PATENTS IN INDIA

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Gives a brief outline of the Patent System in general and describes in some detail the Indian Patent System. Shows the importance of patents as a source of information and enumerates the problems in patent literature search. Describes efforts made at present to exploit. Describes efforts made at present to exploit the patents and suggests ways for their fuller utilization. Some patent office problems are also briefly dealt with.

0 INTRODUCTION

A patent is a grant from the Government, acting through the Patent Office, which confers on the grantee, for a limited term, the exclusive privilege of making, selling and using an invention, and also of authorizing others to do so. In England, where the modern patent system originated, sovereign grants were made in the form of 'letters patent' (litterae patentes) or open letters, so called because they were not sealed up but exposed to view. The grants for invention became known as "Letters patent of inventions". The term 'patent' is derived from it.

01 What of a Patent

The "patent" is thus an industrial protected right, other similar protected rights being 'design', 'trade mark', and 'copyright'. These may be distinguished as follows:

011 Patent relates to the invention underlying the manufacture of a vendible product.

012 Design relates to the external features of that product as they appeal to the eye.

013 Trade mark relates to the good-will of the manufacturer or dealer trading in the product.

014 Copyright relates to exclusive right in the reproduction of literary or artistic composition.

02 What is Patentable

The subject of a patent must be a manner of new manufacture. In essence, a patentable invention:

1 should relate to a manner of manufacture;

2 should be novel in the manner of manufacture;

3 should be the outcome of inventive ingenuity;

4 should have utility; and

5 should not be contrary to law or morality.
03 Why of Patent

The practice of granting these limited monopolies for new invention, inspite of the general condemnation of monopolies as such, is regarded of definite value to the industrial and economic development of a modern society. The utility of the patent system in the national industrial development is universally accepted and exercised throughout the world.

04 A Dutch Experiment

An interesting experiment tried on the Dutch patent system in the nineteenth century illustrates the close relationship that exists between industrial progress and the patent system. In 1869 Holland abolished its patent system. But, it was noticed that the growth of Holland's export trade of manufactured goods came practically to a standstill. So after 43 years, in 1912, Holland reintroduced the national patent system.

1 HISTORY OF PATENT SYSTEM

11 Earliest Patent

Long before a regular patent system developed anywhere, a number of isolated grants appear in various countries.

12 Earliest Patent System

The regular practice of granting patent, however, appears to have began in Venice about 1475. This seems to be confirmed by a declaration of the Senate dated 15th March, 1474, which said that if anyone made and brought to perfection in Venice any new and ingenious machine, not made previously in Venetian territory, others would be prohibited from making the same for 10 years without the consent and licence of the inventor; adding that the State would be at liberty to use the invention and that infringers would be fined 100 ducats and the infringing machine destroyed. Surprisingly, provisions of the modern patent system after 500 years, remain substantially the same.

13 Modern Patent System

Although Venice may claim to be the first state to have a regularised patent system, it was the later development in England that endured. Modern patent systems of the world owe their inspiration to the English example, on which they are generally based.

14 Patents in Many Lands

Almost every country (over 140) with any degree of industrial development has a patent law in force and many of them issue patents regularly (1, 2, 3).

141 England

The Statute of Monopolies, enacted in England in 1624, laid down for the first time the conditions on which patents of invention might be allowed.

142 USA

The United States of America was the second country in the world to enact a law of patents basis for which was laid in the Constitution adopted in 1787. The first patent, however, was issued on July 31, 1790 only.

143 France

The first patent law of France was passed in 1791. In the French Patent System, the patent applications are not subject to examination as to novelty.

144 Germany

The German patent law which came into force in 1877, has had a decisive influence upon the further development of patent legislation in the world. In this system, every patent application is examined for novelty, and after the patent is accepted, an opportunity is given to the general public to "oppose" the grant.
145 USSR

Prior to the first World War, Russia adopted the German system. The present law in Russia, promulgated in 1931 introduces interesting features. It is open to every inventor either to

1 apply for a patent, when he earns the right as patentee to exploit the invention within the limit imposed by Soviet Legislation on private and commercial activities; or

2 apply for a "certificate of authorship" which gives him a claim to recompense in case his invention is exploited by the Government or commercial corporations.

15 International Convention

Forty six countries, including India, are signatories to the International Convention for the Protection of Industrial Property (4). Under Article IV of the convention a person who has duly applied in a convention country for patent protection for an invention may claim "convention priority" for any patent application in respect of the same invention which he may make within the "convention period" (generally 12 months) in convention countries.

2 Indian Patent System

21 Patent Law in India

Substantive legislation for the protection of invention in India was enacted in 1856, 1859, 1888 and 1911. But until 1911 the expression "Exclusive privileges" was used for the term "Patent". Otherwise the enactments corresponded to the legislation in force at that time in the United Kingdom (5).

211 The Act of 1911

The Act of 1911 made important departures, and for the first time provided for the granting of a "patent" and the establishment of Patent Office for matters incidental or supplementary to the granting of patents. For detail of patent Act, rules and regulations see Part I of the latest edition of the Patent Office handbook published by the Government of India, Manager of Publications.

22 Jurisdiction

The Act of 1911 extends to the whole of India except Jammu and Kashmir. A patent granted till 1939 by the Indian Patent Office is operative in Burma also. Patents bearing dates prior to the 1 April 1937 and in force at that time are operative in Aden. Indian patents granted prior to 15th August 1947 have effect in Pakistan as well.

221 Reciprocal Arrangements

Reciprocal arrangements for the mutual protection of inventions and designs exist between India and the following countries:

1 Australia
2 Canada
3 Eire
4 New Zealand
5 Pakistan
6 Union of South Africa

Reciprocal arrangements for the protection of invention only, exist between India and Ceylon.

23 Procedure for Obtaining a Patent

231 Steps

The procedure for obtaining an Indian Patent involves the following steps:

1 Filing an application for patent;
2 Filing a "Complete specification" either along with the application or following the "Provisional specification" filed along with the application;
3 Examination of the application by the Patent office;
4 Acceptance of the application by the Patent Office and its announcement in the Gazette of India. It is then
kept open for opposition for four months;

5 Overcoming opposition on the grant of the patent if the grant is opposed by any person; and

6 Sealing the patent.

**232 Time limit**

The aforesaid steps should be completed within a prescribed time limit (6). Legal minimum time limit for obtaining patent is about 6 months, and maximum 2 years (plus an extension period of 4 months). Normally it takes about 18 months for the sealing of a patent from the date of filing of the application.

**2321 Term of a Patent**

The normal term for an Indian patent is 16 years, and is reckoned from the day when complete specification was filed. Same is the case with British patents. In the U.S.A. and Canada, the 17-year term is reckoned from the date of the grant. Under special circumstances the term can be extended.

**233 Patent Specification**

A patent specification contains the following details:

1 Heading, which includes the name and address of the patentee or patentees, the assignee and the address thereof, the patent number, the date of application, and the title of the invention;

2 Brief statement of the general nature or the objects of the invention;

3 Explanation of the drawings reproduced, if any;

4 Specific, detailed description of one or more ways of embodying and carrying out the invention; and

5 One or more claims that define concisely and comprehensively the invention covered by the patent.

**24 Sources of Patent Information**

**241 Weekly Notifications**

Part III, Section 2 of the Gazette of India contains weekly lists of applications for patents made, applications accepted, specifications printed, patents granted, patents renewed, patents ceased, and other matters notified by the controller of patents for the information of the public.

**242 Patent Office Publications**

The publications of the Patent Office are:

1 The Patent Office handbook;

2 A Guide to inventors;

3 Specifications of invention;

4 The Patent Office Journal - This annual publication includes a subject matter index classifying patents according to the various branches of industry;

5 Inventions (consolidated subject matter index, name index and chronological lists) - there are seven such consolidated lists covering the period 1859-1932.

6 Patents for inventions: Abridgement of specifications - published in 66 groups, for every set of 5,000 patents. Each group volume contains abridgements of specification relating to inventions in respect of subjects indicated fully in the subject matter index; and

7 Annual reports of the working of the Patent Office.

**25 Inspection Centres**

The Appendix 'H' of the Annual report of the Patent Office contains a complete list of inspection centres in India and abroad. Patent literature can be inspected free of charge at these inspection Centres.
3 PATENT LITERATURE

31 Primary Literature for Applied Sciences

Patents make up an important part of the literature of applied sciences, particularly chemical technology. They are primary sources of information because an invention must cover new and useful information to be patentable (7).

32 Chemical Technology

The patent literature is a better source of information on many phases of chemical technology than either reference books (soon out-dated) or even scientific and technical papers. Much of the work done in laboratories having industrial applications are reported and described in patents only. It is estimated that more than 20 per cent of the patent literature pertain to the field of applied chemistry (8). It is about 40 per cent in the case of Indian patents (9).

33 Growth of Patents

Like the periodical literature, the patent literature is voluminous and is growing rapidly. Almost every country with any degree of industrial development issues patents and some of them have been issuing them for many years. It is estimated that in 1955, there were about 7 million patents throughout the world. The corresponding figures was only 1.2 million in 1900 (10).

331 Growth of Indian Patents

The accompanying table depicts the growth of Indian patents during the last ten years (11).

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<th>Year</th>
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</table>

4 PATENT LITERATURE
SEARCH PROBLEMS

Enormous growth in patent literature, and unsatisfactory arrangement obtaining for the retrieval of information from them, make the patent literature search a trying job (12, 13). So much so, in many countries people are officially advised to consult professional literature searchers for their problems. Many progressive industrial concern maintain a highly qualified staff to do patent literature search in their field of interest.

V 8 N 2 Jun 1961
41 Numbering of Patents

Patents are arranged by their serial numbers and referred to by the same. Indian patents get serial numbers as soon as they are filed, and published patents carry the same serial number. Since a number of patents filed are not finally accepted and declared void, there are many gaps in the serial number of patents sealed and published. This creates a problem in the acquisition programme, since a scrutiny has to be made to ascertain whether a certain number is wanting in the collection of the library or truly void. In U.S.A. and some other countries patents get one set of serial number when they are filed and another set when they are finally granted. Japanese patents are given new set of serial numbers for each year.

42 Grouping of Patents

To facilitate searches patents are classified, or more correctly, broadly grouped. The classification system of the various countries differ in most cases. They all have limitations, however, since the field covered is broad and different kinds of patents and searches involve different points of view. Amongst these, German classification system is considered to be the most satisfactory, and Swedish, Norwegian, and Danish patents are classified according to the German system. The Austrian classification is only slightly different from the German (14). In the fourth Aslib Conference, classification systems of Germany, U.K., and U.S.A. were discussed in detail.

421 Grouping of Indian Patents

The subject matter of Indian patent specifications has been classified under 208 main classes which are further divided into a number of sub-classes. These classes have been grouped into 66 groups. A compilation of catchwords and phrases leading to various classes mentioned above are given in Reference index, publication issued by the Patent Office for official use.

43 Index to Patents

A properly consolidated subject index for the patents issued is an essential tool for the patent literature search.

431 Subject-Matter Index

The index published in the Patent Office journal forms a continuation of the indexes contained in the Subject-matter index 1912-32. Entries are arranged alphabetically and grouped under main class heading, and referred to the patents by their serial numbers. Patent Office journal of 1946, 1950 and 1956 contains consolidated subject index for the years 1940-43m 1944-46, and 1952-54 respectively. The publication Inventions is long out of print.

432 Consolidated Index

Thus we see that after 1932, no consolidated index of Indian patents for any considerable period is available. In the absence of long period consolidation of Abridgements (see sec 44), consolidation of subject-matter index for a longer period is desirable.

44 Abridgements

Abridgement of patent specifications are published in "Group volumes" identified by group numbers. Since 5,000 patents (The British Abridgement of specifications are published for every series of 20,000 specifications) are consolidated in each volume, these serve as index for patents issued in less than two years. Moreover, the latest Abridgements available refer to the year 1948 and earlier, thus seriously limiting their value as tools for retrospective search.

5 WORKING OF PATENTS

Although patents are important sources of technical information, their main value lies in their effective utilisation. If patents are not
exploited, it goes against the very basis of the patent system which is established on the assumption that it is conducive to the industrial progress of the country. To implement this inherent stipulation, in most countries of the world a patent is granted and exclusive rights are for a limited period (4 years in India) reserved to the patentee on condition that within a reasonable time the invention is "worked" in the country.

51 Nominal Working

It is not always feasible to arrange for an article to be manufactured in each country where it is patented. The patentee must, however, show that he has made an attempt to do so, and for this purpose it is usual to advertise or make written offers of licence to work the invention; that procedure is known as "nominal working", as opposed to "actual working". In India nominal working is accepted. For most other industrially advanced countries actual working is required. Working is not required in U S A.

52 Governmental Effort

In Russia, a duty is imposed on the Government and public authorities to promote inventions. In England, machinery for actively promoting such use has been provided by the Development of Inventions Act 1948, which has authorised the setting up of a National Research Development Corporation, whose functions are those of securing, where the public interest so requires, the development or exploitation of inventions and of dealing in patent rights.

521 National Research Development Corporation of India

The National Research Development Corporation of India was established in December 1953 with the aim of "to stimulate development of patents and inventions arising out of researches conducted in research institutions financed out of public funds and, where feasible in the public interest, of patented inventions from individuals also." Till the end of 1953, Industrial Liaison Committee which dealt with patents and processes arising out of researches sponsored by C S I R and Patents Advisory Committee which was concerned with exploitation of government owned patents, both under the Ministry of Commerce & Industry, were responsible for this work.

Total number of investigations referred to N R D C upto 31 March 1959, were 503. Out of these 70 inventions were released free and 100 abandoned, leaving a balance of 333 effective inventions. Total number of projects instituted during this five year period were 11, and 67 inventions were licenced (15).

53 Development of Nationally Useful Patent

Although there are nearly 16,000 patents in force in India and on an average 3000 patents are granted each year, a very low percentage of these are exploited. There is, thus a lamentable wastage of inventive ingenuity. In a symposium held in Calcutta in February 1956 during the centenary celebration of the Indian patent system, a plea was made that "patents should be grouped and examined in the light of the broad objectives of the national plan and a comprehensive scheme for the development of nationally useful patents should be drawn up" (16). In order to work such a scheme in practice the first essential step appears to be to expedite the bringing out of an up-to-date compilation of classified abridgements. This classified information would bring within the realm of practicability the selection and development of patents on a planned basis. Developmental work may be undertaken by the N R D C.

54 Practical Difficulties

But there are many practical difficulties in the way of effective utilization of patents. In relation to minor inventions the patent system works more or less as it should. In
relation to major inventions it works well enough as a system for collecting and disseminating technical information, but as a system for encouraging the making and commercial use of inventions it is not very satisfactory.) Once a new technique or product has been developed and shown to be commercially workable, a competitor with the technical resources of modern industry at his disposal will not find it very difficult to work out another way of doing the same thing. This tendency is emphasized by the high cost of litigation about patents (17).

541 Incomplete Disclosure

Another factor for poor exploitation of patents is incomplete disclosure of information. Patent disclosures are supposed to be full, clear, and exact but they seldom measure up to this standard. Disclosures are sometimes inadequate and sometimes misleading. Often experimental details are not given sufficiently. A patent application sometimes intentionally has the real essence of the invention hidden away in a single inconspicuous paragraph. Often patents, worded by lawyers, are written in a form that is difficult to strip of legal terminology to get down to facts (18). This factor may be a sequel to the malpractices mentioned in the previous section.

6 PATENT OFFICE PROBLEMS

61 Patent Search

At present, except for a few private agencies, no facilities for patent search exist in India. Even in the Patent Office comprehensive patent search is not undertaken with the result that sometimes costly and time-consuming litigation has ensued after a patent has been accepted. A bill (Patents Bill, 1954) is under consideration to make it obligatory on the Patent Office to make a thorough literature search for ascertaining the novelty of invention before a patent is accepted. Once these facilities are fully developed in the Patent Office, the services can be utilized for other types of patent search as well. In course of time specialized search facilities may be developed in some of the patent inspection centres, e.g., chemical literature search at the National Chemical Laboratory, search of metallurgical literature at the National Metallurgical Laboratory and so on.

611 Personnel

For making a thorough literature search possible, provision of adequate qualified staff is absolutely essential. In this connection it would be worthwhile to study the practice followed in some of the advanced countries.

6111 American Patent Office

In the Patent Office, literature searching forms a large part of the patent examination procedure. This enormous task concerns itself with the screening of all the world's technical literature, including both foreign and domestic patents. The work is divided among a number of examining divisions, each division having jurisdiction over certain assigned fields of invention. Each division is headed by a primary (or principal) examiner and staffed by a number of examiners. The examiners perform the work of examining applications for patents and determine whether patents can be granted. The examiners also determine when an interference exists between pending applications, or a pending application and a patent, institute interference proceedings in such cases and hear and decide certain preliminary questions raised by the contestants. At present the US Patent Office has about 2,300 employees of whom about half are examiners and others with technical and legal training. Patent applications are received at the rate of over 70,000 per year (19).

6112 Delay

In spite of enormous staff, it takes on average nearly 3 years for a patent to be accepted in America. The problem has become so acute, that programme is at
hand to carry out the literature search mechanically (20).

62 Classification Problem

In India, the question of literature search by electronic machines does not arise at present, because of the enormous cost involved. But to make the search more expeditious, and efficient, a more refined tool than broad subject grouping, as is being used at present, is required. Classification seems to be the answer to this problem both for manual searching as well as for mechanical searching. But then, classification of patents itself presents a very peculiar problem.

621 Search Elements

Patents cover the field of:

1. Manufactured products;
2. Process for manufacturing the same;
3. Apparatus used in practicing manufacturing process;
4. Materials used in manufacturing processes for making the manufactured products;
5. Non-manufacturing processes; and
6. Apparatus used in practicing non-manufacturing processes.

The search operation must satisfy all of the diverse interests within the above six categories. Thus a patent office search is invariably for combinations. These combinations are of known factors in alleged new relation to give some new or improved function or results (21).

622 Faceted-Depth Classification

Since different kinds of patent searches involve different points of view "any classification system which is going to be useful for patent search purposes must be an organic sort of entity ... for it must be able to grow and to adjust itself to an ever changing environment ... A good classification system ought to be capable of both micro- and macro-evolution. The scheme must have built into it the capacity to effect comparatively minor adjustments in its structure, not too extensive new connections between items; and the associated computers should be able automatically to make the necessary readjustments in its programming, in its memory organs, etc." (22). Perhaps the faceted-depth classification based on postulational approach (23) coupled with chain procedure (24) being developed in India may provide the right tool for helpful arrangement and easy retrieval of patents.

63 Printing

Delay in printing of patents is a perennial problem with the patent office. Each year it carries a back-log of nearly 2,000 sealed patents awaiting printing. Once a patent is notified in the Gazette of India, Insdoc starts receiving requests for supply of a copy of the specification -- which sometimes takes as much as two years to get printed. This difficulty can be obviated if arrangements are made at the Patent Office to make photographic master copy of the original and supply photo-reproduction of the patent on demand. Even-cheaper copying processes, e.g. diazo, will serve for most of the purposes, when a copy is not needed for long preservation (25).

64 Storage

Problem of storage of patents at the Patent Office -- which must be considerable, considering the fact that nearly 3000 patents are sealed each year -- gets automatically solved if the above procedure is adopted. Only item needing storage will then be master copies of the patents sealed.

7 DISSEMINATION OF PATENT INFORMATION

Rama Pai, formerly Controller of Patents & Designs, has analysed the causes for India's apathy to the patent system (26), and one of the
remedies he suggests is proper publicity.

One important factor for the proper utilization of Indian patents would be effective dissemination of patent information. Besides original patents and official patent office publications (27) other sources of patent information may be classified as follows:

1. Scientific and technical periodicals;
2. Abstracting and indexing periodicals;
3. Patent digests and lists;
4. Court records;
5. Periodicals devoted to patents; and
6. Other services.

7.1 Scientific & Technical Periodicals

Many a journal devoted to specific branches of technology, have abstracts sections which usually include abstracts of patents relevant to the industry. They often give a fuller abstract than is found in the general abstracting journals. Some of the foreign journals which provide such abstracts in special fields are:

- American dyestuff reporter,
- Chemie et industrie,
- International sugar journal,
- Journal of the American Ceramic Society,
- Journal of applied chemistry,
- Journal of the Institute of Petroleum,
- and Koloid Zeitschrift.

7.2 Abstracting and Indexing Periodicals

Abstracting and indexing periodicals are perhaps the best sources of patent information, and perhaps the only source consulted by many patent literature searchers. There are many excellent abstracting and indexing periodicals in the field of chemistry and specialized branches of technology. The most well known service in the field is Chemical abstracts which covered nearly 22,000 patents from 21 countries in 1958. There are annual and cumulative patent number indexes that are classified by country.

Chemisches Zentralblatt, also has a good coverage of patents (25,600 in 1958), particularly continental patents.

Referativnyi zhurnal, Khimiya of the U.S.S.R covered in 1958 about 12,000 patents from 18 countries. Soviet patents are not abstracted. In 1960, separate section has been published for patents.

The following table gives comparative coverage (in 1958) for the three abstracting periodicals described:

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<th>Number of patents abstracted in Referativnyi Zhurnal, Khimiya</th>
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<td>2 Austria</td>
<td>144</td>
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Table Continued

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<tr>
<td>21 Switzerland</td>
<td>223</td>
<td>1559</td>
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<td>22 U.K.</td>
<td>2808</td>
<td>4285</td>
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<td>23 U.S.A.</td>
<td>8432</td>
<td>4968</td>
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<td>24 U.S.S.R.</td>
<td>984</td>
<td>-</td>
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<td><strong>TOTAL</strong></td>
<td><strong>21963</strong></td>
<td><strong>25615</strong></td>
<td><strong>12069</strong></td>
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60 Indian patents. Abstracts of the Central Board of Irrigation & Power, Documentation Notes, N. B.O. abstracts - some of the well known Indian abstracting periodicals - do not cover patent literature. Steps may be → model of Chemical titles published by the same Service.

721 Indian Abstracting & Indexing Services

There is no Indian Abstracting and indexing periodical in the field of chemistry and technology. Chemical abstracts covers only about →
taken to exhaustively index the Indian patents in such classified indexes as Insdoc list or Bibliography of scientific publications of South and South East Asia.

73 Patent Digests & Lists

The number of digests of patents on specific subjects is small. Many of them are German publications and are often based on German patents only. Some of the important publications in this field are: Fortschritte in der anorganischchemischen Industrie an Hand der deutschen Reichspatente dargestellt, 5V., Doyles digest of patents relating to coaltar dyes and allied compounds, Fortschritte der Teerfarbenfabrikation und verwandter Industriezweige, 26V., Chemical patents index, etc.

731 Indian Digests

The only Indian publication in this category is perhaps the Patented inventions of the C S I R, which is a compilation of 132 of patented inventions of the Council of Scientific & Industrial Research for the period 1940-50. The specifications are arranged in the numerical order and indexes (of inventions and inventors) are given at the end.

74 Court Records

Valuable information may be obtained at times from court records of patent cases. The Official Gazette of the United States Patent Office gives brief reports on selected decisions in patent cases. Some useful sources of legal decisions on US patents are: Decisions of the Commissioner of Patents, Court of customs and patent appeals, Reports of the patent section, and U.S. Supreme Court reports for patent, copyright and trade mark cases.

741 Indian Sources

The Patent Office journal gives a list of special proceedings regarding patents for which there has been opposition, appeals to the High Court, etc. The Patent Office handbook also contains Chapters on proceedings in court as well as decisions of courts.

75 Periodicals Devoted to Patents

Some of the periodical publications having international coverage are: Research, patents, and trademarks, 1947 - (formerly the International bulletin of industrial property), Dessins et modeles internationaux, and Revue internationale de la propriete industrielle et artistique.

76 Other Services

Besides the publications described, various other types of services are available in some of the industrially developed countries:

761 Microfilms

Patent classification microfilm (10 reels, 3,000,000 patents. Available as PB 144 504 from the Library of Congress, Washington 25, D.C. at $6.00/reel and $50.00/set) is the 16 mm copy of the official records of the classification of U.S. patents issued upto September 23, 1959. It is arranged numerically in class and sub-class order according to the patent office Manual of classification. There is also Patent classification microfilm. Classification of design patents available (Pb 144 625 Library of Congress, Washington 25 D.C).

762 Specialised Service

The British Patent Office, on opening a deposit account, supply to the subscriber all specifications which are relevant to a particular industry (28). This is of interest to industrialists, specializing in a line of technology, and for whom it may not be profitable to maintain a full-fledged patent literature search facilities. A comprehensive service on micro-cards for U.S. patents is available in U.S.A. A private organization, Information
for Industry supplies, on a subscription basis, a cumulative bimonthly uniterm index to chemical patents (29).

763 Lapsed Patents

Publicity may be given to lapsed patents of the nature which may be attractive to small scale industrialists. They are very often not in a position to licence patents in force.*

8 BIBLIOGRAPHY

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9 Sec 32 India. Patent Office. Annual report ... 1955.


12 Sec 4 Luik (J V) etc. Searching the chemical and chemical engineering literature. 1957. 27-33.


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22 Sec 622 Warren (Weaver). loc cit.

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26 Sec 7 J Sci Industr Res; 7; 1948; 271-72.

27 Sec 7 Crane (E J) etc. loc cit.
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