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OECD Patent Statistics Manual

Chapter 2

Patents as Statistical Indicators of Science and Technology

2.1. Introduction

The statistical properties of patent data are determined by their legal characteristics and by their economic implementation, as these influence which inventions are protected, by whom, what information is disclosed (hence made accessible to statisticians), how important patents are for industries, etc. This chapter provides an overview of the legal and economic foundations of patents. It describes the basic concepts necessary for the use of patent as indicators of science and technology (S&T).

2.2. Legal foundations of patents

Patents are legal instruments used in economic life. A patent is a legal title protecting an invention (Article 28 of the Trade-Related Intellectual Property Rights [TRIPS] Agreement):

"I. A patent shall confer on its owner the following exclusive rights:

a) where the subject matter of a patent is a product, to prevent third parties not having the owner's consent from the acts of: making, using, offering for sale, selling, or importing for these purposes that product;

b) where the subject matter of a patent is a process, to prevent third parties not having the owner's consent from the act of using the process, and from the acts of: using, offering for sale, selling, or importing for these purposes at least the product obtained directly by that process.

II. Patent owners shall also have the right to assign, or transfer by succession, the patent and to conclude licensing contracts".

Patents grant their owner a set of rights of exclusivity over an invention (a product or process that is new, involves an inventive step and is susceptible of industrial application) as defined by the "claims". The legal protection conferred by a patent gives its owner the *right* to exclude others from making, using, selling, offering for sale or importing the patented *invention* for the *term of the patent*, which is usually 20 years from the filing date, and in the country or countries concerned by the protection. This set of rights provides the patentee with a competitive advantage. Patents can also be licensed or used to help create or finance a spin-off company. It is therefore possible to derive value from them even if their owner does not have its own manufacturing capability (*e.g.* universities).

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Patents are temporary rights, valid for a maximum of 20 years after the date of application, after which the invention they protect falls into the public domain.[1] Patents are territorial rights which only apply to the country for which the patents have been granted. For instance, a patent granted in the United States will not confer exclusivity in Japan – it will only prevent the patenting of the same invention in Japan (since worldwide novelty is required to obtain a patent). Patents are granted to inventions in all fields of technology. In general, laws of nature, natural phenomena and abstract ideas are not patentable (there is of course debate about the boundaries of the system – *e.g.* is software an "abstract idea" or is it a patentable invention?).

2.3. Administrative routes for protection

Patents are obtained after following specific administrative procedures.[2] In order to obtain a patent, the inventor has to file an application at a patent office which checks whether the invention fulfils the relevant legal criteria, and grants or rejects it accordingly. There are different alternative "routes" for protection available to inventors, who will choose one or another depending on their national or worldwide business strategy.

- **National route.** When an inventor (an individual, company, public body, university, non-profit organisation) decides to protect an invention, the first step is to file an application with a national patent office (generally the national office of the applicant's country). The first application filed worldwide (in any patent office) for a given invention is known as the *priority application*, to which is associated a *priority date*. The patent office then begins "searching and examining" the application in order to learn whether or not a patent may be granted, *i.e.* whether the invention is directed to patentable subject matter, is novel, inventive ("non-obvious to persons skilled in the art") and capable of industrial application. The application is generally published 18 months after it is filed (*publication date*). The time lag between filing and grant or refusal of patents is not fixed; it ranges from two to eight years, with significant differences across patent offices.
- **International route.** Since 1883, when procedures were standardised under the Paris Convention (about 170 signatory countries in 2006), applicants who wish to protect their invention in more than one country have 12 months from the priority date to file applications in other Convention countries, and if they do so the protection will apply from the priority date onwards *in the countries* concerned. Alternatively, inventors can use the PCT (Patent Cooperation Treaty) procedure, which has been in force since 1978 and is administered by the World Intellectual Property Organization (WIPO). The PCT procedure makes it possible to delay national or regional procedures significantly (until the end of the thirtieth month from the priority date)

through a unified filing procedure (see Chapter 3). Applicants therefore have more time to fulfil national requirements and can use the time to evaluate chances of obtaining patents and of exploiting the invention (estimate competition, find licensed parties, etc.).[3] It is now the most popular route among inventors targeting worldwide markets.

- **Regional routes.** Applicants can also submit a patent application to a regional office (*e.g.* Eurasian office, ARIPO). For instance, the EPO (European Patent Office) is a regional office with 32 members in 2007which searches and examines patent applications on behalf of European countries. EPO grants "European patents", which are valid in all its member states in which the holder has validated his rights. Validation requires translation into the national language and payment of national fees. In this national stage, European patents are subject to national laws.

National patent laws have to comply with international standards, now laid down in the TRIPS (Trade-related Aspects of Intellectual Property Rights), an international treaty which is part of the WTO (World Trade Organization) package signed in 1994. Provided that a country is a member of the WTO, TRIPS imposes strict conditions on that country, such as patentability of inventions in all fields of technology, minimal term of patents of 20 years, limitations of compulsory licensing, etc.

After it is granted by an administrative authority, a patent can still be challenged by third parties. They can do so through the legal system, requesting that a patent be revoked or deemed invalid. In such cases, the patent holder must go to court in order to enforce the disputed patent, alleging third-party *infringement*. This is, again, a purely national process, even in Europe.[4]

The procedure for obtaining a patent involves the disclosure of much information for legal or administrative purposes. This information is potentially of great interest to statisticians. The front page of patent applications to the WIPO, EPO, JPO and USPTO are shown in Figures 2.A1.1 to 2.A1.4. Useful information found in patent documents includes:

- Number and type of application, publication number, etc.[5]
- Name and address of the inventor; name and address of the applicant or assignee (usually the company employing the inventor).
- Technical details regarding the invention: title, abstract, detailed description of the invention, indicating how it is constructed, how it is used and what benefits it brings compared with what already exists.
- A list of claims, which is a clear and concise definition of what the patent legally protects.
- A series of codes corresponding to items in a technology classification.
- A series of dates: date of priority, application, grant, etc.

- A list of references to other patents or scientific literature considered as relevant to the determination of patentability of the invention.

2.4. Economic foundations of patents

The stated purpose of the patent system is to encourage invention and technical progress by providing a temporary period of exclusivity over the invention in exchange for its disclosure. By providing protection and exclusivity, a patent is a policy instrument intended to encourage inventors to invest in research and the subsequent innovative work that will put those inventions to practical use.

Patents reinforce inventiveness in different ways (Scotchmer, 2004, Guellec and van Pottelsberghe, 2007). Because they reveal new knowledge through disclosure of inventions, they diffuse information that might otherwise be kept secret, thereby enabling other inventors to develop new inventions. By diffusing information on inventions that have been achieved and are protected, the patent system also deters needless duplication of R&D efforts, encouraging researchers to focus on really new areas. In addition, as patents are legal titles, they can be traded. Patent rights thus facilitate the development of technology markets, which improves the allocation of resources (for technology use) in the economy. Patent rights allow the most efficient users to implement inventions (*e.g.* through licensing for instance) even if they did not necessarily invent them or to exchange technologies needed for further innovations.

The reason for providing a legal framework to protect inventions is that information is a public *non-excludable* and *non-rival* good. "Non-excludable" means that it is impossible to exclude those who did not bear the cost of invention from using the good (*i.e.* it permits "free riding"). A "non-rival" good is one the consumption of which by one person does not reduce the quantity available to other individuals (*i.e.* the marginal cost is zero). Patent rights make the invention excludable, as the authorisation of the inventor is needed to use it, while keeping it non-rival, so that many entities can use it at the same time.

However, information (knowledge) is not a perfect public good and it can be protected in ways other than patents, or in most cases, in a way that complements patents (Blind *et al.*, 2002). Other strategies to protect returns to inventions are secrecy,[6] rapid launch and short product development cycles, low prices and other competitive approaches (production and marketing capabilities; after-sales service; long-term contracts). Various business surveys have confirmed the use of these strategies (Levin *et al.*, 1987; Cohen *et al.*, 2000). For instance, in the Carnegie Mellon Survey (1994) of American firms, it was found that secrecy and lead time were ranked overall as the two most effective appropriability mechanisms for product innovations, each with scores of just over 50%. Furthermore, companies declared that patent applications are only submitted for 52% of product inventions

and 33% of process inventions. In the NISTEP Survey (Goto and Nagata, 1997) of Japanese firms, it was found that lead time (41%) was also ranked as the most effective appropriability mechanism for product innovations, and that complementary assets for manufacturing (33%) followed protection by patents (38%). In the EPO applicant panel survey of 2006, it was found that about 50% of inventions become patented, with the highest proportions in audio, video, and media and electronics (about 70%). The lowest proportions were in biotechnology and pure and applied organic chemistry, at about 25%.

Patents face a trade-off. They encourage new inventions *ex ante*, but have a cost *ex post*. By giving exclusive use to a particular company, a patent will limit competition and allow higher prices, thereby excluding customers who would have been ready to pay the marginal cost of a good but cannot pay the mark-up charged by the patent owner. This is considered the central dilemma created by patents: they improve the dynamic efficiency of the economy (by fostering innovation, hence growth and value creation), but they do so to the detriment of static efficiency (reduced competition and thus higher prices, which excludes some consumers).[7] Patent policy provides various tools to deal with this dilemma. In particular, both the duration of patent protection and its breadth (how different another product must be in order not to be an infringement) are instrumental in influencing the balance between protection and diffusion: longer and broader patents favour protection, while shorter and narrower ones favour diffusion.

Policy design is more difficult in the case of cumulative invention (or complementary invention, *i.e.* inventions building on each other). In this case, certain studies argue that patents can limit the use of technologies which are necessary for further innovation, as follow-on inventors should not infringe patented knowledge although they need it for their own inventions. This configuration of cumulative inventions raises the policy issue of how to balance the protection given to the initial invention and to the follow-on invention. This dilemma exists for instance in biotechnology, as regards particular treatments (which are patented) associated with certain genetic pathways (which are also patented). In the case of new inventions relying on several inventions patented in the past, which happens in biotechnology and software, the new inventor needs to negotiate access to each of the existing inventions. In these cases, it has been argued that transactions are potentially so costly as to deter the new invention in the first place. There are some patent-based solutions for reducing transaction costs, such as patent pools (consortia of companies agreeing to cross-license their patents and license them to third parties), and patent clearing house models which aim to standardise transactions (in terms of contracting clauses, royalty rates, etc.). However, in order to ensure conformity with patent rights and a well-functioning market, patent policies must abide by competition policies and anti-trust laws.[8]

Because of these advantages and drawbacks in the use of patents as policy instruments, there is an ongoing debate among economists about the best design for a patent system and whether it is in the interest of society to have such a system in the first place. No absolute consensus has emerged, but there is broad agreement on the following points:

- Patents granted should be of "high quality", meaning that they should cover significant inventions only and reveal the actual content of the invention.
- Competition policy should keep close watch on the patent system.
- The patent system should be used as a complement to other instruments of innovation policy, notably science policy, sectoral policies and public procurement.
- Mechanisms that facilitate the circulation of and access to patents should be encouraged, although not to the detriment of competition (*e.g.* patent pools, licensing contracts, etc.).

Since the early 1980s, important market and policy changes have helped to expand the role of patents in the economy. With increased international competition, the emergence of information technologies and biotechnology, and the increased importance of start-ups and firms specialised in R&D, the use of patents has become more widespread among innovative firms. The growing relevance of technological competition in markets has increased the importance of intellectual property rights in companies' economic value. In parallel, since the early 1980s, patent policy worldwide has been oriented towards strengthening the rights of patent holders. In the United States, the Federal Court Improvements Act, enacted in March 1982, created the Court of Appeals of the Federal Circuit (CAFC) to consolidate patent decisions (the CAFC was assigned jurisdiction over appeals of patent cases in all federal circuits); and from 1980 the Bayh-Dole Act enabled non-profit research groups to patent and commercialise technologies developed with federal funds, in view of facilitating their commercialisation.

In Europe, the creation of the European Patent Office (established in 1977) led to stronger patents in many countries. In Japan, a series of reforms since the late 1990s has tended to reinforce patent holders' rights. The signature of the TRIPS in 1994 showed countries' willingness to push for greater harmonisation of patent rights. As a result of these moves, the number of patent applications worldwide rose considerably between the mid-1990s and the mid-2000s and continues to rise. For instance, the number of patent applications at the EPO grew by 6% a year on average over the period 1995-2005, while at the USPTO applications rose by an average of 7% a year (OECD, 2007).[9]

The patent landscape changed markedly as a result, as new actors have emerged (universities) and non-standard uses of patents have expanded (*e.g.* licensing, raising capital). It is important to keep this changing context in

mind when interpreting patent statistics, especially time trends and cross-country or cross-industry comparisons.

2.5. The information content of patent documents

A patent document contains a large amount of information, all of which has potential for statistical analysis. This is not only true for the bibliographic information gathered on the front page, but also even for the abstract, the claims, and the description of the invention, which can be subjected to textual analysis. For statistical purposes, information contained in a patent document can be grouped into three distinct categories:

- Technical description of the invention.
- Development and ownership of the invention.
- History of the application.

Most of the types of information explained below are available regardless of the patent office at which the application is filed, as information requirements and procedures are quite standardised throughout the world. Some of the procedural information is not available from the patent documents themselves, but is recorded and published by patent offices in other ways.

2.5.1. Technical description of the invention

- Title and abstract (describes the invention).
- The list of "claims". This describes the innovative content of the claimed field of exclusivity. The claims define the scope of protection of the patent rights (legal boundaries). It can be more or less broad or narrow, depending on the content and number of claims.
- The technical classes to which the invention pertains (based on patent classification). These are fixed by patent examiners. The most commonly used classification is the International Patent Classification (IPC) system. In parallel, the national (*e.g.* USPC at the USPTO) or regional (ECLA at the EPO) patent classification is contained in the patent document (*e.g.* ECLA is very detailed, with more than 100 000 categories; it is a breakdown of the IPC).
- Prior art. Each patent lists prior art relevant to the invention. The prior art determines the boundaries of what is in the public domain and what the applicant is entitled to in relation to the claims. The cited (patent and non-patent) references help to define the patent's claims and its specific uses and applications.
- Patent references. These are citations to previous relevant technology protected by or described in other patents filed anywhere in the world, at any time, in any language.

- Non-patent references. These include scientific publications, conference proceedings, books, database guides, technical manuals, descriptions of standards, etc.

2.5.2. *Development and ownership of the invention*

- The list of inventors and their respective addresses. Inventors are individuals, usually employees of the patent applicants. In the United States, inventors are the applicants.
- The list of applicants (assignees in the United States) and their respective addresses. Applicants will have legal title to (be the owners of) the patent if it is granted. In the vast majority of cases, the applicants will be companies and the inventors their employees. However, it is also possible for the same person to be an inventor and an applicant (*e.g.* independent inventors).[10]

2.5.3. *History of the application*

- Publication number, application number, patent (grant) number. These numbers have various formats depending on the patent office. They can be used as identifiers when performing data analysis on patent databases.
- Priority number. This is the application or publication number of the priority application, if applicable. It makes it possible to identify the priority country, reconstruct patent families, etc.
- Priority date. This is the first date of filing of a patent application, anywhere in the world (usually in the applicant's domestic patent office), to protect an invention. It is the closest to the date of invention.
- Date of filing. This is the first day that protection will apply in the country concerned if the patent is granted.
- Date of publication. Patents are normally published (*i.e.* the information is available to the public) 18 months after the priority date. Prior to the publication of a patent document, the content of the document remains secret.[11]
- List of designation. For patent applications filed using the European Patent Convention or Patent Cooperation Treaty procedures, applicants are required to designate the member countries in which protection is being sought.
- Date of refusal or withdrawal. This indicates that the invention did not fulfil the statutory criteria (novelty, non-obviousness or industrial applicability) for patentability, or that the applicant decided to suspend the patent application during the examination process.
- Date of grant. There is a delay between the application date and the date of patent approval. In general, it takes between two and eight years for a patent to be granted.

- Date of lapse. A patent can lapse prior to the statutory expiry date if renewal fees are not paid or if it is revoked by the courts. This "post-grant information" is usually available from "patent registers", which also record (depending on the country) changes in ownership, declared licensing contracts, etc.[12]

2.6. Patents as statistical indicators of inventive activity

Among the few available indicators of technology output, patent indicators are probably the most frequently used. Patent-based statistics have several uses. They allow for measuring the inventiveness of countries, regions, firms or individual inventors, under the assumption that patents reflect inventive output and that more patents mean more inventions. Empirical research has shown that patents are frequently a good predictor of economic performance. In a study of 258 R&D professionals, Keller and Holland (1982) concluded that the number of an inventor's patents is significantly correlated with superior performance ratings and self-rating. In a study of 1 200 companies in high-technology industries, Hagedoorn and Clood (2003) concluded that the number of patents filed by a company is a very good reflection of its technological performance. At the country level, de Rassenfosse and van Pottelsberghe (2008) have found a high correlation between patent numbers and R&D performance.

Patents statistics are also used to map certain aspects of the dynamics of the innovation process (*e.g.* co-operation in research, diffusion of technology across industries or countries, etc.), or of the competitive process (the market strategy of businesses); they are also used to monitor the patent system itself. In addition, patents are helpful for tracking globalisation patterns. For example, using the inventor's address, patent indicators can be developed to monitor the internationalisation of research, *i.e.* international co-invention in S&T activities or the mobility of inventors across countries.

Whereas patent applications are an indicator of successful research –notably in a particular line of research or in a programme – patents do not reflect all of the research and innovative efforts behind an invention. Conversely, an invention covered by a patent (a new product or process) need not actually be industrially applied. It is reported that many patents are never implemented, because, having submitting an application, the inventor realises that the invention does not have sufficient economic value or that a superior invention can be marketed more rapidly. According to the PATVAL survey (2005), about 40% of patents in the sample are not used for industrial or commercial purposes for strategic reasons or because the owners lack the complementary downstream assets to exploit them: 18.7% are not used and aim to block competitors, and 17.4% are considered "sleeping patents" that are not used at all.

Patents can also be considered as an intermediate step between R&D (upstream) and innovation (the invention is used downstream in economic processes). Patents can be obtained at different stages of the R&D process, notably in the case of incremental or cumulative inventions. In this sense, patents can be seen not only as an output of R&D but also as an input to innovation and thus as both inputs and outputs in the invention process. This intermediate character makes patent data a useful bridge between R&D data and innovation data (both of which are collected through business surveys).

Patent data have advantages and disadvantages for reflecting inventive activities. Their major advantages are:

- Patents cover a broad range of technologies for which there are sometimes few other sources of data (*i.e.* nanotechnology).
- Patents have a close (if imperfect) link to invention. Most significant inventions from businesses are patented, whether based on R&D or not.
- Each patent document contains detailed information on the invention process: a reasonably complete description of the invention, the technology field concerned, the inventors (name, address), the applicant (owner), citations to previous patents and scientific articles to which the invention relates, etc. The amount of patent data available to researchers is huge. More than one million patents are applied for worldwide each year, providing unique information on the progress of invention. Patent data are public, unlike survey data which are usually protected by statistical secrecy laws.
- The spatial and temporal coverage of patent data is unique. Patent data are available from all countries with a patent system, *i.e.* nearly all of the world's countries. They are available – sometimes in electronic form – from first patent systems, which go back to the 19th century in most OECD countries.
- Patent data are quite readily available from national and regional patent offices. The marginal cost for the statistician is much lower than for conducting surveys although it is sometimes still significant (data need to be cleaned, formatted, etc.). Unlike survey data, collection of patent statistics does not put any supplementary burden on the reporting unit (*e.g.* business) because the data are already collected by patent offices in order to process applications.

However, as indicators of technological activity, patents have certain drawbacks:

- Not all inventions are patented. Inventions with few economic possibilities may not justify the cost of patenting. Inventions that make a trivial contribution to the art and non-technological inventions do not qualify under the legal requirements of patenting. Strategic considerations may lead the

inventor to prefer alternative protection (secrecy), with the result that the patent data do not reflect such inventions (*e.g.* Pavitt, 1988).

- The propensity to file patent applications differs significantly across technical fields. For instance, in the electronics industry (*e.g.* semiconductors) a patented invention can be surrounded by patent applications on incremental variations of the invention, with a view to deterring the entry of new competitors and to negotiating advantageous cross-licensing deals with competitors. As a result of this "patent flooding" strategy, some technical fields have a larger number of patents than others. Companies' propensity to patent also differs: new or small and medium-sized enterprises (SMEs) – notably those that lack large-scale production – have more difficulty covering the costs of a patent (although national policies attempt to deal with this problem by providing SMEs with subsidies or discount rates).
- Several studies have shown that the value distribution of patents is highly skewed (*e.g.* Pakes and Schankerman, 1986; Harhoff *et al.*, 1999). Many patents have no industrial application (hence, are of little or no value to society), whereas a few have very high value. Nonetheless, the disclosure of information represents a benefit for society, as it increases the stock of knowledge. With such heterogeneity, simple patent counts can be misleading. This is not specific to patents, but a reflection of a prominent feature of the inventive process which also applies to R&D expenditure (which often results in little success, but sometimes in huge success).
- Differences in patent law and practices around the world limit the comparability of patent statistics across countries. It is therefore preferable to use homogenous patent data (coming from a single patent office or single set of patent offices).
- Changes in patent laws over the years call for caution when analysing trends over time. The protection afforded patentees worldwide has been stepped up since the early 1980s, and companies are therefore more inclined to patent than before. The list of technologies covered has grown longer over time and in some countries now includes software and genetic sequences, which were previously excluded. Other variables such as office administration can have a substantial impact on patent counts, notably patents granted, during a particular time period.
- Patent data are complex, as they are generated by complex legal and economic processes. It is therefore important to take into account all of these factors when compiling and interpreting patent data, as failing to do so leads to erroneous conclusions.

Most of the limitations outlined above can be overcome by using appropriate methodologies to address data bias and limitations in order to limit their impact. For example, the issue of the skewed distribution of patent value can be

addressed by weighting patent counts by number of citations, or by selecting a sub-sample of patents that are of similar value (*e.g.* triadic patents capture high-value patents, see Chapter 4). Similarly, to surmount the drawbacks associated with differing propensities to patent across industries, one can restrict the analysis to a sector or industry or weight the data appropriately.

Depending on the question addressed, patent data can be used in conjunction with other data, such as R&D or innovation survey data, to investigate innovation and technological performance. This combination makes it possible to corroborate (or negate) interpretations drawn from each separate source of data, and data linking allows for extracting more information (*e.g.* in certain circumstances the degree of success of R&D can be inferred from patent filings). Certain researchers have linked patent data with other data, such as R&D surveys or other business data (notably private databases); others have developed special surveys which complement patent data in order to better measure the variables of interest, *e.g.* surveys of technology companies about their use of patents (Carnegie Mellon survey; Cohen *et al.*, 2000), surveys of inventors to learn the process that led to the patents or the value of patents (Gambardella *et al.*, 2005).

2.7. Patent databases

Patent databases have been developed for a long time. Databases including bibliographic information (described in Section 2.3) and the full text of patents are basic tools in the research and examination procedures carried out at patent offices, as they record the patented prior art. In the last decade, databases have expanded, linking patent data to other information: company data (*e.g.* after standardisation of applicants' names and matching to companies' lists of names), industry classifications, codification of territorial levels (regions) based on addresses (inventors or applicants), etc.

Patent databases can include additional information on the examination processes, such as the legal status of examination and the filing and publication of the application. Some other types of data are rarely codified by patent data producers. For instance, changes in ownership during the examination process or during the life of a patent are seldom registered in the traditional patent databases that are made available by patent offices.

Although patent data are produced by the patent authorities, patent databases using such data are also produced and published by private entities. Users should be attentive to the types of patent information contained in the databases and the kinds of information that can be reflected in the statistics and indicators.

Some patent databases widely used for statistical and research purposes are: the NBER Patent Citations Data Files created by Jaffe, Trajtenberg and Hall,

with the assistance of researchers at the NBER and Case Western Reserve University; the EPO Worldwide Patent Statistical Database (also known as EPO PATSTAT) created by the EPO with the OECD Patent Statistics Task Force; and the IIP (Institute of Intellectual Property) patent database, which gathers internal patent data from JPO (Seiri Hyojunka Data).

2.8. Topics of investigation

Indicators and studies based on patent data are extremely diverse in terms of the publication format (statistical directories, policy reports, academic research); the level of aggregation of the data compiled (national, regional, company level, industry or technical field level); the approach taken (compilation of indicators, performance of econometric estimates); and the analytical or policy questions addressed. The following is a non-exhaustive list of topics addressed in the extensive literature that uses patent data:

- **Technological performance.** Patents are used to monitor the technological performance of companies (or other organisations), regions or countries. Compared to other output indicators such as publications, patents are a more proper indicator of activities closer to technology development. They help track technological leadership or positioning in a given technology field or area (*e.g.* indexes of revealed technological advantages) and changes over time. As indicators of technological performance, the level of technological specialisation and/or strength of a geographical region or country (or company) helps policy makers to identify weak and strong areas in national or regional innovation systems.
- **Emerging technologies.** Patent-based indicators are a unique means – sometimes the only one available – to track the rise of emerging technologies (*e.g.* nanotechnology, biotechnology). Particular technical fields can be built up by using keywords or by searching in abstracts and patent descriptions. The detailed information provided in patent documents permits the identification of the companies or agencies active in these fields, the modes of invention (*e.g.* inter-institutional collaboration), the mapping of technology clusters, etc. Patent data can be used in conjunction with data on scientific publications. Business surveys usually come at a later stage of development, as they require precise advance knowledge of the field (notably of the active entities).
- **Knowledge diffusion and the dynamics of technical change.** Because they provide a detailed description of how the inventions have been made and the prior art, patents are a reliable measure of knowledge transfer. Patent citations point to the use of previous inventions in new inventions, which makes it possible to identify the influence of particular inventions or particular sets of inventions and map their diffusion in the economy. Citations of other patents or the non-patent literature (notably scientific publications) are useful

in quantifying knowledge transfers across organisations (*e.g.* company to company or university to industry), geographical regions and/or technology fields, as well as knowledge spillovers from specific inventing entities (*e.g.* multinational to domestic firms or from public research centres to industry).

- **Geography of invention.** As the addresses of the inventor and applicant are reported, patents can be allocated across regions at any degree of detail (although this involves a non-negligible amount of work as the raw data are not always well formatted). Hence patent data can be used to study the geographical properties of inventive processes, *e.g.* the role of local actors in regional or national innovation (universities, small companies, large companies, etc.), their interactions, the profile and impact of regional technological specialisation, etc.[13]
- **Creativity and social networks.** Patent information can be used to track the career and performance of individual inventors (*e.g.* their field of work, location, employer), or to analyse networks of inventors (who invents with whom, etc.).
- **The economic value of inventions.** An invention's value is an important indication of its economic impact. Patent data provide unique access to information about the value of inventions. Correlations between the value of a patent and the number and quality of its (forward) citations have been demonstrated; this information can be exploited to compile indicators of the relative value of patents. By matching applicants' names with company data, patent data can be linked to economic data such as stock market data, accounting data, etc.
- **Performance and mobility of researchers.** As the inventor's name is reported in patent documents, it is possible to investigate aspects of inventiveness at the level of individual researchers. This involves a great deal of data cleaning, as identifying individuals in databases with millions of names is not a straightforward task. However, this information can be used to investigate issues such as researcher mobility (across companies or countries), differences in profiles across fields, who works with whom, gender issues (when identifiable with the aid of complementary data), etc. (Trajtenberg *et al.*, 2006).
- **The role of universities in technological development.** The impact of universities can be observed by compiling counts of the patents they have taken, their (forward) citations, etc. It can also be observed from the citations of academic research in patents filed by industry (Narin *et al.*, 1999). In an increasing number of countries, number of patents is used by funding agencies or ministries to evaluate the performance of academic institutions or individual researchers.

- **Globalisation of R&D activities.** Patents include information on the inventive performance and activities of multinational firms. Through the applicants' and inventors' addresses, it is possible to track the patterns and the intensity of international co-invention (the measure of research collaboration between inventors located in different countries), foreign ownership of domestic inventions, and *vice versa* .
- **Patenting strategies by companies.** The history of the patent application is also available in the patent document. It reveals the timeline of the invention, the application's passage through the patent office's workflow, and the applicant's strategies (designated states, patent equivalents and priority dates, etc). This information is helpful in identifying the market strategy of the patent owner, notably the countries for which protection is being sought and their order of importance.
- **Assessing the effectiveness of the patent system.** Patent data can also be used to assess the effect of the patent system on inventions and diffusion. To what extent and in which ways does the economy benefit from the patent system? To what extent are strategies with alleged negative social impact (blocking, fencing, etc.) adopted by applicants? What is the effect of particular patent-related policies on national economic performance?
- **Forecasting patent applications.** Patent data compiled over time are also helpful in predicting future demand for patents. This is useful for patent offices' budgetary planning.
- **Monitoring the internal working of the patent system.** Not surprisingly, patent data can also be used to monitor the patent system itself, *i.e.* the volume of patenting activity by companies, the way patent offices operate, etc. However, this use of patent data is not a major focus of this manual, which concerns patent data as indicators of technology. In many cases, different statistical rules should apply when monitoring the patent system. For instance, dates that are purely administrative (*e.g.* issue date of the search report) and are of little interest from an economic perspective can be extremely important for assessing the internal performance of a patent office. Such use of patent data is mainly made by patent offices themselves (see the annual *Trilateral Statistical Report* published jointly by the EPO, the JPO and the USPTO, or the various statistical publications of the WIPO).

Notes

1. Certain jurisdictions provide extended terms for certain inventions (*e.g.* drugs) in order to compensate for the administrative delays in granting approval to market.
2. While most of the methodologies and patent indicators described apply to patents (known as "utility patents" in the United States) and utility models, the focus here is on the former as patents offer more standardised intellectual property rights

over inventions worldwide than the latter. Utility models or "petty patents", like patents, give market exclusivity to their holder. As compared with patents, they are weaker (shorter life span, often six or ten years) and easier to obtain (less stringent *patentability* requirements). They are not available in all countries.

3. This procedure allows the claiming of first priority while keeping the right to file actual patent applications in member countries later. An international patent application has two phases. The first phase is the international phase in which patent protection is pending under a single patent application filed with the patent office of a contracting state of the PCT. The second phase is the national and regional phase, following the international phase, in which rights are continued by filing necessary documents with the patent offices of separate PCT contracting states. The decision on the granting of a patent remains the responsibility of each of the designated national or regional offices.

4. However, in Europe, the centralised EP opposition procedure as well as the centralised EP appeal procedure may lead to the revocation of a European patent as an alternative to legal action.

5. Following the WIPO standards, two-letter INID codes ("internationally agreed numbers for the identification of bibliographic data") are indicated to identify bibliographic elements on the front page of a patent document. They help to harmonise the usage and appearance of patent specifications and related material, and provide a means of conveying information without using foreign languages or scripts.

6. However, trade secrets are subject to legal protection in the framework of TRIPS (see art. 39).

7. The extent and duration of market power depends on several factors, *e.g.* the degree of substitutability of technologies, the rate of technological change, etc.

8. Some practices in the exploitation of patents can restrict competition in technology markets beyond the rights embodied in the intellectual property right, *e.g.* tying the sale of other unpatented products or materials to patented inventions (tie-in), restraining licensees' commerce outside the scope of the patent (tie-out), imposing veto power over grants of further licences, setting royalties not reasonably related to sales of the patented products, etc.

9. In contrast, the number of patent applications at the JPO was relatively stable over the period 1991-2005 (OECD, 2007).

10. Changes in ownership over time are not always recorded in patent databases. In the majority of patent offices, the last information released reports the last owner(s) registered, and registration of a new owner, in the event of such a change, is not compulsory.

11. In some cases, applicants can request early publication of the patent application prior to the habitual dates (see Chapter 3, Section 3.3.2).

12. In certain offices, patent applications can also "lapse" during examination, due to refusal or non-payment of fees, or "induced withdrawal" after a discouraging search report or for applicants' own business reasons.

13. Attention must be paid when interpreting geographical patent data, notably in terms of activities by companies, as their research activity is spread geographically and the address of invention is not necessarily where the research actually took place.

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ANNEX 2.A1

Figure 2.A1.1. **Front page of an EPO patent application**

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 046 310**
A1

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number: 81108647.1

(22) Date of filing: 16.10.79

(51) Int.Cl.³: **H 02 K 15/02**, H 01 F 29/10, H 01 F 41/02

(30) Priority: 18.10.78 AU 6456/78

(43) Date of publication of application: 24.02.82 Bulletin 82/8

(84) Designated Contracting States: AT BE CH DE FR GB IT LU NL SE

(62) Publication number of the earlier application in accordance with Art. 76 EPC: 0010585

(71) Applicant: Card-O-Matic Pty. Ltd., 20 McEnvoy Street, Waterloo New South Wales, 2017 (AU)

(72) Inventor: Stanley, Louis, 22 Penyara Road, Beverley Hills New South Wales 2209 (AU)

(74) Representative: Baillie, Iain Cameron et al, c/o Ladas & Parry Isartorplatz 5, D-8000 München 2 (DE)

(54) **Electrical equipment and its fabrication.**

(57) An inductive electric machine such as an induction motor or a transformer having field and rotor cores, or, respectively, primary and secondary cores, each such core being formed of metal strip (204) punched to have a plurality of holes spaced and located at predetermined positions along the strip (204) so that, when the strip is wound about a central axis, the holes (205, 206, 209) are located so as to form radially extending slots (205, 208, 209) on a face of each such core. Windings (213) can be placed in the slots of the field core and in the slots of transformer cores. A conductor (208) can be placed in the slots of the rotor core.

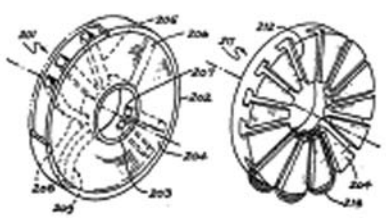

Figure 2.A1.2. **Sample front page of a JPO patent application**
This is a sample, not a copy of a real application

(19)日本国特許庁(JP)　　(12)公 開 特 許 公 報(A)　　(11)特許出願公開番号
特開２０００－２４４５７９
〈Ｐ２０００－２４４５７９Ａ〉
(43)公開日　平成12年５月20日(2000.5.20)

(51)Int.Cl.⁷	識別記号	FI			テーマコード(参考)
Ｇ０１Ｂ　3/00	１０１	Ｇ０１Ｂ　3/00	101	A	2C032
Ｇ０２Ｃ　26/00		Ｇ０２Ｃ　26/00			2F029
23/02		23/02			
		Ａ４５Ｃ　12/00	101	A	
		Ａ４７Ｂ　23/02			

審査請求　未請求　請求項の数１　ＯＬ　外国語出願　公開請求　〈全６頁〉　最終頁に続く

(21)出願番号　特願平11-123456

(22)出願日　平成11年11月10日(1999.11.10)

(31)優先権主張番号　８３３０４３５９．９
(32)優先日　平成10年11月12日(1998.11.12)
(33)優先権主張国　フランス〈ＦＲ〉

特許法第30条第１項適用申請有り　平成10年９月21日付画像工学会研究専門委員会主催の1992年度画像符号化シンポジウム〈ＰＳＣＪ92〉において文書をもって発表

特許法第65条の２第２項第４号の規定により明細書及び図面の一部は不掲載とする。

(71)出願人　390000011
パテント　コーポレーション
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日本特許発明株式会社
東京都千代田区内幸町４丁目５番６号
(72)発明者　発明　太郎
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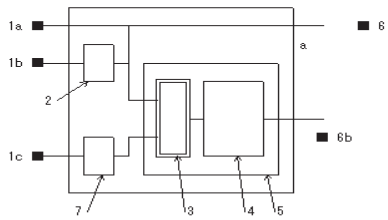
(74)代理人　123456789
弁理士　代理　太郎　〈外２名〉
最終頁に続く

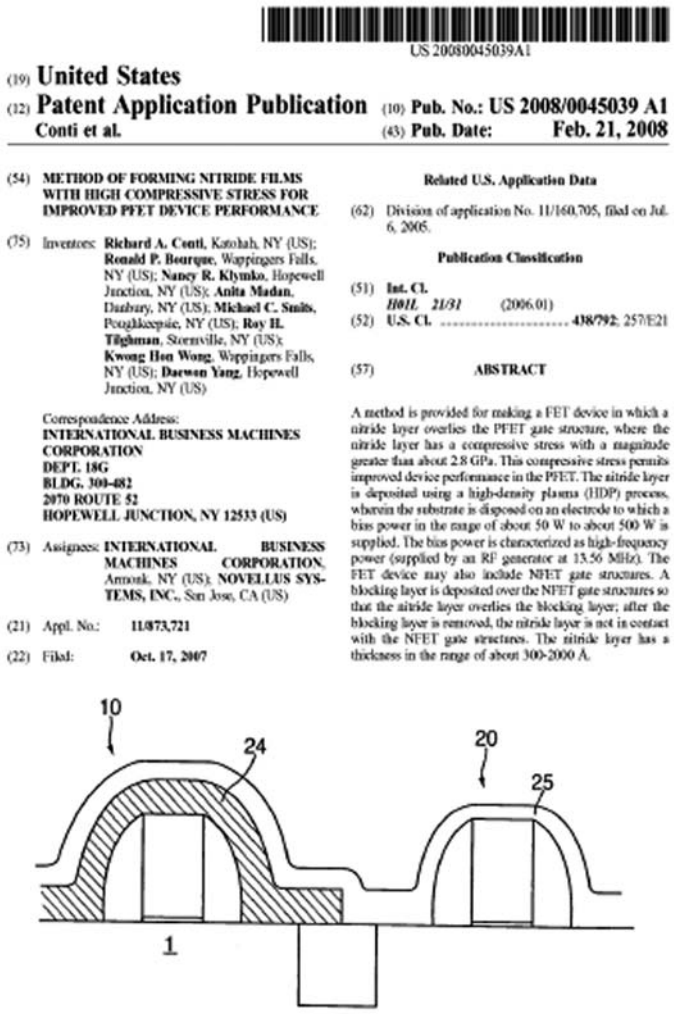
(54)【発明の名称】ファクシミリ走査装置

(57)【要約】　〈修正有〉
【目的】ファクシミリ端末パラメータ識別方法に関し、ファクシミリ装置機能のパラメータ拡張を容易にする。
【構成】通信時の端末パラメータを識別する方法において、端末パラメータを含む制御信号の送信端末１ａ、１ｂは制御信号のファクシミリ情報フィールドを、複数のサブフィールドに分離し、各サブフィールドの情報を分離するファクシミリ情報フィールドのデータ中には現れない特定の識別コードを挿入してファクシミリ情報フィールドを作成する。制御信号の受信端末７はファクシミリ情報フィールド内の上記特定の識別コードを検出し、ファクシミリ情報フィールドを複数のサブフィールドに分離して、各サブフィールドの情報の内容を解析し相手端末の端末パラメータの内容を検出する。装置機能のパラメータを拡張する場合はユニークコードを挿入して可変長の端末パラメータを分離する。



OECD PATENT STATISTICS MANUAL – ISBN 978-92-64-05412-7 – © OECD 2009

Figure 2.A1.3. **Front page of a USPTO published patent application**



US 20080045039A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2008/0045039 A1**

Conti et al. (43) **Pub. Date: Feb. 21, 2008**

(54) **METHOD OF FORMING NITRIDE FILMS WITH HIGH COMPRESSIVE STRESS FOR IMPROVED PFET DEVICE PERFORMANCE**

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(21) Appl. No.: **11/873,721**

(22) Filed: **Oct. 17, 2007**

Related U.S. Application Data

(62) Division of application No. 11/160,705, filed on Jul. 6, 2005.

Publication Classification

(51) **Int. Cl.**
H01L 21/31 (2006.01)

(52) **U.S. Cl.** **438/792**; 257/E21

(57) **ABSTRACT**

A method is provided for making a FET device in which a nitride layer overlies the PFET gate structure, where the nitride layer has a compressive stress with a magnitude greater than about 2.8 GPa. This compressive stress permits improved device performance in the PFET. The nitride layer is deposited using a high-density plasma (HDP) process, wherein the substrate is disposed on an electrode to which a bias power in the range of about 50 W to about 500 W is supplied. The bias power is characterized as high-frequency power (supplied by an RF generator at 13.56 MHz). The FET device may also include NFET gate structures. A blocking layer is deposited over the NFET gate structures so that the nitride layer overlies the blocking layer; after the blocking layer is removed, the nitride layer is not in contact with the NFET gate structures. The nitride layer has a thickness in the range of about 300-2000 Å.

Figure 2.A1.4. **Front page of a PCT application**

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
18 December 2003 (18.12.2003)

PCT

(10) International Publication Number
WO 03/104470 A2

(51) International Patent Classification[7]: C12N 15/90, 9/12, 15/11, 15/79, A61K 48/00

(21) International Application Number: PCT/CA03/00850

(22) International Filing Date: 5 June 2003 (05.06.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/386,640 5 June 2002 (05.06.2002) US

(71) Applicant *(for all designated States except US)*: **HER MAJESTY IN RIGHT OF CANADA As represented By the MINISTER OF AGRICULTURE AND AGRI-FOOD CANADA** [CA/CA]; Agriculture and Agri-food Canada, Saskatchewan Research Centre, 107 Science Place, Saskatoon, Saskatchewan S7N 0X2 (CA).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **ROZWADOWSKI, Kevin, L.** [CA/CA]; 86 Harvard Crescent, Saskatoon, Saskatchewan S7N 3R1 (CA). **LYDIATE, Derek, J.** [GB/CA]; 101 Albert Street, Saskatoon, Saskatchewan S7N 1E6 (CA).

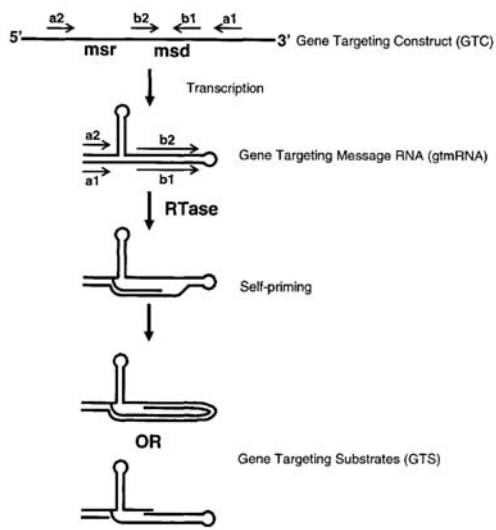
(74) Agents: **Kingwell, Brian, G.** et al.; Smart and Biggar Box 11560, Vancouve 650 West Georgia Street, Suite 2200 Vancouver, British Columbia V6B 4N8 (CA).

(81) Designated States *(national)*: AE, AG, AL, AM, AT (utility model), AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, ES, FI (utility model), FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK (utility model), SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,

[Continued on next page]

(54) Title: RETRONS FOR GENE TARGETING



(57) Abstract: The invention provides methods and nucleic acid constructs that may be used to modify a nucleic acid of interest at a target locus within the genome of a host. In some aspects, the invention contemplates producing *in vivo* a gene targeting substrate (GTS), which may be comprised of both DNA and RNA components. The gene targeting substrate may comprise a gene targetig nucleotide sequence (GTNS), which is homologous to the target locus, but comprises a sequence modification compared to the target locus. The gene targeting substrate may be produced by reverse transcription of a gene targeting message RNA (gtmRNA). The gene targeting message RNA may be folded for self-priming for reverse transcription by a reverse transcriptase. The gene targeting message RNA may in turn be the product of transcription of a gene targeting construct (GTC) encoding the gene targeting message RNA. The gene targeting construct may for example be a DNA sequence integrated into the genome of the host, or integrated into an extrachromosomal element. Following expression of the gene targeting systems of the invention, hosts may for example be selected having genomic modifications at a target locus that correspond to the sequence modification present on the gene targeting nucleotide sequence. In some embodiments, the structure of retrons may be adapted for use in the gene targeting systems of the invention.

WO 03/104470 A2

Acronyms

AFA	Activity of Foreign Affiliates Database
ARIPO	African Regional Intellectual Property Organization
BEA	Bureau of Economic Analysis (United States)
CAFC	Court of Appeals of the Federal Circuit (United States)
CIP	Continuation-in-Part
CIPO	Canadian Intellectual Property Office
DPMA	Deutsches Patent- und Markenamt (Germany)
ECLA	European Classification System
EPC	European Patent Convention
EPLA	European Patent Litigation Agreement
EPO	European Patent Office
EU	European Union
FhG-ISI	Fraunhofer Institute for Systems and Innovation Research
GATT	General Agreement on Trade and Tariffs
ICT	Information and communication technologies
IIP	Institute of Intellectual Property (Japan)
INID	Internationally agreed numbers for the identification of bibliographic data
INPI	Institut National de la Propriété Intellectuelle (France)
IPC	International Patent Classification
IPRP	International preliminary report on patentability
ISA	International search authorities
ISIC	International Standard Industrial Classification
ISR	International search report
NACE	Classification of Economic Activities in the European Community
NAICS	North American Industry Classification System
NBER	National Bureau of Economic Research (United States)
NISTEP	National Institute of Science and Technology Policy (Japan)
NSF	National Science Foundation (United States)
NUTS	Nomenclature of territorial units for statistics (*Nomenclature des unités territoriales statistiques*)
OECD	Organisation for Economic Co-operation and Development
OST	Observatoire des Sciences et des Techniques (France)

PATSTAT	Worldwide Statistical Patent Database (EPO)
PCT	Patent Co-operation Treaty
SIC	Standard Industrial Classification
SIPO	State Intellectual Property Office of the People's Republic of China
SMEs	Small and medium-sized enterprises
STAN	Structural Analysis Database
TL	Territorial level
TRIPS	Trade-related intellectual property rights
USPC	United States Patent Classification System
USPTO	United States Patent and Trademark Office
WIPO	World Intellectual Property Organization
WOISA	Written opinion of the international search authorities
WTO	World Trade Organization

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OECD Patent Statistics Manual

Glossary

Appeal: A procedure by which the applicant or patent holder can request reversal of a decision taken by the patent office.

- *USPTO:* An applicant for a patent dissatisfied with the primary examiner's decision in the second rejection of his or her claims may appeal to the Board of Patent Appeals and Interferences (BPAI) for review of the examiner's rejection. The Board is a body of the USPTO which reviews adverse decisions of examiners in patent applications and determines priority and patentability of invention in interferences. Decisions of the Board can be further appealed to the *Court of Appeals for the Federal Circuit* (CAFC) or to a district court.
- *EPO:* Decisions of the first instances of the EPO can be *appealed* before the Boards of Appeal of the EPO, in a *judicial* procedure (proper to an administrative court), as opposed to an *administrative* procedure. These boards act as the final instances in the *granting* and *opposition* procedures before the EPO. In addition to the Boards of Appeal, the European Patent Office has an Enlarged Board of Appeal. This instance takes decisions only when the *case law* of the Boards of Appeal becomes inconsistent or when an important point of law arises.
- *JPO:* An applicant who receives a rejection can appeal. The panels consist of three or five trial examiners in the Appeals Department of the JPO. Decisions of the panels can be further appealed to the Intellectual Property High Court, a special branch within the Tokyo High Court.

Applicant: The holder of the legal rights and obligations on a patent application. It is most often a company, a university or an individual.

Application date: The date on which the patent office received the completed patent application. A unique number is assigned to a patent application when it is filed.

Assignee: In the United States, the person(s) or corporate body to whom all or limited rights under a patent are legally transferred by the inventor (equivalent to "applicant" in this context).

Citations: References to the prior art in patent documents. Citations may be made by the examiner or the applicant. They comprise a list of references which are believed to be relevant prior art and which may have contributed to defining the scope of the claims of the application. References can be made to

other patents, to technical journals, textbooks, handbooks and other sources. *USPTO:* Applicants before the USPTO are required to disclose prior art known to them that is material to patentability; *EPO:* No such obligation for the applicant; *JPO:* The requirement for disclosure of information on prior art documents was introduced as of 1 September 2002 and entered into full force on 1 May 2006.

Claim(s): Definition of the scope of the invention and the aspects of the invention for which legal protection is sought.

Continuation(s) *(USPTO)***:** Second or subsequent applications for the same invention claimed in a prior non-provisional application and filed before the first application is abandoned or patented. Continuations must claim the same invention as the original application to gain the benefit of the parent filing date. At the time of filing the claims are often the same but the claims may change during prosecution so that they are not exactly the same but not patentably distinct. There are three types of continuing applications: division, continuation and continuation-in-part.

Designated countries: In international and regional patent systems, countries in which patent applicants wish to protect their invention if/when the patent is granted. International application filing automatically includes the designation for all PCT contracting countries that are bound by the PCT on the international filing date (since 2004). A similar rule will apply to the EPO from April 2009, as European patent applications designate all contracting states as in the PCT procedure.

Direct European route (application): A patent application filed under Article 75 EPC (also known as an "Euro-Direct application"). With the direct European route, the entire European patent grant procedure is governed by the EPC alone while with the Euro-PCT route, the first phase of the grant procedure (the international phase), is subject to the PCT.

Division: If the patent office decides that an application covers too broad an area to be considered as a single patent, the application is split into one or more divisional applications, which may or may not be pursued by the applicant. A division can also be requested at the initiative of the applicant.

Equivalent: A patent that protects the same invention and shares the same priority application as a patent from a different issuing authority.

Euro-PCT route: A way to obtain a European patent by designating the EPO in a PCT application (Article 11 PCT). The first phase of the grant procedure (the international phase) is subject to the PCT, while the regional phase before the EPO as designated or elected office is governed primarily by the EPC.

- **Euro-PCT application** – international phase (or Euro-PCT application or PCT international): A PCT application designating the EPO [Article 150(3) EPC]. With

the Euro-PCT route, the first phase of the grant procedure (international phase) is subject to the PCT, while the regional phase before the EPO as designated or elected office is governed primarily by the EPC.

- **Euro-PCT application – regional phase (or PCT regional):** PCT application entering the European (or regional) phase once the applicant has fulfilled the conditions under Article 22 or 39 PCT, Article 158 and Rule 107 EPC.

Euro-PCT search (or PCT Chapter I): Search carried out by the EPO acting as International Searching Authority for a Euro-PCT application in the international phase (Article 16 PCT).

European patent: A European patent can be obtained for all EPC countries by filing a single application at the EPO in one of the three official languages (English, French or German). European patents granted by the EPO have the same legal rights and are subject to the same conditions as national patents (granted by the national patent office). It is important to note that a granted European patent is a "bundle" of national patents, which must be validated at the national patent office in order to be effective in member countries. The validation process may include submission of a translation of the specification, payment of fees and other formalities of the national patent office (once a European patent is granted, competence is transferred to the national patent offices).

European Patent Convention (EPC): The Convention on the Grant of European Patents was signed in Munich in 1973 and entered into force in 1977. It is a multilateral treaty instituting the European Patent Organisation and providing an autonomous legal system according to which European patents are granted. The EPC provides a legal framework for the granting of European patents, via a single, harmonised procedure before the European Patent Office. It enables the patent applicant, by means of a single procedure, to obtain a patent in some or all of the contracting states. As of January 2008 there are 34 EPC member countries. In addition, extension agreements exist with five countries, offering the possibility to extend European patents to those countries upon request. EPC member countries are Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, the Netherlands, Norway, Poland, Portugal, Romania, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom. EPC extension countries are Albania, Bosnia and Herzegovina, Croatia, Former Yugoslav Republic of Macedonia, and Serbia.

European Patent Office (EPO): The European Patent Office (a regional patent office) was created by the EPC to grant European patents, based on a centralised examination procedure. By filing a single European patent application in one of the three official languages (English, French or German), it is possible to

obtain patent rights in all EPC member and extension countries. The EPO is not an institution of the European Union.

Family: a set of patents (or applications) filed in several countries to protect the same invention. They are related to each other by one or several common priority numbers. There are different definitions of patent families (*e.g.* triadic patent families, extended families including continuations, etc.). Depending on the use sought, a different family concept can be chosen, *e.g.* equivalents, triadic family or trilateral family.

First to file: A patent system in which the first inventor to file a patent application for a specific invention is entitled to the patent. This law is increasingly becoming the standard for countries adhering to the Trade-related Aspects of Intellectual Property (TRIPs) guidelines. In the EPO and the JPO, patents are awarded on a first-to-file basis, whereas in the USPTO the patent is awarded on the first to invent basis.

First to invent *(USPTO)***:** A system in which a patent is awarded to the first person who made the invention, even if another person filed for a patent before the person who invented first.

Grant: A patent application does not automatically give the applicant a temporary right against infringement. A patent has to be granted for it to be effective and enforceable against infringement.

Grant date: The date when the patent office issues a patent to the applicant.

Infringement: Unauthorised making, using, offering for sale or selling any patented invention in the country in which the patent is enforceable or importing that invention into said country during the term of the patent.

Intellectual property rights (IPR): The exclusive legal rights associated with creative work, commercial symbols or inventions. There are four main types of intellectual property: patents, trademarks, design and copyrights.

International patent application: See "PCT application". A patent application filed under the Patent Cooperation Treaty (PCT) is commonly referred to as an "international patent application". However, international patent (PCT) applications do not result in the issuance of "international patents" (*i.e.* at present, there is no global patent system that issues and enforces international patents). The decision of whether to grant or reject a patent filed under PCT rests with the national or regional (*e.g.* EPO) patent offices.

International Patent Classification (IPC): The IPC is based on an international multilateral treaty administered by WIPO. The IPC is an internationally recognised patent classification system, which provides a common classification for patents according to technology groups. The IPC is a hierarchical system in which the whole area of technology is divided into eight sections broken down into classes, subclasses and groups. IPC is periodically revised in order to

improve the system and to take account of technical development. The eighth edition of the IPC entered into force on 1 January 2006.

International Searching Authority (ISA): An office with competence to carry out the international search for a PCT application. It may be either a national office (Australia, Austria, Canada, China, Finland, Japan, Korea, the Russian Federation, Spain, Sweden, the United States) or an intergovernmental organisation (EPO), (Article 16 PCT, Article 154 EPC).

Inventive step: At the EPO and JPO, an invention is considered to include an inventive step if it is not obvious to a person skilled in the art. Inventive step is one of the criteria (along notably with novelty and industrial applicability) that need to be fulfilled in order to obtain a patent. See also "non-obviousness"*(USPTO)*.

Inventor country: Country of residence of the inventor.

Japan Patent Office (JPO): The JPO administers the examination and granting of patent rights in Japan. The JPO is an agency of the Ministry of Economy, Trade and Industry (METI).

Lapse: The date when a patent is no longer valid in a country or system owing to failure to pay renewal (maintenance) fees. Often the patent can be reinstated within a limited period.

Licence: The means by which the owner of a patent gives permission to another party to carry out an action which, without such permission, would infringe the patent. A licence can thus allow another party to legitimately manufacture, use or sell an invention protected by a patent. In return, the patent owner will usually receive royalty payments. A licence, which can be exclusive or non-exclusive, does not transfer the ownership of the invention to the licensee.

National application: A patent application that is filed at a national patent office according to a national procedure.

Novelty: An invention cannot be patented if certain disclosures of the invention have been made.

Non-obviousness *(USPTO)***:** Something is obvious if the differences between the subject matter to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person with ordinary skills in the art to which said subject matter pertains. See also "inventive step"*(EPO, JPO)*.

Opposition: This is a procedure usually before the issuing patent office, initiated by third parties to invalidate a patent:

- *EPO:* Opposition to the grant of a European patent can be filed within nine months of the mention of the grant in the European Patent Bulletin.

- *JPO:* Opposition to a grant could be filed within six months of the issue of the grant before the reform of appeals for invalidation was introduced in January 2004.

Paris Convention: The Paris Convention for the Protection of Industrial Property was established in 1883 and is generally referred to the Paris Convention. It established the system of priority rights, under which applicants have up to 12 months from first filing their patent application (usually in their own country) in which to make further subsequent applications in each signatory country and claim the original priority date. There are 172 countries party to the treaty (March 2008).

Patent: A patent is an intellectual property right issued by authorised bodies which gives its owner the legal right to prevent others from using, manufacturing, selling, importing, etc., in the country or countries concerned, for up to 20 years from the filing date. Patents are granted to firms, individuals or other entities as long as the invention satisfies the conditions for patentability: novelty, non-obviousness and industrial applicability. A patent is known as a utility patent in the United States.

Patent Cooperation Treaty (PCT): As of March 2008, there were 138 countries party to the treaty, which was signed in 1970 and entered into force in 1978, enabling a patent applicant, by means of a single procedure, to obtain a patent in some or all of the contracting states. The PCT provides the possibility to seek patent rights in a large number of countries by filing a single international application (PCT application) with a single patent office (receiving office). PCT applications do not result in the issuance of "international patents". The decision on whether to grant or reject patent rights rests with national or regional patent offices. The PCT procedure consists of two main phases: *i*) an "international phase"; and *ii*) a PCT "national/regional phase". PCT applications are administered by the World Intellectual Property Organization (WIPO).

PCT international search: A search carried out by a designated office (international searching authority) for PCT applications.

Pending application: An application has been made at the patent office, but no decision has been taken on whether to grant or reject the patent application

Prior art: Previously used or published technology that may be referred to in a patent application or examination report. In a broad sense, this is technology that is relevant to an invention and was publicly available (*e.g.* described in a publication or offered for sale) at the time an invention was made, In a narrow sense, it is any technology that would invalidate a patent or limit its scope. The process of prosecuting a patent or interpreting its claims largely consists of identifying relevant prior art and distinguishing the claimed invention from that prior art. The objective of the search process is to identify patent and non-

patent documents constituting the relevant prior art in order to determine whether the invention is novel and includes an inventive step.

Priority country: Country where the patent is first filed worldwide before being extended to other countries. See "Paris Convention".

Priority date: The priority date is the first date of filing of a patent application, anywhere in the world (usually in the applicant's domestic patent office), to protect an invention. The priority date is used to determine the novelty of the invention, which implies that it is an important concept in patent procedures. Among procedural data, priority date can be considered as the closest date to the date of invention. In the United States the date of conception comes into play during interferences.

Priority rights: see "Paris Convention".

Processing time: Duration of a process in the patent procedure (*e.g.* search, examination, grant, and possible opposition and appeal).

Publication: In most countries, a patent application is published 18 months after the priority date:

- *EPO:* All patent applications are published in this manner, whether the patents have been granted or not.
- *JPO:* Patent applications that are no longer pending in the JPO, *e.g.* granted, withdrawn, waived or rejected, are not published. While official patent gazettes are only published in Japanese, the abstracts and bibliographic data of most of the unexamined patent applications are translated into English, and are published as the Patent Abstracts of Japan (PAJ).
- *USPTO:* Prior to a change in rules under the American Inventors Protection Act of 1999, USPTO patent applications were held in confidence until a patent was granted. Patent applications filed at the USPTO on or after 29 November 2000 are required to be published 18 months after the priority date. However, there are certain exceptions for the publication of pending patents. For example, an applicant can ask (upon filing) for the patent not to be published by certifying that the invention disclosed in the application has not and will not be the subject of an application filed in another country. Also, if the patent is no longer pending or subject to a secrecy order, then the application will not be published.

Renewal fees: Once a patent is granted, annual renewal fees are payable to patent offices to keep the patent in force. In the USPTO they are referred to as "maintenance fees". In most offices, renewal fees are due every year. USPTO-granted (utility) patents are subjected to maintenance fees which are due three-and-a-half years, seven-and-a-half years, and eleven-and-a-half years from the date of the original patent grant.

Request for examination: Patent applications filed at the EPO and JPO do not automatically enter the examination process. The applicant has to submit a request for examination within six months of the transmission of the search report at the EPO, and within three years of filing at the JPO. Patent applications filed at the USPTO are automatically examined by a patent examiner without the need for a separate request by the applicant.

Revocation: A patent is revoked if after it has been granted by the patent office, it is deemed invalid by a higher authority (appeal body within the patent office or a court).

Search report: The search report is a list of citations of all published prior art documents which are relevant to the patent application. The search process, conducted by a patent examiner, seeks to identify patent and non-patent documents constituting the relevant prior art to be taken into account in determining whether the invention is novel and includes an inventive step.

Triadic patent families: The triadic patent families are defined at the OECD as a set of patents taken at the European Patent Office (EPO) and the Japan Patent Office (JPO) and granted by the US Patent and Trademark Office (USPTO) which share one or more priorities. Triadic patent families are consolidated to eliminate double counting of patents filed at different offices (*i.e.* regrouping all the interrelated priorities in EPO, JPO and USPTO patent documents).

Trilateral patent families: A trilateral patent family is part of a filtered subset of patent families for which there is evidence of patenting activity in all trilateral blocs. It is then similar to a triadic family, except that it would also include applications filed in any EPC state that do not go to the EPO (in addition to going to the JPO and USPTO). Trilateral patent families are usually counted in terms of individual priorities, without consolidation.

United States Patent and Trademark Office (USPTO): The USPTO administers the examination and granting of patent rights in the United States. It falls under the jurisdiction of the US Department of Commerce.

Utility model: This type of patent, also known as a "petty patent", is available in some countries. It usually involves less stringent patentability requirements than a traditional patent, it is cheaper to obtain and it is valid for a shorter time period.

Withdrawal: Under the European Patent Convention, the applicant can withdraw an application at any stage of the procedure either by informing the office or by abstaining from one or more of the following: pay fees in due time, file a request for examination within the given time period, or reply in due time to any communication within the examination procedure.

World Intellectual Property Organization (WIPO): An intergovernmental organisation responsible for the administration of various multilateral treaties dealing with the legal and administrative aspects of intellectual property. In the patent area, the WIPO is notably in charge of administering the Paris Convention, the Patent Cooperation Treaty (PCT) and the International Patent Classification system (IPC).

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