661 (1955).

In the First Circuit Court of Appeals, the court said that Section 103 was nothing new and that it "merely codified existing decisional law by its enactment as a statutory condition of patentability that invention was not obvious, at the time it was made, to a person having ordinary skill in the art." [17]

In the Third Circuit in *Stanley Works* v. *Rockwell Mfg. Co.*,[18] the court referred to the report of the Senate Committee on the Judiciary [19] which stated in part that:

> Section 103, for the first time in our statute, provides a condition which exists in law and has existed for more than 100 years, but only by reason of decisions of the court. An invention which has been made, and which is new in the sense that the same thing has not been made before, may still not be patentable if the difference between the new thing and what was known before is not sufficiently great to warrant a patent.

On the basis of this report, the court stated that on its face, Section 103 was merely a codification of decisional patent law, and three years later in 1956, this court said again [20] that there was nothing in the text or the legislative history of the 1952 Patent Act which suggested that combinations of old mechanical elements were to be judged by a lower standard than the one stated by the *Packwood* case.[21]

In the Fifth Circuit, the court cited *Stanley Works* v. *Rockwell, supra,* and said that Section 103 purports and has been construed to merely embody existing law.[22]

In *Borkland* v. *Pedersen* [23] the Seventh Circuit Court of Appeals refused plaintiff's contention that the 1952 Patent Act lowered the standard of invention and said that the Act merely codified the present decisional law, citing *Stanley Works* v. *Rockwell, supra.*

In a case before the Eighth Circuit Court of Appeals, the plaintiffs argued that the 1952 Patent Act, and Section 103 in particular, liberalized the test of invention to be applied, as was the view in the *Lyon* v. *Bausch and Lomb* case, *infra.* However, the court rejected this contention, refusing to recognize that Section 103 had any such effect on the standard of invention until the Supreme Court so ruled.[24]

The Ninth Circuit has said that the Supreme Court has set up strict standards with respect to inventions made up of new combinations of old elements [25] and that the standards of patentability have been tightened up by recent Supreme Court cases. [26] Even five years after the enactment of the new Patent Act the court

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[17] Wasserman v. Burgess and Blacher, 217 F.2d 402 (1954).

[18] 203 F.2d 846 (1953).

[19] Senate Report 1979 (82nd Congress, 2d Session) p. 6.

[20] Mojonnier Bros. Co., Inc. v. Tolan Machinery Co., Inc., 230 F.2d 850 (1956).

[21] Packwood v. Briggs and Stratton Corp., 195 F.2d 971 (1952) which reiterated the doctrine of Lincoln Engineering Co. v. Stewart-Warner Corp., 303 U.S. 545 (1938) that the mere aggregation of a number of old parts or elements, which in the aggregation perform or produce no new or different function or operation than that theretofore performed or produced by them, is not patentable invention.

[22] Vincent v. Suni-Citrus Products Co. 215 F.2d 305 (1954).

[23] 244 F.2d 501 (1957)

[24] Steffan v. Weber Heating & Sheet Metal Co., 237 F.2d 601 (1956).

[25] Oriental Foods Inc. v. Chun King Sales Inc., 244 F.2d 909.

[26] Muench-Kreuzer Candle Co. v. Wilson, 246 F.2d 624.

said that the Ninth Circuit was committed to the rigid standards of invention of *Lincoln* v. *Stewart, supra,* and the *A & P* case, *supra.*[27] In a recent case,[28] the Ninth Circuit Court of Appeals said that during the last quarter century Supreme Court decisions have gradually raised the standard of patentability without changing the formula or test of what constitutes patentable invention, and that the test set forth in the first sentence of Section 103 is phrased substantially no differently than the test evolved from earlier Supreme Court decisions. The court went on to say that although the Second Circuit Court of Appeals has held [29] that the statute was intended to lower the standard of patentability, which had been raised by recent Supreme Court decisions, it was doubtful whether the Ninth Circuit Court of Appeals was of the same opinion.

It is seen then that six of the eleven circuits have stated that it is their opinion that Section 103 of the 1952 Act does not lower the standard of patentability but merely codifies presently existing decisional law as exemplified by the *A & P* case, *Lincoln* v. *Stewart-Warner, supra.*

Lining up on the other side are five circuits holding that it was the intent of Congress that the rigid test of patentability as laid down by the recent Supreme Court cases be somewhat relaxed by Section 103. Leading this group is the Second Circuit Court of Appeals which held, in an opinion written by Judge Learned Hand, that Section 103 provided a less stringent standard of invention and that it "restores the law to what it was when the court announced the definition of invention, now expressly embodied in this section and that therefore claims which would have conformed to accepted standards of patentability of some thirty years ago are held valid despite the fact that they would be invalid under the stricter test of invention applied for twenty years prior to January 1, 1953, when the 1952 Patent Act went into effect." [30] A year later in another decision, the court reannounced the opinion that 35 U.S.C. 103 required a somewhat more lenient standard of patentability.[31]

In 1953 the Circuit Court of Appeals for the District of Columbia, in the *New Wrinkle* case,[32] said it was unnecessary to define the scope of new 35 U.S.C. 103, but whatever doubt existed about the need of flash of genius in achieving invention, there can be none about a need for such a flash in reconciling the colorable view that the 1952 Act relaxed case law criteria for invention with a contrary view that takes its hue from Senate proceedings. However, two years later the court changed its way of thinking and said that it could be safely assumed that the 1952 Patent Act was intended to restore the law to what it was when the Supreme Court announced the definition of invention.[33] The Court went on to say that it was bound first to look into the prior art to ascertain what may be the real merit of the invention and to decide whether it substantially advanced the art; if it did, the court then liberally construed the patent to secure to the inventor the reward he deserves.

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[27] Moist Cold Refrigerator Co., Inc. v. Lou Johnson Co., Inc., 249 F.2d 246.
[28] Trenton Industries v. A. E. Peterson Mfg. Co., 119 USPQ 41.
[29] Lyons v. Bausch and Lomb, *infra.*
[30] Lyons v. Bausch & Lomb Optical Co., 244 F.2d 530 (1955).
[31] Gentzel v. Manning, Maxwell & Moore, Inc., 230 F.2d 341 (1956).
[32] New Wrinkle, Inc. v. Watson, Commissioner of Patents, 204 F.2d 35 (1953).
[33] L-O-F Glass Fibers Co. v. Watson, Commissioner of Patents, 228 F.2d 40 (1955).

In the Fourth Circuit, the court in upholding a patent in *Brown* v. *Brock* [34] said that the patent involved there met the "standard of invention by the accepted tests, as recently explained in *Lyon* v. *Bausch and Lomb Optical Co.*" This represented a reversal from an earlier view [35] the court took in 1954 when they referred to Senate and House committee reports and stated that the provisions of Section 103 merely codified the law laid down by the courts during the past hundred years, and were added to the statute for purposes of uniformity and definiteness.

In the Sixth Circuit, the court in 1953 said that it would appear that the new act had done no more than to adopt the test of obviousness which has been enunciated by the courts, and that it did not provide a new test differing from that which had been generally followed in the adjudication of patent cases. The court further said that the principle stated in the *A & P* case, *supra,* was not modified by the new act, but continued to be the law.[36] Five years later, however, this court made somewhat of a turn-about-face and stated that although they did not believe that Congress intended to completely eliminate from the patent law as it had been developed over the years, the considerations by which invention may be perceived, or found wanting, either in pioneer or improvement patents, they did believe, however, that undoubtedly, "a less stringent test of the quality of invention has been provided by the Revised Patent Act of 1952." [37]

In the Tenth Circuit, the court in *Blish, Mize and Silliman Hardware Co.* v. *Time Saver Tools* [38] reviewed the recent decisions of other circuits and observed that some have held that Section 103 was but a codification of the common law as it existed for the past 100 years without recognition of any change in the invention concept,[39] while other circuits have held that the codification was of the law as it existed at the time of codification.[40] It was also observed that another circuit had said that the underlying legislative intent was to ameliorate the harshness of the inventive concept inherent in the authoritative cases of the past two decades.[41] The court seems to agree with this last viewpoint when it said that it may well be that the Congress intended to roll back the philosophical standards of patentability typified by the *Cuno Engineering* v. *Automatic* case, *supra,* and the *A & P* case, *supra,* but it did not and could not, however, intend to abandon the distinction between mere mechanical skill and inventive genius.

Thus we have seen how six circuits say that the standard of patentability was unchanged by the enactment of Section 103 and how at present five circuits assert that the standard of patentability has become less stringent under the new act. It is of noteworthy significance that the 4th, 6th, and D.C. Circuits have only recently swung over to the minority after earlier decisions holding that Section 103 did not change the standard of invention, so that a definite trend seems to be taking place.

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[34] 240 F.2d 723 (1957).
[35] Interstate Rubber Products Corp. v. Radiator Specialty Co., Inc., 214 F.2d 546 (1954).
[36] General Motors Corp. v. Estate Stove, 203 F.2d 912 (1953).
[37] Deering Millikan Research v. Electric Furnace, 120 USPQ 2 (1958).
[38] 236 F.2d 913 (1956).
[39] See note 35, *supra.*
[40] See notes 17 and 36, *supra.*
[41] See note 30, *supra.*

THE LEGISLATIVE INTENT UNDERLYING SECTION 103

In determining which of the above groups of Circuit Courts is correct, we must necessarily attempt to ascertain the legislative intent of the Congress in enacting this portion of the statute.

It is elementary that the primary object of construing a statutory provision is to ascertain and give effect to the true intent and meaning of the Congress in enacting it, for it is the intention of the lawmakers that make the law. For the purpose of ascertaining and giving effect to this intention of the lawmakers, it is proper to consider the occasion and necessity for the law. An oft-used means for determining the legislative intent is to examine the history and derivation of the particular provision in question, and consider the circumstances and conditions known to the Congress at the time of its enactment.

It has already been shown how in the 25 years preceeding the 1952 enactment there was a sharp increase in the number of patents being declared invalid by the courts. It will also be remembered that the National Patent Planning Commission recommended the enactment of legislation which would establish some sort of yardstick of patentable invention for the courts and the Patent Office. A brief look at the evolution of Section 103 and at some of the comments for and against the various proposals was also made. Now it would be well to examine some other sources for signs of legislative intent.

The Senate and House Committee reports [42] are almost always relied on for indications of legislative intent. These reports state that although the principal purpose of the bill was the codification of Title 35 of the U. S. Code and involved "simplification and clarification of language and arrangement, and elimination of obsolete and redundant provisions," there were "*a number of changes in substantive statutory law*" (emphasis added). The reports go on to say that the "major changes or innovations in the title consist of incorporating a requirement for invention in Section 103 and the Judicial doctrine of contributory infringement in section 271."

In another place, these reports stated that:

> Section 103, for the first time in our statute, provides a condition which exists in the law and has existed for more than 100 years, but only by reason of decision of the courts. An invention which has been made, and which is new in the sense that the same thing has not been made before may still not be patentable if the difference between the new thing and what was known before is not considered sufficiently great to warrant a patent. That has been expressed in a large variety of ways in decisions of the courts and in writings. Section 103 states this requirement in the title. It refers to the difference between the subject matter sought to be patented and the prior art, meaning what was known before as described in section 102. If this difference is such that the subject matter as a whole would have been obvious at the time to a person skilled in the art, then the subject matter cannot be patented.
>
> That provision paraphrases language which has often been used in directions of the courts, and the section is added to the statute for uniformity and definiteness. This section should have *a stabilizing effect and minimize great departures* which have appeared in some cases.[43]

[42] S. 1979 (82nd Congress, 2d Session) p. 4.
H.R. 1923 (82nd Congress, 2d Session) p. 5.

[43] *Id.*, Senate Report at p. 6, House Report at p. 7.

From these statements of the Senate and House reports we see that the possible meaning and intent of the Congress was to make changes in substantive law as well as to codify. The nature of these substantive changes may be indicated by reference to the last sentence of the above quotation relating to Section 103. These "great departures" to be minimized by enactment of Section 103 could not be anything else except the many adverse holdings of the Supreme Court toward validity of patents. Mr. P. J. Federico asserts that "the departures of which complaint has been made in the recent past are all departures in the direction of greater strictness and hence these would be what the report indicates should be minimized." [44]

Another source from which legislative intent may be determined is the Congressional Record, as this document records the statements made on the floor of the House or Senate and other official statements of the members of Congress. One statement that was made by Senator Wiley, who presented the bill for consideration, was to the effect that the "bill simply constitutes a restatement of the patent laws of the United States." [45] However, it should be pointed out that this statement was impromptu and made after the bill had passed the Senate and after a reconsideration had been asked for by Senator Hendrickson. Senator Wiley wanted to "indicate, apparently, that the bill was substantially non-controversial and that it had received a good deal of consideration." [46]

Another statement made on the floor of the Senate which many say give some indication of legislative intent, was by Senator McCarran in answer to the question by Senator Saltonstall: Does the bill change the law in any way or only codify the present patent laws? To this Senator McCarran gave the extemporaneous answer that it codified the present patent laws.[47] Shortly thereafter, however, Senator McCarran submitted a prepared statement for insertion into the same page of the Congressional Record to clarify his previous oral statement. This written statement included the following:

> In view of decisions of the Supreme Court and others as well as trial by practice and error there have been some changes in the law of patents as it now exists and some new terminology has been used.[48]

Thus the later-inserted statement seems to negative the effect of the oral statement regarding the fact that the bill was merely a codification of the present patent laws, although some believe that because the written statement was not expressed on the floor of the Senate, it was therefore not relied upon so that true legislative intent could not be derived therefrom.[49]

Another way by which it is possible to determine the true meaning of the Act is by reference to comments of those who actually participated in the work of

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[44] P. J. Federico, Examiner-in-Chief, U. S. Patent Office, *Commentary on the New Patent Act*, 35 U.S.C.A. 1.

[45] Congressional Record 98:9097 (1952).

[46] L. J. Harris, "Some Aspects of the Underlying Legislative Intent of the Patent Act of 1952," 23 Geo. Wash. L. Rev. 658, 676 (1955).

[47] *Congressional Record* 98:9323 (1952).

[48] *Ibid.*

[49] Wiviott, *Patent Law—Test of Invention*, JPOS 531 (August 1956).

putting the bill together. One of these persons, Mr. L. James Harris, who was formerly Committee Counsel and Counsel to the Patent, Trademark, and Copyright Subcommittee of the House Judiciary Committee, and who directed and supervised the actual work of preparing drafts and the bill that culminated in the Act, indicates very strongly that it was the intent of the Act "to moderate the strict interpretation of the Courts and to encourage the Courts to take a more friendly attitude towards patents a practice from which they had departed in certain cases." [50] It was also the opinion of Mr. Harris that those cases which held that the first sentence of Section 103 was not intended to change the standard of invention as established by case law just prior to 1952, are "based on a misunderstanding of the drafter's intent." [51]

Another authority to which one can look for a reliable interpretation of the act, one of the experts who provided able and helpful assistance to the Committee, is Mr. P. J. Federico [52] who states in his Commentary on the New Patent Act [53] that while there is no record of an explicit positive command to the courts and while Congress did not intend any radical change in the level of invention or patentable novelty, there was intended some modification "in the direction of moderating the extreme degrees of strictness exhibited by a number of judicial opinions over the past dozen or more years." [54] Mr. Federico's opinion is based on the moderate language used in Section 103 and the significance of the statements in the House and Senate Committee Reports [55] in connection with the decisions rendered before the 1952 enactment.[56]

SECTION 103 AS THE STATUTORY STANDARD OF INVENTION

It is seen that the efforts of Congress to establish a statutory standard of invention have culminated in the 1952 Patent Act, particularly Section 103 thereof. The administration of this provision by the various Circuit Courts of Appeals has not been without confusion. Although a majority of these courts hold that the standard of invention is unchanged by the new Act, a trend toward relaxation of the strict standard of invention can definitely be detected. That this trend toward moderation is what Congress had in mind is substantially supported by the various sources of legislative intent that were examined above.

Can it be said then that Congress, through its enactment of Section 103, has established a statutory standard of invention that can be applied objectively by the courts? If so, are the courts using this standard properly? The difficulty one encounters in attempting to answer these questions with a simple yes or no is borne out by the conflicting decisions of the various circuits as discussed earlier. Perhaps the crux of the problem lies in a basic fundamental that all students of patent law

[50] Harris, *Some Aspects of the Underlying Legislative Intent of the Patent Act of 1952*, 23 Geo. Wash. L. Rev. 658, 679.
[51] *Id.* at 675.
[52] Examiner-in-Chief, U. S. Patent Office.
[53] 35 U.S.C.A. 1.
[54] *Id.* at 22.
[55] See note 42, *supra*.
[56] See note 54, *supra*.

are aware of—that invention itself is not something capable of being measured—so that to refer to a standard of invention as a measuring means is somewhat fallacious. Furthermore, is it not being a bit presumptuous to speak of "changing the standard of invention"? It is submitted that there is nothing to change it *to* or change it *from,* or that there is anything that qualifies to be referred to as a standard of invention. The courts in their opinions have used the term from time to time but only in a mystic way. Congress, by the 1952 Act, has made a step in the right direction, but it is believed that it has gone as far as possible without getting into the pitfall of listing in a statute all the various "negative rules of invention." [57]

That is, a really objective standard of invention does not exist, and it is doubted that one will ever be devised. Indeed, the desirability of such a convenient yardstick to be applied objectively by the Patent Office and the courts in their determinations of patentability is recognized; however, the possibility of ever obtaining such a useful tool is certainly dim when one considers the fact that the term invention defies definition. It would be well if there were available a black box with flashing lights into which could be fed the characteristics and specifications of an invention and which would respond to the turn of a crank to grind out a slip of paper marked either "patentable" or "unpatentable." Perhaps this may be over-idealistic,[58] but is this not what we are in a sense seeking when we attempt to establish a statutory standard of invention?

Certainly Section 103 does not approach the capabilities of such a black box; neither does this provision represent the reduction of the known concepts of patentability into definite rules that can be applied objectively by the courts. This part of the statute then can hardly be said to establish a statutory standard of invention, but "at most (fixes) a 'standard of judgment' . . . . (which) must be applied by the Patent Office and by the courts in the light of their past decisions. The ultimate determination still remains in the courts." [59]

Then is Section 103 of no use? If Section 103 does not establish a statutory standard of invention, which is certainly not a failure of the revisers but simply an impossibility since such a standard cannot exist, of what useful purpose is this provision over which much toil and study was put forth by Congress? This is easily answered. Although Section 103 does not lead the courts by the hand down the proper path of reasoning, tell them where to turn at every instance and direct them ultimately to the proper result, this provision does serve to set the courts in the proper direction and attempt to imbue them with the proper outlook so that there will be less chance for their reasoning and thinking to stray off course. Perhaps it could be said that instead of a standard of invention, a standard of judgment, as suggested above,[60] is established by Section 103. However, regardless of what sort of name one may wish to give it, it is clear that an edict is intended in Section

[57] Mere substitution of materials, variation of size or degree, addition, omission or duplication of parts, etc., is not invention.

[58] Also, the "black box" may lead to the abolition of that segment of the legal profession known as the patent bar.

[59] Smith, *Patent Law,* Vol. 1, p. 454.

[60] See note 59, *supra.*

103, especially when considered in the light of the setting of the entire Act, this edict being that the courts should adopt a "more friendly attitude toward patents," [61] that a positive viewpoint be taken instead of one in which the approach is how to invalidate another patent.

It is unfortunate, perhaps, that a truly objective test or standard cannot be devised; however, it is submitted that until that black box is furnished the courts and the Patent Office, the question of patentability in each and every case will be finally resolved by the subjective judgment of the courts. And the most that can ever be hoped for is something to start the courts off in the proper frame of mind and point them in the right direction. In this connection, Judge Learned Hand had this to say:

> Objective tests may be of value vaguely to give us a sense of direction, but the final destination can be only loosely indicated. . . . [The courts will look] at the history of the art, the occasion for the invention, its success, its independent repetition at about the same time, and the state of the underlying art, which was a condition upon its appearance at all. . . . There comes a point where the question must be resolved by a subjective opinion as to what seems an easy step and what does not. We must try to correct our standard by such objective references as we can, but in the end the judgment will appear, and no doubt be, to a large extent personal, and in that sense arbitrary.[62]

Perhaps it may be too early to attempt to determine what effect Section 103 is having on the decisions of the courts, but from an optimistic viewpoint, it appears that patents will enjoy increased stature in the courts and that the trend is toward moderation in applying the strict interpretations of the law. It was Judge Hand again who said, in the *Bausch and Lomb* case, that "Section 103 only restores the original gloss which has never been overruled, although it may have ceased in practice to be followed." [63]

It may be said, then, that although Section 103 does not set forth an objective statutory standard of invention, it could impart uniformity, definiteness, and stability to the law, so that patents once more will be able to assume their important role in our national economic system.[64]

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[61] See note 50, *supra.*

[62] Kirsch Mfg. Co. v. Gould Mersereau Co., Inc., CCA 2nd (1925) 6 F.2d 793, 794.

[63] See note 30, *supra.*

[64] The following notes and comments on Section 103 as a statutory standard of invention have appeared in the law journals besides those cited:

Aitken, R. L., "Patents—Standard of Invention—Constitutional or Statutory, Student Note," *The George Washington Law Review,* 24, (1956), 722.

Bailey, Malcolm F., "A Proposal for: A Standard of Patentability; Consonant Statutory Changes; A Manual on Determination of Patentability, Part I," *Journal of the Patent Office Society,* 41, (1959), 192; Part II, 41, (1959), 231.

Balluff, E. J., "Do Recent Supreme Court Opinions Raise the Standard of Invention, and Are the Lower Courts Misinterpreting Such Opinions?," *Journal of the Patent Office Society,* 34, (1952), 847.

Beckett, William W., "Judicial Construction of the Patent Act of 1952—Codification v. Substantive Change," *Journal of the Patent Office Society,* 37, (1955), 467.

Brumbaugh, Granville M., "Sustaining Patentability in United States Courts and Related Questions," *Journal of the Patent Office Society,* 40, (1958), 35.

Crouch, L. R., Letter, Editorial Notes, "Amendment to Section 103 of the Act of 1952," *American Patent Law Association Bulletin,* (June 1956), 229.

Frankl, Robert, "On Judgments of Patentability," Part I, *Journal of the Patent Office Society*, 35, (1953), 214; Part II, 37 (1955), 125; Part III, 39 (1957), 122.

Goodman, Herbert H., "The Effect of Section 103 of the Patent Act of 1952 Upon the Patent Laws," *Journal of the Patent Office Society*, 35, (1953), 233.

Kelman, K., "Commentaria Re: A Standard of Patentability," *Journal of the Patent Office Society*, 41, (1959), 585.

Libert, D. J., "Section 103 of the Patent Act and the Standard of Invention: Comments on Lyon v. Bausch and Lomb Optical Co.," *Journal of the Patent Office Society*, 38, (1956), 304.

Lutz, Karl B., "The New 1952 Patent Statute," *Journal of the Patent Office Society*, 35, (1953), 157.

Malley, J. W., "The Standard of Invention and the Impact of the 1952 Patent Act," *American Patent Law Association Bulletin*, (June 1956), 207.

Marans, Hillel, "Some Aspects of the Patent Act of 1952 as Interpreted by Recently Published Decisions," *Journal of the Patent Office Society*, 39, (1957), 177. Also see 37, (1955), 661 and 36, (1954), 582.

Martin, J. V., "The Patent Codification Act," *Journal of the Patent Office Society*, 36, (1954), 625.

Pegan, J. R., "A New Test for Determining Patentability of Mechanical and Electrical Process Claims," Student Note, *The George Washington Law Review*, 23, (1955), 569.

Rich, Giles S., "Interpretation of Section 103, Commentaria," *Journal of the Patent Office Society*, 35, (1953), 307.

Smith, Arthur M., "Pitfalls in Patent Prosecution," *Journal of the Patent Office Society*, 41, (1959), 5.

Patent Office Society Resolution

WE ARE OFTEN ASKED about ways in which organizations, especially small, non-profit organizations and learned societies in related fields, may contribute effectively to the Foundation. For this reason we are reproducing below, as an example, the resolution adopted by the Patent Office Society. It is hoped that the resolution will encourage other groups to support the work of the Foundation, as set forth in the last paragraph of the covering letter.

Dr. O. S. Colclough, Director
The Patent, Trademark, and Copyright Foundation
The George Washington University
Washington, D. C.

Attention: Mr. L. J. Harris, *Executive Director*

Dear Sir:

The enclosed resolution was adopted by the Patent Office Society at a recent meeting of the Executive Committee by unanimous vote.

It is sincerely hoped that this resolution will serve as an incentive to other groups whose aims, as those of the Society, are devoted to improvement of the Patent System.

Very truly yours,
MILTON O. HIRSHFIELD, President
Patent Office Society

PATENT OFFICE SOCIETY

DEVOTED TO IMPROVEMENT OF THE PATENT SYSTEM
Box 685
Washington 4, D. C.

RESOLUTION

WHEREAS the objectives of the Patent Office Society include the promotion of the development of the patent and trademark systems, and

WHEREAS it is the considered opinion of the Executive Committee of the Patent Office Society that the study of the patent and trademark systems by qualified students and practitioners constitutes an effective means of accomplishing said promotion, and

WHEREAS the Patent Office Society recognizes the original contributions in this field by the Patent Trademark and Copyright Foundation of George Washington University, and

WHEREAS the Patent Office Society wishes to provide financial assistance to those scholars, practitioners and other students who may potentially contribute to original research in the patent and trademark systems, and the patent and trademark law,

BE IT RESOLVED, on this date of September 24, 1959, that:

The sum of one hundred and twenty five dollars ($125) be contributed to the Patent Trademark and Copyright Foundation of George Washington University for the dual purpose of: first, providing the Patent Office Society with the benefits of an annual membership in the Patent Trademark and Copyright Foundation, and secondly, establishing a student assistance award, in the name of the Patent Office Society, in the field of patent and trademark systems, and or patent and trademark law.

The said assistance award to be completely administered by the Patent Trademark and Copyright Foundation except that, in the selection of recipients, preference shall first be given to any qualified member or associate member of the Patent Office Society. It is the intention of the Society that this be an annual contribution.

Finally, if during any academic year there is no recipient for the above award, then the amount remaining after the annual membership dues for the Patent Trademark and Copyright Foundation have been deducted, shall be transferred to a special fund administered by said Foundation until used as indicated above.

PATENT OFFICE SOCIETY
Milton O. Hirshfield
President

Program For Young People

PAMPHLET SERIES (E-1)

Booklet Number 2 in the Foundation's series, *The Patent System All Around You,* entitled "How You Get A Patent Today," has been mailed to members of the Foundation and to selected secondary schools throughout the United States.

This second booklet deals with the procedures involved in obtaining a patent and how they developed over the years. The objective of the series is to create an awareness among the youth of this country of the purposes, procedures, problems, and accomplishments of the patent and related systems and their relation to the economy and our cultural life.

From the letters and inquiries we are receiving, Booklet Number 2 appears to be fulfilling another educational need. Patent attorneys are requesting them for their clients and some company executives have ordered them for their engineers and research staff.

The third booklet in the series will deal with "Problems of Establishing Priority: Who Invented It First?"

Booklet Number 2, "How You Get A Patent Today," is available for distribution. Purchases of 25 copies and under are 20 cents per copy; bulk purchases of over 25 to 1,000 are 15 cents each; over 1,000 to 3,000, 12 cents each; over 3,000 to 5,000, 10 cents each, and over 5,000, 8 cents per copy.

Programs By Other Organizations

IN THIS SECTION OF THE SPRING 1959 Issue of the *Journal,* we noted an illustrated talk presented to a group of secondary school students at The Franklin Institute, Philadelphia, by Mr. Virgil E. Woodcock on the occasion of a patents exhibit at the Institute. The exhibit was made possible by the joint efforts of the Institute, the United States Patent Office, the Philadelphia Patent Law Association, and the companies furnishing the exhibits. We reprint below Mr. Woodcock's talk, with some changes and additions.

THE PATENT SYSTEM IN ACTION

VIRGIL E. WOODCOCK*

BASICALLY WE ARE ALL inventors. If we are forced to work with machines or tools which are hard to use, we ask ourselves: Can't someone supply me with something better? We may decide to do it ourselves. Suppose we work on the idea. We buy equipment. We employ people to help us. We are successful. We have produced something new and useful. We have produced an invention. What can we do with it?

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* Mr. Woodcock is a member of the firm of Woodcock & Phelan, Philadelphia, and is a past president of the American Patent Law Association and the Philadelphia Patent Law Association.

In the absence of a patent system, the instant we sell the first machine or tool embodying our invention, a competitor may start making and selling that which we have invented. If he sells the new machine for less money, we will soon be out of business. We will have left our debts for the cost of developing and producing the invention.

The patent system says that a person who invents something new and useful —something which promotes the useful arts—ought to have the right to say who can use it. In other words, the patent system is based on the concept that an inventor who devises a new machine, a new product, or a new composition of matter should have a property right in his invention. By that I mean, an inventor should have the right to prevent others from copying his invention.

If anyone could copy an invention without permission, without paying the inventor for the privilege, there would be little incentive for persons to produce inventions. Certainly, there would be lost the opportunity for the inventor to make money out of his invention.

Our present patent law was passed by the unanimous consent of both Houses of Congress in 1952. The first Patent Act was passed in 1790, within a year after the Constitution had been declared in effect on March 4, 1789.

From the beginning, our patent laws have said to the inventor: You can exclude all others from using your invention for 17 years. Make all you can from it. Manufacture under your patent, license it, or sell it outright. Your reward will be large or small depending on the importance of your invention.

A patent covering a device everyone wants has great value. It is equally certain that a patent on a machine or device no one wants is of little value.

Regardless of the importance of the invention, the patent laws say that you must obtain your total return under your patent within 17 years. After that time, every member of the public shall have the right freely to use everything disclosed in your patent.

I am sure you have heard it said that the day of the individual inventor is past. This is contrary to our experience in the patent field. There are many individual inventors every day creating new inventions; they are establishing small companies, and with patent protection they are building up growing markets. Many large companies have their origin in these small companies.

After the adoption of the first Patent Act in 1790, its administration eventually came under the supervision of Thomas Jefferson. He observed that the patent laws "have given a spring to invention beyond my conception." Abraham Lincoln said: "The patent system has added the fuel of interest to the fire of genius."

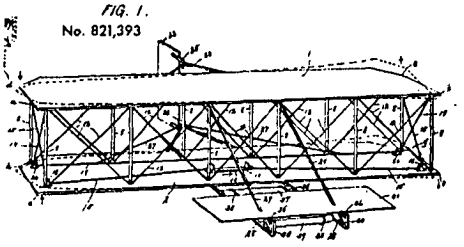
When Franklin D. Roosevelt was President, he appointed a National Patent Planning Commission to study the patent system and its operation. The Commission reported that the patent system:

> . . . has encouraged and rewarded inventiveness and creativeness, producing new products and processes which have placed the United States far ahead of other countries in the field of scientific and technological endeavor.

President Eisenhower, too, has commented on the patent system. He said:

> . . . Soundly based on the principles of protecting and rewarding inventors, this system has

FIG. 1.
No. 821,393



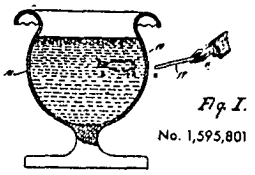


Fig. I.
No. 1,595,801

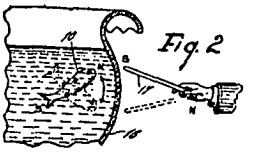


Fig. 2
No. 1,595,801

No. 2,249,454

Fig. 3.

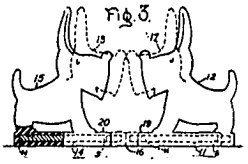


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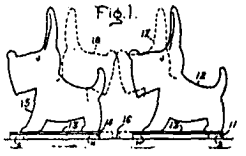
Fig. 1.



No. 2,249,454 3

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In combination, a pair of cooperating magnetic articles, each of which comprises a miniature figure and a permanent magnet, said miniature figure being secured to said permanent magnet, each of said articles being freely movable in all directions over a horizontal surface, and the magnets being secured to said figures in a manner to produce interacting magnetic fluxes whereby upon manual movement of one of said figures with respect to the other adjacent figure said other figure may be made to assume any one of several different positions on said surface.

Fig. 9.

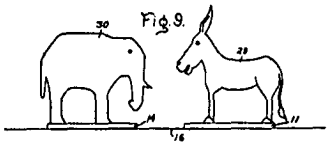


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Fig. 10.

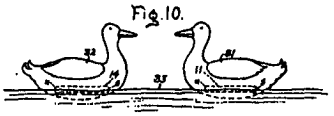

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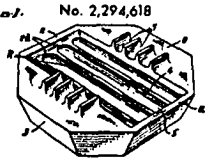
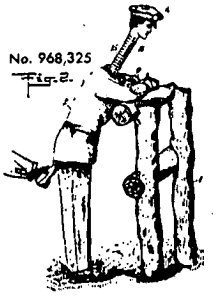
Fig. 1. No. 2,294,618



No. 968,325
Fig. 2.



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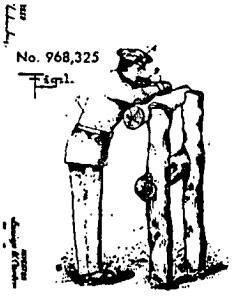

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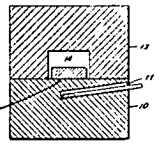

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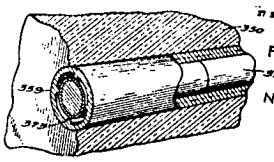

FIG. 39.

No. 2,708,656

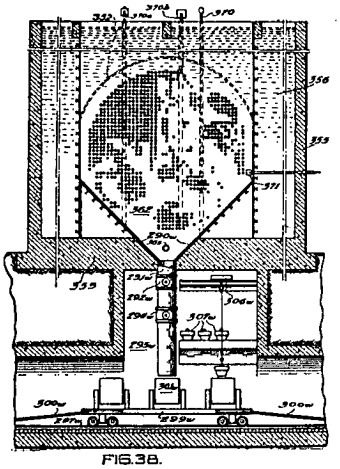

FIG. 38.

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FIG. 42.

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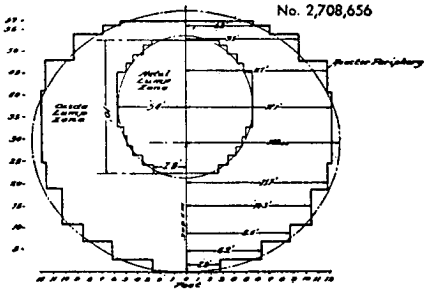


Fig. 1. No. 6,469

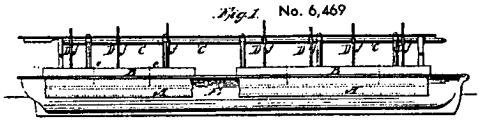
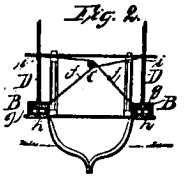


Fig. 2.



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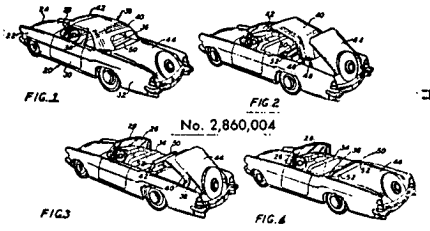


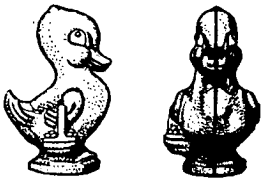
FIG. 1 FIG. 2 FIG. 3 FIG. 4

No. 2,860,004

FIG. 1.

Des. 161,865

FIG. 1. FIG. 2.



Des. 161,521

No. 2,860,004

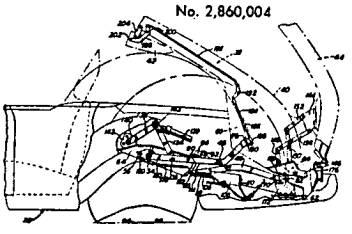
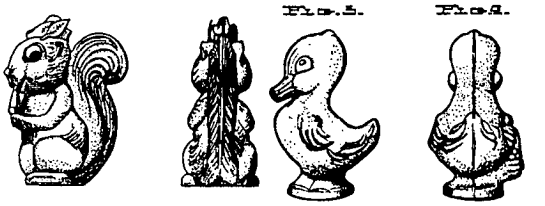


FIG. 7

FIG. 2. FIG. 3. FIG. 5. FIG. 4.



> for years encouraged the imaginative to dream and experiment. . . . From such exploration . . . has welled a flood of innovations and discoveries which have created new industries and reactivated old, giving more and more Americans better jobs, adding greatly to the prosperity and well-being of all.

Patent applications are now being filed at the rate of between 5,000 and 6,000 per month. Patents are issuing at the rate of between 3,000 and 4,000 per month.

Many persons say that only a small fraction of inventions covered by these large numbers of patents issuing each month have any value. In order to find out in a more definitive way the extent of use of patents, a project was undertaken by The Patent, Trademark, and Copyright Foundation of The George Washington University.

This "Patent Utilization Project" has been continuing for a number of years. At the present time, the results indicate that between 47% and 64% of the inventions of issued patents have been used.

It is not always easy to determine whether a given patent has commercial value or not. For example, you all know of Orville and Wilbur Wright, and you know that they invented the airplane. At least, they are given credit for the invention of the airplane. What I am sure you do *not* know [Fig. 1, No. 821,393] is that the Wright Brothers' airplane did not have a propeller. It did not have an engine to drive the propeller. The Wright Brothers' patent covers the glider that they used at Kitty Hawk. Nevertheless, their patent was quite valuable.

The Wright Brothers discovered how to stabilize an airplane in flight. The pilot had to lie flat between the wings with his head toward the front of the plane and above the front stabilizer. This he could tilt up and down about a horizontal axis, and by thrusting his hips to the right or to the left, he could warp the wings up and down, thus preventing tipping of the wings by air currents or uneven loading of the plane. Thus, the patent disclosed the basic idea later embodied in the use of small ailerons. They are the small wing-like structures on the back of the wing which the pilot tilts up and down to stabilize the airplane.

The patent on the Wright Brothers' airplane was granted under the patent laws provided for by Section 8 of Article I of our Constitution. That Section reads as follows:

> The Congress shall have power . . . To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.

Patents are granted for only certain kinds of inventions. Specifically:

1. For Machines—the airplane;
2. For Articles of Manufacture—hand tools;
3. For Processes—chemical; manufacturing;
4. For Compositions of Matter—plastic compounds;
5. For Designs;
6. For New Plants—new roses, or improved apple trees.

Perhaps I should mention that authors are granted copyrights to protect their writings. Copyrights run for 28 years with right of renewal for a further term of 28 years.

Inventions need not be complex. For example, here you find standing on a small permanent magnet a reproduction of a dog.

Can this possibly be an invention?

You now see that we have a white dog and black dog, both standing on their own little permanent magnets. These are called "Tricky Dogs." You probably have seen how they will always spin around to face each other.

Suppose you had invented these "Tricky Dogs." How would you go about getting a patent?

First, you make sketches of your invention. You describe how it works and why it is useful.

Second, you select a patent attorney and have a search made to determine whether your invention is new or old.

Suppose you have had the search made and the searcher sends you Patent No. 1,595,801 [Fig. 1] showing a small fish in a fish bowl. Inside the fish is a small magnet. If you bring a bar magnet to the outside of the bowl, the fish can be made to move [Fig. 2]. As you can see, with the north pole at the head of the fish and the south pole at the end of the magnet, the fish will be attracted, and by raising the magnet up and down, the fish will bob up and down and follow it. Of course, if you reverse the magnet, and put the north end toward the fish's head, he will be repelled and will take off in the opposite direction.

With this fish-in-the-bowl as prior art, would you believe that you could obtain a patent on the "Tricky Dogs"?

The inventor and his patent lawyer now work as a team to analyze the differences between what is old and what is new.

So let's take a closer look at the "Tricky Dogs" and how they work.

Here are Figs. 1 and 3 of Patent No. 2,249,454. In Fig. 3 the broken-line pictures of the dogs indicate they are moving toward each other. This happens since the north pole of the magnet is near the south pole of the other.

In Fig. 1 of the patent, one dog is shown sneaking up behind the other. This makes the north poles approach each other. As everyone knows, north poles repel, and so the dog on the left spins around to face the dog that has come up behind him. The realistic way in which the dogs perform makes them entertaining toys. But are they patentable?

The inventor's patent attorney can advise as to the chances of obtaining patent protection. The inventor should decide whether the likely patent protection will be broad enough to make the cost worthwhile.

The breadth of the patent right is determined by the claims of the patent. Do the claims define a broad invention or only a very narrow one?

If the claim is written so broadly as to define the fish-in-the-fish-bowl as well as the "Tricky Dogs" it would be invalid since it would cover that which is old—that which the "Tricky Dogs" inventor did not invent.

But let's get back to our problem. The inventor and his attorney decide to file a patent application on the "Tricky Dogs." The application is in the Patent Office assigned to one of several hundred skilled engineers who are called Examiners. They decide whether an invention has been disclosed and whether the claims are

too broad. This has some of the characteristics of a contest. The patent attorney insists on broad protection. The Examiner, in trying to be sure that the claims cover only that which is new, frequently goes too far in his rejection of the claims.

That is precisely what happened to the application on the "Tricky Dogs."

The Examiner in the Patent Office did not care very much for the invention of the small figures on the magnets. The Examiner finally rejected all claims. This means: Sorry, no patent. An inventor need not be content with what the Examiner says, however. There are provisions for an appeal to a higher tribunal.

In this case, the inventor took an appeal, and here is the claim which the higher tribunal, the Board of Appeals, allowed [Claim 1 of No. 2,249,454].* As I have said, a claim is a definition of what is new and distinguishes the invention from what is old. A claim tells you what the patent protects.

As you examine this claim, you will note that the feature of novelty is the provision of two magnets, both free to move on a flat surface, and each magnet carrying a representation of a figure. Thus, relative movement of the figures will cause the one to take a plurality of positions relative to the other.

The patent claim does not cover, does not describe or define the fish-in-a-fish-bowl.

You may be interested in the rest of the patent on the "Tricky Dogs."

The patent attorney and the inventor did not want their claims to be limited to dogs, so they show in Fig 9 [No. 2,249,454] an elephant sitting on one magnet, and a donkey sitting on another magnet. Fig. 9 has political undertones.

Fig. 10 gives rise to quite a problem. Here the inventor has illustrated magnets carried by two ducks in water. We are now getting mighty close to the fish-in-a-fish-bowl.

If an inventor should disclose his invention in its several forms, and one form happens to be identical with a prior art device, he is in trouble. The present inventor narrowly escaped this hazard.

May I now show you an even simpler invention on an ash tray, Patent No. 2,294,-618. Some companies require that this ash tray [Fig. 1] be used in every area where smoking is permitted. The reason: the invention here resides in the deep grooves in the center. If a cigarette is dropped into a groove, there is insufficient air to keep it burning, and it will automatically go out. This is a real protection against fire hazard. The small grooves at the edges of the ash tray are old, though they do perform the same purpose of snuffing out the cigarette.

Inventions are made in the amusement field [Fig. 1, No. 968,325]. Here you see a device arranged to measure the strength of a kick. You simply move up to this individual and kick him in the seat of the pants. The extent to which his neck is elongated will measure the strength of your kick [Fig. 2]. I am not informed as to whether this invention has gone into use. It has been shown because I thought you, too, might get a kick out of it.

Besides on simple inventions, patents are issued on some of the most important discoveries.

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* The references relied upon by the Examiner and the board were U.S. Patents No. 464,611 and No. 2,036,076.

Here you will see the heading of the Fermi *et al* Patent No. 2,206,634 on a process for the production of radioactive substances. Note this patent was applied for in 1935. Dr. Fermi had filed his first application in Italy in 1934.

The single drawing of the patent is quite simple [Fig. 1, No. 2,206,634]. The rod which you see in the hole 11 contains a source of neutrons. This source irradiates the material illustrated at 12. Dr. Fermi and his associates found that high energy neutrons had to be slowed down before contacting the material to be activated. They disclose a number of different substances for slowing down the neutrons, and they present in their patent an *extensive* discussion of all of the various elements from which there may be produced radioactive isotopes capable of emitting beta rays.

Here is a much later patent issued to Dr. Fermi and Leo Szilard, [No. 2,708,-656]. This patent was filed in late 1944 and issued in 1955. This patent covers a neutronic reactor, that is, a nuclear reactor. You have all heard about "critical mass" and the great secrecy surrounding atomic energy of all kinds. In 1955, the secrecy order on this invention was lifted. There then issued this patent disclosing all necessary constructional details of how to make a nuclear reactor.

The next few figures [Figs. 39, 38, 42; No. 2,708,656], all from the later Fermi and Szilard patent, show you how patents disclose constructional details so that after 17 years, when the patent expires, every member of the public can take advantage of the inventors' disclosures. This is a fairly large reactor—some 24 feet along the major axis—and some 20 feet high.

Now you have seen two very important patents in the atomic energy field.

I would like you now to see Patent No. 6,469 by an equally famous person. Abraham Lincoln had issued to him on May 22, 1849 a patent on "Buoying Vessels over Shoals" [Fig. 1]. River boats had a habit of running on sand bars. They were most difficult to float free of the submerged bars. Mr. Lincoln conceived the idea that each boat would be fitted with boxes which you will note are located near the top of each side of the hull [Fig. 2]. When the boat runs afoul of a sand bar, the boxes are opened and inflatable tanks are pushed into the water. These tanks, when inflated with air, add to the buoyancy of the vessel, lift it from the sand bar, and the boat proceeds merrily on its way.

Now to a more recent patent [Figs. 1-4, No. 2,860,004]. Here you see the Ford convertible as covered by the Hollowell *et al* Patent. This patent is owned by the Ford Motor Company, and you can see that it covers the idea of converting a hardtop into an open top car.

Fig. 1 to 4, which you are looking at, would not be sufficient in themselves to justify the grant of a patent. The inventor must tell how you can make such an arrangement work. Here you can see the mechanism used to slide the top into and out of place from down behind the trunk lid [Fig. 7, No. 2,860,004].

The patents thus far discussed are the so-called "utility" patents. Their subject matter must be new and useful. There are two other classes of patents: plant patents—which I shall not discuss—and design patents. Design patents are interesting because they are concerned with appearance rather than utility. Appearance is the measure of the presence or absence of patentability.

Here you see a copy of Palmer Design Patent No. 161,865 on a squirrel. The squirrel on the right, made of milk chocolate, represents what the inventor's competitor made and sold. The Palmer patent proved to be a highly valuable one. It seems boys and girls like to buy chocolate squirrels having the appearance of the one in the Palmer patent. That is why the competitor company copied it. The patent owner thereupon brought an infringement suit.

The competitor was not content with copying the squirrel. He also copied a little duck which formed the subject matter of another Palmer patent—Design Patent No. 161,521. Here again you can see the close similarity in the copier's commercial product—the milk chocolate duck—and the design covered by the patent.

Our federal courts right here in Philadelphia were not impressed with the defense and held both design patents valid and infringed. Damages were awarded to the patent owner. The infringing company was told: You must stop copying the Palmer designs. You must pay for the wrongful taking of the Palmer designs.

I believe you now have some idea of the "Patent System in Action." It provides protection only for that which is new and useful. It protects only that which promotes the useful arts. A patent never takes from the public anything already in the public domain. A patent is not a monopoly as that word is commonly understood. As Mr. Justice Roberts put it in the case of *United States* v. *Dubilier Corporation,* 289 U.S. 178,186:

> An inventor deprives the public of nothing which it enjoyed before his discovery, but gives something of value to the community by adding to the sum of human knowledge.

The inventors have given this country its technical leadership.

The patent system has provided the incentives for the continued flow of inventions, new and useful to all of us.

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———————, "Uses of Titles for Copyrighted and Public Domain Works," *Bulletin of the Copyright Society of the U. S. A.,* 6, (December 1958), 64.

Tatum, E. L., "A Case History in Biological Research," *Science,* (June 26, 1959), 1715.

Generalizations illustrated by this article by a Nobel Prize winner on factors in "the discovery that genes control biochemical events" include: (1) dependence of scientific progress on contributions of past and present investigators all over the world; (2) importance of free exchange of ideas in international scientific community; (3) "hybrid vigor resulting from cross-fertilization between disciplines"; (4) "chance, geographical proximity, and opportunity."

Taubman, J., "Creation, Copyright and the Constitutional Clause," *Bulletin of the Copyright Society of the U. S. A.,* 6, (April 1959), 153.

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Woodcock, V. E., "What is Prior Art?," *Villanova Law Review,* 3, (April 1958), 255.

RECENTLY PUBLISHED BOOKS FOR YOUNG PEOPLE ABOUT SCIENTISTS, SCIENCE, AND TECHNOLOGY

Ahnstrom, D. N. *The Complete Book of Jets and Rockets.* New York: The World Publishing Company, 1959.

Asimov, Isaac. *Words of Science* and the History Behind Them. Illus. by William Barss. Boston: Houghton Mifflin Company, 1959. 266 pp.

Beiser, Arthur. *Our Earth.* New York: E. P. Dutton & Company, 1959. 123 pp.

Branley, Franklyn M. *Experiments in Sky Watching.* Illus. by Helmut K. Wimmer. New York: Thomas Y. Crowell Company, 1959. 111 pp.

Cane, Philip. *Giants of Science.* Illus. by Samuel Nisenson. New York: Grosset & Dunlap, 1959.

Clason, Clyde B. *Men, Planets and Stars.* New York: G. P. Putnam's Sons, 1959. 160 pp., illus.

Cooper, Elizabeth, *Discovering Chemistry.* New York: Harcourt, Brace, 1959. 190 pp., illus.

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Irwin, Keith Gordon. *The Romance of Chemistry:* From Ancient Alchemy to Nuclear Fission. Illus. by Anthony Ravielli. New York: The Viking Press, 1959. 148 pp.

Kinney, William A. *Medical Science and Space Travel.* New York: Franklin Watts, Inc., 1959. 150 pp., illus.

Leonard, Jonathan N. *Exploring Science.* Illus. by Louise Darling and I. N. Steinberg. New York: The World Publishing Company, 1959. 318 pp.

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NOTES

Federal Patent Policies in R and D Contracts To Be Studied

The policy of the Federal Government with respect to the right to patented inventions growing out of government-financed research and development contracts will be the subject of research and analysis by the Foundation.

The object of the study is to examine and evaluate the implications of government policy with respect to (1) contractors, (2) government agencies, and (3) the public interest. Some of the factors included in the concept of public interest are (1) the progress of science and the useful arts; (2) the strengthening of the national security; (3) the stimulation of economic growth through gains in productivity; and (4) the preservation of a free and healthy economic structure.

Dr. Donald S. Watson, Professor of Economics at The George Washington University, will be the Principal Investigator for the research project, and Dr. Harold F. Bright, Professor of Statistics at the University, will be Associate Investigator.

The Foundation's preliminary planning of the study indicates that we should attempt to cast light on many factors, some of which are listed below.

a. The influence of the contractor patent-ownership policy in contributing to the concentration of economic power of large concerns to the detriment of a freely competitive industrial economy as mentioned in the Attorney General's report of November, 1956, to the President and to Congress.

b. The motivating effect on scientists and other technical people actually engaged in the work of knowing that an invention would become government property rather than the property of their employing concern.

c. The problems of utilization or administration of patent rights when acquired by the government.

d. The possibility of reduced availability of research facilities of industry if there is a departure from present patent-ownership policies.

e. The extent to which concerns are motivated by factors other than title to patents, such as the opportunity to develop know-how, to improve the training of their scientists and technicians, and to get benefits usable in their commercial production.

f. The effect upon the government's research and development costs of diminishing the patent rights currently given contractors under present patent-ownership policies.
g. The relative effectiveness of the contractor patent-ownership policy as an invention incentive to concerns. The effect, if any, on the invention incentive of a policy which limits the contractor's patent rights.
h. The possible effects by way of discouraging commercial production of inventions as a result of departing from present patent-ownership policies.
i. Consideration of policies which are "in between" the contractor-ownership and government-ownership policies, such as giving the contractor (1) a non-exclusive license only; (2) title, but a requirement to license promptly to any concerns; (3) title, but a requirement to license to small business concerns; (4) an exclusive license to a contractor for a fixed period of years (or contractor-ownership of the title to patents for a limited period of years), title thereafter reverting to the government or dedicated to the public; (5) other alternatives.

The project was developed on behalf of the government by the interagency Task Force for review of government procurement policies and procedures through a study group headed by the U. S. Commissioner of Patents and is being continued by the Office of Procurement Policy in the Federal Supply Service of the General Services Administration.

Guides to Foundation Research

The third guide in the series entitled "What Do You Know About . . ." is being distributed by the Foundation. This guide concerns the Foundation's project on Patents and Taxation. The series is directed to busy executives and professional people and is intended to bring to their attention reports and articles published in the *Journal*. This is part of the Foundation's information program aimed at developing media of communication to present the results of our research to various publics.

The first guide was on Foreign Licensing, and is intended to expand management's horizons and call attention to the opportunities for new lines and new markets.

The second guide, relating to Commercial Use of Patented Inventions, provides useful information on the research and patent activities of American companies.

Library Committee of the Foundation

A Library Committee for the Foundation has been appointed to advise on library policy and acquisitions. The committee consists

of Miss Bertha M. Rothe, Librarian to the Foundation; Professor S. Chesterfield Oppenheim, the Foundation's Adviser on Research; Dr. Irving H. Siegel, and Dr. Joseph Rossman, members of the Foundation's Research Staff; and Mr. John C. Green, Consultant to the Foundation.

Books Received

Allyn, Robert Starr. *The First Plant Patents* and *Plant Patents 1934-1943.* Abstracts of Plant Patents 85 to 610, A Supplement to *The First Plant Patents.* Printed privately. 52 pp. and 105 pp.

Jewkes, John; David Sawers; and Richard Stillerman. *The Sources of Invention.* London: MacMillan & Co. Limited, 1958. 428 pp.

Methodology of Statistics on Research and Development. NSF 59-36. Washington: National Science Foundation, 132 pp.

Rae, John B. *American Automobile Manufacturers.* A History of the Automobile Industry: The First Forty Years. Philadelphia: Chilton Company, 1959. 223 pp., illus.

Trademark Management. (2nd ed.) New York: The United States Trademark Association, 1956. 130 pp., illus.

Individuals and organizations are invited to contribute as loans and permanent gifts, books, materials, and manuscripts in the various fields of the Foundation's interest, such as economics, statistics, law, psychology, sociology, and engineering.

The Foundation's specialized library contains a collection of published and unpublished material designed to meet the reference needs of students, patent specialists, teachers of law, research workers in the physical and social sciences, professional people, and others interested in the patent and related systems.

Research Program and Staff of the Foundation

For the convenience of *Journal* readers who may not be members of the Foundation and who may not have the occasion to see the 1959-60 Bulletin, we are including this note on our research program and a list of the members of the Staff of the Foundation.

All the projects being explored or undertaken by the Foundation at this time are concerned generally with a better understanding of the nature and value of the patent, trademark, and copyright systems. This over-all purpose is being carried out in eight selected areas to provide as comprehensive a picture of patents, trademarks, and copyrights as can be obtained with the resources and techniques at our disposal.

The eight areas selected for investigation and the projects undertaken in these areas are as follows:

*I. Utilization of Patents, Trademarks, and Copyrights

#1a — *Patent Utilization*

To determine the proportion of patented inventions that are used in production and, insofar as possible, the contributions that such use makes to our economy.

II. Patent, Trademark, and Copyright Evaluation

#2a — *The Value of the Patent in the United States* **

To develop the methodological framework within which the value of the patent system can be determined, focusing on method rather than definitive, empirical treatment.

III. Impact on Industrial Development and Community Growth

#3a — *Role of Patents in the Creation and Growth of Small Industrial Units*

To illuminate, through selective industry case studies, the contribution of the patent system, among other factors, to the creation and growth of new firms and industries. The first seven studies are:

"Patent and Other Factors in the Development of Firms in the Custom Heat-Treating Industry." **

"Patent and Other Factors in the Future Organization of the Steel Industry." **

"Patent and Other Factors in the Growth of the Electronics Industry in the Boston Area." **

"Patent and Other Factors in the Operations and Prospects of Independent Firms in the Aluminum Fabrication Industry." **

"Patent and Other Factors in the Operations and Prospects of Independent Firms in the Fabricated Plastic Products Industry." **

"Patent and Other Factors in the Operations and Prospects of Independent Firms in the Scientific and Other Instruments Industry."

"Patent and Other Factors in the Operations and Prospects of Independent Firms in the Machine Tool Industry."

#3b — *Role of Patents in the Evolution of Established Companies*

To illuminate, through selective case studies, the contribution of the patent system, among other factors, to the evolution (diversification, etc.) of firms and industries. The first two studies undertaken are "Patent and Other Factors in the Evolution of Firms Engaged in

Transistor Production;

Mining and Metallurgy"

#3c — *Comprehensive Surveys of Published and Unpublished Materials on Company Patent and Research Activities*

The first two studies undertaken are "Corporate Patent and Research Activities as Revealed in Reports to Stockholders" and

* Areas are set forth in Roman numerals.

** Completed projects.

"Review and Evaluation of Materials Provided by Project 3a and Non-Foundation Surveys on Patent and Other Factors in the Development of Small Industrial Units."

IV. Relationship to Antitrust and Trade-Practice Laws

#4a — *Effects of Certain Antitrust Decrees Involving Patents as a Major Factor*

To ascertain whether there are measurable criteria for judging the technological and economic effects of litigated and consent antitrust decrees in which patents are a major factor. The first three studies are:

"The Concrete Block Making Machine Industry" **

"The Parking Meter Industry" **

"Compulsory Licensing and Color Movies: Effects of Technicolor and Eastman Antitrust Decrees"

V. Foreign Patents, Trademarks, and Copyrights

#5a — *Relation of American Patents, Trademarks, and Techniques and American-Owned Foreign Patents to Foreign Licensing*

To obtain information on licensing operations abroad by American business; and primarily on the relation of American patents, trademarks and techniques, including the effect of American-owned foreign patents, to such licensing.

VI. Public Attitude and Invention Incentives (Socio-Psychological Studies)

#6a — *Public Attitudes Toward Patents, Trademarks, and Copyrights* **

To study public attitudes toward and information levels about the patent system in an effort to provide guidance to a public relations program.

#6b — *Attitudes of American Inventors Toward Defense Invention* **

To find out the attitudes of inventors to invention for national defense, including invention deterrents and incentives. This project is being undertaken pursuant to an agreement with the National Inventors Council.

VII. Governmental (Ownership of Patents; Atomic Energy; Evaluation of Copyright Office, Patent Office, and Judicial Procedures; Taxation)

#7a — *Taxation and Patents*

To identify specific tax problems that involve patents and to gather data on these problems by interviews with corporations and individual inventors and by means of mail questionnaires.

#7b — *Federal Patent Policies in R and D Contracts*

To examine and evaluate the implications of federal patent policies for contractors, for government agencies, and for the public interest.

** Completed projects.

This project is being undertaken pursuant to an agreement with the General Services Administration.

VIII. Role in Executive Decisions

#8a — *The Role of Patents in Executive Decisions*

To shed light by means of the case method on the role of the patent system on executive decisions relating to research, development, and production within the firm and to explore the interaction of decisions to patent with those on other aspects of firm strategy.

The above eight areas are based either upon the uniqueness of the combination of disciplines employed or upon the fact that the particular subject matter could best be studied in a unified approach. The Foundation's work falls into three *basic* categories. The first or general category *inquires broadly into the value and nature of the patent system.* The second *concerns the attitude of people in different capacities or roles toward the system.* It isolates the patent system as a central idea to which the participants in our economy react. The third category *concerns the relation of the patent to different aspects of industrial organization and functioning.* That is, the patent is considered in context with other economic and social factors in business and industry.

The projects are conducted by qualified men—economists, statisticians, lawyers, psychologists, sociologists, etc.—selected on the basis of their knowledge and experience in the areas of investigation.

Under the auspices of the University, as a warranty of free and independent inquiry, primary emphasis is placed upon empirical research, on the facts as found by the investigators. The nature of this work is interdisciplinary, a reintegration of specialized information. Interdisciplinary research is implicit in the concept of a university and location at a university permits the integration of the Foundation's research into the university program of education.

The Foundation's Advisory Council, National and Area Committees, and selected members advise and assist in carrying out the projects. The Foundation conducts its research by going to the laboratory, factory, business executive, agriculture, labor, consumer, and to all related areas of our national life. Facts are collected and analyzed, and the results are made available to all interested individuals, organizations, companies, and the general public.

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S. Chesterfield Oppenheim, A.B., A.M., J.D., S.J.D., *Adviser on Research.*

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* Projects or studies in a project on which these researchers worked have been completed.

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James S. Worley,* A.B., A.M., former *Research Associate* on Project 2a; Princeton University.

Eighth Report to Members

The *Eighth Report to Members* containing news and pictures of Foundation events, people, and documents is available for distribution to individuals and organizations interested in applying for membership in the Foundation. The *Report* is published periodically to bring members up to date on Foundation activities. It includes news of recently formed Area Committees and newly appointed officers of those committees. Members are apprised of latest appointments to the Research Staff and Advisory Council, new projects, information on current publications, and new members of the Foundation. The *Eighth Report* features a comprehensive coverage, with pictures, of the third Annual Public Conference.

The Bulletin

The 1959-60 *Bulletin* of the Foundation is off the press and available upon request. This edition contains, among other information, an outline of the organization of the Foundation, including current members of the Advisory Council, Area Committees, and Research Staff; the educational program of the Foundation; information about new publications we distribute; a description of new and continuing projects, and an up-to-date list of Foundation members.

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* Projects or studies in a project on which these researchers worked have been completed.

New Data on Foreign Licensing

J. N. BEHRMAN, Principal Investigator*
W. E. SCHMIDT, Associate Investigator**

SUMMARY

THIS INTERIM REPORT on foreign licensing is part of a continuing study by the staff on Project 5a. After completing and reporting on a pilot project on the nature and problems surrounding foreign licensing (see, *PTC J. Res. & Ed.*, 2, No. 2, (June 1958), pp. 181-277) the Foundation embarked on a search for additional empirical data to augment these earlier results. Recently we completed an analysis of the pricing provisions under licensing contracts (see, *PTC J. Res. & Ed.*, 3, No. 3, (Fall 1959), pp. 272-302). Interest in both governmental and business sectors in the valuable contribution which foreign licensing is making to economic growth in the free world has been stimulated by our reports. Our research has demonstrated to those concerned with foreign operations of U. S. business that this accompaniment to direct investment is more important than many had previously thought.

The present report relates to the foreign assets which U. S. corporations have available for licensing abroad; the experience of licensors as to negotiation, contract procedure, and profitability of licensing; and the experience of some potential licensees abroad as to negotiation of contracts. The results indicate that much more research needs to be done on the economic effects both at home and abroad of practices under license arrangements. We contemplate extending our research to the economic aspects of antitrust legislation on foreign licensing operations and to the impact on economic growth abroad of the transfer of proprietary rights and technical and managerial know-how.

INTRODUCTION

DURING EARLY 1959, the Foundation sent a new questionnaire (see, *PTC J. Res. & Ed.*, 3, No. 1, (Spring 1959), Appendix B, pp. 13-20) to two groups of selected companies. The questionnaire was an extensive revision of the one sent in 1957 to other companies and sought to obtain information on areas not covered formerly. One group of recipients was composed of 162 companies which we knew to be interested in licensing and which on their part knew of the work of the Founda-

* Dr. Behrman, Professor of Economics and Business Administration at the University of Delaware, is Principal Investigator of *Project 5a*, Foreign Licensing.

** Dr. Schmidt, Associate Professor of Economics at The George Washington University, is Associate Investigator of *Project 5a*.

tion. Another group of 220 companies was chosen from among the 1,000 largest U. S. companies that also had at least one foreign subsidiary.

Replies from 80 of the first group (of 162 companies) were received, and 65 from the second group (of 220 companies) as follows:

	1st	*2nd*	*Total*
COMPLETED QUESTIONNAIRES	47	22	69
FOREIGN ASSETS RECORDED	10	14	24
INSUFFICIENT EXPERIENCE	9	17	26
COMMENTS IN LETTER	1	0	1
PERSONAL INTERVIEW	3	7	10
DECLINED TO FILL OUT QUESTIONNAIRE	10	5	15
TOTAL	80	65	145

We, therefore, had a reply ratio of 50% in the first group and useful responses from 61 companies, or 37%; compared to 30% responding in the second group and 19% useful (including personal interviews). We may draw from this comparison the expected conclusion that results will be significantly raised when respondents are familiar with the research personnel and project being undertaken.

Part I

DATA FROM U. S. LICENSORS

Foreign Assets and Techniques of Their Use

THE PURPOSE OF THE QUESTIONS (#1-7) concerning U. S. owned foreign patents and trademarks was to obtain some idea as to the magnitude of the assets available for licensing. We asked for information as to the *number of inventions* on which patents were held in the United States and abroad and the number of trademark registrations in the United States and abroad. The data provided by 90 respondents are arrayed in Table 1.

1. Patents

The results give striking evidence that by far the majority of inventions patented in the United States are not patented abroad, even in Canada. And, when Canada is excluded, the number drops precipitously in most cases, with several companies indicating that they do not patent inventions outside of the U. S. and Canada. The data indicate that 69% of all U. S. patented inventions are patented abroad by the 90 companies when Canada is included, but 28% when it is excluded. These averages are *not* "representative" since they are *strongly* affected by the policies of the few large companies included, which patent most of their inventions abroad. Thus, 51 companies reported having less than 100 inventions patented in the United States, and they patented only 50% of these inventions abroad (including Canada) but 27%, or close to the overall average, excluding Canada.

Those companies having the largest numbers of inventions patented fall into the producer-goods classification; only eight of the 39 companies having over 100

patented inventions are in the consumer-goods class; whereas 22 of the 51 with less than 100 patented inventions are in the consumer-goods class. There does not seem to be any pattern in foreign patenting policies according to consumer versus producer goods types. Nor is there a clear pattern among large and small companies; some of those with many U. S. patented inventions file only sparsely abroad, and some having only a few U. S. patents file none abroad. Also we find some companies throughout the range patenting abroad nearly 100% of their inventions patented in the United States.

TABLE 1

OWNERSHIP AND LICENSING OF FOREIGN PATENTS BY 90 U. S. COMPANIES IN 1959, RANKED BY NUMBER OF PATENTED INVENTIONS REPORTED

1a Number of Inventions Patented in U. S.	1b Abroad Including Canada	1b Abroad Excluding Canada	1c Number of Foreign Companies in Which Inventions Usually Patented	3 Number of Inventions Licensed Under Foreign Patents	9 Number of Patent License Agreements
	90%	20%	7	80%	106
Over	100%	100%	10	100%	290
1,000	100%	20%	5–7	70%	63
	50%	.1%	1	.1%	7
	40%	40%	12	1%	6
700	700	50	1–16	0	—
600	360	250	—	all	16
600	60	55	10	4	12
509	172	71	6	0	—
500	420	360	4	6	6
498	48	17	3	3	1
492	47	31	10–12	18	3
454	103	72	19	67	83
450	74	15	12	50	3
419	68	53	5–8	11	20
412	227	151	8	128	6
390	150	0	1	0	0
265	239	107	6	32	10
258	121	32	5	4	7
253	70	47	4	0	15
200	100	60	25	10	7
172	29	29	—	15	2
160	60	60	12	60	4
150	25	25	10	20	7
150	25	25	10–18	9	28
140	60	55	6	10	1
117	37	31	8	18	7
110	99	88	5	all	9
110	50	34	3	41	3
109	37	37	11	37	6
100	maj.	maj.	10	90%	108
85	20	—	4	13	7
83	20	5	2	6	3
80	10	?	10–15	2	14
76	8	8	10	28	29
60	60	14	2	2	1
60	60	5	1	5	5
58	28	28	9	20	10
50	25	25	10	4	15
47	40	40	19	18	7
34	34	1	36	34	138

TABLE 1—Continued

OWNERSHIP AND LICENSING OF FOREIGN PATENTS BY 90 U. S. COMPANIES IN 1959, RANKED BY NUMBER OF PATENTED INVENTIONS REPORTED

1a Number of Inventions Patented in U. S.	1b Abroad Including Canada	1b Abroad Excluding Canada	1c Number of Foreign Companies in Which Inventions Usually Patented	3 Number of Inventions Licensed Under Foreign Patents	9 Number of Patent License Agreements
25	4	4	6	2	—
25	15	15	3	all	2
20	5	1	3	2	2
20	10	?	8	20	14
18	15	?	3	?	3
16	9	4	3	9	—
15	15	15	13	0	1
15	7	6	0	0	0
15	7	5	10	all	11
15	8	0	15	5	5
12	10	10	9	3	4
10	10	4	3	0	—
9	9	—	17	9	6
6	0	0	0	0	0
6	0	6	0	0	—
5	0	0	0	0	0
5	5	4	—	0	0
4	1	1	0	0	0
1	1	0	4	1	1
neg.	—	—	—	4	4
—	—	—	—	—	12
—	0	0	0	0	0
—	25%	—	15–30	0	—
0	0	0	0	0	0
—	—	—	—	—	13

24 companies not licensing:

1,408	753	—	—		
650	210	30	1		
200	50	5	1		
175	51	38	6		
160	112	10	6		
153	57	56	8		
112	31	8	—		
100	45	45	0		
90	10	10	5		
73	54	27	2–6		
62	31	27	7		
45	14	0	7		
41	91	72	5		
34	2	1	4		
32	23	10	1		
13	0	0	0		
10	9	5	2 or 3		
10	10	0	1		
8	6	6	4		
5	3	3	3		
1	0	0	0		
0	0	0	0		
0	0	0	0		
—	5	—	—		

A critical question in patent policy is the number of foreign countries in which to file. Our respondents were asked to indicate their general policy as to the number of countries in which they filed. The replies indicate that almost all of the companies file in one to 15 foreign countries; thus each invention patented abroad provides a multiple of assets for licensing which on the average is five or six times the number of inventions patented abroad.

It is evident from the large number of inventions patented in the U. S. which are not patented abroad by these 90 companies that there are significant assets considered valuable in the U. S. market which are not available for licensing abroad since the corresponding patents were not acquired abroad. Many of the inventions not patented abroad may not have potential value there. But a precise determination of the impact of the patent system on licensing of proprietary rights would require considerably more investigation into the specific decisions of whether to patent abroad, in what countries, and how long to maintain these patents. Whether these decisions were "in error" or the criteria of decisions will change in the future as licensing abroad becomes more prevalent will depend on the costs and probable returns, which will in turn require a more careful assessment of each patent's potential than is currently given by many companies.

Among the 90 companies in Table 1, 24 reported that they did not license any company abroad (93 companies reported either on their licensing or their foreign patents and trademarks, but three which license did not report on their foreign assets). A few of these did not have foreign patents on their inventions and thus had nothing to license, but the remainder gave a variety of reasons for their lack of licensing. Several indicated that they were just beginning to negotiate licenses or were in the first steps of setting up licensing programs; others indicated that they had received no requests for licenses and were not effectively exploiting these assets themselves. A few had received requests from abroad but negotiations had proven unsuccessful, and some few others had sought licenses unsuccessfully. One was licensed abroad through another U. S. company, and two extended rights to their wholly-owned subsidiaries abroad but not under license. The remainder stated that they had no desire or need to license: the domestic market was expanding too rapidly, the product was too specialized, or licensing appeared unprofitable.

Among those licensing some foreign assets, at least 14 did not license their foreign patents, but eight reportedly licensed all of their foreign patented inventions in at least one country. Those not licensing indicated that they sold only through their own distributors, or that the patents had "no value outside of own plant," or that they were too new to exploit, or that prospective licensees wanted too much of a capital contribution. As indicated in the responses to question 2, recorded in Table 2, considerations of *licensing* were generally important in the decision to patent abroad only for a little over half of the companies responding. The remainder of the patents my be equally well "used" without licensing since protection of export sales or against future competition was the over-riding consideration; and for 20 companies licensing was not a consideration at all in the decision to patent abroad.

TABLE 2

CORRELATION OF IMPORTANCE OF LICENSING IN DECISIONS BY 88 COMPANIES TO PATENT AND REGISTER TRADEMARKS ABROAD (64 LICENSING[1]+24 NOT LICENSING[2])

TRADEMARKS—PATENTS	ALL	MAJORITY	MINORITY	NONE	TOTALS (PATENTS)
ALL	8	1	0	3	12
MAJORITY	0	10	15	9	34
MINORITY	0	1	12	9	22
NONE	0	1[3]	4[3]	15	20
TOTALS (TM)	8	13	31	36	88

[1] Five did not answer the question.
[2] The inclusion of companies not licensing weights the results toward non-consideration of licensing; of these 24 companies, 9 gave *no* consideration to licensing of patents; 7 considered it in a minority of cases; and 8 in majority or all cases; in registering trademarks, 16 gave no consideration to licensing; 5 "minority"; 2 "majority"; and 1 "all."
[3] No patents held.

"Utilization" is also not measured by whether an invention is licensed or not, for the same invention is frequently patented in several countries. We would have to obtain specific information on each invention—where patented and if licensed—for each country abroad to know specifically the extent of use through licensing. But this amount of data would have been too burdensome to request, especially when the questionnaire was already considered lengthy. Table 3 gives some insight into the extent to which U. S. companies file for patents on the same invention in several countries. The grouping indicates that over two-thirds of the companies responding generally file for patents in less than 10 foreign countries; none reported filing in more than 40 countries generally. But, since the average number of countries in which an invention is patented abroad appears to be about six, there are generally six foreign patent rights for each U. S. patented invention which is protected abroad.

To determine how many patent licensing agreements were extended by our respondents, we collated the information given in response to question 9, adding all agreements that covered patents (whether patents only, or in combination with other licensed assets). The following data represent the replies of 69 companies licensing some assets abroad:

NUMBER OF PATENT LICENSES	NUMBER OF COMPANIES
0	9
1–5	17
6–10	15
11–15	7
16–20	3
21–30	2
31–50	0
51–100	2
Over 100	4
No Reply	10
	69

While there are a few companies extending large numbers of licenses, the majority are involved in less than ten such contracts abroad.

TABLE 3

FOREIGN ASSETS

Companies Filing for Patents Abroad	Average Number of Countries Involved	Companies Registering Trademarks Abroad
12[1]	0	7
7	1	10
18	2–4	8
15	5–7	7
14	8–10	7
9	11–15	6
3	16–20	6
2	21–30	11
1	31–40	6
0	50–65	10
0	80–100	3
0	over 100	5
12	no reply	7
—		—
93	total	93

[1] Four had no U. S. patents.

A scatter dispersion (not shown) of the relation of the number of inventions licensed (under some foreign contract) to the number of patent license agreements abroad shows no definite pattern. The conclusion must be that some companies prefer to extend all of their patent rights to a few licensees, while others prefer to extend to many licensees a few patent rights; and others will extend to each of several licensees, rights to different patents. The lack of pattern indicates that here is an area of policy decision which should be given more close examination. This area revolves around the decision to extend exclusive licenses and will be investigated along with our study of antitrust problems connected with licensing abroad.

In sum the "average" company among our respondents, therefore, has several hundred U. S. patented inventions, protects over two-thirds of them abroad (including Canada), but less than 30% (excluding Canada), patents each invention in about six foreign countries, licenses 69% of the inventions patented abroad in any country, and will extend six to ten different licenses under its foreign patents.

2. Trademarks

We requested similar information on trademarks; the results are tabulated in Table 4. The 90 responding companies are arrayed according to number of U. S. trademarks reported, showing also the number of foreign countries in which a U. S. trademark is generally registered, the number of such trademarks licensed abroad in one or more countries, and the number of agreements extending rights to trademarks. We decided against requesting information on the number of U. S. trademarks which were registered abroad because of the confusion as to whether a mark registered in several countries would be counted as "one" or as several registrations, and because of the necessity of expanding too greatly the number of questions asked. However, our previous questionnaire (in 1957) obtained some information along this line.

TABLE 4

OWNERSHIP AND LICENSING OF TRADEMARKS ABROAD BY 90 U. S. COMPANIES IN 1959, RANKED ACCORDING TO NUMBER OF U. S. TRADEMARKS

1d Number Registered in U. S.	1e Number of Foreign Countries in Which Usually Registered	4 Number Licensed Abroad	9 Number of Agreements Licensing Trademarks
363	—	1–10	—
300	125	Majority	57
242	0	29	6
200	40–50	all	—
200	25	30	30
175	25	20	14
156	51	54	3
152	3	0	0
150	1	0	0
115	15	3	3
104	73	27	5
100	6	0	0
100	30	7	7
100	1	0	—
60	135	10	7
60	35	8	6
59	9	4	6
52	56	6	14
50	25	90%	48
50	1	0	—
50	25	3	5
47	25	0	0
47	28	1	2
45	80	all	16
43	20	2	7
41	11	4	0
41	23	10	0
40	20	4	8
36	60	1	0
35	37	1	2
33	1	1	—
31	10	11–20	9
30	15	20	10
30	5–8	2	20
28	50	all	16
25	50	all	4
25	20	1	0

TABLE 4—Continued

OWNERSHIP AND LICENSING OF TRADEMARKS ABROAD BY 90 U. S. COMPANIES IN 1959, RANKED ACCORDING TO NUMBER OF U. S. TRADEMARKS

1d Number Registered in U. S.	1e Number of Foreign Countries in Which Usually Registered	4 Number Licensed Abroad	9 Number of Agreements Licensing Trademarks
25	20–25	5–6	4
24	15	0	0
23	102	2	16
23	36	6	2
20	50	5	7
20	80	all	11
18	2	5	7
18	9	3	3
14	4	3	—
13	5	9	2
12	9–11	1	0
10–12	5	4	6
11	0	1	1
6	40	6	11
6	20	2	14
6	18	1	4
5	1	1	1
5	8	0	—
2–5	—	1	1
4	50	1	1
3	120	2	1
3	4	0	0
3	5	1	0
1	25	1	3
1	1	1	2
1	40	1	3
0	0	0	12
—	—	—	0
—	—	—	13
24 companies not licensing:			
118	100		
94	64		
84	25		
52	8		
26	30		
25	1		
23	2–6		
18	8		
13	7		
12	2		
12	33		
11	3–5		
10	14		
7	0		
6	60		
3	1		
3	1		
1	0		
1	15		
1	0		
1	6		
1	0		
1	1		
0	3		

Our 90 respondents have U. S. trademarks ranging in number from none to over 360, averaging under 50 per company. These same companies vary widely as to their registration policies. Some have a large number of U. S. marks but register in no country abroad, and some have a few U. S. marks which are also registered in over 100 countries. There seems to be no clear pattern in this activity, though there are some differences depending on the type of products involved. Thus, the consumer-goods companies tend to have the larger number of marks and to be more active in foreign registration; however, there are some notable exceptions to this in our list, especially where the producer-goods company has an active licensing program.

From our data obtained in 1957 and through discussions with trademark experts, we feel that it is possible to conclude tentatively that U. S. companies generally register at least 50% of their marks abroad. Many, especially in the consumer goods fields, register nearly all of their marks in some foreign country and a large proportion register over 75% of their U. S. marks abroad. Thus, if we take the conservative estimate of "half" being registered abroad in some country and the average number of countries at 16 to 20, as reported by our recent respondents, there are eight to ten foreign trademark assets for every one trademark registered in the United States.

Of those companies licensing the use of any of their trademarks abroad, nine indicate that all of their foreign marks were licensed to one or more companies. (And nine others which license patents abroad stated that they did not license trademarks.) The remainder licensed various of their trademarks under one or more contracts, averaging six per company. If we make a somewhat unrealistic comparison of the number of trademarks licensed abroad to the U. S. marks owned by the licensing companies, we find that the number of *foreign* marks licensed is only 10% of the number of U. S. marks owned. This could mean either a lack of foreign registration or of licensing—or both.

The distribution of separate licenses extending rights to trademarks was as follows for the 69 companies licensing any asset abroad:

Number of Agreements	Number of Companies
0	13
1–5	20
6–10	12
11–15	9
16–20	2
21–50	2
Over 50	1
No reply	10
	69

The average for the 63 companies reporting having foreign marks was seven license agreements extending trademarks (either alone or in combination with other assets).

The data do not tell us whether the same mark in a given country was licensed to more than one licensee, or the same type of mark registered in more than one country was licensed in the different countries. Thus, we have no information on "utilization" through licensing; but, again, the primary purpose of a trademark

registration is not licensing but protection, and many may be performing this function well. (See, Table 2.)

In sum, the "average" company among our respondents will have about 50 U. S. trademarks, 25 to 30 of which will be registered in 16 to 20 countries, giving rise to between 400 and 600 licenseable trademark assets. But only seven agreements will have been made licensing rights to these marks. Again, to have a clear picture of utilization through licensing, we would need to know how many trademarks were licensed under the agreements and what territory was covered by the license. We have no information as to how many marks registered in a single country are extended under one agreement, but data analyzed below indicate that licensees seldom have rights under marks outside of their own country.

3. Know-How

Only one company out of the 69 licensing abroad indicated that it did not offer know-how under a license; it did, however, extend the same information to its subsidiaries abroad without a license. Only 14 companies offered know-how who did not also have patent licenses abroad; 13 of these had extended trademark licenses; thus, only one company responding extended only technical assistance agreements.

Among the 24 companies not having licensees abroad, only four indicated that they had offered know-how but had not been able to negotiate a contract. The remaining 20 had not offered to license their technical know-how. The reasons for this lack of activity included: no requests received from abroad, no occasion in the particular field, free exchange of technical knowledge in the industry, no desire to license, domestic market expanding too rapidly, foreign market too limited for the product, and foreign operations only through subsidiaries which are not licensed.

4. Sale of Services

In an attempt to discover the relative importance of licensing in the transfer of managerial and technical skills abroad, we asked question 6 concerning the extent to which such services were sold either to licensees outside of the license agreement (or outside of the royalty provisions of the license) or to foreign companies not licensed at all.

There is very little such information extended to companies which are not licensees. Three U. S. respondents sell technical services only to non-licensees; one of them sells managerial services to non-licensees only; one to both licensees and non-licensees; and the third to neither. Six others sell technical services to both licensees and non-licensees, but vary in their practice of selling managerial services; with four making no such sales, one to only licensees, and one only to non-licensees. The results, shown in Table 5 indicate that of the 66 companies answering this question, 31 sell neither type of service, another 18 sell no management services, and another six sell no technical services. Of the 18 selling technical services, four make sales to both licensees and non-licensees, 13 only to licensees, and one only to non-licensees. Of the six selling only managerial services,

all are to licensees. Seven other companies sell both types of services to licensees only.

TABLE 5

DISTRIBUTION OF 66 U. S. COMPANIES EXTENDING TO LICENSEES AND NON-LICENSEES MANAGEMENT AND TECHNICAL ASSISTANCE NOT COVERED BY LICENSE ROYALTIES DURING 1959

Technical \ Management	Both Licensees and Non-licensees	Licensees Only	Non-licensees Only	Neither Licensees nor Non-licensees	Technical Totals
Both Licensees and Non-licensees	0	1	1	4	6
Licensees Only	0	7	0	13	20
Non-licensees Only	1	0	1	1	3
Neither Licensees nor Non-licensees	0	6	0	31	37
Management Totals	1	14	2	49	66[1]

[1] Excludes 3 companies not giving this data *and* 24 companies not licensing any assets abroad.

We may conclude, therefore, that sales of managerial and technical services by our respondents to non-licensees are relatively small, being made by only nine companies. Sales of such services to licensees are made by 26 companies, but evidence obtained in a later question (#25) indicates that the relative returns from such sales compared to those from licensing are small. Thus, licensing is apparently the most important means of transferring managerial and technical skills outside of the direct investment route, which is itself usually combined with licensing, as we shall see from further evidence presented in this study.

5. Licensing by Intermediaries

To determine whether a company might itself not license abroad but might extend similar rights or services through a U. S. intermediary, we asked in question 7 if the respondent had granted U. S. companies the right to sub-license abroad and why.

Eleven of the 69 companies licensing abroad stated that they licensed another U. S. company which was authorized to sub-license abroad, but they also licensed abroad directly. One other gave sub-licensing privileges to a French company since approvals in Japan were gained more readily this way, and the French licensee guaranteed the payments from the sub-licensee. Only two companies did no licensing abroad themselves while permitting sub-licensing abroad by a U. S. licensee.

The reasons given by those permitting other U. S. companies to license abroad were that (a) the licensee produced related parts and/or the licensed patents covered only a small part of the final product; (b) the licensee had more contacts abroad and better qualifications to license; (c) the patent concerned fell outside the scope of the patentee's business, while the licensee was a specialist in the field

and was better equipped to promote use abroad; and (d) the U. S. licensee was extended an exclusive world-wide license.

We may conclude again that it has not become general practice for U. S. companies to turn their foreign licensing programs over to other companies in the United States, although in a few special cases it has been found advantageous.

Extent and Nature of Licensing

To ascertain whether our pilot study had provided reliable data and to broaden the segment studied, we asked for specific data on the nature, extent, and direction of foreign licensing. And, to obtain insights into practices which we found through our interviews were important, we asked some specific questions on the fulfillment of the contracts.

1. Duration of the Licensing Program

So that we would know whether our respondents were mainly new licensors and the results biased by their short experience, we asked in question 8 how long each has been licensing abroad. Five of the 63 responding to questions on their experience did not answer this question.[1] The distribution of the remainder, given below, indicates that the majority of our respondents have been licensing over 10 years.

Number of Years	Number of Companies
1–5	12
6–10	13
11–15	8
16–20	5
21–30	13
31–40	4
41–50	2
Over 50	1
	58

In response to the question as to how soon the program had become profitable, only 22 companies gave an answer. One said it did not know; three replied "not yet" since they had just begun; three reported "immediately"; six said within one year; two said within two years; and the remaining seven reported between three to five years. While the expectation is for licensing to be a long-run proposition; the contract can be drawn so as to produce profitable returns in a relatively short time.[2]

2. Geographic Distribution

Of the 63 companies eight did not provide data on geographic distribution of their licenses by type of agreement. However, information from the other 55

[1] Six companies, which stated that they licensed only a very few companies abroad, answered no questions on their licensing experience; they are excluded from this section, therefore.

[2] On problems of pricing in licensing contracts, see, *PTC J. Res. & Ed.* 3, No. 3, (Fall 1959), pp. 272-302.

indicates that further empirical study of the direction of licensing would be useful. These 55 licensors had over 1,200 foreign licenses (possibly with less than 1,200 licensees)—an average of 22 agreements per respondent. This average, however, is heavily weighted by a few who have over 100 licenses with foreign companies.

The evidence from Table 6 suggests that licenses covering patents only are by far more numerous than any other form; but this contradicts the generally expressed view that know-how is much more important than any other asset licensed. It also contradicts the often stated view that patents are valuable usually only with know-how supplied by the licensor. Despite the diversity of the companies reporting and the fact that they account for over 8% of the number of U. S. companies found by the U. S. Department of Commerce to be licensing abroad,[3] we can state only that the data are suggestive of the actual picture and not necessarily representative.

TABLE 6

DISTRIBUTION OF LICENSE AGREEMENTS OF 55 U. S. CORPORATIONS BY TYPE AND BY REGION, 1959

Area	Patents Only	Know-How Only	TM Only	Patents & Know-How	Patents & TMs	TMs & Know-How	Patents, TMs, & Know-How	Grand Total
Industrialized Countries—Total	530	24	102	155	3	29	186	1019
a) British Commonwealth (inc. Can.)	335	8	78	62	1	11	75	570
b) Continental Europe (inc. Scandinavia)	146	16	23	70	2	18	101	366
c) Japan	49	0	1	23	0	0	10	90
Non-industrialized Countries—Total	55	16	9	17	1	28	60	186
a) Latin America	31	10	8	11	0	25	49	134
b) All Others	24	6	1	6	1	3	11	52
Grand Totals	585	40	111	172	4	57	246	1205

The data are impressive, however, in the relative importance given to combination licenses of "patents and know-how" or "patents, trademarks, and know-how"; the latter was indicated as the more frequent type of contract. It is also significant that over 100 licenses extending only trademarks were recorded as compared to over 300 extending trademarks in combination with other assets. The advice given by some experts to keep the trademark agreement separate is apparently heeded only in about one-fourth of our cases relating to trademarks.

The picture given in Table 6 as to distribution of the licenses between the indus-

[3] The Department of Commerce report covered 650 companies replying to a questionnaire on royalty returns; if, as is likely, there are several hundred other companies licensing abroad, the 55 companies covered in this particular question may be only a 5% sample, or less.

trialized and non-industrialized countries is broadly accurate, showing that the advanced countries outnumber the less developed nations as recipients of licenses from our respondents by 5½ to 1. The British Commonwealth received over half of those extended to the industrialized countries. And Latin America received two-thirds of those directed to the less developed countries. These data indicate that U. S. licensors are much more ready to move into areas where there are (1) no language barriers or great differences in customs, and (2) factors of geographic and market proximity which outweigh the absence of similar language or customs.

In order to determine whether these licenses were largely to independent foreign companies or a result of direct investment abroad, we have tabulated information as to licensing of foreign *subsidiaries* and independent companies. Table 7 provides data supplied by the 63 companies responding in 1959 and information obtained from 144 companies questioned and interviewed during 1957. The most striking information is that two-thirds of the licenses extended by the 207 companies reporting were with independent companies abroad. Of the 207 companies, 41 had extended licenses only to such companies; they had no associates or subsidiaries abroad. Of the remaining 166 companies, 92 extended 823 licenses to wholly-owned subsidiaries; 49 U. S. companies extended 173 licenses to less-than-wholly-owned subsidiaries; and 83 licensors extended 374 licenses to associated foreign companies. Comparing these data with those on financial relationships with foreign companies, it is evident that over 80% of subsidiary and associated companies of our respondents are licensed by the U. S. parent or partner. Thus, licensing is a most important means of transferring non-capital assets abroad, even to financially-related companies. Yet, as Table 7 shows, licensing is still a small operation for most of the respondents. In each "equity" category the majority of companies licensing have only one to five licensees.

From a policy standpoint, we were interested to know how the financial interest in a licensee was developed (question 11) and whether or not such a relation was a firmly established policy of the licensor (questions 12-14). Of the 51 companies responding in 1959 to question 11 (12 of the 63 did not answer), 19 indicated that they had no financial interest in licensees. Of the remainder, 25 obtained some of their interests through a capital contribution; two of these companies and four others obtained some interests through royalty returns; and four of the 25 and five others obtained some interests through a lump sum payment taken in equity shares; several used more than one method. We may tentatively conclude that, where a financial interest is held by the licensor, licensing is generally a complement to a direct investment; in a minority of cases, the interest has arisen from licensing alone.

Only three of the respondents recorded a definite requirement that they have a financial interest in all licensees; (three did not reply) and 57 said they did *not* require such an interest. Moreover, six of these 57 companies stated that they were categorically opposed to taking a financial interest in the licensee. These latter companies stated that they did not want any capital overseas, that it was too difficult to do business abroad, that they wanted royalties only, or that minority control was of little advantage. Those insisting on financial interests stated that they wanted 100% control over all overseas operations or that they wanted to share in the

TABLE 7

DISTRIBUTION OF FOREIGN SUBSIDIARIES AND LICENSEES ACCORDING TO EQUITY INTEREST, REPORTED BY 207 U. S. COMPANIES DURING 1957 AND 1959

Equity Interest in Foreign Companies						Range of Subs. Associates and Licensees	Equity Interest in Licensee							
100%		51-99%		Under 51%			100%		51-99%		Under 51%		Independent	
U.S.	Subs.	U.S.	Subs.	U.S.	Assoc.		U.S.	Lic.	U.S.	Lic.	U.S.	Lic.	U.S.	Lic.
39	0	105	0	78	0	0[1]	74	0	117	0	83	0	36	0
91	215	54	90	68	135	1–5	64	150	44	66	66	130	80	217
16	123	3	26	9	83	6–10	11	93	3	26	7	51	36	290
5	66	2	29	6	77	11–15	5	66	0	0	6	77	16	205
4	71	1	16	1	19	16–20	4	71	1	16	0	0	10	184
7	208	0	0	3	84	21–50	6	182	0	0	3	62	17	479
0	0	1	64	1	54	51–100	0	0	1	64	1	54	6	353
2	261	0	0	0	0	Over 100	2	261	0	0	0	0	6	1004
166	944	166	215	166	454	Totals[1]	166	823	166	173	166	374	207[2]	2732

Grand Totals: 207 U.S. Companies; 4114 Foreign Licensees

[1] Excludes 41 U.S. licensors who reported having *no* subsidiaries or associates abroad.
[2] Includes 41 U.S. licensors who reported having *only* licensing arrangements abroad.

growth of the operation and to maintain continuity of policies. In sum, 51 of the 60 responding indicated that they will either invest in the licensee or not as the occasion requires; six wanted no investment and three always wanted an investment.

The relationship between licensing and investment can be drawn in another way, as asked in question 14—that concerning whether licensing was a precursor to investment abroad. The replies of 57 (six did not reply) were distributed according to whether they used licensing prior to investment in "all," a "majority," a "minority," or "none" of the cases of foreign operations: All—14; Majority—13; Minority—10; None—20. The fairly even distribution reflects the general policy—indifference to a financial interest but a willingness to invest where returns are promising. We cannot say from these data, however, that licensing is more a forerunner of investment than its complement. It is fairly definite, however, that it is a very important part of direct foreign investment by U. S. companies.

Part II

NEGOTIATING EXPERIENCE

SINCE IT IS OF PRIME IMPORTANCE in foreign licensing to find the right licensee, we were interested to discover the origin of initiative—whether from the side of the licensor or the potential licensee—and to what extent negotiations terminated in a contract. Also, when the negotiations were unsuccessful, we wished to determine what the major causes of failure were. Responses to questions 15 and 16 showed that, among the 51 companies answering, there is no correlation at all between the success of negotiation and the source of initiation. Despite the fact that the requests from licensees would more likely include many from less desirable companies, these are apparently screened out rather quickly so that actual negotiations are not entered upon.

The responses indicate, however, that a significant portion of the negotiations are initiated by the foreign licensee. Specifically, 29 of the 51 companies responding (12 failed to answer the question) indicated that 50% or more of the negotiations were at the initiation of the potential licensee, and nine indicated that they had always been initiated by the foreign partner. Contrarily, eight stated that they had always initiated the negotiations themselves. The distribution of responses according to the origin of initiation and the percentage of successful to unsuccessful negotiations is given in Table 8.

When negotiations did fail, we wished to know why. Of the 63 companies licensing abroad, 14 reported no unsuccessful negotiations, and 14 others failed to answer this question. The remaining 35 indicated that the most important factor in causing a failure of negotiations was the absence of an adequate market abroad. Following this factor were those of an inadequate credit standing of the applicant, exchange restrictions, and disagreement over specific provisions of the agreement, and lack of integrity of applicant's executives. The broader obstacles of political instability, foreign taxes, and unfavorable economic conditions were generally considered unimportant, and the specific problem of adapting the product or process

TABLE 8

RATIO OF UNSUCCESSFUL TO SUCCESSFUL LICENSING NEGOTIATIONS OF 51 COMPANIES, 1945–59; AND THE PERCENTAGE OF SUCCESSFUL NEGOTIATIONS INITIATED BY LICENSEES.

Ratio of Unsuccessful to Successful Negotiations	Percentage Initiated by Licensee												
	0	10	15	20	25	30	40	50	60	75	80	90	100
0: over 100								1					
0:20	1												
0:10						1						1	
0:7	1									1			
0:6											1		1
0:4										1			
0:2								1					1
0:1	1												2
1:12		1											
1:10		1		1	1							1	
1:9	1				1						1		
1:6								1					1
1:5					1			1					
1:4									1	1			
1:3	1		1			1			1	1	1		
2:5	1												
1:2					1								
1:1	1		1		1			2					2
2:1	1	1											
5:2											1		
3:1													1
4:1					1							1	
5:1								1					1

to the licensee's requirements was generally considered a small obstacle. The distribution of responses as to whether individual factors were considered important or unimportant was as follows:

Factor	Important	Unimportant
Inadequate Market Abroad	24	11
Credit Standing of Applicant	18	17
Exchange Restrictions	18	17
Disagreement Over Terms of Contract	16	19
Integrity of Applicant's Executives	15	20
Unfavorable Economic Conditions Abroad	12	23
Political Instability	10	25
Expense of Adapting to Licensee's Needs	7	28
Foreign Taxes	6	29

Other factors which were mentioned by one or more respondents as precluding entrance even into negotiations included the desire to export or invest rather than license, the existence of previous commitments abroad, disinterest of management in licensing, undesirability of the potential licensee as a foreign representative, lack of raw materials in the foreign country, and difficulties of servicing the licensee with the required know-how.

Given the feeling by many companies that the U. S. antitrust laws have hampered foreign operations or have been extended too far into overseas business, we wished to obtain information as to the ways in which negotiations were made difficult by the existence of such laws and whether they have prevented the successful conclusion of license agreements. Of the 56 companies answering these questions (#17-19), 55 stated that they had lost no agreement to a competing licens*or* abroad because of the antitrust laws; the remaining company had lost out to a foreign competitor because of inability to agree to practices which he considered would be in violation of these laws. Two companies stated (in response to question 18) that negotiations had been greatly complicated because of the antitrust regulations, and 13 others said they had had to sacrifice provisions which they considered desirable in order to comply with these laws. Although 45 companies stated that they had had to sacrifice nothing in order to gain provisions which were in compliance with the antitrust regulations, the 13 others stated that they had been unable to designate sole territories, had lost control over sales, had lost an agreement from the licensee that he would not use competitors' products, had lost higher royalties, had lost control over exports of licensees, were unable to exclude sales into the United States, had lost provisions which would have fixed prices and included tying clauses on materials purchases, and/or had lost favorable reciprocal terms.

Despite these difficulties or modifications, only four companies replied that they have *frequently* had to clarify provisions of the agreements to stay within the changing interpretations of the antitrust laws. Of the 52 responding to question 19, 24 companies clarified their provisions only infrequently, and 24 stated that they had never had to do so.

1. Licensing Returns

In view of the lack of information as to the returns from abroad on foreign licenses and the general absence of cost data, we attempted to obtain a fairly broad picture of the profitability of licensing from questions #20 through 25. Of the 61 companies responding (two failed to reply to *any* of these questions), 29 companies considered that *all* of their foreign licenses were directly profitable; 27 replied that *most* of their licenses were directly profitable; two replied that only a *few* were; and three said none. Profitability need not stem completely from royalty returns, however; they can arise indirectly through expansion of exports. While no company found that its exports had expanded in every case as a result of licensing, 12 found that they had increased in a majority of cases; 21 indicated that exports had risen in a minority of cases; and 21 others replied that they had not increased (two companies had insufficient experience, and five failed to reply to this question).

Direct returns from licensing need not be in the form of royalties; cross-licensing may be employed to cancel payments between the parties. We asked (question 21) whether the licensor received all or part of the compensation in the form of a license under U. S. patents or foreign know-how. While nine failed to reply, another nine stated that they received *some* compensation of this sort in all instances; another six said they did in the majority of instances; 13 received returns of this type in a minority of cases, and 24 never have. Only two companies, apparently, licensed under a strict cross-license arrangement whereby the rights exchanged were considered of equal value and no payments were made.

To obtain an even larger picture of the flow of licensed rights into the United States, we asked (question 25) whether the respondent was a licensee of a foreign company, and if so, what was the ratio of receipts from licenses to payments under licenses to foreign companies. Of the 59 companies replying, 42 stated that they were not licensees; of the remaining 17, two failed to state the ratio of payments and receipts, two indicated a complete exchange with no payments, and three reported insignificant payments. Ten others gave specific ratios ranging from \$10. of receipts to \$1. of payments to \$100.: \$1., and a few showed payments larger than receipts by amounts up to about 30 to 1. It may be concluded, however, that among our respondents, relatively few are important licensees of foreign companies.

As a means of obtaining information as to the magnitude of returns under licenses and of comparing these with other returns and to payments under licenses, we asked each company (question 23) to indicate the appropriate range in which its annual gross income from licensing fell during the past three years. We obtained the following distribution as to royalty returns for the 57 companies responding (four failed to answer this question):

Royalties	Number of Companies		Royalties	Number of Companies
None	5*		\$100000–\$500000.....	21
\$1000–\$5000.....	2		500000–1 million.....	0
5000– 25000.....	13		Over \$1 million.....	7
25000– 50000.....	4			
50000–100000.....	2	*"too new"		

A rough calculation based on these data and our interviews indicates that nearly $33 million of royalties were returned annually to these 57 companies during the past three years. These data do not include returns from subsidiaries in the form of dividends which might be applicable to licensing, but such returns would probably be small compared to direct royalty receipts.

Given the sizable returns for many companies, we sought to discover whether our respondents were considering an expansion of foreign operations through the use of these funds abroad by establishing foreign-base companies. Of the 60 responding, 31 indicated that they were seriously considering a foreign base corporation out of which to operate their licensing programs; 27 replied that they were not; two had already established such a company.

Additional returns from foreign use of American managerial and technical know-how are obtained through the sale of such services *outside* of licensing agreements. We were concerned to put these operations in perspective by determining whether they were larger or smaller than the provision of similar services *under* licenses by our respondents. (It should be emphasized that our selection of companies would generally preclude companies *solely* engaged in selling such services.) Eighteen companies failed to reply to question #24, but 37 indicated that they made no such sales of services to non-licensees. Only six companies, therefore, supplied information showing some such sales (though nine of our respondents indicated earlier that they make such sales—see the section on "Sales of Services"). The distribution showed that three companies' sales were one or two percent of licensing income; another's was 20%; another 30%; and the sixth was 50:50. It may be concluded for those replying, therefore, that returns under licenses are considerably more significant, in general, than any sales of managerial and technical services to non-licensees. Where this is not so, there are special characteristics of the service provided or of the relationship between the parties which makes a long-term contract unnecessary or undesirable.

2. Trademark Licensing

Realizing that there are distinct problems in licensing of trademarks as compared to licensing of patents and know-how, we asked our respondents to answer a set of questions specifically directed at trademark licensing. Of our 61 companies, 50 reported licensing their trademarks, of these, 42 indicated that they had trademark licenses with independent companies abroad; these 42 licensed 336 foreign companies to use U. S.-owned trademarks of the American companies. Sixteen of these 42 respondents, plus eight others, extended trademark licenses to associated companies, that is, foreign companies in which an equity interest of less than 51% was owned. These 24 companies had extended trademark licenses to 118 associated foreign companies. Not all of these licenses are separate from grants of patents or know-how. The following replies relate to these 50 companies and their licensees.

The products to which the trademarks related were about equally divided between consumer-goods and producer-goods, with some few companies licensing trademarks covering both types of goods. The usual period over which the licenses

run is either five or ten years; but many are on a year-to-year basis or for "indefinite" periods; the distribution of 45 responses is as follows:

Duration in Years:	2–5	5	7	10	10–20	15	17	50	Indefinite (year-to-year)
Number of Companies:	1	7	2	13	1	3	1	1	16

One of the more important problems in trademark licensing is the protection of the mark from infringement or from loss by infringing on others. Because of the widespread fear of such loss, we asked respondents to indicate how often they had defended or been a defendant in a litigation over the trademark which was licensed. Out of the total of 454 licenses covering trademarks, extended by 50 different U. S. companies, 33 U. S. licensors have not had to defend their licensed mark in litigation against foreign infringement since World War II.

Although five companies did not answer the question, five had defended once and only one company had lost; two had defended three times with only one company losing one suit; four had defended ten times, but only one was successful in all cases; finally, one company had successfully defended fifty times.

The distribution of defenses and successes in defending are as follows:

Frequency of Defense and Success in Defense

	0	1	2	3	5	7	10	50—times
No. of companies defending	33	5		2			4	1
		↓		↓			↓	
No. of companies succeeding	1	4	1	1	2	1	1	1

The necessity to defend against infringement through litigation has not been frequent for our responding companies and even when it was required, the success incidence has been quite high, for only 15 out of 101 cases were lost.

Contrarily, we asked how often respondents had been a defendant under an infringement suit brought by foreign third parties against the licensed trademark since 1945. Forty-four of the responding companies indicated that they had not been a defendant in such a suit; one indicated that it was currently involved, and another had been a defendant five times and had been successful in three of the instances.

These results should not be taken as meaning that there is little need to maintain surveillance over the trademark and its use. It is probably because of careful guarding of the mark and quick threat of litigation once an infringement is brought to the attention of the licensor that has kept the numbers of litigated cases so low.

We did not expect that many of our U. S. companies were licensed under foreign-owned U. S. trademarks; but we asked whether the respondent was a licensee and under how many foreign-owned marks. Only three companies responded that they were licensed under one such mark; one other said it was licensed under three.

To obtain a picture of the operations under trademark licenses, we asked a

series of questions concerning contract provisions and the actual practices of both licensee and licensor. The results are tabulated in Table 9.

TABLE 9

FREQUENCY OF CERTAIN PRACTICES AND PROVISIONS IN TRADEMARK LICENSES EXTENDED BY 47 U. S. CORPORATIONS TO INDEPENDENT AND ASSOCIATED COMPANIES ABROAD[1]

	All Cases	Majority	Minority	None	No Answer
a. Do you write separate trademark contracts when you also license patents or know-how to a foreign firm?	11	3	5	27	1
b. Do you supervise or control the licensee's production or quality?	37	5	3	2	
c. Does the licensee have exclusive rights to the trademark in his own country?	25	8	3	9	2
d. Does he have rights under your trademarks in countries other than his own?	8	5	16	20	
e. Does he have exclusive rights outside his country?	1	2	12	32	
f. Does he sell outside his own country?	8	9	22	5	3
g. Does he sell outside his licensed territory?	7	4	22	12	2
h. Is provision made for the licensee to pay your distributor in a third country a commission if he sells in the territory of your distributor?	1	3	6	36	1
i. Is provision made to pay the licensee a commission if you sell in his territory?	6	3	7	30	1
j. Do you maintain the foreign trademarks?	42	3	1	1	
k. Have your licenses been renewed on expiration?	16	13	1	0	17[2]

[1] Total companies replying were 63; of these, four did not answer this question and 12 had extended no licenses of this type.
[2] None expired.

Taking a snapshot picture of the practices and provisions under trademark licenses, we would find the "average" operation among our respondents as one under which trademark licenses are not written separate from other rights licensed; the licensor maintains the trademarks; close supervision and control is maintained over the quality of the licensee's production; the licensee is given exclusive rights in his own country, but not outside his country; the licensee seldom sells outside his own country and even less frequently outside his licensed territory (when it includes more than his own country); the licensee is not paid a commission when the licensor sells in the former's territory, and the licenses have generally been renewed at expiration. While there are some few licensing arrangements which would paint a picture opposite to the above in each aspect, the general pattern is quite clear from the responses shown in the foregoing table.

3. Licensing of Patents and Know-How

To obtain a similar picture of licensing of patents and know-how, we asked respondents to provide separate data concerning these rights. Fifty-one companies reported having extended patent and know-how licenses to 898 independent licensees abroad; 26 companies reported extending such licenses to 127 associated companies (that is, companies in which they held less than 51% equity interest). The types of products or processes involved were classed more in the producer-goods group than consumer-goods by a ratio of 4 to 1. The usual duration of the agreements was between 5 to 10 years; the distribution reported was as follows for 45 companies:

Duration in Years:	1–4	5	6–9	10	11–14	15	17	Life of patent	Indef.
Number of Companies:	2	10	7	15	1	4	1	1	4

Since licensing tends to set up a potential competitor for the licensor, we asked each respondent if it was his judgment that, where exchange or trade controls were initially important in stimulating the license, the licensee would be in a position currently to undersell the licensor in the former's market without those controls. That is, would it now be possible, if licensing had not taken place, for the licensor to enter those markets as an exporter as the restrictions are removed. Of the 51 companies involved in licensing of patents and trademarks, 11 did not answer this question, but 24 licensors stated that most of the licensees would be able to undersell after the removal of restrictions and 15 said that a *few* would be able to do so (only one company reported that none would be able). These views indicate that licensing has not itself prevented exporting, but that exporting would be largely impossible even without the former currency and trade restrictions.

To determine the competitive picture more precisely, however, we asked if the licensees would be able to undersell the licensor even if the license were terminated. All 39 companies which responded above also responded to this question, with 26 of them reporting that the licensee could out-compete the licensor even without the license and 13 reporting that he could not. The 26 affirmative answers would imply either that the licensee was able to undersell the licensor even before the license or that the license has already extended sufficient information to make the licensee so able. The 13 negative replies indicate that the licensee is still largely dependent on continuing know-how or that the patent right is itself singularly important.

To obtain an insight into the reverse flow of patent rights and know-how, we asked whether our respondents were licensees of foreign firms. As to patent rights, two merely replied "yes" and three stated they were licensees under "many" foreign-owned U. S. patents. The distribution of the remainder is as follows:

Number of patents licensed:	0	1	2	4	5	6	12	30
Number of companies:	18	2	1	1	5	1	1	1

Thus, 17 companies were licensees of foreign companies under patent rights; 81 patents were involved, plus the unspecified responses above.

We asked the same question concerning know-how, with two companies replying that they were licensed under "many" know-how agreements. Others gave the following specific data:

Number of foreign know-how licenses:	0	1	2	4	5	6	12	25
Number of companies:	14	4	6	1	4	1	1	1

Thus, 20 companies reported having know-how licenses from foreign companies; this number equals about one-third of the total number of our respondents who have extended know-how licenses to foreign companies. At least 83 agreements were in existence, plus those of the two companies reporting "many" such licenses.

A picture of the general practices under, and provisions of, the agreements extended by the 51 companies responding with specific information is shown in Table 10. The licensor has more frequently than not licensed the manufacture of the product abroad *without* having tested the market by exports; he has practically never manufactured the item abroad prior to licensing in the same territory; he has practically never manufactured the item himself abroad in a territory after a license was granted therein; he has seldom had to adapt the item substantially to meet foreign requirements; he generally transfers new developments in know-how throughout the life of the agreement to the licensee, and all relevant know-how is given to him; the licensee generally returns improvements in an invention and royalty free; these improvements are generally extended to all licensees manufacturing the same item; the licensee is generally given an exclusive right to manufacture in his own country, but less frequently the exclusive right to sell in his own country; he is very seldom given exclusive rights outside of his own country and seldom sells outside of his specified territory; even less is he permitted to sublicense others in his territory; when he does sell in territory where the licensor has a distributor, he seldom pays a commission to the distributor; and the licensor seldom pays the licensee a commission if he sells in the latter's territory; by far the majority of licenses have been renewed upon expiration.

4. Licensing Foreign Subsidiaries

Because of the important contribution of patents, know-how, and non-capital assets from the parent to its subsidiary, we were concerned to find out whether foreign subsidiaries were licensed by their U. S. parents and if so why, what special rights might be given subsidiaries which were not granted to others, and what returns were obtained. In order to keep the length of the questionnaire within manageable bounds, since it was already quite long, we decided not to ask questions repetitious of the information concerning trademark and patent licensing, though we considered that provisions of contracts to subsidiaries might be substantially different from those to associated or independent companies.

As indicated earlier in this report, a large proportion of subsidiaries (wholly-owned or merely controlled) are licensed under formal or informal agreements from their parents. Just over half of our 63 respondents have subsidiaries abroad

TABLE 10

FREQUENCY OF CERTAIN PRACTICES AND PROVISIONS IN LICENSING OF PATENTS AND/OR KNOW-HOW BY 51 U. S. CORPORATIONS TO INDEPENDENT AND ASSOCIATED COMPANIES ABROAD[1]

	All Cases	Majority	Minority	None	No Answer
a. Have you licensed the manufacture of an item abroad without having already exported it to that market?	2	17	19	12	1
b. Have you licensed the manufacture of an item abroad and later manufactured it yourself in that country?	0	0	4	47	
c. Have you had to adapt substantially your item to meet the licensee's requirements?	1	5	19	25	1
d. Have you manufactured abroad prior to licensing a foreign firm to manufacture in the same territory?	0	1	7	43	
e. Are new developments in know-how transferred throughout the life of the agreement?	28	20	1	2	
f. When know-how is transferred, is the licensee given access to all relevant know-how you use?	32	17	2	0	
g. Does the licensee return to you improvements in the licensed invention?	20	15	8	4	4
h. If so, royalty free?	26	11	3	4	7
i. Do you extend these improvements to all other licensees of the same item?	24	8	2	6	11
j. Is the licensee given an exclusive right to manufacture in his own country?	28	12	6	5	
k. Is he given an exclusive right to sell in his own country?	18	13	4	15	1
l. Does he have exclusive rights outside his own country?	2	4	11	33	1
m. Does he sell outside his own territory?	12	9	20	10	
n. Does he sublicense to others in his territory?	1	2	14	34	
o. Does the licensee have to pay your distributor in a third country a commission if he sells in your distributor's territory?	5	2	5	36	3
p. Do you agree to pay the licensee a commission if you sell in his territory?	7	2	3	38	1
q. Have your licenses been renewed at expiration?	15	14	3	3	16[2]

[1] Nine of our responding companies had no such licenses; three others did not answer this question.
[2] None expired as yet.

which they license. The reasons for making a specific agreement differ according to whether the rights extended include trademarks, patents, or simply know-how. In stating their reasons, our respondents provided the following:

a) Reasons for licensing *trademarks* included: In first rank was the fact that a registered user agreement must be in writing in the U. K. and in some other countries. Second was the reason that such an agreement gave greater control over maintenance of quality of the product; of equal importance was the desirability of giving legal precision to the relation, obtaining protection of title in the parent, and protection in the event of expropriation or the sale of an interest in the company. Of less frequent mention was the advantage that such an agreement provides in obtaining royalties rather than dividends. And, finally, such an agreement provides a rationale for guidance by the parent in sales promotion activities, which are frequently needed by the subsidiary.

b) Reasons for licensing *patents* included: First, the added legal protection and the necessity for governmental approval of royalty payments. Second, was the desire to establish a justification for charging of royalties or fees; and of less significance was the desire to prove "working" of the patent. Others mentioned the reasons that the agreement could give the subsidiary the right to sue against infringement, that it demonstrated a segregation of the parent from the subsidiary, and that it tended to avoid charges of discrimination.

c) Reasons for licensing *know-how* included: First, the desire to obtain fees for such services and to reduce taxes. Of considerably less significance was the desire to protect against loss in the case of a sale or the loss of control; other reasons mentioned by a few companies included the desire to demonstrate segregation of the companies and to avoid charges of discrimination, to obtain better administration of the know-how and fulfillment of the arrangement, and to prevent taxation which arises when a sale of know-how is carried out.

This last reason provides a justification also for not assigning patents or trademarks to foreign subsidiaries. Several respondents mentioned the fact that there was no particular reason to make such an assignment, and that it would raise the problem of taxation if transferred. Others simply stated that they preferred to maintain control over such assets in the parent company. There were a few companies, however, which had assigned patents or trademarks to their subsidiaries abroad. This was done generally to enable the subsidiary to sue against infringement, to circumvent the problems faced by the parent in gaining a registration in its own name, to share the imminent risks of World War II; and to permit "free and open" operation of the subsidiary by local management. It must be concluded, however, that such assignment is not a general practice and will probably be important only with the growth of foreign base companies.

For the same reason of desire for centralized control, most U. S. parents do not permit their foreign subsidiaries to sublicense abroad. Of the 31 companies responding to this question, 20 said that they permitted none of their subsidiaries to sublicense; eight permitted a minority to do so; two permitted a majority to sublicense; and one permitted all to do so (this company had only a few

subsidiaries abroad). Those companies permitting such practice stated, however, that the right was extended only as "special circumstances" or only to a foreign-base company.

Despite what would seem to be a logical desire of many U. S. parents for royalty income from the subsidiaries, only 17 of our 33 respondents having foreign subsidiaries require a royalty payment from *all* their licensed subsidiaries; another five require the majority of their licensed subsidiaries to make royalty payments; one parent requires only a minority to do so; and ten do not require any to make such payments. Of the total 33, seven obtain no other form of compensation from their licensed subsidiaries, but seven others obtain an exchange of know-how, and seven more receive "technical assistance and management" fees. Others count a return of patents, sales of components, profit participations, and expense charges for technicians as part of their returns.

The widespread consideration of return of improvements as a part of the reward for licensing can be seen from the fact that 30 of the total required any improvements to be returned without charge under an assignment (apparently) or by royalty-free license; one other required a license to be extended, but with payments from the parent.

To complete the picture of the reverse flow of patents and know-how, we asked how many foreign subsidiaries had extended one or more such licenses to the responding parent. Of the 33 replying, 24 said they had received no such separate licenses; one replied that it had received a "few," two companies had received one each; another had received licenses from two of its subsidiaries, another from three; and another from "all" of its subsidiaries.

We may conclude, therefore, that there does not as yet seem to be a large reverse flow of information from the subsidiaries in the form of new developments which might give rise to licensing. However, there may be a sizable flow of improvements to the parent on licensed inventions or know-how which permits them to feel that no royalties need be charged of the subsidiary. This field of intra-corporate relationships is as yet largely unexplored, yet it has an importance surpassing corporate policy and entering the area of the national interest in the location and development of skills in research. The Foundation considers that the area of intra-corporate flows of information and rights is one which should be given more attention from the standpoints of making business policy more effective and of making public policy more relevant.

Part III

DATA FROM FOREIGN LICENSEES

WE SENT QUESTIONNAIRES (see, *PTC J. Res. & Ed.*, 3, No. 1, (Spring 1959), Appendix A, pp. 11-13) to 155 companies abroad which were known to be interested in receiving a U. S. license, as evidenced by their advertisement in the Department of Commerce, *Foreign Commerce Weekly*. We were mainly concerned

to see how the licensing agreements had been initiated and negotiated, if at all, and what competitive conditions had existed.

We received replies from 47, or 30%, which again illustrates the intense interest in licensing. It is not the usual case that questionnaires sent to foreign countries get much attention; we considered that a 15% response would have been acceptable. The distribution of questionnaires sent according to country and the responses are as follows:

Country	Number Sent	Number Returned
Great Britain	66	21
Australia	29	7
France	24	7
Canada	15	4
Belgium	14	5
Italy	7	3
	155	47

The questionnaires to France and Belgium were sent with a letter in the French language explaining the purpose of the study; others were sent in English.

Not all of the respondents answered all of the questions; some questions were not applicable to their operations. The replies provide some interesting tentative results, however. Only 11 of the 47 companies could state that they had received a license from a U. S. company; they had a total of 32 licenses, but one company in the U. K. held 10. The distribution of licenses by country and by types was as follows:

Country	Licenses
Australia	5
Belgium	2
Canada	1
France	3
Italy	0
U. K.	21
Total	32

Type of License	Licenses
Trademark only	4
Patents only	3
Know-how only	10
Patents & TM	1
Patents & KH	3
TM & Know-how	3
Pat., TM & KH	8
Total	32

As shown by the results to question 2, the companies we reached were those interested in obtaining licenses but had not been successful as yet. Question 2 asked whether the company has sought or been offered a license if it did *not* now have one. Of the 11 companies having licenses, four indicated that they had sought others or had others offered and should be classed with those disappointedly seeking licenses. In all, 36 companies replied that they had either sought or been offered licenses which did not materialize; five had both initiated such negotiations and been the company sought out; two had only been sought by the U. S. companies; 29 replied that they had been the initiator in each instance and had never been approached by any U. S. company. Also among the 11 having licenses, nine reported that they initiated the negotiations 75 or 100% of the time; one said "never" and the other was the initiator 25% of the time.

The companies which answered were all apparently new in the field of licensing, save for one which had been licensed since 1920. The others had received theirs mainly within the past five years, but all since 1951.

Since the record of unsuccessful negotiations might give some insight into competitive conditions, we asked the series of questions in #6. The few companies which responded show the following:

Company	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Unsuccessful Negotiations	6	1	2	all	1	3	5	2	2	all	all	2
License Obtained from Other U. S. Company	2	0	0	0	1	0	2	0	1	0	0	0
Similar License Obtained Elsewhere	—	—	—	—	—	1	1	2	0	—	0	0

The other countries mentioned as the location of the eventual licensor were England, Finland, Germany, and Switzerland. It may be judged, tentatively, however, that a turndown by a U. S. company means that the licensee generally does not have a sound proposal.

The reasons for failure to negotiate a license fell into four categories: inability to agree; licensee's unilateral cessation of discussions; licensor's severance of negotiations; and lack of government approval. Inability to agree meant generally that after investigation there was no further interest on the part of both parties, or, there was disagreement as to the responsibilities of the parties preliminary to signing the contract. The reasons why the licensee severed negotiations included the views that the articles offered by the licensor were unsuitable, the status of the licensor was unattractive, the royalties asked were too high (15% was noted), or a provision requiring the licensee to maintain patent rights was insisted upon. Among reasons why the licensor severed negotiations were that the licensee had inadequate funds for promotion, the potential licensor was more interested in exporting, or the licensor preferred a Continental European licensee. Governmental rejection was exemplified by the following account from one foreign company:

> An agreement was drawn up but this was rejected by the British Government Board of Trade and the Bank of England. Rejection was based on the high royalties being asked, particularly as no patents were involved, and the difficulty of describing and evaluating the intangible asset of know-how. Exception was also taken to the infinite aspect of the know-how which our American friends claimed. Frankly this application failed largely because the company concerned would not take our advice, and insisted on having the best professional advisers who tried to be too clever. Our friends did not even present themselves to the London official concerned and the "professionals" made poor deputies. We tried to warn them what the outcome would be, but they preferred the advice of the legal and financial "experts." When they eventually had the application turned down we had become lukewarm and were unwilling to press the Authorities to alter their decisions. They now realize the error of their ways and have since offered us much better terms, but neither we nor anybody else seems interested.

Knowing that establishing the initial contact is often difficult, we sought in question 8 to determine the sources of information. All of the companies we questioned had advertised in the *Foreign Commerce Weekly* of the U. S. Department of Commerce, but the most frequently mentioned source of information was "technical journals." Far behind were Chambers of Commerce and foreign representatives. Personal contacts were even further down the list, followed by embassies, bank bulletins, and various government agencies and trade associations.

A general conclusion may be drawn despite the inadequacy of the sample on foreign companies—that the Department of Commerce's service on "Foreign In-

vestment Opportunities" is no real service as far as licensing goes. Many respondents were vehement in their replies that "not one inquiry was received as a result of their notification in the *Foreign Commerce Weekly.*" The opportunities apparently require some screening operation, else those which are valuable fall by the wayside among the much more frequently poor proposals.

The story of one company's search for a license is of considerable interest in this connection:

> The problem of contacting is very difficult unless one knows precisely what is wanted In our case we alerted the Board of Trade, the American Embassy, the Scottish Council (Development & Industry), the Federation of British Industries, the Machine Tool Trades Association, all of whom are in contact with U. S. A. We also advertised through the appropriate American Government channels, inserted advertisements in American newspapers, appointed a representative in U. S. A. and made several visits to that country. Out of all this we were offered about twelve license proposals. Most of these were quite unsuitable for our plant, etc., but we had reasonably high hopes of three. One of these proposals was withdrawn for no very good reason. The excuse given was that with the upturn in trade in U. S. A. they could not now afford the time to establish a foreign operation. The second one was about ten years too late in thinking about a foreign operation and we were being asked to take all the risks. The third looked good to start with, but eventually we learned that several companies on this side were being encouraged at the same time. We have come to the conclusion that this company also is starting operations much too late and that for success they would require to be willing to demonstrate their confidence that their product will sell, by taking a much bigger stake in the risk capital involved.
>
> Just when we were despairing about the prospects, an important American company got in touch with us as the result of a chance talk between one of their Directors and the General Manager of an American bank in London. As a result of this we are now negotiating a joint venture whereby the American company will be able to control their product, but we shall retain a proportion of our activity as an independent organization. This company are willing to make a considerable investment and we have worked out a programme which will help to pass on their know-how to us in the shortest possible time. At the time of writing we are confident that at least we have been able to contact a company which is looking for what we want, and are satisfied to start with what we are prepared to contribute.

Finally, as to those which had obtained licenses, we were concerned to know if they had been renewed or cancelled. One company had failed to renew, but gave no reason; another had its license cancelled because the licensor thought that German companies were better, but five reported no failure to renew and no cancellations.

Besides the experience in finding and negotiating a license, we sought information on government policies as seen by the licensee. Fifteen of the companies responding indicated that they had not obtained any encouragement from their government in obtaining a foreign license. One said that it had received many encouragements, and others mentioned a favorable attitude toward royalty remittances, particularly if the agreement were in the national interest. Conversely, 10 respondents indicated that no impediments had been placed in their way by their governments, but six indicated that exchange controls prevented imports of components or remittance of royalties, and one indicated that general "bureaucracy" was an impediment.

We sought also to discover whether the license improved the foreign exchange position of the host-country. Only three could say definitely that it did, by replacing imports or expanding exports; five reported that it had not improved the reserve

position because royalties were also paid in U. S. dollars or because the impact was too small.

Because of the agitation concerning the restrictive nature of U. S. antitrust legislation, we asked whether it had hampered negotiation or concluding of a contract. Thirteen companies responded in the negative and the remainder did not reply. There was no indication that any provisions had been changed as a result of antitrust interpretations.

Finally, to determine whether cross-licensing was significant, we had hoped to obtain some information on the extent of licensing of U. S. companies by the foreign companies. Only one had significant patents in the U. S., and it had licensed half of them to its U. S. licensor. Others had sought U. S. licensees, but without success.

We may conclude from this response that a larger study of the experience of foreign licensees could provide useful insights into problems and appropriate policies in the transfer of proprietary rights and information.

Supplemental Report on Scientific Instruments Industry*

PAUL R. NICHOLS, Research Associate

THIS report supplements two others published in this *Journal* ** on "Patent and Other Factors in the Development of Independent Firms in the Scientific and Other Instruments Industry." It concentrates on three points: the size of firms included in the survey on which the earlier reports were based, the problem of non-response encountered in that survey, and the significance attributed to patents by the responding companies.

Size of Firms

The study was designed to cover small scientific instrument firms in the New England and Middle Atlantic States. In general, the companies included in the sample were very small, with names not frequently familiar outside the industry in which they are classified or the geographic area in which they are located.

The questionnaire sent to the selected firms sought information on gross company receipts in the preceding fiscal year and on number of employees as of June 30, 1958. Ten of the 26 firms returning questionnaires with substantive information supplied data on revenue as follows:

Gross Receipts (Dollars)	Number of Firms
Less than $100,000	1
100,000, less than 500,000	1
500,000, less than 1,000,000	3
1,000,000, less than 5,000,000	2
5,000,000, less than 10,000,000	1
10,000,000, less than 15,000,000	2
Total	10

Thirteen of the 26 responding companies supplied the following information on employment:

Number of Employees	Number of Firms
Less than 10	2
10, less than 20	1
20, less than 30	1
30, less than 75	3
75, less than 100	2
100, less than 300	1
300, less than 500	2
500, less than 1,000	1
Total	13

* Dr. Nichols is Associate Professor of Economics at Simmons College, Boston. This study is one of several organized under the general direction of Dr. Irving H. Siegel, Consultant on *Project 3a,* Role of Patents in the Creation and Growth of Small Industrial Units.

** See, *PTC J. Res. & Ed.,* 2, No. 4, (December 1958), pp. 561-2; 3, No. 3, (Fall 1959), pp. 262-71.

From these figures and other information included in the returned questionnaires, it appears that the "typical" firm among the respondents is a corporation, is 15 to 20 years old, maintains a research and development program, has gross annual receipts of $750,000-$1,000,000, and employes 50 to 100 persons. The "typical" firm, moreover, appears to have developed primarily with the aid of retained earnings; and it attaches great importance to "calibre of management," "access to capital," and "technical know-how" in its origin, career, and current operations. It does not attribute an outstanding role to patents, either at the time of origin or in later years. (This is not to say, however, that patents are not vital to the relatively few small firms founded upon or evolving around strong patent positions.)

Non-response

About two-thirds of the companies to which questionnaires were sent (52 out of 78) failed to supply any requested information. A small number apparently went out of business between the time of compilation of the 1957 *Conover-Mast Directory* and the time the survey was conducted. Thus, four questionnaires were returned by the Post Office with the notation "Mailing Address Unknown" or "Not at This Address." A few other companies stated reasons for not participating in the survey. Among the reasons cited were: lack of time or ability to supply the requested data, a restrictive company policy regarding release of information on patents and other matters, and company engagement in the distribution rather than production of scientific instruments.

The large majority of non-participating companies, however, gave no reasons. Many of these companies doubtless had reasons similar to those indicated by the few firms that took the trouble to comment on their unwillingness to cooperate. From the nature of the sampled firms, the absence of significant patent activity or patent experience would seem to be a more likely explanation than any reluctance to disclose information that could hardly be considered secret. Of course, in the absence of significant information to report, other circumstances frequently encountered in small firms (e.g., limitation of office staff and of the scope of their records) might become sufficient reasons for non-participation and non-response.

Interest in Patents

Patents were significant for the establishment of only a few of the reporting companies. Of the 26 respondents, only five stated that patents were of prime importance to them at the time of origin, and two considered patents to be of moderate importance. Of the remaining companies in the reporting group, six failed to answer the question, and 13 indicated that patents were of "no or little importance" at the time of origin.

Patents have in general remained a minor element in the operations of the responding firms, perhaps assuming slightly more importance over the years. Of the 26 responding firms, seven considered patents more significant in later years than at the time of origin; 13 considered them to be equally important; and two regarded them as less important.

The above two paragraphs refer to 26 firms, not to the 78 included in the original sample (or the 74 apparently in business when the questionnaires were mailed). If, as seems likely, most of the non-participating companies had no significant patent activity or experience to report, then the role of patents in the full original sample of small scientific instrument firms was still less important than in the group of 26 respondents.

Development and Implications of the First Transistor Patents

EDGAR WEINBERG AND IRVING H. SIEGEL*

THE TRANSISTOR HAS BEEN JUSTLY acclaimed as a major technological achievement of the postwar period. Its availability, with related solid-state semiconductor devices, has permitted extensive changes in the design of equipment for electronic communications, data processing, and automatic control of industrial operations and has greatly expanded the technical and economic applicability of such equipment. Its invention and successful commercial use have stimulated wide-ranging research that promises fresh advances in theory and practice concerning metals and other industrial materials.

This interim report describes briefly the origin of the key transistor patent in the Bell Telephone Laboratories (BTL); the diffusion of information regarding the utility of the invention; the growth of markets for the new product; and the implications for small business. It is based on the voluminous published literature. In later reports, information derived from a questionnaire addressed to transistor patent licensees will also be treated.

Research Leading to the Patent

A decade or more of relevant basic research at BTL preceded the filing of the patent application for the transistor in 1948. The project that led directly to the invention was begun under the direction of M. J. Kelly, who in the late 1930's organized a small group of physicists, including William Shockley and Walter Brattain, to investigate the physical properties of matter in the solid state. While this basic research was not directed toward development of any particular product or service, it was clearly consistent with the continuing long-range efforts to improve the efficiency of the Bell telecommunications network. It could perhaps help overcome a major weakness of vacuum tubes: their high energy consumption.[1] It could perhaps improve the scientific understanding of solid-state phenomena so that materials might ultimately be designed and fabricated according to engineering requirements.[2]

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* Mr. Weinberg, Research Associate on *Project 3b,* is a business economist with U. S. Bureau of Labor Statistics. Dr. Siegel, Principal Consultant on *Project 3b,* is a member of the staff of U. S. Council of Economic Advisers.

[1] According to J. R. Pierce, "Innovation in Technology," *Scientific American,* September 1958, p. 117: "The power needed to operate a vacuum tube is often thousands or millions of times greater than the signals it amplifies."

[2] In a paper on "Appraisal of Solid State Science and Technology," presented at the Solid State Circuit Conference on February 21, 1959, M. J. Kelly observed: ". . . too much of our progress in employing materials such as copper oxide, selenium, silicon and even magnetic materials in telecommunications components was through empiricism. For example, in the Bell System we used only copper from a particular mine for fabricating copper oxide telecommunications varistors. It made the best. We did not know why."

The Bell scientists built upon deep foundations of prior research work on semiconductor materials. A short history of the transistor has to go back at least to the discovery of silicon by a Swedish chemist more than a century ago and the discovery of germanium by a German in the 1880's. Other important steps along the way include the invention of the carborundum crystal detector by an American, Dunwoody, in 1906 and the patenting in the same year of a cat's-whisker crystal detector by Pickard.[3]

World War II interrupted the basic research project of BTL. But, in the course of developmental work in behalf of defense at Purdue University, considerable new knowledge of the electrical properties of germanium and silicon was accumulated.

In 1946 the BTL research project was resumed under the direction of Shockley. A group of 13 scientists, including experimental and theoretical physicists, a physical chemist, and an electronic circuit engineer, undertook a thorough study of the electrical properties of silicon and germanium. A primary task was to obtain single crystals of these minerals of the highest purity or with controlled impurities.

Non-pecuniary factors evidently played a great role in motivating this group. According to one well-placed commentator, "the investigators were not a closely organized and firmly directed 'team'; they were talented individuals working on matters of great personal, as well as mutual, interest."[4] BTL's policy of easy publication insured identification in the scientific world of the contribution of each individual. Although no special monetary award for inventions or royalties from patents could be expected, it was the policy to consider each invention as a meritorious performance to be taken into account in salary determination.[5]

In the course of fundamental experiments testing theories on the flow of electrons through germanium crystals, John Bardeen and Brattain in 1948 observed the amplifying phenomenon that led to the invention of the point-contact transistor. For their accomplishment, Bardeen, Brattain, and Shockley were awarded the Nobel Prize for physics in 1956.

A patent application was filed on June 17, 1948 by Bardeen and Brattain, and BTL was designated the assignee. The patent was granted on October 3, 1950 (No. 2,524,035). The stated objects of the invention were: "to amplify or otherwise translate electric signals or variations by use of compact, simple, and rugged apparatus of novel type"; "to provide a circuit element for use as an amplifier or the like which does not require a heated thermionic cathode for its operation and which, therefore, is immediately operative when turned on"; and "to provide such a circuit element which requires no evacuated or gas-filled envelope."

Intensive research and development efforts on the part of BTL and other scientists and engineers have followed this patent grant. These efforts have been directed toward, for example, the design of improved and more versatile devices, the determination of technically justified uses, and the achievement of the same

[3] A. Coblentz and H. L. Owens, *Transistors: Theory and Applications* (McGraw-Hill, New York, 1955), pp. 2-4.

[4] Pierce, *loc. cit.*, p. 118.

[5] Ralph Bown, "The Transistor as an Industrial Research Episode," *Scientific Monthly*, January 1955, p. 46.

levels of efficiency, reliability, and uniformity for mass-produced transistors as for laboratory models. Rather than divert the original group from its fundamental studies, BTL organized teams of different specialists to work on particular aspects of transistor development.[6]

By 1958 M. J. Kelly reported that one-third of the work done by BTL for the Bell System was devoted "to building a new communications technology in which the transistor is the central element and applying it in the development of new facilities for communication." [7]

This further research effort of BTL produced a number of improved but closely related semiconductor devices, differing in design, specifications, and efficiency. Among the main new inventions were Shockley's junction transistor in 1951; the phototransistor in the same year; and the field-effect transistor in 1952.[8]

In addition to improvements in the transistor itself, important advances were made in methods of obtaining germanium crystals. A new challenge was presented to the chemical and electronics industries by the problem of preparing single crystal semiconductor materials having an impurity no greater than one part in ten million. A major breakthrough came with the invention of the "zone refining" technique by W. G. Pfann of BTL in 1954. The diffusion process for introducing impurities in a controlled manner was a second important advance of the same year. These developments had implications far beyond their usefulness in making transistors, suggesting that engineers would ultimately be able to design materials with desired properties and then proceed to make them.[9]

Diffusion of Knowledge

BTL pursued a policy of prompt and extensive dissemination of information about the transistor and the underlying science and technology. A high official idealistically stated: "We hold that a laboratory that draws knowledge and trained people from the world of science is thereby under some obligation to return value in kind. By prompt publication of its scientific advances a laboratory makes this return to the common fund." He expressed a view more familiar to the college campus than to the forums of commerce: "Science and technology advance through competition and interplay of bright minds. No one laboratory has more than a fraction of the talent that can operate usefully on a new scientific idea. Exposing the idea to other minds will lead to more advance." But his next sentence indicated that the policy also had some advantage to BTL: "And who is in a better position than the originator himself to recognize and profit from further advances?" [10]

BTL went to some lengths to spread the new transistor technology to the electronics industry. In addition to making extensive disclosures in the patent, it licensed freely and gave technical assistance to licensees. An enthusiastic official

[6] *Ibid.*, p. 45.

[7] M. J. Kelly, "The Transistor—Ten Years of Progress," *Bell Laboratories Record*, June 1958, p. 190.

[8] R. M. Ryder, "Ten Years of Transistors," *Radio Electronics*, May 1958, pp. 34-37.

[9] J. Bardeen, "Flow of Electrons and Holes in Semiconductors," in E. U. Condon and H. Odishaw, eds., *Handbook of Physics* (McGraw-Hill, New York, 1958), pp. 8-63.

[10] Bown, *loc. cit.*, p. 43.

of a beneficiary company has said: "The information was presented far more vividly and expertly than any consideration of ethics, laws, defense, or any other factor would require." [11] BTL sought through conferences to inform representatives of the latest fabricating techniques. It published numerous authoritative volumes on semiconductor technology based on intramural research. It took leadership in sponsoring professional meetings in the United States and abroad.

Economic Significance

As usual, there was a lag between the invention of the transistor and its widespread commercial use. The invention was disclosed in 1948, and it was enthusiastically received. The Korean Conflict provided another favorable circumstance; yet transistors were not available in quantity until 1953. Economical, large-scale production had to await the resolution of many technical problems. At first the percentage of rejects was high. With the improvement of purification, assembly, and testing procedures, quality control to closer tolerances was obtained in manufacture.

Since 1953, the first year of significant production runs, the transistor has had a cumulative impact. In 1958 factory sales of transistors by some manufacturers amounted to 47 million units, valued at $113 million. This quantity was 36 times that of 1953.[12] Drastic price declines accompanied the expansion of the market. In October 1959 a Bell System advertisement noted that nearly 80 companies had been licensed to make and sell the transistor—substantially more than the number cited in a similar advertisement a year earlier—and claimed that the invention was doubtless "one of the biggest factors in the electronics boom." A much larger number of companies have been licensed to make and incorporate transistors in the equipment they manufacture.

The United States is the leading producer of transistors, but other industrial nations have been quick to exploit the new technology and to add to the family of semiconductor devices. BTL has licensed manufacturers in Japan, England, France, West Germany, Italy, Netherlands, Switzerland, and Sweden.[13] Not only is Japan the second largest producer, but it is also so successful an exporter to our own country that a threat to our national security has been claimed by American manufacturers. Furthermore, a Japanese physicist, Leo Esaki, in 1958 invented the tunnel diode, a semiconductor device regarded to rank with the transistor itself in importance.[14] American firms are eagerly pursuing this promising new line of electronic development.

The market potential of transistors is still to be reached. Their small size and

[11] R. W. Olson, "Building a New Business Via the Patent License Route," a paper presented at the President's Conference on Technical and Distribution Research for the Benefit of Small Business, Washington, September 24, 1957. (Mr. Olson was Research and Engineering Vice President of Texas Instruments, Inc.)

[12] *Electronics Industry Fact Book,* 1959 ed., Electronics Industries Association, Washington, pp. 38-39.

[13] W. O. Baker, "The First Ten Years of the Transistor," *Bell System Technical Journal,* September 1958, p. iv.

[14] "Tunnel Diode: Big Impact?," *Electronics,* August 7, 1959, p. 361.

low power requirements favored their application in the first instance in battery-powered portable radios and hearing aids. (No royalties are paid by makers of such aids.) Other civilian uses are being developed in electronic data processing, medical instrumentation, and telephone communication. In the design of man-made satellites and such military equipment as missiles and field radio transmitters and receivers, the miniature size, ruggedness, and reliability of transistors are highly regarded. The adoption of transistors will be aided by further price cuts. Nevertheless, for many uses, the price advantage of vacuum tubes is still decisive; and these tubes are themselves undergoing constant improvement and being adapted to specialized tasks and high-grade performance.

The impetus given to research in the solid state by the advent of the transistor is as impressive as the progress in production. In 1957 the number of original research papers presented on this subject before the American Physical Society was more than six times the number presented in 1948. Meanwhile, the number of papers presented in all phases of physics only doubled.[15]

Implications for Small Business

From what has already been said, it is evident that the original transistor patent has been used conspicuously as an instrument of "positive competition" (in the sense in which this term has been defined in an earlier paper in this *Journal*[16]) and that Bell assumed a complementary, rather than a competitive, relationship to licensees. Small firms received encouragement and the technical information needed for production and sale of transistors; and many small ones are engaged in related metallurgical, research, consulting, and assembly activities.

Although semiconductor technology has provided an avenue for the development of small firms, their success, of course, is hardly guaranteed. Their fortunes will depend on the future scale of civilian and military demand, the scope and vigor of foreign competition, and ability to supply local or special markets more effectively than the branches and divisions of national corporations can. They still require access to capital, competent management, and know-how for survival and growth. The company official cited earlier on the help received from Bell properly points to the quick maturation of his firm's "expertness" as a major factor in subsequent success: his firm was the first to produce silicon transistors commercially in large volume (in 1954). Other medium-size or small licensees may not be able to improve their original technical position by comparable timely feats.

Furthermore, emphasis on opportunities should not blind us to the fact that a new technology often displaces an old one—that the change is often a substitution, at least in part, rather than an addition without any offset. In the case of the transistor and related semiconductor devices, we should note that an established vacuum-tube technology has been rendered partially obsolete; and that the damage that may have been sustained by particular small firms need not be cancelled by any advantage derived by the same firms from the advent and commercial acceptance of a successor technology.

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[15] Kelly, article cited in footnote 2.

[16] L. J. Harris and I. H. Siegel, "Positive Competition and the Patent System," *PTC J. Res. & Ed.* 3, No. 1, Spring 1959, pp. 21-32.

In short, experience with the transistor suggests that a pattern already observed will be repeated. The new technology may not threaten, and it could even enlarge, the role of "small business" as a category. But this does not mean that particular firms rooted in the predecessor technology have not been, or may not become, victims of what is called "progress" by the rest of society; or that firms getting a start or a lift from early association with the new technology will have the financial, managerial, and technical qualities needed for survival and growth.

FORUM

Although the primary purpose of this *Journal* is to communicate the research work of the Foundation, it also serves as a vehicle for educational activities designed to exchange informed opinion and stimulate additional study. This section provides a medium for the presentation of papers and notes which do not necessarily rest as yet on a firm basis of empirical research. It is hoped that the material published in this section will stimulate researchers to undertake factual study of the issues.

Wanted: A Definitive Government Patent Policy

HOWARD I. FORMAN*

"IT IS URGED THAT THE PRIME CONCERN of the government should be the implementation of a policy which tends to make every patented invention contribute as much as possible of its potential utility to the country's welfare. Encouragement should be given to the investment of capital, labor, and materials to convert each such invention into a useful article of manufacture, composition of matter, or manufacturing process. It has become more and more apparent that such investment will not be made by the government, as there appears to be very little desire for such activity by persons inside the government and there is much opposition to it by persons on the outside. Therefore, such investment can be expected to come only from private sources. In that event, recognition should be given to the fact that the best encouragement of such investment which can be given is the limited "lead" time afforded by the patent grant. By lead time is meant the opportunity to experiment with the construction of a plant, the development of know-how through trial and error, the planning of means for distributing a product, etc., with a fair chance to recoup that investment before having to share the invention with competitors who can stand by until it is developed to the point of practical utility and then get into the field with a minimum of such investment. That the exclusive rights afforded by the patent grant work in this manner has been attested to by leaders in all walks of American industrial life.

It is recognized that merely to leave the rights to inventions in the hands of private ownership will not, per se, guarantee their exploitation in the manner described above. To discourage disuse of the inventions, there should be some requirement that the holders of the rights thereto must prove that they have made reasonably satisfactory efforts to exploit them within a stipulated period of time, or else yield the exclusive rights thereto."

* A talk by Dr. Forman, a patent attorney with the Rohm and Haas Company, Philadelphia and Chairman, Committee on Government Patent Policies, American Patent Law Association.

The author believes that, if followed to its logical conclusion, this proposal should settle not only the problem of dealing with contractor-originated inventions, but also should resolve the equally knotty problem of inventions made by government employees.

INTRODUCTION

CONFUSION SURELY REIGNS supreme in the area of patent rights covering inventions arising wholly or partially because of government-sponsored research and development. For over three-quarters of a century, there have been arguments advanced in favor of one proposition or another concerning the "proper" disposition of those rights. In all that time, there has been utter failure to come to agreement as to such disposition. What is even worse, there has been no agreement on a single, basic policy which might help to decide the problem.

This lack of a fundamental, definitive policy has led to results which are ridiculous, besides being harmful because of the stumbling blocks they place in the path of negotiations between the government and its contractors. To illustrate, consider the situation whereby the government continues to add to its total of some 7000-8000 wholly-owned, unexpired patents. Committed to no policy for exploiting those patents so that they will be used commercially, most of the technology represented thereby goes unexplored and undeveloped. The non-exclusive licenses which can be obtained to use a government-owned patent hardly will induce the investment of the many thousands of dollars which often are required to foster embryonic developments having numerous "bugs" to be cleared up before an efficient commercial operation can be evolved. Why should anyone take the chance that, after he works the patented invention into a commercial success, another government licensee will come along and readily compete with him without anything approaching the additional investment required of the first licensee? This passive attitude toward the exploitation of the patents the government owns has essentially the same effect on them that is caused by the willful failure of any other patent owner to put his patented inventions into commercial use.

INCREASED INVESTMENT IN RESEARCH TENDS TO INCREASE PATENTS

It is a pity, indeed, that in this wonderful age of scientific accomplishment people find it so difficult universally to agree upon the relative value of patents to the welfare of the nation. Apparently, patents mean different things to different people. To the inventor who obtains a patent and successfully employs it in suing infringers, forcing them to cease and desist use of his invention or to pay him royalties, the patent system normally will be looked upon with favor. To the would-be infringer who is thus curbed, to the inventor who fails to get a patent because his invention is ruled to be old in the art, or to the patentee who finds his patent can readily be circumvented because its coverage was too restricted, the patent system may appear to leave something to be desired. There are other such pros and cons which have been discussed in the literature much more extensively, but it is not proposed to review them here, for it is desired to focus primary attention on other issues.

Would anyone argue against the view that research and development *tend* to produce inventions? It would appear safe enough to consider that proposition as being an example of the well-known legal doctrine, *"res ipsa."* What about the proposition that inventions tend to lead to patents? Of course, not all research culminates in inventions; and not all inventions are patentable. But since it appears to be a normal desire in man to protect his intellectual property, just as any other property which he may possess, one may expect that if inventions result from research the originators will seek some form of protection such as the patent system is presumed to provide. And when patents exist which appear to bar another's path to free use of the inventions covered thereby, we have seen the seeds of new research efforts sown in an effort to "get around the patent," this leading to new inventions and a continuation of the cycle as new patents are obtained.

Until rather recently, there have been expressed considerable doubts as to whether the number of patents an individual or an organized research group obtains could be directly proportioned to the amount of time and effort invested in research and development. Now, as a result of objective studies made by The Patent, Trademark and Copyright Foundation of The George Washington University, it appears rather clear that the number of patents obtained actually is a measure of research activity.[1] In other words, the more we invest in research and development, the greater the chances that we will discover new ideas, a good proportion of which will be patentable.

Of course, to keep things in proper perspective, one does not engage in research merely to see how many inventions can be made or how many of them will prove to be patentable. Research is entered into for many reasons, but the procurement of patents is not one of them per se; the motivation for patenting is the effect, not the cause of research. Primarily, research programs are entered into for the purpose of finding solutions to problems, to satisfy needs or wants of some kind. Practically anyone or any group that wishes to keep abreast of the times, whether it is in the interest of national defense, the advancement of medical knowledge, the furtherance of the economy, etc., must utilize the results of someone's research.

It may be a surprise to many people that, although over $10 billion per year is currently being spent in research and development in the United States,[2a] we were not always so research-minded. The Navy and some of our early industries always employed some people to develop and improve devices. No university did any more than a little part-time dabbling in research until 1876 when Johns Hopkins was founded with graduate research as one of its major purposes. General Electric, in 1900, was the first industry to set up a research organization as a separate, full-time activity. By 1915 we had about 100 industrial research laboratories, about 1,600

[1] Cf. "Productivity Surprise in Patent Scorecard," *Chemical Week,* July 25, 1959, p. 109, which cites reports from The Patent, Trademark, and Copyright Foundation of The George Washington University, indicating that 55-65% of all patents granted have been commercially used to the profit of the owner. The basic data may be found in *PTC J. Res. & Ed.*, 1, No. 1, (June 1957), pp. 74-75, 89-96; Conference Supplement (1957), pp. 72-73; 2, No. 4, (December 1958), pp. 463, 472-485, 493, 495, 498, 499, 500-501.

[2a] Based on National Science Foundation survey as reported in *Chemical and Engineering News*, Vol. 37, No. 37, September 14, 1959, p. 31.

by 1930, and today there are well over 3,400 such facilities employing about 170,000 people.

In the first half of the twentieth century the federal government's interest in research has grown tremendously so that a sizable chunk of our annual budget is invested in it. In 1957, for example, when U. S. industry spent $7.2 billion on research and development, the government's share of that bill was $3.7 billion. The colleges, universities, non-profit organizations—a large number of them working with the aid of government contracts and the government in its own laboratories—spent a total of another $2.8 billion on research and development in the same year. It is estimated that close to 50% of the total, or about $5 billion, was spent by the government that year; and the total appears yet to be climbing upwards. It has been estimated that federal spending for research and development will reach $7.7 billion in fiscal 1960, an increase of 7% over fiscal 1959 levels and 40% higher than in fiscal 1958.[2b] Primarily, the expenditures are for work on items considered necessary to national defense; but they also finance a major part of our studies in agriculture, geology, and medicine.

Before World War I, very few of our tax dollars were spent on research and development. At the turn of the century, we were still mainly an agrarian country and had just about completed the job of opening up the West. Our interest in fostering commerce and industry through government-wide assistance had not yet been generated. The Departments of Commerce and of Labor were not even in existence. Few looked to the national government as an organization that should sponsor widespread research for solving our peace-time problems, our wants, or our needs. Private initiative, it was maintained, would do this if the occasion demanded, just as it had always met the exigencies of the past.

The first World War changed all this. Suddenly the government, as the instrumentality of the people for perfecting our defense against our enemies, was obliged to seize every opportunity to obtain better weapons, better munitions, better war material of every kind. Having little in the way of its own research organizations, and certainly no time to develop any, it contracted for most of its research and development requirements. There were not many contractors in those days who had devoted their pre-war activities to developing items that were needed to fight a war. It is probably safe to assume that none of them had "Government Sales Departments" or "Military Weapons Departments," with supporting research divisions, as many firms have today. Most of the contractors of that day had very little background or experience and even less of a history of financial investment in research on items which the government called upon them to develop.

As stated above, research tends to lead to inventions, often patentable inventions. A number of patents started to appear on inventions which arose out of or were involved in work paid for by the government in the comparatively brief World War I period of 19 months. Undoubtedly, there were also many patented inventions used by the government whose development had not been so subsidized. Whatever

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[2b] National Science Foundation Report, "Funds for Research and Development in the United States, 1953-59" (Government Printing Office), and *Chemical and Engineering News*, Vol. 38, No. 1, January 4, 1960, p. 20.

the origin, there was a rash of patent damage claims, many of which were settled administratively. There is no publicly available record of the outcome of these, but the record is clear as to some 64 patent suits which ultimately had to be resolved in the Court of Claims. The total amounts claimed in these suits was over $236 million. Judgments in favor of the claimants were entered in 15 cases for a total of almost $13 million; the other 49 cases were dismissed. It is significant to note that the last of these suits was finally terminated in 1944, just 26 years after the war's end.[3]

This was the background—the beginning of the government's interest in research and in patents. From then it grew somewhat slowly. In 1930, the federal research budget was about $25 million, about 12% of the total national investment in research which then was only about $166 million. This rose to 30% by 1940, to over 70% during World War II, and has remained about 50% in most of the years since then.

Whether one favors it or not, the fact remains that the government's procurement activity continues at record-breaking "peace-time" highs. This activity, crossing over an increasing number of lines of industrial operations, is bound to bring more claims against the government of alleged patent infringement. To illustrate this point, it is interesting to note that from 1920 to 1954 there were 266 such suits which reached the Court of Claims, and the amounts sued for were in the neighborhood of $5 billion. About 35 of the claimants prevailed with judgments totaling about $6.5 million.[4] With the experience of handling patent claims arising out of and since World War I behind them, it has long been apparent to government procurement officials that something ought to be done to prepare defenses against inevitable patent infringement claims.

Since half the research in the country continues to be financed by federal funds, it seems reasonable to expect that some of the inventions resulting from that investment, if patented and available for use without further charge to the government, might form the basis for defense against unwarranted patent claims and lawsuits. Many companies apply for patents on their developments purely for defensive reasons, i.e., to forestall the possibility that someone else will make the same discoveries, patent them, and charge royalties which could have been avoided if the former had obtained the patents. The government has exactly the same stake in protecting its research investment. This is as it should be, and every taxpayer should insist that our government take steps to gain that protection.

This problem has been considered in and out of the halls of Congress for almost 40 years. Various government and bar association committees have worked on it, as have many organizations purporting to represent certain segments of industry. Practically all of these groups have published their findings and/or recommendations. In almost every instance, there has been no disagreement with the general proposition that the government should obtain rights to inventions which are primarily paid for out of federal funds, so as to protect against the possibility that it will have to pay someone a patent royalty for the use of something it caused to be

[3] Forman, *Patents—Their Ownership and Administration by the United States Government* (Central Book Company, New York, 1957), p. 44.

[4] *Id.* at p. 48.

developed first. There has been considerable disagreement, though, as to what sort of protection the government needed or should seek to obtain.

GOVERNMENT'S RESPONSIBILITY RE PATENTS ARISING FROM GOVERNMENT-SPONSORED RESEARCH

Many conscientious government officials in the Legislative and Executive Branches thought they saw a two-fold responsibility which they should discharge with respect to patents on inventions arising out of federally-financed research. In addition to the consideration of using them for purely defensive purposes, they looked upon them as government property to which all of our people should be equally entitled. On its face, there seems to be nothing wrong with this proposition; if there are benefits to be enjoyed from any piece of government property, it is normally proper that every citizen should have an equal right to share them. But the problem is not so simple. There are at least two contingencies which make its solution on an equitable, practical, and sensible basis quite difficult.

One is that in most cases the inventions which arise out of a government contract cannot clearly be defined and delimited as having been made entirely at the government's expense. Government procurement authorities quite naturally try to obtain research and development contractors who have a background of experience, equipment, and facilities to tackle a particular problem. They know that, as a rule, they stand a better chance of getting a satisfactory solution, in the least amount of time and at the least expense, if they call on people having a commercial background of applicable "know-how." Very often a contractor is selected and agrees to accept a contract because it has one or more patented or patentable inventions in its "bag of tricks" which both the contractor and the government contracting officials are sure will solve the government's needs most satisfactorily. It then becomes a question of balancing the equities. How much of the end result was paid for by the government? How much was paid for by the contractor? This can cause a big enough headache when a company which manufactures nuts and bolts is asked to design a new product that is only slightly different from its commercial line. The problem naturally is magnified many times when the contract is a guided missile in which the contractor may find it expedient to use numerous and complicated circuits or tube elements it developed for television at its own expense.

The second contingency, which makes it so difficult to decide how to determine who should get the patent rights arising out of government contracts, is the net effect on the utility to the nation of the inventions themselves. It must not be forgotten that the people of this nation, the founding fathers and all their descendents, have instituted and developed a patent system for a very special, very important purpose. The basis of that system was written into our Constitution as being for the prime purpose of advancing the progress of the arts and sciences. To implement that constitutional mandate, laws have been enacted to the end that our government will grant patents on inventions which will contribute to that progress, and we have every reason to believe that the industrial greatness of our nation is largely due to the effectiveness of our patent system. It is, therefore, only right that if patentable inventions arise out of contracts subsidized by our government, every effort should

be made to nurture those inventions so that they too can enhance our national economy and way of life.

In balancing the equities with regard to investments made by the government and its contractors, our government procurement planners have heretofore considered both parties as if they were private individuals and applied our customary legal principles accordingly. Or, if the government was considered to be in a somewhat different position, it was with the noble thought that the government could not leave any more patent rights to its contractors than they were entitled to receive according to those equitable principles, for this would unjustly enrich them at the expense of the rest of the taxpaying public. But never have the pertinent statutory provisions or procurement regulations been predicated primarily on the premise that the government owes an even greater obligation to its citizens than just protection against the unjust enrichment of a few, namely, to see that the patented inventions which it may cause to come into being are protected against disuse and are stimulated into adoption and application as much as possible. More will be said about this concept later.

DEFENSE DEPARTMENT EXPERIENCE AND PRACTICE

To illustrate some of the views mentioned above, it may be of interest to consider a few of the actual laws and regulations governing allocation of patent rights in government contracts. As a case in point, it is particularly interesting to examine pertinent portions of the Armed Services Procurement Regulation (ASPR), primarily because the Defense Department has always engaged in research and development contractual activity in numbers and dollar amounts far greater than that of any of the other federal departments or agencies. Up to and including the January 3, 1955 edition of the ASPR, there always was a Section 9-107.1 entitled "License to Foreground Patents" and a Section 9-107.2 entitled "Title to Foreground Patents" or fully equivalent provisions. Under the former, and with few exceptions, the government received a royalty-free license to practice or have practiced any invention *conceived or first actually reduced to practice* in the performance of a research and development contract—or in the performance of such prior work upon the understanding that a contract was to be awarded. This was the mandatory minimum requirement in all research contracts.

Alternatively, the title article could be used if the contractor could be convinced to accept it, and Department of Defense contracting officers were given a list of typical "equitable circumstances" as a guide in determining when they should attempt to insist on this clause in lieu of the license article. The use of this alternative article meant that the government would get full title, except for a license-to-use reserved to the contractor, to all inventions conceived or first actually reduced to practice under the contract. It was this article more than any other, with the possible exception of the ones pertaining to non-patentable technical data, that caused the most controversy between the procurement people in government and in industry. After some years of study and consultation between the sponsors of the ASPR and representatives of various segments of industry, the title article was eliminated from a Revision No. 1 to Section IX which was published January 4, 1955; and this stand was reaffirmed in each of the succeeding revisions including the most recent one

published on October 15, 1958. Since it has been dropped, no further mention thereof is deemed necessary in this discussion. Instead, some thought will be devoted to section 9-107.1 as it now stands under the latest revision.

With regard to inventions made during the course of a contract, the government is to receive the same form of royalty-free, non-exclusive license. However, there has been a modification which is responsive in part to some of the complaints heard from industrial sources. This change is in the requirement that the government be given a license under any invention which was first actually reduced to practice under the contract, even though it may have been conceived by the contractor, possibly at some considerable expense, before it accepted the contract. Now the contracting officer is authorized to consider and exclude from the licensing grant any invention which is covered by an issued United States patent or pending United States patent application filed by or on behalf of the contractor *prior* to the contract. To justify such exclusion, the contracting officer must find that at least one of the following conditions exist:

(1) The contractor has spent sums to develop the invention (e.g., research and development costs and expenses for preparing and prosecuting the patent application) which are relatively large compared to the cost of the proposed contract or at least of that part of the contract which appears likely to involve the invention in question;
(2) The practicability of such an invention has been established by engineering design;
(3) The invention concerns a basic material, and it is not the purpose of the contract to develop such material;
(4) The invention is useful only for military purposes *and* the contractor does not have facilities for furnishing the item to the government in production quantities.

It certainly appears reasonable for the government to demand a license to any invention first *actually* reduced to practice in the performance of its contract, *but only* if the invention was not covered by a pending United States patent application or issued United States patent. If no application is on file or patent issued, there may always be a source of dispute as to whether an invention later proved to have been reduced to practice under the contract is identical with one the contractor claims to have made before receiving award of the contract. With the application or issued patent a matter of record such a dispute can be more readily settled administratively, or by arbitration, or by court action if necessary.

But what is to be gained by demanding a license if the contractor has a patent on an invention but has not yet made a model or sample of it, unless he meets one of the four conditions just described? Undoubtedly, the contractor will get a "break" in that he will be given funds to test out his invention and thereby eliminate or minimize financial risk on his part. The government should not complain about this so long as it receives the benefit of the invention by successful performance of the contract. The majority of the people, who, after all, the officials of our government represent, should not complain because if the invention proves useful, whether in the defense of our nation, or in the advancement of the arts and sciences, they

will receive derivative benefits. A few competitors of the contractor will, perhaps, be put to a temporary disadvantage if the invention proves to have commercial significance. But, in the likelihood that such an invention is involved, it is just as probable that the owner thereof will seek and find other sources of financial support and then reduce his invention to actual practice without government contract assistance. If this happens, the government loses out in failing to get the benefit of what appears to be a qualified contractor with a potential answer to a government problem. What is more, if the invention gets on the market free of government aid, the government proper, and the people-at-large will still be liable to pay the inventor, in one way or another, for the right to use his invention.

What is wrong with letting the inventor capitalize on his invention in keeping with the principles of our patent system? If the government subsidy he appears to be getting distorts our perspective, then think of the contract sum as a loan. The government makes loans for many other purposes, such as for subsidizing a business undertaking or a farming enterprise; why not for developing a worthwhile invention? Successful performance of the contract would be the *quid pro quo*—full repayment of the "loan."

It is difficult to see the wisdom of insisting on the existence of at least one of the four conditions mentioned earlier. It only causes more hardships for the contracting officer and more delays before the contract is consummated as approvals of such exclusions are weighed and acted upon through channels. It all adds up to considerable unnecessary expense by the government for no really worthwhile purpose.

PATENT PROVISIONS IN NATIONAL SCIENCE FOUNDATION, ATOMIC ENERGY, AND SPACE ACTS

Although the patent provisions in the current Armed Services Procurement Regulation may not be the product of any predetermined government policy, it has in its favor the fact that it represents a compromise that is more widely accepted as being reasonable by people in and out of the government than any other such edict has ever enjoyed. Before it, Congress enacted the Atomic Energy Act[5] with requirements that title to *all* inventions made or conceived during the course of research on operations financed by the Atomic Energy Commission should be assigned to the United States. Afterwards, in 1958, the National Aeronautics and Space Act[6] was passed with essentially the same underlying philosophy, if not exactly the same stipulations.

To be sure, a major difference exists in that the Space Act requires assignment only of inventions made within the scope of the contract and related to the assigned work or duties; and the Administrator of the Act is permitted to waive rights to inventions deemed not to fall within those requirements.[7] However, the net result of both the Atomic Energy and the Space Acts is identical in one respect: both are bound to add large numbers of assignments of patents to the government's stockpile. Moreover, neither one appears the least bit concerned with what happens to those

[5] 42 U.S.C. 2011 (1954).
[6] P.L. 85-568 (July 29, 1958).
[7] Federal Register (March 5, 1959), pp. 1644-1649.

pieces of property after title thereto passes to the government. In each instance, Congress appears only to have been concerned with the notion that, for one reason or another, the patent rights must not fall into private hands. But whatever evils conceivably might develop if those rights were to be held by the government's contractors, no thought seems to have been given to the possibility that even greater evils might arise if the potentially valuable inventions were to suffer from lack of commercial support as explained previously. It could be that, if one were to compare the advantages of encouraging private ownership to exploit those inventions exclusively against the disadvantages thereof, or to compare those advantages with the virtues of making the inventions available to any seeker, the balance would clearly indicate that allowing for exclusive exploitation of the inventions advances the public welfare far beyond any other considerations.

In the absence of an openly professed, well-recognized statement of policy, one can only speculate as to the reasons why Congress stipulated that certain patent provisions be inserted in one statute and other provisions in another statute. To further indicate the inconsistency of Congressional thinking in this area, consider the patent provisions in the National Science Foundation Act of 1950.[8] There it is required that any contract executed pursuant to the Act shall contain provisions governing disposition of inventions produced thereunder "in a manner calculated to protect the public interest and the equities of the individual or organization with which the contract or other arrangement is executed." Here we see the Congress specifically requiring only that the public interest be protected but establishing no guiding principles as to what that interest is or how it might best be cared for.

Is it so difficult for Congress to develop a philosophy which will hold that every statute pertaining to research and development performed under government sponsorship must have patent provisions that, in the over-all picture, will protect the public's interest? Is it impossible to formulate a policy which will implement that philosophy regardless of the subject of a particular statute, whether it is the regulation of atomic energy, space, or other scientific inventions, discoveries, or developments? Is it beyond hope that such guiding principles can be agreed upon which will stand as an everlasting beacon and not be changed with changing personnel in Congress or because some need for a new statute involving government-sponsored research should arise in the future? A proposal for a definitive government patent policy is in the offing, one that would, if adopted, answer all of these questions in the negative. It will be set forth below; but, before considering it, there is the product of another area of government-sponsored research that deserves examination, namely, inventions made by government employees. It may be that the policy to be proposed will also apply to that area.

SHOULD INVENTIONS OF GOVERNMENT EMPLOYEES BE SUBJECT TO THE SAME OR DIFFERENT PATENT POLICY?

Persons interested in the problem concerned with inventions of government employees appear to be divided into three groups. One favors the assignment of all such inventions to the government, asserting that public funds have paid for the

[8] 42 U.S.C. 1871 (1959).

employees' services and the results thereof, and the employees should not be left with the title and the right to charge the public a royalty for the use of that which the public already has paid for in the form of salaries, etc. Another argument in favor of such assignment is based upon analogies made with the corresponding employment relationship in most private organizations.

A second group favors leaving title with the employees as an incentive to attracting qualified personnel to scientific posts in the government service, thus offsetting the lure posed by higher salaries offered by private industry which traditionally requires its employees to assign inventions to the employer. This group urges that the government needs only a royalty-free, non-exclusive license for its protection against claims that it may be infringing other persons' patents. Hence, why not leave title with the employees and thus help solve recruiting problems as well as the problems involved in taking title and administering patents assigned to the government?

A third group contends that there is a "middle ground" between these two extremes, and it is the best solution because it is based on a "fair and equitable" distribution. The proponents of this position would have employees assign their inventions to the government when the inventions were made as a result of the employees having been specifically hired and/or assigned to work on research and development problems and when the inventions were made with the aid of government help in the form of funds, material, equipment, services, etc. Title to all other inventions not qualifying for assignment to the government in view of such criteria would be left with the employees, subject to a non-exclusive, royalty-free license to the United States.

All three of these views are adequately discussed in "Federal Employee Invention Rights—Time to Legislate" [9] by Finnegan and Pogue who, incidentally, advocated the views represented by the third group described above. Actually, as in many controversial issues, there is some merit to the position of each group. It then becomes a question of weighing those merits against offsetting drawbacks in order to arrive at any sensible conclusions. This was attempted by the present writer in a critique of the article by Finnegan and Pogue which was entitled "Federal Employee Invention Rights—What Kind of Legislation?" [10]

As in the case of inventions made by government contractors, there has been lacking from all previous considerations regarding the disposition of rights to inventions by government employees a much-needed fundamental philosophy. Little if any heed has been given to the end result of the proposals which would lead to the assignment of increasing numbers of patents to the Government. What happens to the inventions covered by those patents appears to have been nobody's concern. The ability or failure of those patents to contribute to the progress of the country through exploitation of the arts and sciences which they disclosed seems to have been lost in the consideration of other matters.

People inside the government argued for various reasons in favor of one or another of the three proposals depending on the apparent needs or views of a particular department or agency. People outside the government, except for a militant

[9] 40 J. Pat. Off. Soc. (April and May, 1958).
[10] 40 J. Pat. Off. Soc. (July, 1958), p. 468.

group which argued against the government's needing any sort of patent rights—even as a defense against infringement claims—cared little about what happened to inventions made by government employees. What those people outside the government did not realize was the fact that there is a close parallel to be found in the reasons for either taking or leaving title to inventions of government personnel with the reasons for taking or leaving title to inventions of government contractors.

Congress obviously has been led through one route to see such a parallel because in the patent provisions of the Space Act it adopted much of the thinking incorporated in Executive Order 10096 [11] which presently governs the distribution of rights to inventions made by government employees. Evidence of this fact can be found in an article by O'Brien and Parker entitled "Property Rights in Inventions Under the National Aeronautics and Space Act of 1958." [12]

It is submitted that, through quite another route, one can see even more clearly how closely parallel are the problems concerning disposition of rights to the government employee's inventions and to the inventions made by government contractors. This is through the overriding concept of the public's interest and will be revealed in the proposal for a definitive government patent policy to be set forth below.

PROPOSAL: A DEFINITIVE GOVERNMENT PATENT POLICY

It is urged that the prime concern of the government should be the implementation of a policy which tends to make every patented invention contribute as much as possible of its potential utility to the country's welfare. Encouragement should be given to the investment of capital, labor, and materials to convert each such invention into a useful article of manufacture, composition of matter, or manufacturing process. It has become more and more apparent that such investment will not be made by the government, as there appears to be very little desire for such activity by persons inside the government, and there is much opposition to it by persons on the outside. Therefore, such investment can be expected to come only from private sources. In that event, recognition should be given to the fact that the best encouragement of such investment which can be given is the limited "lead" time afforded by the patent grant. By lead time is meant the opportunity to experiment with the construction of a plant, the development of know-how through trial and error, the planning of means for distributing a product, etc., with a fair chance to recoup that investment before having to share the invention with competitors who can stand by until it is developed to the point of practical utility and then get into the field with a minimum of such investment. That the exclusive rights afforded by the patent grant work in this manner has been attested to by leaders in all walks of American industrial life.[13]

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[11] 15 Federal Register 389 (1950).

[12] 19 Fed. Bar J. 255, 261 (1959).

[13] Cf. Koris, "Atomic Energy Patent Program," 41 J. Pat. Off. Soc. 34, 38, 44 (January, 1959); Starr, "The Manufacturer Looks at Proprietary Rights in Atomic Energy," 41 J. Pat. Off. Soc. 375 (June, 1959); Land, "The Role of Patents in the Growth of New Companies," 41 J. Pat. Off. Soc. 502 (July, 1959). See the series of articles on proportion of companies which regard patent protection essential for the development of an invention which appear in *PTC J. Res. & Ed.*, 2, No. 4 (December 1958), pp. 463, 472-485, 493-495, 498-499, and 500-501. Also see *Patents and the Corporation* by Scherer *et al.* (Boston, 2d ed., 1959), pp. 34-38.

It is recognized that merely to leave the rights to inventions in the hands of private ownership will not per se guarantee their exploitation in the manner described above. To discourage disuse of the inventions, there should be some requirement that the holders of the rights thereto must prove that they have made reasonably satisfactory efforts to exploit them within a stipulated period of time, or else yield the exclusive rights thereto. A similar provision, incidentally, has been adopted by the National Aeronautics and Space Administration (NASA) in its latest "Patent Waiver Regulations." [14] It provides that in those cases where a contractor is permitted to retain title to inventions made in the performance of the contract, the permission may be voided if within five years there is presented no satisfactory evidence of having "worked the patent."

Recently, a Subcommittee on Patent Law of the House Committee on Science and Astronautics held hearings to consider whether the patent provisions in Section 305 of the Space Act of 1958 should be revised. This came about by virtue of a storm of criticism which swept the country from coast to coast when those provisions were first published, since the language of the Act appeared to require assignment to the government of the rights to all inventions arising from contracts let by NASA. The storm was of such intensity that it scarcely diminished even when NASA issued its waiver regulations. As a result, the above-mentioned subcommittee was formed, under the chairmanship of Representative Erwin Mitchell of Georgia, to investigate the situation.

The General Counsel of NASA, John A. Johnson, appeared before the Mitchell Subcommittee on November 30, 1959 and presented a proposal for replacement of Section 305. In essence, the proposal called for the disposition of rights to inventions conceived or first actually reduced to practice in the performance of contracts with NASA. The disposition, which was to be in a manner calculated to protect the public interest and the equities of the contractor, could range from the vesting of title in the United States to a waiver of all such rights subject only to the reservation of an irrevocable, non-exclusive license for the government's benefit.

Mr. Johnson, on December 9, 1959, appeared before the Senate Subcommittee on Monopoly of the Select Committee on Small Business (headed by Senator Russell B. Long of Louisiana) and had occasion to explain NASA's existing patent policies more fully, as well as to recommend certain changes in Section 305. In effect, he called for the granting to the Administrator of wider discretionary authority to dispose of rights to NASA-sponsored inventions and patents. Presumably, a feature of NASA's patents administration will be to issue licenses to its contractors responsible for making the inventions in question. The license will be revocable at the option of the Administrator if the recipient fails to convince him that the invention has been developed to the point of practical application within five years from the date of issuance of the patent thereon, or within eight years from the grant of the license. In the same period, NASA would grant other such non-exclusive, revocable licenses. By the end of the licensed period, if the invention has not been worked, NASA may revoke all non-exclusive licenses and grant an exclu-

[14] Cf. Sec. 1245.106 in Federal Register for Thursday, October 29, 1959, pp. 8788-8790. Also, cf. 40 J. Pat. Off. Soc. 468, 479, 480 (July, 1958).

sive license for a specified new period of years with a similar working requirement. The exclusive licensing would be tried at that time on the theory that the non-productive result of the non-exclusive licensing effort indicated that a factor precluding development of the invention was the lack of exclusive rights which would justify the risks of development costs.

On January 11, 1960 Representative Overton Brooks, Chairman of the House Committee on Science and Astronautics, introduced H. R. 9484, a bill designed to replace Section 305 so as to give the Administrator broadened discretionary authority as described above. It is submitted that passage of this bill will only be another piecemeal effort to patch up the troublesome patent provisions in the existing law. That it will not satisfy the industrial concerns of the nation has already been indicated by the protests which were heard at a panel discussion on January 20, 1960 before the Washington, D. C. meeting of the American Patent Law Association in which both Congressman Mitchell and General Counsel Johnson took part. But even more important than the voiced objections was the fact that once again we see in formation another stop-gap approach to the problem of establishing a clear-cut government patent policy.

The NASA proposal that patents arising from its contracts should be given the chance to be commercially developed is sound, but its intended method of implementation is not. By keeping title to the inventions at the outset, NASA is bound to discourage its contractors from investing heavily in exploiting inventions that may require considerable capital for their development to a point of practicality. Even if NASA, at the outset, gave an exclusive license to the contractor which made the invention, the licensee would be concerned over the possibility that NASA might take back all rights to the patent without giving what the contractor would consider to be a reasonable chance to prove that it is working the invention. But the plan to issue non-exclusive licenses is much worse; it may cause the contractor who originated the invention to lose interest, dispose of the facilities that it may have devised or set aside for developing the invention, reassign personnel to other tasks, etc., once the contract is over. The chances of the government to get the contractor interested in taking an exclusive license several years after such a decision will be mighty slim indeed.

Perhaps the NASA proposal falls short of the solution advocated by the present author because of a desire to effect some sort of compromise between the demands of its contractors and the objectives believed to be wanted met by the Congress. If so, it is too bad because the proposal will surely not satisfy its critics among would-be contractors, and it will be putting Congress in the position of enacting another law that merely defers the problem instead of solving it. A revision to the Space Act's patent provisions should shift the emphasis from the current plan to leave title with NASA and merely license the contractors. In lieu thereof, exclusive title should automatically be vested in the contractor subject only to a reversionary right in the government upon failure of the contractor to work the invention within the previously described five or eight year period. This could be accomplished by providing for the right of the Administrator to issue a rule to show cause why such reversionary right should not be exercised by the government.

Such an arrangement would give the contractor an incentive to work the patented invention before the expiration of the designated period by giving him the assurance that he will have a guaranteed exclusive right for that time, and an opportunity to defend that right against any possible adverse administrative action if he believes he has made a conscientious effort to work the patent within that period. No contractor who has an honest intention to exploit the patent should object to such a plan because it gives him a reasonable chance to keep the exclusive rights to the invention he originated. If the five or eight year period proves to be too short to do a good job of exploitation, as in cases where Acts of God, strikes, or other problems beset the contractor, he could probably get more time allowed him upon appeal to the Administrator. Keeping in mind that the government's fundamental objective would be to get the inventions into commercial use if possible, the Administrator could establish reasonable requirements, and, with some experience in their enforcement, contractors will learn how to live with them without too much difficulty.

The shift of emphasis from the government to the contractor may seem to be a small one, but it may be the difference between success and failure in the attainment of what should be the principal Congressional objective. It may well end contractor resistance to the taking of government contracts with patent provisions such as NASA must now include therein. It may encourage the commercial exploitation of inventions arising out of government-sponsored research and development on a large scale such as was never before contemplated. All this and other advantages may be derived, and there is practically no risk in finding out if such will be the case. What harm can come from first trying the exclusive "licensing" route, and then resorting to wide-open, non-exclusive licensing if the former expediency fails? At most, there will be a delay of five years or so before the government will know if the invention is being exploited by the exclusive licensee. Moreover, if a follow-up system is employed beforehand, it is possible that the disinterested contractor would even voluntarily surrender his exclusive rights or arrange to license another party to do the exploitation.

From some sources, there may be objections to the foregoing proposal to induce the contractor to work the patented invention on the ground that it smacks of compulsory licensing, a feature of some countries' patent laws to which the present author is opposed as much as anyone. Perhaps it does, but there is a huge difference. True compulsory licensing requirements impose an additional burden upon those who disclose their inventions in exchange for the limited right to exclude others, which is inherent in the patent grant. A person who invests his own money and effort in making an invention has the right to keep it as a trade secret or make such a public disclosure so as to get a patent grant. If he has that exclusive right of ownership (i.e., the exclusive right to use it without the correlative obligation to let others in on it) at the outset, why should he be made to lose it for failure to utilize it commercially within the term of the grant? The

bargain he made with the government in return for the patent grant will be kept in due course, as agreed. The government, which issues the patent, will get its return for the exclusive grant it gave when the patent expires and becomes vested in the public domain.

Let any critics of the above proposal be reminded of the fact that the invention rights in question are not made solely or even principally with the inventor's money and effort. The government makes a significant contribution, and with its employees or contractors may be considered as having formed a limited partnership with regard to the inventions. Considered in this light, the government has the right of a partner to object to any desire on the part of the inventor or his assignee to refrain from promoting the commercial development of the inventions. The government should not be interested in merely acquiring all or a share of those invention rights and nothing more; it should be actively interested in seeing that they are utilized as discussed above. Since active commercial promotion of those invention rights by the government may create even more problems and dissatisfaction than does the present state of affairs, an alternative is to let the other "partner" to rights in the inventions do the promoting and to safeguard the government's stake in the promotion by means of the reversionary right described above in the event the invention is not exploited in a reasonable manner.

If the underlying philosophy of the suggested policy is considered with favor, it must become apparent that it will apply uniformly to the inventions made by government contractors and by government employees. It is a mistake to treat the ownership of the inventions from those two sources as separate issues. The government, its employees, its contractors, and the public-at-large all have at least one common interest in those inventions regardless of their source. If one accepts the proposition herein advanced, namely, that the fundamental requirement in the case of government-sponsored inventions is to aid and abet their commercial utilization, then there can be only one major issue. Once the fundamental philosophy is determined, the modus operandi for resolving such problems in any variation can readily be determined in the future.

Upon agreement as to the philosophy concerning government-sponsored inventions, such questions as whether government employees are in a different category than private companies or employees are made unnecessary. Whatever those differences may be is not important. It is the *invention* made by the employees that counts, whether they are employees of the government or of its contractors. What is done with that invention to promote the progress of our arts and sciences is the important consideration.

Here, then, is a challenge. Congress, which for over 80 years has been considering what to do with the rights to inventions made in the performance of government-sponsored research, has never settled upon a definitive policy which all could understand and which would apply uniformly to all. Congressional committees interested in the by-products of government-sponsored research represented mainly by patent rights have reacted in various ways to pressures brought by all sorts of

interest groups, both within and outside of the government itself. The different patent provisions in the different statutes affecting inventions made by government contractors, and problems caused by the refusal to legislate with regard to inventions made by government employees, add up to a woeful lack of purposeful direction.

Editor's Note: *The Patent, Trademark, and Copyright Foundation is engaged in a study of the policy of the federal government with respect to the right to patented inventions growing out of government-financed research and development contracts. The object of the study is to examine and evaluate the implications of federal patent policies for contractors, government agencies, and the public interest. Dr. Donald S. Watson, Professor of Economics at The George Washington University, is the Principal Investigator for the research project, and Dr. Harold F. Bright, Professor of Statistics at the University, is the Associate Investigator. Reports on this project, undertaken pursuant to an agreement with the General Services Administration, will be published in future issues of the* Journal. *For further information on this project, see* PTC J. Res. and Ed. *3, No. 3, (Fall 1959), pp. 348-49.*

CONTRIBUTED ARTICLE

Some Antitrust, Trade, and Investment Aspects of Foreign Licensing: An Economic Analysis*

WILSON E. SCHMIDT**

SUMMARY

IT HAS BEEN SUGGESTED that the growth of foreign licensing would result in a reduction of international trade and investment. This paper indicates that this need not be so. It has also been suggested that anti-competitive clauses in license agreements are not in the interest of the United States. Assuming a national focus of the antitrust laws, this economic analysis shows that such a generalization cannot be made.

IT IS MY GOOD FORTUNE TO WORK on a research project of The Patent, Trademark, and Copyright Foundation of my university with Jack Behrman of the University of Delaware. Our efforts concern various aspects of the overseas licensing of American-owned foreign patents, trademarks, and know-how.

This form of international economic intercourse has received little attention in comparison with foreign investment and trade. It deserves better treatment, partly because it has been growing very rapidly and partly because it spreads one of the prime propellants of economic growth.

Some conception of the extent of the international transfer of know-how is provided by the fact that U. S. receipts in 1957 from patents, technology, copyrights, trademarks, rental equipment, and similar assets were at least 380 million dollars. (*Foreign Commerce Weekly,* December 28, 1958). This figure clearly understates the activity however. Neither the royalty payments to branches of American companies overseas nor to foreign base companies are included. And the Department of Commerce freely admits that it did not know all of the firms to question.

We don't have a precise figure for the number of American companies licensing abroad. The Department of Commerce put the figure at a minimum of 650 in 1957, which would be a quarter or a fifth of the number of U. S. companies with investments abroad. But this figure is undoubtedly low. In Japan alone there are now about 1,000 technical assistance agreements of which over 600 are with American

* A paper presented to the Southern Economics Association on November 21, 1959 in Jacksonville, Florida.

** Dr. Schmidt, Associate Professor of Economics at The George Washington University, is Associate Investigator of the Foundation's *Project 5a* on Foreign Licensing.

companies. And Australia reported for 1957 that, while there were 185 U. S. companies with investments in Australia, there were 400 with licensing arrangements.

Licensing is a business of extremes. A large variety of products and processes are covered, ranging from heavy electric equipment to carpeting. The licenses are widely dispersed, though not evenly, throughout the world, appearing in both rich and poor countries. Licensing is big business and it is little business: on the one hand, an agreement between major corporations calling for payments of several million dollars; on the other hand, a convicted murderer serving a life sentence in a foreign jail who has sought out a U. S. license broker to look for profitable uses for an invention he has created during his confinement—despite the fact that under the law he cannot collect a cent of royalties for it.

One question of theory and one of policy concerning foreign licensing are especially deserving of analysis. Both are questions on which some people have taken rather firm positions.

EFFECT ON TRADE AND INVESTMENT

The question of theory is the effect of foreign licensing on international trade and movements of the factors of production among nations. A businessman can exploit his know-how, patented or unpatented, in foreign markets in several ways: he can export products containing that know-how; he can undertake direct investment abroad, carrying the know-how with him; or he can license or sell it to foreign enterprises. Because the decision to license involves these alternatives, there has been a tendency to assume that the international transfer of knowledge reduces trade or foreign investment. In a world which needs to expand its international economic relations for both political and economic reasons, this might be considered a serious offset to whatever advantages foreign licensing may have.

There are several reasons, however, why the export of ideas need not reduce international trade.

TRADE

First, our investigations indicate that licensing often gives rise to sales of component parts to the licensees. Not infrequently, the gross receipts from these sales will far exceed the royalties received. One can readily see that if the grant of a license does displace exports of a finished product, there may be a more than compensating rise in the export of component parts if the grant of the license causes the price of the finished product abroad to fall far enough and if the elasticity of foreign demand is great enough.

Second, the dynamics of consumer and business expenditures are such that the increased supply of one product may stimulate the demand for a second, and if the second is a product imported by the licensee country, as is sometimes the case in licensing, exports from the licensor country may rise.

Third, because of the need to balance international payments, the royalty payment which accompanies the license may induce, through any one of various balance-of-payments adjustment mechanisms, an expansion of the exports of the licensee country.

Fourth, licensing contributes to the real income of the partner countries and therefore may raise the demand of each for imports.

Fifth, the foreign application of any innovation may affect factor rewards in a way which expands trade. Suppose a cost-reducing innovation which makes greater relative use of our comparatively scarce factor of production occurs in a U. S. export industry. After sufficient time has elapsed to permit the innovation to have its full effects on world trade, suppose that the innovation is transferred abroad? In order to take the worst possible case for the level of trade, suppose that it is applied in an import-competing industry abroad rather than in export production.

Imports of the country receiving the innovation will fall if the prices of its factors of production remain constant, because that nation's import-competing production will enjoy lower costs as a result of the innovation. But what happens when we take account of changes in factor rewards? In a two-country, two-commodity model, the scarce factor in one nation is the abundant factor in the other. One might therefore suppose that when an innovation which uses relatively more of the scarce factor in the U. S. is applied abroad, it would make greater relative use of the foreign nation's abundant factor. As a result, factor rewards abroad would shift in a manner which restricted trade: a country tends to export products which use its relatively abundant (cheap) factor intensively and tends to import products which use its relatively scarce (expensive) factor intensively; an innovation which made greater relative use of a nation's abundant factor would raise the price of the abundant factor, thereby raising the cost of export production, and it would lower the price of the scarce factor, making import-competing production less expensive; these shifts in costs would reduce the exports and imports of the nation receiving the innovation.

But this need not be the case. Our investigations indicate that licensors are willing in varying degrees to adjust the know-how transferred to the particular circumstances of the licensees. Since it will be more economical to use the process abroad with a different factor mix because relative factor prices differ between countries, an innovation which makes greater relative use of the scarce factor here may be modified to make greater relative use of the scarce factor abroad. Hence, even though the transfer of knowledge would, with given factor prices, reduce costs in the import-competing industries abroad and thereby contract trade, it may ultimately expand trade by raising the relative price of the scarce factor abroad and by reducing the relative price of the abundant factor abroad. As Messrs. Findlay and Grubert have shown in a recent issue of the *Oxford Economic Papers,* (February 1959), whether or not this happens depends on the extent of the cost reduction in the import-competing industry—with a smaller cost reduction favoring the expansion of trade. The extent of the cost reduction is automatically limited in licensing because a royalty is charged for the know-how and because the costs of adjusting the process to the local situation will often be paid by the licensee as part of a lump sum initial payment, thus making the expansion of trade more likely.

Finally, we must note the possibility that the net addition to income from licensing may stimulate further research in the United States which in turn may lead to additional shifts in factor rewards which conduce to expanded trade.

INVESTMENT

Now consider the effect of foreign licensing on factor movements. Again, the tendency is to suppose that because licensing and investment are alternative methods of exploiting know-how abroad, licensing must reduce investment. This need not be the case.

First, not infrequently the licensor will take payment for his know-how in the form of stock rather than royalties; licensing, therefore, leads to foreign investment in both financial and real terms.

Second, U. S. parent firms often license their subsidiaries to obtain tax advantages by substituting royalties for the dividends they would otherwise receive. They also do this because it gives protection to the licensed assets in the event of nationalization. To the extent that this procedure increases the returns from foreign investment by reducing taxes and makes foreign operations more secure, it may stimulate further investment.

Third, licensing leads to some investment because it provides a method of testing the market for subsequent exploitation through manufacture abroad.

Fourth, as in our discussion of trade, the transfer of an innovation may encourage factor movements through its effect on factor rewards. Suppose that all of the conditions necessary for world-wide factor-price equalization through free trade prevail so that there is no inducement for factor movements. If then an innovation occurs in the U. S. which is not transferred abroad, production functions would differ and factor prices could not be equalized by free trade; therefore, an incentive for factor movements would exist. If the innovation is then transferred, production functions would again be the same, and the incentive for factor movements would be wiped out by free trade. In such a situation the international transfer of knowledge would substitute for factor movements.

But if we drop the restrictive assumptions necessary for factor-price equalization, as we surely must, this conclusion need not follow. Suppose that labor tends to flow into the United States and that capital tends to flow out. If an innovation occurs in the United States which makes greater relative use of labor, these flows will be encouraged because the reward to labor will rise and that to capital will fall in this country. If the innovation is transferred abroad and if it has the same factor-using characteristics, it would discourage these flows by raising the reward to labor abroad and reducing that to capital abroad. But if, as suggested earlier, the factor-using character of the innovation shifts as the know-how is transferred, the international transfer of knowledge could further encourage factor movements by depressing wages abroad and increasing the reward to capital abroad.

In conclusion, considerations of fact and of theory suggest that the international transfer of knowledge need not always restrict foreign trade and factor movements.

THE ANTITRUST ISSUE

Now to the question of policy.

As many of you know, the last few years have seen mounting pressure from certain groups of businessmen and lawyers for some relaxation of the antitrust laws

in respect to the foreign operations of American companies. Support for this was recently gained when two studies commissioned by the Executive Branch made recommendations to that end.

The proponents of this point of view hope to avoid nasty legal snarls and international political difficulties when an American firm overseas is obliged to do one thing under U. S. law and the opposite under foreign laws. The present situation is labeled "judicial aggression" by some lawyers on the theory that the limits of a nation's laws are its boundaries, and we extend our claim to the earth's surface when we apply the Sherman Act to acts performed on foreign soil. The proponents also believe that easing the antitrust laws will stimulate foreign operations—an objective which, at least until the recent balance-of-payments difficulties of the United States, has been regarded as desirable. The thought that antitrust relaxation will encourage foreign operations is, of course, strange to economists who have been under the impression that it is competition which maximizes any given line of activity.

Assessment of the antitrust question is complicated by the fact that there is significant disagreement among competent lawyers as to what the law is. This uncertainty, plus the pressure for relaxation, suggests that there is an opportunity for useful economic analysis of the antitrust question, and this provides the economist with an unusual chance to apply the terms-of-trade argument for trade restriction to a practical issue because the focus of the Sherman Act seems to demand it. Under the law, an act which would bring immediate antitrust threat if performed in the United States would be free of threat if performed abroad if it has no substantial effect on U. S. commerce. As the Attorney General's Committee wrote, "The Sherman Act is not, of course, intended to protect foreign consumers against monopoly in their home markets." (p. 79). It would seem that any policy recommendations made should place zero weight on the welfare of foreigners, whether we like it or not, and this is the key assumption underlying the terms-of-trade argument for trade restriction.

A central issue in the application of the antitrust laws is the propriety of territorial divisions between licensors and licensees. Some lawyers currently advise their clients that license agreements should not contain clauses which prohibit either party from selling in the other's market. And penalty royalties on sales outside of one's territory are also dangerous from an antitrust viewpoint.

A good many people believe it to be extremely undesirable to prevent the parties to a license agreement from restricting competition between themselves. For example, Stephen P. Ladas, representing an international business organization, testified that, ". . . to require the American company to authorize a foreign company to import its goods into the United States is to destroy . . . the moving force of such agreements . . . [An American manufacturer] could not be expected ever to enter into an agreement with a foreign company under his patents, trademarks, or know-how if this meant that he must create a competitor in his own business in this country." (*A Study of the Anti-trust Laws,* Committee on the Judiciary, U. S. Senate, 1955, p. 1708).

And a close student of the antitrust law states that, "If the rights or information

which the foreigner obtains from the American derive their value from their uniqueness, secrecy, or exclusiveness, the licensee will want some assurance that in his own market these values will not soon be undercut by direct sales from the American licensor or by licensing the identical right and process to other people in the same market area." (Brewster, *Anti-Trust and American Business Abroad,* p. 136).

Perhaps the standard models of economic analysis will help us understand if clauses which restrict competition are necessary to the process of licensing and, if so, whether they are justified in terms of the interest of the United States as a whole.

THE COMPETITIVE CASE

Suppose that a firm discovers a new product that can be produced by a large number of firms throughout the world which compete with one another, or that it discovers a method of cutting the costs of producing a product which is currently manufactured in a large number of competing firms in the world. If the product or process is patentable or if the process can be kept secret from those who refuse to pay for it, the firm can license it with profit at home and abroad. The royalty charged would have to be low enough to allow firms to produce the product more cheaply than before if they are to be induced to accept the license; and if it is set that low, then all firms will have to take the license in order to remain in business. Subject to the restriction that the cost of production, including royalty, would have to be lower, the licensor would set a royalty which would produce a monopoly equilibrium for the industry. In theory, to maximize his profits he would behave as if he were to derive the curves which are marginal to the industry world demand and supply schedules, and their intersection would give him the optimum output. To achieve that output he would require a royalty equal to the difference between demand and supply schedules at that output or, in other words, equal to the difference between the price and long-run average cost of the licensees exclusive of royalty. Equilibrium would prevail because the licensees would be enjoying only their normal profits since the difference between the price and cost at the monopoly output would be absorbed by the royalty. And this royalty would give the licensor all of the profits to be had by monopolizing the industry. Clearly, in this model, it does pay to create or sustain competitors by licensing them, contrary to the position cited before.

In further contrast, if we suppose that the supply and demand conditions remain fixed, there is no need for anti-competitive clauses in the license agreements. The licensees need not be protected from one another because, with the prospect of only normal profits, none has an incentive to expand sales further. And they need not be protected from the licensor. In theory, to determine his output, the licensor will add to his costs a shadow royalty equal to the royalty charged of licensees, and he, just like the licensees, would expand production until marginal cost, including the shadow royalty, just equals price. If the licensor failed to add the shadow royalty, he would expand production until marginal cost, exclusive of royalty, equaled price. Because the licensees include a royalty in their marginal costs, the marginal cost in the licensor's firm would then be above that of the

licensees. This would mean that the total cost of producing any given level of world output of the product would be higher than it need be since total costs would fall if some production were shifted from the licensor to the licensees. This is not in the interest of the licensor since he can obtain all of the monopoly profits of the industry and would therefore wish to minimize total costs.

Even if we allow for possible cost and demand shifts, the licensor has substantial protection. For example, if the costs of the foreign licensees should fall drastically at some future date, and if it were not possible to renegotiate the royalty rate—and it is not likely—the foreign licensees might take over the market of the licensor and his domestic licensees. But even if they did, the net income of the licensor could not fall. The same royalty is charged of all firms. Therefore, if foreign production completely displaced domestic production, the added royalties gained from foreign licensees would at least equal the income lost from domestic licensees and on the licensor's own production, i.e., the shadow royalty.

THE MONOPOLY CASE

If we shift the model to assume that the licensor and each potential licensee have monopolies in their respective market areas before the discovery of the cost-reducing innovation, the protection afforded to the licensor in the competitive model breaks down completely. For several reasons the royalty charged of foreign licensees has no necessary relationship to the profit which the licensor gains in his own market from exploiting the innovation. First, the optimum royalty in each market will differ according to the cost and demand conditions. Hence, the optimum royalty might fall below the profit of the licensor in his own market. Should the foreign licensees take over his market as a result of future cost reductions, the licensor would not be fully compensated for his lost profits. Second, unless there are a number of candidates for a single license in each foreign market so that the licensor can auction off the license, the negotiations are strictly bilateral bargains. Consequently, the royalty agreed upon may fall far short of the optimum royalty, further reducing the protection afforded to the licensor. This provides a clear cut rationale for restrictive clauses which protect the licensor.

As for protecting the monopolistic licensee, it goes without saying that each licensee will desire exclusivity if he can obtain it. The evidence suggests that licensees are willing to pay for this privilege because royalties on exclusive licenses are often twice those of non-exclusive licenses. But this does not mean that the licensor will grant the privilege: he may wish to retain the right of entry in case market or cost conditions change or the original licensee's performance is not satisfactory. A number of licensors, including major companies, have a policy of avoiding exclusive licenses for just this reason. But it probably costs them something in the form of lower initial royalties.

THE COMPETITIVE CASE WITH PENALTY ROYALTIES

For a final model, return to the competitive situation discussed before but amend it to allow the licensor to impose penalty royalties on sales outside of specified territories. The net gain to him will clearly be greater with this amendment for

it allows market segregation and optimal allocation of production. Not only can he establish a royalty which equates marginal revenue in the world market with the marginal cost derived from the world supply curve, but also by means of different royalties in different territories, he can assure that sales are allocated so that the marginal revenues are the same in each market and production is allocated among territories in a fashion which equates the marginal costs derived from the supply curves in each territory. Except by accident, the optimum price in each market will be different, and the optimum allocation of production and sales will require some trade between territories. To preserve these optima some export royalty may be required.

With these royalties, the licensees would have exactly the same protection from each other and from the licensor as they enjoyed in the previous competitive model. The licensor to protect himself from cost changes abroad would, however, have to require an extra royalty when goods are sent from a low royalty to a high royalty market.

THE ECONOMIC INTEREST OF THE U. S.

Since the opportunity to segregate markets and production provides the licensor with greater profits, some market dividing device is clearly in his interest even where there are a large number of potential licensees, i.e., in the competitive case. But is it in the interest of the United States as a whole to allow American licensors to use such a device—leaving aside, as the antitrust laws seem to suggest, the interest of foreigners?

Suppose that after the establishment of all of the optimum royalties, the United States exports the licensed product. The optimum level of trade for the United States as a whole is achieved when the marginal gain from foreigners from the sale of one more unit of exports just equals the price of the product in the United States. This is so because the marginal gain from foreigners reflects the value of the additional goods which we can purchase from foreigners, while the price in the United States reflects the value to American consumers of what we give up if we export one more unit of the licensed product. The American licensor will set the royalties at levels such that the marginal gain to him of one more unit of export just equals the marginal cost of producing those exports. Since the price in the United States must exceed this marginal cost because the product is produced at a monopoly level if the licensor charges the optimum royalty of his U. S. licensees, it follows that the price here must exceed the marginal gain from foreigners. Hence, the licensor allows too many exports to optimize U. S. trade.

But a contrary inference is drawn if we consider the condition for maximizing U. S. output. Exports are an indirect means of "producing" import-type products. Maximum output is achieved when the marginal gain from foreigners through exports just equals the marginal social cost of the exports. The marginal social cost of the exports is measured by the marginal cost exclusive of royalty in each *firm,* for this measures the production of goods and services which must be given up by producing one more unit of exports. The licensor will, however, set the level of exports so that the marginal gain from foreigners just equals the marginal cost derived from the *industry* supply curve in the United States. Since this

marginal cost must be higher than the marginal cost at the level of the firm, it follows that the marginal gain from foreigners exceeds the marginal social cost of exports. Hence, the United States should be exporting more to maximize output.

Depending upon the size of the divergencies between price and marginal gain, and between marginal gain and marginal social cost, and on the responsiveness of trade and production to the changes in prices, a decrease in the penalty export royalty in order to raise U. S. exports could either raise or reduce U. S. national welfare. Hence, there would appear to be no presumption in favor of or against the use of a market dividing device such as the penalty royalties applied in this case.

This uncertainty is also found in the competitive case without penalty royalties. Because the licensor cannot segregate markets, the relationship between the marginal gain from foreigners and the marginal social cost of exports cannot be specified; we may export too much or too little.

Finally, in the monopoly case, an assessment of the desirability of prohibiting competition requires a comparison of the loss of royalty income which we may suffer if licensees are not given some protection from possible future competition with the gain from trade which might be enjoyed if cost conditions later change so as to permit trade. The size of the gain from trade is obviously uncertain because that depends upon how market conditions change. And the loss of royalty income would reflect the licensee's estimate of the danger of future cost and market changes which would bring him competition. Clearly, the balance of gains and losses is uncertain, and there hardly can be a presumption either in favor or against restrictive clauses in licensing agreements.

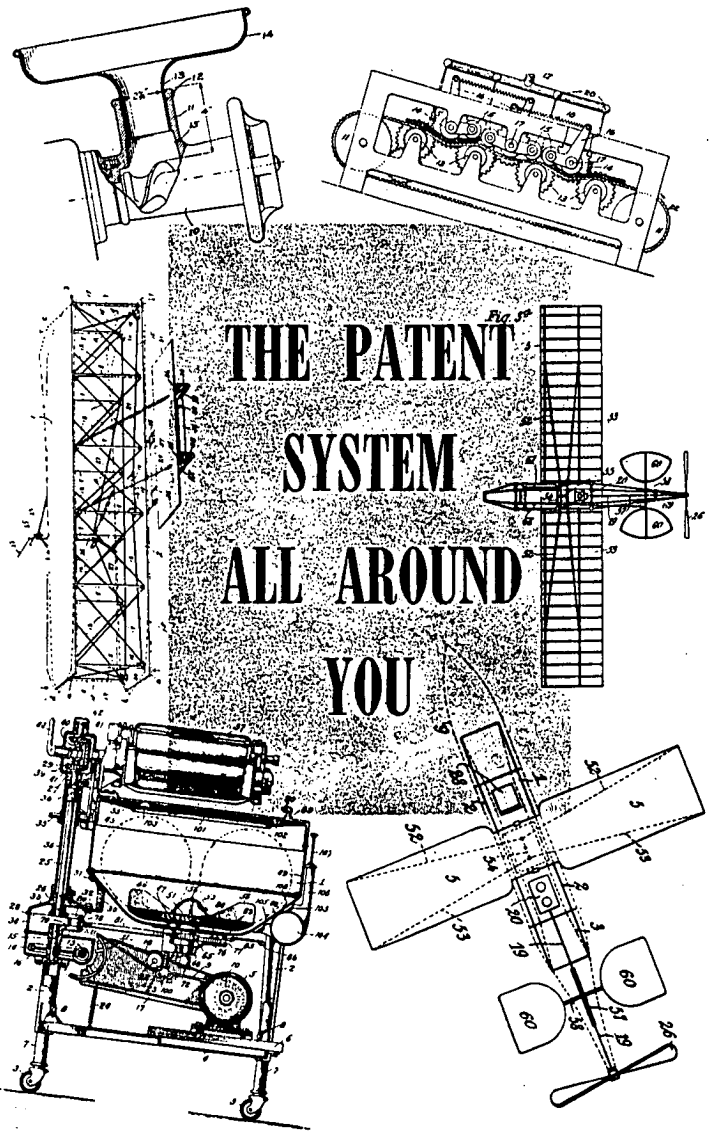
If this analysis has any validity then, it suggests that there can be no *general* rule on restrictive clauses in foreign licenses.

EDUCATIONAL ACTIVITIES

Program for Young People

The Foundation is distributing a series of booklets on the patent and related systems as part of an educational program for young people. The series, which is entitled *The Patent System All Around You,* has as its objective the creation of an awareness among the youth of this country of the purposes, procedures, problems, and accomplishments of the patent and related systems and their relation to our economy and cultural life. These booklets are being distributed to secondary schools in selected areas of the United States and to Foundation members. For the convenience of *Journal* subscribers and others who may not have occasion to see these booklets, we plan to reprint copies, from time to time, in this section of the *Journal.*

The first of these booklets—originally printed in an attractive shade of medium-red with contrasting tones of black and grey—is reprinted below with some changes in general make-up.



THE PATENT SYSTEM ALL AROUND YOU

"... never has youth had such spectacular opportunities to break through the barriers to wonderful new things."

—Charles Franklin Kettering

THE PATENT SYSTEM ALL AROUND YOU

The patent system added the fuel of interest to the fire of genius—*Lincoln.*

WHAT DOES the patent system mean to *YOU?* Stop and think for a minute. Are you interested in rocketry and space travel? Are you a member of a science club? Are you planning to participate in a science fair? If so, like many other young people, you too are striving to improve the nation's resources in fields that are vital in this time of challenge.

Our technology is advancing rapidly today on many fronts. A young person like yourself, interested in science and invention in pioneer areas, may have what Lincoln called the "fire of genius." What he was saying in these words, which appear above the entrance to the Patent Office in Washington, D. C., was that the patent system has stimulated the interest of inventors and others connected with development and commercialization of inventions. This system provides a framework for tomorrow's technology as well as yesterday's and today's.

But suppose you have not been drawn to science at an early age and do not expect to have that "fire of genius." Then perhaps you're wondering, "What has all this to do with me?"

Well, you have friends who may be encouraged by your awareness of things they ought to know. Perhaps this is the way in which *your* fire burns best! Do you listen to the radio? Watch television? Ride in an automobile or plane? Go to the movies? Or perhaps listen to high fidelity recordings? Whenever you do any of these familiar things, you are using inventions that were patented before they were put on the market to serve you. Or, take an electric or safety razor, full-fashioned hose—again you are using patented inventions.

Let us look more closely at these "inventions." The radio is made up of not one, but many complementary inventions, each representing a new idea. Marconi, Fessenden, de Forest, and Armstrong, generally credited with making the

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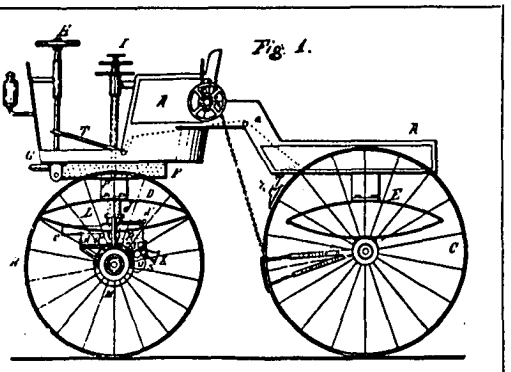


Fig. 1.

G. B. SELDEN.
ROAD ENGINE.
No. 549,160. Patented Nov. 5, 1895.

most important contributions to this field, all employed the patent system to protect their work. (See page 8 for this and stories of other patented inventions.)

Television too developed from diverse sources, and here, also, the patent system played an important role. The modern electronic system of television is based in large part on the work of Vladimir Zworykin and Philo Farnsworth. Inventions in the radio field also contributed to the same stream.

As for motion pictures, Fred Waller, deeply interested in optical physics and the psychology of sight, was largely responsible for Cinerama. But, before him there were important figures laying the foundations, abroad as well as in our own country, and these inventions too were often protected under the U. S. patent system.

The story of inventions never ends. Scientists are continuing to make contributions to these fields and to numerous others. Right now, men and women are working in laboratories developing new ideas that will eventually be patented and commercialized into new products and into new industries.

MANY PEOPLE YOU KNOW

EVEN THOUGH some of you may think that only engineers and other specialists obtain patent protection, you may be surprised to know that many famous amateur inventors have been granted patents. A large number of these are well known to you in other roles. You have heard, of course, of the inventions of Whitney, Bell, and Morse. You may be surprised to know

that patents have been granted to countless other men and women more famous for other accomplishments, for example: Abraham Lincoln, General Pierre G. T. Beauregard, General James E. B. ("Jeb") Stuart, Mark Twain, Lillian Russell, George Washington Carver, Harry Houdini, Secretary of Commerce Lewis L. Strauss, former Senator Ralph E. Flanders, and Hedy LaMarr.

WHY PATENTS?

THIS BROCHURE will introduce you to the purpose of patents: how you get them; what some of the problems are in connection with patents; and tell you some of the accomplishments under the patent system. Future pamphlets will discuss these and other points in more detail.

The story goes back to our Founding Fathers. The Constitution gives Congress the power "to promote the progress of science and useful arts" by giving inventors, for a limited period of time, the exclusive right to their discoveries. You may have read the Constitution without realizing the significance of this eighth clause in Section 8, Article 1—the only place in the Constitution in which "Science" is mentioned. In those days, the meaning of this word was much broader than now.

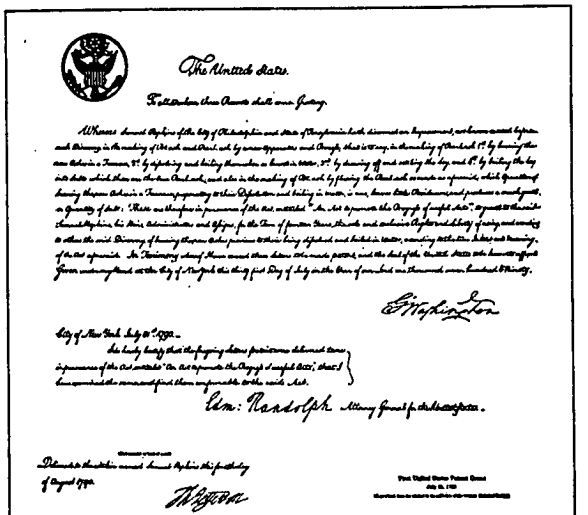
Congress exercised the power granted it by the Constitution and in 1836 instituted the present United States Patent Office which issues all patents for a product or process. Each patent has a life of 17 years. More specifically, a patent is:

(1) an official document
(2) issued by the government
(3) granting the inventor who gets the patent
(4) the right to the patented invention
(5) for a limited number of years

A patent is granted for something "new." The patent is a means to encourage people to think up improvements in the products and processes we use and to create new ones. It also is intended to help introduce goods to the market and to make the ideas available for public information in the records of the Patent Office.

HOW DO YOU GET PATENTS?

INVENTIONS COME from two main sources. Many of our important inventions have been made in the past by independent, or lone, inventors.



THE FIRST PATENT

Equally important ones have come from research laboratories operated by companies. Research is also conducted by colleges, universities, private laboratories, and the government. It is expected that over five billion dollars will be spent by the federal government on research and development in 1959.

Suppose you think you have an invention. If you believe it is new and useful, the first step would be to determine whether it will work and whether it is good enough to sell. No businessman will invest in an invention that he cannot profitably apply.

In the same way that physical property—an automobile, for example—is protected, a patent is property that belongs to the inventor, and the patent laws will prevent others from making, using, or selling the patented invention without his consent. However, when two people independently apply to the Patent Office for patents on the same invention, it is necessary to determine which is the first inventor. Therefore, it is important for each one to keep careful records of the development of his invention.

Before one applies for a patent, a "search" (looking through Patent Office records) should be made to determine whether the invention is really new and has not already been patented. This procedure is usually much less expensive than filing an application which may later be

denied because of the priority of another invention. If, after comparing the patents found in the search with his own invention, the inventor decides he really has found something new, he should, if he has not already done so, engage a patent attorney to prepare a patent application. Only a registered *patent* attorney, a registered agent, or the inventor himself may prepare and file the application in the Patent Office.

WHAT ARE SOME OF THE PROBLEMS CONNECTED WITH PATENTS?

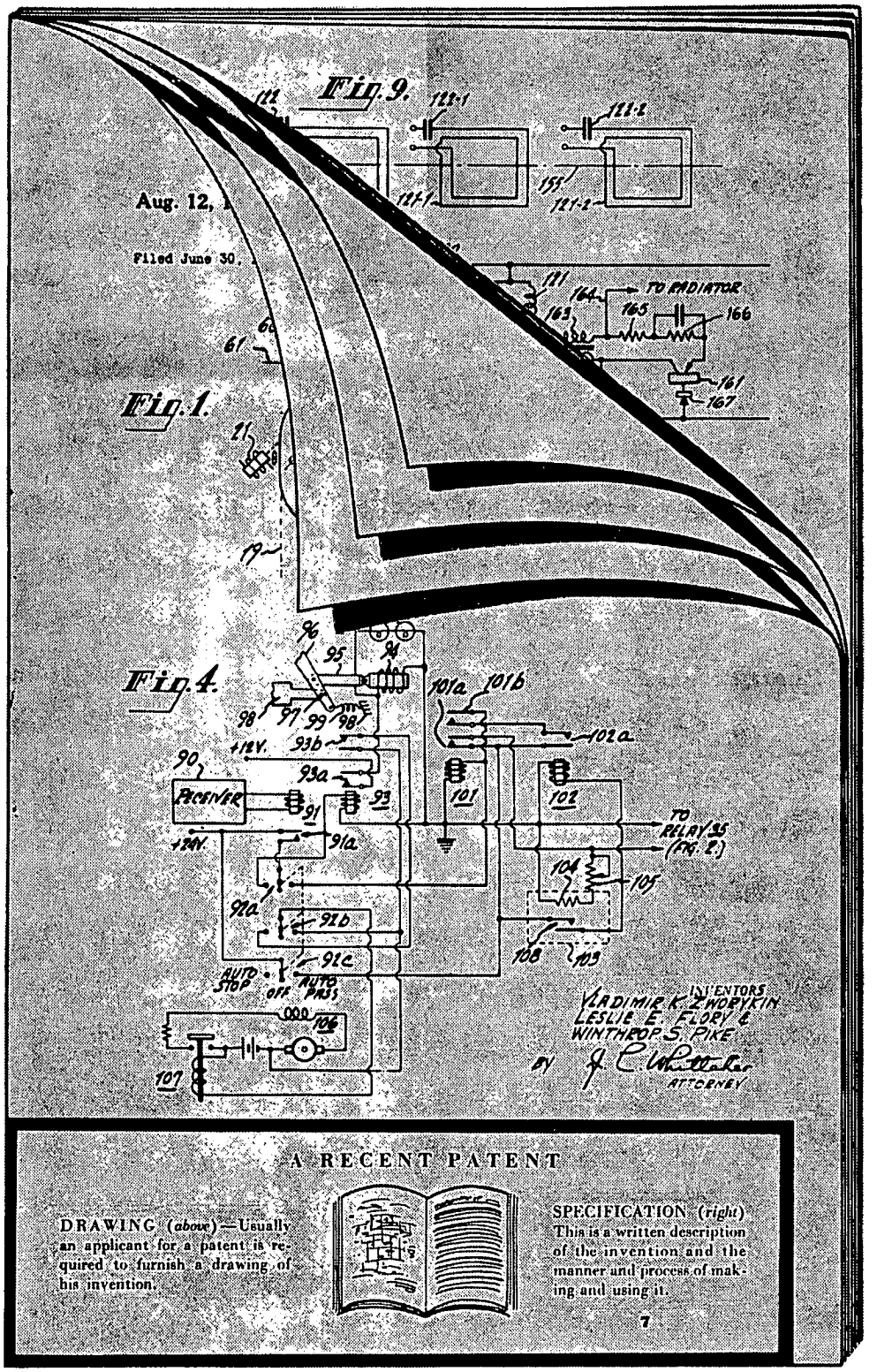
MANY AMERICANS believe that the patent system, through the protection it offers, has stimulated the creation and marketing of new things. They also believe that the system has added to our fund of knowledge in science and other technical fields by setting other minds to thinking and thereby stimulating new ideas which, in turn, are patented. The common belief is that patents have made basic contributions to our progress and prosperity and that they have created jobs, increased incomes, and lowered prices.

These beliefs have been questioned by other people who have called patents "monopolies" that restrain trade, that suppress inventions, favor big business, and that in general hamper the progress of science and useful arts.

These doubts have been expressed in the literature and in the hearings and investigations of various branches of the government. Because of these doubts and the gaps in our knowledge for resolving them, the need for the Patent, Trademark, and Copyright Foundation arises. The major function of the Foundation—like your doctor—is to diagnose, to find out how the system is actually performing, and to give you, the citizens of the country, the facts.

WHAT ARE SOME OF THE ACCOMPLISHMENTS UNDER OUR PATENT SYSTEM?

THERE IS NO question that science and invention have had a direct and important effect on all of us and on everything we do. There is also no question that, in the approximately 170 years of the existence of the patent system, America has steadily advanced to its present position of technological supremacy (Sputnik to the contrary notwithstanding) and from that supremacy our industries have flourished. As a result,



A RECENT PATENT

DRAWING (*above*)—Usually an applicant for a patent is required to furnish a drawing of his invention.

SPECIFICATION (*right*) This is a written description of the invention and the manner and process of making and using it.

7

United States Patent Office

2,847,659

Patented Aug. 12, 1958

AUTOMATIC CONTROL SYSTEM FOR VEHICLES

Vladimir K. Zworykin, Leslie E. Flory, and Winthrop S. Pike, Princeton, N. J., assignors to Radio Corporation of America, a corporation of Delaware

Application June 30, 1954, Serial No. 440,452

39 Claims. (Cl. 180—82)

The present invention relates to a vehicle guidance system, and more particularly to an improved system for automatically guiding an automobile down a roadway, or along a selected route.

The driving of an automobile on modern roads, particularly in traffic, differs greatly from the driving of a vehicle over open terrain. In effect, the driver is obliged to follow a prescribed lane, to hold his speed within close limits, and to maintain a definite spacing with respect to other cars. He is almost as restricted in his choices as the locomotive engineer guiding a train along a railroad track.

It is a general object of the present invention to provide an improved automatic driving arrangement which may relieve the driver of his routine duties whenever his car enters or travels a modern road system.

It is another object of the present invention to provide an improved vehicle guidance system in which dangerous conditions in advance of the vehicle such as another car moving at a slower rate or stalled on the highway, automatically cause a warning or control signal to be transmitted to the following vehicle.

It is still another object of the present invention to provide an improved system in which a vehicle is made automatically to stop or to change its course in response to a dangerous condition in advance of the vehicle.

A further object of the present invention is to provide a vehicle guidance system in which a dangerous condition such as a stalled automobile in one lane of a two or more lane highway system causes a warning signal to be produced which is received by a following vehicle and which causes the following vehicle to steer from the lane in which the stalled vehicle is located to a passing lane and after having passed the stalled vehicle to return to the first lane.

Yet another object of the present invention is to provide an improved automatic automobile guidance system wherein an automobile automatically follows a plurality of different highways or routes in order to travel from one place to another.

The foregoing and other objects and advantages are accomplished in accordance with the present invention which provides an improved system wherein each lane of a path of travel is divided into "blocks" in a manner somewhat analogous to railroad practice and means are provided for indicating to vehicles using the path of travel the presence of occupied blocks ahead. Means are also provided for automatically steering the vehicle along the path of travel and for stopping the vehicle or causing it to change lanes when there is an occupied block immediately preceding it. Each block includes warning or control signal transmitting means, which are actuated by a vehicle passing over or stalled in the block, for transmitting a signal the duration of which is a function of the speed of the vehicle passing over the block.

In a preferred embodiment of the invention, each block may comprise a normally inoperative oscillator and a radiator connected to the oscillator extending along the highway in a direction opposite to that of the direction of travel of the vehicle. Means actuated by a vehicle passing over or stalled in the block are connected to the oscillator for rendering it operative. The result is that as a vehicle passes along the highway it creates behind it a "flying tail" of warning or control signals, the duration and amplitude of which may be made dependent upon the speed of the vehicle. This signal is received in the following vehicle and serves as either a warning or control signal. A steering current cable or transmission line extends along the center of the path or paths of travel. The vehicles are provided with means including a pair of sensing devices for causing the vehicle automatically to follow the steering current cable and to correct the course of the vehicle when it tends to veer from the cable path.

In a path of travel consisting of a plurality of lanes, each of the lanes is provided with its own steering current cable and each cable carries current of a different frequency. Means responsive to the "flying tail" signal may be provided for automatically steering the vehicle from the lane occupied by one steering current cable to the lane occupied by another steering current cable so that a stalled or slower moving vehicle in the path of a following vehicle will be passed by the following vehicle.

In another embodiment of the invention the control apparatus in each vehicle actuated by the "flying tail" signal includes means for controlling the gain of the apparatus as a function of the speed of the vehicle. Thus vehicles moving at higher speeds will receive "flying tail" signals at a greater distance from the "flying tail" signal transmitter than vehicles moving at a slower speed.

The invention will be described in greater detail by reference to the following description taken in connection with the accompanying drawing in which:

Fig. 1 is a diagram of a typical highway layout in accordance with the present invention;

Fig. 2 is a schematic diagram of a vehicle steering control circuit in a typical embodiment of the present invention;

Fig. 3 is a diagram of further details of the steering control system of Fig. 2;

Fig. 4 is a circuit diagram of a typical embodiment of an automatic stopping and passing system of the present invention;

Fig. 5 is a block diagram of a portion of an automatic stopping and passing circuit in accordance with one preferred embodiment of the invention;

Fig. 6 is a circuit diagram of one embodiment of a warning system used in the present invention;

Fig. 7 is a circuit diagram of another embodiment of a warning system;

Figure 8 is a circuit diagram of a third embodiment of a warning system;

Fig. 9 is a diagram of the tuned circuits of the warning systems of Fig. 6–8 showing the position of the coils of the tuned circuits relative to the path of travel of a vehicle;

Fig. 10 is a circuit diagram of a transistor oscillator used in the present invention for transmitting a warning signal;

Fig. 11 is a diagram of different paths of travel for a vehicle;

Fig. 12 is another diagram of paths of travel of a vehicle illustrating means for collision prevention; and

Fig. 13 is a block diagram of a control circuit usable in the present invention.

In the drawing similar reference numerals refer to similar elements.

Referring now to the drawing, and more particularly to Fig. 1, in an automatic vehicle control system in ac-

you and I have benefited by the achievement of a higher standard of living than that existing in any other country in the world. Other countries may excel in one or another branch of technology, but in none has the scope of development been so broad, and in none has science been so comprehensively applied to the improvement of the well being of the ordinary people.

At the beginning of this pamphlet we referred to a handful of inventions. From the many hundreds of thousands of patents that have been granted, these were selected simply because they deal with processes and products of everyday life with which we all are familiar. Although the Foundation is presently engaged in studies on the *actual role* of the patent and related systems (i.e., trademarks and copyrights) in the growth and development of our economy, these few are good examples of what has been accomplished during the existence of the patent system in the United States.

WHY THIS PAMPHLET?

SINCE SO MANY young people are interested in invention, and since world conditions will stimulate greater inventive activity in ever newer fields, the Patent, Trademark, and Copyright Foundation is initiating a program to inform young people about the patent and related systems. This pamphlet, as we explained earlier, is the first of a proposed series. The Foundation has discovered through its research that the public in general is remarkably unaware of the purposes, procedures, problems, and accomplishments under the patent system. Since the future responsibilities of citizenship rest with the young people of today, the Foundation is making a special effort to reach teen-agers.

NOW WHAT?

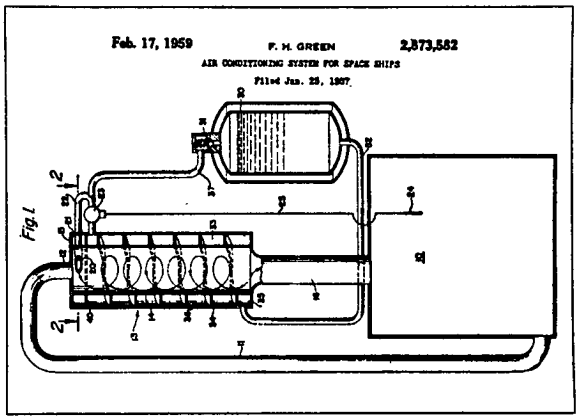
PLEASE LET US KNOW IF YOU have any ideas on what you would like to see incorporated in our pamphlet series and if there are any particular questions you would like to have answered.

SOME INVENTIONS YOU KNOW

Radio

OF THE FOUR GREAT contributors to radio—Marconi, Fessenden, de Forest, and Armstrong—

Armstrong developed the latest important contribution, a system of frequency modulation. E. H. Armstrong was strictly a "solo" operator who preferred to work alone. He held some 48 patents. Even before he commercially employed his own system of frequency modulation, his name was identified with other outstanding developments in radio. Although Armstrong was unable to prove that he was the first to use de Forest's triode tube as a generator of high-frequency oscillation, he independently discovered this use, and was the first fully to explain its operation technically. He also independently developed the super-heterodyne circuit, which he patented and sold to Westinghouse for a substantial sum, and was the first inventor of the super-regenerative circuit. He felt that static could be overcome by frequency modulation, and that he could make it a practical system of broadcasting, even though most broadcasting companies were apathetic. Finally, Armstrong convinced the Yankee Network to build the first frequency modulation station. The system has grown, and now there are many FM stations throughout the world. You may not know it, but an FM system has become standard for the audio portion of television.



Air and Sea Navigation

EARLY MARINERS on the Indian Ocean were guided by the monsoons, which blew from one direction for six months of the year, and from another direction for the other six months. At that time, and for a long time thereafter, the sailor depended on the steering oar. Even early

aircraft employed essentially the same device. As the speed of navigation increased, the time allowed to the navigator for determining direction decreased so greatly that in supersonic flight an unbelievable amount of ingenuity and inventiveness had to be employed. Traveling faster than the human body can react, the pilot must have automatic controls. The era of guided missiles was introduced by the German V-2 rocket, and America has since embarked on the development of supersonic aerodynamics and missile control. Electronic computers, small and light, having fantastic capabilities, have been devised by companies like Autonetics, a division of North American Aviation, Incorporated. Gyroscopes are so delicately balanced that the weight of an eyelash might affect their operation. Metal parts entering into airships, satellites, and water craft have been smoothed to microscopic tolerances thought impossible only a short time ago. Men and women of many nations have contributed to the progress of navigational science, and many patents have been granted. But the space age is only beginning, and dazzling new inventions may be expected.

The Razor

THE HISTORY of mankind may be written in terms of man's beard, which has been used to terrorize enemies, prove manliness, and mark dignity, as well as provide protection from the cold. The man who did most to change the world's face was King C. Gillette. One morning in 1895, while he was shaving with a straight-edge razor, the idea for a safety razor came to him. Eight years later, his razor was introduced to the public. In 1903, the first blades were marketed, but sales were disappointing. Soon, however, the safety razor won wide acceptance, and fourteen years after introduction, razor sales reached over a million, and blade sales over a hundred and twenty million, annually. The Gillette Company credits the presentation to servicemen in 1918 of millions of razors with giving the self-shaving habit to the nation. The company credits the Second World War with teaching men the daily shave habit. Servicemen used over twelve and a half million Gillette razors and over one and a half billion Gillette blades

during the Second World War. The Gillette Safety Razor Company believes that the patent granted Mr. Gillette on his invention in 1904 is the foundation on which the company was built.

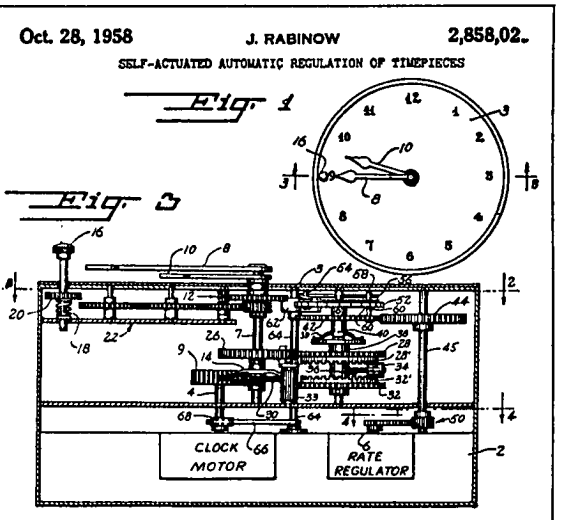
Women's Hosiery

IN THE 16TH Century an English clergyman, Reverend William Lee, was troubled that his wife had to work long hours knitting hosiery to help support their family. He decided to build a machine to help his wife. He spent a number of years at this task and finally devised a knitting frame which, though primitive and manually operated, was able to produce hosiery six times faster than before. Unfortunately, in those days patents were granted in England at the Sovereign's discretion; and the Queen, acting on the theory that the patent might take away jobs, refused one to the Reverend Lee. Consequently, those that followed Reverend Lee had little inducement to perfect his knitting frame, which remained the standard knitting machine for nearly three centuries. In the 19th century, under a more enlightened patent policy, an Englishman, William Cotton, improved the Lee machine. In 1864 he was granted patents in the United States and England covering a power-driven, semi-automatic machine. At the beginning of the present century all full-fashioned hosiery knitting machines used in this country were imported from Europe. In 1952, Henry Jannsen and Ferdinand Thun, founders of Textile Machine Works, operating a small machine shop in Reading, Pennsylvania, designed a new and improved machine on which they were issued a patent. Their machine had a production capacity approximately one hundred times that of Reverend Lee's knitting frame. The present machine used in the United States is a complex mechanism and incorporates the subject matter of innumerable patents.

Gasoline

GASOLINE IS THE biggest income yielder of all the products derived from a barrel of crude oil. By means of refinery processes which crack, or break up, the crude petroleum, the amount of gasoline obtained was raised to approximately 50%. Researchers later found that cracking oil

in the presence of a catalyst, a substance which affects the reaction without itself being permanently changed, produces a gasoline of greater improved quality. But the catalyst became contaminated with deposits which could not very readily be removed. Some years ago a method was developed to regenerate one of these catalysts. The procedure was commercialized and patents were obtained to cover it. However, the process was quite expensive, and the Esso Research and Engineering Company then came up with the entirely new and economical "fluid catalytic cracking" process. According to the reports of the researchers, this process is based on an extremely unusual state of matter—solid particles mixed with a little gas acting partly like a liquid and partly like a gas. This process was patented and put into commercial use. Similar techniques are applicable to other fields of production, such as metallurgy.



This invention relates to the automatic regulation of timepieces and has for its primary object the improvement of means for automatically regulating the timepiece solely by the recurrent act of setting the hands to the correct time without any other adjustment or the necessity of an act of judgement by the user.

Rubber Tires

THE UNITED STATES was dependent upon sources for natural rubber before World War II in the Far East, South America, and Africa. With the

outbreak of the war, it became clear that a rubber substitute would be essential. Although synthetic rubber had already been made by a number of methods, it was expensive, and the product was relatively unstable. One of the chief weaknesses of natural rubber was that it tended to dry out and crack on exposure to sunlight or oxidizing agents. Thus, for the purposes of the war, a better rubber than natural rubber was needed. Robert Thomas and William Sparks, working for Esso Research and Engineering Company, discovered that a new process for building up giant molecules from a chemical derived from petroleum could be modified by a small amount of another chemical, one of the building blocks of natural rubber. The resulting material, which could be vulcanized and had rubber-like properties and greater chemical stability, was butyl rubber. Patents were obtained on the new rubber, the new process of synthesis, and the special equipment that was needed to handle the very low temperatures required for building up the giant molecules. Many difficult problems had to be worked out such as ways to handle the sticky material without clogging the apparatus. This was done and the results were patented. The process was turned over to the United States Government for important uses in the conduct of the war. It was discovered that butyl rubber was a better material than natural rubber for holding air in an inner tube. Butyl rubber is used for electrical insulation, shock absorbers, window seals, and rubber tires.

THE
PATENT, TRADEMARK and COPYRIGHT
FOUNDATION

THE
GEORGE WASHINGTON
UNIVERSITY
WASHINGTON 6, D. C.

BOOKLET 1

ANNOTATED BIBLIOGRAPHY

Recently Published or Reported Material Related To The Foundation's Work

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Since 1954 Fortune Magazine has been publishing "The Fortune Directory of the 500 Largest Industrial Corporations." The 500 largest companies are ranked according to the volume of sales, total assets, net profits, invested capital, and the number of employees. This particular editorial analyzes the shifts, and points out that there is much fluidity in this top layer of American corporations. A significant number of companies making the grade in one year are displaced by others in succeeding years.

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NOTES

Frank A. Howard Receives Kettering Award

Frank A. Howard, New York research consultant and President of the Sloan-Kettering Institute for Cancer Research, will receive the 1959 "Charles F. Kettering Award for Meritorious Work in Patent, Trademark, and Copyright Research and Education." The award, which is presented annually by The Patent, Trademark, and Copyright Foundation of The George Washington University, is given for outstanding work in the field of patent, trademark, and related areas.

The late Dr. Kettering, in whose honor the award is named, was a member of the Advisory Council of the Foundation. Dr. Kettering was one of the six national leaders in research who were named Honorary Members of the Foundation at its inception, and he aided in its formal establishment in 1954.

As the recipient, Mr. Howard will receive an honorarium and an appropriate citation. The presentation will be made at the fourth Annual Public Conference of the Foundation, to be held June 16, 1960 at the Mayflower Hotel in Washington.

Mr. Howard holds two degrees from The George Washington University, Bachelor of Science in Mechanical Engineering (1911) and Bachelor of Laws (1914). From 1919 to 1944, he was President of the Standard Oil Development Company, which under his leadership became one of the leading technical organizations in the industrial world. Both as a research executive and inventor, he has made outstanding contributions to the development of oil refining processes and to the production of tetraethyl lead, petroleum chemicals, and synthetic rubber. Over 90 patents have been granted to Mr. Howard. He served as Vice President of the Standard Oil Company of New Jersey from 1940 to 1945.

In 1945, Mr. Howard founded at The George Washington University the annual Howard Lectures for engineering students, a series which has brought outstanding industrial leaders to the University to give students pertinent information about opportunities in industrial research.

Mr. Howard is a Director of the Ethyl Corporation and the Minerals and Chemicals Corporation of America; he is a trustee of The George Washington University, the Memorial Cancer Center in New York, the Woods Hole (Massachusetts) Oceanographic Institution, and the Alfred P. Sloan

Foundation. He is a member of the American Institute of Mechanical Engineers, the American Association for the Advancement of Science, the American Chemical Society, the American Patent Law Association, and the Society of Automotive Engineers.

Final selection of Mr. Howard to receive the Kettering Award was made by a five-man Board of Review of the Foundation: O. S. Colclough, Director of The Patent, Trademark, and Copyright Foundation and Acting President of The George Washington University; L. James Harris, Executive Director; Willard C. Asbury, Chairman of the Advisory Council and Vice President of Esso Research and Engineering Company; John C. Green, Executive Director of the National Inventors Council, Department of Commerce, representing the Research Staff of the Foundation; and Fulton B. Flick, of Brown, Critchlow, Flick, and Peckham, Pittsburgh, Pennsylvania, representing the Foundation's National and Area Committees.

The Award has been presented twice before, to S. Chesterfield Oppenheim, Professor of Law at the University of Michigan, for the year 1957; and to United States Commissioner of Patents, Robert C. Watson, for 1958.

Fourth Annual Public Conference

The Foundation's fourth Annual Public Conference will be held on Thursday, June 16 and Friday, June 17 at the Mayflower Hotel in Washington, D. C. Registration will begin at 10:00 a.m. and continue until 1:30 p.m. on June 16.

The Conference program opens at 1:30 p.m. with "Foundation Research Reports," consisting of two sessions. The first of these sessions will feature "A Panel Discussion of Findings." An innovation this year, the panel will highlight the findings of the Foundation's studies and give our investigators, who are drawn from different disciplines and professions, an opportunity to review the findings for projects for which they do not have primary responsibility—and also permit those in attendance the opportunity to participate. This intellectual cross-fertilization should prove stimulating and productive. The panel will be moderated by the Adviser on Research, Professor S. Chesterfield Oppenheim, and consists of the Foundation Director, Executive Director, Principal Investigators, and representatives from our Advisory Council. From 4:30 p.m. to 5:15 p.m. a "Brief Discussion of New Studies" will be presented by several of the researchers engaged in them.

At 7:30 p.m. a reception will be held, followed by a dinner at 8:30 p.m. during which the Charles F. Kettering Award for 1959 will be presented by Director O. S. Colclough. The recipient, Frank A. Howard, President of the Sloan-Kettering Institute for Cancer Research, will deliver the acceptance address.

On Friday morning, June 17, a "Special Session Devoted to Discussion of Current Issues" will be held. These issues will be presented by a panel of experts selected to represent some of the best thinking of the various fields in which we are interested. This has always been a provocative session and the maximum participation from the floor will be encouraged.

Please place these dates, June 16 and 17, 1960, on your calendar, and plan to attend the Foundation's fourth Annual Public Conference. Advance registration forms will be distributed shortly. More detailed information and a copy of the program will be available at a later date.

Note on a Study of Patents in Mining

Paul W. McGann*

A study of the role of patents in operations of mining and related companies has been initiated as part of Project 3b.** A questionnaire survey is being designed to provide the information for formulating and testing hypotheses concerning this role. A few tentative observations are offered in the paragraphs that follow.

A first impression gained from the literature on technical and economic aspects of the mining industry is that most of the pertinent patents are held by outside interests. In this respect, the mining industry resembles construction and agriculture; but, in the latter, of course, there is considerable scope for the origin and use of product patents (i.e., for varieties of vegetables and flowers).

The substantial technological progress that has taken place over the past half century in mining has apparently depended to a much greater degree on patents held by manufacturers supplying the mining and mineral concentration industries than upon patents held within these industries.

Thus, machinery manufacturers have most of the effective patents on mining equipment and on crushers, classifiers, and other types of concentrating equipment. In the field of supplies and explosives, nearly all the patents used are owned by suppliers of these products; and the same is true in the case of flotation and other concentrating chemicals.

The process patents developed and owned by mineral producers tend to be specialized for use only in connection with certain types of ores. The major apparent exception is in the field of mineral refining, where many important processes are protected by patents owned by the mineral refining companies; but this is not really an exception because refining is a manufacturing, not a mining, industry. (It should be noted in passing, however, that professional employees of mining machinery companies and of mineral

* Research Associate of the Foundation and Chief Economist, U. S. Bureau of Mines.

** Dr. Irving H. Siegel, Staff Member of U. S. Council of Economic Advisers, serves as Consultant on this project.

refining companies with major mining operations, regard themselves as associated with the "mining industry.")

Many reasons come to mind which would explain the relatively limited control of patents by companies engaged in mining, but three are outstanding. The first is the essential constancy of the products of the mining industry—namely, refinable ores, concentrates, and usable prepared minerals. (Insofar as these are products of the mining industry, they have not yet undergone chemical or thermal treatment or transformation, which may occur at later stages classified as parts of manufacturing industries. Thus, smelting and alloy preparation are manufacturing, not mining, activities.)

The second reason is that the basic raw material for such products is variable—both chemically and in respect to conditions of occurrence in nature. The third reason, and the most important one, is that mining patents originating with mining interests are generally sold or licensed, for purposes of commercial exploitation, to manufacturers of mining equipment or supplies. Such manufacturers are in a position effectively to promote the use of the patents by other mining companies, but the patent-originating mining companies are not. Indeed, an originating company would have to enter the mining equipment or supplies business if it wished to exploit its own patents; and it would have to do so without a full line of products and under other adverse circumstances.

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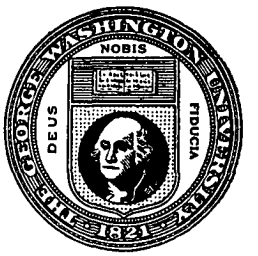

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THE CONFERENCE

THE ANNUAL PUBLIC CONFERENCE is the occasion for the presentation and discussion of the research findings of the Foundation, and discussion of current issues important in the fields of the Foundation's interest from which the Foundation itself may derive guidance on the planning of its future work. The Conference also provides an opportunity for people from different branches of learning and fields of endeavor, who have a common interest in the patent and related systems, to meet and enlarge their perspectives by participating in the stimulating and productive exchanges and contacts of the Conference.

In attendance at the Conference are key representatives from the different fields of activity throughout the nation: commerce, education, science, manufacturing, labor, finance, and the professions.

The proceedings of the third Annual Public Conference are published in this issue of *The Patent, Trademark, and Copyright Journal of Research and Education.* This issue contains (1) a summary; (2) an edited transcript of the proceedings, which includes research developed by the staff of the Foundation up to the date of the Conference, comments on this research and on current issues by qualified discussants, and questions from the floor and answers; and (3) appendices to the proceedings.

When discussants are invited to participate in the Conference, they are, of course, assured that they will be free to make whatever remarks they wish, either as individuals or as members of the organization with which they are associated. Their remarks include both comments bearing directly on the staff reports and on various aspects of the patent and related systems.

A Summary of the Proceedings

I. WEDNESDAY EVENING SESSION

THE THIRD ANNUAL PUBLIC CONFERENCE was inaugurated with a dinner in honor of Robert C. Watson, United States Commissioner of Patents, 1958 recipient of "The Charles F. Kettering Award for Meritorious Work in Patent, Trademark, and Copyright Research and Education."

Commissioner Watson, in his acceptance address, paid tribute to the late Dr. Kettering for his outstanding inventions and for his abiding interest in and service to inventors and the patent system.

The Commissioner talked about the role of the Patent Office in disseminating information with respect to patents and the workings of the patent system in an attempt to fully inform all. He expressed the belief that as the nations of the world become more closely associated, the widely varying patent systems will tend to become more uniform. He pointed out that the number of international agreements dealing with industrial property are on the increase and stressed the advantage to all countries of the rapidity with which the patent offices of the world transfer technological information from country to country. He referred to trends in the world today which bear watching, such as the four Scandinavian countries which are endeavoring to reach an agreement on a single patent to be operative in them all; the European Common Market Treaty, which would seem to necessitate some changes in the patent laws of member countries; Russia and the Iron Curtain countries, which are giving careful consideration to what we do; and the newly-formed Association of the Heads of National Industrial Property Departments.

At the conclusion of his address, the Commissioner presented to the Foundation a handsomely framed reproduction of the first patent granted by the United States.

II. THURSDAY SESSIONS

Dr. Lawrence R. Hafstad, former Chairman of the Advisory Council, and Vice President in Charge of Research, General Motors Corporation, was moderator of the Thursday general sessions of the Conference. Dr. Hafstad introduced Director O. S. Colclough who spoke of the Foundation's developing educational program; the Adviser on Research, Professor S. Chesterfield Oppenheim, who discussed the overall research program; and Executive Director L. James Harris who presented details of the day-to-day research and educational activities. All three emphasized the need for increased financial support.

PRICING, ANTITRUST, EUROPEAN COMMON MARKET, AND OTHER PROBLEMS IN FOREIGN LICENSING

Report presented by J. N. Behrman and Wilson E. Schmidt

Discussants: Joseph S. Cardinale, Momsen & Freeman, New York
Paul N. Weil, *President,* Pegasus International Corporation, New York

Dr. Behrman discussed some recent quantitative information showing the distribution of licensing agreements held by U. S. licensors with foreign subsidiaries, affiliates, and independent companies. Dr. Schmidt covered certain aspects of the pricing of licenses: whether or not research and development costs should be included in determining the minimum acceptable royalty; whether running or fixed royalties provide greater revenues; and exclusive versus non-exclusive licensing.

Mr. Cardinale discussed the nature and extent of the application of the U. S. antitrust laws in the foreign operations field. He felt the ever widening scope and aggressive enforcement of these laws by the Department of Justice and the effect of recent court decisions without due regard for the peculiar circumstances in the international field require a reappraisal of present policies with respect to U. S. trade abroad. He queried whether identical criteria can be used in the domestic and foreign fields to determine restraint of trade or a conspiracy to monopolize trade. He set forth tests used by U. S. courts in determining whether antitrust violations exist in the foreign field and discussed the problem with respect to their application. Mr. Weil examined the impact of the Common Market on opportunities to license in Europe.

TAX PROBLEMS OF THE INDIVIDUAL INVENTOR

Report presented by John F. Creed and Robert B. Bangs

Discussants: Scott P. Crampton, Prince, Taylor & Crampton, Washington, D. C.
Roscoe L. Egger, *Manager,* Tax Department, Price Waterhouse & Company, Washington, D. C.

Mr. Creed discussed the taxation of patent transfers by individual inventors. He considered principally the problems which have arisen under the new legislation, Section 1235 of the Internal Revenue Code of 1954, relating to allowance of capital gains on patent dispositions. Dr. Bangs summarized the results of a recent survey conducted by the Foundation regarding the tax experience of individual inventors. He concluded that Section 1235 has had as yet only a limited impact on the pattern of patent exploitation by inventors.

Mr. Crampton identified several interpretive problems under the new statute which will probably require judicial clarification. Mr. Egger explored the practicability of qualifying employee-inventors under Section 1235 and commented generally on the opportunity for corporations to expense currently the cost of patents acquired under royalty arrangements.

PATENT AND OTHER FACTORS IN THE CREATION AND GROWTH OF SMALL FIRMS: PRELIMINARY SYNTHESIS

Report presented by Irving H. Siegel

Dr. Siegel discussed, under three headings, the findings of the industry studies on the role of patents among other factors in the creation and evolution of small

firms. He dwelt most on his first major topic—the significance assigned by small firms to patents and other technical knowledge and to such factors as adequate financing and capable management. His second major topic concerned the interrelation of firms, particularly the interdependence of large and small companies. The third main heading dealt with the relations of Government to small business.

"Small business" remains a hardy category despite the technical and financial difficulties experienced by individual firms. In the industries studied thus far, small companies seem to rely to a limited degree as a rule on owned or licensed patents, but are unequivocal in attributing great importance to unpatented or unpatentable know-how. It appears that, as companies increase in size and market potential, they develop greater interest in the creation and protection of technical knowledge through patents and trademarks. Relatively few small companies conduct formal research programs. Some take advantage of opportunities to establish mutually beneficial relations with large companies. New legislation, established government programs, and Congressional vigilance already provide, and promise to extend, encouragement of activity by small companies on the expanding technological frontier.

VARIATIONS IN PATENT UTILIZATION BY DIFFERENT TYPES OF COMPANIES

Report presented by Joseph Rossman and Barkev S. Sanders

Salient findings from completed questionnaires have been incorporated in six interim reports. These reports, dealing with different aspects of patent utilization, have been published in *The Patent, Trademark, and Copyright Journal of Research and Education.*

Although the focal point of the patent utilization study is to determine empirically the proportion of patented inventions used in industry, the study sheds light on many related aspects of the role of patents in the economy. The latest analysis relates utilization of patents to companies ranked according to their patent portfolio and financial assets. The analysis shows that among companies with assets of $100 million or more, irrespective of the size of the patent portfolio, and companies with portfolios of 75 or more patents, about 50% of the patented inventions are used. The corresponding percentage of use for companies with less than 75 patents and assets of less than $100 million is 75. The economic impact resulting from the use of the patent is also greater in the latter group. The analysis further shows that acquisition of patents subsequent to issuance is much higher among the companies with smaller assets and small patent portfolios.

COMPULSORY LICENSING AND COLOR MOVIES: EFFECTS OF TECHNICOLOR AND EASTMAN ANTITRUST DECREES

Report presented by S. Chesterfield Oppenheim and George E. Frost

Discussants: Theodore A. Groenke, Snyder, Chadwell, Fagerburg & Keck, Chicago
Frederick M. Rowe, Kirkland, Ellis, Hodson, Chaffetz & Masters, Washington, D. C.

The report on Project 4a was devoted to discussion of the effects of the Technicolor and Eastman antitrust decrees. The Foundation investigators reported that, in their judgment, technical competition is the most important impelling force to the continued technical progress of the professional motion picture film

industry. They express the conclusion that no antitrust decree is likely to be as effective in compelling the prompt introduction of improvements as the existence of a competitor ready and willing to offer such improvements. They further indicate that to the extent patent rights give rise to such competition they provide a most important stimulus to technical development.

Mr. Groenke emphasized the difficulties of assigning casual connections in a report such as that presented and the futility of attempting to frame either patent law or antitrust law policy which anticipates bringing about some certain result. He suggested that in a free enterprise society, resort must be made to the assumption that no individual can lay down a rule or attempt to regulate a complex situation successfully, and that this philosophy must be applied both to the patent laws and the antitrust laws. Mr. Groenke noted that the experience of the antitrust case itself has an important and immeasurable influence on the conduct of defendants.

Mr. Rowe pointed out that the report highlighted the importance of aggressive research and technology as an element of competition. He noted that the fruits of competition in the professional color film industry were not the result of price-cutting by numerous suppliers of an identical product, but rather, were the result of aggressive development and marketing of new products. He pointed out that in this setting, conventional antitrust thinking places too much emphasis upon the element of price and too little on the role of managerial talent and technical drive. Mr. Rowe noted that the provisions of antitrust decrees are not useless, but too much should not be expected from antitrust enforcement and antitrust decrees. As a possible solution to the problem, Mr. Rowe referred to the suggestion that antitrust decrees be made self-liquidating in periods of ten or fifteen years.

SPECIAL SESSION DEVOTED TO DISCUSSION OF CURRENT ISSUES

Moderator: John C. Green, Consultant to the Foundation.

Speakers: Donald L. Brown, *Vice President,* Polaroid Corporation, Cambridge, Massachusetts
Henry E. Ford, *Director of the Development Department,* E. I. du Pont de Nemours & Company, Wilmington, Delaware
David S. Kane, Kane, Dalsimer and Kane, New York
Colston Warne, *Professor of Economics,* Amherst College, *President,* Consumers Union of the United States
Wallace Waterfall, *Secretary and Treasurer,* American Institute of Physics, New York

Mr. Brown presented a case history of the growth and development of the Polaroid Corporation with special reference to the effect of the patent system, first upon the individual inventor, then upon the small company, and finally on the larger company which uses the patent system to maintain its position in the industry.

Mr. Ford discussed the problems of a research-oriented corporation in dealing with the outside invention. He considered the public relations aspects and the legal hazards involved. He also took up such problems as the financial value of the submitted invention.

Mr. Kane spoke about the adequacy of the patent system for the current needs

of our economy, with emphasis on the day-to-day patented inventions. He was interested in whether inventors, the people who deal with inventions, and society in general were being properly and efficiently served by the patent system. Mr. Kane deplored the negative attitude of the courts toward patents and pointed out the means other than litigation under the patent statutes that inventors are turning to to protect their inventions.

Dr. Warne expressed his misgivings with respect to certain phases of the patent process. His first misgiving involved the failure to provide administrative facilities adequate to cope with the growing technical problems with which the Patent Office must contend, resulting in the "bogging down" of the system with a host of items which represent no genuine invention. Another misgiving related to his belief that the courts have not gone far enough in reducing contractual restraints based on patents which have impeded competition in industry. A third misgiving lay in the confusion created for the consumer by which a product can be protected under different brand names. A fourth misgiving referred to the standardized 17-year period of patents. A fifth related to the cost to the American consumer of government-financed research. He suggested the possibility of public prizes for solutions to major problems, rather than patent rights. Finally, Dr. Warne suggested that the Foundation dedicate some of its energies to these problems from the standpoint of the consumer.

Dr. Waterfall brought to the attention of the Conference the serious copyright situation of scientific societies, resulting from the growing tendency of librarians and others to photocopy parts of journals. These societies feel this may eventually adversely affect subscriptions.

The Proceedings of the Conference

Wednesday Evening Session

WHAT THE PATENT SYSTEM MEANT TO A GREAT AMERICAN AND SOME THOUGHTS ON ITS CHANGING INTERNATIONAL ROLE

ROBERT C. WATSON

AN ADDRESS DELIVERED by Robert C. Watson, United States Commissioner of Patents, at the award dinner of the Annual Public Conference of the Foundation on June 24, 1959. Commissioner Watson received the Foundation's second "Charles F. Kettering Award for Meritorious Work in Patent, Trademark, and Copyright Research and Education."

LAST YEAR the recipient of the Kettering Award, Professor Oppenheim, delivered a very learned address upon a legal subject of great difficulty, but with the intricacies of which he is altogether familiar. It was an excellent presentation and much appreciated by the many lawyers who heard it. At that time Dr. Kettering, a staunch supporter of the Patent System and in whose name this Award is made, was in good health and quite active for a man of his years.

Upon this occasion, following as it does the death of Dr. Kettering last November, it is in order, I believe, to give some brief account of his life-long interest in invention and of his views of the importance to us all of the Patent System of the United States.

As we all know, Dr. Kettering was a man of many interests. Equipped with an inquisitive disposition, a brilliant mind, and a natural mechanical aptitude, he became a member of many important groups. In 1940, when the National Inventors Council was first formed, he became its Chairman and continued to hold this office until the time of his death. I met him for the first time when I became a member of the National Inventors Council in 1953 and always enjoyed hearing him set forth his views in his strikingly distinctive manner.

One of the last things which he did was to participate in a meeting of that Council in Dayton, Ohio, last November, just ten days before he died. Under Dr. Kettering's guidance the Council served most usefully during the last war in bringing inventors and responsible officials of the Department of Defense into contact, all for the purpose of perfecting our war machine. It has continued to serve in times of peace, and it was with sorrow that the members of the Council learned of Dr. Kettering's death.

Just how many inventions were made by Dr. Kettering during his lifetime, I do not know, but his name appears as inventor upon 186 United States patents, so he must have made a substantial number. He first secured quite a few patents for inventions in cash registers, then moved into the field of ignition systems for explosion motors or internal combustion engines, next worked out the first practical engine starting device (self-starter), then improved the household type of refrigeration apparatus. His last patents were for humidity control devices,

and there was a span of nearly 48 years between his first cash register patent of 1909 and the humidity control patent of 1956. Also, in the intermediate years he developed, sometimes with his associates, antiknock fuels, pumps, engines, ventilating systems and made many other inventive contributions, all of most practical character.

Without doubt Dr. Kettering would have made some inventions even if no reward in the form of patents or other compensation awaited him for so doing. With his kind of mind he could not have avoided innovation. It is reasonable to conclude, however, that he would not have made very many without the benefit derived from the operation of the patent system, because, if patents had not been available, the vital question of financing could not have been successfully dealt with.

At one time he deposited all of his patents in a bank as security for a loan, together with other assets, and if no loan had been forthcoming, his work in developing the self-starter for automobiles would of necessity have been interrupted, perhaps permanently abandoned. Research and development activities are costly, and income from patents is, in the case of an inventor or research group, necessary to support that effort.

In the year of 1941 President Roosevelt, by Executive Order, created the National Patent Planning Commission and made Dr. Kettering Chairman. In its final report the Commission set forth these findings, among others:

> The American patent system established by the Constitution giving Congress the "power to promote the progress of science and useful arts," is over 150 years old. The system has accomplished all that the framers of the Constitution intended. It is the only provision of the Government for the promotion of invention and discovery and is the basis upon which our entire industrial civilization rests.
>
> The American people and their Government should recognize the fundamental rightness and fairness of protecting the creations of its inventors by the patent grant. The basic principles of the present system should be preserved. The system has contributed to the growth and greatness of our Nation; it has—
>
> (1) Encouraged and rewarded inventiveness and creativeness, producing new products and processes which have placed the United States far ahead of other countries in the field of scientific and technological endeavor;
>
> (2) Stimulated American inventors to originate a major portion of the important industrial and basic inventions of the past 150 years;
>
> (3) Facilitated the rapid development and general application of new discoveries in the United States to an extent exceeding that of any other country;
>
> (4) Contributed to the achievement of the highest standard of living that any nation has ever enjoyed;
>
> (5) Stimulated creation and development of products and processes necessary to arm the Nation and to wage successful war;
>
> (6) Contributed to the improvement of the public health and the public safety; and
>
> (7) Operated to protect the individual and small business concerns during the formative period of a new enterprise.
>
> The strongest industrial nations have the most effective patent systems and after a careful study, the Commission has reached the conclusion that the American system is the best in the world. However, as with any system of long standing, conditions arise which were not foreseen at the time of its establishment. The American patent system should be adjusted to meet existing conditions without destroying its basic principles.

I know of no better single statement than that which I have just read which has ever been made in support of our system of granting patents to meritorious inventors, and you will observe that each of the points made by the Commission was one stressing the value of the operation of the system to the public generally,

instead of being one primarily intended to benefit the inventor.

Dr. Kettering's interest in our Patent System was not a selfish one, conceived to be a means by which he might enrich himself. Upon one occasion he said: "I am for the double profit system, a reasonable profit for the manufacturer and a much greater profit for the customer."

Actually the Patent System is a double profit system in which the inventor, if his contribution to the arts is acceptable, receives a substantial profit, but the benefit to the public must inevitably be much greater. This is clear inasmuch as the patent in and of itself makes no profit for the inventor or anyone else. It is the manufacture and sale of the patented product, or the practice of the invention in some other manner if it is not a product, which results in profit to the inventor. If the public puts its seal of approval upon the new thing or method, the inventor will profit as a matter of course because the public will be glad to pay both manufacturer and inventor. In any event, where patents are concerned, there must in every case be this double profit which Kettering announced to be his system, and the first to profit must be the public.

We are indebted to Dr. Kettering for many things in addition to the inventions which he made and which have added so greatly to our comfort. The sound practical advice which he gave to young ambitious engineers and to the boards and groups of which he was a member will be missed. We are indebted to him for his deep interest, since 1950, in The Patent, Trademark, and Copyright Foundation of The George Washington University.

The Patent System as we know it in this country provides the incentive, the encouragement, which must be necessarily held out to one who has the capacity to invent in order to encourage him and, in many cases, to make it possible for him to spend the time and treasure which must be expended in the development of an invention. The system which we have of rewarding inventors in this nation is the fairest and most democratic of all systems ever devised for the reward of persons who contribute to the advancement of what we call "the useful arts."

The patent which he receives from the Patent Office establishes the place of the invention in the scheme of things with great particularity, and the inventor's reward is in most cases directly proportionate to the value of his contribution. If he has made a pioneer invention which the public wants, his return is great. If he makes a minor contribution, his return is correspondingly less. Our Patent System contemplates the encouragment of inventors who contribute to the welfare of the people in all kinds of ways and not only those persons who have made outstanding scientific breakthroughs. Its offer extends to every person on earth regardless of race, color, creed, or nationality, and United States patents are issued to persons located in practically every country, although by far the greater number are issued to nationals of the United States—as might be expected.

It was not long after the Constitution was adopted that the first Patent Law was enacted, this taking place in the year 1790, and in a message at that time to Congress by President George Washington, he stressed the desirability of effecting: "The advancement of agriculture, commerce and manufactures by

all proper means," and "* * * the expediency of giving effectual encouragement as well to the introduction of new and useful inventions from abroad as to the exertions of skill and genius in producing them at home, * * *."

Since 1790 we have not been without a patent law, although it has been modified from time to time, and as lately as 1953.

The Patent System was, as I have already pointed out, found by the National Patent Planning Commission to have stimulated American inventors to originate a major portion of the important industrial and basic inventions during the period of 150 years preceding its report in 1943. The inventors who were early patentees were not mentioned by name but we remember offhand many of them, for instance: Eli Whitney, who invented the cotton gin; Cyrus McCormick and the harvester; Elias Howe, who invented the sewing machine; George Westinghouse and the air brake; Alexander Graham Bell, who obtained many patents mainly directed to the electrical transmission of sound (the telephone); the Wright Brothers, who in 1906 patented the flying machine; Goodyear and the vulcanization of rubber; de Forest's amplifying tube; the Sholes' typewriter; Mergenthaler's linotype; Edison, with his electric lamp and a thousand other patented inventions, and many other great inventors of the past.

Inventions of the present day are more complex than those of past years, as might be expected. As basic research results in the discovery of more and more fundamental truths of nature, applied research, which follows very closely, develops ways and means for usefully employing those fundamentals to supply human desires. Patents are issued for such ways and means, and capital, with the patent to protect it, exerts itself to supply the public and, incidentally, make a profit. The economy is, because of this, maintained in a flexible condition. Something new is added every day and the older things are steadily improved.

All this is in the public interest in that it elevates the industrial base upon which our standard of living rests and which determines our capacity to defend ourselves. Khrushchev announced several months ago that industrial production of Russia would exceed that of the United States by 1970, and we have the spectacle of China, where every possible effort to speed up production of goods and services is being made. Only passage of time will make clear whether Khrushchev's prophecy was justified or not but, in any event, this is no time for us to relax. No person who can take part effectively in the technological race in which we are presently engaged should lack incentive to contribute what he can, and the Patent Office is doing everything possible to disseminate information with respect to the patent and the workings of the Patent System in an attempt to fully inform all.

All of the major industrial countries of the world have patent systems, each such system being adapted to the economic needs of the home country. In some countries patents are refused for subject matter which we in this country consider to be patentable, and the habits and customs of the people, and the state of industry, have apparently directed the adoption of provisions which we view with impatience. The patent laws of this country, we firmly believe, are the best of all, but when we say this, we must recognize the fact that we have foremost in

our minds our own economic needs and not the economic problems of the other patent-issuing countries.

However, as the world shrinks and all countries become more closely associated with each other in every respect, the various systems of rewarding meritorious inventors will no doubt tend to become more uniform in character.

President Eisenhower has observed many times that the world is growing smaller rapidly. In his recent remarks to a group at the State Department's Foreign Service Institute, he said:

> What we call foreign affairs is no longer foreign affairs. It's a local affair. whatever happens in Indonesia is important to Indiana. Whatever happens in any corner of the world has some effect on the farmer in Dickinson County, Kansas, or on a worker at a factory.

The number of international agreements which deal with industrial property are on the increase, and it seems to be likely that this trend will continue when it is kept in mind that the inventor, wherever he may be, contributes to the welfare of all peoples and not only to the enjoyment of his own countrymen. George Washington recognized this when he advised Congress in 1790 that one purpose of the then-proposed patent law was to attract foreign inventors. In fact, the patent offices of the world together bring about the transfer of technological information from country to country very much more rapidly than this information would otherwise be conveyed, to the advantage of all countries.

There are trends in the world today which bear watching.

For instance, the four Scandinavian countries are endeavoring to reach an agreement which, if brought into being, will cause a single patent to issue in one country to an inventor for an invention which he made in that country; the patent, however, to be operative in the other three countries also. This would be a radical departure from the present nationalistic habits of granting rewards to inventors, the patent being effective in the home country only. The European Common Market Treaty would seem to necessitate some changes in the patent laws of the member countries. Russia and the Iron Curtain countries, areas in which industry is owned by the state, have their own methods of rewarding innovation, but are nevertheless giving careful consideration to what we do here and what is being done in other countries of the Free World.

The Heads of European Patent Offices have an association which meets frequently for the purpose of working out common problems and, at the recent international conference in Lisbon for the purpose of revising the Paris Convention, or International Convention for the Protection of Industrial Property, a further association was brought into being, i.e., a truly international association—known as the "Association of the Heads of National Industrial Property Departments"—of the heads of Patent Offices which will include the heads of Patent Offices located in the Americas as well.

Perhaps, as we become better acquainted with our neighbors in space we will expand this organization further, but this is one possibility I will leave for the consideration of others to come later.

The Patent, Trademark, and Copyright Foundation of The George Washington

University, which is off to a good start, may well be studying, some day, certain problems created by the fact that the inhabitants of other planets may wish to exchange copies of their patents for copies of the patents issued on earth by a single earth authority. Dr. Kettering did not live to receive a report from a research unit which he set up to ascertain how energy from the sun is fixed and stored up in new compounds, a subject in which he was intensely interested; and I will hardly be around when patent copies are being exchanged with the help of space ships. The Foundation, however, will be functioning and can evaluate objectively the various developments which come within the scope of its authority, however startling they may be.

I have made reference to the fact that George Washington recommended to the Congress in 1790 that a Patent Law be enacted, thus demonstrating his interest. He not only did this, but actively participated in the granting of those Federal Patents which were issued shortly after the first law became effective. Fortunately, the very first patent granted by the Federal Government in 1790 was discovered intact several years ago and is in the possession of the Chicago Historical Society. It was signed by President George Washington and also by Thomas Jefferson, as Secretary of State, and by Edmund Randolph as Attorney General. We have had it copied, and it is now my pleasure to present a copy to President Colclough for The Patent, Trademark, and Copyright Foundation of The George Washington University.

Thursday Morning Session

June 25, 1959

The Conference was convened at 9:35 A.M., Lawrence R. Hafstad, Moderator, presiding.

DR. HAFSTAD: Gentlemen, will the meeting please come to order.

The first thing on our program today is a report on the Foundation's progress, first by Director O. S. Colclough, whom you all know.

REPORT ON THE FOUNDATION'S PROGRESS

DIRECTOR O. S. COLCLOUGH: Executive Director Harris, Professor Oppenheim, and I have divided this first period to give a report, and I hope we won't overlap each other too much.

What I want to talk about for a few minutes this morning is one of our dual objectives, namely, education.

As you know, it is the Foundation for "Research and Education."

Now, when I use the word "education"—or when we use it as one of our dual objectives—we are not speaking of education just in the formal sense, by any means. When you are dealing with something as complex, on the one hand, and as important to all the citizens of this country, on the other, as the patent, copyright, and trademark systems, you must reach the people. After all, the institutions, political and economic, of this country depend upon the understanding of the people.

Consequently, I refer to education in the broadest sense, or I could say "communication."

Up to now the Foundation has exercised its capabilities to a limited extent in the communication field, in the educational field, and for a very good reason. Sound education depends upon a sound basis, which in this case had to be developed through research. Our product now is at that stage that it permits us to embark upon the communication phase of the Foundation's objectives, because our research is now producing materials on which sound education can be based.

This educational, or communication, program now takes several forms. One is in the field of educational materials. In the folders that you have been supplied today, there are one or two examples of that. There is the pamphlet, *The Patent System All Around You,* which is just the first in the series. The next one will be *How You Get a Patent Today.*

We have received a very fine response from the many high schools to which that first pamphlet was sent—some 5,200.

Then there is the type also which you will find in your folder which speaks to that person who cannot sit down and spend hours reading the *Journal.*

May I say here that it was never expected that it would be a journal the reports of which would be minutely studied by everyone who is concerned with the patent system. But of the one thing we are certain, namely, that without the *Journal* with its published materials based upon sound research, we would be in the same position as many other writers in this country have been, that of basing our views with respect to the operations of the patent and related systems in a great measure merely upon opinion alone.

So it is the *Journal,* or the research upon which the *Journal* is based, serves as the foundation stone of the the educationl aspects.

Another phase of this educational undertaking is in terms of our cooperation—the cooperation of the Foundation—with groups and individuals throughout the country who are also interested in working toward a better understanding of the patent system. Local patent law associations, industrial groups, individuals can call upon us, and we are in a position to support their effort by furnishing sound, incontestable, if I may say, reports on the patent system.

One of our Advisory Council, Mr. Laurence Dodds, who is the Vice Chairman of the Advisory Council of the Foundation, has undertaken a project. I just mention it—something he has done on his own—as illustrative of the things that can be done. He, with the cooperation of some 25 high school principals, has undertaken a study of the textbooks in social sciences and economics that are used in the high schools of two or three counties on Long Island.

I don't need to tell you that he found some surprising statements concerning the patent system in these books which the high school students of today are studying.

The principals are cooperating with him, and he is dealing with the publishers also in an effort to make available information concerning the patent system which is based upon solid ground.

Now, Mr. Harris and Professor Oppenheim will talk about other phases of the program, but I should not sit down without telling you gentlemen that our research is an expensive process. The educational phase adds additional expense. Therefore, I submit for your consideration, as you think about the Foundation and its work, that you maintain your awareness that its program can well be limited by its financial resources.

We need considerably more financial support than we are now receiving.

And remember we are supported over the widest possible area of business and of individuals; from the professions; industry and business, big and small. That's one of our strength elements in my opinion.

But as you go about in your activities, you would do well to remember that in the final analysis we can't move any faster or on a broader base than our financial support justifies.

It reminds one of what you hear said so often today about universities. One of the favorite statements of university presidents is, "There's nothing wrong with us that one or two million dollars wouldn't cure." That's not quite a sound statement, and that isn't what I mean to say. But certainly the dollars are necessary, and we plead for your support.

DR. HAFSTAD: I will now call on Professor Oppenheim for a few comments.

PROFESSOR S. CHESTERFIELD OPPENHEIM: Mr. Chairman and Gentlemen of the Conference, this a prime example of conscious parallelism without conspiracy. The President said we may be overlapping. I didn't know what he was going to say; he doesn't know what I am going to say.

There is overlapping. But I don't think the emphasis will do any harm.

In discussing the Foundation's research activities we have been accustomed to bisect the Foundation's objectives into two divisions,—research and education. Perhaps it may be clarifying to recall that, as stated in our Declaration of Trust, the generic character of the Foundation's functions is that of an educational organization. Education comprehends multiple means and channels of broadening horizons of knowledge about the patent, trademark, and copyright systems. We seek to illuminate the meaning of this body of knowledge by a beacon light which searches for veracity, unvarnished by confusing what ought to exist with what actually exists.

Research, to be sure, is only one headwater of an educational process, but without this we would not have the source from which authoritative principles, facts, and conclusions concerning the systems flow.

During the past year the Foundation's awareness of the interplay of research for scholarly ends and dissemination to the citizenry of published materials for instructional purposes had been accentuated. This has resulted from sincere questioning by some who are supporters of and believers in the merits of the Foundation's goals of what they fear is undue emphasis upon research in the grand manner for the few, which may tend to subordinate to a minor role the diffusion of educational material for the many.

My belief is that these two functions are complementary rather than conflicting. In the past year, as well as previous years, the Foundation has been aware that it must strike a reasonable balance between the utilization of its funds and personnel for research studies and for other activities that fall within the range of the Declaration of Trust.

This accommodation is difficult to achieve in full measure in these early years of the Foundation. As funds and personnel within the Foundation and assistance outside of persons who are willing to subscribe to the Foundation's objectives increase, this allocation of our resources can, and I feel will, be made in even greater degree.

It is well known that the Foundation's *Journal of Research and Education* is our primary medium of making public the technical and professional material that stems from the Foundation's research program. This *Journal* is not intended for light bedtime reading, even though it might fascinate a reader interested in a research "whodunnit."

We regard the *Journal* as an educational tool, but its value lies in a mixture of immediate and long-run reference value.

The patent utilization study furnishes an example. Tomorrow some researcher may find it electrifying to learn that for the first time a generally accepted statistical method has unearthed factual support for a conclusion that a majority of patented

inventions have been used. This is a conclusion which upsets the long-held mere opinion that 10% or less of issued patents are put to use.

Five or ten years from now this same study may continue to have original source value in private and public inquiries into this phase of the functioning of the patent system.

Every one of our research projects feeds into the *Journal,* and those who draw from this pool of knowledge translate its teachings into the theory and practice of their individual research endeavors in industry, educational institutions, and government.

Research funds, therefore, are the Foundation's venture capital, employed in plowing old ground and in breaking new ground, as we probe and test the complexes of the systems pertaining to industrial and intellectual creations.

Research will lie fallow unless it is a prologue to dissemination of the gathered knowledge. Let me emphasize, therefore, that from the headwater of research we are beginning to build streams of communication to the general public.

The pamphlet series on *The Patent System All Around You* demonstrates the informational function of the Foundation in preparing elementary and non-technical material for the secondary school level. Other pamphlet publications will be adapted to the more sophisticated levels of the universities and adult education.

Yet these activities are but the other side of the research coin, because the Foundation releases nothing to the public which does not measure up to its warranty that its educational offerings, like the research source from which the materials are derived, are free from self-interest and bear the mark of dispassionateness.

A summation of last year's research program may tend to bring into sharper focus the Siamese-twin nature of the concepts of research and communication of its fruits to the public. In high-spot fashion, here are the distinctive features of current work:

1. A larger study of the nature and extent of licensing abroad by American licensors with a new questionnaire for American companies and foreign company licensees.

2. An expanded study of taxation and patents. We are using a sub-sample of 200 inventors who have previously responded to the questionnaire in the patent utilization study, and in this way we are obtaining the information in a speedier and more useful way.

3. A final report on public attitudes toward patents. This has been published.

4. Interim reports have been published on patents in the plastics fabricating and parking meter industries, and a final report on the aluminum-processing industry.

5. A survey of companies licensed by Bell Telephone Laboratories under its transistor patents is now being conducted to ascertain the role of such licenses as a growth and research factor.

6. Annual reports of corporations for 1958 are being reviewed to surface information on patent and research activities and to demonstrate the use of such reports as a fact-finding source.

7. A new study has been launched on the development of the machine tool industry.

8. Under way is an interpretation and synthesis of the Foundation's findings on the place of patents in small business enterprises.

9. By invitation, this Foundation has submitted to the Interdepartmental Committee Study Group to Consider the Federal Government's Patent Policy a proposal to evaluate federal patent policies for contractors, government agencies, and for the public interest implications.

10. The Technicolor and Eastman antitrust decrees, which will be discussed today, have been studied for the effects of their patent provisions.

11. Finally, progress is being made on the role of patents in the executive decision-making.

If you should scrutinize the details of these studies, which I have just outlined in very general terms I believe you will find they are designed to combine principles, earthy facts, practical operations, and conclusion directed toward the co-existent objectives of gathering the information and publicizing the authoritative knowledge in these selected areas of the Foundation's Declaration of Trust.

Finally, let me interject, if I may, three sort of guiding thoughts that I have in my way of looking at life that I think apply to this.

First, I think we have to bring a sense of humility, in recognition of the magnitude of the task, to bear on what we are doing.

Second, I think we have to have a sense of perspective in recognition that anything anyone does is ever relevant to the links of the past, the present, and the future.

And, finally, a sense of humor—and it may be a grim sense at times—and this helps to absorb the contingency that may arise that the Foundation's rich budget of ideas may sometimes outrun its more modest—and I think at times it looks a little anemic—financial budget.

Now, when that happens, as President Colclough has said in the past, we have to look to the partners of the Foundation for help, because it is an "all hands" job.

I want to say finally that I was just thinking this morning that if this Foundation should not have continuing funds to sustain its work, my own personal feeling is that this would be a great blow to the patent bar, to all of those in government and outside of government and in educational institutions who are interested in the patent, trademark, and copyright systems. I say that because, if this Foundation should fail *only* because it doesn't have funds, the disconcerting thought I get is that it may seem to those who are not so interested in these systems that this has been a demonstration that those who believe in it aren't ready to give it the support it needs. Perhaps they may feel that we are not interested in the research and the educational process that takes time and effort and a sense of dedication as against the daily hustings when we put a particular patent to use.

Now, at the suggestion of the Chairman, it gives me pleasure to turn to the Executive Director of the Foundation, L. James Harris, who will talk on his phase of the work.

EXECUTIVE DIRECTOR L. JAMES HARRIS: President Colclough spoke to you about our financial needs and our developing educational programs. Our Adviser on Research, Professor Oppenheim, discussed the overall picture of our research program. I shall try to round out your perspective of the Foundation's operations by presenting details of the day-to-day research and educational activities, and tell you a little about the other activities in which we are engaged.

Yesterday one of our participants showed me the program, and he said that I was in the "clean-up" position. I prefer to think that a compliment. I assume he was referring to baseball.

Some of you may wonder just how our team functions, since our Director is the Acting President of a large university; our Adviser on Research is a Professor, among other things, and is located in Michigan; and our research staff are all busily engaged in other endeavors. My position as Executive Director in the Foundation is that of directing and coordinating the administrative and research work of the Foundation. Personnel, projects, publications, programs are under my immediate supervision and management. The Director has overall supervision of all aspects of the work of the Foundation and Professor Oppenheim advises on research programs and projects. Certain members of our research staff are so keenly interested in the opportunity which the Foundation affords to participate in the opening of this relatively new field for research, for systematic university investigation that they take time from their busy schedules to participate ex officio in critical reviews of plans, procedures, findings, and reports for projects for which they do not have primary responsibility.

This integration, this intellectual cross-fertilization, has proved very fruitful.

All the projects of the Foundation are concerned generally with a better understanding of the nature and value of the patent and related systems. This overall purpose is being carried out in eight areas based either upon the uniqueness of the combination of specialties employed or upon the fact that the particular subject matter could best be studied in a unified approach. As we go forward with our research program, we are increasingly aware, not only of the mutually supportive aspects of our research projects, but also the importance of the new areas that open up and afford us what we euphuistically call "targets of opportunity."

I think I can best tell you about these "targets of opportunity" by using one of the members of our research staff as a guinea pig. Dr. Siegel, for example, is very alert to the possibilities of this type of research in his area of specialization. In the writing up of a summary and interpretation of the studies already completed on the project on the "Role of Patents in the Creation and Growth of Small Industrial Units," on which he's the Principal Consultant, it was decided to include more than the material we developed in the course of these studies. We felt this general synthesis provided us with an "opportunity" to cover other available material, both government and private, published and unpublished, on small business, on antitrust, et cetera, which might be pertinent and accessible to us.

On what we call a "shop-talk walk" on the university campus with Dr. Siegel, during a discussion of the progress of our project on patents in smaller industrial units, he brought a Bell Telephone advertisement on transistors to my attention. We

were struck by the wonderful opportunity transistor licensing by Bell Telephone Laboratories would provide for a brief, relatively costless, survey of the role these companies attribute to these licenses in their growth and development and the companies' subsequent research. Also, he told me about a report he heard presented by the vice president in charge of research of the Texas Instrument Company at a Presidential conference on small business; and Dr. Siegel was impressed with the amount of assistance that was given by the Bell Telephone Company to its licensee, the Texas Instrument Company. I must confess that some of our awareness of—or wonder about—the potentialities of these licenses for small business was due to the fact that a popular market barometer reflected, among other things, an unusual growth and development for that particular licensee. Moreover, we felt this would provide an opportunity also to test one of the hypotheses set forth in a paper we had jointly prepared on "Positive Competition and the Patent System," published in the Spring Issue of the *Journal* concerning a unique relationship between certain large companies and small companies. In this relationship, large and small companies may economically supplement each other rather than shove each other with the small ones being bumped out.

Another "target of opportunity" resulted from a suggestion by Dr. Siegel that more companies ought to utilize their stockholders' annual reports for dissemination of research and patent information. I was taken with the potentialities of this idea and suggested that we publish a short note on this in the Foundation's *Journal*. As a result of further discussion, this note grew into Dr. Siegel's paper on the subject published in September 1958 issue of the *Journal*. The response to his paper was so encouraging that we have undertaken a systematic review of the annual reports of corporations for the year 1958. Of course, this adds to the burden of our rather limited office staff, but we feel that the usefulness of the information concerning what the companies patent and what their research activities are, and, additionally, the insights it will supply into what the companies think about the patent system, will be well worth while. Since these "targets of opportunity" are unfinanced in their initial stages, whatever knowledge we gather is not at a financial sacrifice—at least in the exploration period. I shall not elaborate on our research projects since our investigators themselves are scheduled to do that, and I'm sure they can do it far better than I.

Let us now turn to the Foundation activities in which we are presently engaged—the third Annual Public Conference. We're experimenting with a new format this year. The reception and award dinner were held last night, and the Conference proper is being held today. This enabled the members of the Conference to attend the award dinner last night after business and to return home after five-thirty this evening. In this way, you are away from your offices one day while attending in the relatively relaxed atmosphere, we hope, of a two-day conference.

This year we are devoting most of the Conference to the discussion of three projects and the current issues session. The foreign licensing, taxation, and the antitrust research projects are, we believe, at stages in their development at which discussion would be most profitable for the investigators themselves and most

informative and interesting to the Conference. New developments in other projects will of course, be noted.

Since we have two years of experience with the Conference and we also have an established *Journal* and educational and research program, we feel that we can now have the Conference serve additional functions much more effectively. Our first Conference was almost entirely devoted to research project reports, our second Conference mostly to such reports and some attention was given to current issues. Although one purpose of the Conference is the presentation and discussion of the research findings of the Foundation, we're now giving more attention to the discussion of current issues important in the fields from which the Foundation itself, of course, will derive guidance on the planning of its future work. We also are giving more attention to the opportunity for people from different fields who have a common interest in the patent and related systems to meet and enlarge their perspectives by participating in the stimulating and productive exchanges and contacts of the Conference.

Since the last Public Conference, we have inaugurated a program of educational activities devoted to improving the knowledge on the part of young people with respect to the patent and related systems. This educational program, as you probably know, was motivated by the Foundation's study on the public attitudes towards patents, trademarks, and copyrights, conducted by Professor James N. Mosel. The study revealed a great lack of understanding by the public of what the patent system is, how it functions, what its problems are. Since so many young people are interested in invention and since the world conditions probably will stimulate greater inventive activity and also since the future responsibilities of citizenship rest with these young people of today, we're beaming this program to teenagers and young adults, the relatively small group of high school and college students.

This new educational program is tentatively organized in the form of two projects. Project E-1, "E" for "Education," is a project based on the studies we have conducted. This is a direct effort of the Foundation involving the preparation and dissemination by the Foundation of its materials. Project E-2 is an "energizing project" with and through our Area Committees and to cooperate with any other groups and individuals who have parallel interests.

The Foundation's Area Committees have been asked to draw up and assemble model materials on a decentralized basis suitable for the geographic areas in which they are located. They also have been asked to confer with school authorities on how best to use the material locally. We hope to benefit from the exchange of ideas with the Area Committees and develop a pool of information which might be applicable to more than one area and assist us in the establishment of a unified program.

At the same time, we are in the process of developing material for Project E-1, which I talked about, which involves the preparation and dissemination by the Foundation itself of educational literature. In this connection we have inaugurated a series of pamphlets entitled *The Patent System All Around You,* concerned with purposes, procedures, problems, and accomplishments under the patent and related

systems. And this is the pamphlet I am talking about—which you will find in your kits. [Indicating] You will notice the type of format used in the pamphlet, and I think you will recognize the attempt to make it interesting, inviting to teenagers and young adults, as well as dignified.

The first booklet of this series has been distributed to secondary schools in the District of Columbia and the states of California, Illinois, Massachusetts, Missouri, New York, Ohio, and Wisconsin. These areas were selected because they include both urban and rural communities and the cities in which our Area Committees are located. We will, of course, include the state of New Jersey in any future mailing in view of the recent organization of our New Jersey Area Committee, consisting of Hugh S. Wertz, Chairman; John H. Graham, Vice Chairman; and members: Norman St. Landau; H. Hume Matthews; and Walter C. Anderson. I would also like to mention that Elwin A. Andrus has been appointed Chairman of the Milwaukee Area Committee; Kimball S. Wyman, Vice Chairman; and Adrian L. Bateman, Jr., Joseph E. Kerwin, and Merl E. Sceales have been appointed members of the Committee. The appointment of Judge Arthur M. Smith, our Detroit Area Committee Chairman, to the Court of Customs and Patent Appeals we feel has added luster to the Foundation. Chairmanship of our Area Committees might be one of the roads future aspirants to the bench might very profitably explore.

With this series of booklets we hope not only to contribute to the education of secondary school children about the patent and related systems, but also make school authorities aware of our educational activities so that they will understand the purpose of the contacts by our Area Chairmen at the local level and be "energized" into participating in Project E-2.

We are encouraged indeed by the favorable reception the first booklet is receiving. We have also sent the booklet to Foundation members and subscribers for their comments and suggestions.

The booklet contained a number of examples of important inventions with which we felt young adults would be familiar. In discussing radio we used as an example Major E. H. Armstrong, a colorful personality and a brilliant contributor to the field. Three letters were received from members of the Foundation expressing concern that our information on Major Armstrong was inexact or misleading. Although Armstrong was a controversial figure, the information we used we believed to be authoritative and was, in any case, well documented. We made it clear to our correspondents that it is not the intention of the Foundation to take sides, nor does the Foundation intend such material, which is prepared for general educational purposes, to be used for the much more exacting requirements of patent litigation or legal interpretation. In a subsequent issue of the *Journal* some of the documentation may form the basis of a note on the intriguing question of "who invented it first" in which the patent literature abounds. I should also point out that this will be the central subject treated in Educational Booklet No. 3.

The second booklet is already being prepared and deals with the procedures involved in obtaining a patent today. It also devotes attention to some of the

interesting historical development of these procedures. Subsequent booklets will deal with the following subjects:

No. 3—Problems of Establishing Priority: Who Invented It First?

No. 4—The Role of Patents in the Development of an Industry.

No. 5—Who are the Inventors?

No. 6—What Can You Do with your Patent? How Do You Put the Patented Invention to Work?

Another facet of our educational program, a seminar and lecture series conducted in conjunction with the faculty of The George Washington University Law School, has become a most productive part of our educational program. It is here that students are being introduced to the patent and related systems as social and economic as well as legal institutions. The cooperation of our researchers and the student product have been most encouraging. We are finding a growing number of papers from the seminar publishable. Some have already been published in our *Journal.* Others have been annotated for use in our specialized library.

We are happy to say that we have received several generous contributions of books and pamphlets, and we look forward to the continued growth and use of the Foundation's specialized library.

In our *Seventh Report to Members*—you all have copies in your kits—we listed on the back cover the major reports, articles, and papers which have appeared in *The Patent, Trademark, and Copyright Journal of Research and Education* during the first 18 months of publication. This I submit is some measure of the productivity of the Foundation. Our *Journal,* incidentally, has grown considerably in domestic and international prestige. Also in this *Seventh Report to Members* we continue to introduce reproductions of articles on our work appearing in various other publications and pictures of Foundation people and Foundation events. This closer look at the Foundation has received some very favorable comment by the membership. The *Eighth Report to Members* will be published shortly after the Conference, which it will feature, among other things.

You all have copies of the 1958-59 *Bulletin* of the Foundation in your kits. The *Bulletin* includes information on the organization of the Foundation, its educational and research programs, and a list of Foundation members. The 1959-60 *Bulletin* is scheduled for distribution in September.

With respect to the *Journal,* I should like to call your attention to the fact that all issues published to date can be reviewed at the registration desk. I should like to point out that an "Educational Activity" section has been introduced in the *Journal* in accordance with Article III of the Declaration of Trust, which states that one of the objectives of the Foundation is to organize educational programs on the systems for use in courses of instruction. Also included in the "Educational Activity" section are reports on the progress of programs and projects of the Foundation and *other* organizations to improve the knowledge and understanding of the patent and related systems by the public.

The issue of the *Journal,* just off the press, the Summer Issue, Volume 3, No. 2,

is the Kettering Commemorative Issue, honoring the memory of Charles F. Kettering, former member of our Advisory Council and the person for whom the Foundation's annual award is named. A number of persons familiar with Dr. Kettering and the various phases of his career have contributed articles on Dr. Kettering as inventor, researcher, research director, teacher, entrepreneur, and leader of men. We have also compiled a Kettering bibliography for this issue.

As part of the Foundation's information program, we are developing media of communication to present the results of our research to various publics. A "What Do You Know About . . ." series has been sent to busy executives and is intended to bring to their attention reports and articles published in our *Journal*. A copy of the first of this series, devoted to "Foreign Licensing," is included in your Conference kit.

Before going on to our research investigators, I should like to emphasize the point that our problem is not a lack of projects in which we have an interest. Our problem is not a lack of capacity. Our problem is and has been a lack of funds more than anything else. I would therefore like to urge all of you to bring back to your companies and friends the information and knowledge you have attained here and encourage them to support our work by taking out a membership in the Foundation. There are membership forms in your kits. Specifically, before you leave this Conference, please give us the names of those individuals who will probably, if asked, accept membership in the Foundation and the appropriate people to contact in companies and firms which you believe would be interested in, or are likely to become interested in, the Foundation. We have stationed a pretty girl at the registration desk to receive these names.

The Foundation is not endowed. We look to your cooperation, you who are prominently identified with our free enterprise system, to help raise the funds so that we can pursue a research program dedicated to the gathering and developing of unbiased knowledge for the benefit of all.

Thank you.

DR. HAFSTAD: Thank you, Dr. Harris. I think you have convinced all of us that you and your staff have been busy over the last year.

It is now our pleasure to move into the part of this program that deals with specific papers by various experts.

The next item on the program is "Pricing, Antitrust, European Common Market, and Other Problems in Foreign Licensing." This paper will be presented by J. N. Behrman. For your information, Dr. Behrman is the Principal Investigator on the Foundation research project "Foreign Licensing," and he will report on the subject listed. He is a professor of economics, formerly of Washington and Lee and now of the University of Delaware. He was research assistant in the International Labor Office in Montreal on postwar problems in the iron and steel industries. He taught at Davidson College and was an instructor at Princeton. He is author and co-author of a number of books and articles.

I give you Dr. J. N. Behrman.

PRICING, ANTITRUST, EUROPEAN COMMON MARKET, AND OTHER PROBLEMS IN FOREIGN LICENSING

RESEARCH PROJECT INTERIM REPORT

DR. J. N. BEHRMAN: Thank you, Dr. Hafstad.

The licensing project has been going on for a couple of years now, and we have gotten empirical data which have preliminarily been published in the June 1958 issue of the *Journal,* but we have expanded this research and now have an additional sample of licensing activity which has been set forth in the mimeographed table which you have before you.[1]

This is one of the many quantitative results that we will have for you in the next few months, but I think this is of particular interest in terms of the relationship of investing and licensing and the distribution of licensing to independent companies abroad.

Let me very quickly go through parts of the table for you so you can interpret it. This covers 175 companies who gave us specific information on their subsidiaries, associated companies, and their licenees. There are 145 of the 175 companies who have an equity interest of some form in a foreign company. We have taken those 145 United States companies and distributed them according to the range of foreign companies that they have, looking at the broad middle column in the table, 0, 1-5, 6-10, 11-15, and so on, in order to get some sort of distribution.

The 145 companies have, as you read across the bottom line, 885 foreign subsidiaries wholly-owned.

The same 145 companies, reading still across the bottom line, have 194 subsidiaries which are 51% or more, but not wholly-owned.

The same 145 companies have 346 associated companies—that is, under 51% equity ownership.

Our question was: What did they do in licensing these companies?

If you read straight across the bottom line, you will still see the 145 companies licensed 764 of their wholly-owned subsidiaries, not by any means all of them.

They licensed 142 of their less than wholly-owned, but controlled subsidiaries.

They licensed 268 of their associated companies.

When we get to the next column of 175 companies, this includes 30 companies that had no equity interest at all in any foreign company. Therefore, they licensed only independent companies. But they, the 30, plus the 145, licensed 2,374 independent companies.

Now, that 2,374 is about two-thirds of the total number of licensees of these 175 companies. Therefore, the licensing of independent companies is still by far the more important activity.

Now, we can take the breakdown in the table, and we get some fairly interesting results. However, I don't want to go through each of these for you. Let me just indicate what the top lines, however, would indicate to you, the zero range, because this excludes a lot of companies very quickly.

Thirty-one of the 145 companies had no wholly-owned subsidiaries. However,

[1] See Appendix I, page 109.

91 had no partially-owned, that is, 51 to 99% owned or controlled, subsidiaries. This means by far the usual operation, for this group of companies, anyway, is a wholly-owned relationship. Seventy-four of them had no associated companies.

As we move across to the equity interest in the licensees, we find that, not only did the 31 companies which had no wholly-owned subsidiaries not license, but an additional 33, even though they had wholly-owned subsidiaries, did not license them. In the last column under independent licensees that 35 companies licensed, we find only those in which they had an equity interest. That is, they did not license any independent licensees. This, however, is a minority number.

This is the sort of information that we will be able to gather for you. We are getting questionnaires returned daily, and we will continue to add to this table before it is finally published.

In addition we are studying some of the economic aspects of licensing, pricing, the impact on trade, investment, balance of payments. We also hope to expand into the economic aspects of antitrust and some of the changes in the world structure of trade and investment which are exemplified by the Common Market.

For a discussion of the pricing aspects this morning, we have my associate, Wilson Schmidt, who is an associate professor at The George Washington University.

After that, Mr. Joseph S. Cardinale, partner of Momsen & Freeman, a firm that specializes largely in Latin American law and economic relations, will present some of the aspects of the antitrust problems in licensing.

Following that, Mr. Paul Weil, president of Pegasus International, which is a consulting firm on international business, will discuss the Common Market impacts.

In order to save time I make these introductions now. We will present these ideas seriatim and have a short period of discussion immediately after the three presentations.

Thank you.

Wilson Schmidt.

DR. WILSON E. SCHMIDT: Thank you, Jack.

I thought I might discuss very briefly with you what we're doing in the way of analyzing pricing questions on foreign licenses. The reason we are interested in this question is, of course, that next to the selection of the licensee, perhaps the most important decision bearing on the financial success of a foreign licensing program is the rate and type of compensation received.

Our project is taking a close look at practices in this area, and we want to learn more about what is being done, why it is being done, and what the effects of current practice might be.

Now, the reward from licensing obviously has something to do with the extent of licensing. For instance, in a recent interview with an American firm which is just beginning to look for licensees, they explained that the reason they were casting about for foreign licensees was simply that they had heard that a lot of money could be made in this business.

Simply because the reward from licensing has something to do with the extent of licensing, we want to look very carefully at the degree to which this compensa-

tion may affect the transfer of American knowledge and know-how throughout the world.

Given the view that foreign licensing is in the public interest as an aid to foreign economic growth, the analysis of the royalty and other provisions which bear on the profitability of licensing and thus on its extent deserves very special attention.

We, of course, are also interested in the royalty provisions simply because the compensation, along with the value of the asset or knowledge transferred, determines the net gain to the country which receives the license, and also, of course, it has a substantial bearing on the net gain from foreign licensing to the United States economy.

At least three questions leap to the investigator's eye regarding the question of compensation.

The first is concerned with those factors which should be considered in determining the licensor's reservation price or that price which is the minimum acceptable one to him. It's possible that American firms are missing opportunities to add to their net profits because they are including inappropriate costs in determining their reservation prices. In particular, the costs of research and development for knowledge which already exists are in some cases being injected into negotiations. Now, if this is anything more than a bargaining device, it may not be a very sensible procedure. The reason is that these costs have already been met, and if a licensor can get more revenue from the license than the out-of-pocket costs of negotiating, transferring, and servicing the license, he will contribute something toward the research and development expenses which otherwise would not be possible.

The second question is concerned with how closely the royalty payment ought to vary with production or sales. We have discovered that most of the licenses involve a running royalty, a royalty based on output or sales. Is it possible that the gross royalty receipts of a licensor would rise if payment were made independent of output?

A number of licenses contain a provision for a royalty rate which decreases as production or sales expand. This provides the well-known incentive for the licensee to expand output simply because the added cost of each additional unit of production is reduced as the royalty rate diminishes. This incentive, in fact, could be strengthened by making the royalty payment completely independent of output or sales—perhaps, for instance, by charging a fixed royalty per year. This in turn could benefit the licensor, first, if the licensor recognized that under such a fixed royalty he would have an inducement to produce a greater output, second, if the greater output then implied greater prospective profits for the licensee, and third, if the licensor could then take advantage of these greater expected profits in the bargaining process.

For the present this is only a hypothesis. We can't say that the prospective licensees will behave in this fashion, because this depends importantly on how they make their production and price decisions. And even if the hypothesis is supportable, it does not necessarily follow that such an approach is desirable simply because such a fixed royalty precludes the licensor from sharing in the risks of

the licensing operation and thus, perhaps, in some of the extra rewards from licensing.[2]

The third question concerns the conditions under which exclusive licensing will provide greater gross royalties than non-exclusive licensing. It is not at all obvious that exclusive licensing is superior to multiple licensing in a single market, even though the royalty rate per unit of output is greater under exclusive license. The output on which these royalties are taken may be larger as more firms are put into production.

Given the important antitrust questions involved in exclusive licensing, analysis of this problem may be especially useful since it would have substantial bearing on the question of the effects of different government policies toward exclusive licensing on the American economy, on the rest of the world, and, in general, on the international transfer of knowledge.

Thank you.

DR. BEHRMAN: Thank you, Will.

Mr. Cardinale will now talk on some of the antitrust aspects.

MR. JOSEPH S. CARDINALE: United States business is becoming increasingly concerned with the nature and extent of the interpretation and application of the United States antitrust laws in the foreign operations field—and will become much more so, I believe, in the future.

The ever-widening scope and aggressive enforcement of these laws by the Department of Justice and the impact and effect of recent court decisions and consent decrees without due regard for the peculiar circumstances and the competitive situations encountered in the international field, in which the national interest of the United States is so vitally involved, require a thorough examination and reappraisal of present policies and their unfortunate implications with respect to United States trade and investment abroad.

It is the considered opinion of many experienced individuals in business and government that a new and realistic policy must be evolved with respect to the application of United States antitrust laws to foreign operations based upon an understanding and appreciation of what is involved in the conduct of business abroad, particularly the inherent and unique problems, the competitive factors and pressures emanating from foreign sources, as well as to determine whether,

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[2] A subsequent comment from the floor indicates that some clarification is needed. The hypothesis embraces situations in which competitive licenses are offered by a number of companies, as well as those in which the licensor has no competition. If two firms offer equally effective processes to a prospective licensee, one asking a fixed payment and the other asking a running royalty which would produce the same total royalty payment, the former will be successful; this is because the licensee, according to the hypothesis, would make greater profits under a fixed royalty and would therefore prefer such a contract unless he wished to share the risks and rewards. The hypothesis comprehends situations in which costs decline as output expands, as well as when they rise. Even if costs decline as production increases, the substitution of a fixed for a running royalty reduces the additional cost of additional output, making greater production profitable and thereby adding to total profits; this gives the single licensor an opportunity to gain greater royalties in the negotiation process or gives one licensor a competitive advantage over another licensor who asks the same total royalty through a running royalty. If this hypothesis is to be relevant, royalty payments must not be unimportant to licensees in determining their prices and production; not infrequently royalties are 5% of sales, which means that royalties may constitute more than 5% of costs, depending upon the markup.

in fact, the interpretations placed upon the antitrust laws are compatible with and in the interest of the foreign economic policy of this nation.

It is clearly evident from the various court decisions that:

1. The foreign activities of American firms, whatever their nature or where they be carried on, come within the purview of the United States antitrust laws and are subject to the scrutiny of the United States Department of Justice.

2. American companies and their foreign subsidiaries, despite the fact the latter have been organized under and are domiciled in and subject to the laws of the particular country, or foreign companies controlled or affiliated with United States firms, fall within, and can be brought within, the jurisdiction of the courts of the United States.

3. The antitrust laws of the United States as presently interpreted make no distinction between domestic or foreign trade, and, consequently, the same basic criteria will be applied to judging a foreign contract or activity as would be applied in the case of domestic counterparts.

It is also apparent from the recent court decisions and consent decrees that:

1. A contract to be performed abroad or any of its provisions, or any act or failure to act arising therefrom, may be judged illegal in the United States, despite the legality of same in the other party's country.

2. An American firm or its foreign subsidiary, or controlled or affiliated company, operating within another country will be subject, with respect to operations or acts undertaken in or with respect to the foreign country, to both the laws of the United States and the particular country.

3. A decision of a United States court or its consent decree ordering or restraining the performance of an act in a foreign country or relating to the disposition of assets therein will have legal effect within the particular foreign country and must be complied with by the American firm involved or its foreign subsidiary or controlled company, despite the fact that the procedural codes and the courts of the particular country do not concede or acknowledge the jurisdiction of the United States court or the legal effect of its decision or order within its territorial limits.

In view of the foregoing conclusions, the following basic questions arise:

Assuming the fact that the courts of the United States have jurisdiction over an American corporation engaged in operations abroad, whether directly or through a foreign subsidiary or affiliated company—which premise is difficult for many to accept—there is the question of whether, at the time of their enactment, it was the intent of Congress that the antitrust laws be applied to every phase or manner of operation of American firms abroad, including the tenuous and illogical conclusion that a finding of illegality results not only from a determination that the trade or commerce of the United States with foreign nations, in fact, has been restrained, but that it is intended to or may restrain same.

Probably the most important question of all is whether a determination of what may be restraint of trade or a conspiracy to monopolize trade or commerce can realistically be made on the same basis or applying identical criteria or tests in both the domestic and foreign fields.

In the domestic field, there can be no doubt that the parties are subject to the full and equal impact of United States law; there is no question as to jurdisdiction, both as to the parties and the subject matter or act involved. In addition, the parties must observe the same patterns of business behavior as shaped by pertinent laws.

American business firms entering foreign markets, whether through a direct manufacturing operation or licensing, face an anomalous, and in this sense paradoxical and entirely disconcerting, situation as a result of the present policies with respect to interpretation and application of United States antitrust laws to the foreign operations field where the factors and circumstances are and must be different from those in the United States.

Among these factors are the following:

1. Foreign restrictive exchange regulations and import limitations and procedures with varying patterns and purposes and protectionist regulations which in many instances tend to create or foster and sustain monopolistic practices.

2. The inherently greater risks involved in foreign operations, among which are intense and widespread nationalism, threats of expropriation or nationalization, inconvertibility, inflation, foreign government controls, and limitations with respect to the manner and extent of investment of capital and know-how and the remittance of profits.

3. The increasingly intensive competitive situation resulting from the aggressive and widespread entry of European and Japanese firms into world markets through the medium of exports and direct manufacturing operations and licensing.

4. The competitive advantages possessed by foreign firms made possible in most instances by the policies and programs of their governments, involving cartels, subsidies, special tax benefits, long-term and special loan facilities, and insurance and guaranty programs, all of which surpass in purpose, scope, and effect any assistance or leeway given to American firms by their own government.

5. Undoubtedly, the most important factor of all is that other nations active in the foreign operations field, including those which have some form of antitrust legislation—which curiously is weakly enforced or not at all as to activities abroad—do not scrutinize or impose restrictions or controls on the methods or patterns of behavior employed by their nationals abroad, and, in fact, encourage methods or arrangements that will promote their trade and investment interests abroad through combinations or restrictive practices. The resultant free hand enjoyed by foreign competitors abroad results in a great and substantial disadvantage for United States firms.

In this connection, it is interesting to note that Articles 85 and 86 of the European Common Market Treaty do not contain a general statement as to the illegality of activities restraining trade and commerce, but rather, set forth specific instances which will be considered illegal restraints.

Furthermore, it is curious to note the following:

(a) As contrasted with the Sherman Act, emphasis is placed upon the term "distortion of trade within the Common Market," which term would appear to

require a more severe impact on trade and commerce than would be required under United States law.

(b) No reference is made to the applicability of the antitrust provisions to the trade and commerce of the citizens and firms of the Common Market countries with non-member nations or with respect to operations in or between other foreign countries.

(c) Restrictive practices which increase production will not be considered illegal.

One further factor must be considered. American firms dealing with each other or competing with each other in the United States are subject at all times to the same laws and to similar treatment thereunder as well as in the courts. The picture in the case of American firms operating abroad is quite different. Not only are they bound by United States antitrust laws, which figuratively if not literally they carry around their necks in the manner of the albatross which burdened the "Ancient Mariner," but they also must observe and comply with the laws and regulations of each foreign country, thus being placed in a quandary as to whether what they do or do not do is legal or illegal at the same time or at different times depending upon which legal criteria are applied.

Agreements or acts which clearly are antitrust violations in the domestic field and deemed so in accordance with our legal concepts and social and economic mores cannot be considered as such when they take place in or with respect to a foreign jurisdiction in which the framework of factors and circumstances are and must be different and the consequences of antitrust enforcement abroad on a domestic basis would be injurious to the interests of both the United States and its business firms. The pursuance of such a policy or interpretation might well be considered a form of "Judicial Imperialism."

It would seem logical and reasonable that a distinction must be made until such time as the other nations competing with us in world markets are willing and, in fact, do place their nations under a similar set of rules as we are compelled to follow.

What are the tests or criteria used by the courts of the United States in determining whether antitrust violations exist in the foreign field?

One of the questions is jurisdiction. United States courts will assume jurisdiction and apply the antitrust laws as to acts and contracts abroad which operate within the United States or—and this is the important point—have effect upon United States trade and commerce—a very broad statement.

It would appear that courts do not construe the term "effect upon United States trade and commerce" as requiring only proof of direct, actual, or substantial effect. Indications are that even potential effect may be considered.

Once jurisdiction has been established, the next question is whether the contract or act is illegal under the antitrust laws.

It would appear as a general rule that once the basic or underlying question of an effect upon United States trade and commerce has been established, any act which is considered a violation of the antitrust laws if it occurred within the United States, likewise is considered illegal if it occurs outside the United States.

It is on the same grounds or reasoning that acts such as division of foreign markets are considered illegal even though they are undertaken by foreign companies or only with respect to foreign markets.

Next is the problem with respect to the application of the tests or criteria referred to above.

The concept of "effect upon United States trade and commerce" is so nebulous and elastic a test that it is conceivable that any manner of restraint occurring abroad may affect United States trade and commerce. Once the "effect on United States trade and commerce" has been established, thus placing the acts complained of within the jurisdiction of the antitrust laws, it would appear that any acts of a restraining nature are per se violations of the antitrust laws whether occurring within or outside the United States. The pattern of restraint resulting from a number of agreements or the effect of various acts are important considerations with respect to vulnerability to antitrust prosecution in the field of foreign licensing.

It is important to realize that the United States Department of Justice and the courts are concerned not only with contractual provisions or with specific and identifiable acts of a positive nature on the part of the licensor or controlling company that may be considered as antitrust violations, but also with such aspects of a passive or indirect nature such as the absence of competition, or the failure of the parties to act in a manner that would indicate freedom from restraint and control. Furthermore, it is not necessarily the isolated or individual act or the effect of a single contractual arrangement that may result in an antitrust situation, but also the interplay and the pattern resulting from several or many license agreements and activities.

Another important factor to bear in mind is that, although bigness and a leading position in an industry may make a firm more prone to antitrust actions, this offers no assurance that the medium-size or even small-size company may not find itself the object of an antitrust prosecution; as has, in fact, happened in the past, particularly where it is in a unique position with respect to an important process or product that has significant impact or bearing upon industry, the economy, or the public warfare.

Thank you. [Applause]

DR. BEHRMAN: Thank you very much.

Mr. Paul Weil will discuss some of the implications of the Common Market.

MR. PAUL N. WEIL: Thank you, Jack.

I assume most of you are familiar with the basic aspects of the European Common Market, so my comments will be limited to a few brief statements based on some personal observations. Having just returned from Western Europe, I was amazed at the dynamic impact the Common Market has had not only on the six countries that go to make up this economic entity,[8] but on the other neighboring countries as well. For the first time people are beginning to wake up to the fact that they know they will, within a relatively short time, lose most of their protectionist laws and other restrictive measures against importations which have

[8] France, Germany, Italy, Belgium, the Netherlands, and Luxembourg.

been imposed by their governments, trade associations, and via cartel arrangements. They know that they now have to increase their efficiency. Every manufacturer, each agricultural group, and in fact, the entire economy of all the Western European countries is realizing that today they have to realign their thinking to more progressive terms than ever before.

Nevertheless, I do want to mention that in spite of the Common Market one cannot at this stage think in terms of licensing just one manufacturer in one of the six countries in the hope that that licensee will be able to fully serve the other five remaining countries. It would not be possible for Ford, for example, to think in terms of having only one plant within the Common Market and delivering their cars into the other countries, because they would not only face the still existent duties, but more important, be subject to the quota system. For example, in France, Renault expects to ship some 40,000 cars into Germany this year, whereas Volkswagen will, because of the quota system, be able to sell less than 1000 cars in France.

So it is still very problematical whether the Common Market will, in the near future, be of great benefit to its six members. At the present time, however, the American business man has to consider licensing in Europe in terms of determining how his own products fit into the various countries' markets. One licensing agreement therefore may not be enough.

There is also a very definite effort being made to limit other types of restrictions which still exist. For example, it is regrettable that the Common Market Treaty in Rome did not provide for common action on patents and trademarks. Each country still has its own laws and regulations, and there is as yet no effective committee endeavoring to combine these in order to have a uniform system within the Common Market area. In quite another area there was recently a meeting of members of the wine-growing industries in the six member-nations. At their Wiesbaden meeting they all agreed that it was in their common interest to have the wine bottle labeling laws uniform within the six countries. While this was agreed to by the wine industry, it would still have to be ratified by the various countries' authorities. Therefore we have to be cautious about developments of this sort and, perhaps, at times, question the motivation which causes action to be taken. I understand that these wine people got together mainly because of the competitive impact of Coca-Cola and Pepsi-Cola in the various countries, rather than for purely altruistic economic reasons. If you walk on the Champs Élysées in Paris and see everyone drinking Coke and Pepsi, where before they were drinking their favorite apéritif or wine, you can realize why the wine people were given to agreement.

However, while there are reasons to believe that even in another five or ten years something constructive will come out of these negotiations, the American businessman still has to be very much concerned with the regulations and laws as they exist in each and every separate country.

Recently there also was formed a second free trade association, consisting of England, Norway, Sweden, Denmark, Austria, Switzerland, and Portugal. Experts from these seven countries have just met in Stockholm, and there is good

reason to believe that within another year or two a second Common Market Group will be formed in Western Europe. It is, of course, the hope of everyone that this group will have some kind of association with the presently existing Common Market.

From a long-term point of view the common market trends will, we hope, give the necessary impetus towards a completely unified and integrated Western European Economic Community. It is hoped that perhaps in another ten or fifteen years we may even find that all 17 members of the OEEC (Organization for European Economic Cooperation) will actually belong to one big Common Market. And then it becomes of vital importance to the United States because of the tremendous market potential involved. It is important, therefore, to lay the proper groundwork at this time and not wait until all 17 countries are unified into one entity. Whoever is there first, obviously has the most to gain. At the same time the Common Market, and one day what may be a unified common market of all Western European countries, may have a tremendous impact upon the United States in connection with negotiations on tariffs. Being a combined unit, these countries will be in a much stronger position to make demands for U. S. tariff concessions than is each specific country at this stage.

I would prefer to limit my own comments to some discussions from the audience. Jack, I don't know whether you want me to stay here or how you want to do it.

DR. BEHRMAN: Dr. Hafstad will moderate it.

DR. HAFSTAD: We are running a little bit behind schedule, but I think the subject is so important that we should take a few minutes now for questions from the audience and general discussion.

Are there any questions?

A CONFEREE: I would like to ask Mr. Weil if he would care to make a guess on when the quotas as between the individual countries in the Common Market will be eliminated.

MR. WEIL: This year both France and Italy have lowered quotas by certain escape clauses on some categories of commodities. They reduced arbitrarily 20% of the quota on imports from Germany in order to adjust for different cost standards. There has been a lot of discussion, particularly in Germany, where it was felt that this was unfair, particularly since France had just devalued the franc by about 17½%. There are many other escape clauses, unfortunately, in this treaty, and each country obviously interprets its own treaty to its own specific advantage. It is a question of maybe ten or twenty years before a real economic union will exist. Originally, very few people believed that it was possible that this treaty would be ratified by the six different parliaments; yet it did go through. An important beginning has been made, and there is hope that over a long period of time these countries will ultimately get completely together on economic, as well as on many other matters of joint concern.

PROFESSOR OPPENHEIM: Mr. Weil, I wonder if there is any indication of what the Common Market countries may do with respect to requiring, let us say, the control of American enterprises abroad, those who have subsidiaries now, or who

might want to venture abroad. Is there any indication that they will insist upon a majority of voting control in the foreign nationals?

MR. WEIL: It varies from country to country. There is no uniform policy. For example Italy, particularly southern Italy, is delighted to have as many American industries come in with as much capital as possible. There are no controls because capital is needed so badly. Germany, on the other hand does not need capital. As a matter of fact, Germany itself is investing heavily in underdeveloped countries in Africa and the Near East. Considerable investment money comes into this country and Canada from Germany as well. I would say Germany today would be much happier with manufacturing licenses rather than with American companies setting up wholly-owned subsidiaries. Most major European countries—particularly France, which is still very nationalistic in its outlook—prefer an American company to have only a minority equity. Nevertheless, there is no direct effort made to control the American organization, and from a strictly legal point of view the American company abroad has the same rights as domestically owned industries have. When it comes to a question of national defense, there naturally may be different regulations applicable.

PROFESSOR OPPENHEIM: You see no signs of this developing into a Common Market policy where there might be agreement about it?

MR. WEIL: It may develop. As I mentioned before, it was amazing what was done in a comparatively short period of time, and there is a concerted effort being made toward a common policy in all these matters. I think it will come in time.

MR. LYELL H. RITCHIE:[4] Assuming the other seven countries do come to some sort of agreement, is there any indication at this time what approach, what meeting of minds, they may achieve with the Common Market countries?

MR. WEIL: I would say that for the time being it will be limited to working together, rather than trying to integrate the seven nations within the Common Market area. You probably are aware that in order to take in even one new member, the Common Market treaty would have to be ratified again by the parliaments of each country. Action of this sort today might even break the Common Market apart.

Actually, up to now, it was just the experts of these seven countries who have met. It was not done yet at top governmental levels. This meeting will be followed by a Foreign Ministers' conference of these seven nations, which should take place sometime within the next six months, probably again in Stockholm. Perhaps one day all the 17 nations of OEEC will get together. That is a long term hope.

A CONFEREE: Would any of the speakers care to comment on the present licensing situation in Japan?

MR. WEIL: There is very little doubt that within the past year or two, the Japanese Government has looked very carefully into licensing agreements which have to be submitted to it for approval. About five years ago it was fashionable to enter into licensing agreements in Japan, and a lot of agreements were made which really did not benefit the Japanese economy. In some fields licenses were

[4] Lyell H. Ritchie, Porter International Co., Washington, D. C.

given in the same sort of commodity, the same sort of product or process—needless duplication for which there was really no need. Japan today feels that it may be losing a lot of foreign exchange via some of these licensing agreements. Then too, some of the royalty payments may have been too high. Our experience has been, however, that if an American firm has something worthwhile to offer and expects a fair and reasonable royalty rate, the Japanese Government will approve such a licensing agreement if it can be demonstrated that the agreement is in the interest of the Japanese economy. I do know a number of cases where the would-be licensee has gone to the Government and said, "Will you please deny the present terms, the royalty is too high." In other words, the licensee has endeavored to get the Japanese Government on his side in order to get better terms from the licensor. That has been a practice in the last couple of years, and I think American companies should be very careful to make sure their would-be licensee does not enlist the aid of the government in getting terms for their own benefit.

MR. W. C. ASBURY:[5] Mr. Moderator, I would like to make a few comments about the presentation of Professor Schmidt.

It seems to me that he has overlooked the very important fact that in setting royalties you have to base your royalties in many cases on the competition. Usually —and this is particularly true in the oil industry—there is more than one way of doing a job. There may be several processes which can produce gasoline. They all have advantages and disadvantages. They may or may not have patent protection. If you come in with a new process of this type, you have to meet the competition, and this has a great deal to do with setting your royalty rate.

If you happen to be lucky enough to have something where no one else is in the field and it is brand new, then, of course, you have got a different situation—an unusual one, I might add.

But the hard facts of life for most people doing licensing are that they have to compete, and this has a big bearing on what you set as your royalty rates.

Now, the other point that Dr. Schmidt made is that perhaps the licensor would make more money if he had a down payment and he didn't worry the licensee about a running royalty per barrel or per pound or dollar value. Well, don't forget that the licensee has always the incentive of decreasing cost by increasing throughput.

The royalties are usually a small part of his total economic consideration. He has a big incentive of reducing his costs, operating costs, per pound or per barrel by increasing throughput, and it is perfectly logical then for the royalty to go along with the increase in production.

DR. HAFSTAD: Thank you, Mr. Asbury. Gentlemen, I think we will have to bring this discussion to a close if we are going to stay on schedule.

I want to thank Dr. Behrman and his associates for an interesting presentation.

Our next subject is "Tax Problems of the Individual Inventor."

The initial presentation will be made by Mr. John F. Creed. Mr. Creed is a

[5] W. C. Asbury, Esso Research & Engineering Co., Linden, N. J., Chairman of the Advisory Council of the Foundation.

research associate in the Foundation's patent research. He is an associate of the firm of Baker, McKenzie and Hightower in Chicago and Washington. Papers by Mr. Creed, an attorney specializing in tax practice, have been published in many legal journals.

Mr. Creed.

TAX PROBLEMS OF THE INDIVIDUAL INVENTOR

RESEARCH PROJECT INTERIM REPORT

MR. JOHN F. CREED: Thank you, Dr. Hafstad.

Gentlemen, the broad aim of Project 7a, "Taxation and Patents," is to evaluate the impact of taxation generally on patent creativity and utilization. Our inquiry today is into the Federal income tax problems of individual inventors.

My purposes will be to review tax law as it applies to patent transfers by inventors and to identify problems of current interest in that area. Dr. Bangs, who is to follow me, will discuss the results of a recent Foundation survey of individual inventors regarding their Federal income tax problems on matters relating to patents and inventions.

The salient tax question on patent dispositions by inventors is whether the proceeds therefrom are taxable as ordinary income or capital gain. The taxation of such transactions is governed principally by Section 1235 of the Internal Revenue Code which in 1954 was enacted to provide a tax incentive for inventors.

The section provides generally that the transfer by an individual of all substantial rights to a patent, or of an undivided interest therein, shall result in long-term capital gain. The patent transferred may be a United States patent or a foreign patent.

A transfer to a related person, other than a brother or sister, cannot qualify under the section. For this purpose, a controlled corporation—that is, one in which the transferor has a 25% or greater interest—is deemed to be a related person.

The section applies only to individuals, that is, to individual inventors and to individual investors who acquire an interest in the patent prior to its actual reduction to practice.

Under prior law, the inventor could realize capital gains only if his disposition of the patent satisfied as the sale or exchange of a capital asset. Section 1235 represents a departure from that standard in three important particulars: First, it eliminates the requirement of the six-month holding period, which previously had presented the troublesome question of when the invention came into existence. Secondly, it obliterates the distinction between the amateur and professional inventor in providing for the eligibility of both groups for capital gains benefits. Under prior law, the professional inventor was generally denied these benefits on the ground that the patent was held primarily for sale to customers and hence did not constitute a capital asset. And, lastly, the section provides specifically for the qualification of a periodic payment arrangement based on the productivity or use of the patent, or measured over its life.

In 1950 the Internal Revenue Service had announced, in Mimeograph 6490, that the assignment of a patent in consideration of royalty payments was not to be regarded as a sale of the patent. While this position met consistent defeat in the courts, it nonetheless resulted in considerable uncertainty in the tax law and was probably a deterrent to patent exploitation.

It is encouraging to note that the Internal Revenue Service has within the past year revoked Mimeograph 6490, which until that time had remained in force with respect to transfers falling beyond the scope of Section 1235. Thus, the existence of a royalty arrangement is no longer an obstacle to the realization of capital gains on corporate assignments of patents.

It should perhaps be emphasized that Section 1235 is not the exclusive means of obtaining capital gains treatment on the disposition of a patent. A transfer by a corporation, or by an individual in circumstances not qualifying under the section, may be accorded this treatment under the general tax law as the sale or exchange of a capital asset.

Most of the recent cases under Section 1235 have involved the construction of the term "transfer of all substantial rights to a patent." The legislative history of the section reveals that this requirement was adopted in continuation of the basic criteria of "sale or exchange" under then existing law. The courts have generally employed this standard in interpreting the new statute. Hence, the pivotal question continues to be whether the transfer of rights amounts to an assignment—that is, a sale—rather than a mere licensing of the patent.

Traditionally, the grant of the exclusive license to make, use, and sell the patented article has been held to effect an assignment of the patent. The regulations under Section 1235 adopt a somewhat more flexible standard and require merely that there be a transfer of all rights which are of value at the time of the transfer. Thus, it was recently held that the grant of the exclusive right to manufacture and sell constituted a transfer of all substantial rights to the patent, in that the transferor's retained right "to use" did not have "provable substantial value."

In transferring a patent, the transferor, in order to protect his interest, may find it desirable to retain the right to terminate the conveyance in the event the transferee defaults in payment or, in contingent royalty situations, fails to maintain a minimum standard of production or sale of the patented article. The courts have held consistently that the reservation of this right is in the nature of a condition subsequent, and hence not fatal, to an attempted assignment of the patent.

It should be emphasized, however, that the termination of the assignment must be contingent on an event or standard over which the transferor has no control. Thus, the retention of the right to terminate on six months' notice has been ruled to constitute a right to terminate at will which effected a mere licensing of the patent.

The transferor may wish to prohibit the transferee from sublicensing or subassigning the patent without his prior consent. The regulations under Section 1235 state that the reservation of this right may or may not constitute the retention of a substantial right by the transferor. The inclusion of such condition pursuant

to a royalty arrangement has generally been sustained by the courts as necessary to protect the transferor's rights as to future payments.

It is possible under Section 1235 for the employee-inventor, the so-called captive inventor, to realize capital gains on the assignment of a patent to his employer. The employment relationship, however, frequently presents the factual question of whether payments received by the employee are in consideration of the patent transfer or constitute compensation for services rendered. The regulations provide that in this determination consideration shall be given not only to all the facts and circumstances of the employment relationship, but also to whether the amount of such payments depends upon the production, sale, or use of the patent by the employer. The existence of a royalty arrangement, then, would seem to be strongly evidentiary that payments to the employee are in consideration of an assignment of the patent. It is perhaps ironic, though nonetheless logical under the circumstances, to find the Treasury now taking the position that a royalty arrangement is indicative of the sale of a patent.

An employer acquires no interest in the invention of an employee by the mere fact of the employee relationship. Where, however, the inventor conceives and perfects the invention during his hours of employment and with his employer's equipment, the employer is vested with "shop rights" to the invention, that is, he gains a non-exclusive license to use the invention in his field of business without compensating the inventor. It is well established that the employer's shop rights are insufficient to dilute the inventor's "substantial rights to the patent," and the inventor in assigning these rights, either to his employer or to a third party, is eligible for capital gains under Section 1235. A transfer to a third party, of course, is subject to the employer's shop rights.

As stated earlier, the assignment of a patent to a controlled corporation is not eligible for capital gains under Section 1235. Such transfer may nonetheless qualify under the general capital gains provisions as the sale or exchange of a capital asset. The transfer must, however, be supported by business purpose and be for a reasonable consideration. Of course, the patent must have been held by the transferor for more than six months. The eligibility of such transfers for capital gains was recognized prior to the enactment of the Internal Revenue Code of 1954 and has been sustained by subsequent decisions.

The Commissioner has traditionally looked with disfavor on transfers of patents to controlled corporations, and usually to no avail. His most recent opposition is to be seen in Revenue Ruling 59-210, issued less than two weeks ago. That ruling invokes Section 1239 of the Code to deny capital gains to the assignment of a patent to a corporation in which the individual transferor has an interest of greater than 80%.

Section 1239 provides generally that gain from the sale or exchange of depreciable property between an individual and a controlled corporation shall result in ordinary income. More fully, the property in the hands of the transferee must be of a character which is subject to allowance for depreciation under Section 167. A patent owned by a corporation would seem generally to satisfy this requirement. Under Section 1239 the interests of the transferor's spouse, his minor

children, and his minor grandchildren are attributed to him for purposes of determining his greater than 80% control of the corporation.

The Commissioner's position appears well founded and probably constitutes a formidable barrier to transfers to corporations in which the requisite control is present. Section 1239 applies to all sales or exchanges made after May 3, 1951. Thus it is possible that many such transfers of patents which were effected in the interim between this date and the issuance of the ruling will now be subject to tax consequences which were hardly visualized when the transfers were made. This would appear especially true with respect to transfers made in consideration of continuing royalty payments where the statute of limitations will provide only limited protection.

Generally speaking, Section 1235 has brought an unprecedented certainty and stability to the taxation of patent transfers by individuals. Nonetheless, the heavy incidence of litigation under the section reflects the need for careful compliance with its technical requirements. It is appreciated, however, that the bulk of this litigation has involved agreements which were concluded prior to the enactment of the section, in the period to which it has been made retroactively applicable. Prospective assignments can normally be made to conform to these statutory requirements.

This has been a somewhat summary discussion of the taxation of the inventor. A more detailed examination of the subject can be found in the December 1958 edition of the Foundation *Journal.*

Thank you. [Applause]

DR. ROBERT B. BANGS: Gentlemen, to provide some empirical basis for our studies of tax problems of individual inventors, a limited mail survey was conducted during the early part of this year. Questionnaires were sent to 200 individual inventors, and usable replies were received from 80, distributed among 24 states and the District of Columbia. Both captive and independent inventors were represented in the reporting sample, with slightly more than half the total response coming from captives.

The 80 inventors who responded to this questionnaire had received somewhat more than 1,100 patents during their lifetimes to date. Captive inventors, typically, had received more patents than independents.

Our returns showed that only 13% of the responding inventors had actually taken advantage of the right to treat proceeds from invention as capital gain either before or after 1954. More independent than captive inventors had taken advantage of the capital gains provision, as would be expected.

One-third of all the inventors who replied indicated that they are now more willing to make an outright sale or to grant an exclusive license to a patented invention because of the possibility of getting capital gains treatment under the 1954 law. Thus, it appears that the law will eventually have a considerable impact on the arrangements made by individual inventors for the use of their inventions, although too little time has elapsed for much change yet to be noticeable.

A number of our responding inventors were either ignorant of the special pro-

visions in the tax law for their benefit or had failed for some other reason to take advantage of these provisions.

In a number of cases, for example, inventors chose to maintain patented rights in a company owned or controlled by themselves, even though they might have made more advantageous arrangements or might have had more favorable opportunities to sell or license the patent elsewhere.

The most common reason for inventors being refused capital gains treatment was that they had sold or licensed something less than an undivided interest in the entire patent. In other words, they had maintained under their own control too large a proportion of the total bundle of rights. This is evident not only in our sample, but also in the series of tax cases coming before the courts in connection with administration of Section 1235 of the Internal Revenue Code.

Among the independent inventors in our sample, about one-half had been able to take advantage of the provision of Section 174 of the Internal Revenue Code allowing expensing of research and development expenditures, and one-half had not been able to take advantage of this section.

The principal reason in the case of those not expensing research and development costs was that this work was unrelated to the primary nature of their trade or business. In a number of other cases the patents developed as a result of the research work had not yet found a commercial use and therefore had produced no income against which research and development expenditures might be offset.

Eleven per cent of our respondents had made use of Section 1302 of the Internal Revenue Code to allocate income from an invention to earlier years. This income-spreading provision is of advantage not only to inventors, but also to all other occupational groups that may receive proceeds from several years' work in one year.

In the experience of approximately half of our reporting inventors, some foreign patents had been secured to support their American patent rights. These foreign patents had generally been taken on only a fraction of the American inventions. For example, less than 10% of our reporting inventors had had more than one-half of all their American inventions backed up by foreign patents.

No usable results concerning the nature of special foreign tax problems encountered by inventors were obtained in this survey because of the limited number of responses where special foreign tax problems were indicated.

Our returns showed that where patents were assigned by non-captive inventors, in about one case out of six, some related services were rendered by the inventor to the assignee. For the most part, these services were in the nature of general advice and consultation, rather than specific help in putting the patented invention into production.

In some cases where services are rendered in connection with the patent assignment and the inventor is compensated in a lump sum, there is some possibility that he may receive capital gains treatment on the entire proceeds, including the value of his services. We found no specific evidence of growing use of this practice in our reporting sample, but it is known from tax cases that this sort of arrangement has actually been made in a few instances.

Our survey results indicated that in most cases captive inventors received no compensation except a regular salary for inventions that they developed and assigned to their employers. In a few cases we found evidence of special bonus arrangements because of the extraordinary economic value of a particular patent. The great majority of captive inventors, however, had received no special compensation for the assignment of their invention. An opportunity may be present here for American corporations to increase the incentive of their inventors by offering special compensation related to the use or profitability of specific inventions.

Our returns indicated that captive inventors have somewhat more patents to their credit than do individual or non-affiliated inventors. This finding may be interpreted to mean that captive inventors generally spend more time working on activities closely related to, or likely to lead to, invention, whereas for many independent inventors, invention is primarily a hobby or spare-time activity. Another aspect of these results is that, generally speaking, only known productive inventors have the opportunity to become captives.

The results obtained in this limited survey of inventors' tax experience are by no means conclusive. They will undoubtedly be modified by later information obtained from more extensive surveys. However, the results obtained do fill a gap in our knowledge about how individual inventors put their patents into use and what kind of compensation or rewards they receive from these inventions.

The conclusion is inescapable that the special tax provisions for the benefit of individual inventors have had as yet only a limited impact on a relatively small number of a special group of people in our industrial civilization. As a group, inventors do not seem to have had any more difficult tax problems than any similar group in the population. The standard of compliance with tax rules by individual inventors also appears to be remarkably high.

The full explanation of this questionnaire survey and a more detailed analysis of the results may be found in the June 1959 issue of the Foundation *Journal.*

We plan, as time permits, to supplement our work on the tax experience of the individual inventor with a survey of the tax experience of corporations having extensive patent assets. For this purpose, a questionnaire will shortly be distributed to a number of corporations known to have control of important patent rights.

These results, we hope, will round out the Foundation's empirical studies in this area and add to public knowledge about the relations between the patent and tax systems.

We are privileged to have as our first discussant Mr. Scott P. Crampton, an attorney with the firm of Prince, Taylor & Crampton in Washington.

DISCUSSION

MR. SCOTT P. CRAMPTON: Mr. Bangs and Gentlemen. They tell me the term "discussant" as used on the program is a fairly new term and has not been too closely defined. Therefore, I take it a person in that category is entitled to ramble some, and I shall probably do so.

I think it would be interesting to comment at the outset on a point made by Mr.

Creed. Section 1235 was new in the Revenue Act 1954, and there is some question about the treatment of prior years—that is to say, the years 1951 through 1954.

It might be of interest to the group to know that Congress recently amended the Internal Revenue Code of 1939 to say, in effect, that the language in those years is now the same as it is under the 1954 Code.[6] One of the inventors who in the earlier years had been reporting all of his royalties as ordinary income—as he should have in accordance with the rules of the Internal Revenue Service at that time—decided he was now entitled to capital gain treatment and filed a claim for refund.

A District Court held for the taxpayer.[7] That holding was reversed in the Sixth Circuit on the theory that the statute of limitations had already run or that a new running of the statute of limitations did not begin at the time of this relatively recent enactment.[8]

The Fifth Circuit had reached the same conclusion between the time of these two opinions.[9]

I think it is of some interest that the same issue is now pending in the Court of Claims,[10] which tribunal in a somewhat related case held a new running of the statute of limitations does begin when Congress in effect changes the law.[11]

I mention the point because if any of you are representing people who have reported in those earlier years on the basis of treating income from royalties as ordinary income, it would certainly be a good protective measure to file a claim for refund and see what happens in that field.

One other point I think might be of interest. The importance of whether you do get capital gain on these royalties has already been mentioned. In view of the big difference in the rates, I am sure as a matter of federal law all of you are concerned with that importance. I think it is also of interest to look at your local law.

Those of us in the District of Columbia know if you hold a capital asset for two years, you may sell it and not report any capital gains tax or any ordinary income from the sale.[12]

In view of these various statutes it is apparent that the tax aspects of your dealings in patents should be given continuing consideration.

Another question that has been discussed is the situation that might occur if you sell your rights to a patent without having applied for a patent, or without having submitted a patent application, and perhaps with no intention of doing so.

I know of one situation where an individual for valid business reasons elected not to apply for a patent and then assigned all substantial rights in the invention to a corporation and reported the income received as capital gain. The question now pending is whether Section 1235 can be applied.

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[6] Act of June 29, 1956, c. 464, 70 STAT. 404, adding § 117(q) to the Internal Revenue Code of 1939.
[7] Dempster v. United States, E. D. Tenn., 162 F. Supp. 585.
[8] United States v. Dempster, 6 Cir., 265 F. 2d 666, petition for certiorari pending, 28 L. W. 3017.
[9] Tobin v. United States, 5 Cir., 264 F. 2d 845.
[10] Zacks v. United States, Docket No. 104-59.
[11] Verckler v. United States, C. Cls., 170 F. Supp. 802.
[12] District of Columbia Code (1951), § 47-1551(1) and § 47-1557a.(b)(11).

I am not sure of the answer. I can tell you, however, that the Internal Revenue Service has been considering the problem for an extended period, and we are still awaiting its views. Certainly this is a field that should be watched.

If there are not a number of important business considerations, it would probably be advisable to file an application for a patent. I believe that as soon as an application is pending practically all of the revenue officials will hold that the royalties received may be reported as capital gain.

There is another situation that might be mentioned here. It arises in cases where your client has a royalty contract and then makes a gift of it to his wife or children. There has been some conflict in the decisions on this issue. The recent holdings are that the donee of the gift is entitled to report the income as capital gain. The *Heim* case in the District Court of Connecticut went the other way,[13] but that decision was reversed by the Second Circuit a few months ago.[14] I suggest, however, that this field of law is far from being settled.

Dr. Bangs mentioned the possibility of inventors assigning an invention or a patent to a corporation and then, perhaps, being retained to perform services. He suggested that it might be possible to treat the entire amount received as capital gain. This again is an area that should be watched rather carefully. I believe that you might very well discover that a revenue agent would insist that in this situation there should be an allocation.

If your client received $10,000, it is important to know whether $8,000 of this was for service and the other $2,000 was for royalty, or whether just the reverse was true.

If you are interested in clarity of the point, it would be advisable to segregate the items and state in your assignment that the inventor will be continued as a consultant or an employee at a fixed salary, and then fix your royalty rate at a certain percentage or on a certain basis so that when somebody does examine the man's return, this question is at least clear-cut on paper.

Another possibility that might be considered on this topic is a covenant not to compete. This is a device that can often be put into these contracts. It would give the purchaser an ordinary and necessary business expense deduction and probably result in some ordinary income being received by the inventor; but the seller might be able to make a better deal than if he insisted on getting all of his return as capital gain.

The Internal Revenue Service recently ruled that a taxpayer could sell a fractional interest in his patent.[15] It seems clear, therefore, that you may assign someone 35 per cent of a patent and you will not have any trouble with the Treasury Department on that point.

There is one other factor that might be considered. It is the gift tax problems or the valuation problems that are always inherent in these transactions. Here is one of those situations where perhaps you can in your negotiations come up with some basis for fixing a value that will be helpful to you if later on you are

[13] Heim v. Fitzpatrick, D. Conn., 151 F. Supp. 574.
[14] Heim v. Fitzpatrick, 2 Cir., 262 F. 2d 887. *See also*: Commissioner v. Reece, 1 Cir., 233 F. 2d 30, and Dwan, Tax Notes, 45 A.B.A.J. 513 (May, 1959).
[15] Revenue Ruling 59-175, 1959 P-H Fed. Tax Serv. ¶ 54,899.

examined by the Internal Revenue Service. Thank you. [Applause]

DR. HAFSTAD: We have one more discussant here, Mr. Roscoe Egger, of Price Waterhouse & Company.

MR. ROSCOE L. EGGER: Thank you, Dr. Hafstad.

I looked over the impressive studies that have so far been carried out in Project 7a, and I think the one thing that strikes me the most is that we have to keep in mind that Section 1235 probably found its way into the Internal Revenue Code because it was necessary as a solution to a problem.

I'm not going to try to review in detail the historical background of Section 1235 because you have already heard about it here, and you have read about it, and will hear more about it as the studies of the project continue.

By the time the 1954 Code was in draft stage, it had become quite obvious to everybody that there was a great need to take some sort of step to eliminate the voluminous controversy and litigation that arose as a result of the distinction by the Commissioner and by the courts between the amateur and the professional inventor. You will recall that the principal issues in the great majority of these cases were (1) whether the inventor had in fact sold his patent rights, or whether the transaction was a mere license; and (2) assuming the transaction was a sale, whether he was engaged in the business of selling patents.

The almost infinitesimal lines of distinction which were drawn in many of these cases interjected so much tax risk into patent transfer transactions that it had become virtually impossible for the inventor to predict tax consequences with any reasonable degree of accuracy.

In enacting Section 1235, Congress sought to eliminate the controversy in these two major areas. This effort was not completely successful since we still face the same old question of whether substantially all of the interests of value have been transferred, or whether the inventor has retained for himself, directly or indirectly, substantial rights in the patent.

It is also true that some new questions are present in the application of Section 1235 such as relationship between transferor and transferee. However, many, if not all, of these questions are present in other areas of taxation outside the patent field, and, while I am satisfied that Section 1235 does not eliminate all of the questions as to the appropriate tax treatment of patent transfer transactions, I do think that the technical questions of interpretation and application are almost inherent in our taxing system.

I'd like to take just a minute to comment on the availability of capital gain benefit in Section 1235 to the captive inventor. Undoubtedly, employers could, if they so chose, enter into compensation arrangements with employee-inventors which would provide in part at least some of the benefits of Section 1235. For example, a salary-bonus arrangement could probably be made whereby, in an appropriate agreement, the employee could be paid a salary which could be related directly to the employer's shop rights to any patentable invention, and a bonus or royalty which could be related directly to the exclusive license or the assignment to the employer. I concur in Mr. Creed's observation that a mere bonus to be paid for each patentable invention would probably not be considered as

qualifying under Section 1235. I think it would be necessary to spell out in the agreement an arrangement such as I have described.

Obviously, Section 1235 was never intended to convert all income of inventors to capital gain without regard to source. Accordingly, when an individual works for a salary, if he is to receive some of the benefits of Section 1235, it will be an essential that he assume also some of the economic risks—that is, the risks of whether his efforts will or will not produce valuable patentable inventions.

Interestingly enough, the studies of this Foundation, about which Dr. Bangs has spoken, indicate only very few captive inventors are compensated in a fashion designed to take advantage of the special tax benefits. As for the independents, the solution to the problem which was worked out legislatively and embodied in Section 1235 intended to, and did, provide certain benefits in the nature of capital gain treatment. Thus, in a case of what we might term the independent or the professional inventor, he could conceivably turn all of his efforts into capital gain income. The indications are, however, that only a few actually do this to any substantial extent.

This conclusion is also supported by the Foundation's studies.

I would like to close with a comment on one or two unrelated technical points which do not appear to have been covered in other places. First, there has been some discussion with respect to what happens when an inventor sells or assigns his patent, receiving royalty rights in payment, and thereafter dies. The question is whether the capital gain benefit conferred by Section 1235 carries over to the widow or to the other successors of the inventor. I think it is quite clear, first of all, that future payments to be received by the heirs or next of kin will be subject to tax, at least to some extent. On the other hand, I think it is equally clear that such income in the hands of the heir would constitute income in respect to a decedent as dealt with in Section 691. In such case the Code makes it clear that the income retains in the hands of the successor the same character as it had in the hands of the decedent. Accordingly, it appears that the widow or other heir of the inventor would be entitled to the same capital gain treatment as the inventor would have had, had he lived.

I have one other point which Mr. Crampton covered so I won't repeat it.

The final point which I would like to cover concerns the application by the Commissioner of the theory of the *Associated Patentees* case. Until very recently, Internal Revenue was quite reluctant to rule or to concur that a purchaser of patents where the purchase price was under, or pursuant to, a royalty arrangement could get a current deduction for the payments at the time of making these payments. You will recall that the *Associated Patentees* decision held that payments made in the acquisition of patents constitute capital expenditures and were therefore not deductible as expenses.

However, the decision also holds that the purchaser was entitled to amortize his cost over the life of the patent, and in the absence of a better method for determining appropriate depreciation deduction, the Court permittted the purchaser to claim his yearly payments as depreciation deductions. In effect, this permitted the purchaser to charge off currently the costs of acquisition. This view was

recently supported by the Tax Court in the *Best Lock Corporation* case. What is more important is that recently, I understand, some private rulings have been issued by the Commissioner approving this treatment in the case of patent acquisitions.

Thank you very much. [Applause]

DR. HAFSTAD: The papers and the comments of the discussants are now open for general discussion.

Are there any questions on this?

This gentleman.

MR. DAYTON R. STEMPLE, JR.:[16] Mr. Creed, on this so-called 80% ruling—as I call it—recently by the Commissioner, is there any support for that in any of these court decisions and is there any indication that the court will sustain the Commissioner in that, or will they overrule him as they have done pretty much in the past on this type of case?

MR. CREED: To my knowledge, there has been no court decision which has dealt with this argument. As a matter of fact, there was a case, the *Neugass* case, decided about two months ago in the District Court whereby a man and wife had a 98% interest in a corporation to which they transferred their patent. But circumstances were such that the transfer date was approximately nine months before the effective date of section 1239, so the Commissioner was not able to make the 1239 argument.

It seems that the succession of litigation has just about reached that state, and to my knowledge there has been no opportunity for the Commissioner to invoke 1239.

My own feeling is that the ruling is well founded.

1239 reads: "Property which in the hands of the transferee is of a character subject to allowance for depreciation under Section 167." That is further amplified in the regulations to include property which can be amortized, and it would appear to me that a patent in the hands of a corporation would almost automatically, in the normal course, satisfy as depreciable or amortizable property.

And I can see no defense to it, quite honestly. It seems to be well founded, and it seems to be reasonable.

The obvious solution, of course, is not to acquire 80% of the corporation, and the attribution rules are limited, as I stated to the man's spouse, his minor children, and minor grandchildren.

If a man has a grown son, he can transfer 50 per cent of the corporation's stock to the son and evade the impact of Section 1239.

DR. HAFSTAD: There was another question over here.

MR. WILLIAM E. SCHUYLER, JR.:[17] Mr. Chairman, there is a large group of inventors who are captives of the United States Government. There was a time when they were given the incentive of retaining their commercial rights to inventions through license to the government. We hope that may return.

There is another group of independent inventors who undertake development

[16] Dayton R. Stemple, Jr., patent attorney, New York.
[17] William E. Schuyler, Jr., patent attorney, Washington, D. C.

contracts with the government by the terms of which they retain all rights, but they license to the government for governmental purposes.

Would a transfer of these retained commercial rights be all substantial rights within the meaning of 1235?

DR. HAFSTAD: Who will take that one?

MR. EGGER: Well, I think it should, because it seems to me that what the government retains there is a non-exclusive license which is similar to the shop rights of the employer, and it would seem to me that if the theory that is expressed here is correct—and I for one think it is—the shop rights themselves are not so substantial as to prohibit the application of Section 1235.

I think under the circumstances you described if he then did go out and make a sale or an assignment of all other rights of any substantial value, I can't see any reason why 1235 shouldn't cover it.

MR. JACOB RABINOW: [18] On two or three occasions I have done this, and I had no trouble with income tax. I worked with the government. I had certain cases of commercial rights left—foreign rights—and I sold them outright and they were treated as capital gains.

DR. HAFSTAD: Any other questions?

MR. HARRY R. MAYERS: [19] I have a reaction first to the use of the phrase "captive inventors." I recognize it as a "shorthand" term. However, I suspect that it would be as objectionable to the people to whom it is applied as it perhaps is to their employers, and in view of the extraordinary mobility at the moment of technically-trained people, I question the "captive" characterization.

From the standpoint of the tax problem being considered, I think it might throw the problem involved into a little better perspective to refer to these people as salary-guaranteed inventors. I think that is a little more relevant to the financial problem here in question.

Further, in what Dr. Bangs said there was a little implication—although I'm sure unintended—that there is no evidence that the salary-guaranteed inventors receive any reward for their inventions. I suspect it would be very difficult in in any corporation to find an outstandingly successful inventor whose economic status does not display some very tangible evidence of that success.

One other reaction on this tax point. As one considers the possibility of capital gains arrangements with salary-guaranteed inventors, I think the last speaker made a very important and fundamental point that it would necessarily be part and parcel of any such proposal that there be some sharing of the risks as well as of the agreed-to financial rewards which the capital gains arrangement would entail.

Just one final comment as to the research being reported on. I'm not entirely clear that I know exactly what the frame of reference of the research project is, but I take it that so far it has been primarily a questionnaire approach, which is presumably a necessary starting point for this kind of research. But in dealing with problems of this kind, it is my personal feeling at least, that the tax

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[18] Jacob Rabinow, Rabinow Engineering Co., Washington, D. C.
[19] Harry R. Mayers, General Electric Company, New York.

problems of these cases are so highly specialized that truly meaningful data can very probably not be obtained simply by the questionnaire approach, and that if the questionnaire has value, it may be more in terms of furnishing a lead to specific cases which could then be explored in depth.

DR. HAFSTAD: Thank you.

Does anyone here want to comment?

DR. BANGS: May I speak to this one?

DR. HAFSTAD: Surely.

DR. BANGS: We are happy to accept the terminological amendment and to call the captive inventor a salary-guaranteed inventor. I think that is a much better term, and we will use it in the future.

So far as the compensation of salary-guaranteed inventors is concerned, our findings do not go to the question of how well they are compensated, as compared with independent inventors, but merely in what form they draw their compensation; and there the finding is that the bulk of them draw it in the form of salary and salary alone and that other arrangements are rare.

So far as the third point is concerned, about how much information we can collect by mail questionnaires, we are well aware of the limitations, and before we did any questionnaire work we did some interviewing; and that plus a study of the cases was a basis for the questionnaire that we finally designed.

We were well aware that only a limited amount of information can be obtained this way.

DR. HAFSTAD: We are running short of time here. I think I had better call this one to a close, because we have two more papers before lunch. Maybe I can suggest you raise your questions informally with the speakers.

I thank you now for your contributions.

The next paper concerns "Patents and Other Factors in the Creation and Growth of Small Firms: A Preliminary Synthesis," and this is by Dr. Irving Siegel. He is a member of the staff here, as you know. I will dispense with further introduction to save time.

PATENTS AND OTHER FACTORS IN THE CREATION AND GROWTH OF SMALL FIRMS: PRELIMINARY SYNTHESIS

RESEARCH PROJECT INTERIM REPORT

DR. IRVING H. SIEGEL: It has been my custom as a manager of men, on the few occasions that I have had this privilege, to ask people who work for me not to write what they want to write by way of a report, but to write instead a summary of the report they want to write. And, of course, the natural result is that they write something quite lengthy anyway, something which is as long as any report should be.

I hope to emulate this practice, although, as you know, it is hard to apply to oneself the great precepts and principles which one imposes upon others.

I should like to present my remarks under three general heads.

One concerns patents and other factors in the small company's scheme of things.

Second is the relationship of a small company to other companies, with special reference to the role of knowledge.

Third is the relation of small companies to government, again with special emphasis on the knowledge factor.

Under these three heads, I can subsume a considerable amount of the findings of my project and also make some additional observations which are not yet in the nature of pertinent conjectures.

By way of prelude, I must tell you that my project is especially concerned with the past, present, and future of small independent firms, rather than divisions of large corporations; and with industries that are relatively new and that are known to offer opportunities for such firms. In selecting firms for study once an industry has been designated, we do not set up advance criteria in terms of patent ownership or utilization. On the other hand, we do not erect strict criteria of smallness, such as the Small Business Administration might invoke.[20] But we should certainly exclude firms with thousands of workers and annual incomes of tens of millions of dollars, even though such firms are not associated in the public mind with "big business." Thus far, we have studied the custom heat treating, aluminum processing, fabricated plastics products, electronics (Boston area), and scientific and other instruments industries. We have also inquired into the opportunities that might be afforded to small business in the iron and steel industry and auxiliary industries as new processes (such as direct ore reduction, oxygen steel making, and continuous casting) are adopted.

First, with respect to the patents and other factors in the small company's scheme of things, our studies show that many factors other than patents are naturally very important in the establishment and evolution of small firms. This finding should not be surprising, although it often is disappointing to the people who carry out the studies.

In my project, as I have already noted, we do not pick industries or company samples on the basis of any prior knowledge that the patent is important. One could easily "stack the cards" by making an industry survey in this manner. Instead, we start with industries that we know to be growing and to have some place for small business; and, within these industries, we select cases or samples without regard to any prior evidence of an interest in patents.

In this kind of realistic "environment," we find that patents simply take their proper place among other things. They are investigated in their natural context, and their significance is not exaggerated out of proportion. This is not to say that patents are not important to those small firms that engage in patenting activity or that were organized around patents, or that operate under patent licensing agreements. The ratio of such firms to all small firms, however, appears to be minor for the industries already studied.

On the other hand, as our little pamphlet—*The Patent System All Around You,* the pamphlet we prepared for teen-agers—observes, many companies come

[20] On the definitions used by Small Business Administration, see *Federal Register,* December 4, 1958 and May 1, 1959. For purposes of Government procurement, firms are usually considered "small" if they have 500 or fewer employees. Exceptions are permitted, however, for certain industries.

into contact with patents every day without even knowing it. They may, for example, use alloys or other materials that have been covered by patents. They may also use equipment that bears the patent imprimatur.

We find, interestingly, that the responses in our industry surveys are relatively small, in the neighborhood of 25 or 35%. In one case, due to an intensive follow-up effort in a compact geographic area very closely investigated, the sample response has been brought up to about 75%. But normally the percentages are much smaller.

Accordingly, when you find that patents have a certain importance as reflected in the returns of cooperating small companies, there is still the question as to how significant the results are in terms of the whole group of firms surveyed. You can operate on different theories as to the remainder—i.e., the non-respondents. I suspect that most of the firms that do not answer, after follow-up letters are sent to them, simply don't have much experience of a direct kind with the patent system and thus have little or nothing to report. This interpretation appears more plausible than the view that small firms are too harassed with other problems, or are too busy inventing or doing other things which might be covered by the patent system, to respond to additional questionnaires from Washington, albeit under non-government auspices.

Now, one of our investigators whose results have not yet been published in the *Journal* (Professor Paul R. Nichols) has listed a few of the items other than patents that are important to the responding companies. I shall not give you all of the replies, but just an idea of what some of the firms said.

As a basis for growth, most of the firms in this particular industry—scientific and other instruments—emphasized the importance of retained earnings. They mentioned retained earnings as a factor by itself and also in combination with other items such as sale of securities, adequate bank financing, venture capital, and even purchased patents.

Among other factors that the firms consider important in their origin, survival, and development are, of course, the caliber of management, trademarks, technical know-how, trade secrets, and government contracts.

The responding firms also mentioned patents. Forty-two per cent of them said that patents were important. But the response rate for the scientific instruments study is only about one-quarter, so you see how small the proportion becomes —about one tenth of the original sample—in the event that the non-responding firms had no experience with the patent system.

Now to another matter that I want to consider under the first heading of patents among other factors in the small company's scheme of things—the relation of patents to other forms and other embodiments of technical knowledge.

In all of our industry surveys, almost all companies emphasize the importance of know-how. It would seem as though know-how is the fruit of the little man's version of research and development. Know-how seems to be the result of the informal or unbudgeted activities of process or product improvement that are necessary for staying in business and growth; and there apparently is a lot

of such activity which does not get established, say, as a research and development program under Section 174 of the Internal Revenue Code.

Many small companies are evidently engaging in a certain primitive, low-cost, bread-and-butter research to establish and improve their technical know-how. They may not know that they are engaging in research, very much as Moliere's amateur gentlemen did not know he had been talking prose all his life.

Now, in addition to know-how, there are, of course, other types of information, other types of technical knowledge of value to firms. There are trade journals, as you know; and many people scan patent disclosures quite carefully to see what they can learn therefrom.

Furthermore, many small companies maintain wholesome relationships with larger companies. These arrangements sometimes provide financial aid to the smaller firms and may also provide valuable technical information.

I should like at this point to return to the sampling response problem, because so many other studies are based on specially selected companies and give a distorted impression as to the significance of patenting activities among all small firms in an industry. One of the surveys that has come to our attention was made by a student of engineering at the Newark College of Engineering. He surveyed a hundred "carefully selected" small business firms in a variety of industries, and his apparent results are, of course, very different from ours. He selected his firms "carefully"—no doubt, with a patent bias—whereas we selected our firms without regard to patent interest. His response, furthermore, was "over 60 per cent," but this limitation is given no consideration in the interpretation of the replies.

For example, one question asked was: "Do you retain a patent attorney either part time or full time?" About 83% said, "Yes." You see how weighted this case study is with patent-minded firms and how important the response rate becomes if abstention from reply signifies only minor patent activity or none at all.

"To locate a patent attorney, would you (a) ask a business associate first?" At least 81% of those who responded apparently had thought of this problem and answered, "Yes."

"Are you familar with patent procedures?" Eighty per cent said "Yes." The rate is still remarkable if we assume that non-respondents were different from respondents.

"On important developments do you have a search of prior art made?" Seventy-five per cent of the respondents said, "Yes."

"Do you provide for trial of new ideas?" About 73% said, "Yes."

"Do you know nonprofit research organizations are available to help you?" Seventy-three per cent again said, "Yes."

"Have services of nonprofit organizations been satisfactory?" About 67% said, "Yes."

It seems that about 37% consider the patents of others to be "restrictive"; and about 33% regard their own patents as "excluding others" and keeping markets "open."

Another question that might interest you is: "Have you found the United

States Patent Office a source of new ideas?" And about one-third said, "Yes."

Almost 30% said, "Yes," in reply to the question: "Do you make a practice of referring to the *Official Gazette*?"

The greatest percentage said "Yes" to the question: "Are new methods and/or new apparatus essential to your business?" The positive response exceeded nine-tenths.

So you see, in sum, that these are unusual companies, and therefore more likely to be dramatized in the press and advertising blurbs—especially if the non-response rate is conveniently overlooked.

I don't want you to get the impression that I am crying down the importance of patenting and related activities for small firms. But innovational behavior must be seen in a larger perspective. After all, most business activity, whether the firms are large or small, is in the nature of "routine," involving patterns already established and familiar. Otherwise, it couldn't be performed the way it is performed, especially through large impersonal organizations like corporations. Often, when you hear that, say, 30% or 50% of the products made by a company were not even in existence five or ten years ago, you will find there is a "gimmick" in the definition of a product, so that two versions or models of the "same" thing are counted as different. Furthermore, much of the research and development activity going into one product class may also be applied to other classes, especially successive models. You also find that many companies claiming inventive activity as part of their daily business frequently are large military research contractors; they *do* set great store today by military inventions which weren't made or weren't used five or ten years ago because the technology of warfare and defense has been changing so significantly.

At this point, it is desirable to cite some figures. According to a study made by the U. S. Bureau of Labor Statistics for the National Science Foundation, nearly 20,000 firms, including almost 14,000 manufacturing companies, "contributed" to the nation's research and development effort in 1953. About 12,000 of the manufacturing companies employed fewer than 500 (but more than seven) persons. The study also indicated that almost 3,000 firms owned patents—about one-fifth of the total number of companies actually "engaged in research and development" in 1953. However impressive all these statistics may sound, the fact remains the universe of companies is much, much larger. Thus, according to the Census of Business, Manufacturing, and Mineral Industries, there were 2.8 million companies in 1954, including 263,000 in manufacturing. Another source cited a higher figure for the 1954 manufacturing population: 331,000 firms.[21]

Evidently, the technological highways are not so crowded as we often imagine, and they comprise only a part of the system of roads that may lead to business success. It is pertinent to recall here the comment made by Professor Weldon Welfling in a note on the Boston area electronics industry.[22] At first, small

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[21] *Science and Engineering in American Industry: Final Report on a 1953-1954 Survey.* National Science Foundation, 1956; *Company Statistics,* Bulletin CS-1, U. S. Department of Commerce, 1958; and B. C. Churchill, "Rise in the Business Population," *Survey of Current Business,* May 1959, p. 18.

[22] PTC J. Res. & Ed., 1, No. 2, (December 1957), pp. 218-19.

companies that were not organized around patents may show little interest in the patent system, even when they have scientifically trained leadership. As they grow, however, and as they acquire control of products or processes that have commercial potentialities, they become more interested in ways to protect their technical advantage. Innovation becomes interesting when it becomes profitable.

Now, I want to say something about my second main topic, the relationship of small companies to other companies. I shall simply mention the practice of patent licensing, which has importance for a few of the small firms covered in our studies to date; and interferences and infringement proceedings, which are occasionally reported by our respondents.

One of the most interesting things about small business is that, as a category, it survives, despite the advertised difficulties of small firms. The pattern of persistence invites some attention.

Many reasons have occurred to us on contemplating the phenomenon of survival. One is the very geographic diffusion of the population and of industrial activity. Another is the fact that it is important, not merely to develop new basic and applicable knowledge, but also to locate it in a useful place and embody it in useful forms.

Thus, people who specialize have a kind of knowledge which others would have to spend considerable time and effort to duplicate. Firms that already are in existence and effectively operating in a given field have at least short-run advantages over potential competitors.

Large firms do not necessarily establish branches to compete specifically with small businesses. Various reasons might be cited, among which is the key fact that different people and different organizations have different profit horizons. They have different profit thresholds for selecting and ranking alternative activities. Innovation may be regarded as more or less profitable than investment in established lines; and two managements will differ on the wisdom of setting up new outlets.

Our studies also suggest that we ought to reconsider the idea that the small firm is essentially a competitior, and usually a losing one, of the large firm.[23] It is true that in many industries there is striking evidence of small and large firms uneasily coexisting side by side. But equally striking is the vertical complementary relationship between large firms and small firms, with the small ones often serving as patent licensees, vendors, consultants, suppliers, and subcontractors. Our study of the outlook for new steel technology revealed, for example, the importance of oxygen techniques for makers of equipment generating this gas in large quantities.

Sometimes, a large company may subcontract research as well as procurement. University professors occasionally start on business careers after working on projects that are commercially sponsored.

A large firm gets some advantage out of associating with the small firm too.

[23] After the Conference, John C. Green called to my attention a report distributed by his Office of Technical Services—*Research, Problem-Solving, and Use of Technical Information in Small and Medium Sized Manufacturing Firms*—in which the authors stress the "interdependence" of large and small companies.

Indeed, in the case of manufacturing subcontract arrangements, the large firm attains a kind of "accordion capacity," which it can either use or drop without any continuing responsibility.

Through the relationships established with large firms, small firms acquire various types of know-how and experience which often stands them in good stead in other activities. The small firms benefit in very much the same manner as companies that engage in research and development activity for the government and are left with a residue of patents, skills, and experience which can be turned to good account in the private sector.

I shall now deal briefly with the third topic, the relation of small companies to government.

I have just said something about research and development activity. As you know, relatively few prime contracts for research and development are available to small business. In some instances, however, subcontracts are available—e.g., from prime contractors for weapons systems.

It is preferable, of course, for the small business that can to do in-house research rather than, say, have it farmed out to research institutes. If you can keep the benefits of research in terms of growing know-how, or an expanding patent portfolio, or the increasing experience of your own people, you are adding really to the intangible capital of your company.

The Small Business Act of 1958 has a potentially important provision for stimulating research activity for the benefit of smaller firms. I commend to your attention Section 9 of that Act which contemplates the encouragement of research pools. These would be set up by small business firms acting in concert—and with the "blessing," if I may call it that—of the Federal Trade Commission and the Attorney General.

Another recent Act that will interest many of you is the Small Business Investment Act of 1958, designed to encourage the pooling of private funds as equity capital for small business.

Many of you may know that in military procurement arrangements a small business "potential" is recognized, namely, the area in which small business can conceivably do the work required. Congressmen and others zealously watch to see that this potential is utilized as fully as practicable.[24]

In closing, I wish to repeat several points:

1. Although the studies we have thus far made of new and growing industries indicate only a limited direct dependence of small companies on owned and licensed patents, the importance of unpatented or unpatentable know-how is universally acclaimed as a factor making for success. This generalization does not, of course, disparage the importance of patents for the relatively few small firms that have been organized around, or are heavily dependent upon, patents.

2. Companies become more interested in patents and trademarks when they acquire a certain size that broadens considerably their market potential. Until

[24] For additional observations on the relation between small business and government, see, for example, *Final Report of the Select Committee on Small Business*, H. Rept. No. 1148, 85th Cong., 2nd Sess., January 3, 1959.

then those that are not organized around patents seem to be much more concerned with such problems as the generation of internal funds, access to outside capital, and development of capable management than with the creation and protection of technical knowledge.

3. The vertical complementary relationship of large and small firms, which often strengthens the technical foundations of the latter, is just as noteworthy as the better publicized stereotype of unequal competition on the same plane.

4. Technical, as well as geographic and economic, considerations suggest the continuing viability of "small business" as a category despite the hazards and uncertainties that beset the individual small firm.

5. Recent legislation and the continuing solicitude of the Congress suggest expansion of opportunities for small business to participate in research and development activity.

6. Although research is becoming in increasingly important feature of our economic life, relatively few companies actually have formal research programs; and the problem of achieving and maintaining profitability remains more complex than the provision for technical innovation.

7. The methodology employed in industry studies of the role of patents among other factors in the creation and evolution of small firms necessarily leads to results which sound different from, but ought to be consistent with, the results obtained in projects restricted to firms having a well-defined patent interest.

Thank you. [Applause]

DR. HAFSTAD: Thank you, Dr. Siegel.

I think we had better go right on to the next paper in order to stay on schedule. It concerns "Variations in Patent Utilization by Different Types of Companies," by Joseph Rossman and Barkev Sanders of the Foundation's staff.

VARIATIONS IN PATENT UTILIZATION BY DIFFERENT TYPES OF COMPANIES

RESEARCH PROJECT INTERIM REPORT

DR. JOSEPH ROSSMAN: Mr. Chairman and Friends: The object of the Patent Utilization study is to determine by valid statistical methods the proportion of patented inventions that are used in production, and, as far as possible, to determine the contributions that such use makes to our economy.

To date we have published in the Foundation *Journal* a number of reports which are based on questionnaires that we sent to a 2% probability sample of patents issued in 1938, in 1948, and in 1952.

The statistical analysis that Dr. Sanders has made and which has been checked by a number of very capable and competent economists and statisticians indicates we have a very reliable sample.

Now, time being so short, all I can do here is refer you to the papers which already have been published.

In Volume 1, No. 1, (June 1957) the first issue of the *Journal,* we published our first report on the Patent Utilization study, which gives a very detailed analysis of

some of the answers that we received to our questionnaire.

In the Conference Supplement of 1957, some more findings are reported.

In Volume 2, the March 1958 issue, we reported findings under the reasons for non-use of patented inventions, and the 1958 Conference Supplement contained a report and discussion of the presentation that was made at last year's conference.

In Volume 2, No. 3, the September 1958 issue, we published a report on the economic impact of patents, and in Volume 2, No. 4, the December 1958 issue, the attitudes of the assignees toward patented inventions.

I wish I had time to just give you the highlights, but, unfortunately, it is impossible. Now, just one or two points. We found, for example, as reported in our last year's conference, the very surprising result that about 26% of patents owned by companies are licensed, and about 41% are willing to license their patents, and 11% have indicated they might license if they were hard pressed. Only about 6% stated that they would probably not license under any circumstances.

In the reported study on reasons for non-use, 40% indicated that the reason the patented invention was not used was that it reached the point of competitive disadvantage. That is the main reason. Thirty percent indicated there was lack of market demand. Fifteen percent indicated rapid obsolescence.

In our report on the attitudes of assignees, we gave an analysis of the reasons this 26% of patented inventions were licensed. We found 39%—which was the largest percentage—indicated the reasons were for cross-licensing purposes.

Nineteen per cent indicated the main incentive was royalty income.

Five per cent indicated the licensing occurred on account of government contracts.

In our September 1958 report we found that 75% reported they obtained very definite and tangible returns in value from their patents.

From patents which were in current use in this group, 34% who reported estimated the dollar gains and losses they obtained as follows:

Ninety per cent said that their net gain amounted to, on the average, about $600,000 per patent, and for the balance of this group we found they reported net loss averaging about $88,000 per patent.

Of course, these are figures based on our sample, and if our sample is statistically valid—and we believe it is—these percentages should be true for the entire population of the actual existing patents.

Today Dr. Sanders will give you the highlights of a further study that we haven't yet published on the variations among companies and their patent utilization rates and the economic impact of these variations.

Dr. Sanders.

DR. BARKEV S. SANDERS: Mr. Chairman, perhaps before I proceed I should ask how much time I have. By my watch, it is 5 minutes. Should I gauge myself to the 5 minutes, or 10 minutes, or 15 minutes?

DR. HAFSTAD: I was thinking about 15 minutes. We will have to be a little late for lunch.

DR. SANDERS: The focal point of the patent utilization study is the determination of the proportion of patented inventions that are put to industrial use. The study also includes many other facets bearing on the contribution that the patent system makes to our economy. Some of these, as Dr. Rossman has indicated, have been made the subject of prior interim reports. There are many more that can be exploited provided the resources of the Foundation will permit.

To give you a little illustration of what has been done: For years people have argued and speculated regarding the proportion of patented inventions that were put to industrial use. There were all sorts of "guesstimates," but none of them based on verifiable, empirical data that can be repeated by someone else for confirmation. Therefore, the Senate Subcommittee on Patents, Trademarks, and Copyrights in its initial official report voiced the attitude and knowledge as it prevailed at that time. This is a chapter heading: "The Effect Upon the Patent System and the Economy of the Issuance of Vast Numbers of Unused Patents."

Then follows:

> The accumulation of vast numbers of unused patents by some companies and the effects of such accumulation (1) as a deterrent to newcomers attempting to enter these industries and (2) on the conduct of research by others is a matter of real concern. Related to this problem is the number of patents issued to corporations as against those issued to independent inventors. Indeed, the fate of the independent inventor, heretofore a prolific source of new inventions, is a cause for alarm.

Now, I do not mean to say at all that this was misrepresenting the facts. There were no facts. These were legitimate inferences from what was presumed to be known. I'm sure if the subcommittee were writing its report today it would write it differently.

Our findings to date indicate that every one of these assertions on which we have been able to shed some light appear to be almost the opposite from what has been commonly assumed to have been the facts.

On the score of "vast numbers of unused patents," our findings to date indicate that as far as the assigned patents are concerned—and the subcommittee was addressing itself to that group primarily—55 to 65% of the patents by the time they are ready to expire are being used, or have been used, in industry.

Our earlier study indicated that assignees, owning 75% of the patents sampled, retrospectively considered the patent of value to them.

To counter the statement that "the accumulation of vast numbers of unused patents by some companies and the effects of such accumulation as a deterrent to newcomers," the National Science Foundation made a study of research and development expenditures of companies, and incidental to that, also considered patenting. It was found that 55% of the companies studied owned patents and had patents pending. That is, they were still active. Fifteen per cent owned patents, but did not have any pending patents. And 5% were companies that did not have any patents, but had patents pending. They were new entrants.

What does this indicate? That there is fresh movement—just like in a fountain, fresh water is flowing in and stagnant water is flowing out. This evidence shows there is no deterrence to new entrants. Another indication of this is that patent exploitation is much higher in the smallest companies than in the largest companies.

The research and developmental expenditures per patent owned and per patent application pending are more than twice as large for the larger companies in comparison to the smaller companies, indicating that these small companies find the patent system a useful way to maximize their research and development.

The patent acquisition rate is 15 times higher in the smallest companies than in the largest companies.

I do not want to take the time to go to the blackboard. But of the initially assigned patents, the larger companies obtain something like 65%; the smaller companies obtain about 35%. But of patents which were initially unassigned, but subsequently became assigned, over 88% became assigned to these smaller companies.

So, there is no evidence of deterrence.

On the question of evidence derived about the independent inventor, the subcommittee's own study, fortunately, shows that between 1936 and 1955, at least, there has been no appreciable diminution of the proportion of patents going to individual inventors. It was 42% in 1936; it was 41% in 1955.

What is most surprising is that within this time the total self-employed diminished from 11 million to less than 8 million, while the total corporate employment increased from some 25 million employees to something over 56 million.

What our research really does is reverse the question from how much ground have individual inventors lost, to what is keeping the springs of invention high among individual inventors despite their progressive diminution in the labor force? And I think that finding the answer to this may prove highly significant.

Now I would like to turn to a few of the tables.[25] I think I have another five minutes, and I will simply comment on some recent findings summarized in these tables.

Of course, in the past we often have dealt with averages because it is simpler. You can cite one figure, and it is a kind of summary statement. But, after all, averages could be misleading, and as our research deepens, we want to see the variations. We can learn much more from the variations, even though interpreting them is time-consuming and not always unequivocal.

In Table A you will find that I have shown, on the basis of the Senate Subcommittee report, the total number of patents that were in force at the end of 1955. I have grouped these into deciles on the basis of the listing that the subcommittee's publication No. 3 gave. First, companies with the highest number of patents constituting the highest decile, and then those in the next decile, and so on. At the end are left all the others that were not listed as the residual group. The residual group I have called small companies.

The large companies (those listed) include companies with 101 patents or more issued to them during the period 1939-55; all companies with assets sometime in 1954, of $100 million or more with one or more patents; and some companies with 75 to 100 patents.

Now, if you look on your Table A, columns 2 and 3, column 2 gives all the

[25] See Appendix II, page 110.

assigned patents based on the subcommittee report and the residual, which again comes from the subcommittee report.

Column 3 shows the percentage distribution for these patents. I have grouped them so that there will be roughly about 10% of patents issued in each group.

Now, the next column, column 4, shows the distribution of our 2% sample for these identical companies. In other words, we took patents in our sample company by company and put them into groups in which these companies fell according to the number of patents issued to them. Of course, there were some instances where we did not have any patent for a particular company, but we grouped in each group as many as we had representation of. The percentage distribution of these is given in column 5.

Compare column 5 with column 3 and see how close they are. You see, this means that our 2% sample for three years matches with surprising closeness the number of patents in force at the end of 1955, that were issued to these companies for 17 years.

Now, let's turn to Table B. In Table B we show the proportion of assignees that have replied to our questionnaire, again maintaining the groupings we developed for Table A.

You notice that the percentages are somewhat different for different groups, but by and large the utilization rate shows inverse relationship to the company rank. As we go down the rank according to the number of patents held and large assets, the utilization percentage seems to increase. There is certainly a significant difference between these so-called groups of large (listed) companies, of which only 50.6% of the patents were utilized, as against those non-listed, small companies which reported 76% of their patents were either in current use, had been used in the past, or were about to be used.

Now let's turn to Table C. In Table C we have also added the information on utilization of the sampled patent obtained from the inventor in those cases where we did not have an assignee return. So we have returns for about 75% of the patents in our sample. These are all assigned patents.

Look again at the very decided difference between "large" companies and "small" companies. "Large" companies have about 53% of patents used or about to be used, "small" companies have 75%.

Let's turn to Table D. Of course, utilization is a very broad term. We wanted to get as close as possible to really evaluating the extent of use. In Table D we show the statement of the assignees as to whether the sampled patent had been used extensively or very little, and you notice again it is the "small" firms that more often indicate extensive use of their patents, in spite of the fact that their patent utilization rate is much higher.

Now, in Table E this difference between "large" and "small" becomes somewhat less clear cut. Table E is the effect of use on sales. The advantage of smaller companies is still there, but it's not quite as marked. Why? Because some of these small firms are newly formed firms. In other words, the use of the sampled patent has just begun.

Our study suggests that some of the most vital new growth comes from companies coalescing around one or two inventor's patents. In other words, there is indication that our patent system is contributing to the growth and further extension of frontiers of competition.

The last table further confirms what I have just indicated. May I have the time to read one paragraph?

The further analysis of our data tends to strengthen our inference that the most intensive patent exploitation for assigned patents is to be found among the "small" companies. Other evidence which supports and strengthens this conclusion, which we do not have time to present in detail, is the fact that the acquisition of unassigned patents by smaller companies is 15 times greater than by larger companies.

A study designed specifically to compare the growth and survival rates of companies with a strong patent position, of newly formed young companies, and of others without patents will be most revealing as to the economic potency of patented inventions in extending and intensifying the frontiers of competition. That is, I think through such empirical studies, we can establish by fact rather than by guess that our patent system provides a dynamic force in our economy. [Applause]

DR. HAFSTAD: Thank you very much for these very persuasive arguments.

I have been asked to call on Bob Spurdle of Sun Oil Company, who has conducted some comparable studies, if the audience will bear with us for about five minutes more.

Is Mr. Spurdle here?

MR. ROBERT O. SPURDLE:[26] I think that I can confine my remarks to about two minutes.

Last year at this time I directed some suggestive comment to Dr. Sanders and Dr. Rossman concerning certain procedural aspects of this study. That comment entailed two fundamental questions, one of which was concerned with the *definition of "use"* that was used *by the "answering people"* in evaluating the utilization of their patent portfolios. The other question was directed to the validity of this statistical approach based upon random sampling on a very, very small percentage basis.

It would appear that my questions, as far as statistical approach, were unfounded, and the approach seems to be substantially supported.

During the last year, first as a matter of curiosity and then finding it of real value, I have worked through an evaluation of the Sun Oil Company's patent portfolio. To put this into proper frame here, Sun Oil Company is a large company. It's about ninth or tenth in size among the major oil companies, and our patent portfolio in the oil industry is about of that order. Now, in this study I departed from my original premise that the "use" of a patent must entail the actual practice of a *claimed* invention. I went instead to the term "usefulness" as affording a broader base for evaluation; and that usefulness is based upon five factors:

1. The actual practice of a claimed invention by the patent owner or by a licensee under the patent;

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[26] Robert O. Spurdle, Sun Oil Company, Philadelphia.

2. The specific licensing of a claimed invention;

3. The broader patent support base that is provided for licensing programs even though all specific patents in the license portfolio are not actually used at all times—this serving to support and protect the licensee;

4. The use of patent potentials. That is, the use of potentially practicable inventions that have been claimed in patents as trading basis in negotiation with other companies for an exchange of valuable rights, and finally:

5. The value of a patent portfolio in support of, and as a justification for, maintenance and expansion of an expensive research program.

Now, with that background I give you a concrete picture to set against the broad frame that these remarks have developed and have provided for preliminary screening. My evaluation has shown that our usefulness factor is about 35%. This "usefulness factor" is based upon patent assets developed within the last 15 years in a portfolio of seven or eight hundred patents having today average unexpired life of eight to ten years.

In light of our size, this figure would tend to support the statistics that have been set forth in Table A here, but at a slightly lower level. On the studied statistical basis we would have a patent utilization factor of about 50%. I think that ours is not higher than 35%.

Thank you. [Applause]

DR. HAFSTAD: I want now to thank all of the participants this morning for their presentations and the discussions. I want to thank the audience for being patient with us and carrying through to the end of this session.

This meeting is adjourned.

[Whereupon, at 12:45 p.m., the morning session of the Conference was adjourned.]

Thursday Afternoon Session

June 25, 1959

2:00 P.M.

DR. HAFSTAD: Gentlemen, will you be seated? We would like to start on time. Will the meeting please come to order.

I have a couple of announcements to make. The first is that this morning we were rushed for time. I should have asked each of the questioners from the audience to identify himself and give the company association. If there are members here who did ask questions this morning, we would appreciate it if you would jot down your name, company affiliation, and the question, and pass it up to the secretary.

This afternoon's session will be devoted first to a discussion of "Compulsory Licensing and Color Movies, the Effects of Technicolor and Eastman Antitrust Decrees." This will be presented by Professors Oppenheim and Frost, with discussants as indicated.

I now would like to take time to introduce Professor Oppenheim to those few who don't already know him. He is our Adviser on Research and the Principal Consultant on the Foundation research project "Effects of Certain Antitrust

Decrees Involving Patents as a Major Factor." He is a professor of law at the University of Michigan Law School, was co-chairman of the Attorney General's National Committee to study antitrust laws, and was recipient of last year's Kettering Award. Professor Oppenheim.

COMPULSORY LICENSING AND COLOR MOVIES: EFFECTS OF TECHNICOLOR AND EASTMAN ANTITRUST DECREES

RESEARCH PROJECT INTERIM REPORT

PROFESSOR S. CHESTERFIELD OPPENHEIM: Thank you, Mr. Chairman and Members of the Conference. I fear that the designation in the program might be somewhat misleading. I am listed as principal consultant, but the principal work and the "sweat-without-tears," I believe, has been that of George Frost, so that my function is simply to give you in summary fashion a little background of this project, and Mr. Frost and the discussants will give you their outward and inward reactions.

All of these projects have been undertaken with the primary research goal of evaluating the efficacy of the antitrust decree in prying open the relevant markets to viable competition, with stress upon the extent to which this can be imputed to the patent provisions of the decree.

In this endeavor we have adhered to two guideposts. One is that the assessment of any changes in the structure, behavior, and accomplishments of the industry or the relevant lines of commerce, which might or might not be attributed to the decree, requires a method of probing that demands documented facts as paramount to the lesser probative value of inferences based upon mere opinions.

The other is that the derivatives of each antitrust decree must be studied and appraised in the full context of the plurality of factors which may have operated in causal relation to the positive fruits of the decree, or account for the absence of anticipated consequences. This means that the analyst must be astute to guard against the oversimplification that antitrust is the solitary force from which a desired result stems.

Previous studies and the present Technicolor project have underscored the need for awareness that the ascertained facts and the relentless probing and testing of their accuracy by field interviews and followups may reveal offshoots for which antitrust alone can claim little or perhaps no influence.

Multiple pressures of government policies and internal or external considerations such as those affecting managerial personnel, skills, and decision-making may increase, diminish, or cancel out what might otherwise be wrongfully ascribed to antitrust.

I remind you that this Technicolor study is the third in the Foundation series. The first explored the Besser decree in the concrete block-making machine industry. The second inquired into the Vehicular Parking decree. These selections were made with the thought that we should start to cut our teeth on what appeared to be less complicated situations before progressing to Technicolor, which was regarded as a study with more challenging dimensions.

At any rate, we had no presumptions or preconceptions regarding what the

facts would turn up. Each study must stand on its own factual feet. But as additional studies are made, it is hoped that similarities and dissimilarities will stand out in bolder relief as a possible basis for generalizations warranted by comparisons of the effects of various decrees.

Now I turn to the Chairman to introduce Mr. Frost, who, as I said, has shouldered the major responsibility for these studies, and he will epitomize this particular one.

DR. HAFSTAD: Thank you, Professor Oppenheim.

George Frost, as you know, is the principal investigator on this particular project. He is a patent attorney and practices in Chicago. He was a member of the Attorney General's National Committee to Study the Antitrust Laws and he has been teaching patent and trade regulation law at the John Marshall Law School in Chicago.

The report on the decrees in the professional color motion picture industry was preceded by presentation of a series of slides illustrating the history and techniques involved. The slides shown were as follows:

1. A view of three projectors illustrating the process of additive three-color color reproduction.
2. Edison patent 1,138,360 (directed to one form of additive color motion picture display).
3. A color view in perspective of the essential physical relationships used in the Technicolor three-strip camera, together with three color separation films produced thereby.
4. A view in color of three color separation matrix films used in the Technicolor imbibition release printing process.
5. A diagrammatic view in color showing the respective layers of Eastman Color professional camera film and prints made therefrom.
6. A photomicrograph of Ektachrome monopack film before and after development.
7. A view of three Technicolor color separation films, Eastman Color negative film, and Ansco color negative film.
8. A view of Agfacolor (Germany), Gevacolor (Belgium), Feranicolor (Italy), Kodachrome 16mm. and successive frame negatives.
9. A view of VistaVision, standard, and anamorphosed color motion picture negatives in Eastman Color.
10. A diagram illustrating the colored coupler action in Eastman Color negative film.
11. A diagram showing the alternative processing methods for making color release prints from a colored negative camera film.
12. A view of the actual prints produced during the various steps in the various alternative processing methods for use with colored negative camera film.

MR. GEORGE E. FROST: Well, those are our slides, and we would like to resume from the platform.

Is Neil Twomey in the room? Neil, would you just stand up? Neil has been working with us for quite a while. Now he is with a New York law firm. I just want to say that we do appreciate what you have done, Neil. Thanks.

[Applause]

Let's get back to the Technicolor case. Here we have a situation where Technicolor developed its process with the three-strip negative and the imbibition prints by about 1935. Almost simultaneously Kodachrome was put out by Eastman.

It turned out that there was a Patent Office interference between a Technicolor application and an Eastman application. The Technicolor application was based on some earlier Technicolor work on these three-layer processes. The Eastman application related to the Kodachrome development. The Troland patent, owned

by Technicolor, won the interference. Eastman ultimately took a license. The license included provisions with respect to the manufacture and sale by Eastman of a film for professional motion picture use—that is, the 35-mm. size. We need not dwell on the details of the license. The important thing—and the thing emphasized by the Department of Justice—was that before Eastman offered a 35-mm. monopack film to the professional trade generally, Technicolor would have an exclusive period of not less than 18 months and as much as 36 months during which Technicolor would be the only company selling and processing the film for the motion picture industry. Eastman did not offer such film until 1950, after the patent and license had expired, so that the exclusive period never came into being. It was this license, coupled with some other factors, that formed the major basis of the antitrust complaint. The argument of the Government was fundamentally that Eastman and Technicolor had divided fields, that Technicolor had induced Eastman to stay out of the 35-mm. motion picture business, that Technicolor had been successful in doing that, and that Eastman had not put out, let's say, Kodachrome or some similar film, because of this agreement (coupled with some other agreements and relationships they had).

That was the purport of the antitrust complaint insofar as we're concerned here this afternoon.

The antitrust case was wound up by two consent decrees, one in 1948 against Eastman. Eastman agreed to license royalty-free about a dozen patents, 13 patents to be exact. It agreed to license on a reasonable royalty basis another 14 patents. It agreed to license on a reasonable royalty basis improvement patents.

The decree as to Technicolor was entered in 1950. Technicolor was the main villain in this so far as the Antitrust Division was concerned. Technicolor was required to grant royalty-free licenses on about 90 patents and reasonable-royalty licenses on an additional 60 patents. And it too was required to grant licenses for future patents over a five-year period. Both the decrees contained provisions directed to know-how and disclosure of the know-how.

The subject to which we'd like to address ourselves this afternoon is what has been the effect of these decrees.

We can start with a very narrow question of compulsory licensing, and that is the easiest question to answer. I think it is fair to say that as a practical matter the compulsory licensing aspects of these decrees have been relatively unimportant. The Troland patent expired before either decree so it was out of the picture anyhow (whatever otherwise may have been the situation). And I might add the provisions that the Government criticized on the license had been cancelled around 1946.

As to other patent rights, there is only one other manufacturer of monopack film in this country who has actually been making such film, and that's Ansco. I wish I had time to show you a few slides of Ansco film. But, in any event, Ansco has been making film based on a German development. It was a German development in the middle '30's. Whatever can be said about this Troland patent

—and there is a great deal of argument about it—one thing seems to be absolutely certain, and that is that it couldn't cover the Ansco type of film.

I won't dwell on that except to say that Ansco is not concerned with the Troland patent. Ansco has not used the colored coupler principle. And, on top of that, it's been the Eastman policy to offer its patents for license. So that all around it seems that Ansco hasn't gained or lost because of the decree.

The volume of imported color film is so low that we need not concern ourselves with it.

Now, let's consider the three-strip camera. Bear in mind the Technicolor patents involved are primarily to the three-strip camera and to the imbibition process. As to the three-strip camera, the minute the Eastman Color was placed on the market and was proven a success, the three-strip camera was through. Those cameras cost about $30,000 apiece. They were bulky, cumbersome, something that no one would use if it could be avoided. Eastman Color negative has simply displaced the three-strip camera. Whereas before the decree we had Technicolor being the principal source of the color separation negatives and the camera facilities, now we have the industry using Eastman negative film almost entirely. So that, in that respect, all the patents on the three-strip camera are really quite unimportant.

On the imbibition process we have a somewhat different situation. About 1953, Deluxe, a processor, completed a license agreement with Technicolor. This was the result of rather extensive negotiations. The license included subject matter over and above what was required to be licensed by the decree. But it certainly was based, at least in part, on the decree.

The curious thing is that after all these negotiations, Deluxe ended up by going to Eastman Color. In other words, the investment in the imbibition processing equipment, which was immense, was such that Deluxe just lost interest and decided to go into Eastman Color processing.

So I think we can say that as of today, the effects of the decree, licensing effects, are rather unimportant.

What about other effects? What about broader effects of this decree? Has the decree created competition? Has Technicolor's or Eastman's market position changed?

I think there is one fact in this situation that is clear beyond all doubt. The industry has changed. The change is great. Secondly, the change has been due to Eastman Color. The Eastman camera film has replaced the three-strip camera. Eastman Color release printing done by independent processors (and initially by studios) has given rise to competition with Technicolor as to making the imbibition release prints, and prices have gone down.

Let me just give you some quick figures. Prior to 1931 Technicolor was charging about 8¾ cents per foot for two-color film. This price applied to release prints above a minimum quantity. In 1931 the price was 7 cents. In 1932 it was 5½ cents. That price, that 5½-cent price, applied to the three-color film, which was a very good quality job. In 1950 the price was 6 cents—from 5½ to

6 cents in that long period. Then here's the interesting thing. In 1953 the price was back to 5 cents.

In 1953 Eastman Color existed. Technicolor was fighting to retain its processing business as against the competition of these independents using the Eastman Color process.

Going from 1950 to 1953, we have a price reduction at a time of increasing costs. It was a substantial increase in cost because during that period Eastman increased its charges for the blank film used by Technicolor.

I might say that during the earlier period prior to about 1953, Technicolor bought all its film from Eastman. It now buys very little.

Now, just by way of comparison, as against the 5-cent price of the Technicolor release prints in 1953, the Ansco and Eastman release print stock was running around 6¼ to 6½ cents a foot. What that really means is this: That, economically speaking, if you have a motion picture and want to make a few prints, then the monopack Eastman Color or Ansco stock has an economic advantage, because this 5-cent figure for Technicolor doesn't begin to apply until a large number of prints are made—let's say over about 50. Then if you have a large number of prints to make, Technicolor has the economic advantage. And that's the situation as it exists today.

Technicolor continues to process. Its volume is down very substantially. It is having its problems that way. But it's heavy in the large-volume productions —just because, you see, once you make the three-separation matrices, and you get all set to grind out these three-color release prints, then it can be done rather inexpensively.

So, our question really then comes down to this: Did the decree bring about the introduction of Eastman Color, or did it not? If the decree brought about the introduction of Eastman Color, we can say it had a major effect on competition in this industry. If it didn't bring about the introduction of Eastman Color, then we can shake our head and say, "Well, whatever the decree may have done, the really important thing came about otherwise."

Now, let's look very quickly to some of the facts. I'm sure that we can never prove in a conclusive way one way or another on a thing of this kind. But we can look to some of these things.

First, we can say, I think with some confidence, that Eastman could not have put out the Eastman Color materials in the form they were put out until about 1950. The color coupler principle which we discussed is one key to that problem. Eastman had a couple of patent applications to it. They were filed in 1944 or 1945. Eastman put the colored coupler concept into its Kodacolor film in 1949, and this was still film having nothing to do with Technicolor. And for other reasons which we need not dwell on now, I'm sure Eastman moved as fast as it thought it could.

So that in 1950 when Eastman brought out that film, they were bringing out a film that, technologically speaking, was one they couldn't reasonably have put out substantially earlier.

Now, another thing. You remember our talk here about the color separation

step in the overall printing process as Eastman recommended it about 1953. That was a troublesome thing, something no one would want to do, and if it could be overcome reasonably there was no doubt it was to everybody's interest to do it. And Eastman just was unable to do it at that stage, which is another indication we are not dealing here with some complete, final, finished product that was on the shelf just ready to be taken down and marketed. We are dealing with a product here that was being developed at the time of marketing.

So, that again seems to indicate that Eastman just simply could not have put out—and this is my personal opinion at least—could not have offered the Eastman Color at a substantially earlier date.

Of course, that's only part of the story. There is no doubt that Eastman could have put something out prior to 1950, and what it could have put out prior to 1950 may have been something that could have been marketed and made a success. After all, it had Kodachrome in 1934 or 1935—along in there—and the Kodachrome was improved with time.

So the question really is: Would such a film have been a marketable thing?

Again let's look to the facts. Ansco did do that. Ansco put out a professional motion picture film in 1946. We had one picture of that if you will recall. Ansco did everything it could to sell it. It had nothing to do with Technicolor, nothing to do with Eastman. Ansco was not a newcomer in the field. It worked with many producers on an experimental basis. The Ansco volume was always small. It had production problems, quality problems. And I think it is fair to say that Ansco certainly didn't make much of an impact on the industry. And the Ansco product was in a rough way similar to the sort of thing you'd have if Kodachrome was made available or marketed intensively for motion picture use.

Eastman did experiment with Technicolor from about 1942 to 1949. This was one of the things that the Government complained of. But whether the Government was right in complaining or not, the important point is this: About 60% of the film during that period was rejected by one company or the other just as a matter of quality control. This gives an idea at least of the kind of problem that existed there.

There are other items in this that are rather interesting. If there was the great demand for 35-mm. Kodachrome for motion pictures, the 16-millimeter film could have been turned sidewise like the 35-millimeter in one of the pictures we had. In that way it would have made a film that was not as good as the 35-millimeter Kodachrome but approaching it. That was tried; it never caught on at all. Cinecolor and others used the 16-millimeter film in the conventional way. Also Ektachrome became available in 1948. One of the reasons I wanted to show you these slides was this: Those films I developed myself in the kitchen—with some protest from the family, I might say—but, in any event, it was done. Now, if I can do it myself in my kitchen, surely it's something that a professional ought to be able to do something with on a full-time basis. So far as is known no Ektachrome was used in this fashion.

Why didn't someone do these things? Now, of course, all these alternatives have disadvantages. There are all sorts of reasons why you could say it couldn't

be done. But again it gets back to the fact that we have some objective indications that there wasn't as much interest marketwise as has sometimes been contended.

I think one of the things we must go quickly to is asking ourselves the real question. The real question is not why didn't Eastman promote Kodachrome for 35-mm. use. The real question ought to be why *should* Eastman have done it. What was there to push Eastman into this thing?

I want to save time here a moment, and I just want to say that when you analyze the market factors involved, bearing in mind that Eastman was selling all the film that Technicolor was using, and for every one foot of the Kodachrome it would sell for camera film, it was already selling three feet of three-strip negative, the economics of the thing become really quite uninteresting.

Now, all of that changed when Eastman Color film became available. Then Eastman was not talking about camera film entirely but release-print film making by independent processors as well. Eastman was able to offer a product that could be carried all the way through from camera to release print with quality competitive with Technicolor. Obviously a new market existed, with the incident prospective sales volume. Of course, we can't be absolute. My personal opinion is Eastman's entry into Eastman Color was due to factors other than the decree. But this doesn't necessarily mean the litigation had no effects. It certainly created a consciousness of the antitrust problem. And we should not lose sight of the fact that the very provisions of that license agreement indicate that Eastman was concerned, or Technicolor was concerned, with Eastman monopack competition as early as 1934.

But, again, I think the major thing here is that we have an important technical development, and its roots can be traced to things that seem in my opinion at least to be independent of the decree.

Now, where does this take us? I'd like to make just a few quick general observations.

First, I think the study emphasizes the problem we face when we talk about decrees and litigation and the government putting on paper matters concerning competition in a highly technical industry. The best example I can give you of that is this: There are two important Eastman patents to the color coupler principle, one a Hansen patent, one a Vittum patent. The decree that was actually entered had a gap in it for which no compulsory licensing was required, and that gap, curiously enough, encompassed those two patents.

In other words, the two patents that were the most important in this field were not covered by the decree at all.

Now, it makes no real difference. Eastman has offered them for licensing. One of them issued after an interference with Ansco, and I'm sure Ansco has rights to it. So, as a practical matter, it doesn't make much difference. But it does bring out the difficulty of trying through government control or action of one kind or another to enter into a highly complex industry of this kind.

That, of course, brings us to the question: What is the real cure?

Well, I'd like to just offer this suggestion: What we really need in this type of situation is technological competition. We have to have an industry structure that assures that there really is competition in technical matters for a company like, say, Eastman.

I think if Ansco had come out with color film that really threatened to occupy that field, I venture to say Eastman sure would have moved a whole lot faster. This is no criticism of Eastman at all. But people, being what they are, move a whale of a lot faster if there's something behind pushing them. And if Ansco was threatening to occupy a market and take up a business that was 9% or 10% of Eastman's total dollar volume, I don't think the Eastman people would have let much grass grow under their feet.

It's in this respect that a patent system properly operating, it seems to me, has the major contribution to make.

I will just come back to Polaroid as one example of a company that has upset things with these fresh approaches—these new ideas—and they do threaten the established companies.

Now, I'm sorry to have gone over time, but I do appreciate your interest, and I hope that you share with us at least a little thought that we have some sex appeal here. [Applause]

DR. HAFSTAD: Thank you.

I think this discussion is so interesting that we can afford to go a little bit over time here.

I think my duty is to keep this program on schedule.

I'd like now to call on the discussants. First, Mr. Theodore A. Groenke of Snyder, Chadwell, Fagerburg & Keck.

DISCUSSION

MR. THEODORE A. GROENKE: Let me first pay tribute to the work of The Patent, Trademark, and Copyright Foundation. Frankly, until receiving an invitation to discuss George Frost's paper, I was unaware of its activities. Since that time, I have had an opportunity to study The Patent, Trademark, and Copyright *Journal* and to review the Foundation's statement of purposes. It seems to me that the educational program of the Foundation and the studies of basic factual matters underlying the patent and antitrust laws which are being made by the research staff of the Foundation are a valuable contribution, both to public understanding of these laws and to the factual knowledge which we must have in order to adequately administer them. As an antitrust lawyer, my interest, of course, is in the latter part of your activities.

The effort to study the effects which antitrust decrees have had upon competition in certain industries is certainly an interesting one. Customarily, in antitrust matters—and I think this also may be true of patent matters, although I am less familiar in that field—discussion begins with a basic philosophical assumption as to the nature of competition or the purpose of such laws. The conclusions reached are generally determined by the nature of the assumptions

which were used as a starting point for the discussion. It is very refreshing to review an effort to approach the antitrust laws empirically.

Having said that, however, I think the principal value of Mr. Frost's work, not only with the Technicolor Decree, but also with the Concrete Block Machinery and Vehicular Parking Decrees, is that it demonstrates the very difficult problems involved in determining just exactly what effects the patent and the antitrust laws have in any particular competitive situation. Such an inquiry involves questions of motives and cause and effect which are almost impossible of resolution.

For example, there is the problem with respect to the Technicolor Decree as to whether it has been the decree or Eastman's development of the colored coupler principle which has been responsible for the changes which have taken place in the color movie industry since the decree.

Also, there is the question of the effect of the Technicolor cross-license agreement with Eastman which was made in 1934. Was this a decision adverse to competition, or was it a decision which was necessary in order to preserve Technicolor as a competitor of Eastman in the color movie business? Prior to the time when Technicolor entered into the cross-licensing agreement, Technicolor had engaged in sharp competition with Eastman in research and in an effort to develop a monopack film. It seems rather clear from the material set forth in Mr. Frost's paper that after entering into the license agreement, Technicolor more or less withdrew from active research in the color film field and turned that research effort over to Eastman. To that extent the cross-license agreement might be said to be anti-competitive. On the other hand, there may have been other business factors underlying that decision which would change one's conclusion on this matter. Technicolor could, for example, have concluded that it could furnish sharper competition by concentrating upon the development of markets for its existing products, rather than dissipate its working capital in further research and patent litigation. Just what factors did enter into the Technicolor decision, and how well founded was that decision from a competitive point of view? Answers to all of these questions would have to be found before one could risk any generalization as to the competitive or anti-competitive effect of the 1934 cross-licensing agreement or as to the effect of the decree. Needless to say, in view of the fact that this was a consent decree, these subject matters were not litigated.

Questions of antitrust violation and of the effect of the antitrust laws in particular business situations thus turn on so many factors as to be almost impossible of resolution by an outside researcher who has not participated in the actual decisions themselves. In a very real sense, I think the problem of making such determinations is very much like sitting down to appraise what your life would have been like if you had done something different. Once a decision is made in one direction, it is almost impossible to determine what the outcome would have been if your decision had been otherwise.

Recognition of the problems involved in predicting the effect of business decisions upon competition leads to some very definite indications with respect to the formulation of antitrust and patent policy.

First, we should recognize the complexity of the factors entering into competitive decisions and rely upon the process of competition, rather than legislative fiat, as the regulator of our economy. The antitrust and patent laws should be designed to keep the competitive process free from artificial interference, not to bring about any predetermined industry structure. As a matter of fact, this is the law with respect to the framing of antitrust decrees, and Mr. Frost's studies confirm that the law developed in this area is sound. If we cannot unravel the tangled skein of factors present in an existing competitive situation, then how foolhardy are we to expect to predict the future results of adding new legislative factors to an already complex situation.

Second, we cannot expect to appraise the effectiveness of our antitrust and patent laws on the basis of our opinion as to the competitive structure of any particular industry. Existing competitive situations are the result of a compendium of factors entering into a multitude of business decisions every day. Antitrust and patent laws are but two of the many factors. There may be many factors in the situation which bring about the structure which exists; and chances are, if the trial and error process has been free to operate effectively, the existing structure is that which experience has proved is best for all concerned. In short, we should avoid value judgments based on limited available factual information and trust in the basic philosophy underlying free enterprise; namely, that, in the absence of artificial interferences, the competitive process will bring about the most desirable competitive result. By the same token, we should be alert to stamp out predatory and monopolistic practices which prevent the competitive process from operating freely. The Technicolor-Eastman cross-license agreement was presumably such a practice. At least the parties consented to its cancellation. I don't think you can go beyond that assumption in light of the principles which I have stated here.

Just one other point, and then I will terminate my remarks because I think my ten minutes are up.

I don't think you can obtain any true picture of the impact of the antitrust laws in our economy by looking merely at antitrust decrees or antitrust litigation. Not only antitrust decrees, but also the experience of having been through an antitrust litigation, and also the very existence of the antitrust laws, have substantial effects in business decisions.

Mr. Frost has pointed out here, for example, that Technicolor, although its colored coupler patents were not included within the consent decree, is nevertheless holding those patents open for licensing. Now, to what extent was the decree a factor in that, and to what extent is that going to affect the ultimate competitive structure of this industry? To what extent does the Technicolor decree, does the fact of the Technicolor antitrust proceeding, does the very existence of antitrust laws, does the very existence of patent laws, enter into each decision made each day within each company within the United States?

That is a very major undertaking, and one that I think is not possible to achieve with any degree of precision. If there is anybody in the country who is equipped to do this sort of thing, I think Mr. Frost is the man, particularly when

he has as a consultant Professor Oppenheim. I think it doesn't come out too clearly in his oral remarks, but I think you will find in reading George's written report that he has been very much aware of this problem, and that he has called attention to it.

I think recognition of the complexity of the factors entering into business decisions and of the fact that the antitrust and patent laws are only one among many factors which contribute to the ultimate result may very well turn out to be one of the major contributions of Mr. Frost's research.

Thank you. [Applause]

DR. HAFSTED: Thank you, Mr. Groenke. The next man is Fred Rowe. He is associated with the firm of Kirkland, Ellis, Hodson, Chaffetz and Masters, has been, I believe, since 1953, and has been a member of the firm since last year.

He was a conferee of the Attorney General's Committee to Study the Antitrust Laws.

Mr. Rowe.

MR. FREDERICK M. ROWE: Mr. Chairman, Professor Oppenheim, Ladies and Gentlemen: While there may be some doubts about the effectiveness of antitrust enforcement in the context of the Technicolor industry, I think there is no doubt that antitrust enforcement has been very effective in changing your program today, because it is only that factor that has kept Mr. Chadwell and Mr. Chaffetz off this platform, I can assure you. They were both very anxious to be here, and antitrust enforcement in practice kept them off.

To me, as a lawyer who has long marveled at Walt Disney color cartoons as Hollywood magic, George Frost's presentation has sex appeal indeed. It reflects impressive technical as well as legal scholarship, and I think the contribution which it has made to the field of antitrust and patents is manifest.

In my judgment, the essential contribution made by George Frost's report is that it permits a comparison of antitrust objectives and antitrust achievements on the basis of concrete knowledge rather than speculation or the fashionable "brainstorming" about antitrust philosophy in the abstract.

The study traces the impact of a particular antitrust decree against the evolution of a particular industry. It carefully documents the economic life cycle of one pioneering enterprise, the Technicolor Corporation, showing the commercial necessities which gave it birth, the driving forces which made it grow to dominate the field, until the technical successes of others caught up with it and forced it into relative decline.

The highlights of the Technicolor story, as I see it, are these:

By dint of the pioneering efforts and the commercial genius of Dr. Kalmus, the president of Technicolor, that corporation by the 1940's had achieved a dominant position in the processing of color movie film. The antitrust suit in 1947 charged that Technicolor's monopolistic position was preserved by restrictive licensing arrangements that kept Eastman Kodak, which was Technicolor's film supplier, out of the color movie field.

The consent settlement of this suit in 1948 against Eastman and, in 1950, against Technicolor, undertook to make available to others Eastman's and Techni-

color's patent rights in order to pry open a market which had been closed.

Significantly and provocatively, the Frost study—or I should say, the Frost-Oppenheim study—concludes that the competition and the price level which today prevail in color cinematography are not the product of the decree's compulsory patent licensing provisions but, rather, are the independent fruit of the dynamic research and creative innovation which successfully brought out the Eastman Color monopack film and thereby, in effect, pushed the Technicolor three-strip camera over the cliff.

These findings are effectively documented by the report and the factual findings which support the report.

The record, as George has recounted, shows that Technicolor's dominant position was not eroded by those who took advantage of the decree's provisions which made patent rights available. In fact, virtually nobody availed himself of the opportunities guaranteed by the judgment, which, in effect, was already obsolete in many ways at the date of its entry.

Instead, Technicolor lost out to the 35-mm. monopack film of Eastman which simplified color photography so as to supplant Technicolor in the movie market and thereby gained the upper hand in the competitive struggle.

Now, what significance may be drawn from this conclusion of the study? To me the Technicolor story highlights the importance of aggressive research and technology as an element of competition.

According to the study, the fruits of competition in the industry which was surveyed were not produced, for example, through price-cutting by numerous suppliers of an identical product. Rather, the competitive advances here were created by aggressive development and marketing of new products and the commercial genius of people like Dr. Kalmus of Technicolor and now, of course, Dr. Land of Polaroid.

In this connection, conventional antitrust thinking, it seems to me, tends to place singular and undue emphasis on the element of competition in price. Such a one-dimensional analysis of competition is highly unrealistic in ignoring the explosive competitive potential of research and innovation as a force of economic rivalry.

A narrow preoccupation with price competition, fashionable in many antitrust circles, also tends to overlook the role of managerial talent and drive as factors in exploiting technical advances into a marketable product or process to gain a temporary edge over rivals in the industry.

The end result of such a shallow perspective, it seems to me, is an unreasoned suspicion that something is wrong or that nefarious maneuvers are afoot whenever prices in a particular industry don't bounce around like stock market quotations.

The point illustrated by the Frost-Oppenheim study is that while price, of course, is the most obvious index of competition, quality improvements or aggressive research activities to develop new products and markets are also important facets of commercial rivalry which can realize the goals of antitrust for the consumer in the form of better products and lower prices.

Now, if I may venture a guess, furthermore, I would say that the Technicolor story is symptomatic of the nature of competition in the chemical and the electronic industries, among others, where pioneering technical advances, rather than price competition or antitrust decrees, have been chiefly responsible for creating new products and competitive markets.

If, then, the competitive situation in color cinematography or in these other industries exists independently and irrespective of the antitrust decree, does this mean then that such decrees are entirely useless? That is, of course, a fundamental philosophical question which is raised by the conclusions which flow from the Frost-Oppenheim report.

In my judgment, such provisions of antitrust decrees are not useless. They are useless only if we expect too much from antitrust enforcement or if we expect too much from antitrust decrees.

Basically—and I believe Ted Groenke touched on this in his comment on the report—the competitive free enterprise system under which we live cannot be dependent on antitrust laws or antitrust decrees. Its successful operation, rather, depends on the prevalent attitudes of government, business, and public opinion toward the spirit of competition as a commercial way of life. Our antitrust laws are a legal expression of this widely accepted public philosophy, and their vigorous but fair enforcement can symbolize our dedication to this policy and help keep the spirit of competition alive.

But an antitrust decree cannot create competition. At most it can make competition possible.

Let me illustrate what I mean.

Whatever may have been the actual utility of the compulsory licensing provisions in the Technicolor and Eastman decrees, competition was certainly made possible by those clauses which prohibited "tying" arrangements on the part of Technicolor whereby cameras, processing, and film were made available only on a package-deal basis.

Another recent example of this type, as pointed out in George Frost's report, is the Kodachrome decree of 1954 which "untied" the sale and the processing of color film and thereby opened the market to independent processors.

By contrast, an antitrust decree can, of course, also make competition impossible. By keeping the large meatpacking companies out of the grocery business, for example, the Swift decree entered in 1920, whatever may have been its virtues at the time, has today become an impediment to competition in retail food distribution. By excluding a potentially vigorous competitive element from the market, the decree has become an antitrust anachronism which now penalizes the American consumer on the basis of legal assumptions which were outmoded by the development of the chain store and supermarket many years ago.

Both types of decree, I may observe in passing, confirm the recent suggestion that antitrust judgments be made self-liquidating after a number of years. In the context of our rapid pace of industrial change, a decree which has not achieved its original purpose within 10 or 15 years is likely to be sterile or outdated, and in all probability no longer serves a constructive function. At that

point it should automatically disappear from the dockets of the courts, without need for adversary litigation to reopen and expunge it, for such litigation is often complicated by political pressures and animus toward large corporations regardless of the legal merits of the controversy.

Similarly, antitrust decrees can discredit the spirit of competition by unfair or vindictive bargaining on the part of enforcement agencies. Antitrust litigation with the Government, as we all know, whether civil or criminal, is a heavy drain on the resources of any business. For the Department of Justice to utilize the threat of criminal prosecution as a weapon to coerce a drastic civil consent decree, is a technique which can only bring antitrust enforcement into disrepute.

I would consider equally unworthy any enforcement technique which sandbags a company not represented by astute and experienced antitrust counsel with excessive decree restrictions that go beyond the necessities of the alleged offense. As any fair-minded prosecutor, the Antitrust Division official must temper his zest for victory with an understanding of the particular public policy to be served.

In this field, the limit should be what is necessary to the preservation and encouragement of competition—not what a company is willing to sign under duress.

In this connection, the report of the Attorney General's Committee to Study the Antitrust Laws took the view that compulsory royalty-free licensing, or a dedication of patents, was a punitive confiscation of one type of vital commercial asset. The zeal for such decree provisions, in my opinion, stems from the naive and false notion that patent rights, regardless of the manner of their exercise, are inherently incompatible with competition or the antitrust laws.

As indicated by the Frost-Oppenheim study, the temporary shelter of patents was an important incentive in the commercial development of the Technicolor and, of course, now the Polaroid Corporation, which contributed dynamic advances from which the industry and the public profited.

The indiscriminate hostility toward the patent system that is sometimes found among antitrust exponents is, in my judgment, a self-defeating attitude which can stultify research and technical innovation, a vital form of modern competition for which intelligent antitrust enforcement should strive.

By focusing on one industry with impressive technical and legal scholarship, I believe the Frost-Oppenheim study has pointed up vital conclusions of great significance to the public interest in a fair and effective enforcement of antitrust laws.

Its contribution is not only interesting, therefore, but eminently valuable and timely. [Applause]

DR. HAFSTED: Thank you very much.

As usual, we seem to be running over here. The discussions and papers are extremely interesting. I think we should have a few minutes here for questions and answers, but we will have to make it very short.

Are there any questions or comments?

MR. ROBERT L. WRIGHT:[1] I would like to ask Mr. Frost this question.

If you assume that the purpose of that decree was to permit, and I emphasize the word "permit," not create, competition between Technicolor and Eastman, did it succeed or fail?

MR. FROST: I think I would answer that question something like this: There is no question in my judgment that there has been competition between Technicolor and Eastman since the decree, very real, vigorous competition that did not exist before the decree.

As to the fact of that, it seems to me there is just no question whatsoever.

The problem we get into is a problem of causation. Did the decree cause it or didn't it? And I think we can all be in complete sympathy with the idea that in writing the decree and based upon the premises upon which it was written, it should have been framed to bring about that type of competition.

I think the conclusion—and this is somewhat personal—that we reach here is that the thing that has brought about the change in competition more than any other one factor certainly has been this technological change. And my own personal opinion is that *that* you cannot credit to the decree.

I hope that is an answer to the question, Bob. I think it is the only one that can be given.

MR. WRIGHT: I think that is the answer. But as one who was in the Antitrust Division for ten years, I would say none of us ever assumed that we were going to affect the course of technological progress by anything put in a decree. The most we would ever hope to do would be to create a situation where technology in possession of one company could compete with that in the possession of another.

Now, that is as far as the ordinary decree goes. You don't expect and you almost never, I suggest, achieve the creation of competition in the sense that you may assign to a decree the responsibility for technological development that might not otherwise occur.

I suggest that when you ask yourself one question as to whether the decree did that, you are asking a question which is mostly unanswerable and one which goes far beyond the modest aims of anybody who is trying to enforce the antitrust laws.

MR. FROST: Bob, I think it's good to have you point that out. I think that perhaps I emphasized the other side somewhat too strongly. I think we are all in agreement on that.

Now, we do get into this question though: That somewhere along the line you have got to say, "Well, what are we trying to do and how are we trying to do it?" And in this particular decree the Government selected 14 patents out of hundreds that Eastman owned for royalty-free licensing, and 14 more or 13 more for reasonable-royalty licensing. It set up a period, you see, for reasonable-royalty license. It then went over to Technicolor and, in effect, made all of their patents subject to the licensing.

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[1] Robert L. Wright, Chief Counsel, Senate Subcommittee on Patents, Trademarks, and Copyrights, Washington, D. C.

Now, all of that was directed, you see, to the idea that that would have some effect in, as you say, making competition possible, and so in that respect, you see, you do get into it.

Now, I'm not—Well, I think that's all that really can be said about it.

DR. HAFSTAD: I think Mr. Groenke has some comments to make on this same subject. Do you want to speak on this?

MR. GROENKE: I had only one point on it. It seems to me the question of whether the Technicolor decree created competition here or not turns on a lot of factors that we don't have before the group.

It turns, in the first place, on whether the Technicolor licensing agreement had an adverse effect upon competition between Technicolor and Eastman. That, in turn, turns on many factors. We don't know what motivated Technicolor to enter into that agreement. We don't know what motivated Eastman to prefer to sell blank film to Technicolor in lieu of taking some other course with respect to the sale of film for the movie industry.

It seems to me this type of discussion, with respect to whether the antitrust laws or any particular antitrust decree created competition or permitted competition, tends to omit too many factors to permit any certain conclusions to be drawn.

The fact of the matter is there are certain types of restraints which, when subjected to the judicial process and careful study by the Department and by the parties involved, may be thought to have a particular effect. But you can't draw any certain conclusion, and it is wrong to attribute any special effect to a particular decree provision.

DR. HAFSTAD: Professor Oppenheim has some comments.

PROFESSOR OPPENHEIM: I would just like to take one minute.

By the way, this has been very graciously—and I appreciate it—characterized as the Frost-Oppenheim report. What it is is the Frost study, which I studied ex post facto as consultant.

But I want to say this: That without trying to even think of addressing myself to the merits of antitrust decrees and their effects, perhaps what we're thinking of as we go along with these studies is—most important in my mind—something that would place a restraint, that is properly grounded in what has come up in the studies, on overgeneralization and oversimplification.

In other words, what has always been called the negative results of research study may be to simply say, "We have gone far enough to be mighty unsure about an overgeneralization or an oversimplification."

I say that because there is a tendency in government and out of government to indulge in these broad conclusions. And perhaps one of the values will be to hope that those in government and other investigators outside of government will pause before they indulge in some oversimplified generalization.

Now, just a half a minute to say that all of these situations may be completely mixed-in factors. I just want to give one concrete illustration.

Let me take as an example an industry where one company by reason of its patent rights has what it would admit was a dominant or lawful monopoly posi-

tion, assuming no abuse of the monopoly power, no monopolization purpose, and so on. Suppose one or two major companies said, "If we only had access to this dominant company's licenses, we could enter that particular phase of the industry."

Assume a consent decree was entered into which opened the way for that. I don't want to try to be factual because I am dealing with assumptions. Suppose one or two of the major companies since the decree have either not applied for any patent licenses or for very few, so that we can't even be sure that when you bring the horse to the water, for example, he is willing to drink.

It seems to me that sometimes it is an application of an old idea that when we know we can't have something, we want to be able to get it; and when we get it, we don't want it. [Applause]

DR. HAFSTAD: I'm sure we could continue discussion on this subject for some time longer, but I have already intruded seriously on the next part of the program, so I would like to adjourn this part, and I will call on John Green.

SPECIAL SESSION DEVOTED TO DISCUSSION OF CURRENT ISSUES

MR. JOHN C. GREEN: Gentlemen, in the interest of time—if we might move along—you know our problem is to blend provocative presentations by five authorities, a major amount of audience participation, and a good healthy shot of controversy in the rest of the afternoon.

Now, the technique that we have chosen is to have concise, direct presentations, immediately followed up by a brief question-and-answer period. Then when the five presentations are completed, we will invite general discussion until the afternoon session is completed.

We hope that will be satisfactory. It may possibly require me to ring a bell occasionally on some of the speakers and some of the questioners. I hope I will be forgiven.

Our first speaker, Mr. Donald Brown, is the vice president of that "young pro" organization, the Polaroid Corporation. He has been its patent counsel and counsel for its predecessor companies for more than 30 years.

He has been engaged in the practice of patent law for 35 years, 20 years of which were in Cambridge and 15 before in New York City.

Mr. Brown is going to give us a case history of the growth and development of that challenging organization, the Polaroid Corporation.

Mr. Brown.

MR. DONALD L. BROWN: Mr. Green, Ladies and Gentlemen: I approach this case history discussion with some hesitancy in view of the fact that I find that my company already has been named two or three times here today under situations which I don't want to talk about at all. I don't want to mention the color work; that is still in the future.

I'd like, however, to tell you how we have gotten where we are from nowhere, because I think this is one situation in which we have an instance of the effect of the patent system first, upon the individual inventor, then, upon the small

company, and finally on a somewhat larger company which uses its patent system to maintain its position in the industry.

About 30 years ago Dr. Land invented a synthetic light polarizer. This was a rather remarkable invention. Light polarizers which were known to the art at that time were essentially of two kinds: natural crystals of tourmaline, which is a semi-precious stone, and Nicol's prisms or their counterparts, which are polarizers made up of crystals of calcite. The Nicol's prism, which is the most efficient polarizer, was a very expensive and fragile optical device; a prism which had a total cross-sectional area of about one-sixteenth of a square inch, cost about $20.

The largest crystals that were known had a total cross-sectional area of about four square inches. I would hesitate to estimate the cost of a polarizer made of those crystals.

The synthetic polarizer that Dr. Land invented could be turned out as an endless sheet; it was a plastic material which contained minute crystals that were oriented. It had the optical properties of the crystal and the physical properties of the plastic sheet. It was produced in sheets 30 inches wide and a thousand feet long at the rate of 20 feet a minute, 20 linear feet a minute. It could be sold, and was sold, for a few cents a square inch, as against a cost of $20 for one-sixteenth of a square inch of the competing polarizer.

This was a real invention, and if it had commercial use, it was an invention which should bring in a substantial reward to the inventor.

We tried initially to interest capital in this invention, and we were met invariably with two questions: "What is your patent protection, and how does industry regard your invention?"

By 1934 we had granted a license to Eastman Kodak Company; and in 1935 we had granted a license to American Optical Company. These two companies had such status in the industry that the financial group no longer questioned how industry regarded the product.

In 1934 we got our first basic patent. By 1937 we had nine or ten broad patents. And in 1937, because of our patent structure and because of industry's recognition of the patent structure, we were able to finance this project. We were able to finance it under rather peculiar conditions.

Dr. Land retained the individual complete control of the corporation under a contract which gave him that control for ten years, and the financial group invested sufficient money in the corporation to enable it to develop and expand.

At the beginning of the war, the company had progressed to what I would call a small-business status. It was doing an annual business of perhaps three million dollars a year in the polarizer field.

During the war period, because of the extensive use of light polarizer materials in connection with military applications, such as variable density goggles that were used by airplane gunners, optical ring sights, range finders, sunglasses, and other products, the company had military business which reached about 15 million dollars a year, and with that business, it had built up a large research organization which it wished to retain.

Dr. Land realized the necessity of some other invention because light polarizers, while interesting and rather remarkable, were essentially a laboratory product, a scientific tool. Their utility in ordinary commercial fields was not as great as had been anticipated.

He then invented the "picture in a minute" camera. And, here again, we found that the patent structure was an essential to the maintenance of the company's position in the industry. We were now entering a much different field. We were entering the photographic industry, an industry in which there was one big company and several smaller companies, and we felt we had to have a position.

We found that it was not necessary to compete on an equal basis with the giants—or giant—in the industry from the commercial standpoint. It was not necessary that our sales approximate the sales of our competitors in order for us to stand on equal footing; but if we had the technological background, if we had the inventive capacity to meet them on an intellectual basis which was equal, we could deal with them fully on an equal basis. And I mean here, not only that we could deal with them technically on a basis of equality, but because of our equality in the scientific field, we could negotiate on an equality in the commercial field.

But, here again, we found that it was necessary to rely upon a patent structure to support our development, to protect our investment, and to act as a bulwark behind which our technical people could safely work and could safely make disclosures. Now, this is a point that I don't think has been adequately developed, nor do I think it has been appreciated, and I would like to elaborate it a little bit. Here I would like to mention a rather remarkable cooperative development.

We have found, as I think anyone going into a new technology will find, that many of the practical applications are already known to those who have been operating in the technology. And we found that it would be quite possible to shortcut our own developments if we had access to what you may call the know-how or the practical knowledge of those who have been working in the industry. We have found in at least three different instances that, where we are able to rely upon our patent structure for protection and where our opposite in the negotiation is able to rely upon his patent structure in the negotiation, we can then work out an arrangement which permits free interchange of information and knowledge on a level which we had thought was quite impossible and which results in a tremendous acceleration of the entire development so that many years are saved, literally, in reaching the commercial result desired.

In this particular industry we have a very peculiar situation. The techniques and knowledge that relate to emulsion manufacture are secret know-how. They have very largely never been patented. Those of you who are familiar with Dr. Mees' book on the photographic process will recognize this from the statement which he makes in the preamble to his book that he will talk about everything except emulsion techniques. That field is a closed book. In that field there is no interchange, or very little interchange, of information. It is largely unprotected by patents. In the other fields of activity in which we are engaged and our competitors are engaged where those fields are protected by patents, there has been,

and continues to be, a remarkably free interchange. There is another situation which I don't think is frequently appreciated. The scientist who is engaged in research activity usually has a different approach to his work than his production and sales associates. It is true that he realizes that if the company doesn't make a profit, he may lose his job, but that doesn't concern him very much. What he is interested in primarily is the acquisition of scientific knowledge, the dissemination of scientific knowledge, and the ability to freely talk about his work with other scientists of other companies. At least this has been our experience.

We find that if we put restrictions upon the ability of the scientist to publicize his work, he becomes discontented, and he may even leave the organization. If we give him freedom of publication—even if that is restricted in time a little until a patent application has been filed covering the work—if we give him the freedom to then publish, we find he is satisfied and happy. If he feels that he can rely upon the company's patent department to protect the business aspects, the money-making aspects, of the result of his work so that he can freely talk about what he is doing with his associates in other companies, he is more content with his job; his work is better; he does better work for the company; and he is a more satisfied employee.

This situation we have found to exist very definitely in our contacts with other companies in the same industry. Where freedom of discussion is permitted because patents have been obtained, the personnel are happy and contented. Where there is no freedom of communication because there are no patents upon which the companies can rely for protection, the people engaged in those activities are discontented.

Now, I recognize that Polaroid Corporation is a rather peculiar company here. We do not make any product that is not covered by patents. We do sell some products as accessories that are not covered by patents. But our principal products are all products of our own development, our own design, the result of our own inventive work, and, therefore, patents to us probably assume a very much more important position than they do to the average company. It seems to me however, that our structure, our development, our feeling with respect to patents must run—I am sure it does run—down through small business to the individual inventor in much the same way as it has with our own work.

When I was in private practice, I never succeeded in inducing anyone with money to invest in an idea that wasn't patented. Occasionally I could get somebody to invest in a patented idea. Now that I'm on the other end of the stick, as it were, now that I am house counsel for a company which is known to be progressive, I receive as many as 150 ideas a week from inventors, from people outside the organization; and my reaction now is the same reaction that I have met with when I represented Dr. Land 30 years ago. I won't look at these ideas unless they are patented or unless I get a release. And why won't I? Because I can't afford to. I can't afford to subject my company, my client, to the possibility of a suit for appropriation of an idea. And I insist that those who submit ideas to me rely upon their patent protection to support their position.

Now, other companies, I know, do the same thing. One of our very good friends and competitors—a large company—approached us to find out something

about this two-color process that Mr. Frost mentioned, and when we said we would be happy to tell him what we knew, we received a letter from their patent department saying that they would come to us and ask us what we knew only if we agreed that what we told them would be theirs to appropriate, unless we had patent protection covering it. Now, this was rather putting the shoe on the other foot, but we were quite responsive to this approach, and we told them that we appreciated their position and would make the disclosure under those conditions.

I have heard a great deal about the possibility of substituting something for the patent system as a better method of protecting the small inventor. I have thought a great deal about this, and I can think of nothing that would be as good a protection as the system that we now have if it is properly handled, if the inventor is adequately advised in connection with his rights, and if he goes to a good attorney who assists him in the preparation of his application.

There is one other point I would make. It has been my experience in connection with the work that we have done with our own inventors that the fact that a patent is to be obtained, the fact that the disclosure must be adequate, complete, precise; the fact that you must define the limits of your invention, that you must carefully analyze your invention to see what classes of materials you can use, imposes upon the inventor a peculiar, but very effective, discipline that he never, never would get anywhere else. He is driven to expand his ideas. He is driven to study what he has done in a way that he never would do otherwise, because usually he has some goal that he's striving for, and if the work that he has done doesn't lead him directly to that goal, he discards it. He won't go into the byways. He won't examine other possibilities. But if he gets to a position where he has to do this in order to get a good patent application, then he will, and very, very frequently this sort of discipline leads to new and important inventions.

Thank you. [Applause]

MR. GREEN: Are there any questions for Mr. Brown?

MR. JACOB RABINOW:[2] I'd like to congratulate the Polaroid Company on the able counsel they have. But I'd like to ask did Mr. Land really invent the camera just because he wanted a product? Was it that casual?

MR. BROWN: The answer to that is yes. Dr. Land appreciated the need of a new product for the company. He was familiar with the photographic industry. It was his feeling that there had been no basic—and I use the word in his sense, not in mine—that there had been no basic invention in the photographic industry since the effective commercialization of the silver halide emulsion. He thought the field was ripe for a basic invention, and he deliberately set out to make one or more.

MR. RABINOW: May I ask another question, please? I happen to know who makes your paper and your emulsion. Is this generally known in the trade?

MR. BROWN: Did you ask whether it was generally known who makes the emulsion?

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[2] Jacob Rabinow, Rabinow Engineering Company, Washington, D. C.

MR. RABINOW: And the paper, your photographic materials.

MR. BROWN: Eastman makes most of it.

MR. RABINOW: I didn't know whether that was known or not. I didn't want to disclose it if it were not. Are your good relations with Eastman partly due to the fact they are also your supplier.

MR. BROWN: I didn't quite hear.

MR. RABINOW: Are your good relations with Eastman, your lack of acrimony in competing with them, possibly due to the fact that they are your major supplier?

MR. BROWN: I don't know the answer to that. We buy a great deal of our emulsion from Eastman. We buy a considerable amount of our emulsion from du Pont. We buy some of it from Gevert. I suppose since we are a customer of Eastman, we stand on somewhat better footing than we would if we were not a customer, but we have found Eastman a very cooperative organization wholly apart from any question of customer relationship. We have found that they seem to have a sincere desire to see the photographic industry develop and expand.

MR. RABINOW: May I say one more thing, John?

MR. GREEN: Yes.

MR. RABINOW: I would very much like to second that statement about patents giving one freedom to talk. We are a consulting firm working for very large companies, and we find if we didn't have patents filed, we couldn't talk. With these in order we can show new things to anybody who wants to see them. My patent attorney files my patents and those of my staff pretty promptly. We find this freedom of talk would be out of the question without having patents filed.

I also agree with you that nobody wants to talk to you unless you can make unhindered disclosures. I don't see how we would possibly operate without patents.

MR. GREEN: If I might take just a minute to speak to that point, I have heard many scientifically-based organizations say that this is where the patent system is a tool of scientific advancement. Large firms will not talk unless management lets their people know that patent protection exists, and then they talk very freely with their scientific colleagues.

Our next speaker is Mr. Henry E. Ford, Director of the Development Department of the du Pont Company. He has been with that organization in research, production, and sales since 1922.

As Director of the Development Department, his responsibilities include keeping the company informed of developments in established businesses, the study of new materials sources, the investigation of products or processes in which the company might be interested, and the review of possibilities for growth and expansion.

Mr. Ford is going to discuss a topic that Mr. Brown alluded to—the problems of a corporation, a research-based organization, in dealing with the outside inventor.

Mr. Ford.

MR. HENRY E. FORD: Mr. Green, Ladies and Gentlemen: When your Foundation paid me the honor of asking me to be a member of the panel

to discuss current events, I was given the widest latitude in the selection of the subject of my remarks. Hoping to find some guidance as to what would be of interest to this audience, I reviewed the report of your annual conference last year. My place was then filled by a quite successful independent inventor, Mr. Jacob Rabinow. I found him, as well as having a reputation as a successful and prolific inventor, to prove himself a most articulate speaker who presented a number of problems faced by the independent inventor. He, I think, quite astutely announced that he was not going to answer any of the questions he raised. And I would like to go even further and confess at the beginning that I don't know the answers to some of the questions that I'm going to discuss.

Since you have heard from inventor's side last year, I thought you might possibly be interested in hearing a little about the problems faced by companies who are potential users and licensees of patents—that is, one of the markets for independent inventors.

For some years now the trend of many businesses has been to diversify, to enlarge the area of activity, to increase sales and profits in an effort to stabilize income, since, hopefully, one area of a company's activities will be on the rise and compensate for a possible decline in another segment. One way to diversify is to produce and market new products, perhaps the ones that are patented, in which case, research and development costs might be recovered before the profit margin is reduced close to the vanishing point by others entering the same market. Even the smallest companies now support research and development work. But no company, however large, can hope to make all the inventions even in its own field.

Today, while many inventions result from extensive and expensive team research efforts, many profitable and very marketable inventions are made by individuals and by small organizations who have neither the capital nor experience properly to exploit their discoveries. Such inventors by preference or necessity approach other companies in an effort to capitalize on their discoveries.

I suppose that most companies have at one time or another been approached by inventors of this type, and the larger companies—as you have heard from Mr. Brown—may have hundreds of offers of inventions each year.

I have had some little experience in dealing with such matters over many years and can propose no "best" way to solve all the problems encountered.

Forgetting the number of offers which come from persons who fail to differentiate between inventions and desires—such as a suggestion that longer-wearing rubber heels be developed and the like—there are a surprisingly small percentage of ideas presented that have any promise of commercial success. But on the off chance that the one that it tossed off too lightly will indeed be a money-maker, each must be examined by a competent investigator.

To begin with, there is a public relations aspect to be considered. No company wants to acquire the reputation of being so smug that it cannot use outside help. Indeed, I know of no companies, however large or small, that can truthfully say that at some time in their career they haven't benefited from outside sources. Every suggestion received from an outsider should be dealt with convincingly and with

consideration if the company's reputation is not to suffer, even though such treatment requires the time and attention of experienced and valuable employees.

As you have just heard, many companies now recognize the danger of discussing unpatented inventions. The hazards are many. The idea may already be under development in its own laboratory. Some later invention may seem to appropriate a part of a previously-submitted idea. And, too, there is a rare but still real possibility that the submission may be part of a scheme to trap the unwary in a lawsuit or settlement out of court to avoid publicity.

If an invention is patented or a patent has been applied for, there is less danger since what is being offered is presumably described in the patent. In cases where patents have not even been applied for, including ideas which may not even be patentable, the inventor and the company both need protection. Many companies have well-considered regulations under which, and only under which, they will receive any unpatented ideas from outsiders. These range from formal rules, often printed in pamphlet form, to general rules usually stated in an exchange of letters designed for that particular case. In any event, these arrangements will put the inventor pretty much in the hands of the potential licensee. Nor do I see how it can be otherwise, for no company should be willing to have its hands tied merely to consider an idea which in a great majority of cases will prove to be of no interest to it.

The du Pont Company will consider unpatented inventions, but only after an exchange of letters by which the inventor agrees to rely on the integrity and good faith of the company. I personally advocate discouraging such arrangements, since even with the best of handling they can easily lead to misunderstanding.

But even with patented ideas, there are still problems. The first problem, if the idea is of any interest at all, is that of value. All inventors want a million dollars—except in the many instances when the price tag is ten million dollars. [Laughter]

That, of course, is an exaggeration, since many experienced inventors have a good appreciation of the value of their ideas. Too many, however, who might well have invested quite large sums, for them, in pursuing their ideas, have no conception of how much more must be spent on developing a commercial process, in market survey and market development work, and finally, building a plant with the inevitable low-return period until a reasonable volume of sales is reached. These expenses can indeed be very large, and in any event, there are many unforeseeable pitfalls, and success is in no way assured.

If each side is willing to share the gamble—and a gamble it usually is—there is a wide variety of schemes, which I am sure you well know, that can be considered to fit individual cases. Outright purchase of the patent is at one end of the scale. Then there are various option arrangements allowing for a period of investigation before entering into a purchase or licensing agreement either on set terms or terms to be agreed at a later date. I have had quoted a down-payment price of three million dollars with continuing royalties, which was finally bargained down to supplying a ton sample free, a free option period, and a much lower

royalty rate. By this time, interest in the idea had greatly diminished, and it has not yet been commercialized.

Another prolific inventor is known to have offered all his present and future developments in a broad field for quite reasonable royalties on the astute assumption, I think, that the more ideas he can get a company to consider, the greater are his chances of having one or more commercialized, and even one such success with a large-volume item might pay off handsomely.

In any event, the inventor deserves his reward, but he must be content to offer his invention at a price that leaves the developer a commensurate incentive for the risks he too must take. Each side must recognize the problems of the other, and negotiations should only be undertaken in an atmosphere of mutual respect and confidence.

Much remains to be discovered, and, hopefully, we will always have the independent inventor. He should be encouraged by having a market for his ideas and an adequate reward for his efforts. Fortunately, no one can stop the flow of ideas from fertile minds, and future developments cannot be restricted to organized research laboratories.

At some time someone invented the wheel, one of the outstanding inventions of all times. Today it looks simple and probably the eggheads of that period wondered why they had not thought of it. It certainly didn't require the teamwork of a large group of scientists, but probably sprang from the mind of one individual, how and why to remain always a mystery.

A recent example of a simple—or so it now seems—invention can be cited to show that the process is still going on. A way has recently been discovered to extrude a plastic mesh or screen. Much thought over the years has been given to extruding fabric-like material, and while a mesh or screen is some distance from a fabric, it's getting closer. In this instance the discovery was made not by one experienced in plastics or extrusion techniques, but by a textile manufacturer with a mechanical bent. The idea came to him while napping after a mid-day Sunday dinner, and it was so well conceived that it was almost immediately reduced to practice.

He had no laboratory or technical team of colleagues to assist him, so he improvised the best he could. At home, with only his young wife present, without equipment or proper material, he made use of what was readily available. While his wife prepared a large dish of mashed potatoes—to go back in the kitchen with Mr. Frost—potatoes, well-mixed with a generous supply of butter to provide good consistency, he whittled a wooden ruler into a makeshift die. Then while his wife put the mashed potatoes through the meat grinder as a screw extruder, he manipulated the makeshift die and laid down a mesh of mashed potatoes. I know of no use for meshed mashed potatoes, but he was quickly able through his mechanical ability to make a well-designed apparatus to extrude plastic meshes of many designs. They come out of the die just like this. [Indicating]

This invention has already been patented and is in commercial production. The du Pont Company has the license for the process in the United States, and samples

are already going to potential consumers. The product appears to have many potential commercial applications, and many more remain to be suggested.

Once you have read the patent, you will wonder, just as I have, why you didn't think of such a simple thing.

Let us hope that Mr. Rabinow and his class of inventors will ever be with us. [Applause]

MR. GREEN: Any questions for Mr. Ford?

MR. RABINOW: I hate to be the only one who asks questions, but what techniques do you employ to protect yourself when you get unsolicited letters? How can you guarantee that somebody won't accuse you of having read one? We get this type of letter now, and we don't know what to do.

MR. FORD: There is hardly anything you can do about that. When we recognize that we have a letter of that type—and there are any number of places within the company any place in the country that a letter of that kind might be received —when it is recognized, it is sent in to the departmental management and may eventually get to the Development Department. But if it is recognized as an idea that we might have trouble with, knowledge of it is confined to as few people as possible, and we write back and say that we won't receive it unless it is patented or unless we get a release letter.

MR. RABINOW: You do acknowledge the receipt of the letter?

MR. FORD: Oh, yes, we have to acknowledge receipt of the letter. I think you're in just as much trouble if you don't acknowledge it as if you do acknowledge it.

MR. RABINOW: Would Mr. Brown like to comment?

Before you do, Mr. Brown, I want to thank you, Mr. Ford, for the personal comments. I'm glad somebody besides myself read the notes of last year's meeting. Thank you very much.

Will Mr. Brown comment on what he does when he gets a letter of this kind?

MR. BROWN: Letters are opened by the mail clerk. As soon as the mail clerk sees the letter embodies a suggestion, that letter is forwarded to my department. I have two people in my department, an attorney and a secretary, who spend most of their time handling these letters. This letter goes to the attorney. The attorney writes back saying, "I have your letter. I am the only one who has seen it. I will show it to no one else unless you sign a release or unless you get a patent application and submit the patent application." Roughly this is the technique.

I would say we get between four and five thousand letters a year. Since this system started, which goes back now six or seven years, we have had only two people who refused to sign the release, so that it seems to work pretty well. Where the release is refused, we return the letter and that's the end of it.

MR. RABINOW: It looks like I'll have to hire a full time attorney. [Laughter]

DR. JOSEPH ROSSMAN:[8] Would Mr. Ford indicate how many ideas have been submitted lately per year, and what percentage are considered seriously by the company?

MR. FORD: Well, it's awfully hard to get a count because there are so many places these letters can come. They can come to almost any department. They

[8] Joseph Rossman, patent attorney, Philadelphia.

come in through salesmen in the field. In Wilmington I think there are several hundred that come in every month.

As to the number that are considered seriously, they are all given careful consideration. Those that get as far as some negotiation because they have some interest are very, very few. It's only a fraction of one per cent.

MR. GREEN: I asked one of Mr. Ford's colleagues the same question once. I asked him why they gave such serious, sympathetic consideration. He said, "Well, who knows? He might be a stockholder." [Laughter]

I'm also rather amused by Mr. Rabinow's questions this year. Last year Mr. Rabinow was speaking as an independent inventor, and his questions were those of an independent inventor. This year he's a management entrepreneur with a very thriving corporation. [Laughter]

MR. RABINOW: I object to this. [Laughter]

The reason my questions are different is because the speakers are different. I sometimes wear two hats.

And I would like to make one additional statement. I did not mean to imply that there is anything wrong with Eastman Kodak's ethics when I said they may be friendlier to Polaroid because they are also suppliers. Eastman Kodak was one of my contractors during the war when I was in the government. There isn't a better company to work with. I don't want to imply anything derogatory.

MR. GREEN: I'm sure Mr. Brown understood that.

Mr. Ashley.

MR. MERWIN F. ASHLEY:[4] Well, since you wanted a little controversy here today, I may say my company also uses this method of having them agree they will rely entirely on the patent laws and waive any breach of confidential disclosure, and so forth, and insists upon complete disclosure. But we have been reconsidering that attitude a little bit. I'd like to hear something more about what the real risks are.

We all agree there is some risk, however you accept disclosures, unless they are patented or unless they are the subject matter of patent applications. To make it difficult for the inventors to submit ideas is, of course, bad public relations. It also tends to discourage the submission of worthwhile inventions, and you may be missing some things that you would like to have.

If the idea, or the suggestion, or the invention is submitted in writing and it's dated, there is a strong feeling among some people in my own organization that we ought to be able to take care of ourselves. We keep records of our own development work and research. Our people keep notebooks and we keep dockets. We have attorneys that are following and keeping track of the work that we are doing. We have the prior art to anticipate a thing that doesn't amount to invention. Is there not something to be said for accepting these disclosures when they are in writing and considering possible negotiation before rejecting them? How much greater *are* the risks of this better public relations attitude, this better invitation to get new ideas—which I am sure we all want—as against taking the somewhat lesser risks that you still must assume when being so stuffy?

[4] Merwin F. Ashley, United Shoe Machinery Corporation, Boston.

I'd just like to hear some discussion on that.

We have a number of cases in which people have come in, and instead of having them sign these forms (sometimes we have offered them to them and they have been unwilling to), we say, "Well, if you will agree to have this all written out, leave us your sketches, and agree that this is your complete disclosure, we will witness it, we will take it and look it over." We haven't come to any harm doing that so far.

MR. GREEN: Any other observations?

MR. MAURICE W. LEVY:[5] I think there is one aspect that can be brought out here, and that is, until you have been sued, actually brought into court on the basis of one of these, it's very difficult to make any kind of policy. But once you have been sued, as we are now in such a suit, then you can make a policy very quickly, very briefly, and you won't put much thought into it at all. You do exactly what du Pont is doing, and you will not accept suggestions unless you have an ironclad release.

MR. GREEN: Dr. Sanders.

DR. BARKEV S. SANDERS:[6] I would like simply to raise this question with the panel members. In our own patent utilization study, as I indicated this distribution by size of company, it seems that in the largest companies 99 per cent of their method of acquisition is through their own employees. All 99 per cent or more of their patents are obtained through their own employees with a contract to assign.

As you go down the line, the proportion of these new acquisitions appears to increase and also the acquisition of patents from employees without contracts to assign.

I'd like to know if this is typical. This is what our returns appear to indicate —from 99 per cent to something like 60 per cent.

MR. GREEN: Further comments?

MR. DAYTON R. STEMPLE, JR.:[7] I would like to make the comment also in regard to Mr. Ashley's conversation that I think sometimes we overlook the fact that you don't immediately see the value of the invention.

Now, I have a client presently who is making artificial arteries out of du Pont's "Tuflon." It's on the market; that part of it is no secret. The secret is how the Tuflon is being bleached, it being brown when it's made into a filament, and how the arteries are corrugated.

Now, some of du Pont's people have asked us how we bleach it. They haven't made any inquiry as to our patent position or anything else. And there are several other people, big corporations, who are interested. The question has come up for the client as to whether we are going to protect by trade secret or by patent rights. The interested corporations have been quite anxious to look at our secret if we were so minded to open it up—all because I think they

[5] Maurice W. Levy, Hoffman-LaRoche, Inc., Nutley, New Jersey.
[6] Barkev S. Sanders, U. S. Public Health Service, Washington, D. C.
[7] Dayton R. Stemple, Jr., patent attorney, New York.

see an immediate commercial value in the idea, and accordingly they are willing to take the risk of being sued.

MR. GREEN: Mr. Ford will look into that tomorrow, won't you, sir?

MR. FORD: I think trying to find out how you bleach it may be in a helpful vein more than anything else, to see if we can help you. We have bleaching experts. We have ways of bleaching things. There is that aspect of the thing. And there is the other aspect that the bleaching may be useful in some other field entirely outside of yours.

If you're asked a question that way, and it gets into technical realms you don't want to answer, the thing to do is say you don't want to answer it, that you want to hold the secret.

We get the same thing.

But, when you're doing sales development work, you get into a fuzzy area where you're giving out technical information, and you're likely to be taking in technical information, and you do it on just a confidence basis. There is no way that you can do business if you don't take some risks.

MR. STEMPLE: I agree pretty much with you—and our patent will cover not only bleaching for blood vessels, but any other bleaching of Tuflon. My only point is that corporations in this instance (not only du Pont, but some of the other larger ones) having seen a situation which appears to have commercial promise and an idea they want, are not putting any of these restrictions on it that they normally would if my client had gone to them and said, "I have something to sell to you." They are quite willing to probe into our secret on almost any basis we'd be willing to let them—if we were.

MR. ROBERT O. SPURDLE:[8] I'd just like to raise a question in support of this gentleman's point that the public relations aspect of the way in which these matters are treated is quite important.

In Sun Oil Company we have endeavored to straddle the fence. We have an established policy that when we have an arm's-length transaction with an utter stranger, there is a release form required to be signed. But that is part of a printed leaflet that has an introductory portion setting forth our views on the value of individual inventors and individual inventions and our desire to take advantage of anything that could be of value in furthering our business and furthering our contribution to the community. We then set forth the several general rules that Mr. Ford was enunciating as to what can happen. We cannot consider anything confidential because it would have to be considered by other people if it's going to be given adequate consideration. Then frequently we have to just tear up the papers and tear up the agreement and sit down and discuss it with the individual.

We have four classes of people, by and large, who are our sources of disclosures from outsiders: our own employees who are not under contract, our stockholders, the individuals who have a standing in the community, consulting engineers, someone who is known as a man of substance, and then those odds and ends of individuals who are complete strangers.

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[8] Robert O. Spurdle, The Sun Oil Company, Philadelphia.

We do not receive the volume of ideas that some of these other companies have, but we do feel that in every individual case the effect of what we do in the patent department, where all this material is screened, the standing of Sun Oil Company is a very important consideration.

MR. GREEN: Thank you, sir.

I'm glad you made that reference to the classes of inventors. It seems to me that is part of the problem. There are a large group of people who aren't inventors at all. They are pseudo-inventors—perhaps 95% of all of them. Then there are professional inventors, men who have made successful inventions. It's unfortunate we tend to lump them together and treat them together.

I might make one other point with respect to Mr. Ashley's comments. The Federal Government now for 20 years has done what you suggest, which is, that we actually solicit patented and unpatented ideas. In this period of time we have had correspondence with about a third of a million people, received over a quarter of a million inventive disclosures. One man has brought suit against the Government, and he was thrown out of the Court of Claims.

MR. ASHLEY: May I say our experiences are perhaps a little different from some. Many of the suggestions that come to us, come from operators in shoe factories. We have a large number of shoe machines. We have no control over the way ideas are apt to come to us. One of our men may be in a shoe factory; he's talking to the foreman or a machine operator. The fellow has an idea and tells him about it. Our man comes back to Boston or to the road office and he tells them about this chap's suggestion. We're in possession of it. We have got a confidential disclosure, whether we want it or not. It's too late to write the man letters. Now, should we discriminate between the fellow who gets it in to us in that fashion and the chap who sends it in by mail?

MR. GREEN: I think it's time to move on.

MR. VIRGIL E. WOODCOCK:[9] I would like to comment briefly on this statement that the number of inventions submitted having merit is less than 1%. Contrast that with the requirements that to have the invention considered, the inventor must: "First file his application. Then submit it to us."

This means there may be filed applications on 99½% of inventions people know are not going to be considered meritorious by corporations. This is the patent system working at its worst, filling the Patent Office with inventions most people on the panel will agree at the outset are not good, are not worthwhile. It's wasting inventors' money and counsel's time to pursue the recommended course of action.

This question arose and still arises in connection with inventors' programs such as "The Big Idea." The policy first adopted was: "File your application; then come to see us, and we'll see whether or not we should then put you on the program." There were selected only about six a week, as you know.

The advisory committee from a patent law association said, "This is not right. An inventor should qualify for the program on the merit of his invention, not whether or not he filed an application."

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[9] Virgil E. Woodcock, patent attorney, Philadelphia.

So, the committee worked out an alternative plan: If the inventor be represented by counsel, the counsel would see to it his disclosure was witnessed. If he would then send a letter telling "The Big Idea" that it would be exonerated from any obligations, the inventor could appear on the program taking a calculated risk on advice of counsel.

Now, if a prior art search had been made and the idea seemed to be of value, we can assume that patent counsel would recommend a course of action to protect this inventor against loss of foreign rights if appearance on TV be considered a "publication." This proposal seemed to solve the problems.

Some inventors had no attorneys. They did not know where to go. So that was worked out by referring the inventors to Lawyers' Reference Service.

I think this is a rather important consideration because the simple way out, the easy way out, is to file the application, and then everyone can be protected more easily. Mr. Ashley has pointed out the need for a solution of these problems. The one I have outlined ought to be considered.

MR. GREEN: Thank you, Mr. Woodcock.

I have advance information that Professor Warne is going to touch on this problem when we get to him.

Our next speaker is David S. Kane. He is the senior partner of Kane, Dalsimer and Kane and is also a member of the faculty for the School of Law at NYU. He lectures there in the Graduate School on patent law. He is former president of the New York Patent Law Association. He is treasurer of the National Council of Patent Law Associations. He has a very provocative topic, the adequacy of the patent system to the current needs of our economy.

Mr. Kane.

MR. DAVID S. KANE: Mr. Green, Ladies and Gentlemen: In selecting my topic for discussion this afternoon, I was told that perhaps the best function I could serve would be to stimulate discussion and perhaps even raise some controversy.

I thought about it for a while and decided that as a trial lawyer this might give me an opportunity to have a testing ground for one or two of my pet theories on the functioning of the patent system in our free enterprise society.

I feel, and I have felt for some time, that the patent system in its operation in our country is perhaps the one major factor that accounts for our advanced technology in comparison with the technology of the rest of the modern-day world.

I am not going to speak about the type of invention that is exemplified by Dr. Land's contribution or any of the other great milestones in our society. I'm not going to talk about the lunatic fringe type of inventions that we all know exist at the other end of the ladder. My interest is in the hard core of day-to-day contributions that manifest themselves as patented inventions and that contribute to the everyday well-being of each of us as we go our ways.

They are the inventions of individual inventors, of small businesses, and of large businesses. They all represent inventions that are put to commercial use and find themselves in the market places.

I direct the question as to whether or not the inventors of this type of invention and the people who deal in these inventions are being properly and efficiently served by the patent system as it now functions.

In order to get into that question, I would like to go back a little bit and talk about some things that I think perhaps are fundamental.

Each of us is so busy in our day-to-day practice of our profession, worrying about whether we're going to get allowed specific language in certain claims in our dealings with the Patent Office, wondering whether we are going to sell a court on a specific point of view with respect to claims that may be at issue in litigation, that we're apt to forget and lose sight of the fact that the patent laws in the very first instance were not designed to serve the inventors, were not designed to serve the companies or the owners of the patents who exploit them, but were designed and conceived, and I assume are still supposed, to serve the public at large, to serve our society.

The original concept, which had its beginnings at about the time of the industrial revolution, carried with it the thought that something had to be done to break up the secrecy of the old guild system of craftsmanship. As you know, a man in a trade got his reputation not only through his skill and through the artisanship he possessed, but through his ability to maintain secret such processes as he chose to use, employ, in the treatment of raw materials and in the processing of his end product.

Congress, I think very wisely, realized that unless some incentive were given to bring into the public domain these ancient crafts and the secrets that went with them, we would never be able to expand and develop as an industrial nation.

Accordingly, this theory of a limited monopoly in exchange for complete disclosure and eventual entry into the public domain became the foundation stone of our patent system, and, I think, in that respect, it has functioned very well.

But very soon after the patent system got rolling, very soon after our industrial might began to make itself felt, we had superimposed upon our legal system a new concept, a new theory that had not existed, and still does not exist in the Old World, and that was the system, that was the theory of antimonopoly—antitrust.

In my opinion, it is the working together and the juxtaposition of our patent system and our antitrust laws that have perhaps contributed the difference between the way this country has developed in its day-by-day technology and the way the European countries have developed.

In Europe, if you were a manufacturer, had a product, and the product was good, served a purpose, there was no necessity to change that product, redesign it, retool it, re-engineer it, because all you did if you were threatened with competition, was to get together with your competitors, form a cartel, and divide up the market.

In this country our antitrust laws made that impossible. There was an opportunity for anyone who had the interest and the ideas to go into competition with you. The patent system and its limited monopoly stood in the way of exact copying, and, as a result, if you wanted to take advantage of our antitrust

laws, if you wanted to enter into free competition, you were stimulated and driven to creative heights. You had to design around existing patents. You had to make things differently. You had to create ideas and structures of your own that would function as well or better than the one that you wanted to compete with and that was patented.

I don't think there is any question but that some of our best contributions to our society from an economic point of view have had that beginning. They have been created because the creator, in order to compete, had to get around existing patents and in so doing exercised freedom of thought and ingenuity and came forward with a better mousetrap.

Now, as we have come through the years and as our economy and our industrial strength have grown, we have been confronted with two problems that have interfered with the free operation of our patent system. The one has been that the great number of patent applications filed and the economic burden of processing them have placed on the Patent Office itself a great burden which has until quite recently slowed down their work to an extent that it took an unconscionable length of time to get an application through to issue.

Due to vigorous action and heroic measures by the present staff, this has been alleviated to some extent. They are still working to do a better job on helping us get our patent applications through.

The next problem that has hit us has been the frightful attrition by the courts. After you struggle to get your patent application issued as a patent, you are confronted by a judicial attitude which, by and large, has insisted upon an almost completely unreasonable degree of creativity, to the extent that only exceptional inventions pass their test, and this, unfortunately, after many years of delay in the courts themselves.

Those of you who are in the business of trying patent cases know how long it takes to get to issue. You know the expense involved in trying a case. And when you look at the table of chances, you are apt—or, if not you, certainly your client is apt—to be discouraged about the eventual outcome.

Now, these problems make themselves felt first at the lower economic level. Big companies with large business interests to protect are apt to carry along by their own momentum for a good long while before they put a rein to a procedure which is apparently expensive and futile. But I'm sure those of you who have day-by-day experience with middle-of-the-road, average-sized businesses have more than once been confronted with the question: "Is patenting worthwhile? Are we getting out of what we put into this what we should? What should our policy be for the future? How much should we patent? How much should we litigate? What should we do with it?"

I think this is the beginning sign of a fundamental weakening of our entire patent structure, which I think is something that all of us should view with great alarm.

One of the things that I have noticed in recent years has been how many times attorneys will turn to other alternate forms of remedy when they have

patent litigation available to them. I can think of several examples that are within my own knowledge.

In one instance, a client with a patent on the mechanical features of a plastic rollerskate chose litigation in the field of unfair competition in the face of the expense, the delay, and the probable outcome of patent litigation, even though in that particular case infringement was clear. And presuming the case could have been tried as a patent case with any degree of certainty on the outcome, that might have been the best way to do it. In that particular case, on an unfair competition basis, it was successful, but it happened to be successful because the copying was in the entirety, and there was no margin for any doubt but that the identifiable features of a very novel new toy had been appropriated.

Another instance that I think about is one in which these plastic flowers that are now becoming the rage were covered by mechanical patents dealing with their structure and methods of assembly of the stem, and the leaves, and the petals, and all the rest of it; and a copy was made again in the entirety by using the patented article as the mold from which models were made, or samples were made, and plaster casts were taken to make the infringing devices. But in this particular instance there happened to exist copyright protection on the plastic flower as well, and the decision was made to go the copyright route, again because of the factors of delay and expense.

Another advantage of both the unfair competition and the copyright routes against patent litigation is the fact that in both of them you have available to you on any decent showing the process of a preliminary injunction or restraining order, temporary restraining order, neither of which is available to you under our patent laws, simply because of judicial interpretation.

A third area that seems to be used with important regularity and which is one that patent holders, where they are able, are resorting to, is the starting up of a complaint and an investigation under Section 337 of the Tariff Act of 1930.

I just went through one of these hearings recently myself. That is a most extraordinary type of remedy. There the patent holder goes in without putting in jeopardy either his patent's validity or the question of infringement, because the Tariff Commission cannot pass on either one, and if he is successful, he accomplishes his purpose, and if he is unsuccessful, he still has available, even against the same defendant, the remedy of patent infringement in the Federal courts.

I think the resorting to these other types of remedies where patent litigation is available is the handwriting on the wall, and I think that it's up to all of us to watch it.

Now, as far as constructive criticism is concerned, I'm afraid that I don't have too much to offer. I think it's something that all of us should give thought to. I'm encouraged, as I am sure all of you who have the patent system's interest at heart, are encouraged, by the recent trend as exemplified by the Second Circuit in the *United States Plywood* case, the recent trend to pay some attention to the presumption of validity that I think should attach to a patent that has been

processed and issued by the Patent Office. But that decision and other decisions of its type stand like lone beacons in a great darkness of discouraging litigations in the courts in patent matters, and I think that it's up to us, to the extent that we are able to do so, to see whether we can't work for an improvement in the attitude of the courts, a lessening of the completely unreasonable test that now must be met by a patent in litigation. [Applause]

MR. GREEN: Thank you, Mr. Kane.

Does anyone wish to make any comment on Mr. Kane's observations? If not, we will move on.

I suppose that if you want to take a poll here of something that everyone agreed on, it is that the patent system is a bulwark of our economy, and, therefore, it's probably a very good thing to have someone who is a noted economist come here and express his misgivings on certain phases of the patent process.

We are extremely fortunate that Professor Colston E. Warne chose to take on that task.

As you probably already know, Professor Warne is professor of economics at Amherst. He has also been president of Consumers Union since 1936, and he is the author of numerous nationally famous books and publications. From 1947 to 1951, he was a member of the Consumer Advisory Committee to the President's Council of Economic Advisers. In fact, he was its vice chairman in 1948.

We will be very pleased to hear Professor Warne's views.

DR. COLSTON WARNE: Mr. Chairman, the acid test of the patent system is its impact on the consumer. If today I seem to pass by the merits of the system, it is because I wish in limited time to accent some of the misgivings I have pertaining to its operation today.

In preparation for this meeting, I wrote a leading patent attorney who had his apprenticeship in the Patent Office to inquire what, if any, changes consumers should demand in the system. His revealing reply states beautifully my first misgiving. Let me quote him. He said:

> The principal difficulty in the patent system today is one that has plagued it for many years—that is, the failure to provide administrative facilities adequate to cope with the growing technical problems with which a patent office must contend in this century.

He went on to add:

> The courts, in spite of their reputation for conservatism, have been much more aware of the increasingly technical character of our civilization, with a consequent higher standard of improvisation entitled to be considered inventive and the necessarily increasingly critical appraisal of the issued patents to assure that the patent system functions to accomplish its original design. The Patent Office, on the other hand, has been reluctant to follow the courts in recognition of the raising of the level of innovation warranting patenting, with a result that many patents are issued on minor devices which make no real contribution to progress.

He recognized that the difficulty with which the Patent Office is confronted is that of scanning a monumental increase in the volume of literature to determine the novelty of any article sent in for patenting, but held that "a lag in the employment of modern search devices has the effect of reducing the discrimination which should be exercised in the granting of patents."

As I would recap the matter, I see no point in bogging down the patent system with a host of items which represent no genuine invention, but merely represent the repatenting of simple devices of everyday life.

Another misgiving I have, on a different level, is that the courts in recent years, while they have had a very salutary influence—and I disagree with the previous speaker—a very salutary experience in reducing operation of contractual restraints based on patents which have impeded competition in industry, haven't gone far enough. I hope the movement can go even farther and develop more challenges, with the Government stepping aggressively into the field of enforcing antitrust.

Today, in a good many instances, I surmise, in place of taking a patent on basic development, the custom has grown of taking many, many small patents, many of these by assignment. The accumulation of these small patents in the hands of a corporation of great power can serve almost as effectively to block off progress and development to the benefit of the consumer, as a single basic patent.

I would suggest as a supplement to the research findings which were set forth this morning, instead of just counting aggregate noses as to the patents and use of patents, one might go into the pivotal importance of certain patents, instead of equating all patents as entities, to see which ones are significant—how much leverage a patent has.

That, to me, is quite important.

Another misgiving lies in the confusion created for the consumer by certain of our patent techniques. I refer to the point, for example, in pharmaceuticals, of copyrighting and patenting processes in which you have a generic name which, when the doctor goes to prescribe or the consumer goes to purchase, is such that the identical product can come out under sundry names.

Just as an illustration, you have "Prednisone" as a generic term. You can buy it under that term. A dozen manufacturers will sell it to you. Or you can buy an identical article under the name of "Deltra," "Deltasone," "Meticorten," or "Taracort." Take your choice; it's all the same.

This world is already complicated enough. To have the consumer, and the doctor too, put up against the obstacle of having differing brand names for the same article is merely to create unnecessary added complexity.

I don't know the answer exactly, but I suggest that this is one aspect.

Another misgiving is about the standardized 17-year period of patents. I realize that was originally reached as a compromise, but I sense that in certain cases there should be a shorter period for patents—dress designs, and so on. A long period is not necessarily something which should obtain in all instances.

Another problem upon which I have misgivings—and I'm rapidly pressing by here—is the question of government research. Patents are issued in a world in which government research has become exceedingly significant. Last year about $3.7 billion was spent by the government, largely tabbed as defense, but with many byproducts in non-defense areas. This year I note the figure promises to go to about $4 billion. Private research totaled something of a

magnitude of $3 billion, more or less. Or if you take the aggregate, the figures range from $6 billion to $9 billion poured out annually in this very vital area.

This question might be posed in this manner: Under the Internal Revenue Code, business is given the option of treating research and development outlays as expense rather than amortizing them. Under this proposition, the consumer initially out of the current product price will pay, of course, for development and certainly has an interest in the result.

But beyond this is the question—and I think an equally important question—of what rules and regulations should attach to the discoveries which are made under the government subsidy program.

I do not know the precise answer, but I suspect that at bottom any concept of patent law is based on the idea that patents will encourage the expenditure of time, effort, and money in promoting progress. It was on this groundwork that the American consumer has, for now better than 150 years, allowed these monopoly privileges to patent holders during the time patents are in force.

These are a cost to the American consumer, and theoretically, the assumption is that patents are worth the cost.

So far as the theory goes, today consumers are no longer, I gather, getting a complete *quid pro quo*. The consumer pays in higher prices for the monopoly privilege when he buys the product. Also, the consumer as a taxpayer may be supporting research, either through the straight government outlay or through the tax privileges, to those undertaking the research.

This is, I appreciate, a complicated problem, but I suggest that it is one demanding a bit of scrutiny and possibly of having a more limited allowance of patents where they are directly linked to government-financed research.

One other aspect of this deserves a moment's mention, and that is the problem of secrecy in government. The privilege of rating as classified the discoveries made through the use of government funds may very well tend to allow a particular private firm to withhold discoveries it has found, even though these are totally financed by the government, until such time as the company receiving the research funds has been able to take a head start over whatever potential competition might arise with the free distribution of the information were such permitted.

In fact, it may well be that you will find not a few cases of companies actually taking out private patents on discoveries directly made and financed by governmental research.

At least I pose this as a very interesting research issue which might be tackled by the Foundation.

We do happen to live in the world we live in. We have to have a lure or a spur to encourage business to undertake development and research. This is recognized. The big question is whether the patent system today as it operates is an adequate lure and spur to significant discovery.

The tendency for, or even the necessity for, business concerns to view their research and development efforts primarily from the standpoint of commercial exploitation tends to drive research of the private sector, into areas which may

not always produce the best public results. And it's these public results that I accent.

Let me turn to broader ground for a final point.

What may be called for, as I see it, is some sort of review of the basic patent concept. Here I refer to what I describe as the "bridge area," the area between that of meaningful research and the area of product exploitation.

Perhaps without some patent protection, large corporations would turn themselves into security-locked empires of private product secrecy which would, of course, do no one any good.

The bigger question today is how to develop workable substitutes for that impetus which the patent system earlier so fruitfully offered.

A secondary question is: How much should the people of the United States justly pay for the goods and services they buy in order to allow for the development of patents on this "bridging" level?

These are awfully difficult questions to answer.

To me, it has become increasingly evident in the last few years that one of the biggest problems—in fact, the problem surmounting all others in the nation—is that of developing better and more effective research at more significant levels; in a word, of using our research staff to greatest effectiveness.

It seems to me that the patent system has in a degree failed and that other approaches might at least be tried at this time. I would suggest the possibility of public prizes for solutions to major problems rather than patent rights. The chances are that these might very well cost the public less than the granting of patents. Furthermore, this approach might allow the public welfare more weight in the setting of research goals.

The public today is rightly uneasy about the development of American science and technology. Subsidy, either private or public, together with patent rights, does not seem to have produced research results adequate to the needs of our times.

As in other sectors of life, men in the field of science face waste and futility, manipulators and parasites. The problems of patents with their monopoly privileges, together with the bigger problems of more effective research, are of utmost significance.

Bound up in this whole question is, of course, a social problem that includes at the one end, the scientific talent in schools and at the other, the competition which the United States faces in competition with the science of the world.

What seems to me to be the challenging issue, and one which needs accent, is not so much the development of a protective armament of patent rights in the familiar, accustomed way, but rather, something in the order of open and public continuing review of the many governmental and private policies that bear on this problem. Without this broadgauge review, we may very well in the time ahead encounter severe difficulties in the field of science.

Thank you. [Applause]

MR. GREEN: Thank you, Professor Warne.

Professor Warne has raised at least six issues, each one of which, I think,

deserves a seminar to itself. And I'm afraid to open this for public discussion or we'll never get to Dr. Waterfall. However, since Mr. Brown has got to run for a plane in a moment, I think we might give him an opportunity to make one observation, and then we will step to Dr. Waterfall. Then, later, if we have time, we will come back to general discussion.

Mr. Brown.

MR. DONALD L. BROWN: I would like to suggest that we do not forget that industry can live only if it makes a profit, and that the only way I know of that research can be paid for in industry is to give the research group something that will refund to them what they have spent on research.

I know of no invention that springs full-blown from the brain of the inventor so that it can go into commercial production without research, development, tooling, testing, de-bugging, piloting, everything else.

If we are to take from industry the protection that is given to them now by the patent which they get on their research, and if we are to provide that as soon as their product enters the market every competitor can seize it and reproduce it without contributing to the research costs, we will have no research and no new products.

If government is prepared now to repay industry for all of its research, whether or not it is productive, whether or not it leads to new invention, and if government is prepared to guarantee to the research organization a reasonable profit upon its capital investment, I'll be very happy to work for such a research organization.

Until that time comes, I want some protection for the money I invest, for the time I invest, and unless someone can suggest something in lieu of the patent protection that we now have, I'm not interested in new products, new research, and new development. [Applause]

DR. WARNE: Just one moment's rebuttal.

I think that we in Consumers Union are fully cognizant of industrial contributions. We test everything from alkalizers through to zigzag sewing machines, and we do well appreciate that in many fields there have been immense improvements, and we would compliment those industries upon their progressive developments.

What I was centrally addressing myself to here was this—that where you have such an immense sum of research money, a three to four billion chunk, thrown in by government, there is a real question as to whether the taxpayer, the consumer, having paid that sum in for development, should thereby vest in a private interest the patent rights resulting from that money. Similarly, when a company deducts the cost of its research as current expense, the consumer is paying for the research in the first instance. If a company is going to put it in on a capital investment basis, fine. I merely raise such questions to point up what to me seems to be a most significant problem of today, that of taking the patent issue out of the narrower focus and placing it in this broad focus.

As a final comment, while I'm on my feet here, I would add that much of

our invention today does not seem of this "kitchen" variety that has been talked of here this afternoon. Invention seems to be developing more and more into a planned variety. And I think our larger corporations have made much of their contribution in terms of planned results.

We as a nation are faced with a critical scientific situation. I don't think that we ought to rest back on a system which in its early days was an exceedingly progressive system (which the patent system was—and I compliment it). We ought to look forward into a period in which we place less stress on pouring out an amazing aggregate of patents—and many of them on petty things—and pay our attention to the rapid development of our scientific research resources in the broadest sense of the term.

MR. GREEN: Professor Warne, I think you will be reassured to know that in the back of the room there are three gentlemen who are associated with the Senate Patents Subcommittee, Committee on the Judiciary, and I think they worry about this problem night and day, all of the six problems you have raised. These problems have been surfaced over the years, and there is active investigation going on in the very areas you discussed.

DR. BARKEV S. SANDERS: I was wondering whether the time would permit to raise some questions.

MR. GREEN: Let's have the next speaker first, please.

We have emphasized the patent aspects this afternoon, but the copyright situation is quite critical and, with the multiplicity of scientific publications, is getting more and more serious. Our scientific societies are very perturbed about it.

We have today the representative of one of the leading groups, Dr. Wallace Waterfall.

Dr. Waterfall is the secretary and treasurer of the American Institute of Physics. Also, from 1925 to 1942 he was an acoustical engineer and director of research for Celotex. He has been secretary of the Acoustical Society of America since 1929 and was executive secretary of the Acoustical Materials Association in 1949.

Dr. Waterfall will bring to our attention this new problem in copyrights.

DR. WALLACE WATERFALL: Thank you, Mr. Moderator.

Ladies and Gentlemen, I am not quite sure, although the moderator made me a little more certain, why I have been inflicted on you, since the comments that I am about to make are quite foreign to what you have heard here this afternoon.

My comments are about scientific journals, librarians, and copyrights.

As you have perhaps noticed, the librarians are also meeting in this hotel today, and it occurred to me earlier that I might be in the wrong room.

Anyway, it's proper that I should be the last speaker listed on the program because I probably have the least information to give you, and I will do so quickly.

The American Institute of Physics has no firmly established policy with respect to copyrights. In the past we have been rather generous in granting

permits to copy substantial parts of our journals. But we are now becoming greatly concerned with the growing tendency of librarians and others to photocopy parts of our journals, because we believe this may eventually adversely affect subscriptions.

I can give you no answers to this problem, but I can elaborate on it and report some of our current thinking on the subject.

I should first tell you something about the Institute. The Institute was formed about 30 years ago by a group of scientific societies in the field of physics to handle journal publishing and other activities common to all the societies. We now publish about 20 journals, reporting original research and applications of it. Eight of these are English translations of Russian physics journals.

All or some parts of all the journals we publish are now copyrighted.

It has not been easy to persuade our member societies and editors to copyright their journals because most physicists have, as an inborn characteristic, a passion for unrestricted communication. This point has already been made by Mr. Brown.

The bylaws of most physics organizations contain something like the following, and I quote:

> The purposes of this corporation shall be the advancement and diffusion of knowledge of the science of physics and its applications to human welfare, and to this end it is part of the purpose of this corporation to undertake, among other measures, the publication of scientific journals devoted wholly or mainly to physics and related sciences and to serve the public by making available to journals, newspapers and other channels of public information reliable communications as to physics and its progress.

It pleases physicists to see their scientific papers disseminated as widely and in as many languages as possible, and it takes hard financial facts to convince them that their interests may best be served in the long run by copyright restrictions.

To encourage widespread distribution of physics journals, the Institute and member societies have effected economies and adopted schemes to keep subscription prices as low as possible. The average subscription price for Institute journals, excluding Russian translation journals, is currently 12.6 cents per 10,000 words. This is about one-third of the average price of physics journals not published by the Institute.

One scheme adopted by the Institute to make these low prices possible is the publication charge varying from $8 to $30 per page which the authors' institutions are requested to pay for publication in most of our journals. This payment is not mandatory for publication, but the page price is now honored on approximately 80 per cent of the submitted articles.

The gross revenue of the Institute and member societies from publications in 1958 came from the following sources:

Forty-three per cent from subscriptions;

Thirty-one per cent from publication charges;

Five per cent from the sale of single copies and back numbers;

Nineteen per cent from advertising.

The income from subscriptions, single copy sales, and from advertising represents about two-thirds of the total income from publications, and it is this two-thirds which we believe is jeopardized by the increasing tendency of our journal subscribers to photocopy. We believe that photocopying by libraries, government agencies, and industrial organizations poses a menace to our journal circulation because of the widespread and increasing availability of photocopying equipment and because photocopying offers some real advantages from the user's point of view.

It is admittedly a real advantage to an organization if its librarian can quickly make photocopies of articles and distribute them to various individuals interested in particular subjects. A single library subscription to one of our journals can thus serve many physicists.

It is easy to see what may happen to journal circulation and advertising income as this tendency grows.

We see no easy way for us to learn about or control this kind of reproduction. We doubt whether our ability to supply additional single copies or reprints of single articles rapidly would discourage this photocopying because it is so much easier and quicker for the librarian to make copies on the simple machine than to order additional copies from us.

As circulation goes down, subscription prices will have to go up, to the point where they will be out of reach of the individual subscriber, and this will further reduce circulation, leaving libraries as our only subscribers. Library circulation is of little interest to advertisers, so we will then lose advertising income. I suppose publication charges levied against authors' institutions will also have to be raised to help compensate for other losses of income, and this may tend to reduce the number of articles published.

If I may be facetious, it would seem that the ultimate solution to our problem may be to stop publishing altogether and then the libraries would have nothing to photocopy.

I cannot pretend that this photocopying problem has yet reached such serious proportions; all of our journals are still enjoying slow but steady increases in circulation. However, the increase is not proportional to the increase in the total number of physicists.

We see no easy way of restricting or gaining revenue from photocopying by simply trying to enforce whatever rights we may have under copyright. In spite of the fact that I am a treasurer, I am conscious of the fact that all physicists desire to have their published works made readily and cheaply available to all of their fellow scientists and the public, and the Institute recognizes this as one of its principal responsibilities. With photocopying methods crowding in upon us, our problem is to find out how we can best serve the advancement of physics without going broke. [Applause]

MR. GREEN: I am not going to ask Dr. Waterfall if he gets approval from the Russians before he translates their journals in English.

DR. WATERFALL: We certainly do.

MR. GREEN: You do?

DR. WATERFALL: Yes.

MR. GREEN: We in the government do not. I should say though, there is a plan that has been discussed which would be parallel to the ASCAP scheme whereby those who photocopy submit a few cents into a central fund. Is this a workable scheme from your point of view?

DR. WATERFALL: We doubt it. There are too many little libraries.

MR. GREEN: Who would not honor the plan?

DR. WATERFALL: Yes.

MR. GREEN: Now we have a few moments before five-thirty. If anybody wants a Donnybrook, I guess this is the time to start it.

Dr. Sanders.

DR. SANDERS: I first would like to say that I wish this conference were divided into two halves with sharp differences of opinion. I fear, otherwise, very often at these conferences we are doing what might be likened to playing chess with yourself. We are talking to an audience that is like-minded. And from that angle I certainly welcome Professor Warne's presence on this panel.

Professor Warne, there are many aspects of your talk that I would like to take up, but because of time, I must limit myself to just a few.

Professor Warne started with the statement that we patent many things by dividing. I would like to ask him how does he arrive at that conclusion, via the armchair? I have some objective way to question his assertion. The number of patents has actually declined, and this decline can be foreseen from 1900 on. If you want proof, read a paper of mine published in 1937 indicating this decline in number of patents. This despite the fact that we are spending more and more on research and development. This is not compatible with the conclusion that we increase the number of patents by subdivision.

Then Professor Warne very directly questioned the numbers which I cited and the inferences I made by referring to them as "counting noses." I would again welcome it if Professor Warne could point out how we can get closely to the thing he wants to assess. We did not merely count whether the patent was used or not. Had Professor Warne taken time to read the evidence, he would have found that we inquired whether the patent was used; was it used extensively, moderately, slightly, or not at all.

We inquired whether it affected sales greatly, moderately, slightly, or not at all.

We inquired whether it reduced production costs greatly, moderately, slightly, or not at all.

We asked whether it had any other useful effects, and to please define what these useful effects had been.

These have been published. Had Professor Warne read them, I'm sure he probably would have modified his statement.

We inquired what was their net loss or profit from the industrial use of the patent. We realized that industry has not been keyed up always to provide such information, and we cautioned our readers about the reliability of losses or profits reported. But the point is, we did not merely "count noses."

And, therefore, if Professor Warne's other remarks are as poorly substan-

tiated, I have some doubts whether they are too well taken. But I would welcome it if he would put down some objective ways that we can answer some of these questions by means other than armchair philosophizing. I would welcome it, and if the resources of the Foundation permit, I would like to put some of these to use.

May I end here. [Applause]

DR. WARNE: May I answer the second question first? It seems to me very well to, let's say, make an inventory of gnats and elephants and come up with a composite, having drawn up aggregate figures. But the point I was making was, to use a specific illustration, that an invention relating to fishhooks is of a different order of magnitude than the devising of a synthetic textile.

As for the patent usage surrounding, let's say, the fishhook invention, it's, perhaps, very well that it gets into your figures. But the thing that I think is at issue in this controversy with the Patents Subcommittee is whether large corporations have come into a position of strategic power with reference to certain patents, whether they have a broad armament of patents which can be used adversely to the public interest.

I do not see too much light thrown on that issue one way or the other by your study.

I'm not here seeking to judge whether you are right or whether the Subcommittee is right. I am merely suggesting that I didn't see very much contributed by this study one way or the other.

As to the pattern and design of an appropriate research study, this ought to be something taking more than a snap judgment. I would feel, however, delighted to furnish whatever assistance we could give from our research group to this problem. But I wouldn't want here to give an answer. All I am saying is, I don't feel you gave a very effective answer to it.

Concerning the other question that you raised which related to the number of patents issued in recent years, I was merely quoting a person—I think a very eminent person—in the patent field. He felt, I think correctly, that the courts were closer to the target in tossing out a lot of patents on what seemed to them items of lesser significance and that there should be a new orientation of the Patent Office, scaling up the level at which patents will be issued. Personally I rather have the impression that courts are fairly conservative in this country and don't go overboard too far, and I would guess that they were perhaps closer to the truth than the Patent Office.

MR. GREEN: I think we ought to give the Commissioner the last word, don't you, Mr. Watson?

COMMISSIONER ROBERT C. WATSON[10]: Just one short question, Professor. You stand for the patentability of dress designs, but take exception to the period of time for which the patent is to be issued. What period of time do you think would be appropriate?

DR. WARNE: Well, I think there ought to be a variable period of time for

[10] Robert C. Watson, Commissioner of Patents, Washington, D. C.

different goods. That is the sense I get, going back to the early discussions of the TNEC on the problem.

COMMISSIONER WATSON: But you don't see anything wrong with patenting dress designs?

DR. WARNE: Oh, no, no. I'm merely suggesting that this notion of cutting the bed to one length for everything was, early, a convenient compromise. I think we have reached the point where a little consideration ought to be given to the notion of having variable patent periods depending on circumstances.

MR. GREEN: Thank you.

Dr. Rossman. One minute.

DR. JOSEPH ROSSMAN: I should like to call Professor Warne's attention to the fact that the copyright law and the patent law as they exist today originate from the same section of our Constitution.

I understand that there is an excellent textbook on economics written for college students by a professor who is collecting royalties totaling nearly a million dollars. Now, would Professor Warne have misgivings in this situation where a professor used only some reams of paper and a pencil to write a textbook enabling him to collect such large royalties, as against an inventor like Mr. Charles Goodyear who sweated and starved to death to produce vulcanization of rubber and did not get his reward in spite of his labors.

DR. WARNE: As a recipient of some royalties—not to the extent of Mr. Samuelson, whom you mentioned—I have no criticism of the principle of receiving such gains. In fact, I think our organization, Consumers Union, has profited from the principle of copyright, and, I might add, we are faced with the same problem of photographing that was suggested here by our friend, Dr. Waterfall.

No, my indictment is not a sort of "hell and damnation" indictment at all. I am merely raising what seemed to me some misgivings about the current context of the problem.

We have come into a situation where invention is of a different variety. Invention is to a greater extent today planned invention. The old "attic inventor," while he is still with us (for which we can be thankful), is not characteristic. The corporation has come in and is swinging its weight around, and we have to face this very difficult complex of issues surrounding antitrust as against the patent system, which I think has been the central focus of discussions through the whole day.

I don't propose that I have the answers to these problems. I am merely raising what seem to me to be some of the more troublesome issues, especially as they affect our 850,000 consumers who face complexities in the marketplace that people of earlier generations never dreamed of.

I hope that we can make life better and, at the same time, to the extent possible, a bit simpler, for consumer choice.

In a word, I don't think we ought to amplify differentiations in products just for the sake of adding things or just for the sake of making life more complicated for the consumer by employing different captions.

The central focus of my plea again is: Let's have a reappraisal and let's have this Foundation dedicate some of its energies to this patent problem from the standpoint of the consumer.

DR. ROSSMAN: Professor Warne, may I take one more minute?

The Senate Committee published an excellent monograph by Professor Machlup on the economic aspects of inventions and patents. He points out that cash rewards, for example, were suggested as one way of stimulating invention.

Now, before 1620 in England, the King granted arbitrary monopolies. Sir Walter Raleigh got a monopoly for the sale of tobacco. He was given this reward which brought him cash returns, but this did not stimulate industry, and it was against public interest.

The French tried giving cash awards to individual inventors, but this was found to be ineffective. Such suggestions as you have thrown out—

MR. GREEN: Joe, we're only in the 1600's, so let's cut it off. [Laughter]

DR. ROSSMAN: I mean, possible alternatives to the patent system have been tried in the past and have been found wanting. Consider the situation today. An artist sits down and in five minutes makes a cartoon of a kewpie doll. He secures a copyright on his work. Then an unauthorized manufacturer makes the dolls, copying this cartoon in three dimensions. This artist goes into court and gets very many substantial dollars in damages for appropriation of what might be considered a trivial work of art. But an inventor might spend $100,000 or $500,000 in developing an invention. If he gets a patent and attempts to enforce it in court, he is, in most cases, unsuccessful today.

MR. GREEN: Thank you, Dr. Joseph Rossman.

DR. WARNE: May I just say one thing? I think there is a great deal of non-economic motivation in this world. There are people, for example, in the field of physics who do not strive even for patent rewards. There are a good many people giving their lifetime for the sheer joy of the quest, if you like.

We do not have to rely exclusively upon the patent reward. I think our economic system would be in poor shape if we did.

The patent reward is one type of bait, and in certain cases it is very valuable, and I would not underestimate the value of it. I am merely throwing out the other ideas that may not be too fruitful, but I think at least they merit careful consideration.

MR. GREEN: I think some of you would keep Professor Warne up here all evening. Why don't you try to corner him before he gets away? [Laughter]

Actually, it seems to me that what he has been saying is that there are great opportunities, great challenges for the Foundation, and I agree there are, and if the Foundation had resources, they ought to tackle it.

Now, we have come to the end of the day, and I think it is time for Director Colclough.

DIRECTOR COLCLOUGH: Before I end and before you leave, Professor Warne, I do want to correct one impression that perhaps you didn't mean to leave. But you used the word and you spoke about a "controversy" between the Foundation and the Senate Subcommittee. As far as the Foundation, of which I am the

Director, is concerned, we have no controversy with the Senate Subcommittee. We are dedicated to research, as our Declaration of Trust and our brochure declare. We are part of a university, engaged in university research. And we are not conscious of any controversy with the Senate Subcommittee. I am delighted the staff of the subcommittee is here today, because I think we are working to the same end.

Now, before we part this afternoon, I thank the staff of the Foundation who are responsible for arranging and planning this third Public Conference.

I thank the consultants who have participated with us today.

I thank Dr. Hafstad, former Chairman of the Advisory Council, who has moderated the meeting.

I want to assure you, as I have on previous occasions, that we value highly your constructive criticisms. We are very, very appreciative of your interest and support.

On that note, the third Public Conference stands adjourned. [Applause]

[Whereupon, at 5:40 p.m., the third Annual Public Conference was adjourned.]

Appendices to the Proceedings

APPENDIX I

PRICING, ANTITRUST, EUROPEAN COMMON MARKET, AND OTHER PROBLEMS IN FOREIGN LICENSING

DISTRIBUTION OF SUBSIDIARIES AND LICENSEES OF 175 U.S. LICENSORS ACCORDING TO EQUITY INTEREST*

Equity Interest in Foreign Companies						Range of Foreign Companies	Equity Interest in Licensees							
100%		51–99%		Under 51%			100%		51–99%		Under 51%		Indep.*	
Cos.	Sub.	Cos.	Sub.	Cos.	Assoc.		Cos.	Lic.	Cos.	Lic.	Cos.	Lic.	Cos.	Lic.
31	0	91	0	74	0	0†	64	0	102	0	79	0	35	0
83	193	50	84	54	109	1–5	55	128	40	61	52	104	65	172
14	103	2	17	9	83	6–10	10	73	2	17	7	51	29	238
5	66	2	29	4	51	11–15	5	66	0	0	5	51	13	164
3	54	0	0	1	19	16–20	3	54	0	0	0	0	8	145
7	208	0	0	3	84	21–50	6	182	0	0	3	62	16	453
0	0	1	64	0	0	51–100	0	0	1	64	0	0	3	188
2	261	0	0	0	0	Over 100	2	261	0	0	0	0	6	1014
145	885	145	194	145	346	Totals	145	764	145	142	145	268	175	2374

Grand totals: Licensees—3548
Licensors— 175

* The total of 175 includes 30 companies which licensed abroad but reported having no equity interest in any foreign companies.

† Figures for companies in the zero range *ex*clude the 30 companies not having an equity interest in any company abroad.

APPENDIX II

VARIATIONS IN PATENT UTILIZATION BY DIFFERENT TYPES OF COMPANIES

TABLE A

COMPARATIVE DISTRIBUTION OF PATENTS IN THE PATENT UTILIZATION STUDY WITH THE TOTAL NUMBER OF U. S. PATENTS IN FORCE AT THE END OF 1955 ASSIGNED TO AMERICAN COMPANIES AT THE TIME OF ISSUE. THE COMPANIES ARE RANKED BY PATENT OWNERSHIP AND INCLUDE ALL THOSE WITH ASSETS OF $100 MILLION OR MORE WITH ONE OR MORE PATENTS. [1]

RANK ORDER OF LARGE COMPANIES AND CERTAIN OTHER COMPANIES ACCORDING TO NUMBER OF PATENTS ISSUED TO THEM DURING 1939–55.	PATENTS ISSUED [1]		PATENT UTILIZATION SAMPLE [2]	
	No.	%	No. [3]	% [4]
(1)	(2)	(3)	(4)	(5)
4 companies with highest number of patents	34,757	10.9	130	11.7
12 companies with highest number of patents	64,689	20.4	238	21.4
19 companies with highest number of patents	78,600	24.7	301	27.1
30 companies with highest number of patents	95,028	29.9	346	31.2
69 companies with highest number of patents	126,895	39.9	456	41.1
160 companies with highest number of patents	158,634	49.9	567	51.1
358 companies with highest number of patents	190,437	59.9	673	60.6
495 companies with 75 or more patents	202,375 [5]	63.7	708	63.8
595 All American companies listed [6]	204,592	64.4	717	64.6
Remaining companies [7]	113,134	35.6	393	35.4
Total	317,726 [8]	100.0	1110	100.0

[1] "Distribution of Patents Issued to Corporations (1939–55)," Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, Eighty-fourth Congress, Second Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, pp. 19–34.

[2] Includes all patents in the sample that were issued, assigned to American corporations irrespective of the fact whether the inventor was residing in the United States or not.

[3] It does not mean that each of the companies listed in the Subcommittee roster of companies was actually represented in our sub-sample, but merely the patents of those companies in a given category that were in our sample accounted for the specified number of patents shown in column 4.

[4] The closeness of column (5) to column (3) would be improved if we adjusted the distribution of patents in our sample according to corporate ownership as of 1954, thus excluding the effect on classification that has resulted from mergers and purchases since 1954.

[5] The Subcommittee list includes a total of 368 American companies with 100 or more patents issued to them by the Patent Office during 1939–55. Of these 101 are companies with assets of $150 million or more in 1954–55, accounting for a total of 119,718 patents, and the remaining 267 companies are said to represent all other companies to which 101 or more patents were issued. These 267 companies with 1954–55 assets less than $150 million, collectively accounted for 71,735 patents. The total number of patents issued to American companies with 101 or more patents at the end of 1955 is 191,453. The list of companies with 75 to 100 patents is incomplete.

[6] Of these 100 companies with less than 75 patents 69 are companies with 1954–55 assets of $150 million or more and the remaining 31 are also large companies with assets of $100 to $150 million.

[7] Obtained by subtracting the number issued to the companies listed from the total number issued to American companies. See reference under 1, p. 12.

[8] Total number of patents assigned to American companies at the time of issuance 1939–55.

TABLE B

PERCENTAGE OF MAILED QUESTIONNAIRES RETURNED BY ASSIGNEES AND UTILIZATION STATUS OF PATENTS FOR COMPANIES RANKED BY NUMBER OF PATENTS ASSIGNED TO THEM AT TIME OF ISSUE, BASED ON ASSIGNEE REPLIES RECEIVED ON OR BEFORE 3/1/59.[1]

PRELIMINARY

PERCENTILE RANK OF LARGE COMPANIES ACCORDING TO THE NUMBER OF PATENTS ISSUED TO THEM DURING 1939–55.[1]	% OF QUESTIONNAIRES RETURNED	USED OR ABOUT TO BE USED		NEVER USED		QUESTIONNAIRES MAILED[2]
		No.	%	No.	%	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Companies with highest number patents, 11 percentile	45.3	27	46.6	31	53.4	58
Companies with next highest number patents, 11–20 percentile	88.0	46	48.4	49	57.6	95
Companies with next highest number patents, 20–30 percentile	63.8	30	51.7	28	48.3	58
Companies with next highest number patents, 30–40 percentile	77.4	36	48.7	38	51.3	74
Companies with next highest number patents, 40–50 percentile	56.8	34	54.8	28	45.2	62
Companies with next highest number patents, 50–60 percentile	52.8	32	57.2	24	42.8	56
Remaining listed companies	52.4	10	45.4	12	54.6	22
All listed companies[3]	62.5	215	50.6	210	49.4	425
Non-listed companies	43.5	123	75.5	40	24.5	163
Total: Per cent	55.8		57.5		42.5	
Number	590[4]	338		250		588
Theoretical totals[5]		630	59.6	428	40.4	1058

[1] Based on "Distribution of Patents Issued to Corporations (1939–1955)," Study of Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, U. S. Senate, Eighty-fourth Congress, Second Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, pp. 19–34.

[2] Limited to patents with American inventors known to have been assigned to American companies, initially at the time of issue or subsequently. Excludes patents assigned to companies for which no current address could be found.

[3] Listed companies are believed to include all companies with assets of $100 million or more in 1954–55 that had issued to them one or more patents, all other companies with 101 or more patents issued to them, and a partial listing of companies with 75 to 100 patents issued to them. (See reference under 1, pp. 8–9.)

[4] Includes two patents with unknown utilization status.

[5] Computed on the assumption that the completed questionnaires for each group represent an unbiased sample of patents owned by companies in that group with respect to utilization status.

TABLE C

UTILIZATION STATUS OF ASSIGNED PATENTS OWNED BY COMPANIES RANKED ACCORDING TO THE NUMBER OF PATENTS ISSUED TO THEM, SEPARATING COMPANIES WITH ASSETS OF $100 MILLION OR MORE FROM THOSE WITH LESS THAN 75 PATENTS, BASED ON QUESTIONNAIRES RECEIVED FROM ASSIGNEES OR INVENTORS ON OR BEFORE 4/1/59.[1]

PRELIMINARY

PERCENTILE RANK OF LARGE COMPANIES ACCORDING TO THE NUMBER OF PATENTS ISSUED TO THEM DURING 1939–55.[1]	USED OR ABOUT TO BE USED[2]		NEVER USED		QUESTIONNAIRES RETURNED[3]
	No.	%	No.	%	No.
(1)	(2)	(3)	(4)	(5)	(6)
Companies with highest number of patents, 11 percentile	51	53.5	37	38.5	96
Companies with next highest number of patents, 11–20 percentile	48	49.0	50	51.0	98
Companies with next highest number of patents, 20–30 percentile	39	52.7	28	37.8	74
Companies with next highest number of patents, 30–40 percentile	47	51.6	42	46.2	91
Companies with next highest number of patents, 40–50 percentile	47	55.3	33	38.8	85
Companies with next highest number of patents, 50–60 percentile	45	56.2	34	42.5	80
Remaining listed companies	15	51.7	14	48.3	29
All listed companies	292	52.8	238	43.0	553
Non-listed companies	194	75.2	51	19.8	258
Total	486	59.9	289	35.6	811

[1] Based on "Distribution of Patents Issued to Corporations (1939–55)," Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, U.S. Senate, Eighty-fourth Congress, Second Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, pp. 19–34.

[2] We have combined with assignee replies those inventor replies which specifically stated that the sampled patent was used or was about to be used. All those questionnaires considered with no specific reply as to the utilization of the sampled patent or a reply of "don't know" are included with the "never used." Inventor replies are used only with respect to patents for which no assignee questionnaire had been received. Only one inventor reply is used for each sampled patent included in this tabulation. Where two or more inventor questionnaires had been returned for a given patent (multiple inventors) by a random process only one of these was selected to be used in this tabulation.

[3] Patents with unknown utilization status have been included; therefore, percentages in column (3) and (5) do not always equal 100.

TABLE D

NUMBER AND PERCENTAGE DISTRIBUTION OF ASSIGNED USED PATENTS BY EXTENT OF USE BASED ON ASSIGNEE REPLIES—COMPARING THE EXTENT OF USE REPORTED BY "LARGE" COMPANIES: WITH THAT REPORTED BY "SMALL" COMPANIES. [1]

EXTENT OF USE [2]	"LARGE" COMPANIES		"SMALL" COMPANIES		ALL COMPANIES	
	No.	%	No.	%	No.	%
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total	172	100.0	107	100.0	279	100.0
Used extensively	63	36.6	48	44.9	111	39.8
Used moderately	50	29.1	29	27.1	79	28.3
Used to a limited extent	59	34.3	30	28.0	89	31.9

[1] "Large" companies are companies with 101 or more patents issued to them during 1939–55, many with 75–100 patents issued to them within this period, and companies with gross assets of $100 million or more. These are companies listed in "Distribution of Patents Issued to Corporations (1939–55)," Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, Eighty-fourth Congress, Second Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, pp. 19-34. "Small" companies are all others in our sample with completed questionnaires but not included in the list.

[2] Based on assignee replies to question 13 of the assignee questionnaire—limited to questionnaires with specific replies to question 13.

TABLE E

NUMBER AND PERCENTAGE DISTRIBUTION OF ASSIGNED USED PATENTS BY THE EFFECT OF USE ON COMPANY SALES, BASED ON ASSIGNEE REPLIES—COMPARING THE EFFECT ON SALES REPORTED BY "LARGE" COMPANIES WITH THAT REPORTED BY "SMALL" COMPANIES. [1]

EFFECT OF USE ON COMPANY SALES [2]	"LARGE" COMPANIES		"SMALL" COMPANIES		ALL COMPANIES	
	No.	%	No.	%	No.	%
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total	132	100.0	99	100.0	231	100.0
Increased sales markedly	20	15.2	14	14.1	34	14.7
Increased sales moderately	32	24.2	31	31.3	63	27.3
Increased sales slightly	40	30.3	29	29.3	69	29.9
Sub-total	92	69.7	74	74.7	166	71.9
Did not increase sales	40	30.3	25	25.3	65	28.1

[1] "Large" companies are companies with 101 or more patents issued to them during 1939–55, many with 75–100 patents issued to them within this period, and companies with gross assets of $100 million or more. These are companies listed in "Distribution of Patents Issued to Corporations (1939–55)," Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, Eighty-fourth Congress, Second Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, pp. 19-34. "Small" companies are all others in our sample with completed questionnaires but not included in the list.

[2] Based on assignee replies to question 18 of the assignee questionnaire—limited to questionnaires with specific replies to question 18.

TABLE F

NUMBER AND PERCENTAGE DISTRIBUTION OF ASSIGNED USED PATENTS BY THE EFFECT OF USE ON PRODUCTION COSTS, BASED ON ASSIGNEE REPLIES—COMPARING THE EFFECT OF USE ON PRODUCTION COSTS REPORTED BY "LARGE" COMPANIES WITH THAT REPORTED BY "SMALL" COMPANIES. [1]

EXTENT TO WHICH THE USE OF THE PATENTED INVENTION REDUCED PRODUCTION COSTS [2]	"LARGE" COMPANIES		"SMALL" COMPANIES		ALL COMPANIES	
	No.	%	No.	%	No.	%
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total	130	100.0	90	100.0	220	100.0
Reduced production costs markedly	19	14.6	5	5.5	24	10.9
Reduced production costs moderately	27	20.8	15	16.7	42	19.1
Reduced production costs slightly	25	19.2	12	13.3	37	16.8
Sub-total	71	54.6	32	35.6	103	46.8
Did not reduce production costs	59	45.4	58	64.4	117	53.2

[1] "Large" companies are companies with 101 or more patents issued to them during 1939–55, many with 75–100 patents issued to them within this period, and companies with gross assets of $100 million or more. These are companies listed in "Distribution of Patents Issued to Corporations (1939–55)," Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, Eighty-fourth Congress, Second Session, Pursuant to S. Res. 167, Study No. 3, Washington, 1957, pp. 19-34. "Small" companies are all others in our sample with completed questionnaires but not included in the list.

[2] Based on assignee replies to question 19 of the assignee questionnaire—limited to questionnaires with specific replies to question 19. In a number of instances the entry under "other" was "new produce". For question 19 this entry is a specific entry, but for simplicity we have not included even these since not having an explicit question for this we are uncertain in how many instances the respondent failed to give this answer since it was not explicitly asked for.