

INTELLECTUAL PROPERTY IN ENGINEERING

Engineering information is a nebulous term used in many different contexts with a wide variety of meanings. The term has classically been used in connection with the results of research and development, innovation, and invention, and with documents, drawings, and data describing or relating to technology. However, the term may also be considered to encompass expertise and other forms of knowledge (know-how). Engineering information is a form of intellectual property. The broader category of intellectual property covers a gamut of intangible assets, such as legal constructs reflecting rights in various types of engineering information and other forms of intangible assets—utility patents, design patents, plant patents, copyrights, mask work registrations, trademarks, trade secrets, and trade dress.

THE DIFFERENT TYPES OF INTELLECTUAL PROPERTY

Information, Data, and Know-how

The term “know-how” is often used in connection with engineering information, and with other types of business information as well. Know-how can be embodied in many forms. It can comprise physical embodiments of technical or business information, such as documents or electronic media. It can also be the intangible personal knowledge and expertise of employees. There is, however, no universally accepted definition of the term. For present purposes, “know-how” will be used as a generic term, generally defined as accumulated practical skill, expertise, data, and information that (1) relate to a company and its operations or (2) facilitate carrying out, manufacturing, or performing any form of industrial procedure or process. Examples of technological know-how include manufacturing processes, specifications, manuals, engineering notebooks, blueprints, vendor and parts lists, inventions, technical developments, and skill and expertise in operating equipment and instrumentation. Examples of business know-how include strategic business plans, marketing plans, internal procedures, sales techniques, and client lists and files.

In addition to encompassing both engineering information and business information, and both physical and nonphysical embodiments, know-how may also be categorized as either *proprietary* or *non-proprietary*. The primary distinction between proprietary and nonproprietary know-how is the extent to which certain legal protections apply.

Proprietary know-how, sometimes referred to as “trade secrets” or “confidential information,” is know-how that, unless

obtained from the owner of the know-how, cannot be derived or, at least, cannot be derived without substantial effort and expenditure of time and money. As will be discussed, legal protection of trade secrets is controlled, for the most part, by state law. To qualify as a legally protectable trade secret in most states, the know-how must not be generally known in the industry, must be subject to appropriate measures to maintain its secrecy and may not be disclosed to any entity that is not also obligated to maintain the know-how in confidence. As will be discussed in more detail, rights in proprietary know-how are typically maintained through physical security procedures and by imposing an obligation of confidentiality on all entities permitted access to the know-how. The obligation of confidentiality is typically imposed through terms in agreements such as confidentiality, employment, development, supply/vendor, manufacturing, foundry, and license agreements.

Nonproprietary know-how is information that is generally known in an industry, or basic skills or practices employed in an industry. A typical example would be the skills and knowledge acquired by an employee resulting from being trained in the operation of a commercially available machine. As a practical matter, nonproprietary know-how can best be protected by retaining employees. Under some circumstances contractual *noncompetition* provisions (obligations not to engage in competitive activities) with employees can be used to prevent competitors from getting the benefit of a company's investment in employee training. However, such agreements are often difficult to enforce; courts will typically enforce a noncompetition provision only if the scope of prohibited activities, geographic scope, and duration are reasonable under the circumstances. Establishing procedures for recording the details of processes, methods, techniques and data used by skilled employees and for retaining possession of those records also accords a modicum of protection; at least the know-how will not be entirely lost should the employee leave.

A related term is "show-how" which sometimes is used to refer to nonproprietary know-how that is communicated to the recipient of technical assistance and/or provided in connection with a license or assignment to enable use of the licensed or assigned rights.

Inventions

In general, *inventions* are new technological developments or discoveries produced or created through the exercise of independent investigation and experiment. Inventions may constitute know-how (typically trade secrets) and may be protected as such or as the subject of patents granted by the governments of various countries.

Industrial Designs and Design Patents

The term "industrial design" tends to mean different things from country to country. In general, however, "industrial design" typically refers to the appearance and nonfunctional aspects of a product. The scope of protection granted with respect to an industrial design tends to vary from country to country.

Utility Patents

In general, a patent is the grant of a privilege or authority by a sovereign government. As commonly used with respect to

engineering information, a patent is the grant of the exclusive right to make, use, offer to sell, sell, and import an invention. Patents are territorial in nature; they are enforceable only within the territory of the government granting the patent. Typically, patents are granted country by country. In most countries, to be patentable, an invention must be "novel" (not already known to the public) and involve an "inventive step" (be nonobvious to a person skilled in the relevant area of technology). The patents of the various countries differ widely in scope and effect. However, under various international conventions and treaties, an applicant for a patent in any one of the signatory countries is accorded certain rights in the other signatory countries.

Utility Model (Petty Patent). Some countries grant *petty patents* (sometimes referred to as "utility models") on functional elements of a product or process of minor importance, which may not meet minimum requirements for a patent. The term of a petty patent is typically shorter than the term of a patent, and the level of protection is lower.

Copyrights

A copyright is an exclusionary right provided to the author of an original literary or artistic work. In general, the copyright provides a remedy for unauthorized copying of artistic or literary expression in the work. It does not, however, protect ideas, concepts or methods, and therefore does not extend to use of the underlying logic or information contained in the work.

The scope and effect of a copyright varies from country to country. In most countries, copyrights come into existence upon the creation of the work, and registration or compliance with other formalities is not required for protection. Registration does, however, often provide procedural advantages. In some countries, individual authors are granted the right to protect the integrity of a work and to prevent false attribution of authorship. These are called "moral rights" and are personal and nontransferable.

Mask Works

A "mask work" is defined as a series of related images, however fixed or enclosed, that represent three-dimensional patterns in the layers of a semiconductor chip. A *mask work registration* is a statutory right in a mask work submitted for registration. Mask work protection is, in effect, a hybrid of copyright and patent protection having a registration system (similar to copyright) and a threshold "not commonplace" requirement (similar to patent novelty). Mask work protection provides a remedy for reproduction, importation, and distribution of chips embodying a registered mask work.

Trademarks, Reputation, and Goodwill

Trademarks provide only indirect protection to engineering information. Trademarks and service marks (collectively, *marks*) are words or symbols used to distinguish one entity's products or services from those of another. A mark identifies the source of the product (or service) and, in effect, connects the goodwill and reputation of a business to its products and services. Under the laws of most countries, a trademark owner has a remedy when a competitor uses a mark that is the same as or similar to the owner's mark.

Marks serve the dual purpose of protecting the interests of both the owner of the mark and consumers. If all products or services bearing a particular mark come from the same source, consumers can rely on the mark as an indication of consistency in quality. The trademark law is intended to prevent the use of any mark with products or services that is so similar to the use of a mark of another entity that consumers are likely to be confused as to the source of the products or services, or as to sponsorship or affiliation between the providers. From the perspective of the mark owner, the trademark law prevents others from attempting to pass off their goods as those made or sponsored by the mark owner or otherwise capitalizing on the mark owner's reputation and goodwill. In this way, a trademark protects the market value of the company's reputation and goodwill, as well as protecting investments in advertising and other promotional activities used to develop goodwill.

In some countries, exclusive rights to use a mark can be acquired without registering the mark with the government. In the United States, rights can be established in any of the states through actual use, and federally through being first to (1) actually use the mark in federally regulated commerce or (2) file a federal application, followed by timely actual use and registration. Federal (US) registration can effectively extend the geographic scope of the rights to all states and provide additional remedies. Other countries, however, require registration as a prerequisite to any exclusive right in the trademark and grant ownership to the first to file an application, without regard to ownership in other countries. In these countries, there is a substantial risk of trademark piracy for companies that fail to register their trademark before introducing their products.

Trade Dress

Trade dress, in general terms, is the appearance and packaging of a product. Where trade dress is sufficiently distinctive and begins to identify the source, origin, or sponsorship of a product, it can, under the laws of some countries, in effect become a trademark.

International Treaties

The Paris Convention. Under the provisions of the International Convention for the Protection of Intellectual Property (the Paris Convention), if the applicant for a patent or trademark registration in one member country files a corresponding application in any other member country within twelve months of the date of the original filing (or within six months of the filing for a trademark application design patent), the corresponding application is treated as if it had been filed at the same time as the original application.

Patent Cooperation Treaty. The Patent Cooperation Treaty (PCT) provides a mechanism for filing a single application for patents in a number of countries. The application is initially filed in a designated receiving office, with a designation of the particular countries of interest. Under the Treaty, an international search authority identifies documents (usually patents) which then are used by an international preliminary examination authority for reviewing the invention for requisite novelty and inventive step (nonobviousness). The application accompanied by the search and preliminary examination

reports is then forwarded to the patent office of each designated country, where it is examined according to that country's procedures and laws. The applications in all designated countries are processed in parallel.

The European Patent Convention. The European Patent Convention (EPC) provides a mechanism for filing a single application for a patent that is applicable throughout most European countries. A single English language application may be filed in the European Patent Office (EPO), designating various member countries (limited to European countries) where the patent will apply. The application is examined by the EPO, and ultimately granted or refused in accordance with the law of the treaty. The rights and enforcement of the European patent in the various designated countries are governed by the laws of the individual country, but the validity of the patent is governed by the law of the Treaty.

OVERVIEW AND COMPARISON OF THE BASIC MECHANISMS FOR PROTECTING ENGINEERING INFORMATION

Trade secret, patent, copyright, mask work, and trademark protection represent the basic legal mechanisms for protecting intellectual property. In addition to describing the respective types of intellectual property assets, the applicability and scope of these various protection mechanisms will now be discussed, with an emphasis on the law in the United States.

Trade Secret Protection

Any engineering information that is not readily ascertainable from publicly available information can be a *trade secret*. Trade secret protection is typically employed in connection with information, data, and know-how and various types of inventions. Maintaining intellectual property as a trade secret protects the intellectual property in the sense that if the competition does not have access to the information, it cannot copy it, and will have to go to the trouble and expense of developing the information itself.

Scope of Protection. Maintaining engineering information as a trade secret can protect the information for a potentially infinite period, that is, for as long as the information can be kept from becoming readily ascertainable from publicly available information.

State law provides for trade secret rights that are enforceable against others, but to qualify for the protection, the information must not only in fact be confidential (not generally known or readily ascertainable from publicly available information), but also be subject to reasonable efforts to maintain its secrecy (e.g., restricted access, disclosed only under confidentiality agreements). Trade secret rights are enforceable only against: (1) entities under an obligation of confidentiality imposed by written agreement or implied by the circumstances (e.g., employer–employee relationship), (2) entities that gained access to the confidential information by improper means (e.g., through industrial espionage), and (3) in some cases, entities that obtained the information clearly knowing that it was a trade secret that had been improperly obtained by another.

The primary disadvantage of trade secret protection is that it provides absolutely no protection whatsoever against an-

other entity independently developing the engineering information, or using publicly available information to reverse engineer the trade secret information. Moreover, under the present law in the United States (1) it is conceivable that if the second entity independently develops the information, it could obtain a patent on the trade secret technology, foreclosing further use of the technology by the first entity.

If a trade secret becomes generally known (irrespective of how it becomes known), trade secret protection is, as a practical matter, lost. As a consequence, some types of engineering information that are ascertainable from publicly available sources are totally unsuited for trade secret protection. For example, any engineering information embodied in a product that is sold to the public and can be reverse engineered simply cannot effectively be maintained as a trade secret. Absent some express or implied contractual obligation to the contrary, a party is under no obligation to maintain information in confidence. Generally speaking, reverse engineering is a commonplace and permissible activity.

Utility Patent Protection

Most engineering information embodied in a product can be ascertained by reverse engineering, and therefore is not suitable for trade secret protection. Accordingly, in the absence of legal mechanisms other than trade secret protection, there would be little incentive for an entity to make the necessary investment in research and development of new products, since the resulting technology (engineering information) would be at risk of being copied as soon as the product was placed on the market. The advancement of technology would be stifled.

Recognizing this problem, the framers of the United States Constitution included a provision for federal patent and copyright systems. Article I, Section VIII of the Constitution provides: "The Congress shall have the power . . . to promote the progress of science and useful arts, by securing for a limited time to authors and inventors the exclusive right to their respective writings and discoveries." Under this authority congress then developed a patent system for inducing an "inventor" to make the necessary investment of time and money in research, while at the same time ensuring that the work of the inventor would ultimately become available to the public.

In the United States a patent can be thought of as an agreement between an inventor and the government. The inventor teaches the public how to use the invention. In return, the inventor is given the right to exclude the public from making, using, or selling the invention for a period of up to 20 years from the date that the application for a patent is filed.

As will be discussed, the "agreement" logic is reflected in the structure of the patent grant. A patent grant typically is divided into three major parts: a drawing, a written description of the invention, and claims. The drawing and written description teach the public how to make and use the invention. The claims define the rights of the inventor.

Requirements for Patentability. Patent protection is available in the United States for "any new and useful process, machine, manufacture or composition of matter, or any new and useful improvement thereof" (2,3). An invention in any one of those categories is generally patentable if it is "novel" and not "obvious." The categories of patentable subject matter

and the novelty and nonobviousness requirements are discussed below.

Patentable Subject Matter. The categories of patentable subject matter are extremely broad and perhaps most easily approached by reviewing the relatively few things that have been determined to be outside of the statutory provision:

Mere Printed Matter. A mere set of words is not patentable. However, patent protection might be available for embodiments of the *concept* described by the words or for the way paper is folded or perforated relative to printed matter.

Methods of Doing Business. Patent protection is not available, for example, for an advertising gimmick, such as the idea of a two-for-one sale.

Things Unaltered from a Natural State. For example, a rock taken unaltered from the earth is not, *per se*, patentable. However, a *method of using* the rock, a purified or otherwise altered version of the rock, or a mixture employing the rock, might be patentable.

Abstract Information and Scientific Principles. Abstract information is not patentable. For example, an entity cannot patent its name. Similarly, abstract principles, divorced from any physical structure (e.g., laws of nature) are not, *per se*, patentable. For example, Newton could not have patented gravity.

As a general proposition, there is no question that electronic or mechanical apparatus, electronic systems, and components are patentable subject matter. Software inventions, however, are often subject to a special test. In the United States, a patent claim on a software invention is first analyzed to see if a mathematical algorithm (defined as a "procedure for solving a given type of *mathematical problem*") is directly or indirectly recited. If no *mathematical* algorithm is recited, the claim is directed to a patentable subject matter. If a mathematical algorithm is found, the claim as a whole is then further analyzed to determine whether the algorithm is "applied in any manner to physical elements or process steps." If the physical elements or process steps are present, the claim is patentable subject matter under the patent statute and, if novel and nonobvious, is patentable. A similar, although not identical test is applied in the European Patent Office.

Novelty. "Novelty," as used in the patent statute, has a broader meaning than the normal English usage of the word. In essence, the statute defines particular circumstances where the invention is considered not to be "novel," either to have already passed into the public domain, so as to become public property, or to have already become the property of another. The patent statute expressly prohibits obtaining a patent under these circumstances, referred to as *statutory bars*:

Earlier Invention by Another. A person cannot obtain a patent on an invention if, before the person made the invention, someone else: (1) knew of or used the invention in the United States (other than in secret), (2) described the invention in a printed publication or patent application, or (3) made (and did not abandon, suppress, or conceal) the invention.

Premature Public Use or Commercialization. An inventor can lose rights by, among other things, prematurely disclosing the invention, offering products using the invention, using the invention in a commercial process, or using the invention in public. The statute states:

102(b) A person shall be entitled to a patent unless . . . the invention was patented or described in a printed publication in this or a foreign country, or in public use or on sale in this country more than one year prior to the date of the application for patent in the United States . . .

United States Code Annotated, Title 35—Patents, 102(b)

Even a single publication, offer for sale or public use more than one year before the patent application will preclude a valid patent. The United States, in effect, provides a one-year grace period from the sale, use, or publication, in which an inventor can claim his or her rights. Most foreign countries, however, do not provide any grace period whatsoever. Any description of the invention published prior to the filing of a patent application bars the inventor from obtaining patent protection in most foreign countries.

Other Statutory Bars. Rights in the United States can be lost through abandonment, improvident filing of an application for patent in another country, deriving the invention from a different entity, or intentionally misnaming the inventors.

Prior Art. The statutory bars thus define a body of prior knowledge, often referred to as the *prior art*, against which patentability is measured: information originating from other than the applicant that either is accessible to the relevant public at large, or is known to the applicant for the patent (whether or not generally accessible) prior to the date of invention, and information (whether or not originating with the applicant) that has been either (1) accessible to the relevant public at large, or (2) the basis of commercialization by the applicant for the patent, for too long a period (more than one year) before a patent application on the invention was filed.

Obviousness. In addition, the statutes require the invention as a whole be “nonobvious” to a person of “ordinary skill in the art” (the average engineer, technician, scientist, or worker in the particular area of technology of the invention). A number of objective criteria are relevant in assessing the nonobviousness of an invention: (1) the scope and content of the prior art; (2) the “level of ordinary skill in the art” (typical education level in the pertinent area of technology); (3) the differences between the invention as claimed and the prior art; and (4) whether the invention provides unexpected results, fulfills a long-felt need, and/or is commercially significant. For purposes of assessing nonobviousness, engineering information which is owned by the same entity that owns the invention, and has not passed into the public domain (by virtue of e.g., publication, or commercialization), should not be considered. The nonobviousness of the differences is then measured against the general knowledge of practitioners in the pertinent area of technology at the time of the invention, considering the invention in total context and without hindsight. It is irrelevant that it might have been subjectively obvious to the inventor. As a practical matter, if one or more

elements of an invention as claimed are not disclosed in prior patents or publications, or if the invention as claimed combines known elements, but no prior patent or publication expressly or impliedly suggests combining those specific elements, the invention is probably nonobvious.

The Patent Grant. As noted above, a patent is typically divided into three major parts: a drawing, a written description of the invention, and claims. The drawing and written description teach the public how to make and use the invention. The claims define the rights of the inventor.

The Drawing. The drawing, which may include a number of sheets and figures, depicts all of the elements (components) of the invention. Individual elements are identified with reference letters or numbers to facilitate unambiguous reference to those elements in the written description. A drawing may be omitted if a full disclosure can be made in the written description. The omission of a drawing occurs principally in connection with chemical invention, and is a rare occurrence when the subject matter of the patent is electronic in nature.

The Written Description. The written description portion of the patent typically includes the following sections: a background, a summary of the invention, a brief description of the drawing, and a detailed description of at least one example (the preferred exemplary embodiment) of the invention. The detailed description identifies the individual elements with reference letters or numbers in the drawing.

The written description must meet two primary requirements; it must be “enabling” and it must “set forth the best mode contemplated by the inventor of carrying out his invention.” To be “enabling” the written description must provide sufficient detail to enable any “person skilled in the art” (the average engineer, technician, scientist, or worker in the particular area of technology of the invention) to make and use the invention without undue experimentation. This requires only that the “person skilled in the art” be enabled to make and use something that works for its intended purpose. It need not be efficient or cost-effective. However, the “best mode” requirement precludes the inventor from “holding back” relevant information that is known at the time the application is filed, and teaching the public only how to make or use an inferior version of the invention. In practical terms, if, at the time the application is filed, the inventor believes that a significant advantage can be obtained by (1) performing a particular function or sequence of functions or (2) implementing a particular function in a particular manner or using particular components, the application should detail those preferences in order to meet the best mode requirement.

The Claims. The claims of the patent are, in essence, one-sentence definitions of the patented invention. Typically, more than one claim is submitted to define the scope of protection provided by the patent in alternative ways. An unauthorized device or process directly infringes (violates) the patent only if the device includes elements corresponding to each and every element of at least one claim. (Responsibility for an infringement can also be assessed for “contributory infringement” and “inducing” infringement, but each instance requires that there ultimately be a direct infringement.) The broader and less specific the terms of a claim, the broader the protection afforded by that claim. However, if the claim is written in terms that are too general, that is, the claim is too broad, and it reads on the prior art, it is invalid. The language

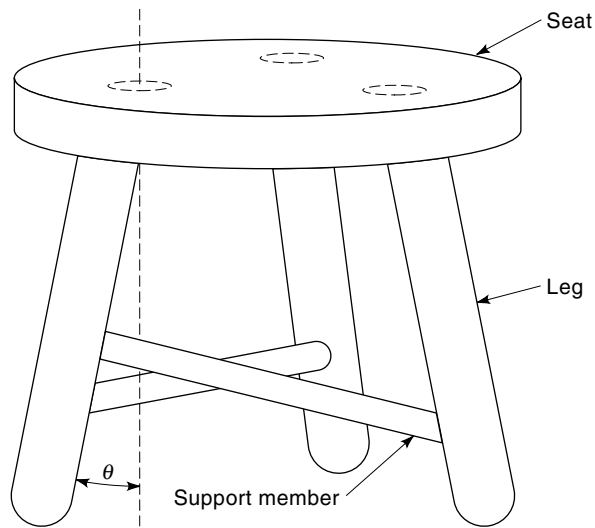


Figure 1. Inventor A's "stool."

of the patent claims must, therefore, be drafted with the utmost planning and precision.

It is permissible to have a number of different claims in the patent application. As a matter of practice, claims of varying scope, ranging from the most general to the most specific, are submitted. In this way, if it appears after the fact that some relevant piece of prior art exists which invalidates the broad claims, the other, more specific claims are not necessarily invalidated. In this manner, the inventor not only can obtain protection on the broad aspects of his invention, but also on the specifics of the particular product that is put on the market.

Claims can be categorized as *independent* and *dependent*. Independent claims expressly set out all of the claim elements. Dependent claims incorporate other claims (parent claims) by reference and add elements or more specific detail. In order to infringe a dependent claim, an accused device must include not only elements corresponding to each and every element expressly set forth in the dependent claim, but also must include elements corresponding to each and every element of the claim incorporated by reference (and each and every element of any claim incorporated by reference by the parent claim, and so on).

Assume, for example, that inventor A has obtained a patent on the "stool" shown in Fig. 1, with the following claims:

1. Apparatus comprising:
 - (a) a seat having upper and lower surfaces; and
 - (b) at least one leg cooperating with the lower surface of the seat and disposed to maintain the seat a predetermined distance above the ground.
2. The apparatus of claim 1 including a plurality of legs.
3. The apparatus of claim 2 further including at least one support member connecting at least two of the legs together.
4. The apparatus of claim 2 including at least first, second, and third legs.
5. The apparatus of claim 4, further including:
 - (a) at least one support member connecting the first leg to the second leg;
 - (b) at least one support member connecting the second leg to the third leg; and
 - (c) at least one support member connecting the third leg to the first leg.
6. The apparatus of claim 1 including three legs, each leg being attached to the lower surface of the seat at one end and extending outwardly at an angle transverse to a line perpendicular to the lower surface of the seat.

Claim 1 is an independent claim. Claims 2–6 are all dependent claims. For example, to infringe claim 4, an accused device must include not only first, second, and third legs, as expressly recited in claim 4, but also a support member connecting at least two of the legs together as called for in claim 2, and a seat maintained a predetermined distance above the ground by at least one of the legs as called for in claim 1.

To accomplish the purpose of the patent system, it is important to promote improvements on inventions without denigrating the protection provided for basic inventions. For this reason a patent provides an "exclusive" (exclusionary) right to the inventor. That is, the patentee has the right to exclude others from practicing the invention. However, *the patentee does not have the right to practice his or her invention if to do so would infringe the prior patent of another.*

Continuing the above example, assume that inventor B purchases a stool, and improves upon it by developing a back and a more stable support structure (adds a fourth leg), as shown in Fig. 2. Also assume that the improvements are not obvious, and are otherwise patentable, and that inventor B obtains a patent on the "chair" with the following claims:

1. Apparatus comprising:
 - (a) a seat having upper and lower surfaces; and

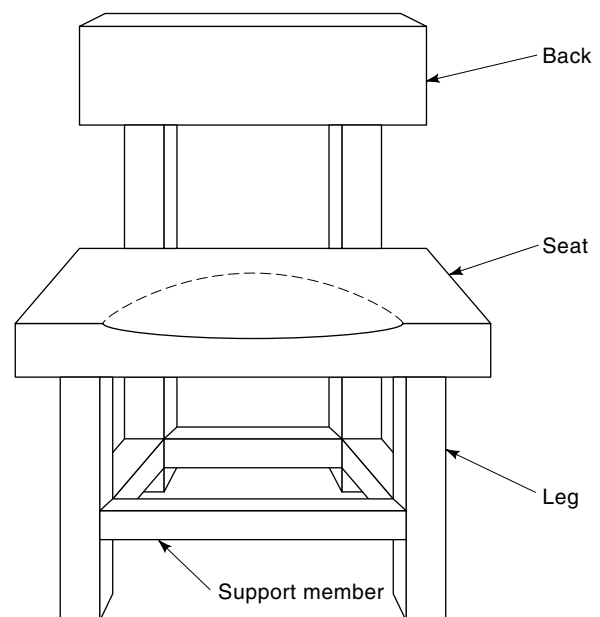


Figure 2. Inventor B's "chair."

- (b) at least one leg cooperating with the lower surface of the seat and disposed to maintain the seat a predetermined distance above the ground; and
- (c) a back extending above the seat.
- 2. The apparatus of claim 1 including four parallel legs.
- 3. The apparatus of claim 2, further including at least one support member connecting at least two of the legs together.
- 4. Apparatus comprising:
 - (a) a seat having upper and lower surfaces; and
 - (b) four legs, cooperating to maintain the seat a predetermined distance above the ground.

Both inventor A and inventor B have patents. However, notwithstanding the addition of the back and four legs, inventor B's "chair" still includes elements corresponding to each and every element of claim 1 of the "stool" patent. It includes a seat, and "at least one" leg (*viz.*, four legs) cooperating with the seat lower surface and disposed to maintain the seat a predetermined distance above the ground. It likewise infringes claims 2, 3, and 4 since in addition to including all of the elements of claim 1, the chair's four legs are also "a plurality of legs" (claim 2), and it includes a support member connecting at least two of the legs together (claim 3) and four legs also include "at least first, second, and third legs" (claim 4).

Claims 5 and 6 would not be infringed. The support member of the chair does not connect the third to the first leg as called for in claim 5. Likewise, a chair with "parallel" legs would not infringe claim 6 of the stool patent; the legs of the chair do not extend outwardly at an angle transverse to a line perpendicular to the seat.

Since inventor B's chair infringes one or more claims of the "stool" patent, inventor B is precluded from making or using the chair in the absence of authorization (a *license*) from inventor A.

On the other hand, while inventor A is free to make, use and sell the "stool" (assuming that no other patents cover the stool structure), inventor A cannot put a "back" on the "stool" without infringing claim 1 of inventor B's "chair" patent. Similarly, inventor A cannot increase the number of legs on the stool to four legs without infringing claim 3 of the "chair" patent.

In theory, to meet market demand for chairs and stools, inventors A and B could each obtain licenses from the other under the respective patents, and, where there was initially only one "stool" manufacturer, there would be two "chair" manufacturers. Although in reality other factors may, of course, come into the picture, the basic model is applicable to many situations, particularly when the improvement patent is obtained considerably later than the basic patent.

Obtaining a Patent. In general, the process of obtaining a patent is initiated by filing an application with the appropriate governmental authority. In the U.S., that authority is the Patent and Trademark Office (PTO) of the Department of Commerce. The application is, in effect, a proposed patent including a drawing, a written description and one or more claims.

The application is then examined and *prosecuted* before the PTO. During the examination and prosecution of the application, the PTO determines whether the application is in

proper form, and the exact scope of the claims to which the inventor is entitled, if any is negotiated. The application is first received by the PTO, then assigned a serial number and accorded a filing date, classified as to subject matter and ultimately assigned to a Patent Examiner with special expertise in the relevant field of technology. The examiner reviews the application for formalities, and conducts an investigation, searching the PTO files of prior patents and literature to determine if there is any relevant prior art.

The results of the review and investigation are then reported in what is known as an *office action*. In brief, the office action lists all of the references (prior art) considered by the Examiner and indicates whether or not the Examiner considers the application to be of proper form, and the claims to be anticipated by or rendered obvious by the references. A response to the office action (assuming one is necessary) is then filed, answering each and every issue raised by the Examiner by traversing (arguing against) the Examiner's positions, amending the claims, or canceling the claims (that is, accepting the Examiner's rejection).

It must be stressed that it is the language of the *claims* that is controlling in arguing against a rejection; differences between the references cited and the preferred exemplary embodiment described in the specification are not controlling. The response must explain to the Examiner how the specific language of the claims is distinguished from the references. The claims, however, can be amended to include any detail described in the specification. The specification, on the other hand, cannot be amended, except for nonsubstantive editorial changes that do not introduce new matter into the disclosure.

After the Examiner and the applicant agree with respect to the exact scope of the claims, the application is given a patent number, an issue date, and issues on that date as a patent. The term of a new patent is twenty years from its filing date. Prior law still provides older patents a term of seventeen years from issue date.

Patent Filing Timing Strategies. The point in time during the development cycle of a product at which a patent application is filed can control the level of disclosure necessary in the written description. The applicant is not required (and in fact is not permitted) to add new matter to the application once it has been submitted to the PTO. The required detail can be minimized by filing an application early in the development cycle. If an application is filed when the basic elements of the invention have been established, but before details of implementation have been determined and there is no particular preferred embodiment of the invention, the additional detail necessary to meet the best mode requirement over and above that necessary to meet the enablement requirement is minimal. Disclosure of later developed preferences, details of implementation, and improvements can thus be avoided, and these matters can be maintained as trade secrets, if not evident from the patented item as marketed. However, if patent protection specifically directed to those later developed preferences, details of implementation and improvements is to be obtained, a new application will have to be filed.

Once issued, an inventor's own patent may be cited as a prior art reference by a Patent Examiner against a later filed application by the same inventor for a patent directed to further improvements. Accordingly, care must be taken to ensure that the later application is not delayed until the earlier

patent becomes prior art under the laws of the jurisdiction where the application is to be filed.

Copyright Protection

To the extent engineering information qualifies as a “work of authorship,” it is amenable to copyright protection in most countries. In the United States (4), works of authorship include engineering writings and other works, for example, drawings, documentation, manuals, blueprints, and at least the literal aspects (code) of computer programs. Of course, works of audio, visual, and literary art are covered as well. However, the statute specifies that copyright does not extend to ideas, methods, systems, mathematical principles, formulas, and equations.

Under the Copyright Act of 1976, which became effective on January 1, 1978, a copyright is automatically created as soon as an “original work of authorship” becomes “fixed” in a tangible form of expression (e.g., a form that can be perceived either directly or with the aid of a machine or device). Neither publication nor registration is necessary to secure copyright protection. In addition, as of March 1, 1989, the United States became a signatory to the Berne Convention for the Protection of Literary and Artistic work, and most of the earlier formalities involved in securing and maintaining a copyright in the United States have been relaxed. Registration remains necessary, however, for a US national to bring an infringement action and for certain rights (recovery of statutory damages and the right to recover attorneys fees as costs), and the use of a copyright notice remains desirable to deter copying and to avoid claims of innocent infringement.

In general, the individual that creates a work is considered the author for copyright purposes. However, if the work is prepared by an employee within the scope of his or her employment, the work is a *work for hire* and the employer is considered the author (and owner) of the copyright. Under certain circumstances, a work prepared by a nonemployee can also be a work for hire. To qualify as a work for hire, the work by a nonemployee must fall within certain categories (contribution to a collective work, part of a motion picture or audiovisual work, translation, supplementary work, compilation, instructional text, test or test answers, or atlas) and the parties must expressly agree *in writing* that it will be a work for hire.

The term of a copyright for works after January 1, 1978, is the life of the author plus 50 years if created by an individual, or if a work made for hire, the earlier of 75 years from publication or 100 years from creation. For works of individuals published before January 1, 1978, the term was 28 years, renewable for a second term of 28 years and subject to possible extension for a total of 75 years.

Scope of Protection. The owner of a copyright on a work is granted a number of exclusive rights: to reproduce the copyrighted work; to prepare derivative works based upon the copyrighted work; to distribute copies of the copyrighted work to the public by sale, rental, lease, or lending; and to publicly display or perform the copyrighted work (in the case of musical, dramatic, and similar types of works). However, this exclusive right is limited by the doctrine of *fair use* and, in certain instances, *archival rights* and compulsory licensing.

A copyright affords a relatively limited protection. A *copyright protects only the expression of ideas, not the ideas themselves*. For example, with respect to a computer program, a copyright protects only the author’s specific expression and does *not* extend to the underlying idea or concept of the program or to aspects of the program that are dictated by function. Such a copyright is infringed by the copying of substantial portions of the program code. However, independent development of the program is a complete defense. Whether or not other aspects of the program (such as its modularity, structure, sequence, and organization) are protected by the copyright depends upon whether the particular aspect that is copied is categorized as idea or expression.

Notice. While a copyright notice is no longer necessary on works published after March 1, 1989, all published copies should bear a notice of copyright when a work is published. Authors planning to submit their original work to an editor or publisher should add a copyright notice on the work. Use of proper copyright notice effectively precludes an “innocent infringement” defense. Basically, the notice of copyright includes three elements: the copyright symbol, the word “copyright,” or the abbreviation “Copr.”; the named owner of the copyright; and the year of first publication of the work. If the work is not yet published, the year of first publication is replaced with the word “unpublished.”

Registration. Except in the case of publication without a proper copyright notice on works first published before March 1, 1989, copyright registration is not a prerequisite for copyright protection. However, registration is significant in three respects: (1) a registration is normally necessary before the copyright on works of U.S. origin can be enforced in court; (2) if the registration is made before publication or within five years of publication, the mere fact of registration establishes the validity of the copyright and of the facts stated in the copyright certificate in court; and (3) the copyright statute provides for “statutory damages and attorneys’ fees” which may range, according to the circumstances, from \$500 (in the case of an innocent infringer) to up to \$100,000 (in the case of a willful infringer).

Trademark Protection

In the United States, common law trademark rights are acquired immediately upon use of the mark (word, symbol or nonutilitarian aspect of a product used to distinguish an entity’s products or services from those of other entities, that is, trademark, service mark, or trade dress) in legal commercial transactions. In general, the first to use a given mark in connection with particular goods or services in a given geographical area (e.g., a particular state) obtains the exclusive right to the mark for use with those goods in that area. However, another entity who subsequently adopts the mark in a remote geographical area (e.g., a distant state), without knowledge of the prior use of the mark by the first entity, will acquire valid common law rights to the mark in the remote area. However, once the mark is used in commerce (or a bona fide intent to use the mark in interstate commerce is formed), a federal registration may be obtained. Registration of a mark on what is known as the Principal Register of the patent and trademark office provides constructive notice of the registrant’s claim of

ownership of the mark (i.e., has the same effect as actual knowledge of the mark). This prevents entities in remote geographical areas from subsequently adopting and obtaining rights in the mark.

In general, a proper mark that has actually been used (sold or transported) in *interstate* commerce (“commerce which may lawfully be regulated by Congress”) and is not “confusingly similar” to a mark already being used by another is eligible for registration on the Principal Register of the Patent and Trademark Office (5). An application for registration of a mark may be filed prior to actual use on the basis of a good faith intention to use a mark in commerce. To obtain a registration, however, actual use of the mark must be initiated within a predetermined period (six months, extendable to one year upon request, and up to 24 months for good cause) beginning on notice from the Patent and Trademark Office indicating the mark is otherwise entitled to registration.

A trademark application must specify a description of the goods and services in connection with which the mark will be used and list the classifications in which application for registration is being made. During prosecution of a trademark application, the description of goods and services cannot be expanded. An application based on an intent to use will establish constructive use of the mark as of the filing date of the trademark application with effect only after actual use is commenced and a registration is issued. Filing trademark application creates trademark rights for use of the mark for the specified goods and services that will prevail over later filed intent-to-use applications for goods or services for which the marks are confusingly similar, but not over the rights of others that (1) actually used the mark to the filing date; or (2) that can claim an earlier treaty priority date based upon a corresponding foreign trademark application. After approval by the PTO, marks are published for opposition by anyone who believes that the registration of the mark may cause damage, usually a prior user of a similar mark. Opposition proceedings are conducted by the PTO as administrative trials to determine whether the applicant is entitled to the registration.

Mask Work Protection

A special form of protection is available for semiconductor chip products. Under the Federal Semiconductor Chip Protection Act, *mask works* are defined as a series of related images, however fixed or encoded, that represent three-dimensional patterns in the layers of a semiconductor chip. Protection is available for any mask work unless:

1. the mask work is not original (that is, the mask work was copied),
2. the mask work consists of designs that are “stable, commonplace, or familiar in the semiconductor industry, or variations of such design, combined in such a way that, considered as a whole, are not original”, or
3. the mask work was first commercially exploited more than two years before the mask work was registered with the Copyright Office.

In essence, the Semiconductor Chip Protection Act protects against the use of reproductions of mask works in the manufacture of competing chips. However, the Act makes it abso-

lutely clear that competitors are not precluded from reverse engineering the chip for purposes of analysis or from using any (unpatented) idea, procedure, process, system, method of operation, concept, principle, or discovery embodied in the mask work.

NEED FOR KEEPING ACCURATE RECORDS

There are a number of instances when it becomes necessary to prove the date and nature of technical activities, and the project with which the activities are associated. For example, such proofs are often determinative in: disputes regarding ownership of technology—whether certain technology was first made under a particular development contract or Government contract; disputes regarding whether particular technology is covered by a particular license agreement; disputes regarding whether certain technology is subject to a confidentiality or nonuse agreement; proving, as a defense to patent infringement, prior development of an invention that was not abandoned, suppressed, or concealed; and interference proceedings before the Patent and Trademark Office—contests to determine priority of invention.

The act of inventing involves two steps: *conceiving* the invention (technology), then *reducing the invention to practice*. Conception is basically the mental portion of the inventive act. Reducing the invention to practice is, in basic terms, building the invention and proving that it works for its intended purpose. The filing of a patent application is considered to be a constructive reduction to practice.

The diligence with which an inventor works to reduce an invention to practice, after it has been conceived, should be documented with accurate records. As a general proposition, if inventor A was both the first to conceive and the first to reduce the invention to practice, inventor A will be deemed the first to have “made” the invention. However, if inventor A was the first to conceive the invention, but the last to reduce the invention to practice, inventor A will still be deemed first to have made the invention if “*diligence*” in pursuing the reduction to practice can be proven from a time period prior to the conception of the invention by inventor B. However, if inventor A cannot prove reasonable diligence in pursuing the reduction to practice beginning with a date before inventor B conceived the invention, inventor B will be deemed first to have made the invention.

As a general proposition, *each aspect of the two-step process of making an invention must be proven by more than just the word of the inventor*. The word of the “inventor” (or even coinventors) as to when and where an invention was conceived or reduced to practice is essentially ineffective without corroboration. Corroboration can be in the form of dated documents, engineering notebooks, drawings, “write once” media (e.g. optical disk), time records, and oral testimony by noninventors. Consideration should also be given to the evidentiary value of records. For example, records stored on magnetic media that are easily altered has less evidentiary value than records stored on “write once” media, or that have been escrowed to ensure integrity.

CONCLUSION

The various mechanisms for protecting engineering information are not necessarily mutually exclusive. In many cases,

different forms of protection can be used concurrently to protect different aspects of a given product. With a little bit of forethought, and accurate and complete records, inadvertent loss of rights can be avoided and an appropriate strategy using each of the various protection mechanisms to its best effect can be developed.

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