(8) Patentblatt, 1958–1966.
(9) Tokkyo Koho, 1958–1966.
(10) Official Gazette of the United States Patent and Trademark Office.
(11) "Third Annual Meeting of the Committee for International Retrieval Among Examining Patent Offices—ICIREPAT", Spartan Books, Baltimore, Md., 1964.
(12) "Fourth Annual Meeting of the Committee for International Retrieval Among Examining Patent Offices—ICIREPAT", Spartan Books, Baltimore, Md., 1966.
(13) "Information Retrieval Among Patent Offices—Tokyo Meeting", BIRPI, Geneva, Switzerland, 1969.
(14) INPADOC Patent Family Service.
(15) "Patents—A Source of Technical Information", British Patent Office, Department of Commerce, 1974.
(16) "International Patent Classification", 2nd ed, WIPO, Morgan-Grampian Ltd., London, England, 1974.

The Patent File and the Patent and Trademark Office Technology Assessment and Forecast Program†

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The U.S. Patent and Trademark Office technology assessment and forecast program was established to enhance and stimulate the use and usability of the patent file. In carrying out this goal, use is made of a machine-readable database covering all U.S. patents. This database and the functions of the program are described.

THE PATENT FILE

The voluminous collection of technical literature within the Patent and Trademark Office (PTO) is known as the patent file. At present, it consists of about 11.5 million U.S. patent documents, some 9.5 million foreign patent documents, and approximately 1 million pieces of nonpatent literature—a total of 22 million documents—classified into more than 95 000 subdivisions of technology, called subclasses. Each year the file grows with the addition of about 650 000 new documents.

Within this file can be found the disclosure of almost all major technological advances that have occurred both here and abroad during the 186 years since the first U.S. patent was granted. The patent file, therefore, represents a compendium of the history, development, and current status of technology. In a sense, the patent file also is an irreplaceable national resource, because much of the technical information it contains is not duplicated elsewhere and is unique to patents.

Such information could be of value to professionals in many disciplines. Yet, today, the file is mostly used only for a part of the information it contains, and by a relatively narrow segment of the scientific community.

Historically, the patent file has been used primarily by inventors, attorneys, and others in the patent community who have need of a patent's substantive disclosure in their efforts relating to preexamination, validity, and infringement determinations; and by patent examiners who look at this same information to assess the state of the art in their determinations of patentability. To a much lesser extent the file is used by researchers interested in technical information of a problem-solving nature.

Often ignored is the additional descriptive information printed on the face of the patent document that adds to the usefulness of the patent file. This includes the inventorship, inventor's address, assignment, application filing date, field of search, and references cited in the patent.

The first of these, inventorship, is very unlike authorship in the nonpatent literature. Inventorship of a patent, which may be singular or plural, is a very precise legal concept which identifies the developer of the patented technology. Only a substantial contributor to the technology can be an inventor. Authorship, on the other hand, often is a matter of convention or the preference of the principal author. A common practice today is to include as coauthors of technical papers those who contributed in only a minor way to its development.

By address of inventor is meant his or her place of residence. When a patent issues, the city and state or country of every inventor is printed on the patent document. In most cases this address corresponds to the geographic source of the technology and can be used to determine whether the technology is U.S. or foreign origin.

Assignment refers to ownership of the patent. Patents are like real property in that ownership can be transferred to a second party, known as the assignee. When ownership is transferred prior to issuance of the patent, the name and address of the assignee becomes part of the patent document. Often this is a public or private research organization since the effort leading to a patent is done by employees who assign patent rights to their employers. This is especially true in the chemical industry where about 90% of all patents issued are assigned to organizations.

The application filing date refers to the date the application for patent was received in the Patent and Trademark Office. It has importance because it is an accurate reflection of when the technology was developed, this being true because inventors usually file an application for a patent as soon as the invention is completed and an application can be prepared. The incentive for doing this is both financial (expected monetary returns from the patent grant) and legal, the law requiring filing of a patent application prior to disclosure by another. This is in contrast to the nonpatent literature where requirements for publication, including prior disclosure, are far less stringent.

The field of search identifies those areas of the Patent Classification System searched by the examiner for state-of-the-art information. While these are frequently the same areas where the patent may be classified, often they are not. For example, reaction apparatus for preparing esters may be found with processes for preparing halogenated hydrocarbons. For this reason, field of search information can be used to locate other technologies where pertinent references may be found.

† Presented in the symposium on "Meeting the Challenges of the Changing Patent Literature", Division of Chemical Information, 173rd National Meeting of the American Chemical Society, New Orleans, La., March 21, 1977, and 11th Middle Atlantic Regional Meeting of the American Chemical Society, Newark, Del., April 20, 1977.

References cited in a patent, in most cases, represent the closest prior art to the patented invention found by the examiner or the applicant. Because they represent the state of the art against which patentability is determined, they have legal implications. However, they also constitute another information source of value to users of the patent system. Often a particular patent may not itself disclose the information sought, while references identified in that patent do provide that information. Although references in the nonpatent literature sometimes perform similar functions, these generally are cited at the discretion of the authors. They are not checked for accuracy and often are not pertinent.

All these data items extend the usefulness of patents by providing specific and accurate information about who developed the technology, where it was developed, when it was developed, and who owns the technology. Using application filing date information in time studies, it also can be used to determine how activity in a technology, as represented by patenting, has changed over time.

Such information can be of value to decision makers in government and the private sector as well as to historians of technology, sociologists, economists, and statisticians. Today, for a number of reasons, these professionals remain, essentially, only potential users of the patent system.

For some, the complete patent file is not an accessible resource because it is located in only one place—the Patent and Trademark Office in Arlington, Virginia. Certainly people living hundreds and even thousands of miles from this Office, especially those with limited resources, will not have ready access to this file.

Others, even those to whom distance and expense are not a problem, do not use the file because of perceived complexities (real or not) in its use. Still others may not use the patent file because of ignorance as to the data contained in the file.

THE TECHNOLOGY ASSESSMENT AND FORECAST PROGRAM

It was principally for these potential users of the patent file that the Patent and Trademark Office began an innovative project called the technology assessment and forecast program in 1971. It its most general terms the mission of this program is to stimulate and enhance the use and usability of the patent file and to assemble, analyze, and make available meaningful information about the file. A primary objective of the program is to assist in the more effective utilization of our technical resources in three ways, by

providing business and government decision-makers with a single source from which to obtain information and data covering the entire spectrum of technology

identifying areas of technology in which a high proportion of the activity is of foreign origin

spotlighting areas of technology exhibiting unusually rapid overall growth

In carrying out this mission, the Office of Technology Assessment and Forecast (OTAF), which administers the program, has assembled and built a computerized master database covering all U.S. patents. The information now present in the database includes:

all subclasses of the U.S. patent classification system

for all U.S. patents, their recorded locations within the U.S. Patent Classification system

for U.S. patents issued since 1963–

the ownership at time of issue in seven categories (U.S. government, foreign government, U.S. corporation, foreign corporation, U.S. individual, foreign individual, and unassigned)

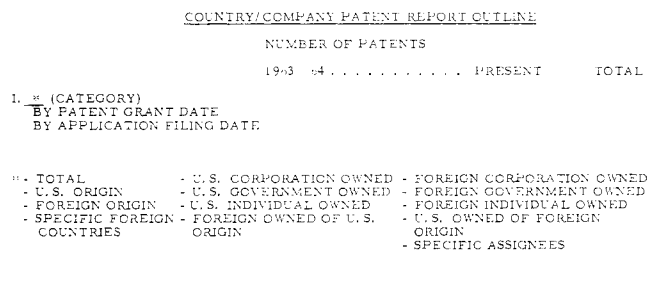

Figure 1.

the country or state of residence of the inventor

for U.S. patents issued since 1967, the date the application for patent was filed in the U.S. Patent and Trademark Office

for U.S. patents issued since 1969, the specific (i.e., named) ownership of all which, at time of issue, were organizationally owned (e.g., by a corporation, foundation, or government agency)

the relationship of all subclasses of the U.S. patent classification system to the Standard Industrial Classification System (SIC) in 55 Product Fields and Product Field combinations.

The latter is the result of a partial concordance between the SIC and the Patent Classification system that was commissioned by the National Science Foundation. This concordance, an updated and greatly expanded version of one reported in 1966,[1] permits broad-scale comparisons of patent data with statistics (e.g., R&D expenditures) which are collected on the basis of the SIC.

The information in this database can be retrieved on the basis of any one or any combination of the items listed above, manipulated on any given basis and presented in a number of formats, e.g., lists, tables, graphs, charts, and the like.

While many different report types are possible, a general purpose report has been developed which incorporates most of these data items. It is called a country/company report. This report, outlined in Figure 1, profiles, in a particular technology, the patent activity in 13 categories, from 1963 to the present, first by patent grant date and then by application filing date of the patents. A patent listing by assignee also is given.

The information in this database is used in two principal ways: first in the preparation of periodic general distribution publications and second, to support preparation of special reports tailored to individual needs.

Seven general distribution publications have been issued to date; the most recent (the Seventh Report) in March 1977. These reports focus on patenting in many technological areas of widespread interest, such as energy, and on areas wherein patent activity has indicated a heavy concentration of effort (both overall and by foreign countries).

Generally, the area is identified by a brief definition, and the patent activity is profiled over the last 10 years. The profile includes (1) total patents, (2) patents granted to residents of the United States, (3) patents granted to residents of foreign countries, and (4) patents granted to residents of specific foreign countries. The two most recent reports also included, for each technological area, a statement of the recent activity and a description of recent patents.

Chemical areas, recently reviewed in these reports, have included such high overall growth areas as synthetic resinous block copolymers and plant growth retardants. Also reviewed were high foreign activity areas such as processes for the preparation, recovery, and purification of lactams, and hair dyeing processes and compositions, for which 70% or more of the recent patent growth was to foreign resident inventors.

In areas of unusually high activity or interest, more detailed or in-depth reports have been prepared by patent examiners

knowledgeable in the area. In each of these, the thrust of the technological activity as represented by the patenting in the area is reviewed. Recent chemical examiner reports have been prepared on prostaglandins, algicides, and aminoglycoside antibiotics.

The presentation of statistical and substantive information on technological areas of interest is not the only function of these general distribution reports; they are also used as a medium for suggesting alternative applications for patent data to those who might not otherwise use it. One such application, presented in the Sixth Report, involved the comparison of patent activity data in six SIC industries with two items of economic data associated with patents: research and development expenditures and research and development manpower. The intent was not to present an exhaustive or definitive treatment of the subject, but rather to use the presentation as a medium to inform workers in economic and related fields of the availability of usable patent data and, perhaps, to stimulate thinking as to how the data might be employed.

Another application suggested, again in the Sixth Report, involved cited reference information available on patents. As previously indicated, these references, for the most part, represent the closest prior art to the patented invention. If a single patent document is cited in numerous patents, the technology revealed in that document is apparently involved in many developmental efforts, and the number of times a patent document is cited may be a measure of its technological significance. In this report, cited references in patents granted in 1975 were examined and the six most cited references were reviewed.

In the Seventh Report, a vector analysis technique was demonstrated which utilizes patent and corporate activity in an area to derive an assessment of a technology's status.

General distribution reports are provided to about 1000 users, mostly public and private organizations. They are also available to others through the National Technical Information Service for a nominal charge, generally around $5–10 per copy.

The second principal use of this database, to support the preparation of special reports tailored to specific needs and interests, is an important function of the technology assessment and forecast program. These reports are available to other government agencies and the public sector on a cost reimbursable basis.

Users to date include approximately 50 corporations and 15 government agencies as well as individual and educational institutions. Although special reports vary in content and format, generally, the nature of the request indicates an interest in the degree of patenting and ownership in specific technological areas.

By way of example, one intelligence agency sought a technology profile of U.S. patents granted to Russian residents over a ten-year period. The interest here was how patent activity changed over time in order to detect changes in technological concerns.

A major corporation sought patent information about foreign activity in aeronautics to aid in the evaluation of the foreign effort in this field and to help its patent department in deciding in what countries a new technology should be patented.

Another corporation, interested in detecting the direction of research of its major corporate competitors, sought information as to the technological areas in which these corporations were obtaining patents.

The National Science Foundation has made extensive use of these special report services to obtain data for use in their publication, *Science Indicators*, where patent data are considered with other available indicators to assess the state of U.S. science and technology.

POTENTIAL USES SUGGESTED BY THE PRIVATE SECTOR

-- OBJECTIVE PLANNING TOOL

-- GLOBAL VIEW OF RELATED TECHNOLOGIES

-- EARLY WARNING SYSTEM OF COMPETITION OR OBSOLESCENCE

-- ADDITIONAL SOURCE FOR "INDUSTRIAL ESPIONAGE"

-- REINFORCEMENT OF EXISTING INFORMATION SOURCES

-- "HUNTING GROUND" FOR DIVERSIFICATION POSSIBILITIES

-- "IDEA GENERATOR" FOR NEW MARKET OPPORTUNITIES

Figure 2.

POTENTIAL USES BY GOVERNMENT AGENCIES

ASSISTANCE IN THE SELECTION OF TECHNOLOGICAL AREAS FOR:

-- GOVERNMENT-SPONSORED R & D

-- SOCIAL AND ENVIRONMENTAL ASSESSMENTS

-- COMPETITIVE (COMMERCIAL) ASSESSMENTS

-- EXPLOITATION OF GOVERNMENT-OWNED PATENTS

-- PROTECTIVE CONSIDERATIONS, E.G. TARIFFS

-- FOLLOW-UP INVESTIGATION BY, E.G. COMMERICAL ATTACHES, INTELLIGENCE GROUPS

-- TECHNICAL EXCHANGE PROGRAMS

-- SCIENCE POLICY ANALYSIS

Figure 3.

Other suggested or potential uses of the patent data for the private sector and government are given in Figures 2 and 3, respectively.[2]

Future activities of the technology assessment and forecast program will be directed to improving the variety and depth of patent information that can be provided. OTAF is currently working with different groups outside the Patent and Trademark Office to ascertain how patent data may be better utilized. One of these, at Cornell University, is seeking to determine if patents and patent based indicators can be useful indicators in applied scientific areas. Two other groups, one in the Commerce Department and one in Israel, are investigating the relationships between patenting, import/export data, and other measures of technological activity. Also, an effort is underway to add additional items to the database, including information concerning patents of other countries. In January 1977, the extensive Derwent database has been added to OTAF's base for patent activity analysis use.

Work has only just begun on how the additional data can be used to enrich patent activity information now available. Preliminary efforts indicate that the Derwent family of patent information is useful to assess which U.S. technologies are most involved in international patenting.

Today the technology assessment and forecast program is not alone in promoting the use of patent information. Since its inception in 1971, other patent organizations have initiated programs that have similar goals.

The Japanese Patent Office has begun a program of technological forecasting through use of patent information. Also the Commission of European Communities has recently established a program to monitor patent activity throughout

the European Economic Community. At least two other countries, Canada and Germany, are considering similar programs.

There is every reason to believe that other programs, similar to these, will be developed. The driving force for such new programs most likely will be a growing awareness of the importance of technology transfer, the implementation of a Patent Cooperation Treaty, and the growth of international bodies responsible for searching and granting of regional patents. The latter will alter the role of many patent organizations by relieving them of some of their current work load.

In addition, a number of commercial databases now exist which, by virtue of their availability and flexibility, should promote the use of patent information in ways others than that for which historically it has been used. Many of these exist on-line and can be accessed in a number of ways, including categories of invention (e.g., International Patent Classifications (IPC) and/or U.S. Patent Classifications), keywords, and/or by assignees. The major limitation of these, for some studies, is the limited size of the databases. None now permit patent analysis across the whole spectrum of technology for more than a few years. As more data are added to these bases, this limitation will lessen.

We are encouraged by these other efforts. Hopefully, through these and our efforts, described above, the goal of making patent information readily accessible to the public will be realized.

LITERATURE CITED

(1) J. Schmookler, "Invention and Economic Growth", Harvard University Press, Cambridge, Mass., 1966, Chapter II.
(2) William Lawson, U.S. Patent and Trademark Office, private communication.

The Role of the American Chemical Society Committee on Patent Matters and Related Legislation†

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The activities of the present Joint Board–Council Committee on Patent Matters and Related Legislation since its appointment in its present form in 1966 are summarized with particular emphasis given to those matters related to the patent literature and educational activities directed toward developing a more comprehensive understanding of the patent system and its proper use in the transfer of chemical technology. So-called patent "reform" legislation, its present status, and its possible future influence on the content of patents are discussed.

While the history of the American Chemical Society published in 1976 indicates that an ACS committee on patents has existed almost continuously since 1899, the present Joint Board–Council Committee on Patent Matters and Related Legislation held its first meeting in March 1966 with Dr. Pauline Newman as its chairman. A precursor ad hoc committee of the ACS Council, also under Dr. Newman's chairmanship, was organized in the fall of 1963 on the recommendation of the Committee on Professional Relations. The major raison d'être of the ad hoc committee stemmed from the earlier introduction into Congress of various bills to reform the patent laws. It was soon apparent to the ACS Board of Directors that continuing liaison of the ad hoc committee with members of Congress and their staffs would be necessary and that a formal Joint Board–Council Committee should be appointed. This was accomplished at a Board meeting in June 1965.

COMMITTEE CHARGE AND GOALS

The Board charged the Committee with the responsibility for advising both the Board and Council on policies and programs relating to patents. Under this charge the goal of the Committee has been "to develop programs in the area of patents and other subjects related to intellectual property that serve the intent of the patent system, as provided in the Constitution of the United States, and that encourage invention and innovation in chemistry".

In carrying out its charge with this goal in mind the Committee has been actively interested in patent legislation, patent office practice, copyright legislation and practice, licensing of patents, U.S. Government patent policy, international patent agreements, trade secret legislation, employment agreements, compensation of employed inventors, including those who made inventions when previously employed, awards to inventors, and, last but not least, publications on patent practices and the proper use of the patent system.

In studying the many facets of these subjects the Committee members have made a conscious effort to bring to their deliberations the point of view of the Society member, modified by the constantly changing requirements of society as a whole, all within the framework established by the Constitution as expressed in the implementing laws passed by Congress. This has been a tall order as the Committee members are all fallible human beings with conflicting ideals, allegiances, and opinions. Nevertheless, the Committee has accomplished a number of interesting and important tasks in its 11-year life, many of which are pertinent to the theme of today's symposium.

PATENT "REFORM"

Before discussing the Committee's role as it relates to publications and the scientific and technical literature, however, I should like to summarize briefly the present situation of patent "reform" legislation, since it has an indirect bearing on the dissemination of patented or patentable information.

As mentioned previously several bills designed to "reform" the patent system had been under Congressional consideration in the early 1960s. These bills reflected a general uneasiness

† Presented in the symposium on "Meeting the Challenges of the Changing Patent Literature", Division of Chemical Information, 173rd National Meeting of the American Chemical Society, New Orleans, La., March 21, 1977, and the 11th Middle Atlantic Regional Meeting of the American Chemical Society, Newark, Del., April 20, 1977.