

(90 + role number). Negation (used only when a negative term would otherwise have to be invented).

(0. Computer input signifying "no role assigned to term").

APPENDIX II. FORMULA EQUATING INPUT COSTS TO OUTPUT SAVINGS

$$s \left(\frac{F}{Q_{\text{test}} D_{\text{test}}} \right) \int_0^{t_n} QD(P_t/P_o) dt = cD$$

where

S = Total cumulative savings afforded by any test system by time t.

C = Total cumulative extra cost of indexing by any test system by time t.

s = Savings afforded by eliminating one false drop (cost of screening one document from a search answer).

F = False retrieval (number of documents) prevented in the test by any given system.

Q_{test} = Number of test questions.

D_{test} = Number of test documents.

Q = Searching load (rate of question receipt) at any time t.

D = Total number of documents in the index at any time t.

P_t = Average probability of retrieving a document added to the index t years ago.

P_o = Average probability of retrieving a document newly added to the index.

P_t/P_o = Document obsolescence factor; average relative probability of retrieving a document added to the index t years ago.

c = Extra cost of indexing one document by any test system (over the cost of indexing by the control system).

LITERATURE CITED

- (1) Van Oot, J. G., *J. Chem. Doc.*, 2, 220 (1962).
- (2) Costello, J. C., Jr., Wall, Eugene, Chapter VIII, p. 141, in "Solutions for Mechanizing Coordinate Indexing," Vol. V, *Documentation, Incorporated*, 1959.
- (3) Montague, B.A., *Am. Doc.*, 13 104 (1962).
- (4) Costello, J.C., Jr., *J. Chem. Doc.*, 4, 116 (1964).
- (5) Walker, J.F., *ibid.*, 4, 45 (1964).

Foreign Patents Documentation*

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This paper is concerned with rapid access to and maximum use of the patent literature published throughout the world.

I estimate that the 45 most active Patent Offices in the world publish some 6000 patent specifications weekly, about one half of which have already been published in another country. Altogether there are about 1000 completely new or first-issue inventions of chemical interest published per week. Only 25% of these basic chemical inventions ever get published in the United States, and half of these are published earlier in some other country. It is clear, therefore, why United States firms are well advised to gather their patent information from an international source, and not merely rely upon specifications published by the United States Patent Office.

I have grouped together different countries on a patent information basis: The first section deals with the five major issuing countries. The second section deals with three minor but quick-issuing countries of particular importance, and the third section with nine further countries of special interest.

Statistics are presented in Section D for the total number of specifications filed in the eight countries dealt with under Sections A and B. For each of these countries, figures are provided showing the number of inventions currently protected in each of the seven broad fields of chemical interest, and also the country of origin or first priority. These figures enable you to assess the volume of work to be carried out in following foreign patents in your particular sphere of interest, and the type of information to be expected from the individual countries.

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Section E shows how the existence of an earlier publication of any given invention may be ascertained and presents statistics showing the distribution among the different countries of first-published inventions for different fields of chemical interest.

Section F shows how subject matter searches may be carried out on the stored information using either manual coded cards, index term cards, punched cards, or magnetic tape.

A. FIVE MAJOR ISSUING COUNTRIES

With the exception of Soviet inventions, very little of real chemical interest does not eventually become published in the patent literature of at least one of this group.

United States. I am pleased to note that a special Commission has been set up recently by President Johnson to report by October 1966 steps to ensure that the patent system will be more effective in the public interest.

Changes that I would like to see made are: (1) simplification of the patent claim structure; (2) the granting of patents only where true inventive steps are involved; (3) removal of descriptive matter referring to rejected claims only; (4) mention of the application number in the country of origin of any convention documents relied upon; and (5) the use of the International Patent Classification when this shortly issues in its final detailed form.

A recent welcome innovation is the service which supplies upon demand the status of U. S. application numbers quoted in published foreign literature. I think that there is sufficient interest to justify the production of periodic listings of U. S. applications with their corresponding granted seven-digit numbers.

United Kingdom. The British Official Journal of Patents published each Wednesday is unique among those of the major countries in listing newly filed applications, thereby providing advance information. It also lists six weeks ahead the full filing details, title, and classification of newly accepted applications due to be published, so that printed copies may be ordered beforehand. The printed specifications, 65 cents each, are expensive, yet they usually contain printing errors. They are unique in being protected by Crown Copyright. Few people, if any, outside the United Kingdom appear to respect this Copyright, so that it is cheaper for British nationals to purchase photocopies from abroad than obtain printed copies from the British Patent Office.

British patent specifications are normally accepted about two years following filing of the complete specification, and are very detailed and informative. The popular belief that patents hide the important facts is certainly not true for United Kingdom specifications, since according to British patent law the applicant is obliged to disclose fully the best known method of carrying out the invention, and each and every claim must be fairly based upon the body or descriptive part of the specification. Some inventors carry these requirements to excess, and even cash in upon them. One research chemist for whom I acted insisted upon including more than 20 pages of theoretical matter about the competing rates of reaction of

primary, secondary, and tertiary amines with lower alkylene oxide mixtures. He frankly admitted that he always regarded the filing of a British patent as being the most economical and effective way of getting his research work and theories printed and publicized.

Citations made against an application are never printed on the specification, but lists may be obtained for any case by written application upon an appropriate form for a cost of 30 cents. Some little time after the specifications are finally granted, very detailed descriptions or abridgments are published by the Patent Office.

Western Germany. The Germans have always carried out very thorough novelty searches, and are most particular about inventive merit. As a result, the number of filed applications rejected by the Patent Office is unusually high. This largely accounts for the relatively low number of published specifications. On the other hand, among the major issuing countries, Western Germany is unique in at least two important respects which lead to the issuance of patents having no counterparts in the other countries.

First, a new compound as such cannot be claimed as an invention, so that it may be necessary to file a large number of applications claiming different methods of producing the same compound. One difficulty is that since in a process patent the utility of the product need not be specified, a searcher may easily miss a relevant citation or may select references which do not really apply. The second unique feature of German patents concerns the possibility of claiming the discovery, apparently without any inventive step in the conventional sense, of a new field of application for a well known product. For example German Patent 1,196,322 claims the use of known silica particles as the carrier in a medicament spray to be inhaled by birds.

German applications are laid open to public inspection when accepted. An applicant can, however, request delay of acceptance and publication for a further six months from the normal date. A weekly batch of German applications is accepted each Thursday, on the same day as the announcement is made in the Official Journal or "Patentblatt". This is the so-called "Bekanntgemacht" date, at which time also a copy of the specification in printed form on green paper, and known as the "Auslegeschrift", can be purchased for about 30 cents. Copies in any particular class can be ordered automatically at slightly reduced rate.

The specification shows, in addition to the serial number of the application as filed, the examination group to which it was assigned and also the German classification which, as with U. S. practice, does not allow an application to be assigned to more than one class. This permits the final serial number order for each weekly batch to correspond also to the class order. The body or descriptive part of the specification is usually very brief. The claims are extremely clear, since in each case a bridging term meaning "characterized in that" and printed in bolder type follows that which is known and precedes that which is new. There are not many claims, since each claim must contain a novel inventive feature, not merely some preferred temperature range or the like.

It is usual for the applicant to cite any prior art known to him and explain how his invention differs therefrom,

so as to anticipate objections by the examiner. It is important to realize that the citations listed at the end of the specification will not include such prior art, and will therefore not necessarily be exhaustive.

Simple applications may issue as shortly as nine months after filing, but the average time is around two years. Anyone may oppose a German patent application, whereas in the UK an opposition will only be entertained from an interested party, usually a competitor. Also, it is very easy to amend an accepted specification prior to grant, and for this reason the final patent printed on white paper as a "Patentschrift" often differs from the "Auslegeschrift." Where differences do exist, they are noted in the "Patentblatt."

France. Since normal French applications are not rejected for lack of novelty, the French patent literature contains a large number of specifications whose counterparts have been refused or abandoned in other countries. Whereas for the most part these may be lacking in novelty from the legal point of view, they often contain much new technical detail. A French specification has no claims but a summary or resumé, which often is so short as to be meaningless. The body of the specification is therefore of greater importance, and the document is far more difficult to abstract and interpret.

Grant is usually some eight to nine months after filing, except in the case of applications originating in France, where a 12-month delay is given to enable any foreign filings to be made first. The applications are laid open to inspection one month after grant, on the same day as the summary is published in the Official Bulletin issued each Friday. The summaries, arranged in International Patent Class order with duplication for multiclass patents so that only parts of the Bulletin may be purchased, are often uninformative, being written by the applicant or his agent. However, the authorities may demand that summaries which are inadequate be rewritten.

From the day of issue of the summary in the Official Bulletin, one can inspect the file copy of the specifications in the archives of the Patent Office, where unfortunately one is not allowed to write or talk. Printed copies at 30 cents each are not available until some three to four months later, but photocopies at 30 cents per page can be obtained with a delay of seven to 10 days, provided excessively large quantities are not ordered.

Special medicament patents were created effective May 1960. These are subjected to examination for novelty, with possibility for opposition within three months of acceptance. Detailed summaries of the specifications are published in a special bulletin issued each Saturday, and average 10 to 15 newly accepted applications per week. The detailed descriptions, with cited documents and the state of the art, enable one to judge opposition without the need to inspect the complete text. Much valuable technical information is also provided, not to be found elsewhere in the patent literature in such readily accessible form. Because of the examination for novelty, these applications do not issue as quickly as ordinary French patents. An identically worded application, save for the omission of therapeutic use in the text, may be filed independently and will issue first as an ordinary patent.

Japan. Printed copies of Japanese patent specifications are issued daily on the patent publication date bound

together in books of 50, known as Gazettes, all the specifications in any one Gazette belonging to one of the seven groups. Most of the chemical patents are in Group II. The Gazettes are cheap, costing only 60 cents per book of 50 patent specifications, but since they are in Japanese and translation into English costs some \$20 per thousand words, they are of little practical value outside Japan. However, detailed summaries in English of all newly accepted Japanese chemical patents are provided in Derwent's "Japanese Patents Report" which issues well before expiration of the two-month opposition period.

For those who are not content with abstracts, a saving grace is that because the specifications are extremely simple and must conform to the principle of one claim for one invention with any occasional subordinate claims clearly related to the main claim, they are relatively easy to interpret and short to translate. Nevertheless, a complete translation into English of a Japanese patent specification of domestic origin will usually cost around \$35. This price may be lowered by requesting that some of the examples be omitted or condensed. The main problem is to find a sufficient number of technically qualified and reliable translators even in Japan.

The numbering of Japanese patents frequently gives rise to confusion. Applications are numbered serially as filed, with a new series commencing each year. Accepted applications are given a six-figure serial number according to their date of acceptance. However, as distinct from normal patent procedure, if and when granted they are given a final but different six-figure granted patent serial number. Each month a bound index costing 70 cents is issued by the Patent Office listing the title, filing details, and Japanese classification of the printed patent specifications published in all the Gazettes during the preceding month. Similarly a Patent Catalog published each month for 70 cents lists the final serial or patent number of all accepted applications granted during the preceding month. However, referring to a Japanese patent, it is usual to quote the six-figure application number as appearing on the printed specification, but care should be taken to ensure that one has not been given the somewhat similar granted patent six-figure number.

B. THREE QUICK-ISSUING COUNTRIES

Belgium. Normally a Belgian application will be laid open to public inspection three months after grant. Grant takes place a fortnight after the fortnight in which the application was filed. Thus an application filed January 6 will be granted January 31 and will be published April 30. An application filed January 19 will be granted February 16 and will be published May 16. These applications therefore become available for inspection in fortnightly batches some three and a half months after filing, which is earlier than in Netherlands but later than the Irish Republic.

However, for a very small payment it is possible to hold up the publication, and incidentally also the grant, for a short period of time. A delayed Belgian patent will be published exactly six months after the filing date, and this is also the date of grant. A Belgian application may be withdrawn, and never published, at any time

up to grant. Request for delay may be made at any time, prior to grant. Thus a "delayed" patent filed January 6 will be published and granted July 6. Batches of delayed Belgian patents are published daily, whereas the non-delayed specifications issue in fortnightly batches. About 50% of chemical Belgian patents are delayed, whereas for general Belgian patents the figure is only around 25%.

One disadvantage of the Belgian disclosure is that it is in the form of a typed document deposited at the Patent Office in Brussels. Moreover, in about 10% of the cases it is in Flemish. The specifications often contain many errors, and corrections are frequently made long after publication and in any case merely as a letter of correction filed at the end of the document, the errors never being noted by the Patent Office on the specification itself. The biggest disadvantage is the relative inaccessibility of the specifications, and the long delay experienced at present in obtaining photocopies.

One of the most popular reasons for filing in Belgium is to ensure early publication, so as to prevent others from patenting in countries such as United Kingdom, of the independent discovery of a process or product otherwise kept secret. The renewal fees are not paid in such cases, the patent being allowed to lapse once it has been published.

When a Belgian application is filed out of Convention it is usual to provide details of other pending foreign filings. This is because the application will convert to a Patent of Importation as soon as the first of the foreign applications has been granted, and it is not known in advance which this will be. Since copies of any priority documents need not be provided unless called for in legal proceedings, one is often left guessing as to which portions of a specification claiming multiple priorities can rightly claim the earlier date. Issuance of the corresponding Netherlands or South African specification will enable the doubt to be resolved, since here the priority documents must be filed and can be inspected.

Monthly lists of newly filed Belgian patents are published for a very modest fee by the Belgian patent agents, Gevers & Cie. However, no Convention details can be provided since these are not made available until the specifications are published. Also, it is not possible to ascertain in advance of grant whether or not request has been, or will be, made for delay of publication. Detailed summaries in English of all Belgian patents of chemical interest are provided in Derwent's "Belgian Patents Report," which usually constitutes the first publication for official purposes in countries such as the United States and United Kingdom. About 15 months after the filing date a short resumé is published in the *Receuil des Brevets* by the Belgian Patent Office.

So-called printed copies are about three and a half years delayed, and are for the most part provided merely to satisfy the requirement whereby Patent Office libraries of different nations interchange copies of their specifications on a money-free basis. Recently Patent Office libraries have been supplied with photostat copies of Belgian patent specifications published between January and August 1963, leaving a gap between June 1959 and the end of 1962. It remains to be seen whether the recent sign of activity after so long will be maintained, and just where it will stop.

Netherlands. Under a new law effective January 1, 1964, and really effective for applications published after July 1, 1964, Netherlands applications filed under Convention are now laid open to inspection 18 months from the priority date. The applications, which have a seven-figure number assigned to them, are printed promptly and placed on general sale at 60 cents each. Novelty examination is made only if requested and paid for by the applicant, and if this is not done within seven years the application lapses. The law was designed to stop the buildup of applications requiring to be examined, which became quite considerable due to the extreme thoroughness of the Dutch Office with its excellent facilities in the Hague. Some of the applications filed under the old law are still being examined and issued.

As in Germany, a substance as such is not patentable, but only processes of manufacture and substances produced thereby. Since all product claims are process bound, many Netherlands patents will have no South African or Belgian equivalents. In practice the Netherlands application is published about the same time as equivalent delayed Belgian, and is more easily accessible. There are difficulties, however. The Official Journal listing the applications is only published fortnightly some four to six weeks after the applications have been made public. In the Patent Office library the newly published copies are only laid out for inspection for a few days, then are filed away and not traceable until the Official Journal issues, unless one relies on ordering by class, which is always dangerous. For this reason it is best to employ someone on the spot at the Hague to select and order copies daily before the limited stocks printed are sold out.

As with the German "Auslegeschrift", a new Dutch application published prior to acceptance is printed on green paper for rapid recognition, whilst the patent if granted will be on white paper. The new specifications are printed from plates prepared using the typed originals as filed. These originals are often very indistinct, so that the duplicated specifications are difficult to read, even by those conversant with the Dutch language. It is, however, possible to secure photocopies of the Netherlands application, and in this way secure a copy which is both clearer to read and, what is more important, usually in English or in some more readily understood language. There is some little delay in securing these copies, however, and the cost is considerable particularly where several cognated applications have been filed.

South Africa. South African patent specifications are not examined for novelty, but only to ascertain that the formalities have been complied with. If they have, acceptance follows some two to three months after filing, and within one month from acceptance filing details together, with one or more claims are reproduced in the weekly *Official Gazette*. Photocopies of the complete specification and printed documents are available as from the date of announcement of acceptance in the *Official Gazette*.

Some applicants regularly manage to secure delay of acceptance by arranging for minor irregularities in the formalities which will not invalidate the application or its effective date, such as forgetting to sign the documents. In such cases a knowledgeable person may still circumvent these delaying tactics. The *Official Gazette*, published each

Wednesday, lists all new applications filed with an indication of any Convention priorities claimed. According to South African patent law at the present time, inspection of documents is permissible, and photocopies are obtainable, 18 months after the priority date even if the application has not yet been announced as accepted in the Official Journal. It is merely necessary, therefore, to watch out for very interesting applications, and request inspection or photocopies some six months after filing even if acceptance has not yet been announced.

C. OTHER COUNTRIES

Because they can constitute sources of early disclosure, or else may have some other particular significance, the patent specifications of nine further countries merit special attention.

Communist Countries. SOVIET UNION. Individual firms can apply for patents in their own name in the Soviet Union, using the State patent agents for the purpose, but more than 95% of inventions are assigned to the State as "Author's Certificates." The filing procedure, legal requirements, and office procedure are substantially the same for both, but a patent specification may be distinguished by the presence of Russian wording in the top right-hand corner of the first page, the actual wording being "Vz-men Ranez Uzdannogo."

Russia is now a party to the International Convention, a move taken to protect its increased filing abroad with the object of receiving large sums of money as royalties. There has nevertheless so far been no apparent change in procedure or policy, although there will now have to be a delay of at least 12 months before new applications are published. At present, examination, grant, and publication average some six to 12 months for completion, and one is allowed to inspect the files even of rejected applications. Prior publication anywhere in the world will invalidate a Soviet application, which may be rejected merely because the invention does not fit into the public economy. This is because in granting an Author's Certificate, the State Committee for inventions is also obligated to press for its industrial application in practice. The document as filed need not have any claims, and even if it has these will usually be ignored. The final claims or "Invention Formula" are drafted by the examiners, and constitute the essential features defining the invention. The descriptive portion is written later after grant.

The claims as drafted by the State are narrow, simple, in the Germanic form, and rarely more than one or perhaps two in number. They are made narrow, since the State wishes to encourage development of further modifications, whereas a capitalist inventor will make his claims as broad and as complicated as possible to prevent competitors' getting around them.

When the claims are in order, and before the body of the specification is finalized, the application is granted, given a final six-figure number, and the claims and a drawing are published in the fortnightly Official Bulletin. The entries are arranged in serial number, which is also class order, the classification corresponding very closely

to the German system. The specification itself is not printed until the text of the description is completed subsequent to grant. This explains why the printed patents are received in haphazard numerical order, depending upon the relative time taken with different texts. It is virtually impossible to purchase these printed specifications, and one is advised to order photocopies from the complete sets available in most Patent Office libraries under the international exchange system.

Officially the grant date of a Soviet Patent is the date on which the Official Bulletin containing the claims was sent for printing. The actual printing is usually carried out much later, and there is no record kept of the real printed date. In the same way there is no record of the actual date of printing or publication of the complete specification. This does not worry the Soviets, since only the claims really count. It must surely worry Patent Offices such as the United States, which must take into consideration all printed documents throughout the world available prior to the effective date of a U. S. application. Cases are known where the complete specification has in fact issued before the Official Bulletin summary was printed.

As a source of information, Soviet patents are very disappointing. There are only about 160 per week, and most of these are of a trivial mechanical nature. A large number are concerned with electrical engineering and electronics. The proportion relating to chemistry is relatively low, and most of these have to do with inorganic chemistry and chemical engineering. Soviet chemical inventions are for the most part fundamental or even academic in nature, and there is a marked absence of the type of commercial improvement patent which dominates the patent literature of large industrial free enterprise countries. There is no evidence that new information is being suppressed, since much new research work is published in the general literature. The incentives given to inventors are, however, so small that they usually prefer to publish in technical journals, thereby invalidating any subsequent patent application. The claims given in the Soviet Official Bulletin are rather uninformative, but detailed abstracts in English of all Russian patent specifications are provided in Derwent's "Soviet Inventions Illustrated."

EAST GERMANY. The East Germans created a stir some time back when they announced that specifications would be published prior to examination. In point of fact, however, the number of filings is so low, and some of the inventions are so trivial, that the specifications issuing from this country are really only worth following on a narrow specialized subject matter basis.

British Commonwealth-Associated Countries. CANADA. Canada is of commercial interest for United States organizations, but there is not a great deal of first issue material published in Canadian specifications. Publication procedure follows that used in United States very closely, even to the same weekly day of issue each Tuesday, and the provision of a Gazette. The specifications, averaging 440 each week, cost twice as much and are often poorly printed. An important difference compared with United States, and which may result in the publication of inventions apparently having no equivalency there, is that under Canadian patent law there can be no claims for a substance itself, except when prepared or produced

by particularly described and claimed methods or processes of manufacture.

AUSTRALIA. Australia was the old favorite early disclosure country before the change of law. Novelty can only be destroyed by importation or knowledge in Australia itself, and also as in Great Britain provisional applications can be filed. A difference is that an announcement is made in the Official Journal if a provisional application is abandoned by not filing a complete specification within the prescribed period of one year. Originally applications were published prior to acceptance 18 months from the convention date. The authorities thought that this discouraged filing, and so a few years ago changed the law to publication 24 months from filing the complete specification. For a considerable time as a result of the sudden change, no applications were published. Realizing they had overdone things, the authorities gradually reduced the period from 24 to 18 months. Maybe in the near future they may reduce the period still further, but they are still 12 months behind the old practice.

There is, however, one little-realized exception. An applicant may at his own request ask for his application to be laid open to inspection at any time three months after the filing date. This is because infringement proceedings may be made retrospective to the date of publication. Very few applicants actually take advantage of this provision. The documents laid open to inspection are a typed specification and any priority documents from which photocopies may be ordered on the same day at 30 cents per page. Also published about the same time are the well-known sheets on which are printed one or more claims, the filing details, and the classification. Following examination for novelty, an accepted application is given a final six-figure number and its acceptance is advertised in the Official Journal together with an Abridgment. Printed specifications may be purchased shortly thereafter at 65 cents each.

INDIA. India is not a member of the International Convention, but does belong to a similar Convention of Commonwealth countries. Thus, if a United States firm wishes to file in India it would be well advised either to file quickly out of Convention, or else to file quickly in a Commonwealth country. Best procedure is to file a provisional British application. It is because firms often file quickly out of Convention in India that patent information there sometimes issues early. Actually there is an examination, but the documents must be in order for application within 18 months of the filing date, which latter is often very near to the first priority date. Filings in India have lowered since the Defence of India Rule giving the State wide powers to use inventions for the national interest.

The Gazette of India, in a special section published each Saturday, lists all new applications filed and gives a very brief and poorly printed summary of accepted applications. Photocopies or typed copies of published specifications are very expensive, and delays of up to six months are common. Some of the specifications are printed eventually, after about two or more years. There are some 100 patents per week, and a four-month opposition period. Final and filing numbers are the same, so that patents are not granted in numerical order.

IRISH REPUBLIC. In the Irish Republic there are only some 20 to 30 applications filed each week, but those

that are filed under Convention are laid open to public inspection 12 months after the priority date—that is, usually immediately after they are filed and earlier than anywhere else in the world. Lists are published in the fortnightly Official Journal, and photocopies at 30 cents per page are obtainable from the Patent Office with a delay of 2 to 3 weeks. Most Irish patent agents will agree to provide written copies of the main claims, at least of newly published applications, without any delay for around \$4.00 each.

Other European Countries. **ITALY.** Theoretically Italy should be of great interest from the patent information point of view since there are in all some 300 applications per week and there is no examination for novelty. However, grant appears to be several months after filing, and photocopies are only available three to six months after grant. They are extremely expensive and long-delayed.

Printed specifications issue only after a considerable period of time, and are not published in anything like numerical sequence. Also, protection cannot at present be obtained for pharmaceuticals, although a Draft Bill has recently been published to provide protection for new processes for the manufacture of medicines. Add to all this the language barrier, and one reaches the conclusion that Italian specifications can at best justify regular watching on a very narrow basis only.

SWITZERLAND. Swiss patents are worth following because of the importance of the Swiss chemical industry. The applications take a long time to issue because of difficulty in getting them to comply with the various formalities, especially insofar as the claims and the special subclaims are concerned. This is the sole reason, since there is no novelty examination except for certain textiles and watches. There are about 150 patents weekly, which can be followed and cheaply purchased in well-printed form fortnightly by selection from a Gazette. The specifications are usually in German or French, but some are in Italian. They follow the German form closely.

PORTUGAL. The complete claims of all new Portuguese applications are published in the Official Journal three to four months following the filing date, but copies of the complete specifications are extremely difficult to obtain. Total filing, however, only averages 30 to 40 per week.

D. STATISTICAL SURVEY

Object of the Survey. Before deciding whether to watch the inventions of any given country over a given field of interest, it is useful to have some idea of the total number of specifications to be scanned each week, and the likely number to be of particular interest. For this reason I have made a statistical analysis of all patent specifications published during 1965, based upon the information provided in the various weekly patent abstract periodicals published by Derwent. In the case of United States patents I used the Official Gazette as information source. For each of the eight prime interest countries dealt with in Sections A and B of this article figures are derived showing:

- (a) the total number of applications filed;
- (b) the total number of specifications published;
- (c) the total number of chemical type specifications published;
- (d) the total number of specifications published relating to each of the seven broad chemical subject matter groups set out in Table I where, for convenience, any patent specification is assigned to one only of the seven groups. These groups approximate the classification used in the weekly patent abstract bulletins published by Derwent;
- (e) an analysis showing the distribution by country of origin or priority, as between United States, United Kingdom, Germany, France, and any other country, for each group of patent specifications published in any given country relating to a given chemical subject matter group.

Survey Results. The figures obtained, expressed on the basis of average number of patent specifications per week, are set out in Table II. Taking patents issued in United States for example, the figures show that of some 1700 applications filed per week only 970 result in granted patents. Of these granted patents, only 255 relate to subject matter falling within the seven broad groups. There is a weekly average of 51 patents on plastics granted

in the United States, and of these 40.5 have U. S. priority, 1.6 originate in UK and France respectively, 4.1 originate in Germany, and only 3.0 per week claim priority in some other country than U. S. A., UK, France, or Germany.

In the case of West German applications no figures are published concerning the number of applications filed. One can, however, derive figure by taking the difference between the first and last A-application over a given period; the first and last B-application over a given period; and so on through the alphabet. The result will give the total of applications filed, including those applications which had subsequently been converted into trivial-type patents or Gebrauchsmuster.

For the four countries dealt with in the lower half of Table II, applications are not examined for novelty or rejected prior to publication, so that the figure for "applications filed" will be the same as the figure for "all subjects-published." On a truly comparative basis, therefore, the figures in the lower half of Table II should be divided by a factor of some 1.6 to 1.8

The results tabulated in Table II are represented graphically in Figures 1, 2, and 3. In the first two figures, the distribution of patent specifications by subject matter is shown for each country; whereas in Figure 3, the distribution of patent specifications for each country is shown on the basis of country of origin or first priority. In Figure 3, for each column where the country of publication and of first priority is the same—e.g., the second vertical column from the left—the values represent "domestic" patents—i.e., patents published in the country in which they were invented or first protected. Referring to the first two columns on the left-hand side of Figure 3 it can be seen that of 255 chemical patents granted per week in United States, 196 are of "domestic" origin—i.e., claim priority in the U. S. A. Referring now to the other columns, it is seen that 92 chemical patents per week published in the UK claim U. S. priority. It is probable that not more than five of the 79 and 39 patents claiming U. S. priority published in Germany and Japan respectively, or of the applications published in France, Belgium, and Netherlands likely to lead to granted patents in the U. S. A., would have failed to be filed also in UK and eventually result in published specifications. We therefore arrive at an estimate of 92 plus five or 97 U. S. A. chemical patents per week which also eventually become published at some time or other in one or more of the other seven countries under review. This leaves a balance of 99 U. S. chemical patents per week which never become published in foreign patent literature.

This quantity is represented by the lower half of the second vertical column from the left in Figure 3, bearing horizontal broken-line shading. All areas in Figure 3 bearing horizontal broken-line shading represent patents which become published in the country of origin only. For example, some 136 Japanese patents of chemical interest published per week in Japan never find their way into the published patent literature of any other country. This emphasizes the danger of following patent specifications on a single national basis only.

General Conclusions from the Survey. It is interesting to note from Table II that the total number of German patents granted is less than half the number of applications

Table I. Classification of Patents of Chemical Interest into Seven Groups for Use in the Statistical Survey^a

Plastics
Paints, lacquers, and varnishes
Resins, rubbers, and plastics
Coating, molding, and extrusion
Electroplating and metal finishing
Textiles
Chemical aspects of textile manufacture and treatment
Dyestuffs and dyeing; pigments and optical brighteners
Cellulose derivatives; wood and paper
Printing and duplicating materials
Pharmacy
Pharmaceuticals and medicinal preparations of all types
Photographic process and chemicals
Petrochemicals
Petroleum and other hydrocarbons production, refining, processing
Fuels, lubricants, mineral oils, fats, waxes, soaps, detergents
Carbon black, bitumen, coking
Organic
General organic chemicals
Pesticides, fungicides, herbicides, organic fertilizers
Food products, preservatives, disinfectants
Leather and tanning
Cosmetics, perfumes, and toiletry
Inorganic
General inorganic chemicals
Ceramics, glass, phosphors, semiconductor materials
Unit chemical processes, chemical engineering
Nuclear power
Metals
Iron and steel manufacture; alloys
Extraction and refining of metals
Metallic coatings other than by electrodeposition
Refractories and glass
Casting and working of metals

^a For purposes of the statistical survey, any patent specification is assigned to one only of the seven groups.

Table II. Distribution of Chemical Inventions in Eight Different

Accepted												
Issue country		United States					United Kingdom					
Origin country	U.S.A.	U.K.	Gy.	Fr.	Other	Tl.	U.S.A.	U.K.	Gy.	Fr.	Other	Tl.
Plastics	40.5	1.6	4.1	1.6	3.0	51	25.3	12.9	10.9	2.6	8.9	61
Textiles	18.0	0.8	1.9	0.6	2.7	24	7.2	6.0	5.8	0.6	6.7	26
Pharmacy	19.4	1.7	2.3	1.4	7.4	32	12.4	7.1	3.8	2.3	10.6	36
Petrochem.	11.7	0.9	3.7	0.3	0.8	18	11.5	3.6	1.8	1.2	1.2	19
Organic	31.7	0.8	2.6	1.2	4.4	41	12.8	7.8	6.7	0.7	4.9	33
Inorganic	48.1	3.2	1.7	1.3	3.7	58	15.7	16.4	9.6	5.9	9.4	57
Metals	26.6	1.0	0.6	0.4	2.7	31	7.5	10.4	3.3	1.3	5.5	28
All Chem.	196	10	17	7	25	255	92	64	42	15	47	260
All Subjects-Published						970	699					
Applications Filed						1700	1020					
Specifications Published												
Issue country		France					Belgium					
Origin country	U.S.A.	U.K.	Gy.	Fr.	Other	Tl.	U.S.A.	U.K.	Gy.	Fr.	Other	Tl.
Plastics	22.7	5.7	11.2	10.0	6.5	56	11.0	2.3	10.0	2.5	4.0	30
Textiles	6.5	2.5	5.4	4.0	5.2	24	4.2	2.2	4.6	1.0	4.0	16
Pharmacy	10.3	3.2	3.6	8.9	8.6	35	7.5	2.4	3.2	1.6	6.1	21
Petrochem.	6.0	2.5	1.1	2.7	0.9	13	8.2	1.1	1.0	0.8	1.2	12
Organic	11.1	4.9	8.6	9.3	5.4	39	5.6	2.0	5.8	2.2	3.7	19
Inorganic	13.1	7.7	9.0	18.5	8.6	57	4.7	3.0	2.9	5.0	3.2	19
Metals	7.5	2.4	6.0	6.9	3.5	26	4.1	1.0	3.7	1.5	3.3	14
All Chem.	77	29	45	60	39	250	45	14	31	15	26	131
All Subjects-Published						700	306					

filed, the corresponding figures for U. S. A. and UK being 1.75 and 1.6, respectively. The proportion of chemical patents is high in UK, more so in Japan, and especially high in the minor quick-issuing countries, being lowest in U. S. A. followed by Germany.

Turning to Figure 1 it can be seen that four of the five countries publish about the same number of chemical patent specifications.

The general distribution pattern is substantially the same for each country. Notable exceptions are the relative high number of patents on metals in Germany, and on pharmaceuticals and organic chemistry in Japan where patents relating to inorganic chemistry and petrochemicals are relatively few in number. According to Figure 2, the quick-issuing countries are particularly rich in patents relating to plastics, pharmaceuticals, and organic chemistry.

From Figure 3 it can be seen that for United States, Germany, and Japan the majority of patents are of domestic origin, with a large proportion being filed in the country of origin only. For United Kingdom and France the number of chemical patents of domestic origin is surprisingly low, especially as the corresponding figure for mechanical and electrical inventions is high. It is apparent throughout that chemical inventions tend to be filed more widely than any other type of invention. United States is by far the biggest money spender on foreign applications, but is one of the least popular countries in which others secure granted patents, presumably because of the cost and complexity involved. Foreign filings are particularly high in the United Kingdom.

E. DUPLICATE FOREIGN PATENTS SPECIFICATIONS

Basic or First-Issue Patents. To cut down the amount of new technical information published in patents to be filed away or to be passed on to the research staff for information purposes, it is important to recognize whenever a newly published specification relates to an invention which has formed the subject of a patent specification already published in the literature of another country.

Referring to Figure 4 the following features are most useful in detecting the existence of earlier publication of a given invention:

(a) Four-letter company code and first priority date shown at the top right-hand corner, namely DAIN and 2.10.62. If all file entries are arranged on cards in company code letter order and, for a given company code, in priority date order, then provided the patent is filed under Convention and the name of the applicant has not changed (for example, by assignment), inspection under the appropriate company code letters and priority date will indicate any probable earlier publication, and the actual abstract printed on the card will enable the information to be verified without further trouble.

(b) Application number in the first-priority country shown on the left-hand side just below the title, namely 43901/62 in Japan. All equivalent patents filed under Convention will have the same first-priority application number, so that equivalent patents may be tracked down even where the applicant, and therefore the four-letter company code, has been changed. For this purpose cards such as represented in Figure 4 will also be filed away

FOREIGN PATENTS DOCUMENTATION

Countries Expressed as Weekly Averages During 1965

Specifications

West Germany						Japan						Iss.	
U.S.A.	U.K.	Gy.	Fr.	Other	Tl.	U.S.A.	U.K.	Gy.	Fr.	Other	Jap.	Tl.	Ori.
6.7	1.2	12.4	0.4	1.6	22	14.0	1.5	3.6	1.0	2.4	31.8	54	PL.
2.9	0.6	7.3	0.2	1.4	12	2.5	2.3	1.9	0.4	1.9	18.2	27	TX.
4.2	1.3	7.7	1.4	4.4	19	4.0	1.1	2.5	0.6	3.6	22.3	34	PH.
2.5	0.7	3.6	0.3	0.6	8	4.0	0.7	0.2	0.2	0.4	2.1	8	PT.
4.4	0.6	14.2	0.7	2.5	22	7.8	1.8	4.4	0.4	2.7	36.5	54	OR.
6.0	2.6	18.9	2.4	3.8	34	3.3	1.4	1.5	1.0	1.1	17.3	26	IN.
2.5	0.8	15.3	1.5	2.6	23	3.6	0.6	0.8	1.0	1.2	23.1	30	MT.
29	8	79	7	17	140	39	10	15	5	13	151	233	CH.
					437							584	Tl.
Incl. Gebrauch.					1060								AP.

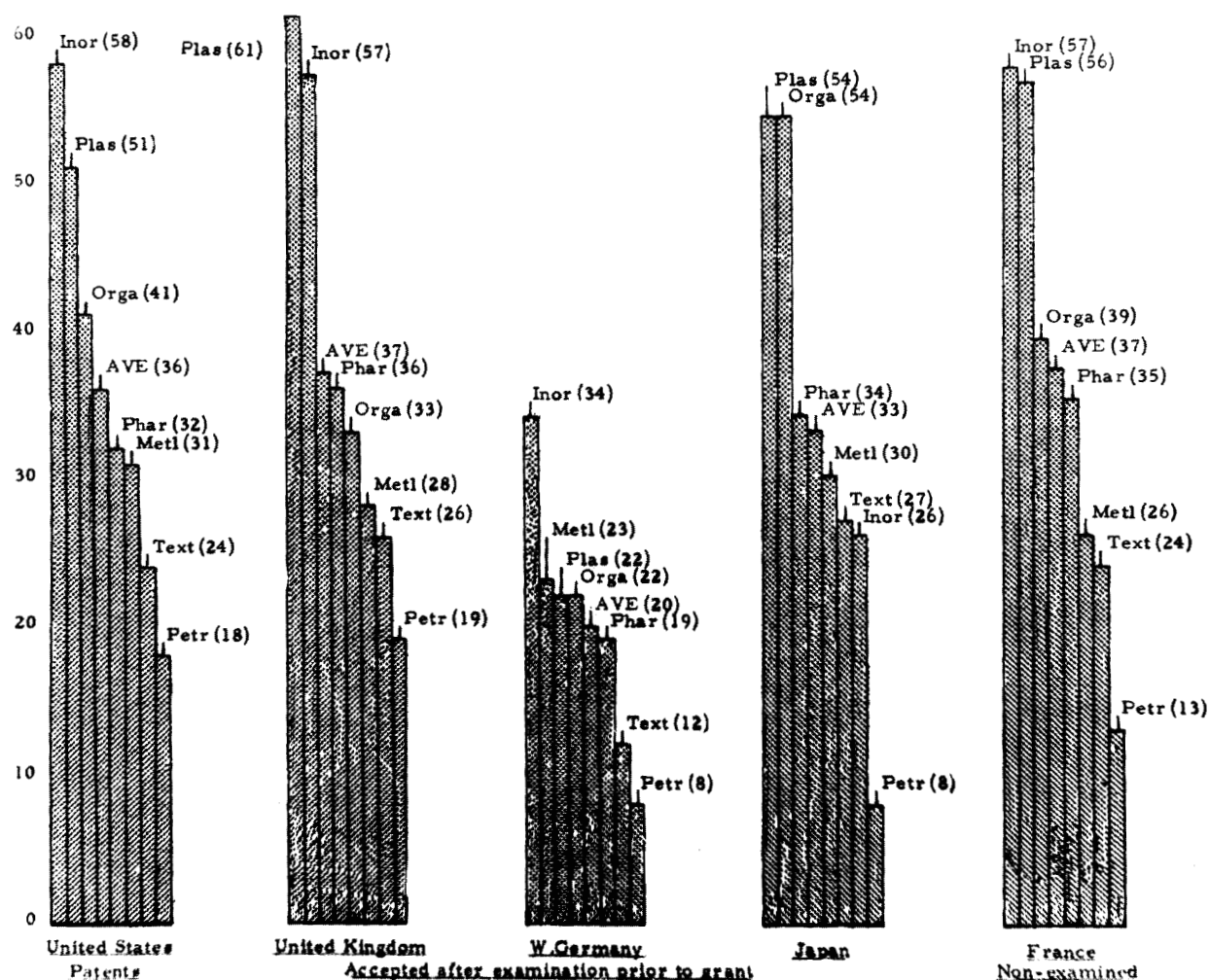


Figure 1. Numbers of chemical patent specifications published in each of the five major issuing countries showing division into seven subject headings for each country.

Based on Table II values, expressed as weekly averages during 1965.

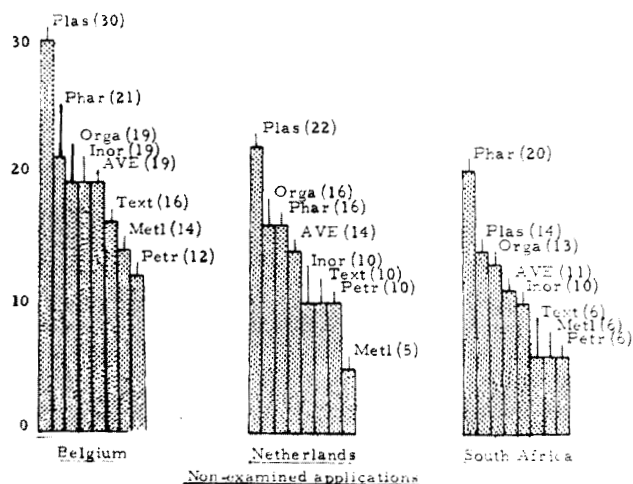


Figure 2. Numbers of chemical patents published in the three minor quick-issuing countries.

Based on Table II values, expressed as weekly averages during 1965.

punched out as well as the four-letter code for the country in which the patent was published, followed by the actual specification number. Thus for the first entry on Figure 5 the punchings would be 15453 USAP 3,193,451. For basic patents such as the third entry on Figure 5 an asterisk is also punched into the entry card.

At fortnightly intervals, and then quarterly and finally annually in cumulative fashion, the cards may be used to generate tape so as to print out lists of all entries in basic number serial order, with equivalent filings entered against them:

5187	FRAN	1743M*
5187	GERM	1149722
5187	AUST	10867 61
5187	JAPA	17973 63
5188	AUST	13851 62*
5188	FRAN	2161M
5189	JAPA	9895 63*
5189	BRIT	936547

FOREIGN PATENTS DOCUMENTATION

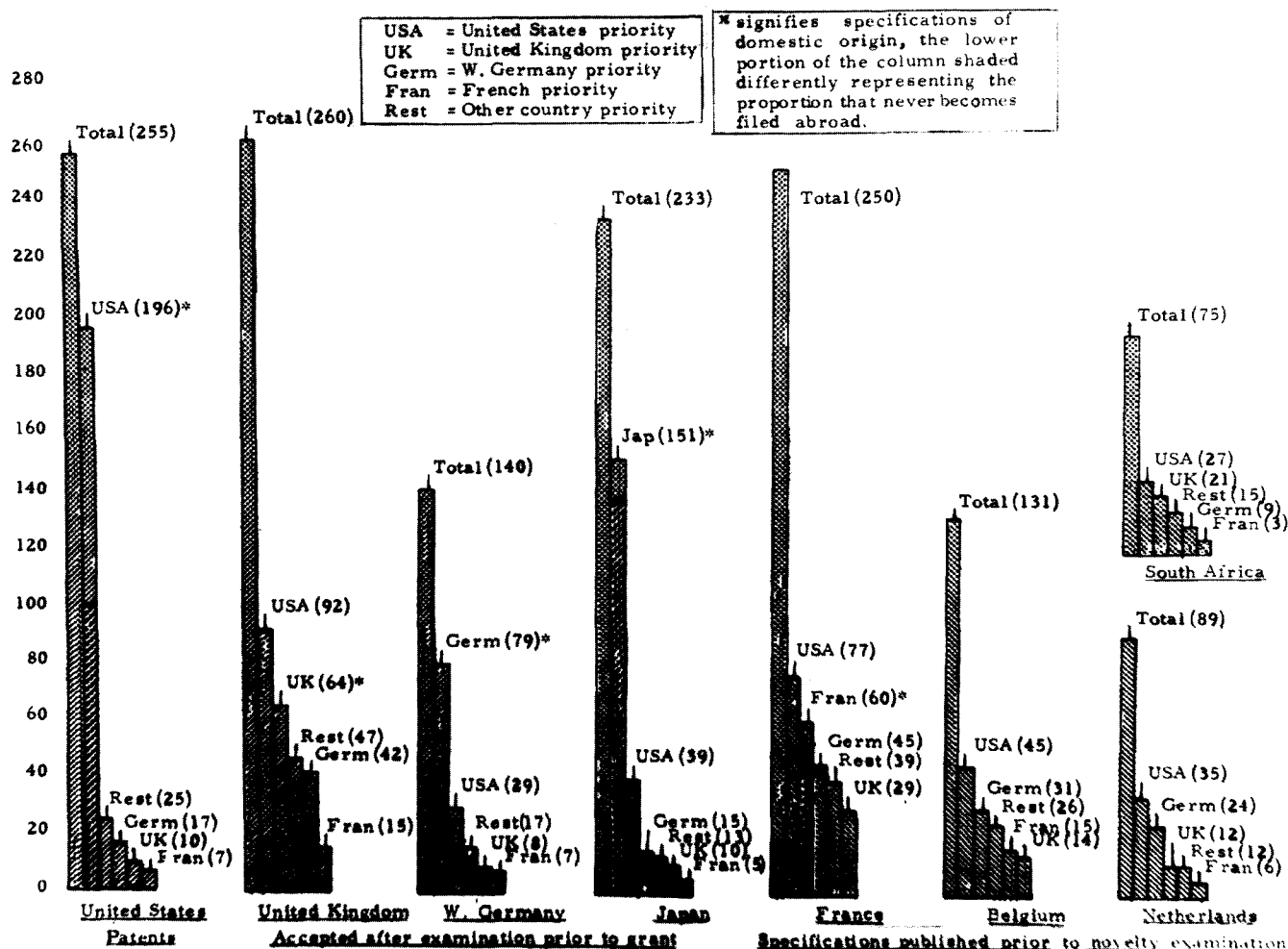


Figure 3. Numbers of chemical patent specifications published in each of eight major interest countries showing division into country of origin or first priority.

Based on Table II values, expressed as weekly averages during 1965.

File number for internal records	First publication date	Applicant in full	Classes assigned for manual coding	First priority date
17,035	2.10.62	VII-A1, VII-D12, XII-A1, XII-A2	Number of manual code cards	2.10.62
Eye-catching title	NITROFURYL VINYL PYRIMIDINES - ANTIFUNGAL, ANTIBACTERIAL			
First-published specification no.	Jap. 10414/65 clg. (Non-Con.) 2,10,62 (Jap.) as 43901/62.			
Priority date and country	Pub. 26.5.65, Dai-Nippon Pharm. Co.			
Application no. in priority country	NEW			
Eye-catching abstract esp. for visual scanning	<p>Nitrofurylvinylpyrimidine derivs:-</p> <chem>O=[N+]([O-])c1cc(OC=Cc2nc(R)nc(X)c2)oc1</chem> <p>R = H, lower alkyl X = lower alkanoylamino, NH₂ or OH.</p> <p>USE</p> <p>Antifungal and antibacterial.</p>			
<p>PREPARATION</p> <p>By condensing 5-nitrofurfural (I) with 2- or 6-methyl-4-alkanoylamino pyrimidine, followed by hydrolysis, if necessary, to replace the 4-substituent by NH₂ or HO.</p> <p>EXAMPLE</p> <p>A mixt. of (I) (3 g), 2,6-dimethyl-4-acetamidopyrimidine (3.3 g) and anhyd. AcOH (7.5 ml) is heated at 110-20° for 3 hrs.</p> <p>After cooling, the ppt. is collected and crystd. from MeCN to yield 6-(5-nitro-2-furylvinyl)-4-acetamido-2-methylpyrimidine (4 g), m.p. 207-208°.</p> <p>Hydrolysis with boiling 20% alc. HCl for 2 hrs. removes the Ac whilst boiling 25% HCl for 10 hrs. produces the 4-HO compd.</p>				

Figure 4. Standard method for recording main features of a patent specification on IBM card.

I.C.F. Volume	14 - Week 128	<u>Suggested standard</u>	Country	UNITED STATES
Patents Pub.	6 July 65.	<u>Individual Country</u>	From:	3,193,451
I.C.F. Issued	22 July 65	<u>Alerting File sheet</u>	To:	3,193,581
3,193,451 FUNGICIDAL COMPOSITION OF UNDECYLENIC ACID DERIVATIVES Wolfgang Benjamin Reulisch, London, England, assignor to <i>Revo Chemische Fabrik G.m.b.H.</i> , Steinau, Kreis Schleierh., Germany. No Drawing. Filed Feb. 6, 1961, Ser. No. 87,123. Claims priority, application Germany, Mar. 14, 1960, R 27,279. EQUIV. Der. 1,5453 corr. Brit. 981,416 1. A process for combating micro-organisms, which comprises applying thereto a biocidally effective amount of: $\text{C}_n\text{H}_{2n-1}\text{CO}_2\text{N}(\text{C}_2\text{H}_5)_2(\text{CH}_2)_m\text{H}$ wherein the group $\text{C}_n\text{H}_{2n-1}\text{CO}_2$ is the acyl derivative of undecylenic acid, R is selected from the group consisting of alkyl and alkylol, and containing up to 4 carbon atoms; n stands for an integer of 1-4 and m is an integer in the range of 1-30.		References Cited by the Examiner UNITED STATES PATENTS 2,694,088 11-54 Sahyun 260-559 2,870,145 1-59 Perron 260-247.2 2,895,992 7-59 Onnacker 260-559 2,912,453 11-59 Moffett 260-559 2,993,831 7-61 Shapiro et al. 167-52 3,036,128 5-62 Moffett 260-559 3,044,931 7-62 Holsius 167-52		
3,193,456 3,5-DIMETHOXY-4-ALLYLOXY-BENZAMIDE COMPOSITIONS AND METHOD OF USE Robert-Yves Mauvray, Riom, France, assignor to <i>Centre Europeen de Recherches Mauvray</i> , Chateau de Bardon, Riom, Puy-de-Dome, France. No Drawing. Filed Sept. 27, 1962, Ser. No. 227,694. Claims priority, application France, Apr. 16, 1962, 894,584; France 2,817, June 15, 1962, 900,947; July 16, 1962, 904,394. EQUIV. Der. 9634 corr. Fr. 2017M 1. The method of achieving a sedative action, which		3,193,457 ORAL ADMINISTRATION OF 6,16a-DIMETHYL-PROGESTERONES Fred A. Kinci, Mexico City, Mexico, assignor, by mesne assignments, to <i>Syntex Corporation</i> , a corporation of Panama. No Drawing. Filed Jan. 3, 1962, Ser. No. 164,183. Claims priority, application Mexico, June 7, 1961, 63,821. BASIC 17377 1. The method of treating hormonal disorders involving estrogen increase in the human female which comprises orally administering to such subject a pharmaceutical composition containing a compound selected from the group consisting of 6a,16a-dimethylprogesterone and 6a,16a-dimethylprogesterone. 2. The method of treating hormonal disorders involving estrogen increase in the human female which comprises orally administering to such subject a pharmaceutical composition containing from 1 to 25 milligrams of 6a,16a-dimethylprogesterone. References Cited by the Examiner UNITED STATES PATENTS		

Figure 5. Portion of suggested standard method file for patent alerting.

EQUIVALENT-TO-BASIC			
British patents			
12626	BRIT	965717	79
3057	BRIT	965718	79
10364	BRIT	965738	79
13020	BRIT	965813	79*
13021	BRIT	965814	79*
13022	BRIT	965844	79*
9058	BRIT	965848	79
10499	BRIT	965856	79
6454	BRIT	965867	79
13023	BRIT	965869	79*
2206	BRIT	965909	79
13024	BRIT	965925	79*
10940	BRIT	965928	79
10940	BRIT	965929	79
U.S.A. patents			
13115	USAP	3142618	80*
13116	USAP	3142619	80*
13117	USAP	3142620	80*
13118	USAP	3142621	80*
9907	USAP	3142570	80
12269	USAP	3142571	80
5457	USAP	3142672	80
13119	USAP	3142673	80*
3514	USAP	3142674	80
13120	USAP	3142675	80*
13121	USAP	3142676	80*
13122	USAP	3142678	80*
5979	USAP	3142679	80
7696	USAP	3142680	80
13123	USAP	3142681	80*

Figure 6. Equivalent-to-basic lists.

Lists may also be prepared at six-month intervals arranging all patents of a given country in strictly numerical order, with their basic serial number opposite. Such lists are illustrated in Figure 6. It is interesting to note that since an asterisk signifies a basic or first-issue patent, the listing confirms the figures presented in Section D showing that far more basic patents issue proportionately in United States than in United Kingdom.

Equivalent-to-basic lists where the patents of a given country are arranged in strictly numerical serial number are particularly important for countries such as Belgium, Netherlands, and South Africa, where the specifications are not published in serial number order and therefore cannot be consulted quickly by reference to the alerting or I.C.F. files.

The cards and tape may also be used to print out lists giving inventions in basic number serial order for patents of a given country, thereby enabling one to ascertain rapidly which of the inventions retrieved in a given search have been protected in a particular country of interest.

Basic Invention Statistics. From the documentation point of view, the number of basic inventions falling within any given category is more important than the total number of specifications issued in the various countries examined. Statistics giving the numbers of basic inventions for each of the seven fields of chemical interest are presented in Table III.

The values were derived by taking, as an approximation of the number of basic inventions excluding those originating in the Soviet Union, the sum of:

(a) the patents of domestic origin filed in each of the five major issuing countries, called "Dom" (first five horizontal columns);

(b) the number of patents claiming priority in one of the so-called "other countries" such as Switzerland and Netherlands and filed in the most popular country of filing, namely United Kingdom, designated "Dom" for the sixth horizontal columns—i.e., labelled REST (in UK):

(c) 40% of the nondomestic filings in France, representing approximately the unaccepted applications filed in one or more of the other major issuing countries and never published by any of them. These values are represented in Table III(A) by "Fr."

Thus referring to plastics patents for example, it is known from the values in Table II from the first horizontal or "plastics" column that the numbers of patents of domestic origin on patents published in U. S. A., UK, Germany, Japan, and France is 40.5, 12.9, 12.4, 31.8, and 10.0, respectively. The total will represent the total number of plastics patents likely to be published in all countries where examination for novelty takes place, with the exception of Soviet Russia which is outside the scope of this consideration, and with the exception of patents originating from "other countries" which, as explained above, is taken to approximate the "other country" priorities in United Kingdom, which from Table II for plastics is 8.9 per week. To this must be added specifications issued in countries like France, Belgium, and Netherlands, and rejected or abandoned in other countries. This may be calculated as being approximately 40% of the French filings from abroad—i.e., 9.1 from U. S. A., 2.3 from UK, 4.5 from Germany, and 2.6 from other countries. The over-all total is 135 basic patents on plastics per week. The figures are probably a little low bearing in mind the rather limited definition of plastics.

The values calculated in Table III(A) are represented graphically in Figure 7. In some respects Figure 7

represents the relative inventiveness of the different countries, and depicts United States and Japan as being outstanding.

Value of Eliminating "Duplicate" Patents. Referring to the last three horizontal lines of Figure 6(A) it is seen that of the 1433 chemical patents issued weekly in the eight countries under review, only 674 are basic or first-issue patents. By eliminating duplicate filings, patent documentation volume can be reduced to one-third in the case of petrochemicals patents, two-fifths for pharmaceuticals and plastics, but to only a little over one-half in the case of metals.

First Publication Country. The values given in Table III(B) have been derived from private records based on long experience of patent documentation service operation. The values are represented graphically in Figure 8, and illustrate the importance of obtaining rapid information from countries such as South Africa, Belgium, and Netherlands.

F. SUBJECT MATTER SEARCHING

Manual Classification Systems. The conventional method of carrying out subject matter searches into the patent literature is to use one or more of the Patent Office Classifications. These classifications, however, need constant revision as new techniques become popular, and as old become abandoned. Moreover, there is a need for standardization, particularly when searching a file based on specifications from a number of different countries. Now that the International Patent Classification has been finalized in its detailed form, and all countries including the United States will be quoting this Classification as an alternative, there is every hope for international standardization for the future, but it will probably be a long time indeed before various countries adopt the International Classification as their main system.

The main objection to Patent Office Classifications, and particularly the International System, is their complexity. Great detail is required to cater to very subtle differences between apparently conflicting inventions, and this tends to lead to overcoding, especially when applied to everyday retrieval problems directed to technical matters rather than to patent litigation.

Ideally a manual classification should be fairly broad so as to be simple to learn and to apply. By removing duplicate inventions from the search file, as explained under Section E, the total number of new patents published throughout the world in any one year on pharmaceuticals for example will not exceed 5000, or on plastics will not exceed 7000, as can be seen from Table III(A). By dividing each of these subjects into about 300 broad classes, and assuming that any patent will on average be indexed under three to four such classes, any one class will yield less than 100 entries per year even for the complete range of patents on plastics.

By recording each invention in the form shown in Figure 4, and by providing as many copies of the record as there are classes to which the invention is assigned, a manual file can be built up for rapid visual searching based on the actual abstracts themselves. Coding and retrieval are simple since only about 300 broad concepts

need to be dealt with, and assignment to a number of classes can be made without a great deal of trouble in cases of doubt.

Our manual code for patents relating to pharmaceuticals has 12 broad groups as follows:

Basic Group	Type of patent
I	Steroids
II	Antibiotics
III	Vitamins
IV	Natural products and polymers
V	Miscellaneous
VI	Heterocyclics, fused ring
VII	Heterocyclics, mononuclear
VIII	Aromatics (polycyclic fused rings only)
IX	Alicyclics (polycyclic fused rings only)
X	Aromatics and alicyclics (mono and bicyclic only) and aliphatics
XI	Processes
XII	Therapeutic classification

Each basic group is suitably subdivided. Thus Group VIII is subdivided as follows:

This group includes only those compounds containing more than two carbocyclic rings fused together, at least one of which is six-membered with three conjugated double bonds (or quinone derivatives thereof). Mono- and bicycloaromatic compounds are coded in Group X.

Code	No. of rings	Carbon atoms per ring
VIII-A	6	General
VIII-B	5	General
VIII-C1	4	6:6:6:6
VIII-C2	4	General (Except C1)
VIII-D1	3	6: 6: 7
VIII-D2	3	6:6:6
VIII-D3	3	General (Except D1 & D2)

In a similar manner patents on plastics are broadly classified under one of the following 11 groups:

Group	Class of information coded
I	Raw materials
II	Additives used in polymerization processes
III	Natural polymers
IV	Addition polymers
V	Condensation polymers
VI	Inorganic polymers
VII	Compounding agents and solvents
VIII	Testing and analysis
IX	Processes for manufacture of polymers
X	Processing and treatment of polymers
XI	Applications

Group V, condensation polymers, is further subdivided into the following five main groups:

- A. Saturated linear polymers
- B. Unsaturated linear polymers
- C. Phenolic resins
- D. Amino resins
- E. Miscellaneous polymers

Table III. Weekly Number of Basic Inventions Eventually Published as a

(A) Based

Subject	Plastics			Textiles			Pharmacy		
	Dom. ^a	Fr. ^b	Total	Dom.	Fr.	Total	Dom.	Fr.	Total
United States	40.5	9.1	49.6	18.0	2.6	20.6	19.4	4.1	23.5
United Kingdom	12.9	2.3	15.2	6.0	1.0	7.0	7.1	1.3	8.4
Germany (W)	12.4	4.5	16.9	7.3	2.2	9.5	7.7	1.4	9.1
Japan	31.8	...	31.8	18.2	...	18.2	22.3	...	22.3
France	10.0	...	10.0	4.0	...	4.0	8.9	...	8.9
Rest (in U.K.)	8.9	2.6	11.5	6.7	2.1	8.8	10.6	3.4	14.0
Total basic specs.		135			68			86	
Total issued specs.		310			145			213	
% basics/total		44			47			40	

(B) Based First Publication Country

Country	U.S.A.	U.K.	Germany	Japan
No. of 1st. issues	150	70	45	160
Total no. of specs.	255	260	140	230
% 1st issue specs.	59	27	32	70

^a Invention country no limit. ^b Signifies applications of domestic origin. ^c Represents rejected or abandoned applications in examining countries, using 40% of filings in France as basis.

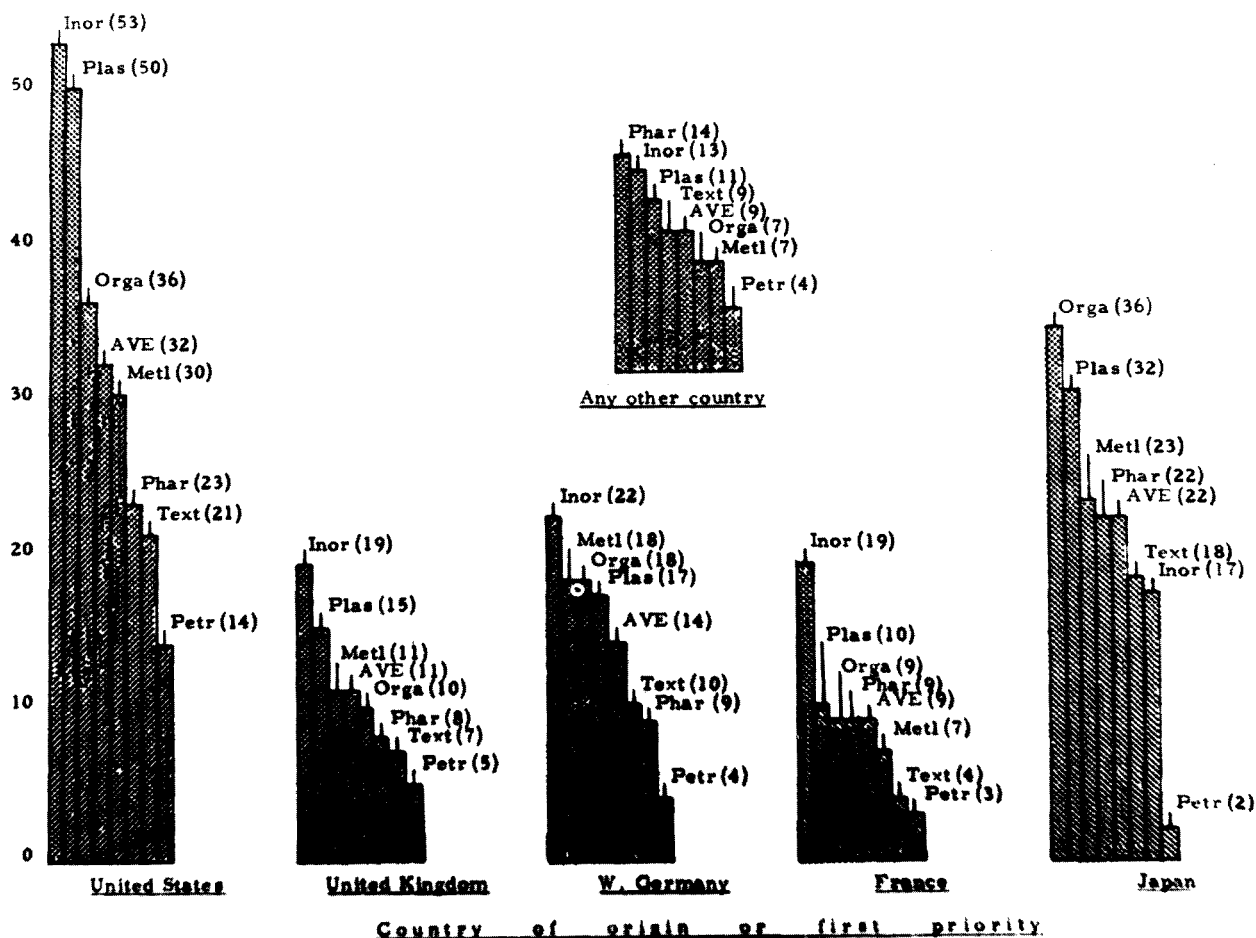


Figure 7. Distribution by country of origin of all chemical inventions on nonduplicate basis eventually published in at least one of eight countries under review.

Showing division into seven subject headings for each country of origin.

Based on Table III values, expressed as weekly averages during 1965.

FOREIGN PATENTS DOCUMENTATION

Patent Specification in at Least One of Eight Countries Under Review

Invention Country

Petrochem.			Organic			Inorganic			Metals			Total
Dom.	Fr.	Total	Dom.	Fr.	Total	Dom.	Fr.	Total	Dom.	Fr.	Total	
11.7	2.4	14.1	31.7	4.4	36.1	48.1	5.2	53.3	26.6	3.0	29.6	227
3.6	1.0	4.6	7.8	2.0	9.8	16.4	3.1	19.5	10.4	1.0	11.4	76
3.6	0.4	4.0	14.2	3.4	17.6	18.9	3.6	22.5	15.3	2.4	17.7	97
2.1	...	2.1	36.5	...	36.5	17.3	...	17.3	23.1	...	23.1	151
2.7	...	2.7	9.3	...	9.3	18.5	...	18.5	6.9	...	6.9	60
1.2	0.4	1.6	4.9	2.2	7.1	9.4	3.4	12.8	5.5	1.4	6.9	63
	29			116			144			96		674
	94			237			271			163		1433
	31			49			53			59		47

France		Belgium		Neth.		S. Africa		Over-all	
95		75		35		45		675	
250		130		90		75		1430	
38		58		39		60		47	

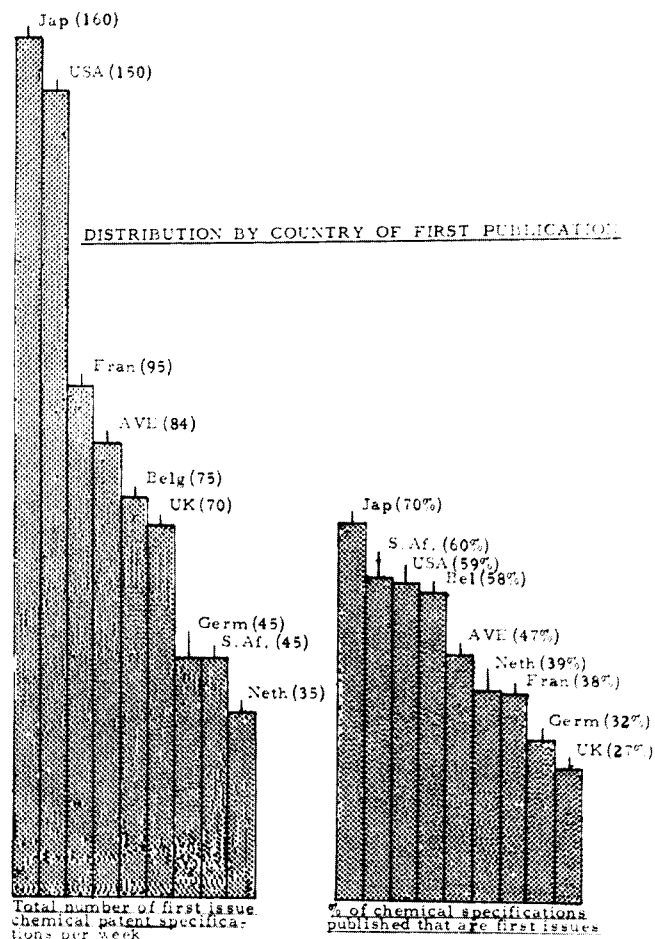


Figure 8. Weekly number of original inventions eventually published as a patent specification in at least one of eight countries under review.

Group V-A, for example, is further subdivided as follows:

Code	Polymer
V-A1	Carbonate or copolymer
V-A2	Urethane or copolymer
V-A3	Urea or copolymer
V-A4	Polyoxymethylene
V-A5	Aldehyde other than A4, or copolymer
V-A6	Alkylene oxide or copolymer
V-A7	Amide from dibasic acid and diamine (Nylon 6-type)
V-A8	Amide from lactam and/or amino acid (Nylon 6-type)
V-A9	Amide other than A7 or A8
V-A10	Isophthalate or copolymer
V-A11	Terephthalate or copolymer
V-A12	Ester or copolymer other than A10 to A11
V-A	General other than A1 to A12, or copolymer

In the Pharmaceuticals Patents Documentation Scheme, known as FARMDOC, operated by Derwent, 318 subgroups are employed, in a generic manual classification based on chemical and pharmacological properties. By using a system of priorities, each patent averages not more than four subgroups, and as many cards are provided as there are subgroups assigned to the patent. Thus from Figure 4, it is seen that for item 17,035, there are three subgroups or classes so that three cards are provided for the manual file.

Based on the experience of three years operation of Farmdoc, it has been found that on this basis only 8% of the individual classes involved more than 110 cards per year. Half of them yielded less than 20 cards per year, and only 1% yielded more than 200 cards per year, with 255 as the maximum.

It is very easy to browse through a manual card such as reproduced in Figure 4. Thus if one were looking for a combination of Group VII-A1 and Group VII-D12, then if one looked through a pile of cards all bearing the com-

mon reference VII-A1, it is only necessary to examine those cards in the pile which also bear the common reference VII-D12. It is even possible to search for manual code combinations by punch card methods or use of a computer, as will be shown later in this Section, in which case only a single batch of cards need be stored, one for each abstract.

The real success of such a manual searching system as used by Derwent is that, since the records are in the form of detailed, eye-catching abstracts instead of mere numbers which have to be tracked down, one can readily afford to search broadly since a reasonable number of false drops is no real hardship. It takes little time to browse through 200 to 300 entries set out pictorially in a standard manner, and it is possible in this way to look for very special features which would not normally be coded for general purposes—e.g., hydrolysis by means of dilute alcoholic hydrochloric acid.

Another type of manual classification is by means of the four-letter company code and first priority date (top right, Figure 4). A company code file may be set up by gathering together all abstract cards of a given company and, within a given company, arranging the cards in first-priority date order. There is thereby provided a pictorial

view in chronological order of the inventive activity of each company. From such a file it is easy to establish whether a newly published specification corresponds to any existing entry.

Part of the company code file for Abbott Laboratories is reproduced as Figure 9. It is important to note that each entry represents an entirely new invention, any equivalents subsequently published in the patent literature of another country not being included. From such records it is easy to assess the relative patent activity of different companies, and it is from such information that Figure 10 has been prepared. It is interesting to note in Figure 10 that companies with high sales volume rating, such as Eli Lilly, do not necessarily take out a large number of patents. This may mean that patents do not in general justify the money and effort spent upon them, or it may merely be that a few well-chosen and worthwhile inventions leading to marketable products are far better than a large number of small improvements of doubtful inventive merit and of little commercial value.

Another type of manual search file is created by placing together all basic inventions claiming priority in the same country, and arranging the cards in application number order. In the case of the entry in Figure 4, for example,

6959	X-A12, X-B1, X-B2, XH-G1	22.11.61	ABBO
N-ACYLAMINOALKYL-N-CYCLOPROPYLBENZYLAMINES.			
S. A. 62/4769 clg. 22.11.61. (U.S.A.) as 154327.			
Pub. 20.3.63. Abbott Labs.			
6958	VII-D4, VII-D5, VII-E3, X-B1, XH-G1	22.11.61	ABBO
N-AMINOALKYL-N-CYCLOPROPYLBENZYLAMINES.			
S. A. 62/4768 clg. 22.11.61. (U.S.A.) as 154326.			
Pub. 20.3.63. Abbott Labs.		SPECIFIC NEW COMPOUNDS	
12.657 (Prov. F.410)	VII-E1, XH-A1, XH-A2	14.11.61	ABBO
3-NITRO-2-ISOXAZOLINE			
Aus. 23338/62, clg. 14.11.61 (USA)		EXAMPLE	
Abbott Labs.			
989 (Prov. F.470)	X-A2, XH-H1	30.10.61	ABBO
3-AMINOPROPANESULPHONIC ACID AND SALTS THEREOF			
U.S. 3,048,000, clg. 30.10.61. (USA) as 148685		2 weeks on this diet with addition of (a) nothing	
Pub. 4.11.63 Abbott Labs.		(b) 2% taurine (c) 0.1% Na salt of I (d) 0.5% of Na	
6464	VI-A2, VII-D4, VII-H, VIII-D2, X-B4, XH-G1	27.10.61	ABBO
CYCLOC 2-PROPYNYLAMINES AS MONOOXIDE OXIDASE INHIBITORS			
S. A. 62/4932 Clg. 27.10.61 (USA) as 148661		SPECIFICALLY CLAIMED	
Pub. 23.4.63 Abbott Labs.		Z A R R	
11.133	I-B1, XH-G4	27.10.61	ABBO
ISOPRENE DERIVS.			
U.S. 3,124,572, clg. (Non-Con.) 27.10.61 (USA) as 148,030		R' = CH ₃ OH or COOH	
Pub. 10.3.64 Abbott Labs.		R' = H or -COCH ₃	
8274	VII-A1, XH-A2	19.10.61	ABBO
5-NITRO-1-FURYLAMIDOXIME-ANTIFUNGAL AGENT			
U.S. 3,097,214, clg. (Non-Con.) 19.10.61 (USA) as 148,366		PREPARATION	
Pub. 9.7.63 Abbott Labs.		H ₂ NOH, HCl KOH/EtOH	
8177	VII-A1, VII-D12, XH-A1	19.10.61	ABBO
NITROFURYL PYRIMIDINE DERIVS.			
U.S.P. 3,096,332, clg. (Non-Con) 19.10.61 (USA) as 148,364		Typically I (R ₄ Me) used in concn of 50 ppm	
Pub. 2.7.63 Abbott Labs.		PREPARATION	
NEW			
Cpds. of the general formula:-			
R = 1-4C alkyl, CF ₃ , CBr ₃ , Cl, or CCl ₃			

Figure 9. Company code file.

Figure 7: Company code inc.

Cards are arranged in first priority date order to give chronological record of all inventions of one company.

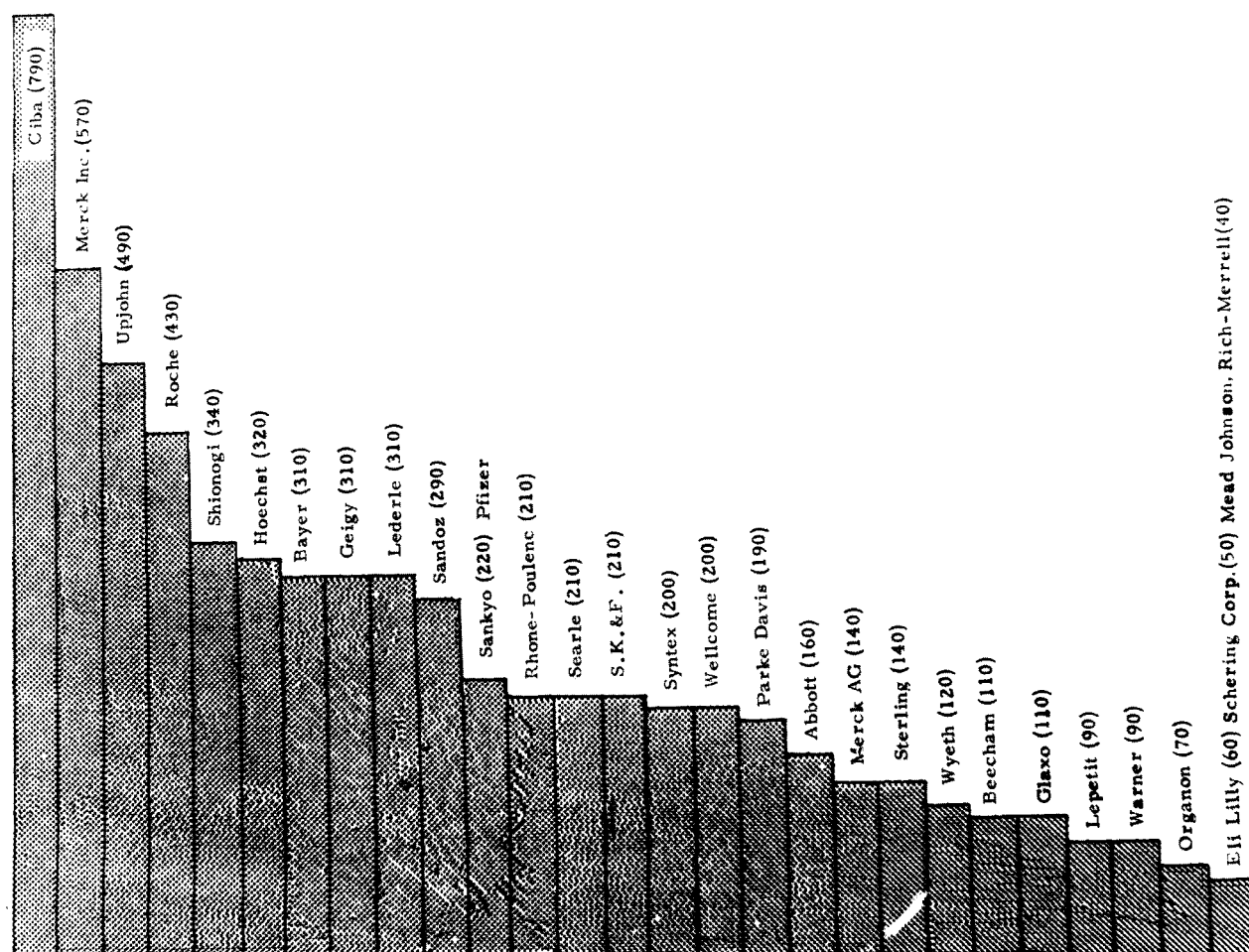


Figure 10. Relative numbers of basic inventions patented by some leading drug manufacturers.

Figures correspond to actual number of basic inventions attributed to each company to Sept. 1965 in Farmdoc scheme.

the card would be placed in the Japanese priority date file, and its position would be governed by the application number 43901/62. If a newly published specification were to claim Japanese priority, then one would look through the Japanese priority file, and if the original application number happened to be 43901/62 then it could be deduced that the new specification corresponded to the invention claimed in basic patent No. 17035. This could readily be verified by comparing the new specification with the abstract and other entries on the file card.

Manual file cards such as listed above are most conveniently provided on IBM cards, since these have excellent handling qualities, are of a universal standard size, are readily housed in cabinets obtained from data processing dealers, and can also be punched if desired to perform a dual function.

Punch Card Code with Machine Sorter. GENERAL PRINCIPLES. For our retrieval purposes, each of the 960 positions on the IBM card has a specific meaning. Should the 960 positions not suffice the requirements of the code, then the number may be increased when used in conjunction with code-type columns. Thus if each punch position in column 1 places a different significance on the punchings in the other 79 columns, then there will be $12 \times 12 \times 79 = 11,376$ different punch positions on the one card. Thus 1/1 may signify that the punchings in columns

2 to 80 are according to a steroid code; 1/2 according to a heterocyclic code; whereas a punch in position 3 of column 1 may signify that the punchings in the remaining 79 columns are according to a peptide code, and so on.

FLEXIBILITY. Whereas it is important not to code too many concepts using a manual classification for fear of assigning too many cards to one patent, this restriction does not apply to a punch card where, with certain exceptions explained below, only one card need be supplied for each invention. For this reason a large number of concepts may be coded and punched into the card. When carrying out a retrieval one has the choice of searching broadly over a few general punch positions only, such as polymerization and ethylene, or of searching very narrowly over very specific punchings, such as polymerization and ethylene and UV light.

PUNCH CARD CODE. This follows the pattern of headings in the manual code. The punchings in any one column form part of the same generic group (all hydrocarbons in column 4, or all esters in column 5) so that search strategy can readily be made narrower or broader. Also, spare punch positions are available for modifying the code, since this is carried out only by addition and never by replacement. Figure 11 shows the general breakdown of columns in the Derwent pharmaceutical patent punch

card code; Figure 12 details the coding of one of the sections—namely, XIII—relating to aromatics; and Table IV shows part of the plastics patent punch card code.

MORE THAN ONE CARD PER PATENT. This is required whenever a number of compounds are to be coded which do not permit of overcoding without grave risk of false

drops—e.g., dichlorodibromomethane and nitrobenzene might give a positive answer for bromobenzene. Fortunately in patents it is customary to deal with one invention only relating to a generic class of compounds, so that, even for the intermediates, overcoding on one card is usually permissible. Another exception is in regard

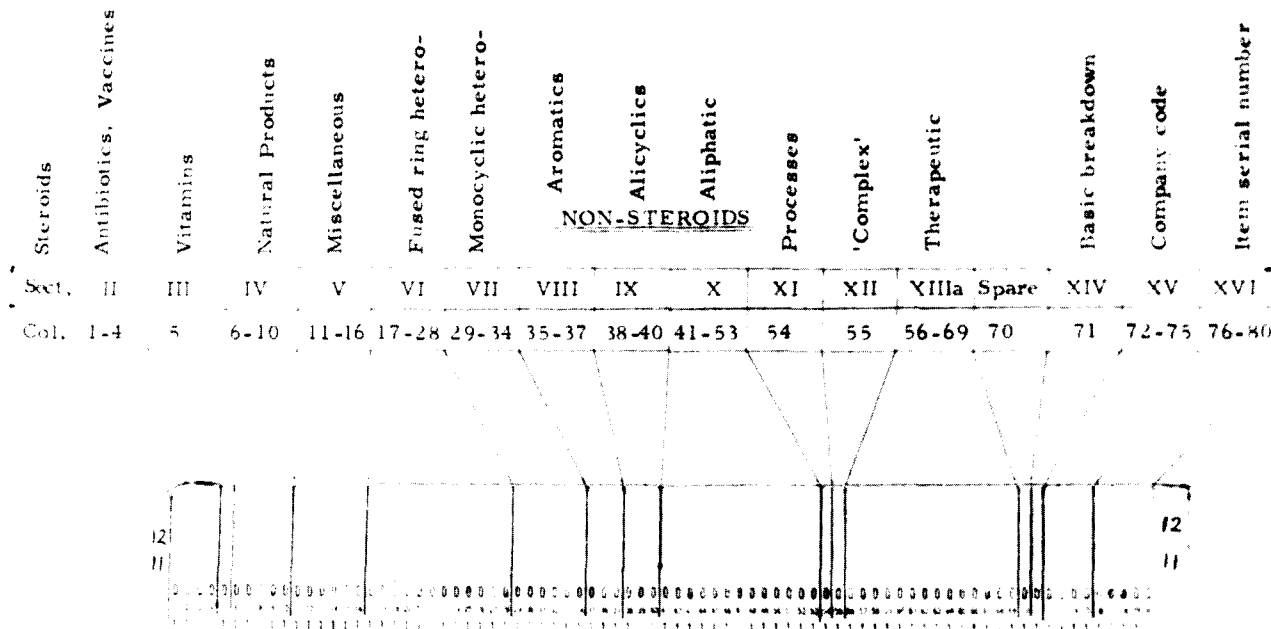


Figure 11. IBM punch card code for drugs.

Rings in group	C. per ring	Formula	Rings in group	C. per ring	Formula	Rings in group	C. per ring	Formula
COLUMN 35			COLUMN 36			COLUMN 37		
12	>6	All rings six-membered General	3	6 : 6 : 7		2	6 : 6	
11	>6	Others General (Excluding 35/12)	3	6 : 6 : 7	Others	2	6 : 6	 (quinones see 37/12)
0	5	6:6:6:6:6 General	3	6 : 6 : 6		2	6 : 6	
1	5	6:6:6:6:6 General (Excluding 35/0)	3	6 : 6 : 6		2	5 : 6	
2	4	6:6:6:6:7 General	3	6 : 6 : 6	Others (Excluding 36/0 & 1)	2	5 : 6	
3	4	6 : 6 : 6 : 6	3	5 : 6 : 6		1	6	
4	4	6 : 6 : 6 : 6	3	5 : 6 : 6	Others (Excluding 36/3)	Aromatic General		
5	4	6 : 6 : 6 : 6 Others (Excluding 35/3 & 4)	3	<5 : 6 : 6	General	Gem-aromatic system Ar Present (attached to two aromatic C)		
6	4	≤ 5 : 6 : 6 : 6 Others	2	6 : 8	General	Three or more aromatic carbocycles present in molecule		
7	3	6 : 7 : 7 Others (Excluding 35/8)	2	6 : 7		Two aromatic carbocycles present in molecule		
8	3	6 : 7 : 7	2	≤ 4 : 6	General	One aromatic carbocycle present in molecule		
9	Bis-compounds (column 35 only)		Bis-compounds (column 36 only)			Spiro aromatic group present		

Figure 12. Detail of coding of Section VIII, aromatics.

Aromatic refers only to carbocyclic systems (mono-, polycyclic, or bridged) containing at least one six-membered ring with three double bonds (and quinonellike derivatives thereof, which are given the parent "aromatic" system coding).

FOREIGN PATENTS DOCUMENTATION

Table IV. Part of Plastics Punch Code

Materials

Polymer types: Linear polymers with saturated carbon-carbon chains and containing only C with or without H, O, S, N or halogen only

Polymers derived from:

41/720	Aliphatic hydrocarbon monomers containing a single ethylenic double bond OR compounds liberating aliphatic saturated hydrocarbon radicals	
41/42/683/721	Diazo compounds	
41/42/43/683	Diazomethane	Forming polymethylene
41/42/44/683	Diazoethane	Forming polyethylidene or polyethylene-1,1
41/42/45/683	Others	
41/46/722	Aliphatic (including cycloaliphatic) hydrocarbon monomers containing a single ethylene double bond	
41/46/47/723	Ethylene	
41/46/47/48	Density not greater than 0.935	i.e., Low and medium density)
)To be used for the homopolymer only
41/46/47/49	Density greater than 0.935	
41/46/50	Propylene	
41/46/51	Butene-1	
41/46/52	Isobutylene	
41/46/698	4-Methyl pentene-1	
41/46/53	Others having branched chains	Includes olefines having two substituents on the α -carbon atom
41/46/54	Others	Includes cycloaliphatic hydrocarbon monomers

to properties. Thus if benzoyl peroxide is claimed for use as an accelerator, and methyl mercaptan is stated to be an inhibitor, the use of a single punch card to record both these facts could result in benzoyl peroxide being picked up as a false drop in a search for inhibitors.

PRESORTING AS AN AID TO RETRIEVAL. In order to cut down retrieval time and to save unnecessary usage of the punch cards, it is preferable to presort the cards into files of manageable size—e.g., steroids, heterocyclics, peptides, etc. When column 1 has been used to define the type of punchings in the remaining 79 columns, this presorting may in fact be carried out mechanically. It is customary to provide all the cards of a particular deck with a specific color edge.

FALSE DROPS. Inherent in most codes is the possibility of incorrect answers being obtained. These can be due to several causes. Thus a search for a chemical structure may give answers to another compound of which it is a partial structure or there may be "directional" false drops as explained above. If a search yields no false drops whatsoever, then there is always a strong suspicion that the search parameters have been chosen too narrowly with a risk that relative material may have been omitted. For this reason it is advisable to search sufficiently broadly to permit some false drops at least. By having the abstracts printed on the punch cards it is quite convenient to tolerate a relatively large proportion of false drops since these may readily be spotted in the machine room. The coding of the question in as broad terms as possible is the principle behind the choice of search parameters. In this connection one should search for groups of compounds rather than for individual substances—e.g., search for catecholamines rather than adrenaline. Similarly it is preferable to search for groups or types of substituents rather than individual groups—e.g., search for halogens rather than just for a chloro compound. The introduction of negative search terms is a dangerous procedure and should be avoided if possible.

PUNCH CARD SORTING MACHINES. Operation with the single column punch sorter, such as IBM 082, is rather slow, requiring passage of cards through the machine more than once. In order to save time and expense, searches should be conducted so that the least likely punch positions (those with the lowest occurrence) are searched first. Once a deck of cards which partially satisfies the search requirements has been obtained, these are then passed through the machine and examined for a second search position. The process is continued until a deck of reasonable size is obtained to permit visual examination. Such a deck may be greater where abstracts are carried on the cards instead of mere accession numbers. A machine capable of searching simultaneously for logically related terms is the multicolumn IBM 108 punch card sorter. Plugboard wiring establishes the logical interrelationship between terms. It is possible to carry out four to eight searches simultaneously, the IBM 108 having a capacity of 80 relationships. Each positive, negative, or alternative search term, as distinct from punch positions, is one relationship.

SEARCH EXAMPLE USING SINGLE-COLUMN SORTER. Considering the case where all references are required to du Pont (1/12, 1/1) patents dealing with the polymerization (2/12) or purification (2/11) of aralkyl thiocyanates (8/2, 12/3) or alkyl thiocarbamates (8/3, 12/4), the search logic would be—

$$1/12 + 1/1 + (2/12 \text{ or } 2/11) + (8/2 + 12/3) \text{ or } (8/3 + 12/4)$$

- (1) Search on column 1, and collect all cards falling in box No. 12.
- (2) Resort the cards from (1), but closing box 12.
- (3) Sort cards on column 2, retain cards collected in boxes 12 and 11 for further sorting.
- (4) Search the cards from (3) on column 8, retaining those collecting in boxes 2 and 3.
- (5) Search the cards from box 2 in (4) above, for column 12, retaining those falling in boxes 3 and 4.
- (6) Search the cards from box 3 in (4) above, for column 12, retaining those falling in boxes 3 and 4.

The searching procedure is stopped whenever the operator feels that the cards obtained are of a suitable number to permit visual searching. Thus, if at stage (4) there are only 12 cards, there is little point in searching beyond this point by machine.

MULTICOLUMN SORTERS. With this machine it is necessary to run the cards through only once. The machine will not cater for such a complex search strategy directly, but two machine questions will have to be posed (these can, however, be run simultaneously):

(i) $1/12 + 1/1 + 2/12 + (8/2 + 12/3)$ or $(8/2 + 12/3)$

(ii) $1/12 + 1/1 + 2/11 + (8/2 + 12/3)$ or $(8/3 + 12/4)$

This illustrates how a written question may break up into several machine questions. This is always necessary when there is more than one variable term in the search strategy—e.g., $A + (B \text{ or } C \text{ or } D) + (E \text{ or } F \text{ or } G)$.

The card sorter is not able to distinguish between the "or" terms in the first set of brackets and those in the second set. If all were coded as alternatives the machine would regard the question as:

$$A + (B \text{ or } C \text{ or } D \text{ or } E \text{ or } F \text{ or } G)$$

and $A + B$ and $A + E$, for example, would incorrectly satisfy the enquiry. It is therefore imperative that the sorter is wired to give unambiguous search strategies, and this written question would have to yield three machine questions:

(1) $A + B + (E \text{ or } F \text{ or } G)$

(2) $A + C + (E \text{ or } F \text{ or } G)$

(3) $A + D + (E \text{ or } F \text{ or } G)$

Punch Card Code Using Computers. The punch card sorter method has many disadvantages. As the file builds up in size, storage and handling become problems. Also, the cards can only be passed through the sorter a limited number of times before becoming worn to the extent of needing replacement. Moreover, unless all of the cards are absolutely flat and in perfect condition, especially as regards moisture content, individual cards are liable to foul the machine and cause wreckage to a whole pile of succeeding cards. Above all, at normal sorting speeds of the order of 650 to 1000 cards per minute, single-column sorters require uneconomically long search times. Even multicolumn sorters of the 108 type will only sort at 1000 cards per minute, but will of course permit of many columns being searched at one pass, and more than one search at a time. Search times are still very long, and a 108 sorter will cost the equivalent of \$400 per month on a rental basis. For this reason more and more documentalists are transferring their punch card records onto magnetic tape or discs for retrieval by computer methods.

For any set of punch cards having any number of punchings per column, it is possible to place the records onto magnetic tape for computer retrieval. If the popular IBM series machine is used, this must be provided with

a column binary feature. The same card-to-tape program will also apply to the newer IBM 360 series machine operated in "emulator" mode provided the equipment is provided with the 1401 compatibility feature. The card-to-tape program will not normally depend upon the details of the punch card code employed. Thus Derwent uses three different codes for its pharmaceutical patents, pharmaceutical literature, and plastics patents punch cards, yet the same program suffices for updating and searching for all three systems. The program would also be expected to work for any in-house 80-column punch card code using the same type of multiple punchings.

It is outside the scope of this article to go deeply into the various aspects of computer operation as applied to information retrieval. In order to gain a clear insight into the principles involved, and the possibilities available, a short description will now be given of operation with the most popular of present-day computers, the IBM 1401 of around 12K memory, provided with the column binary feature. The remarks apply equally to the newer 360/30 or 360/40 machines run in "emulator" mode provided these are fitted with the 1401 compatibility feature. To add clarity to the remarks, the search will be illustrated with specific reference to the search example given above. This called for all references to du Pont (1/12, 1/1) patents dealing with the polymerization (2/12) or purification (2/11) of aralkyl thiocyanates (8/2, 12/3) or alkyl thio-carbamates (8/3, 12/4). The search logic for computer retrieval will be the same—namely, $1/12 + 1/1 + (2/12 \text{ or } 2/11) + (8/2 + 12/3) \text{ or } (8/3 + 12/4)$.

On the 1401 retrieval program as developed by Derwent, planning of the search and preparation of the punched question cards is made simple by the use of the concept of different levels of logic. Column 80 is used to denote a level of logic, and all cards with an 80/1 punch will be examined first; followed in turn by question cards with an 80/2, 80/3, etc. up to a possibility of 80/8 punch position.

The following question cards will be punched for asking this specific question of the computer:

Card 1	1/12	1/1	80/1
Card 2	2/12		80/3
Card 3	2/11		80/3
Card 4	8/2	12/3	80/4
Card 5	8/3	12/4	80/4

All five cards would also bear the same punching indicating the serial number of the search. There would be no cards bearing the punching 80/2 as this is reserved for items which must not be present—i.e., negative quantities in the search strategy.

A 1401 search using the Derwent program follows very closely the mechanism used in a multicolumn machine sorter, but with means for short-stopping a pass, and naturally at far greater speed. Each record on the magnetic tape, corresponding to a single punch card of a coded abstract, is examined successively to ascertain if it fulfills the requirements of the search.

Card one is first presented for matching against the tape record. To make certain that this card is examined first it is given a "1" punch in column 80—i.e., the "mode" punch. If the record does not match the question card—i.e., if both 1/12 and 1/1 are not present together—the record is negative and there is no point in testing any other search cards for a match. Accordingly the computer would present the next record for examination.

However, if card one matches the record then the 80/3 mode cards—i.e., cards two and three—are presented for matching. If card two matches the record, the computer will not bother to examine card three, but will pass straight to cards four and five. If, however, neither card two nor card three matches the record, the answer is negative and the computer will present the next record for matching without bothering to test for cards four and five.

For simplicity the above description refers to the case where only one question is being asked of the computer in a single run. The Derwent program enables up to some 25 questions to be asked at a time on a 1401 machine. If more than one question is being asked, then each record will be examined for all the questions successively before passing on to the next record. During the run, whenever any given record satisfies any given question, the number of the record together with the question number is registered on a separate magnetic tape. At the end of the search run the answers on this separate magnetic tape are sorted into question number order and for each question into record number order.

The outstanding advantage of the Derwent 1401 program is that there is always only one machine run per question, even when there are only either/or descriptors in the search logic—i.e., there does not have to be a "must" or "must not" term present.

Punching of the question cards is very easy because of the concept of different levels of logic, and as many as 25 questions may be searched simultaneously over 30,000 records in less than one hour.

Instead of printing out mere numbers, it is customary on the Derwent system to employ a second tape for printing out an abstract and filing details. This adds but very little to the computer time required, and has the advantage that since the results may be interpreted directly, a reasonable proportion of false drops can be tolerated, so that the search parameters may be chosen more broadly. Also the printout may be passed directly to the inquirer in intelligible form.

Two typical printouts, taken from drug patents and plastics patents respectively, are shown in Figures 13 and 14. The meanings of the various items will be apparent from the description given above with reference to Figure 4.

It is better and far more convenient for groups of firms to use a common updated tape at a data center, employing a large machine such as an IBM 7094, capable of running 100 or more searches simultaneously at very great speeds. Derwent has created such a computer center in London for subscribers to its documentation services. By presenting inquiries in the form of punched question cards, the secrecy risk is reduced to a minimum.

Searching by Means of Index Terms. Index terms are used as descriptors to define the essential features of an article, particularly for retrieval purposes. In an ordinary type of index there is no restriction to the number of index terms to be used, and in some respects the terms used on the last line of each of the entries of Figure 14 may be regarded as being index terms. Such terms when stored on computer tape may be alphabetized to give cumulative index printouts at regular intervals, the list of index terms gradually increasing as time goes on.

In the so-called "Codeless Scanning" technique developed by Roche/Sandoz in Switzerland, the subject matter is divided into a limited number of some 1200 key words or main indexing terms, which themselves are defined and extended with the aid of a thesaurus. A major difference from an ordinary thesaurus is that the

QUESTION NO.	DERWENT PUBLICATIONS LTD.	PAGE	1
07005/E	10-7/1-PIPERIDYL/LOWER ALKYL/-LOWER ALKANDYL-PHENOTHIAZINES USAP 3,962,208 CLG 7.5.58 USAP AS 746,616 PUB 10.3.63 STER 7.7.58 VI-F4 XII-C9 XII-D5,D8 XII-F5		
08651/E	ANTI-HISTAMINE, ANTI-EMETIC, TRANQUILLIZING PHENOTHIAZINES USAP 3,100,772 CLG 28.9.56 USAP AS 612,881 PUB 13.8.63 AMHP 28.9.56 VI-F4 XII-C10 XII-D5,D6		
08870/E	3-METHYLMERCAPTO-10-7/2-71-ME-PIPERIDYL-2/-ETHYL-1/-PHENOTHIAZINE SAFR 62/2973 CLG 14.7.61 SWIT PUB 28.8.63 SAFR 14.7.61 VI-F4		
09353/E	SUBSTO. PHENOTHIAZINE INTERMEDIATES FOR 10-AMINOALKYLATED PENTAFLUORO-SULPHUR-PHENOTHIAZINES USAP 3,107,242 CLG 11.4.61 USAP AS 102,124 PUB 15.10.63 CHN 11.4.61 VI-F4 XII-C5,C9,C10 XII-D5,D6		
09767/E	10-DIALKYLAMINOALKYL-PHENOTHIAZINES FRAN 1,842,835 CLG 11.9.62 FRAN AS 909,146 DEED 11.9.62 VI-F4		
10414/E	10-7/4-SUBSTO. PIPERAZINYLALKYL/-PHENOTHIAZINE SEDS, ANTI-EMS, -HISTAMINES SWIT 373,043 CLG 15.1.57-15.3.57-25.9.57 FRAN AS 729,532-734100-748031 FRAN 15.1.57 VI-F4 XII-C8 XII-D5,D6 PUB 31.12.63		

Figure 13. Computer printout of piperidiny-phenothiazine patent search.

428802/D PHOTOGRAPHIC STRIPPING FILM OF LINEAR POLYESTER, ESP. P.ETH.TEREPHTHAL,
ON CELLULOSE NITRATE PERMANENT SUPPORT CONTNG ADHESION AGENT
BRIT 976,315 CLG 11.6.62 USAP AS 201566 PUB 25.11.64
EACH 11.6.62 PHOT-STRIP POLYESTER-TEREPHTH CELLULOSE-NITRATE

428817/D TRANSPARENT LAMINATE HEAT/PRESS-DISTORTABLE FLEXIBLE PLASTIC INTERLAY
SANDWICHED BETWEEN RIGID TRANSPARENT LAYERS, LAMINATED IN OIL AUTOCLAVE
AND MOUNTED ON EVACUABLE BAG WITH INNER HEAT-SEALABLE RIBBED WALL ESP.
ENCAPSULATING LAMINATED AIRCRAFT GLAZING CLOSURES
BRIT 976,317 CLG 2.8.62-13.6.63 USAP AS 214360-287632 PUB 25.11.64
PITP 2.8.62 LAMINATE ENCAPSULATION GLAZING AIRCRAFT

428827/D MAGNETIC RECORDING ELEMENT* HIGH ABRASION RESIST., TEAR STRENGTH, BINDER
0.754 MATRIX*2000PLUS M.W. SOLID SOL. THERMOPLASTIC COPOL. UP TO 50%
VINYL ALC. WITH VINYL ESTER, HALIDE, ACETAL OR VINYLIDENE HALIDE. REST
DIISOCYANATE-BASED ELASTOMER
BRIT 976,359 CLG 13.6.61 USAP AS 106272-116761 PUB 25.11.64
MAGC 13.6.61 MAG-RECORD VINYL-ALC-P ISOCYANATE-ELASTOMER

428837/D COPOLYMER LUBRICANT/FUEL ADDITIVE* ANTIWEAR, DETERGENT TREAT OIL-SOL.
OLEFINE COPOLYMER COATING K-CHU GP ESP METHACROLEIN/STEARYL METHACRYLAT
WITH URG. AMINE OR PHOSPHITE
BRIT 976,365 CLG 2.5.61 NETH AS 264248-9 PUB 25.11.64
SHEL 2.5.61 LUBE-ADD FUEL-ADD ACRYLIC-P PHOSPHITE-REC N AMINE-REC N

Figure 14. Computer tape printout of entries on plastics patents.

PEPTIDE	Card No. 106	34857	PEPTIDE	Card No. 104	34311
053/112	00111F		039/247	34672E	
C 'nitrile' o-cyanobenzyl-'C-ester' of diff. 'aminoacid' e.g. <u>glycine</u> -der. limited-use in 'peptide' synth. Australian J.Chem. 18, No.11, 1877-83 /1965/ Stewart F H C /Parkville, Austr./ Condensation Experiments with the o-Cyanobenzyl Esters of Some Amino Acid and Peptide Derivatives.			B tetradeca'peptide' biosynth. by 'trypsin'-act. horse-plasma-globulin E pharmacol.act. cf. 'angiotensin' use as 'peptide-hydrolase' renin- substrate Arch. Exp. Pathol. Pharmacol. 251, No.2, 173-74 /1965/ /Ciba/Montague D, Rintjer B, Brunner H, Gross F /Basle, Switz./ Synthetisches Tetradecapeptid als Reninsubstrat.		
056/670	00132F		039/253	34678E	
P deca'peptide' pepsitensin isol. from cattle 'pepsin' demonstration E struct. and 'sympathomimetic'-act. = valyl-5-'angiotensin'-I rat Biochem. J. 97, No.2, 540-46 /1965/ Franke de Fernandez M T, Paladini A C, Delius A E /Buenos Aires, Arg./ Isolation and Identification of a Pepsitensin.			P 'histamine' cf. 'animal-substance' gastrin /Leo/ cf. gastrin- analogue-tetra'peptide' influence on 'gastric-secretion' cat Arch. Exp. Pathol. Pharmacol. 251, No.2, 181-82 /1965/ Sewing K F, Born G V R, Vane J R /London, Eng./ Differences in the actions of histamine, gastrin and a related tetrapeptide on gastric secretion in cats		
056/674	00136F		039/258	34683E	
M 'antibiotic' bacilysin isol. and purification from 'bacterium' C 'Bac. subtilis' possible 'peptide' struct. Biochem. J. 97, No.2, 573-78 /1965/ Rogers H J, Newton G G F, Abraham E P /Oxford, Eng./ Production and Purification of Bacilysin.			B 'peptide' isol. from 'blood'-serum kininogen containing 'kinin' P 'peptide-hydrolase' -carboxypeptidase-A 'pancreas' pancreatic kallikrein 'trypsin' cattle Arch. Exp. Pathol. Pharmacol. 251, No.2, 187-88 /1965/ Habermann E /Wuerzburg, Ger./ Isolierung, pharmakologische Eigenschaften, Strukturaufklaerung und Spaltung peptischer kininliefernder Fragmente (PKF) aus Rinderserum-Kininogen.		
108/364	00225F		090/344	34780E	
B 'bradykinin' = BRS 640 /Sandoz/-act. 'kinin' kallidin = KL 695-act. P cf. 'histamine' 'peptide' eleidoisin = ELD 950 influence of bradykinin-potentiating-factor from 'scorpion' venom of 'zoology' Bothrops jararaca Experientia 21, No.10, 607-08 /1965/ Graeff F G, Ferraira S H, Corrado A P, Rocha e Silva M /E.S. Paulo, Bras./ Potentiation of the Cerebral Vascular Action of Bradykinin by the 'Bradykinin Potentiating Factor' (BPF) in the Dog.			A 'angiotensin'-det. by 'serology' displacement of 'iodine'-labeled- angiotensin from comb. + 'antibody' to 'polymer' 'peptide' poly-L-'lysine'-angiotensin -'complex' Circulation 32, No.4, Suppl. II, II-167 /1965/ Page L B, Haber E, Lagg S /Boston, Mass./ Specific Immunochemical Method for Quantitative Determination of Angiotensin.		
169/536	00309F		128/313	34805E	

Figure 15. Index card on the term "peptide."

number of indexing terms is kept to a minimum, synonyms being reduced to one preferred standard term wherever possible to give uniformity of retrieval.

Where appropriate synonyms cannot be found, then free-terms are used. A brief abstract or heading is provided for each entry, such as the entries shown in Figure 15, where each term in inverted commas and underlined is an index-term, the others being free-terms. An abstract may have several indexing terms associated with it, and for any given indexing term cards may be prepared' at

intervals listing the main features of all abstracts incorporating the given index-term. In this manner a set of manual searching cards is built up for rapid scanning, not requiring the searcher to have any knowledge of coding. The typical card shown in Figure 15 is for the term Peptide, and relates to references from drug literature.

All the information contained on an index card such as Figure 15 can be transferred to magnetic tape for computer retrieval. Also taped information of the type

given in Figures 13 or 14 can be searched. All the terms, whether free-terms or index-terms, and also company code and convention details, are searchable on magnetic tape. The results may be printed out not merely as numbers but as full citations. Thus the tape used to print out from a punch card search is itself searchable on a word basis.

The principle used in computer term searching is similar to that for an ordinary punch code, except that actual words are punched into the search cards instead of coded positions; and the records similarly are actual words, so that a code need not be used.

Thus, comparing with the example given above, in a term search the question cards would be punched

Card 1	DUPO	80/1
Card 2	POLYM	80/3
Card 3	PURIF	80/3
Card 4	ARALKYL THIOCYAN	80/4
Card 5	ALKYL THIOCARBAM	80/4

In order to obtain matching, it is important to use standardized language and always the same synonyms; hence the reasons behind the Codeless Scanning concept. It is to be noted also that parts only of a word may be searched.

POSTGRADUATE COURSE AT UNIVERSITY OF TENNESSEE

The postgraduate training program of science librarians at the University of Tennessee Medical Units is among the very first ones approved by the National Library of Medicine. Its objective is to develop one of the several types of personnel capable of and interested in providing the all important link between the exploratory work in progress and the growth of already recorded information.

Using a novel approach, the trainee is assigned to the research team of a competent scientist, and serves as a liaison between the investigator at the laboratory bench and the pertinent resources of published disclosures. The trainee's intimate exposure to the atmosphere of the research laboratory should provide him with a better understanding of the scientist's needs in terms of library service. He is in a unique position to cooperate in the development of most authoritative and much needed systematic and comprehensive surveys, in a specific area of research, which the scientist would not be in a position to compile otherwise.

Taking into account both the candidate's interest and his scientific background, selection of a major field and one or more minor fields will be made; care will be exercised to have the training in the major area effectively supported by an appropriate choice of ancillary subjects. Next, a *major professor* and *minor professor(s)* will be selected to serve as intimate collaborators with the trainee. Subsequently, a specific program of study, including course work and research collaboration, will be established between and among the *major* and *minor professors* and the trainee.

The trainee will be guided by his research scientist colleagues into assisting with two general aspects of library and information use: (a) exhaustive bibliographic treatment of specific areas of research, and (b) exploration, evaluation, and development of procedures for literature search as well as for information storage and retrieval suited for the day-to-day operation of a research laboratory, utilizing up-to-date tools and methodology.

Through the normal close collaborative function of the various laboratories, departments, institutes, and the library, it is expected

that the interdisciplinary utilization of science information can be stressed, thus leading the trainee to appreciate the necessity for devising efficient methods of intercommunication. It is expected that the trainee will become an integral part of the working research team, at once stimulating and in turn being stimulated by his scientist colleagues.

Applicants seeking admission to the Program must hold the degree of Master of Science in Library Science, or its equivalent, from an appropriately accredited institution. Those holding *also* an undergraduate or graduate degree with a major in one of the physical or biological sciences will receive preferential consideration. Qualified candidates should write to: Dr. Andrew Lasslo, Professor and Chairman, Department of Pharmaceutical and Medicinal Chemistry, University of Tennessee College of Pharmacy, Memphis, Tennessee 38103.

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The San Francisco Bay Region Chapter of Special Libraries Association will publish in April *Acquisition of Special Materials*, a compilation of lectures presented by experienced special librarians at a "continuing education" series held at the University of California in Berkeley. The 200-page volume will sell for \$5.75.

The lectures comprise a guide to recent developments, methods, and sources in the acquisition of difficult-to-acquire or unusual materials. These include government documents, serials, maps, technical reports, trade literature, specifications, standards, conference and symposia announcements, programs and proceedings, foreign materials and patents, translations, out-of-print titles, microtext, interlibrary loans, and photocopies in lieu of loans. Orders should be sent to: Mr. Joseph R. Kramer, San Francisco Bay Region Chapter, Special Libraries Association, P. O. Box 1184, San Carlos, California 94070.