

The Patent Searcher's Dilemma: Where is the Value?

How to Manage Costs Conducting Patent Searching for Competitive Intelligence

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Introduction:

Patent data is an extremely important resource for competitive intelligence in the field of high technology research and development. Finding cost effective and efficient routes to that data is often challenging. A researcher must choose from a broad spectrum of database resources to provide reliable answers. The good news is that there appears to be a trend towards flat pricing of patent database services. The following paper touches on some of the critical issues in making such choices.

Background: Searching IP

Database quality and coverage are the principal challenges of conducting Intellectual Property searches on both free Internet and Commercial databases. Few patent databases are searchable further back in history than 1970, so it would be difficult to find patents by Buckminster Fuller or Nikola Tesla. Another issue is currency: patents commonly change ownership as they are re-assigned when corporations merge, change, or dissolve. Many databases only record the first assignment on the face of the patent as issued in one country, and do not record changes from that date.

The better databases are updated with amended records including changes in status. Patents often become invalid due to failure to pay maintenance fees or through litigation or re-examination. Certain databases, such as INPADOC or Derwent's World Patent Index, maintain status information on members of patent families. Never assume that the records for all countries attain the same standards or include the same data. Bear in mind that the "status letter" codes are all different for every country.

While recent patent data is well covered, databases for design patents, utility models, industrial designs, petty patents, and inventors' certificates are scarce. These lesser forms of protection that are generally based on the appearance of a product are often confused with utility patents. Trademark databases are well developed for US, Canada, Australia, Europe and Japan. The only database of copyrights is that supplied by the US Library of Congress on their webpage at www.loc.gov/copyright/ or through commercial database services such as Dialog.

Searching for Assignees/Patentees/Owners

One of the simplest inquiries an IP administrator deals with is the question "Does XYZ Co. own a patent on this product, and if so in what countries is it valid?" Checking the relevant patent databases may yield a quick yes/no answer regarding registrations under the current corporate name. Unfortunately, answers to questions of assignment and ownership are often more elusive - many large corporations use a wide variety of corporate names. Is the patent owned in Canada by Shell Canada, or Royal Dutch Shell, or Shell Inc.? Is a consortium the assignee of which Shell is a partner? Has the consortium allocated the same patent rights to specific corporations in different countries?

Patents missing from a corporate portfolio may be held personally by the CEO or founders of XYX Co. - if the original inventor started the company he or she could still be listed as patent owner. XYZ Co.'s patents could also be owned by a subsidiary or parent company, or even a numbered company. Check with such corporate directories as the Thomas Register of American Manufacturers, Dunn's Million Dollar Directory, or the Directory of Corporate Affiliations for information on subsidiaries and branch companies.

Most databases only go back three decades, so conducting a thorough historical assignee or inventor search may require going to print indexes such as the Patent Office Record published by CIPO or commercial databases such as IFI Claims.

If a company's patents cannot be found, competitive intelligence sleuthing through newsbases and annual reports may turn up evidence of license agreements indicating that XYZ Co. is using valid patents from other sources such as joint venture partners. Unfortunately, registration of patent licenses are not required in most countries. The better commercial patent databases such as Lexpat and IFI Claims Reexamination/Reassignment indicate changes in patent ownership. Sometimes re-assignments of patent rights are not properly registered. In Canada manual checking of CIPO records is required.

Often patents are missing because they are alleged to be pending. However, even the United States now publishes some patent applications after 18 months, so the "patent pending" excuse wears thin after a couple of years. Provisional applications, of course, are held in secret for one year.

In order to verify whether a patent is issued, pending, or designated for a given country, reliable patent family databases must be checked to discover all the patent documents for a given invention based on a common priority filing date. Such information is included in INPADOC, Derwent's World Patent Index or STN's Chemical Abstracts. Note that INPADOC and Derwent have a different philosophy regarding patent families - Derwent is more inclusive on borderline patents, while INPADOC rigidly follows the common priority date rule.

Example: A Competitive Intelligence Web Search on "The Club"

Let us assume you are a small manufacturer in Canada who wishes to make and sell a steering wheel locking device, possibly for export to the US. You notice that the most popular model is called "The Club", and there seem to be a number of similar products in stores. You must conduct a search to discover what valid patents covering steering wheel locks are in force in Canada and the USA.

Step One

Assuming "The Club" is a trademark, go to a trademark database such as appears on the CIPO or USPTO websites and enter the terms "The Club" in the search menu. Several marks turn up by the same owner: Winner International Corp.

Step Two

Further assuming that the owner of the trademark would also be the assignee to the patents, search the name "Winner International" in the assignee field of the USPTO database. A wide range of automotive security device patents turn up. But close scrutiny reveals that these are more advanced than the basic "Club" locking device for which you are searching.

Step Three

On the USPTO database check the earlier patents cited by some of the more recent Winner International patents such as US 5600979 "Vehicle Anti-Theft System". You will notice that some of the oldest indicate James Winner as Assignee (US 4738127 and US 4856308) rather than the Winner Corporation. Upon reviewing these two patents (the latter of which is a continuation) entitled "Automobile Steering Lock" they appear to cover the original "Club" device.

Step Four

Go to an international database such as INPADOC and view the patent family for these patents to see if there is a Canadian equivalent. Or go to the CIPO patent site and search for patents with James Winner as assignee. The result indicates Canadian patent CA 1283301 was filed on Aug. 13, 1986. Adding 20 years for the life of the patent to this date produces the conclusion that the patent protection will expire in the year 2006 in Canada, the USA, and in any country with an equivalent filing.

Step Five

Conclusion: Anyone will be able to make or sell a product within the claims of the original "Club" patents when they expire in 2006. However, any enhancements or improvements to such a device would have to be carefully searched for infringement of existing valid patents. The USPTO database indicated over 80 patents citing US 4738127 as prior art, evidence that there are very many patents on similar products. A subject search using the relevant patent classifications produces even larger results. (Review US class 70/209 to see over 300 steering wheel lock patents.)

The reason the earliest "Club" patents could not be found on Internet databases such as the Espacenet, CIPO or USPTO databases is that they only indicate the original assignees to a patent: subsequent reassignments are not recorded. If a commercial database such as Lexpat or IFI Claims had been searched for the assignee Winner International, the earliest two patents assigned to James Winner would have appeared with the information they were reassigned from James Winner to the Winner International Corp. If the database had not made these connections, the patents would not be found unless searched under the original assignee - James Winner. Such a situation is common with young companies that undergo rapid changes in ownership and corporate name.

A review of the "Winner International" patent portfolio indicates that this company owns scores of US utility and design patents, but files relatively few counterpart patents in

Canada and other countries. The company also owns over 100 active trademarks. Winner has been very active in the field of vehicle security locks, and places high value on new and improved products. The Winner International Corporation is quite vigilant against "knock-off" products, initiating 40–50 legal actions per year against firms that infringe on its intellectual property. Although most of these actions settle out of court, Winner claims a 28–0 record in favorable judicial decisions.

Using Intellectual Property Data for CI

Companies compete in the areas of products, corporate organization, manufacturing, marketing, strategic alliances, financials, reputation, and technology. The focus of this presentation is technology, for which patents and other forms of Intellectual Property are often good indicators. When analyzing technological development in a field, the first indicators may be rumors, gossip, and "gray literature". The first concrete evidence of a new product, drug or industrial process may be published patent documents, often patent applications, now universally published 18 months after filing.

A case from the British Columbia high technology community offers an example of a catastrophe that may have been prevented through a little investigative patent searching. Xillix, a BC company in the medical device field, formed a strategic alliance with Olympus Optical of Japan in the early 90's and disclosed some of their trade secrets. Unknown to Xillix management in Vancouver, Olympus proceeded to file a number of Japanese patents based on the Xillix proprietary technology. Only in 1998 did Xillix discover this when an Olympus patent issued in the US based on these Japanese applications. Although Xillix won the subsequent legal battle in Japan, the company came near bankruptcy. A little CI effort would have provided some early warning, since the Japanese patent applications were published years earlier.

Intellectual Property usually has three broad functions within a corporation:

- ◆ As a tool to protect price and market share by excluding others from a specific marketplace (patents) and as a guarantee of channels to market and goodwill (trademarks).
- ◆ As insurance against legal action by other patent holders, operating to mitigate risk of infringement.
- ◆ As a financial asset in the high-stakes game of strategic alliances, in which technology is licensed, swapped, assigned, mortgaged, or held as a blocking strategy.

Analysis of Intellectual Property holdings may reveal a great deal about a competing corporation's technology strategies. Patent and other IP data is widely available publicly from a variety of free and fee-based sources, and is standardized to a degree. Several companies offer software packages to collate, map and chart patent holdings to indicate patent filings over time, density/frequency in specific technologies, international equivalents, citation history, and activity of particular individuals, companies or groups.

See software products PatentLab (Wisdomain,), ThemeScape and Aureka, (Micropatent), Patentmaps.com (i3-Research) and the offerings of ClearForest, CHI Research, IP Vision, M-Cam and the Metrics Group.

Intellectual Property Data Sources

While the Internet provides a wealth of free IP data, serious problems may arise if wrong assumptions are made regarding the coverage, currency and integrity of databases that are deficient. The databases hosted by Dialog, STN, Questel-Orbit and Lexis-Nexis tend to be deeply indexed, often include full-text searching, offer comprehensive coverage, provide product support and come with very powerful search engines. Although these services charge very high hourly rates, negotiation can produce fixed price contracts. Derwent, Chemical Abstracts, and IFI are the best-known providers of quality patent data on these hosts.

A second tier of patent databases services has found a broad market by offering flat rates for a range of monthly or yearly service contracts. These include Delphion, Micropatent, and ICO Patent Search.

The free IP databases provided by Delphion, the US Patent Office, and the European Patent Office (Espacenet) tend to suffer from poor quality abstracts, slow updates, frustrating search menus, missing records, and a significant degree of error caused by case sensitivity and misspellings. These databases are useful tools, but results should be verified in other sources before making major decisions.

Patent Searching Tools and Strategies

Beginner patent searchers often rely on their favorite technical keywords when searching. It should be kept in mind that over half of US patents are filed by non-Americans, usually persons for whom English is not the first language. The chances are good that a translation from another language does not include the usual American jargon and techno-speak. Intelligent use of patent classification when searching is the best way around the language barrier and produces a much higher ratio of relevant patent retrieval.

Patent classification systems are very powerful tools for patent searchers, and the application of these tools varies tremendously from database to database. In theory, every claim of a patent should be reflected in the classification coding for that patent. The major systems are the International Patent Classification (IPC), The European Patent Office Classification which is a modification of the IPC (ECLA), and the US Patent Office Classification.

Citation searching is another useful tool. A highly cited patent represents core technology that other inventors have attempted to improve upon. When an important patent turns up in a search, the patents (and patent applications) citing it should be reviewed, as well as the older art that it cited. Often the first patent in a mechanical or chemical subject area is 100 years old.

The person responsible for management of a patent portfolio should carefully scrutinize recently issued patents citing patents in his portfolio, since these may represent infringers who could be required to obtain a technology license to practice their patent. It is also a good idea to conduct citation searches on competitors' patents, since this may indicate new technologies entering the market.

What Information can be Extracted from Patents?

Identification of competitors or collaborators:

The results of any subject search can be ranked by assignee or otherwise graphically charted to compare the gross numbers of patent documents held by competing companies. This kind of analysis needs to be weighted in favor of inventions with counterpart filings in many countries, since such an invention represents more R&D dollars than an invention protected in a single country.

Assessment of human capital by analyzing inventor records for competitors:

A ranking and time-line review of inventors may reveal a broad based R&D team with low turnover, or a volatile situation in which reputable scientists have fled to other companies. Patent records may reveal jointly held patents with Universities or other research collaborations, indicating strategic use of human resources.

Assessment of competitors' R&D effort and direction:

Graphic mapping of the density and frequency of patent filings across all technologies for a competitor reveals the focus and intensity of their research efforts. Gaps in their IP portfolio may be discerned, and offer evidence of need to license or partner. Patent family searches (and also trademark searches) indicate the segments of the international market the competitor is targeting. Temporal profiles for patent filings may show a competitor is abandoning a particular field. Citation searches may reveal competitors "patenting around" a patent portfolio, filing improvements to a rival's product line.

Discover market trends, birth of new technologies:

The US Patent Office makes their data searchable by country of filing, so it is very easy to map technologies by patent classification filed from particular countries and analyze developing markets. A temporal map of patent filings will reveal accelerated patenting in hot subject areas.

Find new employees, consultants, and experts:

A subject search may reveal universities filing patents in an area of interest, revealing an economic way to engage temporary scientific talent, obtain contract research, or license cutting edge technology.

Locate licensees:

A thorough search of a company's area of patented technology may reveal newcomers to the field who should obtain a license to practice their patents.

Analyzing Patent Quality

Patents are not created equal. Most patents become colorful wallpaper and never return the costs of filing. Sometimes a close look at a patent document will provide clues to its inherent value. A glance at the front page of a patent can reveal a great deal about the quality of the document.

Reputable corporate or institutional source as assignee?

If the patent is held by a private inventor, there is a probability the invention was not the result of a well funded R&D program. If the inventor drafted the patent (indicated by lack of a legal representative) then there is a chance it is worthless.

Patent Cooperation Treaty Filing?

If the priority filing was a PCT application, this would indicate that considerable funds have been expended for international filings, indicating some confidence in the technology.

Prior art cited? Literature cited?

Studies indicate that patents issued to universities and research institutions providing generous citations reflect quality research.

Several inventors?

Many inventors indicate a well financed research team.

Continuations in part?

Indicates ongoing serious research.

Prosecuted by solid law firm?

Certain patent firms specialize in particular industries and are good litigators as well. In theory, a patent produced by such a firm would be well drafted.

Patent quality can be further tested by doing a little patent research

Is the patent highly cited?

If the patent has been issued for a few years and no one has cited it as prior art then it may be a dead-end technology. Highly cited patents represent seminal technology.

Any foreign equivalents or counterparts?

A patent family search will reveal whether corresponding patent applications have been made in other countries and whether they are being expeditiously prosecuted. Often a PCT application will be filed and the case will stagnate in limbo, effectively abandoned.

Litigation, opposition or re-examination?

Legal status files may reveal that the patent has been abandoned due to failure to pay fees. On the other hand, litigation, opposition and reexamination are indicators that there is some value at stake.

Claims valid, supported and broad?

A patent agent or consultant could be engaged to review the claims. A validity search could be conducted to verify there is no prior art missed by the examiner, and that there are no other patents restricting freedom to operate.

Patent Portfolio Analysis

The thrust of a competing corporation's current and future technology development can be analyzed by reviewing its IP portfolio. The geographic coverage of the IP indicates global market strategies. The age of patents and frequency of filing disclose the product life cycle and maturity of technology. Citation counts reveal the importance of a patent within the industry. A look at the inventors on research teams may indicate personnel trends in R & D management. Professional analysis of the quality of patents reveals how well a core technology is protected

In analyzing patent portfolios, many experts use the number of foreign counterparts as an indication of the "weight" of a patent. If a company spends \$100,000 in patent costs, then the invention represents a substantial research investment, implying a serious effort to gain market entry. By comparison, a single patent filing in the US may cost as little as \$5,000.

Vigorous patent prosecution or lack thereof may indicate the priority placed on a technology in development. If a PCT application lies in limbo for years, with little prosecution activity apparent, one can assume the invention will eventually be abandoned. Many institutions view patents as options on technology, and abandon applications for inventions that do not immediately get attention from investors or the marketplace.

The history and correspondence of patent prosecutions is available through file wrappers, which may reveal weaknesses in a patent position discovered during examination. Reviewing the legal history of a patent portfolio, as well as the infringement, opposition, re-examination, and other IP and trade-related litigation pursued by a company, indicates the company's degree of enforcement. Opposition proceedings against pending patent applications are a national sport in Japan and some European countries.

Statistical analysis of a competitor's patent portfolio often uncovers new trends and themes as they focus on new market opportunities and discontinue activity in other fields.

Analyzing a Technology Using Patent Data

In any technical field, the two most important elements are:

- ◆ The number of prior art patents (how crowded is the field?); and
- ◆ The rate of technology adoption (accelerating? decelerating? stagnant?).

A crowded technology of rapid product cycles, many new players, and skyrocketing sales is risky, but lucrative. In an area such as software, the need to be first to market in order to dominate the sector may be a primary consideration, and the profitable life of a software package may be 18 months. However, taking the time to build a strong IP portfolio may also pay off in the long run. STAC's portfolio of a few highly important

patents in the field of data compression was enough to win an infringement suit against Microsoft to the tune of \$124 million in 1994.

The pharmaceutical business is a mature industry characterized by crowded art, slow change, and little freedom to operate. Drugs cost hundreds of millions of dollars to develop and test, but the rewards are also very high. Patents are critical in the biotech and pharmaceutical industry.

In the early days of breakthrough technologies such as genetic engineering or photonics, the seminal patents in areas of sparse art can be very broad and profitable in terms of enforcing licenses on latecomers in the field.

The mechanical arts generally produce slow change, and patents are not valuable since they are mostly very small incremental improvements on existing devices rather than new platform technologies. However, some companies such as COE Newnes/McGehee have become successful through patenting automated mill equipment to include scanners, sensors and robotics. Creo Products has developed more efficient color printing technology, shaking up a stagnant, multi-billion dollar industry.

The value of any IP portfolio depends to a very great extent on shrewd marketing and good corporate management. An astute administrator can leverage a handful of patents on a hot technology that is object of litigation or a corporate acquisition to amazing valuations. There are several war stories regarding IP portfolios of liquidated companies being turned into gold mines in the right hands.

Often it is the case of finding the right niche for a technology ahead of its time. Industry Liaison Officers at the University of BC tried for ten years to sell international manufacturers of excavation machinery their suite of force feedback joystick patents to use as controllers. Ultimately the Immersion Corp. of California paid a high price for the portfolio to consolidate their hold on the force-feedback video game joystick market, which is currently booming.

Patent Strategies and Tactics in Portfolio Management

As a defensive strategy, IP managers should periodically conduct searches on their own patent portfolios to determine if other corporations are citing their company patents to “patent around.” Regular state-of-the-art searches may indicate who is about to launch a new technology that could be substituted or added to current products. Trends should be mapped and statistically analyzed to decide where the industry technology is heading. Companies need to be aware of competitors who are preparing to leapfrog ahead with innovations such as “smart” products with onboard chips.

IP analysis can play a critical role in advancing corporate goals. Penetration of specific markets begins with analyzing the barriers to entry, such as scrutinizing blocking patents for invalidation, purchase, license, or reverse engineering. A powerful technology position in the marketplace can go hand-in-hand with an aggressive licensing strategy.

Small companies pursuing strategic alliances with corporate giants may obtain a strategic advantage by searching for chinks in the larger company's IP armor. Filing provisional patents around the larger firm's core technology can pave the way for an equitable joint venture or cross-licensing agreement.

Several strategies may be adopted when a competitor's patents block a company. These strategies may include buying the patent or the company, licensing or cross-licensing the IP, creating better technology and patenting around, suing for infringement or invalidating the patent by legal action or re-examination, and opposing pending applications. The IP of acquisition targets must be studied: often a company in turmoil has a portfolio of lapsed, invalid, misassigned, expired, and mortgaged patents that poorly protect the technology under negotiation.

On the other hand, a more profitable path may be to avoid confrontation and cross license or swap IP in order to share different segments of the market in a joint monopoly, a strategy commonly used by IBM and Intel. Other situations may warrant major players forming a patent pool to dominate an industry. Two competitors with minor interests in a new technology may be better off forming a new joint venture company with the combined IP.

Conclusion

In any high technology institution intellectual property assets must be managed as competently as human and physical assets. An IP manager must have a complete understanding of the strengths and weaknesses of his group's IP portfolio and understand how it can be used strategically for best advantage. IP strategy needs to be aligned with the corporate or institutional strategy, and both supported completely by a structured competitive intelligence effort.

A key element of a competitive intelligence program must be data gathering and analysis of the intellectual property landscape for the enterprise. It is only with such information that management can focus patent activity to leverage the value of the company's technology in the marketplace and protect its market.

A competitive intelligence program must have an intellectual property component, with manpower and budget to support activities such as patent searching and analysis. While patent searching can be expensive, tedious and time consuming there are resources available that can be tailored to supply timely and cost effective information for any high technology institutional or corporate entity. There are also abundant legal, research, and data analysis consultants available for work that needs to be outsourced.

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www.ekms.com/resources/IAM_patentmining.pdf

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“Complementary Searching in Patent Databases” B-R Weekend, World Patent Information Vol 9 No 3 pp 140-146, 1987

Useful Websites Regarding Patent Searching

<http://www.piug.org> Patent Information Users Group (PIUG) Professional association of patent searchers. Searchable discussion list of patent data problems.

<http://www.bl.uk/collections/patents.html> The British Library Patent Page.

www.mayallj.freemove.co.uk Mayall's IP Links. Comprehensive listing of free international IP databases.

<http://www.piperpat.co.nz> PIPER'S Virtual Intellectual Property Library

www.patex.ca PATSCAN Website. Many licensing and IP links.

APPENDIX: Conducting Patentability and other subject matter searches.

Example: A Novelty (Patentability) Patent Search for a Prosthetic Device.

An inventor requires a patentability search to ensure his invention is novel. The task is to discover prior art patents which would either anticipate his invention on all points, or that could be used collectively to indicate that it would be obvious to assemble a combination of known elements to make such an invention.

The invention at hand is a prosthetic knee joint for amputees with artificial legs. The principal element is an air-spring mechanism that causes the knee to extend forward at every step. The plan is to find all patents including spring loaded prosthetic knee joints, and compare the mechanical elements of the invention against those disclosed in prior art patents.

Step One: Analyzing the Question - What to Search

The first step is to analyze the invention in terms of its function, and decide what novel elements would logically be claimed when the patent was drafted. If it is a device, one must understand how it is structured, how it works and the effects it produces. If it is a

process, one must detail the sequence of steps involved. The invention may be a combination apparatus and process also including the end product, thereby broadening the scope of the search. If the invention relates to a new substance or recently discovered protein a chemical structure search or sequence search may be in order. If it is a new use for a known substance a broad search of the chemical and patent literature for such applications is required.

Regarding the search for the prosthesis as described above, the question is quite clear - the answer is defined as spring loaded mechanical device functioning as a human knee.

Step Two: Finding the right pond to fish in - Patent Classification

A serious patent search should include use of patent classifications. These would reflect the claims of patent and are usually the most convenient method of retrieving patent literature on a given subject. The USPTO classification, the European Patent Office Classification (ECLA) and WIPO's International Patent Classification will be used as examples. To perform a US search, one must first examine the functionality of the invention in order to think of how it might be classified in the USPTO scheme of classification. For example, if the function of the intermittent windshield wiper is analyzed, it works by use of a periodically activated electric motor. The correct classification is thus 318/444 defined as:

PERIODIC, REPETITIOUS OR SUCCESSIVE OPERATIONS CONTROL OF MOTOR, INCLUDING "JOG" AND "INCH" CONTROL - Variable periods or intervals between controlling operations

The IPC tends to be an "application oriented" classification, so many of these devices would be classified with windshield wipers with electrical drives (B60S-001/08) . The ECLA classification below adds a further distinction:

[B60S1/08F](#) [N: including control systems responsive to external conditions, e.g. by detection of moisture, dirt or the like]

ECLA on the web may be found at <http://12.espacenet.com/eclasrch>

The objective is to locate relevant classifications which may be of assistance in conducting the search. One can use the WIPO alphabetical Official Catchword Index to the classification manual to locate the classification, or go directly to the relevant part of a classification manual to see if the most important classifications can be spotted. (web version at www.wipo.int/classifications/fulltext/new_ipc/index.htm.)

For instance, the alphabetical index on the USPTO website (www.uspto.gov) under "knees" lists "knees - artificial" at the subclass 623/39. This is a clue where to begin examining the class manual. Looking up "prostheses" in the same index produces the general classification for "prosthetic articles" at class 623.

Some analysis should be done here, since several classifications may be applicable depending on the view of the invention. In the case of a prosthetic knee joint, there are

very specific US classifications for different kinds of mechanical knee joints according to function or structure. Such knee joints almost always employ springs.

In the following example, subclass .027 "LEG" is a main line or first line subclass in classification 623. Indented subclasses beginning at .039 "Knee" up to and including .046 all relate to indented subclasses concerning knee prostheses. The single indented subclass .047 commences the next subject "Ankles". There are two locations that indicate springs in the class schedule, one included under combined knee and foot actuators (...042) and one indented directly under knee (.046).

026 HAVING FLUID ACTUATOR

027 LEG

.....

- . **039** Knee
- .. **040** Combined knee and foot actuator
- ... **041** Latch
- ... **042** Spring
- .. **043** Brake or latch
- ... **044** Weight or position responsive
- ... **045** Adjustable friction joint
- .. **046** Spring
- . **047** Ankle

The USPTO website links subclass numbers directly to the subclass definitions, explaining the scope of the particular subclass. The classification definition of a "spring" in these two classes is stated as: "Subject matter having an elastic device which regains its original shape after being compressed or expanded." Technically this is a very broad definition of a spring, composed of any substance in any configuration.

In order to conduct a search of Canadian or international sources, it would be necessary to discover the relevant International Patent Classification. The best place to search is the WIPO Internet site where both the Catchword Index and the sections of the IPC are browsable. IPC Class A61F includes a range of medical devices including prostheses. A61F-002/50 is the general subclass for prosthesis not implantable in the body, knee joints per se being found in the single class A61F-002/64.

A61F ...PROSTHESES; ORTHOPAEDIC, NURSING OR CONTRACEPTIVE DEVICES

- 2/50 .Prostheses not implantable in the body.
- 2/52 ..Mammary prostheses
- 2/54 ..Artificial arms or hands
- 2/56 ...Adjustable
- 2/58 ...Elbows; Wrists
- 2/60 ..Artificial legs or feet or parts thereof
- 2/62 ...adjustable

2/64 ...knee joints
2/66 ...feet, ankle joints
2/68 ..Operating or control means
2/70 ...electrical
2/74 ...fluid

In the IPC there is only one subclass for external prosthetic knee joints with no distinguishing subclasses including springs. There is however another subclass for "fluid operating or control means" (A61F-002/74) which could be useful, as the search parameters include an air-spring. In the patent jargon air and gases technically are fluids.

On the Espacenet database it is possible to search either the IPC or the related European Classification (ECLA). Finding a relevant patent record (such as GB 2181352) and clicking on the ECLA classification allows a view of the relevant page from the ECLA manual, in which the following appears:

A61F2/64 ... Knee Joints
A61F2/64P[N: Polycentric Joints, without longitudinal rotation]
A61F2/64P2[N: of the single-bar linkage type]

ECLA in this case provides a finer division than the IPC, but it is not helpful in this search since these classifications do not involve springs. Comparing the results of entering the Class number A61F2/64 in the IPC and the ECLA fields in Espacenet produces useful but almost completely different results. This indicates considerable lack of consistency in applying classification to records. Another useful strategy would be to combine the general classification for springs (F16F9) in the IPC and ECLA fields with that for knee prostheses.

[F16F9/00](#) Springs, vibration-dampers, shock-absorbers, or similarly-constructed movement-dampers using a fluid or the equivalent as damping medium ([F16F5/00](#) takes precedence; connection of valves to inflatable elastic bodies [B60C29/00](#); [N: braking devices, stops or buffers for wing-operating appliances [E05F3/00](#), [E05F5/00](#)]) [C9907]

Step Three: Deciding on the search strategy

Having located relevant US and IPC classifications concerning prosthetic knee joints, the challenge remains to harvest the relevant items from the two hundred or so patent documents found. Strategies must be developed to effectively search for the concept of an air-spring.

One can combine the relevant classifications for artificial knees with selected key words used as synonyms for air-springs such as "gas spring" or use more generic terms such as "pneumatic" or "brake" or "retarder" or "fluid power." Another tactic is to simply

combine the knee sub classifications with other general classifications for springs. For instance US Class 188 "Brakes" includes retarders or shock-absorbing type fluid springs.

Patent searching is a multi-stage, iterative process. Performing preliminary keyword searches is often a useful early step to identify additional relevant key terms and classifications. Assuming you retrieve a small group of patents that are close to the invention, you may perform the following analysis:

Which classifications are most important and which seem marginal? What is the generally used terminology in the field that would be useful? Are there British or European terms which should be used as well as American terms? For example, is the subject matter tar, asphalt, bitumen, blacktop or an aggregate composite? Use your thesaurus! Would some application-oriented IPC or ECLA classes be more useful than US classifications that deal with functionality?

Focus on a particular classification if it contains exactly the data set you need in a "rifle" approach. Search ranges of classes when necessary, using the "shotgun" approach. The broader the search strategy the more irrelevant or "garbage" patents will turn up. Sometime use of generic key terms will bring up patents that actually include the specific item for which you are searching. Chemical patents commonly use such approaches. For example the term "alkali salts" includes the specific salts of sodium, potassium etc.

Write down the best classifications and keywords and combine them in all possible ways. This includes classes and classes (Classification for knee joints and classifications for springs), ranges of sub classifications (623/4* includes everything from 623/40 to 623/49), classifications and keywords, and all keywords. Use wildcards (the * symbol in the examples below) liberally to catch all possible plurals and variations on words, and to truncate classifications wherever you want.

188/* and 623/4* (Broad search including all patents classified with braking devices in the range of US patents for artificial knees).

623/4* and 623/26 (All patents classified with knee prostheses also in the classification for prosthetic fluid actuators).

623/4* and brake or retarder or shock absorb* or air spring or gas spring or pneumatic* (General range of US patents on prosthetic knees combined with selected keywords).

A61F2/64 and A61F2/74 (Specific IPC classification for external prosthetic knees with that for fluid operating or control).

A61F2/64 and F16F9 (Specific IPC classification for external prosthetic knees with the general class for springs - strategy works both in the IPC and ECLA).

A61F2/64 and brake or retarder or shock absorb* or air spring or gas spring or pneumatic* (IPC or ECLA class with selected keywords).

When using keywords it is necessary to search all the text fields possible besides the abstract field. In free Internet databases probably the most important field to search would be the claims field. For instance, US 5201776 "Orthopedic and prosthetic joint", only provides mention of a gas spring in claim 4. Though the drawings of this patent clearly illustrate a gas spring, the classification does not reflect this, nor is it discussed in the abstract or the specification. One of the frustrations of patent searching is such variability.

Another important point is that a patent may disclose elements of an invention in the specification, such as in the discussion of prior art, while it claims a slightly different invention. Full text keyword searching can often discover such hidden gems. Use of commercial databases, such as Derwent and Chemical Abstracts with highly indexed records designed for good retrieval, will produce better results than free Internet databases which are mere downloads of US or EPO abstracts.

Be aware of the "Patentese" or patent jargon that surrounds many subjects. The trademarked substance "Velcro" is often described as "hook and loop" or "hook and pile" fasteners. Pencils are classified under "Coating implement with material supply."

If you cannot find all the elements of the invention in one patent (A + B + C) the next logical thing to do is to find patents which combine A + C or B + C or A + B. That way it may be possible to infer that A+B+C would be an obvious combination to make. Another tack is to look for general rather than specific elements to combine. For instance, rather than look for a screw in a machine, search for any kind of fastener.

Step Four: The Search Process - Go Fishing

Often a preliminary keyword search will produce results of hundreds of candidate patents, many of marginal relevance. Such a large hit list can be reduced to manageable size by a variety of methods:

1. Use proximity operators when possible to specify that keywords be near each other rather than using the "and" operator. Results are more meaningful when keywords are in the same sentence.
2. Restrict the keywords to the claims rather than the whole patent specification if you are using a full-text database. If you are using a database with only abstracts, restrict the search to patent title.
3. Use classifications as filters or screens. For example, if you are searching for a particular kind of alarm system, combine the result of the keyword search with all database records in class 340 (covering electrical alarms). If the US classification is not convenient, then screen US patents with the IPC system. For instance, the IPC code G06F will pick out most computer applications if you are looking for software patents.
4. If the subject matter is recent, just restrict the search to the last few years of pending and issued patents.

Searching requires experimenting with different approaches. Apply new tactics when search results indicate additional paths to follow. To conduct a thorough search, rotate all the keywords and classes through your search engine as many ways as possible.

When you have a handful of good patents, or possibly one patent which stands out, conduct citation searches on them to discover recently issued patents and applications. Also review the relevant old art cited in important patents and check new patents that may cite this seminal art.

After you have exhaustively covered one database, go on to verify the results on other sources using different classification systems. Compare results with those from a commercial database or request a search from a professional search agency. Check current affairs and scientific databases for news in the specific subject area. Follow up with patent searches on companies or individuals active in this field of inquiry. Don't be afraid to ask experts for help.

If after all leads have been explored and all strategies have produced the same results using all possible relevant classifications and key terms, then you can confidently conclude the search.