PATENTS AND TRADE SECRETS

1. Practice and Management

This article provides a basic, step-by-step approach to problem solving in the practice and management of patents and trade secrets. The significance of aggressive patent and trade secret protection to the economic well-being of a business or organization should not be underestimated. Without patents and trade secrets, the marketplace is reduced to competition on the basis of price, which may be very difficult.

Patents and trade secrets are protected by securing rights to ideas and the application of ideas that have commercial worth. The grant of rights in patents and trade secrets is based on an appreciation of development, advancement, and invention that will stimulate innovation by advancing technology. Patents and trade secrets are two distinct mechanisms for protecting invention vis-à-vis the application of ideas. Both are supported by the policies and laws of the United States.

Compiling a portfolio of patents provides an organization with an offensive weapon with which to protect and ensure profitability. Competitors who desire to enter a product market or maintain a meaningful interest within it must engage the owner of the leading technology in that market. If the leading technology is protected by patents, the owner of this technology has an excellent tool with which to ensure their profitability. A patentee may in turn realize a return on the time and energy invested in obtaining protection by securing a principal interest in the market, royalties from competitors, or even damages from those who choose to ignore the rights flowing from the patent grant (see LICENSING).

A patent also serves a defensive function. It provides the patentee with a partial or total shield that prevents others from patenting inventions which would ultimately restrict the patentee's commercial activity in the marketplace.

Trade secret rights are based on the complete absence of disclosure of the invention to anyone other than the owner. Oftentimes ideas, developments, and advances that are the subject of trade secret protection are those which may not be patentable, for any of a number of reasons. These reasons can include the nature and subject matter of the advance or development, as well as the commercial value of the advance or development. In any instance, an individual, business, or corporation is well-advised to consider all possible means of protection when reviewing an advance, development, or invention.

Some factors to consider when evaluating patent and trade secret protection include (*1*) the form and content of the technological advance, idea, development, or application; (*2*) the desired term of protection; (*3*) the potential for the technological advance, idea, development, or application to be the subject of a commercial product; (*4*) work done previously; (*5*) events which have publicized or publicly disclosed the technological advance, idea, development, or application; and (*6*) factors that may be critical to keeping the technological advance, idea, development, or application confidential, and what events may necessitate disclosure.

2. Harmonization

During 1995 the U.S. Patent laws changed to comply with certain international conventions. Two principal conventions, the General Agreement on Tariffs and Trade (GATT) as well as the North American Free Trade Agreement (NAFTA) have effected a change in the term of patents issued from the United States Patent and Trademark Office (U.S. PTO); a change in type of patents that may be filed in the U.S. PTO; and prospective changes that will internationalize U.S. patent law.

By the turn of the century the U.S. PTO may be operating under a system that includes (*1*) publication of patent applications; (*2*) opposition of allowed applications for purposes of testing validity; (*3*) the dawn of first-to-file priority examination; and (*4*) the end of the antiquated test of inventorship called "interference practice." Legislation implementing many of these changes is pending before the U.S. Congress.

3. The Origin of Patent Rights

A patent is an affirmative right granted by the U.S. Federal Government. The affirmative right is represented by a published written document, referred to as a patent, which provides a full and complete description of the invention. The affirmative rights which stem from the issuance of a patent allow the owner of that patent to prevent other parties from making, using, or selling in the United States what the patent covers. The coverage of a patent is the actual property of the patent owner and is defined by the patent claims, which are like the legal description of real estate in a deed. Interpretation of the patent claims involves answering complex legal questions and is dependent on, among other things, the written description in the patent.

The printed published document which represents the patent rights granted by the Federal Government can be a complex literary work. There are specific and rigid legal requirements for the description, disclosure, and definiteness which support these affirmative rights and enable enforcement of those rights by the inventor or owner of the patent. The basis for this full and complete disclosure of the invention in the patent is clearly articulated in the U.S. Constitution.

A patent is intended to further the development of science and technology by providing a published record of technological developments for all to read, consider, and discuss. At the same time, a patent provides a delineation or definition of the rights which the patent owner considers its own through the claims appended to the patent. The publication of a description of the invention in conjunction with the claimed limits of the invention provides the public with notice of the patent owner's affirmative rights to the invention.

The process of invention generally starts in the transcribing of ideas that may, or may not, result in an advance or a solution to a recognized problem. Once an inventor is satisfied that the development has attained the desired level of usefulness, a summary of the inventive concept may be prepared.

From this summary, including any appropriate data or laboratory work, an application for a U.S. patent may be written. The patent application is generally written by, or at least comes under the supervision of, a patent attorney or patent agent with one or more inventors. The participation of the inventors ensures that the patent application describes the invention in complete detail. The patent application should include the broadest definition of the invention and provide the best forms in which the invention can be practiced, applied, or used. The patent application should also have an explanation of the invention that describes it in terms considered definite by the inventor and that are used in the relevant technology. This terminology will enable others to understand and practice the disclosed invention.

Once the patent application is complete and the inventor has made a formal declaration of inventorship, the application is filed with the U.S. PTO. In the U.S. PTO, the application is the subject of a thorough, formal, and substantive examination by a patent examiner. Once the patent examiner is convinced that the patent application satisfies the statutory requirements provided for under the laws of the United States, the patent application will be allowed to issue as a patent. Issuance takes the form of a publication provided by the U.S. Government. The publication of patents occurs only on Tuesdays that are not federal holidays. At the time of issuance, the patent is assigned a number and made public in a form which allows all interested parties to obtain access to it.

The term of a patent depends on the date on which the application for patent is filed with the U.S. PTO. Patents filed and issued before June 8, 1995 had a term which is the longer of 20 years from the filing date or 17 years from issuance. The filing date is the earliest filing date relied on by the applicant. Patent applications filed before June 8, 1995 that issue after that date also have a term which is the longer of 20 years from filing or 17 years from issuance. Any original or follow-on patent application, ie, continuation, divisional, or continuation-in-part applications, filed after June 8, 1995 have a term of 20 years from filing, once it is issued as a U.S. patent.

4. The Nature of Invention

Invention may result from many different types of scientific or engineering efforts and advances. However, invention can also arise through the simple application of an idea that improves, refines, or otherwise modifies something that had been done previously. The simplest and most common area in which invention arises is in the development of products.

The nature of product development is such that it consists more of a process than a single discrete event. As a result, the objective, eg, developing a high cleaning detergent that is safe to the environment, may take place over a series of steps, rather than occur in one single, identifiable action.

The process of developing a product may result in one large breakthrough that could be considered a broad invention. This breakthrough may result in a new product that is useful and has many of the benefits that the inventor desired at the outset of the developmental project. However, the product still may or may

not be suitable for commercial introduction or various other intended applications. As a result, further efforts may need to be expended toward refinement of the product so that it may take on its ultimate commercial form. Each of these potential refinements may also represent one or more patentable inventions that, while narrower in their intended usefulness than the original product, are still commercially valuable in their own right. In the search for improvements, refinements, and further solutions, invention thus may result either from a developed research effort or through the simple discovery of a solution to the original problem which is arrived at completely outside of the research context.

The resulting discoveries may provide a broad range of solutions or products. For example, invention may result from basic research and development efforts directed toward products which are essential to basic commercial efforts. Alternatively, invention may result in products or applications which add value to basic commercial products that are already in existence. Inventions may also be used to assist an individual or company in commercial efforts toward developing a defensive posture in any given marketplace. When patented, applications may also provide an extended opportunity to license or market the patent without the actual production of a product by the inventor.

4.1. Reading A Patent. reviewing patent documents requires the skill of understanding the significance of what is being disclosed. legal counsel should always assist in interpreting the legal effect of any patent on commercial activity. however, a patent attorney or agent often must seek the assistance of technical personnel to gain a full understanding of the technology disclosed and claimed in a given patent. further, an understanding of the form, content, and function of the various sections of a u.s. patent assist the nonlawyer in understanding the commercial importance of any issued patent.

An abridged copy of U.S. Patent No. 5,131,727 is provided in Figure 1 to illustrate the elements of an issued U.S. patent. The cover or front page of a U.S. patent (Fig. 1**a**) must follow the form requirements placed on issued patents by the U.S. PTO. Specifically, the front cover discloses the inventor in two locations, A and C. The first named inventor is generally used as a head note, A, for the patent. A given patent may often be referred to in an informal sense by this inventor's name.

Once the patent is issued, the inventor is referred to as the patentee. The first named inventor, if there is more than one, is printed prominently in the upper left-hand corner of the front page of the patent, A. All of the inventors or patentees are listed beneath the invention title, B, along with the inventors' full names, addresses, and citizenship if other than the United States (3).

The title of the invention, B, is generally written so as to use the shortest possible accurate description of the invention described fully in the patent and found in the claims. The patent application number, D, and filing date, E, are printed beneath the title, B. The application number, D, and filing date, E, are important because the patent application filing date may be used to eliminate other publications of third parties that might be used to limit the legal scope of the applicant's rights.

Also printed on the front page of the patent is a coded classification listing, F. This coding is complex and largely unnecessary to a lay person's understanding

of a patent. This classification stems from the specific technology area to which the patent application was assigned during processing in the U.S. PTO. The classification also results from the search or review of prior patents completed by the Patent Examiner.

Apart from the technical classification information, F, the front page of the patent also contains a listing of publications or references cited during examination, G, including "United States Patent Documents," "Foreign Patent Documents," and "Other Publications" such as trade literature, journal articles, and product descriptions.

The front cover of the patent generally also identifies the U.S. Patent Examiner who reviewed and allowed the patent application, as well as the patent attorney, agent, or firm who worked with the Patent Examiner on the application, H.

Also provided is an abstract, I, which describes the invention, specifically highlighting its most valuable properties and distinguishing features. By doing so, the abstract assists those searching for prior patents which disclose developments relevant to an invention or patent application presently under examination. Another aid to patent searchers is the listing of claims and drawing sheets, J. A representative drawing, K, may also often be found on the front page of the patent, if figures are provided by the inventor. Figures or drawings are not required to receive a patent. However, where figures are essential to a full and complete understanding of the invention, they must be included. Further, the figures should show those elements of the invention which are found in the claims.

Within the body of the issued patent, the title, B, now L, is generally repeated to maintain clarity (Fig. 1**b**). A field of invention, M, is then provided. The field of invention should direct the reader to the general area of technology to which the invention relates, and to specific improvements in the identified areas of application. Generally, the field of invention is a fairly brief statement which allows the U.S. Patent Examiner to determine which technological area of the invention is the appropriate one.

A description or explanation of the background of the invention, N, may also be provided by the inventor. This background section discusses previous developments of inventors working in the same area of technology and may also list publications or patents that have discussed these developments and predate the filing date of the patent application. The background section may also point to deficiencies in the prior developments that the inventor intends to overcome.

To complement the discussion of problems and prior publication in the background of the invention, N, the inventor may generally provide a summary of the invention disclosed in the instant patent. The summary of the invention, O, should provide an explanation of the invention in the broadest and simplest terms and should also discuss how the invention disclosed in the patent solves problems remaining in prior work in this area of technology.

The patent should also provide a brief description of any drawings or figures, P. This brief description is often given in the technical terms used by engineering draftsmen to explain the various views illustrated in the figures.

The next section of the patent is titled "The Detailed Description of the Preferred Embodiment", Q (Fig. 1**b**), often a multipage work serving several functions. First, the detailed description should provide an illustration of the

invention in both its broadest or simplest sense and in its most preferred sense. Any elements of the invention that the inventor believes are crucial to the success or performance of the invention must also be included within this description. Further, this description should provide an explanation of the invention that is definite and illustrative, so as to allow persons having nothing but the patent before them to practice or use the invention in the manner intended. This description should be understood by those who work in the area that covers the subject matter of the patent.

Elements of Q often include a detailed explanation of the various elements of the invention comprising the function of those elements, a written description of those elements, and an analysis of the elements that relies on any figures present in the patent application. The Detailed Description of the Preferred Embodiment, Q, may also include one or more working examples, R, especially if the invention is related to chemical technology (Fig. 1**c**). That is, in cases relating to chemistry, biochemistry, and chemical engineering, working examples are more often included than not. These working examples may serve any number of functions, including illustrating the formulation, applicability, and performance of the invention. Working examples may also be used to illustrate how the invention is distinguishable from those inventions previously developed and patented. As such, these working examples may include data such as adhesion and cohesion performance for adhesives, disinfecting and sanitizing efficacy for cleaners, or data on chemical and physical properties for polymer systems.

The final section of an issued patent is the claims, S. A United States patent is required by law to have at least one claim. The claims represent the legal definition and boundaries of the rights resulting from the patent grant. Patent claims are analogous to the legal description which one might find on a title to real estate.

When evaluating an issued patent for purposes of determining the patentability of a new invention, the entire patent must be considered. As a result, the figures, K, and The Detailed Description of the Preferred Embodiment, Q, are every bit as important to an issued patent as the claims, S. At certain times any one of these elements may become more relevant than another. For example, claims tend to be more relevant to determinations of patent infringement or violation. However, in determinations concerning the patentability of new inventions, the figures, K, and The Detailed Description of the Preferred Embodiment, Q, may be the most relevant aspects of any previous patent.

4.2. The Technical Subject Matter of Patents. A fundamental requirement for obtaining a patent is defining an advance, development, or invention which is within those classes of "subject matter" which the law of the United States regards as patentable. Two classes of patentable subject matter, ie, computer software and biotechnology, are the subject of relatively new and evolving law. However, other types of subject matter rest on fairly certain ground as to patentability. Examples of patents directed to various types of subject matter are described in the following.

Composition of Matter. This is the subject matter category into which many chemical and biochemical (and biotechnology) inventions fall. Composition of matter includes a compound, a mixture of compounds, or a reaction product stemming from a mixture of compounds. Inventions such as pharmaceutical

products, herbicides, cleaning agents, adhesives, food products, and personal care products such as facial cleansers and shampoos are all commonly regarded as compositions. An example of a patent disclosing compositions of matter is U.S. Patent No. 5,157,128 titled "Certain Optically Active Substituted α,α-Dialkyl-Pyrrolidine-3-Methamines Useful as Intermediates" (1).

Article of Manufacture. An article of manufacture is an invention such as a two-headed tooth brush, an intravenous fluid bag, or an optical fiber "made" by a machine. One example of an invention which could be considered an article of manufacture is U.S. Patent No. 5,241,990 titled "Irrigation/Aspiration Valve and Probe for Laparoscopy" (2).

Machines. A machine is a device which is capable of manufacturing a product or completing a task such as removing hydrocarbon contaminants from silica and dirt. Examples of machines include an extrusion apparatus, a book binder, and a tractor. The U.S. Patent No. 5,020,462 titled "Thermal Remediation Apparatus and Method" (3) discloses both a machine and a process.

Processes. Methods or processes represent patentable subject matter regardless of whether the invention represents a method of using or a method of manufacturing an article, composition, or device. Examples of methods are a series of steps for manufacturing urethane, the sequence for formulating a stable injectable pharmaceutical composition, the manner in which an electrical circuit board is assembled, or a method of treating a disease using a compound or composition. "Method of Making Metal—Film Laminate Resistant to Delamination," U.S. Patent No. 5,112,462 (4), and "Clarification Process for Mining Liquors," U.S. Patent No. 4,997,573 (5), are patents which disclose various processes.

Design. Ornamental designs are also a legally recognized class of patentable subject matter. The design must be embodied in an article of manufacture, such as a concrete masonry block or a sun screen for a car window. An example of a design patent is U.S. Patent Design No. 334,420 titled "Chemical Detergent Block" (6).

Plants. Asexually reproducing plants, ie, those not propagated by means of seed, also represent a legally recognized class of patentable subject matter under U.S. patent laws. Additionally, the inventor must have discovered and asexually reproduced the plant that is to be the subject of the patent application. Plant patents are assigned a different series of numbers than the majority of patents discussed in the foregoing, such as U.S. Plant Patent No. 3,360 titled "Peach Tree" (7).

Assigning the Subject Matter Class. Factors to consider when reviewing the "nature" of the invention may be summarized by the following questions:

What is the technology area of the invention?

How was the invention made?

How is the invention used?

Does the invention "do something" or is it "something that is done or made"?

Does the invention have an evident usefulness, and if so, what is the ultimate usefulness of the invention?

Regardless of whether the invention is useful, is it ornamental?

For example, if the invention has cleaning properties it may be a composition of matter, process, or machine, all of which are patentable subject matter. If the invention performs work, it may be a process, article of manufacture, or machine, which are all patentable subject matter. It may also be that the development of a new composition results in a composition of matter and a process of using the composition, both of which are distinct, yet patentable inventions. The various types of patentable subject matter are not mutually exclusive and may be disclosed in a single patent.

4.3. The Origin of Invention. Invention results from the application of an idea or concept. The idea itself is generally not patentable. An application of the idea may be patentable if it falls within one of the categories of subject matter previously discussed. For example, the idea may be to increase friction or traction in road surfaces during any of a variety of weather conditions. There may be any number of ways to apply this idea. One example of an application would be the creation of grooves in road surfaces. Such channeling of a surface may be found to expedite the drainage of rainwater from the road surfaces. The concept of providing improved traction on road surfaces is certainly not patentable in and of itself. However, once applied, providing drainage channels on the roadway is certainly inventive and possibly patentable, depending on the previous solutions to the presented problem.

A further application of the concept may be found in the patterning of automobile tires to channel residue incident to contact with the road surface away from the automobile tire. Any of these applications of the central idea of providing a solution to increase road traction also may be patentable.

Although it is not always necessary, a practical application of a concept may move through a series of steps or stages. Indeed, the recognized pathway to invention involves at least two factors, ie, conception of the invention and reducing the invention to practice. Returning to the earlier example, the inventor may conceive an application such as modifying the chemical and physical structure of the automobile tires to improve traction. However, without further research the resulting tire may not completely solve the problem and may even create additional problems. For example, softer tires provide greater traction but may also wear more quickly. Investigations may be undertaken on the various levels of tire softness and rigidity so as to accommodate the varying types of weather in which the tire is to be applied. Research may be done to determine the applicability of the various types of synthetic and natural rubbers available for use. Research may also be undertaken to alter polymerization processes so as to produce tires having varying physical properties or design patterns on the face of the automobile tire that may have varying effects on road residues. All of these efforts are directed toward reducing the invention to practice.

The initial research effort may prove to be a broad spectrum of applications or solutions to the original problem that in turn provide any number of inventions. When efforts move toward reducing the invention to practice and refining the invention so that it proves to be commercially marketable, certain applications may prove to be unfeasible or commercially impractical. As a result, only one application, eg, the creation of a given pattern on the surface of the automobile tire, may ultimately prove commercially marketable. However, all the solutions which are developed and considered over the research and development

process may comprise inventions that are worthy of disclosure and claiming in a patent. An application which is not commercially viable today may become viable within the seventeen-year lifetime of a patent.

Unlike the common practice occurring in other countries, in which award of patent rights is based on the date on which a patent application is filed, in the United States the patent grant is based on the first date of invention. To be an inventor in the United States, an individual must contribute to conception of the invention, and may contribute to reduction of the invention to practice. Although the creation of an advance, development, or application may be conceived by one given individual, it often is the case that the act of invention is the work of many individuals, especially in a commercial context. Accordingly, inventorship questions often arise.

Inventorship. Those who may deserve to be considered inventors include all those who have contributed to conception of the invention. Further, those who have provided contributions which would be considered something above and beyond textbook knowledge in the reduction of the invention to practice may also deserve to be listed as inventors.

The legal guidelines which direct inventorship determinations are some of the most stringent and complex in modern patent law. Many factual and legal analyses may justify the listing of an individual as an inventor, and certain levels of contribution do merit this designation. However, under U.S. law an individual is most probably *not* an inventor if: (*1*) that person has merely supervised laboratory operations without providing any general or specific contribution to the project at hand; (*2*) that person has functioned in a capacity that is substantially, if not wholly, directed by a supervising scientist or engineer; or (*3*) that person has used a level of skill that would be expected in the ordinary routine of the production, evaluation, or analysis of that which later embodies the invention.

5. Developing the Record of Invention

Developing the record of invention is an important, if not a fundamental, point in the process of securing protection over the invention. Generally, there are two stages in the development of the record of invention. The first stage is the laboratory or experimental work that is done in conceiving the invention and applying it within the intended area of use. This may take place over a period of weeks, if not months, with continual or intermittent work toward the ultimate production of an advance, development, or application which solves various problems. The second stage of developing a record of invention is the actual process of defining the invention along with the noting of any events or facts that may limit the invention.

5.1. The Laboratory Notebook Page. Most engineers, scientists, and technicians make a record of their work. A common form of record keeping is the use of a laboratory notebook (Fig. 2). Experimentation is usually undertaken with an intended objective. Recording this objective often assists in illustrating the purpose or quality of an invention. The laboratory notebook should reflect elements, parameters, conditions, and thoughts that were material factors in the completion of a given experiment. For example, in the formulation of a

chemical mixture the constituents of the mixture should be defined by their accepted chemical name (and trade name if available) and concentration. Further, other parameters relevant to the successful formulation of the mixture such as mixing time, temperature, volume, and pressure should also be detailed. Parameters that were thought to be completely irrelevant may become relevant once the scientist has reflected upon notations made over the course of repeated experiments. Testing of quality or efficacy should also be recorded in detail. Once the experiment is completed, the scientist, engineer, or technician who has undertaken the work should confirm completion of the work by signing and dating the record. The record should also be witnessed by at least one other person who reads and understands it, and did not take part in the experimentation.

Elements that should be considered in developing a laboratory or experimental record are as follows:

Is the record found in a notebook which has been bound?

Are the record entries in chronological order, with an emphasis on avoiding the skipping of pages?

Is there a full record of a chronology of each experiment, including the starting date of every experiment plus each day's entry?

Has the objective of each experiment been stated within the record?

Have all essential facts been recorded so that if abbreviations are used, they are unambiguous?

When more than one page is required, are references provided to previous and subsequent pages?

If a standard or routine procedure is being used in the experimentation, has that procedure been referred to by location or full description?

Is the record void of any comments concerning patentability?

Is the record complete so as to provide conclusions and evaluations of the results stemming from the experimentation?

Is the record complete in providing analytical data or referring to the place where analytical data can be found?

Is the record unambiguous to the extent that unused portions of record pages are lined through and that there are no erasures or backdated entries?

Has the recording individual used permanent ink?

Has the record been witnessed promptly by at least one individual who did not participate in the experimentation, one who can read and understand the description, and one who preferably, but not necessarily, observed the experiment?

All of these factors should be considered when evaluating the quality of laboratory notebook entries. These entries may otherwise never be considered until they are the subject of a legal contest, at which time quality review may be too late.

5.2. The Record of Invention. The second phase of developing a record of the invention is to condense the record into a summary form which serves several purposes. Specifically, the record of invention establishes a date of

invention through attached copies of notebook records, spectra, and the like which all prove that the invention has in fact been conceived and reduced to practice in some form having practical utility.

Along with other elements of the invention, it is good practice to include within the record of invention any first written descriptions or drawings of the invention. It is also prudent to attach photocopied notebook pages that evidence this development. Another helpful part of the record of the invention is to list the names of individuals who worked on the invention and enumerate their respective contributions.

One further component of the record of invention is a list of any uncovered publications or patents which are relevant to the invention. Such a listing should also include any disclosures made by any of those who worked on the invention to other parties inside or outside the organization. All inventors should sign the record of invention. At least two witnesses who are not inventors should also read and understand the record of invention so that they can sign and date this document.

The importance of an accurate and complete record of invention cannot be underestimated. The record of invention should serve as the basic document for establishing the date of conception and reduction to practice of the invention. The U.S. PTO issues patents to those who are first to invent. In a contest over inventorship, any available record of invention is submitted to the U.S. PTO to establish proof of an inventor's rights. As of January 1, 1996, any inventor from a country belonging to the World Trade Organization may use such evidence before the U.S. PTO. Previously, this type of proof could be relied upon only if the activity, documented in the notebook, record, etc, was undertaken in the United States. Similarly, activity undertaken after December 8, 1993 in Mexico or Canada may also be relied upon to prove inventorship.

The following provides a meaningful but not all-inclusive checklist of factors to consider when completing a record of invention.

Has the technology and commercial field to which this invention relates been identified?

Has a search of the prior patents and literature been done and copies of the search results or the publications been attached?

Have the most relevant prior patents and literature been determined?

Is the invention an improvement over prior patents and literature and has the nature of the improvement that the invention presents been identified?

Has explanation in detail of how the prior patents and literature have been improved and what specific problems were solved been provided?

Has the unexpected or surprising property provided by the invention been identified?

Have the essential elements of the invention been identified?

For each essential component of the invention, have the following been identified: its function? a general definition of the component? a specific list of materials which may be used for each component? what is the preferred

material? limits, boundaries, ranges at which the material is useful? preferred limits, boundaries, ranges?

Have noncritical components of the composition been identified?

Has the intended commercial embodiment of the composition been identified?

Have reasonable alternatives for each component been identified?

Has the invention been described in enough detail to enable someone with skill in the art to make it?

Are copies of the relevant lab notebook pages attached?

Were any graphs or design experiments completed? If so, are they attached to the disclosure?

Are the data sheets for each raw material attached to the disclosure?

Have any tests been done to support the claim that the invention is better than that which is disclosed in the prior patents and literature? Are they attached and identified as such?

What is the nature of these tests? Are the protocols for the tests attached or identified?

6. Determining the Scope of the Invention

Once the record of invention has been written, an evaluation of the invention should be undertaken. A careful evaluation of the record of invention is usually best completed by a committee of individuals from technical, commercial, and legal disciplines. It is important to include the viewpoint of those scientists working in the field, those commercial or sales people who will be responsible for selling any products which stem from the invention, and those individuals who may be able to offer a legal opinion given the insights of commercial and scientific personnel.

First the committee should consider the technical merit of the invention. Specifically, is it reasonable from a scientific or engineering standpoint? Further, is there a clear advance in technology that has not been previously undertaken or achieved by another party?

It is also important to ascertain the commercial significance of the invention. Although the invention may provide a measurably large advance in technology, science, or industry, it may not provide an easily producible commercial vehicle or product. Alternatively, the invention may be easily produced as a commercial product, but that product may have limited relevance to the overall commercial strategy or plans of the organization.

The legally trained member of the interdisciplinary committee should provide insight as to the significance of the technological advance and as to whether any commercial product ultimately derived from the invention could be protected by an issued patent. Another important function of this person is to determine the scope of the invention based on preceding events, publications, or activities which may have otherwise limited the breadth of the invention. To this end, U.S. law requires that an invention satisfy a number of prerequisites or requirements before issuing a patent: novelty, nonobviousness, utility, and disclosure.

6.1. Novelty. A fundamental statutory prerequisite to patentability is novelty. A lack of novelty occurs when each and every element of the invention, as it is claimed, is found in a single disclosure which occurs before the date of invention. Such a disclosure may occur in any of a number of forms. To be an adequate disclosure, it should be catalogued or inventoried as a book might be in a reference library and open to public dissemination. The novelty requirement presents the inventor with an extensive list of "cans" and "cannots." Unfortunately, the natural course of research and development often leads to activities which are much more readily categorized as "cannots" than "cans." Ultimately these activities may even proscribe the issuance of a patent if an application is not filed in a timely fashion.

Questions that should be considered when determining whether an invention is novel include the following.

Was the Invention Known or Used by Others? The invention cannot have been publicly known or publicly used by others or the subject of a patent or publication anywhere in the world prior to the applicant's actual invention date. If someone other than the inventor has published a journal article, received a patent, or used the invention publicly, the inventor will not be able to receive a patent on the invention.

Was the Invention Used, Sold, or Advertised For Sale? The invention cannot have been the subject of an offer for sale, public use, or a patent or publication published more than one year prior to the filing date of the inventor's patent application by the inventor or any other party. This rule means that an inventor may lose the right to patent an invention even though pursuing a normal and expected course of events toward placing the invention in the commercial market. From that point in time in which the inventor discloses the invention to the public, either by advertising the product, publishing an article on the product, placing it on sale, or by allowing a public use of the invention, the inventor has one year to file an application. Otherwise, any right to a patent stemming from the invention will be lost to the public domain.

Was the Invention Abandoned? The invention cannot have been abandoned. An invention may be abandoned either expressly or impliedly. For example, abandonment may occur when an inventor expressly disclaims the invention by dedicating it to the public. Abandonment may also occur if a patent applicant fails to complete the examination of a patent application pending within the U.S. PTO during the time periods set for completion. The publication of an article disclosing the invention may be an abandonment where the inventor does not file an application for a patent within one year.

Has the Invention Been the Subject of a Prior Foreign Patent? Although one cannot be sure when, or even whether, a patent will issue from any application, it is good practice to make sure your U.S. patent application is filed within 12 months of the first foreign filed application. The patenting of an invention in another country by the inventor or another party will preclude the issuance of a patent on the same invention in the United States.

Has the Invention Been the Subject of a Prior U.S. Patent? A previously filed U.S. patent application or issued patent disclosing the same invention and originating with another inventor may be sufficient to deprive the second inventor of the desired novelty. An inventor who is the first to file a

patent application in the U.S. PTO will retain priority of invention and is entitled to a patent over another patent applicant who subsequently files for a patent. Events which may destroy novelty are often also referred to as "prior art," given their nature as an earlier event which is relevant to the technical art.

Other examples of prior events or prior art which may destroy novelty are as follows:

- Graduate school dissertations such as Masters or Ph.D. dissertations.
- Abstracts of meetings of technical organizations.
- Approved or published grant proposals, as well as status reports on ongoing grants.
- Published articles in the popular press.
- Prior products manufactured by the client.
- Prior company literature related to the invention.
- Prior publications of the inventor in the area.
- Research in the technical area of the invention.
- Companies researching in the area of the invention.
- Any patents in the area.
- Presentations made by the inventor or others in the area of the inventions at trade shows, conferences, etc.
- Post-sessions disclosing the invention or other materials related to the invention.
- Demonstrations of the invention to customers or other third parties.
- Any patent applications filed by others in the area of the invention before and after they become publicly available.
- The publications and work of any institutes, associations, or industry groups.
- The trade names and information on competitive products in the commercial area of the invention.
- The contents of all prior filed applications by the inventor with others or by others in his or her organization which are related to the invention.

Economic reality dictates that the invention must eventually be commercially exploited. Experimental trials are a natural follow-on to laboratory work and are often necessary to further refine or otherwise reduce the invention to practice. Although the trial may not preclude the subsequent filing of a patent application on the invention, such experimental trials should be reviewed in advance to determine the effect they may have on filing for patent protection. For example, in some circumstances trials made for purposes of gaining further experimental data on the invention may be perfectly acceptable. In addition, even if a trial is made in public, it may be the case that this trial does not extinguish the novelty of the invention. The application of further refinements to the invention, the facts surrounding the trial, and the ultimate timing of the filing of the patent application may all be determinative of whether or not the novelty of the invention survives.

In any event, the highest importance should be accorded to the coordinating of events which may affect the novelty of the invention. Careful consideration should be given to the importance and timing of promotional events. It is often the case that patent applications can be filed and drafted well before announcements occurring at technical conferences. Further, technical publications often have an extended lead time before they are actually published. In any instance, the filing date of a patent application retains extremely great importance, being a determining factor in the timing of any disclosure.

6.2. Nonobviousness. The grant of a patent is also dependent on whether the advance, application, development, or invention is obvious. If an invention is obvious, it is not patentable. The legal qualification of obviousness is a very difficult concept to understand. Although all the elements of an invention may actually be published, if they do not appear together in a single publication, then the invention is generally still novel. However, if the publications may be read in combination to disclose all elements of the invention, the invention may be considered obvious and not patentable.

An initial determination on the degree to which an invention may be "obvious" can be obtained by answering the following questions:

What do prior patents, publications, and public activity disclose relative to the invention?

What are the differences between all of this prior activity and the new invention?

Would the skilled technician, engineer, or scientist consider the newer invention unexpected or surprising in view of this previous work?

However, even if there is some disclosure of the invention in the prior activity, the law of patents in the United States requires a high level of detail concerning the invention. A summary of factors to consider in establishing that an invention is not obvious is as follows:

The results achieved by the invention are new, unexpected, or superior.

Up to now, the techniques used in the invention were unworkable.

Up to now, problems solved by the invention were not solvable.

The invention has attained commercial success.

The problem solved by the invention was never recognized before.

An element of a prior invention has been omitted without loss of capability.

Prior teachings lack any suggestion that the reference should be modified in a manner required to meet the claims.

Up to now, those skilled in the art never appreciated the advantage of the invention, although it is inherent.

The prior patents and/or literature are inoperative.

The prior patents and/or literature are vague, conflicting, or very old and therefore are weak and should be construed narrowly.

The invention has been licensed.

The invention has been given an award or recognized in a professional publication.

The invention has been copied by an infringer.

The result achieved by the invention is greater than the results achieved by any of the individual prior teachings.

Scientists, engineers, and technicians would find it physically impossible to combine the prior teachings to produce the invention.

If combined, the prior teachings would produce an inoperative combination.

The prior teachings themselves teach away from the invention.

6.3. Utility. Aside from designs and plants, inventions are required to exhibit usefulness or utility to be patentable. In fact, issued patents for processes, machines, compositions, and articles are often commonly referred to as "utility" patents. Depending on the nature of the technology, a single assertion of utility may suffice. In other cases, such as in the field of biotechnology, a more elaborate demonstration of utility may be necessary. Although utility may be supported by an assertion of use, application, or benefit, the assertion must be accurate and credible to ensure the enforceability of any patent relied upon to cover the invention.

An inventor may establish utility by providing several working examples which disclose preparation, application, and even some or all of the benefits of the invention. Utility may also be substantiated by merely disclosing several applications for the invention. One method of determining the breadth or scope of an invention is to define the invention by only those elements essential to performing the intended task. This definition should then become the broadest claim of the patent application.

6.4. Disclosure. An additional statutory requirement is that of disclosure. A patent must provide the public with a disclosure which is enabling, definite, and shows the best mode for practicing the claimed invention.

Enablement. The patent has to enable any person reading the disclosure who has skill in the relevant technical area to make and use the invention. The enablement requirement mandates that the applicant provide a description of the process of manufacturing given invention. Also, the patent provides an adequate description of the process of using the invention. This enables a person of adequate skill in the technical area to which the invention pertains to be able to make and use the invention without undue experimentation. In applying the disclosure to make or use the invention, a certain level of experimentation is allowed. However, the experimentation cannot be undue, requiring the reader essentially to recreate the invention through extended and potentially unsuccessful guesswork.

The disclosure requirement provides that the patent be a teaching document, and enhance the breadth of knowledge held by the public. By increasing the breadth of knowledge within the public sector, a given patent facilitates further technological development and growth, which in turn results in the issuance of additional patents.

Problems with enablement arise when the patent fails to provide an adequate disclosure of parameters or materials for use in producing or performing

the invention. The enablement requirement may, however, be satisfied by relying on and referencing a particular level of experience or knowledge in the given field of technology and incorporating that reference directly into the patent application.

Definiteness. Adequate description or definiteness requires that the patent claims provide an outline of those elements which are integral to the application's invention. In turn, the specification acts as a dictionary wherein the reader can interpret and understand the elements in the patent claims. Complementary to the requirement of definiteness is the requirement that the application must disclose the entire invention. The applicant cannot make a claim of right to the invention where essential elements of the invention are not disclosed in the patent.

The definiteness requirement serves notice to potential infringers as to the exact boundaries of the patentee owner's rights. Thus, a patent provides a record of what the inventor has brought to the technological field, and also provides other parties with notice as to what conduct is permissible in view of the patent claims.

Best Mode. The patent applicant must disclose the best mode of practicing the invention known to the inventor at the time the application is filed. Concerns over best mode often arise when a patent applicant seeks patent protection for an invention but, at the same time, desires to keep as a trade secret one aspect of the invention necessary to the production of a commercial product. This action denies the public access to this information and undermines the policies of the patent system. This would effectively deprive the public of information on the amount of disclosure made in exchange for the 17-yr patent grant, and hence it invalidates the patent grant.

As a result of the need for its disclosure, an inventor must disclose the best mode of practicing the invention that the inventor knows in drafting a patent application. In some instances, the best mode may be the very commercial product developed by the inventor. However, in other instances the best mode may be an article, machine, or process which is economically or commercially impractical. Nonetheless, this embodiment needs to be disclosed in the patent.

7. Drafting the Patent Application

Once the record of invention has been assembled and evaluated, a decision may be made as to whether to move forward and draft a patent application. In drafting the patent application, the inventor may work alone gathering the elements of the disclosure which the inventor deems relevant and material to the invention. However, given the technical and legal complexities of patent application drafting, it is more advisable for the inventor to retain a patent agent or attorney. In order for a patent agent or attorney to represent inventors before the U.S. PTO, these individuals must have a degree in one of the sciences or in the field of engineering. Further, a patent agent or attorney must have demonstrated a proven competence in understanding the procedures and rules of the U.S. PTO by obtaining admission to practice before this office.

In drafting a patent application, proceeding methodically through the several steps necessary to produce the type of disclosure legally and technically sufficient to satisfy the requirements of the laws of the United States is absolutely essential to a successful granting of the patent. A first step is to outline those elements of the invention which are absolutely essential to its practice. A body of disclosure should be outlined for each of the essential elements of the claim. This disclosure should describe each element in terms of its function, as well as the parameters that are relevant to the essential nature of the individual element. For example, if a chemical mixture has a component which acts so as to thicken the mixture, it is appropriate to outline the family of constituents that can serve this function. At the same time, a full outline of the disclosure of this individual element will include mention of those chemicals that are preferred for use within the mixture so as to perform the desired thickening function.

Once this process has been completed for each of the essential elements, patent claims may be drafted which cover the invention. These claims will cover, in the broadest sense, only those elements of the invention which are essential. Narrower, more focused claims, however, should also be included within the patent application. These claims may focus on aspects of the invention that the applicant believes are preferred, or may otherwise represent essential aspects of any commercial product that will stem from the invention. Finally, claims should also be drafted to cover alternative forms of the invention. Such alternative forms of the invention may not necessarily be considered to be preferred commercially, but they may present an area where a competitor could attempt to engineer "around" the invention.

The current regulations of the U.S. PTO allow for a total of 20 patent claims with the payment of a minimum fee. Providing claims of varying breadth and scope through the enumeration of essential elements, optional elements, as well as parameters critical to the practice of the invention is desirable. Providing claims of varying scope helps increase the value of any patent by strengthening its validity, making it more enforceable against any infringers, and making it more commercially valuable by enabling the coverage of alternative products and offering the potential of licensing.

Once the claims have been written, a fuller disclosure of the invention may be drafted. This description of the invention will generally follow the outlines of the essential and optional elements. Such an outline will include a functional description of elements including relevant broad and preferred parameters for each of the elements. The description of the invention also should explain the intended interrelationship of the elements that is needed to produce the invention.

Other known embodiments of the invention should also be disclosed to the extent practical. These embodiments can prevent future patenting by third parties if they are published in the applicant's issued patent.

The patent application should also provide a thorough description of the benefits and advantages of the invention and the manner in which it advances to technology. This may be done in a two-part, two-step analysis. The first step is to outline prior developments and inventions in the "Background of the Invention" section of the patent application (Fig. 1**b** at N). The second step is to

describe the advances or benefits of the invention in the "Summary of the Invention" section (Fig. 1**b** at O). This logical problem—solution format addresses those problems which have been left unmet by the prior inventions. An applicant may also wish to include certain working examples which exhibit the various benefits of the invention. Working examples may also be effective in distinguishing the application from previous inventions as well as in illustrating solutions to problems posed.

With GATT, the U.S. PTO began accepting "provisional" applications as of June 8, 1995. The provisional application provides an applicant the opportunity to gain an early U.S. filing date for a relatively low filing fee without commencing the patent term. Design applications are not included in the provisional application system. The provisional application is not examined by the U.S. PTO except for compliance with formalities, and it has a nonextendable life of one year from the filing date. Drawings must be included if they are necessary for the understanding of the disclosed subject matter.

The provisional application can be filed in a non-English language, but if it is, an English translation is also required. The provisional application must include a cover sheet which (*1*) confirms provisional status, (*2*) lists the inventors and the title of the invention, (*3*) provides the attorney's name and registration number (if applicable), and (*4*) provides the correspondence address.

To maintain the benefit of the provisional application filing date, a regular utility application must be filed during the pendency of the provisional application, ie, within one year of its filing date, and must include at least one inventor in common with the provisional application. The filing of a provisional application does, however, commence the one-year Paris Convention priority period. Therefore, foreign filings must be pursued by the first anniversary of the earliest provisional application.

8. Filing and Examination of the Application

Once the application has been finalized, it should be reviewed by all inventors to make sure that it is a complete teaching of the invention and that the level of disclosure satisfies the legal requirements of U.S. law. The inventors then execute an oath or declaration to this effect. Depending on the structure of the organization with which the inventors are affiliated or for which they work, the inventors may in addition have an obligation to assign the rights for the invention as embodied in the patent application to their employer. In such cases, it is usually appropriate to secure the execution of an assignment by the inventors.

Once the patent application has been reviewed and all formal documents executed, all paperwork including the application is filed with the U.S. Patent and Trademark Office (PTO). Legal regulations govern how a patent application should be filed, and filing is not a simple matter. Further, the correct and appropriate filing of a patent application is essential to obtaining a filing date, which is important to the examination of the U.S. patent application, as well as to the filing of any counterpart applications in foreign countries based on the initial U.S. application.

Once it has been filed, the patent application enters the domain of the U.S. PTO, which is organized by technical discipline into various groups, eg, polymer chemistry, biotechnology, inorganic solid chemistry, as well as organic chemistry. Within each group are specific art units handling areas of technology which are even further focused on specific advances and developments within their respective technical fields.

Figure 3 depicts a generic step-by-step process of examination as it generally occurs within the U.S. PTO. Optional steps are those which may not occur during the process of examining the patent application. Steps designated "if necessary" are those which may not be pursued given the normal course of prosecution. The timing of examination varies depending on the number of patent applications which each group is examining at the time any given application is filed.

After the filing of the patent application, the applicant generally files the Information Disclosure Statement (step 2), in which the applicant is required by regulation to list all patents, publications, literature, as well as facts and events which may pertain to the invention disclosed and claimed in the given application. This Information Disclosure Statement is reviewed and considered by the patent examiner in preparation for examining the patent application. The examiner then reviews the claims in the patent application to determine the number and character of inventions disclosed in the single patent application (step 3). The examiner may issue to the applicant a restriction requirement requesting that the applicant select one invention to have examined at that time. For example, if the patent applicant has filed claims directed to a composition, as well as a method of preparing that composition, the examiner may deem that the application comprises more than one invention; the examiner is only obligated to examine one invention. If the examiner requests the applicant to select which invention should be examined first, the unselected invention may be filed at a later date in a subsequent application, called a "divisional application," without loss of right or filing date, as long as it is filed while the first application is pending, ie, before it issues as a patent or is abandoned. Both the restriction requirement as well as the response to the restriction requirement (step 4) are labeled optional, since they may not actually arise during the course of prosecution.

The first substantive action (step 5) on the merits of the application may occur any time from six to twelve months after filing. This action, generated by the patent examiner and called a first office action, results from the examiner's review of the patent application to ensure its compliance with the formal regulations of the U.S. PTO. These regulations govern definiteness, sufficiency of disclosure, and adequacy of description. In addition, the examiner will have reviewed the applicant's Information Disclosure Statement and conducted a search of prior patents and publications to determine whether the invention was previously known to those in the public. Any publication or patent which has a date preceding the filing date of the patent application being examined may be used against the application as a basis for rejecting the patentability of the applicant's patent claims. The applicant's patent claims will be rejected for lack of novelty if the examiner has found each and every element of those claims within a single publication or patent that has a date preceding the filing date of

the application. The examiner will reject the applicant's patent claims as obvious if more than one reference in combination provides an unequivocal disclosure of the claimed invention.

In order to overcome rejections based on prior publications or patents, the applicant often must amend the patent claims to include aspects of the invention which are not found in the publications cited by the examiner as a basis for the rejections. The applicant may also wish to provide properties, characteristics, or advantages of the invention which are unexpected in view of these publications and patents.

In response to the first office action, the applicant may file a series of amendments (step 6) and should provide substantial reasoning and analysis to explain the reasons that the publication(s) cited by the examiner do(es) not disclose the invention as it has been claimed. The patent applicant's response should also comply with the examiner's request for correcting formal problems in the application.

If the examiner believes that all problems or issues have otherwise been resolved in the pending application, the examiner may pass the application onto allowance (step 9). However, if problems still exist with the application the examiner may file a second office action against the pending application, usually a "final rejection" (step 7). At that time, if the patent application is finally rejected, the applicant has a limited opportunity to respond to the examiner. The applicant's second response to the examiner must overcome the outstanding rejection, and provide a response (step 8). Generally, final office actions place the patent applicant in a procedural phase of the examination where the patent application must either be allowed, abandoned, or placed on appeal before the end of the time period set for response to the final office action (step 9). Pursuing an appeal of the examiner's decision involves providing the examiner with notice of the appeal as well as writing and submitting written comments which explain the examiner's error (step 10). The appeal is then decided by an impartial board of administrative judges (step 11).

If the patent application is allowed based on an applicant's response to the second office action, examination is ended. However, if the patent examiner advises the patent applicant that the rejections will be maintained and the applicant views these rejections as insurmountable, the patent applicant may choose to abandon the patent application. If the patent examiner maintains the earlier posed rejections, and the patent applicant disagrees with the examiner, the patent applicant may appeal the examiner's decision to the Board of Patent Appeals and Interferences, which is comprised of administrative judges. The appeal process involves the noticing and briefing of the appeal, and oral argument before and a subsequent decision from the Board of Appeals and Interferences (step 10). Usually the oral argument is presented to, and subsequent decision is received from, a panel of three administrative judges selected from the full complement of the Board. If the Board panel decides in the applicant's favor (step 11), the patent application will be passed to issuance (step 12). If the Board decides in the examiner's favor, the patent applicant will have to consider whether to refile the application and request another round of examination or seek court review.

The mailing of a Notice of Allowance, whether resulting from the decision of the examiner or from a decision by the Board of Appeals, effectively ends the examination of the application. In this instance, the applicant then is required to pay an issue fee. Once the issue fee has been paid, the patent will issue within months.

Starting June 8, 1995, the term of a U.S. patent changed. Design patents retain a 14-yr term. Issued and enforceable patents and patent applications (including continuations and divisionals) in existence before June 8, 1995 have a term which is the longer of 17 years from issuance or 20 years from the original filing date. Patent applications (including continuations and divisionals) filed on or after June 8, 1995 which result in the issuance of a patent have a term of 20 years from filing. This date is measured from the original application filing date. The original application filing date may be the earliest filing date stemming from a United States or Patent Cooperation Treaty (PCT) filing.

9. Post-Issuance Concerns

Issuance of a United States patent transforms a patent applicant into a patentee, and new concerns may arise relevant to management. For example, the patent should be reviewed to determine formal and substantive correctness. An audit should be taken regularly to determine whether there is a continuing justification to pay the maintenance fees required to keep the patent in force during its effective period. The patentee or patent assignee may have to address concerns of patent infringement or patent validity.

9.1. Correction of Errors in Issued Patents. A patentee should review the issued patent to ensure that the patent grant is free of errors and contains the intended claims. Errors may arise in a patent application or issued patent during the writing of the patent application, examination of the patent application, or the printing of the issued patent document. The errors may be inconsequential, stemming from misspellings, misprintings, as well as insertions or deletions of text. These errors may have occurred through sections taken by the applicant or the U.S. PTO in transforming the patent application to a printed patent document. The issued patent should also be reviewed for compliance with the formal and substantive requirements of United States law and the regulations of the U.S. PTO.

Other concerns which may necessitate a review of a patent after issuance include the discovery of prior art which was not uncovered during the examination of the patent application. A determination should be made as to whether or not the claims in the issued patent are too broad when viewed in light of this prior art. It may also be the case that someone who participated in the examination of the patent application discovered prior patents, literature, or activities which they knew of but did not cite to the patent examiner. In such an instance, this prior art must also be reviewed in light of the patent claims to determine whether the claims are too broad.

If, upon review of the patent, the patentee discovers that the claims contain a formal error, are too narrow, or are too broad in view of the prior art, the patentee may ask the U.S. PTO to correct this error. There are four administrative

vehicles for correcting errors in issued patents. The application of each of these mechanisms is dependent on the nature and severity of the error, as well as the source of its creation.

The Notice of Errors. The first mechanism for correction of errors is called a "Notice of Errors." This document may be filed by the patentee after issuance of the patent with the U.S. PTO and references the patent number, issue date, and the errors contained in the patent. The purpose of a Notice of Errors is to clarify the examination history of the patent and such notice dispositively corrects any misspellings, or typographical errors or omissions. One example of a problem which may be clarified by a Notice of Errors is an omitted chemical bond in a compound used in an exemplary embodiment of the invention. In short, the error is obvious and easily corrected.

The Notice of Errors should resolve those problems which are evident on the face of the patent but which also may be, by their nature, obvious and correctable problems to someone reading only the patent. The Notice of Errors does not result in a further publication by the U.S. PTO, but rather it is instead placed into the examination history of the issued patent and thus is available to anyone who may wish to read this examination history. The Notice of Errors is appropriate for correcting simple matters which do not affect the claim scope or the validity of the patent.

The Certificate of Correction. Another mechanism for correcting the patent is the "Certificate of Correction," which is essentially a petition filed by the patentee to correct minor errors in the patent produced either by the U.S. PTO or inadvertently by the applicant. Unlike the Notice of Errors, a Certificate of Correction does result in an additional publication from the U.S. PTO, and anyone requesting a copy of a patent in which a Certificate of Correction has been filed will also obtain the Certificate of Correction. A Certificate of Correction reflects amendments made during the examination of the patent which were entered by the examiner but not found within the issued patent. The omission of such amendments can be in the body of the patent or in the patent claims. The Certificate of Correction may also be used to correct errors in the issued patent which were not present in the patent application when it was filed. If the error was caused by the patent applicant prior to or during examination, the patent applicant bears the cost of filing and processing the Certificate of Correction. If the U.S. PTO created the errors during examination or printing, the U.S. PTO bears the cost of producing the Certificate of Correction. The Certificate of Correction cannot be used to amend the patent after issuance. For example, if a review of events surrounding the patent turns up additional prior art that, in turn, requires one or more amendments to the patent, other mechanisms must be used to correct these problems.

Patent Reissue and Reexamination. Reissue proceedings and reexaminations proceedings require the resubmission of the issued patent to the U.S. PTO and should be expedited by the U.S. PTO. However, each requires the additional expenditure of substantial funds and a loss of time in the active life of the patent.

A reissue may be ordered to correct any minor or major mistake which occurred during prosecution of a patent, but the mistake must be one that makes the patent partially or wholly inoperable. Inoperable essentially means

that the patent cannot be enforced. For instance, a reissue proceeding can be used to correct inventorship or even broaden claims if the patent is less than two years old. However, such a request to broaden claims in the context of reissue may not be undertaken to recover subject matter canceled during examination. Further, a reissue proceeding may be undertaken to correct formal problems or address newly discovered prior art which affects the scope of the claims. The nature of a reissue proceeding directs that this mechanism should be used only when the validity of the patent is in question owing to the error or problem in question.

A request for reexamination may be made by the patentee, a third party, or the Commissioner of the Patent and Trademark Office whenever a new question of patentability arises. This new question of patentability has to be raised in the form of a publication such as a journal article or a patent which was not considered during the prior prosecution. Reexamination is a more expedited and economical means of receiving a judgment on whether or not a patent is valid in advance of litigation.

By requirement, the patent generally must be resubmitted to the U.S. PTO for reexamination. If the examiner and the patentee differ as to their findings concerning prior art or the ultimate scope of the claims, reexamination can take an extended period of months if not years to complete, all at substantial cost to the patentee. In addition, reexamination and reissue proceedings allow for varying levels of participation by third parties. As a result, before undertaking any such proceedings a patentee should consult legal counsel to define a legal strategy and choose an appropriate forum for correction of the patent in question.

9.2. Patent Maintenance Fees. On the date a patent issues, it has a 20-yr life measured from the earliest filing date relied on for priority. Under current U.S. law, the patentee is required to pay maintenance fees, a policy stemming from an interest in the public in practicing the technology covered or claimed in the patent. After a patent issues, the claims are generally very important commercially and provide the patentee with relatively easily exercised rights to prevent others from making, using, or selling that which is found in the claims. However, as the patent grows older, the public interest in practicing the technology grows stronger. Often the claims become less important commercially and the commercial value of the claims then needs to be assessed in view of the expense of maintaining the patent.

Payment of maintenance fees is required at the fourth-, eighth-, and twelfth-year anniversaries of the date of issuance of the patent. The costs of these maintenance fees vary from year to year depending on the regulations of the U.S. PTO. The first maintenance fee tends to be fairly slight, allowing for the further enforcement of the patent with little economic burden on the patentee. The second maintenance fee tends to increase the payment from the first maintenance fee by a factor of two. The third maintenance fee tends to be substantial, increasing the payment from the first maintenance fee by a factor of three.

The patentee should develop and implement a policy for auditing its patent portfolio in the process of paying maintenance fees to the U.S. PTO. This practice should also be used to justify the further payment of annuities to foreign national patent offices. Maintenance fees and annuities can constitute a substantial

portion of funds expended in the protection of patents over a year's time. Further, without a tangible, real commercial value or advantage stemming from the patent, there may be little justification for maintaining the patent over its last five years of life.

Factors which should be considered in auditing or otherwise determining continued justification for maintaining a patent include the following: (*1*) Do the patent claims cover a product made by the patentee? If so, what is the level of income provided? (*2*) Do the patent claims cover a product made by an infringer or a product which is likely to be made by an infringer within the remaining term of the patent? What is the potential gain in income for the infringer, and what is the potential royalty? (*3*) Is there a potential to sell or to license the patent? (*4*) Is there any other commercial justification for maintaining the patent through payment of the maintenance fee?

9.3. Patent Interference. An interference is a contested action in the U.S. PTO to determine inventorship between two or more patent applicants or between at least one patentee and one or more patent applicants. The principal contest in an interference concerns the right to claim the invention. The interference action results from U.S. law, which awards patents to the first inventor, generally irrespective of patent application filing date. In the simplest situation, an interference occurs when a pending application discloses and claims the same invention which is claimed in at least one other copending application or issued patent.

The interference proceeding is declared by the patent examiner and occurs in the U.S. PTO. Once an interference is declared, a determination is made as to the exact subject matter constituting the invention of the interference and who filed the first patent application on that invention. The first applicant becomes the senior party to the interference. The junior party has the burden of proving that it was prior in time as to its date of invention.

A patentee or patent applicant may win an interference proceeding by proving the right to the invention as the first inventor. Alternatively, a patentee or patent applicant may win an interference proceeding by default. If the invention was known to the public prior to the first date of invention, none of the parties to the interference have a right to claim the invention.

9.4. Legal Actions Based on Patents. The issuance of a patent initiates a term during which the patentee may enforce its rights, ie, the patentee may prevent others from making, using, or selling that which the patent claims. To literally infringe upon the patentee's rights, another person, business, or organization must make, use, or sell something which has each and every element found within the claims of the patent in question. Patent infringement may also occur if the action in question contributes to or otherwise induces the making, using, or selling of something which contains each and every element of that which is found in the claims of the patent.

An action for patent infringement may be based on one or more claims of the patent. The patentee may also bring an action for infringement of patent rights if it believes that the actions of a third party are equivalent to that which is literally recited in the patent claims. If infringement of patent rights is found by court of law, the patentee may receive remedies that include monetary damages, attorney's fees, and injunctive relief.

One accused of infringing on patent rights may defend against the action by showing that they have not made, used, or sold something which includes each and every element found in a claim of an issued patent. Further, one may also defend against a legal action for infringement of patent rights by clearly showing that the patent in question is invalid, ie, that it lacks novelty, is obvious, has not complied with the formal disclosure requirements of the U.S. PTO, or does not designate the proper inventor.

Legal actions based on patents almost always have tremendous commercial significance to the parties involved. The factual and legal issues surrounding and relating to these legal actions can be complex, burdensome, and not easily resolved. Any number of oral or written opinions are necessary from legal counsel which provide the appropriate advice or defenses. Further, the guidance provided by statute and legal precedent may often be lacking. A thorough discussion of legal actions relating to patents is beyond the scope of this article. One considering, or threatened by, a legal action involving a patent should retain competent legal counsel.

10. Foreign Patent Prosecution

The foreign filing of a patent application is an immensely complex task, requiring retention of foreign patent lawyers or patent agents, complying with highly specific rules of foreign practice, and usually requiring a significant expenditure of capital. However foreign patents can provide significant commercial opportunities in valuable international markets. Further, various systems for obtaining patent protection, put in place by multinational treaties, are allowing most organizations to operate on a commercial level which is not national or regional, but global.

For many years, the method of obtaining foreign patent protection corresponding to a U.S. patent application was to file separate, individual patent applications in selected foreign countries. Each of the applications had to be written to conform with the national requirements of the country in which it was filed.

The national laws of most countries are unique to the particular country. However, most industrialized countries are parties to one or more International Conventions which provide for the filing of foreign patent applications. For example, pursuant to the Paris Convention, if an application is filed in a second country within one year after filing the application in the first, "home" country, and if certain legal formalities are met, most foreign countries will treat the foreign-filed application under its own laws as if it had been filed on precisely the same date as in the original, home country application.

The benefit of these treaties generally relates only to obtaining a retroactive filing date, and the individual laws of each foreign country still apply. However, this rule has some important consequences. For example, while the United States permits a one year grace period in which to file a patent application following any public use or sale or other disabling act, many foreign countries do not. Consequently, even with the foreign filing treaty benefits, it has become

necessary to file U.S. applications before there has been any disabling act, even though it is not required by U.S. laws.

10.1. The Patent Cooperation Treaty. A number of foreign countries have signed a Patent Cooperation Treaty (sometimes known as the PCT). Filing a single application in the English language under this treaty allows an applicant to designate any of the countries which are signatories of the PCT. The treaty establishes a system for the centralized filing and searching of a single national application and operates to establish a common filing date for all designated countries. Thus, the initial application, when accompanied by the proper designation of countries and payment of applicable fees, is deemed to be the equivalent of foreign filings on a country-by-country basis of the same application in each country designated by the applicant.

Under this filing procedure, once the single International PCT application is filed a patentability search is conducted by an approved search office. After the search is completed, the search report is published and reported to the applicant.

If the applicant decides to proceed, the PCT patent application will publish. At this time, the applicant may either proceed to file the PCT patent application in each designated national country or request examination of the PCT application within the framework of the PCT. If the applicant requests examination of the patent application within the PCT, an Examiner will file a written action. The applicant may then amend the application by resubmitting new claims and new application pages.

These amendments to the application can be made in English. The Examiner reviews the applicant's submissions and issues a final written opinion on the patentability of the application. At this time, the applicant must pursue national filings within those national and regional patent offices in which the applicant intends to obtain protection. Copies of the PCT patent application and written opinion are then distributed to the National Patent Office by the World International Patent Office (WIPO).

Publication of the complete application occurs as a single International Patent Application 18 months after the first, home country filing date. In theory, this is a simpler procedure for the initial filing of multiple applications in individual countries and avoids a duplication of search efforts. Further, by postponing the requirements for filing translations of an application until after the search results are known, a potential savings is afforded to an applicant who, after reviewing the search results, decides not to continue prosecution of the application in one or more countries which have been initially designated. However, some of these cost savings are offset by special fees, eg, country designation fees, applicable to any PCT application. Also, the process of obtaining a patent in any particular country may be delayed for quite some time relative to the length of time that one would expect if a national application had been filed directly in that particular country. Thus, PCT examination permits delaying the decision as to which particular country the application should be filed.

In the PCT examination process, national patent applications may be filed at the end of Chapter I (18 months from the home application filing date), or at the end of Chapter II (30 months from the home application filing date). If the examination of the U.S. home application ends successfully before completion of the examination of the counterpart application in PCT Chapter I, the PCT

Applicant may file national applications including the claims examined and allowed by the U.S. PTO without proceeding to PCT Chapter II processing. A brief timeline of patent application examination under the PCT is provided in Table 1.

10.2. Regional and National Patent Application Filings. Other methods of obtaining patent protection in foreign countries include national filings and filings undertaken under regional conventions, eg, the European Patent Convention (EPC), to which most European countries belong. National filings can be time-consuming, laborious, and expensive. Most often examination is undertaken in the local language of the country. The expense of retaining local associates, securing translations, and paying local fees usually results in higher costs than are incurred under the PCT or certain regional conventions. Still, certain countries, such as Egypt, Hong Kong, Indonesia, Malaysia, Turkey, South Africa, the Philippines, and Argentina, have maintained their independence from the various world and regional conventions.

Under the EPC an applicant may file a patent application in one or all of the European countries that are signatories by filing a single application. Unlike the PCT, the EPC is actually a system of law, common to all of the present member countries, established for the granting of European patents.

An application filed under this treaty results in a single application which is processed by the European Patent Office, located in Munich, Germany. The European Patent Office, like the U.S. PTO, performs the patent function for all of its member states, but only for patent applications filed under the EPC. At the European Patent Office, the application is examined and granted. The initial filing and most prosecution under the EPC can be made in the English language. When the patent is granted, it is actually granted in the form of a number of identical patents, each of which applies to one of the countries which was designated at the time of filing the European patent application. Each of these patents is interpreted and enforced according to the applicable national laws in the country to which the patent applies.

Even in countries which are not signatories to either the PCT or various regional conventions provided around the world, patent application examination generally follows a fairly standard pattern. After the first national, home application is filed, subsequent applications may then be filed in other countries, within the 12-month time period if such a grace period is provided. If this grace period is not provided, the patent application(s) which are to be filed in non-Paris Convention Countries have to be filed before any event occurs that may destroy the novelty of the invention. Further, under U.S. practice, any invention that is the subject of a U.S. patent application and that is also to be filed outside the United States must be given a foreign filing license by the U.S. PTO prior to the foreign filing.

Once the patent application has been filed in a foreign national or regional patent office, a series of events take place. First, the patent application is assigned to a patent examiner within the regional or national patent office. The examiner generates a patent examination search report, which will be the basis for the examination of the application and which allows the applicant to evaluate the invention in the context of those patents and patent applications which have been previously filed around the world. Unlike the United States,

which maintains patent applications in secret until patent issuance, most national and regional patent offices publish patent applications at a regular interval after the first filing date. In many countries this publication occurs at the 18-month anniversary from the first filing date of the application. In some countries, eg, Taiwan, this publication may occur at any time once examination has been successfully completed. Further, in at least one country, Japan, patent applications are published in each stage of examination.

The next step in examination is a request for the examiner to take action or take the application up for examination. Examination in foreign countries can be very complex, rigorous, and formal. Most countries require a substantive examination of patent applications including a review for compliance, with formal requirements in the format of the patent application and patent claim. In addition, most foreign national and regional patent offices require examination of applications for novelty as well as a concept called inventive step. Although the requirement that an invention have an inventive step is somewhat complex, this requirement is analogous to the requirement that inventions not be obvious under U.S. law.

In the process of examination, a foreign national or regional patent examiner may generate any number of office actions, to each which the applicant is required to respond. When dealing with foreign national and regional patent offices, the applicant is often required as a matter of practical necessity to retain an attorney in the foreign country in which patent protection is being sought. Such an attorney may assist in securing translations, providing practical insight into the legal requirements of the national or regional patent office, and in providing practical insight into the interpretation of publications cited against the application.

Once the application has been determined to be acceptable by a foreign national or regional patent examiner, it is generally published as allowed or granted. At this time, the laws of most foreign national or regional countries or patent conventions allow for the opposition of the allowance or grant by any third party who may deem the invention unworthy of a patent grant. If opposed, the patent grant will undergo an additional examination. If unopposed, after the specified time period the application is granted.

After granting, the applicant must comply with annuity requirements, the necessity of commercially exploiting the invention in the foreign country, any requirements to grant compulsory licenses, and it must also undertake the enforcement of its patent rights. Annuities are generally taxes levied on the patent grant on an annual basis. In many countries the annuities are levied on a claim-by-claim basis, so that the more claims a specific patent contains, the more expensive that patent is to maintain over its lifetime. In certain countries, such as those in the Pacific rim, patent rights can become a very expensive asset to maintain for the life of the patent.

Enforcement of foreign patent rights is of concern. In some countries, enforcement proceedings to prevent another party from using a patented invention can be difficult to initiate owing to the expense, the time period required for the enforcement, or the overall practicality of any remedy provided by the laws of the country. As a result, given the expense of securing foreign patent protection, a principal consideration in the decision as to whether to file an

application should be whether the applicant will ever be able to enforce any patent rights actually obtained in that country.

In evaluating foreign patent protection for an invention, it is necessary to (*1*) select the countries where protection is desired; (*2*) determine which of those countries are participating in the European Patent Convention (or regional treaty), which are participating in the Patent Cooperation Treaty, and which are not participating in either treaty; (*3*) evaluate the importance of the invention; (*4*) consider the level of inventiveness or sophistication of the invention; (*5*) evaluate the need or lack of need for secrecy; (*6*) consider the present or imminent likelihood of infringement by others; and (*7*) consider licensing needs.

11. Trade Secret Rights

An alternative to patent protection for advances, developments, ideas, and applications is to treat such information as a trade secret. The protection of trade secrets relies on the development of ideas, applications, and advances which are not found in the public domain. Trade secrets, by definition, are kept in confidence by their owner, disseminated only to those who accept an absolute obligation of confidentiality, and then only for purposes of which the trade secret owner knows and approves.

If a trade secret is believed to have been violated, a judge must initially decide whether or not it actually existed. Such determination is based in part on the manner in which the trade secret was protected and also on such considerations as the commercial value of the information, the manner in which the information was safeguarded, and the manner in which the information was stolen or otherwise found in the public domain. These are also some of the initial factual determinations which must be made when considering trade secret protection.

In evaluating the application of trade secret protection, a matter of further concern is the commercial relevance of the trade secret. For example, consider whether an improved chemical process for fabricating a semiconductor should be protected by means other than patenting. If it is not possible to ascertain the nature of the new process by close analysis of the semiconductor, the basis on which to file and easily enforce a patent may not be present. By disclosing the process in the form of a published patent the process owner obtains a 17-yr grant of patent rights upon issuance in the United States, but the patent may disclose a key element of the patent owner's business to the patent owner's competitors. Since the process is not evident from the finished semiconductor, the patent owner's competitors would not, but for the issuance of the patent, be able to learn of the process. Also, the patent owner may face the difficulty of not being able to discern whether another party is using the patented process. As a result, the patent owner may have a very difficult time enforcing patent rights against competitors who are using the process in violation of the patent.

The life of a trade secret may extend indefinitely if the owner of the secret has taken the proper steps to safeguard the invention, in contrast to a 17-yr patent term, after which time the invention is in the public domain. Traditionally,

trade secrets have been protected by confidentiality agreements, nondisclosure agreements, and employment agreements.

12. The Creation of a Trade Secret

Because there is no "federal law of trade secrets," protection of trade secrets is often left to the variability of the criminal and civil laws of the 50 states. To the extent that a trade secret is property, violation, theft, or misappropriation of the trade secret may be the subject of criminal penalty. To the extent that a trade secret is bound to rights, violation or misappropriation of the trade secret may be the subject of civil penalty. Significant effort, however, has been made in developing a uniform body of law to apply to ideas and innovations which may be the subject of this form of protection.

Trade secrets may be any type of information, eg, formulae, patterns, compilations, forms, programs, devices, techniques, and processes, as well as any patentable subject matter. However, in order for it to be a trade secret, there must be definite economic value in the information not being known to the public or readily determinable by a third party.

The trade secret must also be the subject of reasonable efforts to maintain its security, though the disclosure of a trade secret does not necessarily end its protectable life. Rather, an evaluation must be made as to whether the disclosure was made by someone who knew, or should have known, that the information was a trade secret. If so, trade secret rights may still be protected.

In determining whether confidential information is indeed a trade secret, knowledge of the information generally, as well as knowledge of the information by those in a given business, must be considered. Other factors include measures taken to safeguard the information; the value of the information within any given business setting; the investment in time and capital made to develop the information; and the ability of others to acquire the information through proper channels.

To summarize, in order to be considered a trade secret, the information (*1*) must not be generally known or readily ascertainable; (*2*) must provide a competitive advantage; (*3*) must have been developed, maintained, or acquired at the trade secret owner's expense; and (*4*) must be the subject of the trade secret owner's intent and efforts to keep it confidential.

Vital information a company may wish to protect will invariably be connected to the company's products or services. In order to facilitate protection, a policy or program should be implemented requiring regular recognition of such information by employees who create, use, or otherwise have access to it.

The protection of a trade secret is a complex task dependent upon any number of factors. The mere formation of an intention to maintain information as secret is not enough; actual safeguards must be put into place. The owner of a trade secret must identify the information as a trade secret and protect the information from disclosure. Means used to prevent disclosure might include the following:

Guarding entrances to the facility in which the information is kept and checking briefcases, purses, and the like and locking or making unguarded entrances inaccessible.

Using employee and visitor identification badges.

Maintaining logs of all who visit the facility during the day, denying visitor access to sensitive areas of the facility, providing visitor escorts within the facility, and guarding experimental, developmental, and prototype work from public view.

Developing an organizational policy on trade secret information and communicating that policy to employees; promoting a program to identify all commercially important or competitively sensitive information for protection as trade secrets, and further identifying such information by clearly labeling it.

Storing and maintaining trade secrets under lock and key in a segregated area that is not accessible to the public.

Limiting access to trade secrets to those having an obligation to maintain it as confidential.

Using agreements to prevent employees who are exposed to trade secrets from disclosing this information if or when they change employment.

Destroying trade secret information by means that will prevent its disclosure, eg, incineration or shredding.

Monitoring or providing clearance for employee publications, lectures, and other public activities related to the business of the organization.

Monitoring or clearing employee activities which involve removing any business-related information or objects from the facility.

Maintaining a user log, either manual or electronic, on all photocopying equipment.

Using photographic, electronic, or keyed access and monitoring equipment.

Consistently protecting all trade secret information to the same level, including consistently investigating any concerns over the theft or breach of trade secret protection.

13. Exploitation of Trade Secrets

Trade secrets become unprotectable when they are found in the public domain, are independently developed, or are disclosed out of confidence. Events of the latter type may occur in any number of controlled or uncontrolled situations. For example, a promotional event such as a trade show or a required disclosure to a governmental agency may result in disclosure of the trade secret. Further, publications in journals or magazines which may be necessary to promote products may lead to a disclosure of trade secrets. Idle correspondence, conversations, or communications with sales associates, suppliers, or distributors may also result in disclosure of trade secret information.

A trade secret owner may also beneficially exploit the trade secret through licensing, sales, or various other business ventures based on the confidential information. Such cooperative ventures often raise other issues. Exploitation of trade secret information may also occur through the unintended disclosure of this information to the public. Generally, the people who learn of trade secret information tend to be the trade secret owner's employees, customers, licensees, suppliers, and joint venture partners.

In business transactions the parties should have a clear understanding of exactly what constitutes trade secret information and consider how the information will be used and who will retain ownership rights. If the transaction is a pure and simple sale, concerns over ownership may be meritless. However, such concerns might be well-founded, if further research or commercial development involves similar information. It may also be necessary to consider whether the seller should be allowed to compete against the buyer in ventures involving the same or related information. These are just some of the issues which arise with the sale of the trade secrets.

When licensing or otherwise undertaking a joint venture based on trade secret rights occurs, other considerations arise. For example, research efforts invariably give rise to additional information which may be the subject of trade secret or even patent protection. If this additional information is derived from the licensed or shared body of initial information, consideration should be given to ownership, further protection, eg, who files and pays for patent protection, and at the end of the agreement how, or even if, this information should be divided. Commercial partners of the trade secret owner should not be provided this information except under the strictest obligations of confidentiality. Keeping in mind that a trade secret owner's supplier probably also supplies the owner's competitors, such relationships are often ready conduits for the dissemination of confidential information. Further, license and joint venture agreements regularly contain confidentiality provisions with substantial penalties for any violations that may occur.

In the case of contract and noncontract employees, a rigid program devised for the identification and protection of trade secret information should be implemented. Confidentiality agreements should be signed by all employees at the time of hire. The agreement may contain a number of provisions on the use of information during and after employment. The significance of the program, including the employee's responsibilities and the company's rights, should be clearly explained to the employee. The employee should also be given tools for maintaining information as a trade secret; for example, the simple use of bound notebooks for maintaining laboratory experiments is almost a universally accepted standard practice. The use of a resource person for questions on identification and protection of established and newly developed trade secret information is also a good practice.

Employees should be regularly briefed on the organization's trade secret program. These briefings should be directed toward the clarification of issues, questions, and concerns. If an employee leaves the company, the organization should remind the employee of its rights and that the obligations of confidentiality continue to bind the employee even after termination of employment.

In short, trade secret information should be disseminated only when commercially necessary, only under obligations of strict confidentiality, and only with definite penalty provisions for improper use or further dissemination.

Even so, a trade secret owner may wish to outline a plan for further protecting the trade secret information. For example, in instances where publication of a trade secret is necessary for commercial exploitation, the filing of a patent application may be an adequate substitute for the complete dedication of rights to the public. If the information would satisfy the requirements of U.S. patent law, then, despite perceived difficulties in enforcement of any patent rights obtained, the best defense against theft or unauthorized use may be obtaining patent rights covering this information.

14. Violation of Trade Secrets

Trade secret rights are generally violated through an unauthorized use by someone other than the owner. This use may take the form of theft or misappropriation for later use in a commercial product. The unauthorized use can also take the form of an unauthorized disclosure to a third party who is not bound to keep the information confidential.

Another form of misappropriation is the disclosure or use of a trade secret of another without consent, by a person who used "improper means" to acquire knowledge of the trade secret. "Improper means" generally include theft, bribery, misrepresentation, breach or inducement of a breach of a duty to maintain secrecy, or espionage.

The finding of misappropriation is highly dependent upon the protection that the owner has given the trade secret, as well as the notice provided to employees. That is, an employee has a duty of confidentiality to his employer for that information which is considered secret, but the employer must provide the employee fair notice of the confidential nature of the material.

An additional concern for trade secret owners is that like other legal actions, there is a definite limitation to the time period for bringing an action for misappropriation of trade secrets. As a general rule, such a legal action must be brought within three years after the misappropriation is discovered. Remedies for trade secret misappropriation can include injunctive relief and money damages, as well as attorneys' fees for bringing the action.

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Table 1. **Patent Application Examination by the PCT Process**

Date	Action
day 1, month 1	filing of first national (home) application
day 1, month 13	PCT application must be filed by this date
month 16	publication of PCT search report
month 18	publication of PCT application
month 19	applicant must file a demand for examination of PCT application to maintain the application, or complete national filings in the intended countries
month 23	if a demand is filed, examiner issues first examination report
month 26	applicant's response to examination report is due
month 28	final examination report is issued by PCT examiner
month 30	end of PCT examination; patent application enters in national or regional examination

United States Patent [19]
Johnson (A)

[11] **Patent Number: 5,131,727**
[45] **Date of Patent: Jul. 21, 1992**

[54] **AERODYNAMIC WHEEL COVER** (B)

[76] Inventor: **Harold M. Johnson**, 2903 Legion Ave. North, Lake Elmo, Minn. 55042 (C)

[21] Appl. No.: **614,861** (D)

[22] Filed: **Nov. 16, 1990** (E) (F)

[51] **Int. Cl.**[5] **B60B 7/02**
[52] **U.S. Cl.** ..... **301/37 P**; 301/37 SA
[58] **Field of Search** ..... 301/37 R, 37 P, 37 SA

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"Mylar® For Packaging, Summary of Properties," Type 50 M-35, Form PBH, DuPont.
"Mylar® For Packaging, Summary of Properties," Type 50 M-44E, Form H-02951, DuPont.
"Mylar® M-45, Summary of Properties," Form 202805B, DuPont.
"Mylar® For Packaging, Summary of Properties," 75 M-45, Form PBH-6, DuPont.
"Mylar® For Packaging, Summary of Properties," Type 48 MM-20, Form E-71065, DuPont.
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"Mylar® 50 OL2, Summary of Properties," Form H-35232, DuPont.
"Mylar® For Packaging, Summary of Properties," Type 75 OL, Form H-02955, DuPont.
"Mylar® 75 OL 2, Summary of Properties," Type 75 OL 2, Form Jan. 30, 1991 PBH, DuPont.
"Mylar® 100 OL, Summary of Properties, Type 100

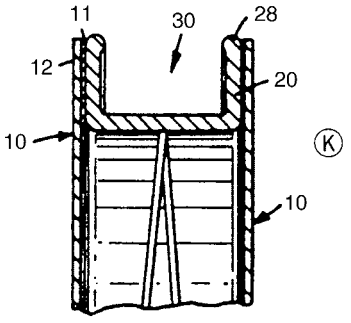
(List continued on next page.)

Primary Examiner—Russell D. Stormer (H)
Attorney, Agent, or Firm—Merchant, Gould, Smith, Edell, Welter & Schmidt

[57] **ABSTRACT** (I)

An aerodynamic wheel cover which includes a two sided circular cover, having an outer edge and an inner edge, and a central aperture. The wheel cover may be affixed by any number of adhesives deposited on one side of said aerodynamic wheel cover adjacent the wheel cover outer edge. The present invention also discloses a method of affixing the wheel cover of the present invention to wheels, the resulting wheels and vehicles.

29 Claims, 3 Drawing Sheets (J)



(a)

Fig. 1. The elements of an issued United States patent (**a**–**c**).

(L) AERODYNAMIC WHEEL COVER

(M) FIELD OF THE INVENTION

This invention relates generally to light weight covers used to increase the aerodynamic properties of wheels. More specifically, the present invention relates to covers for wheels capable of creating an aerodynamic effect by reducing the friction or drag across the surface of a wheel created by air flow.

(N) BACKGROUND OF THE INVENTION

Since the creation of wheels, man has sought various mechanisms to assist wheels in turning at a higher rate. Hubcaps or wheel covers have been used for years to provide ornamental decoration for wheels. Generally, mechanical means of attachment such as friction clips and screws have been used to attach the hubcap to the wheel rim. Traditionally, these approaches have not been used on two wheel vehicles such as motorcycles and bicycles as there is no effective means for attaching hubcaps to an axle that extends beyond the planar, cross-sectional thickness of the wheel rim. Moreover, the weight of hubcaps or wheel covers generally used in the automotive industry are not suitable for motor or human powered cycles.

Recently, composite wheels have become popular. While composite wheels may eliminate the use of spokes, they are costly and do not necessarily reduce the weight of the wheel or the energy necessary to initiate revolution. As a result, composite wheels do not always provide an adequate alternative to wheel covers as they may not be readily applicable to all uses in which spoke wheels may be found. Traditional spoke wheels are still the predominant wheel system for most two-wheeled vehicles.

In the past, various systems have been proposed for covering spoke wheels. For example, U.S. Pat. Nos. 4,712,838 and 4,836,615 to Berg et al discloses a clip-fastened disc cover for spoke wheels, which generally consists of a fabric or plastic cover having a hoop of semi-rigid material in a peripheral pocket of the cover. McEachern, U.S. Pat. No. 4,620,749, discloses a fabric or polymeric wheel cover which generally consists of a porous cover, having a central aperture for the wheel hub held on wheels by tension engagement with an opposing cover.

Laurion, U.S. Pat. No. 3,847,443, discloses an ornamental wheel element which is designed to fit between the spokes, inside a wheel. Strazis, U.S. Pat. No. 4,682,821, discloses a semi-rigid, tension attached bicycle wheel cover assembly intended to improve the aerodynamic efficiency of bicycle wheels. Monte, U.S. Pat. No. 4,732,478, discloses a streamlined wheel for bicycles which comprises two hollow half shells which are joined to create a rim for support of a tire. Imao et al, U.S. Pat. No. 4,729,605, and Viellard, U.S. Pat. No. 4,741,578, discloses spokes and wheel components useful in composite wheels.

However, these systems fail to disclose an inexpensive means of easily improving the aerodynamic properties of a spoke wheel with minimal manual effort. As can be seen, while any number of alternative wheel covers are available, these systems have certain shortcomings which have not yet been satisfied by the art.

(O) SUMMARY OF THE INVENTION

The present invention provides a wheel cover which improves the aerodynamic properties of the hub-rim-spoke wheels. The wheel cover of the present invention is preferably made of a light weight synthetic or natural polymer, fabric or paper film which is adhesively applied to a wheel through simple manual application. In turn, the aerodynamic wheel cover of the present invention may also be easily removed and replaced to allow on-road repairs of spoke, hub, or rim.

Preferably, the wheel cover of the present invention may be easily applied without extended mechanical or manual effort merely by adhesively applying the cover to the wheel spokes or rim. Once in place, the wheel cover may be shrunk to size so as to provide a tightly fit cover.

In accordance with the present invention there is provided, an aerodynamic wheel cover comprising a two sided circular cover having an outer edge and an inner edge. The inner edge of the wheel cover borders a central aperture. Adhesive means is deposited on one side of the aerodynamic wheel cover adjacent to the wheel cover outer edge. Also disclosed are methods for applying the vehicle wheel of the present invention, and the resulting wheels as well as wheeled vehicles.

BRIEF DESCRIPTION OF THE DRAWINGS (P)

FIG. **1** is a side perspective view showing the wheel cover of the present invention in application on a bicycle wheel.

FIG. **2** is a side plan view of one embodiment of the wheel cover of the present invention shown in FIG. **1** with the wheel cover applied to a spoke wheel rim.

FIG. **3** is an alternative embodiment of the wheel cover of the present invention shown in FIG. **1** with the wheel cover applied in this instance to facilitate friction fitting the wheel cover between the interior of the rim and a later applied wheel tire (not shown).

FIG. **4** is an alternative embodiment of the wheel cover of the present invention shown generally attached to a spoke wheel at the spokes.

FIG. **5** is a cut away view of the wheel covers of the present invention shown in FIG. **4** taken along lines **5—5**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT (Q)

The present invention discloses a wheel cover, a method of applying the wheel cover, and resulting wheels and vehicles.

The Wheel Cover

Turning to the figures, wherein like parts are designated by like numerals throughout several views, there is shown in FIG. **1** an aerodynamic wheel cover **10** in one environment of application, that is, applied to the wheels of a bicycle **1**. The aerodynamic wheel cover **10** generally comprises a two sided circular element having an outer edge **12** and an inner edge **14**. The inner edge **14** borders a central aperture **16**. Deposited at the outer edge of one side of the aerodynamic wheel cover is an adhesive **11**. FIG. **2**. The adhesive **11** may generally be positioned adjacent to the wheel cover outer edge **12** to assist in affixing the wheel cover **10** to various elements of the wheel.

In accordance with the present invention, the wheel cover disclosed in FIGS. **1-5**, generally functions to

(b)

Fig. 1. *(Continued.)*

examples demonstrated that a cover can be constructed that will be permeable to air. This is an important aspect to consider for bicycles where cross winds can impart a substantial lateral force that can create handling problems for the cyclist.

(R) WORKING EXAMPLE 4

A triangular shaped wheel cover with the center cut out to provide hub access was then applied to a wheel. The cover was constructed from a heat shrinkable polyolefin film. Tape was attached to the apex points of the triangle. The tape liner was removed and the three adhesive sites were fastened to the spokes. As an identical complementary cover was then applied to the opposite face of the wheel in a mirror image fashion. The adhesive contact points were positioned to encapsulate the spoke on either side within the adhesive contact point. Heat was then used to shrink the covers and achieve a wrinkle-free condition. This example demonstrates that design can play a part in providing a stylish wheel cover that is capable of individualizing the bicycle to meet a wide variety of consumer tastes.

The foregoing specification, examples and data provide a basis for the understanding of the invention. The invention can be made on a variety of embodiments without departing from the spirit and scope of the invention. Accordingly, the invention resides in the claims hereinafter appended.

(S) I claim as my invention:

1. A heat shrinkable aerodynamic wheel cover comprising
   (a) a two sided circular cover, said cover comprising a polyolefin material, said cover comprising an outer edge and an inner edge, said inner edge bordering a central aperture;
   (b) adhesive means deposited on one side of said aerodynamic wheel cover, said adhesive means positioned adjacent to the wheel cover outer edge
wherein said polyolefin material does not interfere with the mechanical operation of the wheel and has a tensile strength of about 200 to 25,000 psi.

2. The aerodynamic wheel cover of claim 1, wherein said cover thickness ranges from about 0.5 mils to about 125 mils.

3. The aerodynamic wheel cover of claim 1 wherein said adhesive means comprises an adhesive selected from the group consisting of velcro, adhesive tape, or an adhesive resin.

4. The aerodynamic wheel cover of claim 3, wherein said adhesive means comprises an adhesive selected from a group consisting of natural or synthetic thermoplastics, and thermosets.

5. The aerodynamic wheel cover of claim 4, wherein said thermoplastic adhesive comprise a pressure sensitive adhesive.

6. The wheel cover of claim 4, wherein said thermoplastic adhesives are selected from the group consisting of polyamides, polycarbonates, polyesters, polyolefins, polyvinyl acetates and combinations thereof.

7. The aerodynamic wheel cover of claim 4, wherein said thermoset adhesives are selected from a group consisting of epoxies, phenolics, isocyanates, cyanoacrylates, acrylics or combinations thereof.

8. The wheel cover of claim 1 wherein said cover has a thickness of about 1 mil to 60 mils.

9. The cover of claim 1 wherein said cover has a thickness ranging from about 3 mils to 15 mils.

10. The cover of claim 1 wherein said polyolefin material has a tensile strength ranging from about 300 psi to 15,000 psi.

11. The cover of claim 1 wherein said polyolefin material comprises polypropylene.

12. The cover of claim 1 wherein said polyolefin material comprises polyethylene.

13. A vehicle wheel comprising
   (a) a wheel rim;
   (b) a hub positioned within the circumference of said rim;
   (c) a plurality of spokes extending inwardly from said rim to said hub; and
   (d) at least one heat shrinkable aerodynamic wheel cover affixed to the wheel, said wheel cover comprising a two sided circular cover, said cover comprising a polyolefin material having a tensile strength of about 200 to 25,000 psi, said cover comprising an outer edge and an inner edge, said inner edge bordering a central aperture adjacent said wheel hub, and adhesive means deposited on one side of said aerodynamic wheel cover, said adhesive means positioned adjacent to the wheel cover outer edge wherein said wheel cover does not interfere with the mechanical operation of the wheel.

14. The vehicle wheel of claim 13, wherein said wheel cover outer edge is attached to the rim through said adhesive means.

15. The vehicle wheel of claim 13, wherein said wheel cover outer edge is attached by fixing said adhesive means to said spokes.

16. The vehicle wheel of claim 13, comprising a second heat shrinkable wheel cover positioned over the second side of the wheel.

17. The vehicle wheel of claim 16, wherein said first and second wheel cover outer edge is attached by fixing said adhesive means to said spokes.

18. The wheel cover of claim 13 wherein said cover has a thickness of about 1 mil to 60 mils.

19. The cover of claim 13 wherein said cover has a thickness ranging from about 3 mils to 15 mils.

20. The cover of claim 13 wherein said polyolefin material has a tensile strength ranging from about 300 psi to 15,000 psi.

21. The cover of claim 13 wherein said polyolefin material comprises polypropylene.

22. The cover of claim 13 wherein said polyolefin material comprises polyethylene.

23. A method of applying a heat shrinkable aerodynamic wheel cover to a vehicle wheel, said vehicle wheel comprising a rim and hub, said aerodynamic wheel cover comprising a two sided circular cover, said cover comprising a polyolefin material having a tensile strength of about 200 to 25,000 psi, said cover comprising an outer edge and an inner edge, said inner edge bordering a central aperture, and adhesive means deposited on one side of said aerodynamic wheel cover, said adhesive means positioned adjacent to the wheel cover outer edge wherein said wheel cover does not interfere with the mechanical operation of the wheel, said method comprising the steps of:
   (a) stretch applying the aerodynamic wheel cover to a hub and rim wheel; and
   (b) heat shrinking said wheel cover after application.

24. The method of claim 23, additionally comprising the step of applying a second cover to said wheel.

(c)

Fig. 1. *(Continued.)*

Laboratory Notebook No. 1412

Page No. 37

Iwana Patent Corporation
Project: Diet Syrup
Date: 3/11/94

Objective: To formulate a storage-stable, phase-stable syrup for baked breakfast goods which is sugar-free.

Constituent	*wt %*
Maple syrup	*10*
Sugar syrup	*60*
High fructose corn syrup	*20*
Flavoring	*0.1*
Cellulose gum	*5.0*
Water	*Balance*

The ingredients were mixed at 100 degrees C for 15 minutes until a homogenous formulation was created. The product was then frozen at 0 degrees C for 5 h and then thawed. This cycle was repeated 10 times without any evident precipitation or separation.

Completed by: Shiela Oswald 3/11/94

Read and understood by: Steven Jay 3/12/94

Fig. 2. Laboratory notebook page.

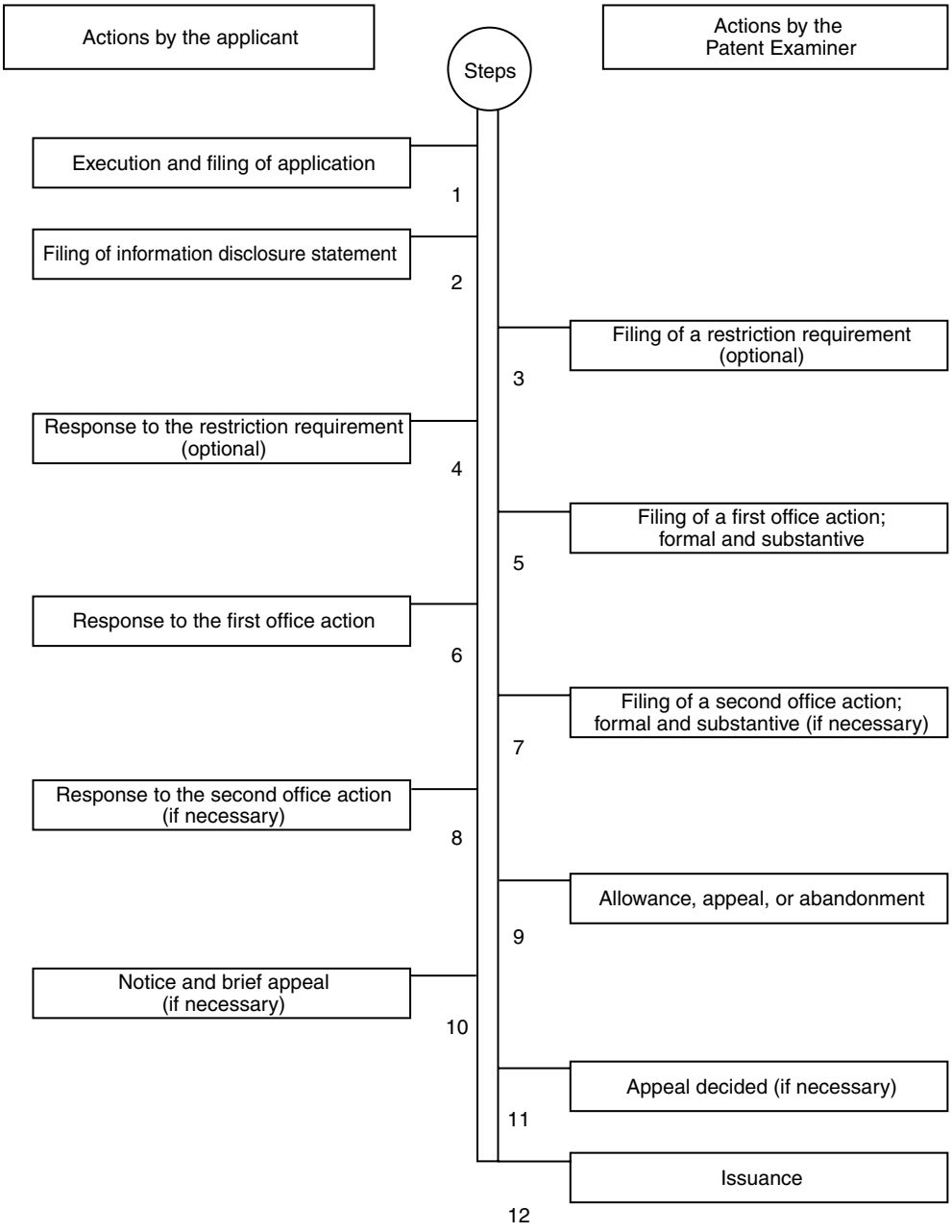


Fig. 3. Timeline for examination in the United States Patent Office.