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Patent Searching in a Large Electrical Company, as Exemplified by the Situation at Siemens

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Summary

This article does not deal with patent databases, retrieval systems or hardware and software facilities available to search engineers. Rather, the different types of patent searches required in an industrial company are discussed. In order to supply this retrospective patent information so as to satisfy the needs of the company, effective communication between the patent engineers and search engineers is required. The basis for such effective communication is familiarity with the possibilities and difficulties of patent and search work, which is obtained by training and co-operation. Together with improved access to patent documents such co-operation, in which outsourcing also plays a role, will tend to enhance the significance of retrospective patent searching.

Introduction

In an earlier contribution, 'Patent Information in a Large Electrical Company, Exemplified by the Situation at Siemens'[1], the present system, and also future developments of current patent information, i.e. on new patent publications, were outlined with reference to fundamental concepts of patent information and the role played by the patent department in the use of patent information. The present contribution deals with retrospective patent searching. The basis for retrospective patent searching is formed by all the patent documents published by states having a patent system, and also information derived therefrom, e.g. in the form of patent databases. Classified patent search files are available in patent offices and patent libraries in the form of paper, aperture cards and CD–ROMs and are used by our search engineers. In-house classified patent search files would be excessively large on account of the extremely high diversification of the global technical activities of Siemens; such search files are not maintained for these reasons.

Fig. 1. The seeker is a finder.

The procurement and use of patent information are of vital importance in modern management on account of the plethora of technical information published in all countries, but also on account of the grave risks involved as a consequence of patent infringement. However, procurement and use are preceded by searching. The Persian characters in Fig. 1[2] express this in the aphorism, also known in other languages and cultures: 'The seeker is a finder'. But before a successful result is obtained there must be a search, which involves effort and expenditure and demands diligence and professional competence. Differentiation is made between various search categories.

Search categories

1. *Name search*

The name search is the type of search which has benefited most from the availability of modern patent databases. The name, for example of an inventor, is a comparatively clear and unique

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selection criterion. Of course it is necessary to be familiar with the ways names are indexed in various databases, e.g. handling of given names, umlauts and compound names. These are, however, no great problem for the professional. Searches for companies as patent applicants or assignees are somewhat more complex, as company names frequently vary from country to country, and company names can change over the period of time covered by a search, or on account of acquisitions and mergers. But these searches can be carried out relatively quickly and precisely in spite of these complicating factors.

2. *Name/substantive search*

This search type is closely related to the above type and aims at finding the patent portfolio of an applicant or assignee, generally a large company, in a given technical field. Problems may be encountered during selection of the documents belonging to the technical field in question when these cannot be defined by classification or clear-cut technical terms. As the name/substantive search relates only to the patent portfolio of one applicant or assignee and is thus generally part of a relatively small data pool, such searches are normally relatively simple and quick to perform. Greater difficulty is encountered with the next category, in which the search is not limited to an applicant or assignee.

3. *Substantive search*

The goal of a substantive search is to find all the patent documents belonging to a given technical field. An optimum result is achieved when all the patent documents belonging to a technical field are retrieved — without missing a single document — and without the results containing any false hits or noise documents. This is, however, the ideal case; in practice, the searcher will attempt to come as close as possible to such a result. Whereas in the field of chemistry highly specific selection means based on chemical composition and structures have been developed for searches in patent databases, in the non-chemical fields, e.g. particularly electrical engineering and mechanical engineering, only the International Patent Classification, database-specific classification systems and technical terms from titles and abstracts are available for searching. The images now also available in patent databases are not an automated selection tool but enhance and accelerate the intellectual selection process, which is frequently necessary after a database search and which was limited to the contents of title and abstract prior to the availability of images.

Common features of categories 1–3

The end user of the search categories 1–3 is mostly the engineer in research, development, manufacturing or sales. The search results are generally delivered in the form of patent documents, as these disclose the complete information in specification, patent claims and drawings. The search results also represent a form of 'competitive intelligence'. The results of search categories 1 and 2 serve to provide a retrospective view of the activities of competitors, whereas the results of substantive searches as search category 3 provide a retrospective view of innovation activity in present or potential business fields of Siemens. In the two following search categories the results are required directly by the patent engineer to facilitate fulfilling the obligations entailed in dealing with the patent matters of the company entities for which he or she is responsible. The categories are as follows:

4. *Search for opposition material*

This is understood to mean searches for prior art relevant for assessment of the legal validity of patents or utility models. Such prior art includes documents, also non-patent documents, suitable to substantiate opposition, appeal, revocation action, for out-of-court disputes on the legal validity of a patent or utility model or action for deletion of a utility model from the register. Of course, the resources employed for a search will depend on the significance of the individual case. In an opposition search to satisfy a vague requirement to keep a given technical area free from third party rights, time and costs will be kept considerably lower than in a search for material to substantiate revocation or nullity action in the event of an infringement with high exposure. A positive search result in the above cases must provide a basis for attacking the novelty and/or inventiveness of an alleged invention. This means, of course, that the search engineer must also be familiar with legal practice in the major industrialised countries with reference to novelty and inventiveness.

Searches relating to inventions of Siemens employees are a special variant of this category. The capacity of the department would be overtaxed by searches to assess the inventiveness of more than 2500 invention reports received annually by the patent department. This is, however, not necessary. The high degree of specialisation of the patent engineers at Siemens assigned to specific organisational entities and the width of experience gained from:

- long-term responsibility for a defined technical field
- processing invention reports
- responding to official action
- conducting opposition procedures
- attending to infringement suits

generally put the respective patent engineer in a position to make a qualified assessment on the suitability of an invention for application. In cases in which this is not possible, a corresponding search is conducted to assess the novelty and inventiveness of the invention.

5. *Collision searches*

Collision searches serve to avoid infringement of third party patents by Siemens products and processes. This can only be effected by identifying relevant granted patents and registered utility models still in force. This is, however, insufficient as pending applications relating to technical apparatus or process features of new products or processes must also be taken into consideration. In this type of search it is not the technical content of the patent document which is of the essence, but the object and scope of the patent claims. Such searches are often complicated by the fact that the patents of a number of states have to be scrutinised, depending on the planned production location and markets. Such searches can only be performed by search engineers having a comprehensive understanding of patent claims and the scope of protection they afford. This serves to enhance sensitivity for possibly relevant patents so that, in case of doubt, the patent engineer is rather provided with a comprehensive search result than too few documents. Collision searches are the most difficult and responsible search category as the economic consequences of a superficial search can be grave.

6. *Statistical patent analysis*

This type of search is also an aspect of competitive intelligence — limited to technical intellectual property rights. Statistical patent analysis has only become feasible since high quality patent databases have become available and the hosts on which these databases can be accessed have provided retrieval systems with commands suitable for statistical evaluation. A particularly suitable patent database for such tasks is, in our experience, *Derwent's World Patent Index (WPI)*, as it combines wide county coverage with high quality titles and abstracts and facilitates assignee searching. Statistical commands used are Memsort on Questel, Get on Orbit and Smart Select on STN.

Statistical patent analysis is essentially based on the formation of a pool of documents in a patent database on the basis of a selection criterion, these documents then being sorted according to one or more selectable criteria, the sorted elements then being counted. There are two main directions, depending on the selection criteria used:

(A) Selection criterion: technical field. Documents/inventions belonging to a given technical field are located and then sorted and counted according to the following criteria:

- competitors
- number of published documents/inventions
- patent countries.

If the development of such figures is traced over a number of years, trends can be recognised.

However, selection problems similar to those in substantive searches are frequently encountered. If the pool of inventions in a specific technical field is incomplete or contains noise documents on account of the selection strategy used, the statistical patent analysis will provide spurious results. This is sometimes the case on account of the inherent limitations of possible selection strategies. In such problematical cases the solution is to employ a broad selection strategy to ensure completeness of the pool found; unsatisfactory precision, i.e. a high noise rate, is then eliminated in a subsequent intellectual selection step. The fact that images are now available for this intellectual selection process in addition to title and abstract will lead to an increase in efficiency and improvement in quality — at higher costs.

B) Selection criterion: competitors. In this case patenting activities of certain competitors are at the focal point of interest. After documents of a competitor have been located these can be evaluated according to

- number of inventions filed
- technological fields of activity
- country spectrum

and also distribution and changes thereof over a period of time. The object of such analyses is to draw conclusions on possible future activities of a competitor on the basis of past filing patterns. Such analyses can make valuable contributions to the benchmarking activities now being carried out intensively: comparison of competitors' patent filing activities with one's own activities. The number of patent applications and the inventions on which they are based can be an indicator for intensity and creativity of research and development; occurrence of patent applications in new fields of technology or disappearance of patent applications from established fields can be an indication of shifts in the technical activities of competitors; changes in countries covered by patent applications can be an indicator for corresponding changes in manufacturing locations or markets. Such comparisons between competitors' activities and one's

own activities can reveal one's own deficits and can give cause for corrective action.

However, due attention should be given to the fact that the possibilities of statistical patent analysis may easily be overestimated. A problematical point is that there is no reliable bibliometrical process which provides a measure for the quality of inventions. Therefore, unfortunately, statistical patent analysis only supplies figures on inventions and applications without providing assessment of the significance of the inventions. It is no great surprise that the value of a key patent can be far greater than the value of a multiplicity of inventions relating to minor improvements.

A further problem is the time delay inherent to patent analyses, caused by the normal period of 18 months between application date and earliest publication. In the case of inventions relating to further developments of an already existing product, applications may be filed only a few days before the beginning of an exhibition at which the product is to be presented to the public. Such patent publications can only be identified, as a rule, 18 months later at the earliest. The situation is different in the case of high-expenditure, long-term research projects in which applications may be filed in the initial phase and then over the entire duration of the project.

Promotion of inventions, filing patent applications and selection of patent countries are significant, but it should not be overlooked that this is only one aspect of the overall complex of entrepreneurial activity. Results from patent analyses are particularly significant when correlated with other economic data.

Delegated end-user searching

There is no doubt that the end user of the patent search knows best what is needed. If opposition is filed against a granted patent, the respective patent engineer is the end user of the search and knows *ipso facto* best which technical features prior art documents must disclose so as to form a basis for a prospectively successful attack on the granted patent on account of lack of novelty or insufficient inventiveness. If the R&D engineer is the end user of a substantive search relating to alternative technical solutions to a given problem, the R&D engineer knows best which alternative solutions are of particular importance.

In spite of this, it is the general practice at Siemens to employ professional patent searchers to perform patent searches. This is because performance of high quality searches requires special professional competence. This competence is the result of thorough training, continuing education, daily practice and sharing of experience with other search engineers in the patent searching department unit. It is not possible and, for economic reasons, not advisable to train the end user to such a level of search proficiency, as the end user is engaged in other professional activities and can only seldom make use of such search capabilities.

However, the fact remains that the end user knows best what is required. This fact can be catered for by establishing close information contacts between the end user and the search engineer during performance of a search.

If the patent engineer is the end user, as is the case in searches for opposition material or collision searches, co-operation is facilitated by the fact that the patent engineers and search engineers at the major locations of the Siemens Patent Department are not only in the same building, but partially on the same floor. As soon as a search request is received, generally in writing, the search can be discussed with the respective patent engineer. The degree of specialisation of the patent engineer is higher, as the number of patent engineers is considerably greater than the number of search engineers. Specialised technical information relevant for the search can be passed on in the course of discussion between the patent engineer and search engineer, focal points for the search can be defined and the significance of the search for the company entity can be discussed so as to assess the resources to be made available for the task in question. During the search, which generally lasts several days, intermediate results can be presented and discussed; the final result will be discussed with the patent engineer in all cases. It is thus not an exaggeration to speak of the formation of a 'temporary team' for important search tasks. Through this close co-operation between patent engineer and search engineer, the search engineer knows exactly what the aim of the search is, whereby the competence of the search engineer comes to bear to the optimum extent.

If an R&D engineer or a strategic planner from the Siemens entity for which the patent engineer is responsible is the end user of the search, the patent engineer then has a liaison function between end user and search engineer. The patent engineer is familiar with the possibilities, difficulties and expenditure necessary for the individual search categories on account of part of his training (as will be elucidated in the following pages). For this reason, the patent engineer will take appropriate action to ensure that patent information as the result of retrospective searches is supplied exactly where and when it is required in the interests of the company. This may be information about technological developments in a certain field or information on development activities of competitors as reflected in filing activity. In our view, the responsibilities of a patent engineer

are not limited to patent attorney functions but are closely oriented to company policy considerations. The patent engineer is informed on strategic goals of the entities for which he or she is responsible, for example development and marketing goals. Achievement of these goals is supported in a number of ways:

- by formulation and implementation of patent portfolio and filing policies
- by creating freedom of action by opposing third party patents
- by taking action against patent infringements,

but also by ensuring that the entities for which he or she is responsible are sufficiently informed on world-wide activities of competitors in the relevant technological fields (inasmuch as such activities lead to patent applications) so as to have a basis for qualified decisions. The patent engineer is thus in an intermediary role in which the patent information needs of the entity are recognised, defined and satisfied in partnership with the search engineer. It is perceived to be an important point that the results of retrospective searches are passed on to the end user in the respective entity by the patent engineer in important cases. The patent engineer's special knowledge of patent law and patent documentation can thus guide interpretation of the results.

Extraordinarily close co-operation and intensive flow of information between end user and search engineer guarantee quality and user orientation of the search results obtained. This is only possible with the right blend of end-user knowledge and professional competence of the search engineer. This is the essence of 'delegated end-user searches'.

Patent searching — an integral part of patent engineer training

Training of patent engineers at Siemens is in the form of in-house training over a number of years generally leading to the European qualifying examination. Within the framework of such training a period of at least one month is provided for in-house training in the field of patent documentation and patent searching. The prerequisites for this training period are fulfilled when the young patent engineer has already processed several invention reports and drafted patent or utility model applications, has responded to several official actions and formulated at least two or three opposition notices. The patent engineer is then familiar with the structure of patent applications, which is of advantage for efficient reading and evaluation of patent documents, has dealt with questions of novelty and inventiveness and knows the fundamental considerations for formulation and modification of patent claims. Moreover, the patent engineer has gained first experience of the entities for which work is performed under the supervision of an experienced colleague. The patent engineer can help these business entities attain their strategic goals through professional advice, frequently on the basis of the results of retrospective patent searches.

During the period of training in patent documentation and searching the young patent engineer is assigned to the patent search department unit. Training is in the manner of 'training on the job', i.e. the patent engineer is trained by performing day-to-day work.

Training begins with an introduction to the basics of patent documentation, whereby the fundamentals are learned, beginning with country codes, kinds of document codes, INID codes, International Patent Classification, *Inpadoc/Epidos* families and patent legal status services and also patent register services. This is followed by an introduction to the retrieval system of a host and a survey of the major patent databases with their contents and structures. We regard it as essential that a modern patent engineer is familiar with documents from the *Derwent World Patent Index* database, the *Inpadoc/Epidos* databases, and also the national patent databases, of which only *EPAT, PATDPA* and the various US patent databases will be mentioned by way of example. The same applies for the most important non-patent database in the electrical and electronics fields, *INSPEC*. During the process of becoming familiar with the major online databases, first of all name or name/substantive searches are performed under the guidance of an experienced search engineer. The trainee patent engineer, in partnership with the trainer, then performs substantive searches and a search for opposition material, whereby the opposition search is generally in the field of the patent engineer, for reasons of motivation. In the case of the two latter categories, the search begins with an online database search but is then continued and verified by a search in a public patent library, as examination of the original documents is regarded as indispensable in such cases. The patent engineer thus also becomes familiar with the advantages and difficulties of searches in classified search files.

A further important point is that the patent engineer also experiences a statistical patent analysis during this training period.

During the training period in the patent searching department unit the young patent engineer is trained by a number of search engineers so that the additional workload involved for the individual search engineer remains at a tolerable level and the patent engineer becomes acquainted with different personal styles of searching, and also gets to know

all the search engineers at the respective location. Experience shows that this is a good basis for later fruitful co-operation. The search jobs performed by the patent engineer during this period are day-to-day work, so that the trainee patent engineer experiences pre-search discussion of the goals of the search as also final discussion of the results on completion of the search. The experience gained by the patent engineer in the temporary role of search engineer has proved to be advantageous; after completion of the training period, the trainee patent engineer changes sides and becomes the party requesting the search.

The training scheme outlined above is not intended to enable the patent engineer to perform his or her own searches. This would not be possible in the short period of time available. Rather, the patent engineer should be made familiar with the facilities, inherent difficulties and, most important, limits of modern patent searching and be put in a position to assess the work and expenditure involved, the patent engineer thus being able to attend to patent information matters for the company entity for which he or she is responsible in an optimum manner. In this context it is an advantage, for example, if the patent engineer is aware of the existence of the database *Litalert* covering patent litigation at US district courts; it can provide a first impression on prior litigation activities or the aggressiveness of a potential opponent at the onset of a patent dispute in the USA.

The patent engineer should also be in a position to answer questions on facilities for finding information on Japanese patents and utility models (also legal status) and to use such information in the course of daily work. In this context, in addition to *WPIL, Inpadoc/Epidos* and *Japio*, an important contribution is made by the Japanese database *Patolis* — with detailed legal status information including prior art cited in grant and opposition procedures.

The search engineer and patent law

The typical search engineer has a qualification in electrical engineering and preferably several years of work experience in the company before commencing training as a patent search engineer, which takes several years. Profound knowledge of search techniques, both online and in classified search files, knowledge of patent classification and good knowledge of English and French in addition to German are important, but still not sufficient for the perfect search engineer. This knowledge and experience must be complemented by a basic knowledge of the patent systems of major patent countries, inasmuch as relevant for patent searching. For example, it is not of relevance for the work of the search engineer to have exact knowledge of the procedure and prerequisites for reinstatement of rights, but it is extremely important that the search engineer is familiar with the practice of the German and European Patent Offices for assessment of novelty and inventiveness. If a search engineer continues a search for prior art to substantiate opposition and fails to recognise that prior art anticipating the invention has already been found, then this is uneconomical. It is necessary for the search engineer to acquire, by way of experience, a feeling for when the combination of documents found is sufficient to substantiate opposition based on lack of inventiveness or obviousness or to limit scope of the claims to a satisfactory extent. The research can then be used as a basis for discussion with the patent engineer. The work capacity of the search engineer is thus utilised to the best extent. It is also a matter of course that a proficient search engineer knows that in USPTO procedures granted US patents not published before, but filed before the date in question, are deemed to be prior art admissible for assessment of patentability. In a search for opposition material against a granted German patent it is important to know that a German patent application filed before, but published after the date in question, is to be taken into consideration during examination as to novelty. In a collision search — as already mentioned — it is necessary that the search engineer has a basic understanding of the scope of protection of a patent as manifested in the patent claims.

The search engineer learns such basics of patent law during training. Consolidation of such knowledge as also keeping abreast of current developments is an ongoing process, achieved by search engineer meetings and by lectures given by the patent engineers. Day-to-day co-operation between patent engineer and search engineer is of decisive importance, as the search engineer develops a fine feeling for questions of novelty and, in particular, inventiveness during discussions on prior art documents for opposition searches. In certain cases the patent engineers inform the search engineers on the contents of opposition notices filed, so that the search engineer sees how argumentation against novelty or inventiveness is formulated on the basis of the 'common' opposition search.

The fact that the search engineer has knowledge in the field of the patent engineer — as has the patent engineer in the field of the search engineer — promotes mutual understanding and renders co-operation more intensive and efficient.

Outsourcing

The searching capacity of the staff is such that it is just sufficient under normal conditions. Unusually high search request intake or loss of capacity

due to absence has to be compensated for by outsourcing. Searches for opposition material are regarded as being suitable for passing on to external organisations. In this category, the technical features to be searched for in the prior art are clearly described in the text of the patent document and defined in the form of patent claims. In the case of all the other search categories it is considerably more difficult and complicated to provide an external searcher with all the information required for successful performance of the search, which makes the in-house 'delegated end-user search' so successful.

Examining patent offices are particularly qualified external search organisations. They are centers of competence for opposition searches; the examiners are experts on the question of novelty and inventiveness and a high degree of specialisation is ensured by the large number of examiners, the examiners thus being highly qualified in their respective fields of examination. Moreover, the examiners have access to comprehensive search files and also access to all the important patent databases.

A preferred partner for such external searches is InterPat Sweden. The Swedish Patent Office is the organisation behind this search service. As we frequently use out-of-house search facilities for opposition to European patents, it is not appropriate to entrust the European Patent Office with these tasks. Several years of experience show that InterPat Sweden supplies high quality, cost-effective searches. The search results come from more than 140 evidently highly-motivated examiners, all having access to online search facilities and much more than PCT minimum documentation. A point worthy of note is that the US patent documents are not arranged in the search file according to the International Patent Classification system but, more appropriately, according to the US Classification system. InterPat Sweden also offers rapid search facilities on request, i.e. within two weeks. In the past we have generally allowed a period of four to six weeks, as our own experience shows that pressure of deadlines is detrimental to the quality of a comprehensive search result. A feature of the searches performed by the Swedish Patent Office we have come to appreciate is categorisation of documents found in three classes of relevance, whereby documents are frequently commented on.

The German Patent Office with more than 600 examiners and specialised search files also has an excellent basis for quality searches. Moreover, the patent information system PATIS now in the introductory phase will serve to improve conditions for search work. It is, however, regarded as a disadvantage that the German Patent Office only supplies a listing of patent documents not arranged under relevance categories or commented on for searches under § 29 Abs. 3 PatG (prior art statement). It would enhance the search service provided by the German Patent Office if, in the case of opposition searches, the documents found were classified according to relevance and, in the best case, even commented on.

In addition to searches outsourced on account of lack of capacity, external searches are also commissioned from one or more institutes in cases of particular strategic importance — for example examination of validity of granted patents in infringement cases — in addition to our in-house search. Experience has shown that in-house search results are at least as good as those received from patent offices in most cases. This may appear surprising in view of the degree of specialisation and the excellent facilities of the patent offices. This phenomenon may be accounted for by a number of factors: extremely high motivation in such cases; close co-operation between the search engineer striving to find the information and the patent engineers working with the information; the lower degree of specialisation of the search engineer as compared with the examiners of the patent office, which has the effect that the search engineers are not biased in a particular direction and are open to technical ideas and solutions from related technical fields.

Outlook

A wave of technical innovations has swept over the patent information and documentation world in recent years. More comprehensive patent databases with lower error rates, more sophisticated retrieval systems, CD-ROM databases, patent documents on CD-ROM, and online availability of significant drawings may be mentioned by way of example. All these innovations are established as instruments and tools of patent searching. But they have not reduced the value of the original patent document as an information medium and have not made patent searching in classified search files completely obsolete.

These modern tools have brought improvements in searching for relevant patent documents but in many particularly important cases, for example searching for detailed information for assessing the validity of granted patents or for collision searches, searching in classified search files is indispensable in addition to online searches. Maintenance of such search files is, however, expensive, involves much work and requires a huge amount of space. In the long term this will lead to considerations as to whether the existence of such search files is justified.

The tendency to terminate production of patent documents on aperture cards is gaining ground

in all the patent offices; this in spite of the fact that aperture cards are a space-saving and comparatively economical way of establishing and maintaining search files.

The weekly patent publications of the patent offices on CD–ROM are only suitable for current awareness services and reproduction of patent documents. The fact that the German Patent Office has decided to issue German, European and PCT first publications classified according to the International Patent Classification on 50 CD–ROMs gives cause for optimism. This will also only be a transitional product. In the long term there is a need for a comprehensive database containing all the major patent documents, for example the BACON documents. Access to facsimiles of original documents could then be provided rapidly and economically at each search location through the data highways which are, at the moment, the subject of animated discussion.

A further consideration. All these technical innovations have not made the competent and qualified patent search engineer superfluous. On the contrary, there is a greater need than ever in this profession for technically competent, dedicated young persons who have the ability to exploit the potential of all these modern facilities to the full and who search with intelligence and persistence and — far from leading an ivory tower existence — deliver exactly the results required by the end user. Patent searching performed to such standards is a task for the future, the results of which can make a major contribution to the competitiveness of our companies and support them in their search of excellence.

References

(1) R. Naetebusch, H.-R. Schoeppel and H. Fichtner, Patent Information in a Large Electrical Company, Exemplified by the Situation at Siemens, *World Patent Information*, **16**, 4, 198–206, 1994.

(2) C. A. Pickover, *Mazes for the Mind: Computers and the Unexpected*, St. Martin's Press, New York, p. x, 1992.