Patents for Engineers

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- What can be patented, what cannot be patented.
- What is new and what is obvious.
- Who may apply for a patent and how.
- What is a claim and what is infringement.
- Structure of a claim and claim language.
- Validity, infringement analysis.
- Literal infringement and the doctrine of equivalents.
- Conclusions.
The ‘223 Adler Patent

- Title
- Inventor
- Owner of the patent
- Filing Date
- Technology classification
- Prior Art
- Preferred Embodiment
How much do you know about patents?

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1. A patent grants the inventor the right to make, use, or sell his/her invention.
2. The Patent and Trademarks Office determines the validity of a patent.
3. Any good idea can be patented.
4. A patent may be granted for device that cannot work.
5. The description in the patent and the accompanying drawings define the patented invention.
6. A patent is not valid unless the description completely defines a usable invention.
7. Every claim in the patent defines a different invention.
8. A device can avoid infringement by adding elements that are not defined in a claim.
9. If an invention can be constructed from existing patents then it cannot be patented.
10. A component of a device and the element of a claim are considered equivalent if there is an “insubstantial difference.”

The word **patent** means generally “open to public inspection,” and is a synonym for “obvious” and “evident.”

- The granting of patents to inventors is the result of public policy that considers it a benefit to society to have inventors share their insights openly.

- In exchange, society agrees to protect the inventor from another’s use of the invention for a period of time.
A U. S. Patent

A U. S. patent for an invention is the grant of a property right to the inventor, which is issued by the Patent and Trademark Office. The right conferred by the patent grant is, in the language of the statute and of the grant itself, “the right to exclude others from making, using, offering for sale, or selling” the invention in the United States or “importing” the invention into the United States.

The term of a new patent is 20 years from the date on which the application for the patent was filed in the United States or, in special cases, from the date an earlier related application was filed, subject to the payment of maintenance fees. US patent grants are effective only within the US, US territories, and US possessions.

http://www.uspto.gov/web/offices/pac/doc/general/
What Can Be Patented

In the language of the statute, any person who “invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent,” subject to the conditions and requirements of the law.

- “process” is defined by law as a process, act or method, and primarily includes industrial or technical processes.
- “machine” is an apparatus or device.
- “manufacture” refers to articles which are made, and includes all manufactured articles.
- “composition of matter” relates to chemical compositions and may include mixtures of ingredients as well as new chemical compounds.

These classes of subject matter taken together include practically everything that is made by man and the processes for making the products.
What Cannot Be Patented

The patent statute specifies that the subject matter must be "useful." The term "useful" in this connection refers to the condition that the subject matter has a useful purpose and also includes operativeness.

- A machine which will not operate to perform the intended purpose is not considered to be useful, and therefore would not be a valid patent.
- The courts have ruled that the laws of nature, physical phenomena and abstract ideas are not patentable subject matter.
- A patent cannot be obtained upon a mere idea or suggestion. A complete description of the actual machine or other subject matter for which a patent is sought is required.
What Is New

It is not new if:

- “the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent,”
- “the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country more than one year prior to the application for patent in the United States . . .”

The patent literature known as “prior art” is the primary source of what is NOT new.
Is It Obvious

An invention is not patentable if the *differences* between it and the prior art are *obvious*.

The invention and the prior art must be sufficiently different from what has been used or described before, so that it may be said to be *nonobvious* to a person having ordinary skill in the area of technology related to the invention.

- If prior art can be combined in ways “obvious” to one of ordinary skill in the art to generate the invention, then it is not patentable.
- If elements known to one of ordinary skill in the art can be substituted into prior art to generate the invention, then it is not patentable.

Obvious to one of ordinary skill in the art is the fundamental criterion
1802--The “bureau of patents” was established under the “Superintendent of Patents” in the Department of State.
1836--Reorganized as the Patent and Trademarks Office under the Commissioner of Patents and Trademarks.
1849--The Patent and Trademark Office was transferred to the Department of Interior.
1925--It was transferred to the Department of Commerce where it is today.

- The Patent and Trademark Office administers the patent laws as they relate to the granting of patents for inventions, and performs other duties relating to patents.
- The Patent and Trademark Office has no jurisdiction over questions of infringement and the enforcement of patents, nor over matters relating to the promotion or utilization of patents or inventions.

The grant of a patent by PTO does NOT mean it is valid. This is decided by Federal Court.
Patent Examiners

The Patent and Trademark Office has about 5,700 employees, of whom about half are examiners and others with technical and legal training.

- Applications for patents are divided among a number of examining groups, each group having jurisdiction over certain assigned fields of technology.
- Each group is headed by a group director and staffed by examiners. The examiners review applications for patents and determine whether patents can be granted.
- If an examiner refuses to grant a patent, an appeal can be taken to the Board of Patent Appeals and Interferences, and a review by the Commissioner of Patents and Trademarks may be had on other matters by petition.
- The examiners also identify applications that claim the same invention and initiate proceedings, known as interferences, to determine who was the first inventor.

Patent applications are received at the rate of over 200,000 per year. The Patent and Trademark Office receives over five million pieces of mail each year.
Who May Apply

ONLY the inventor may apply for a patent, unless:

- the inventor is dead, in which case the application may be made by the administrator or executor of the estate.
- the inventor is insane, in which case the application may be made by a guardian.
- one of a set of joint inventors refuses to apply for a patent or cannot be found, then the other joint inventors may apply on behalf of the non-signing inventor.

If two or more persons make an invention jointly, they apply for a patent as joint inventors. A person who makes a financial contribution is not a joint inventor and cannot be joined in the application as an inventor.

A person applying for a patent who falsely states that he or she is the inventor is subject to criminal penalties, and the patent is invalid.
How Do You Apply

A **non-provisional application** for a patent is made to the Assistant Commissioner for Patents and includes:

- A written document which forms the specification (description and claims), and an oath or declaration;
- Drawings if needed to explain the specification; and
- The filing fee. Fees change each October. ($355 small business, $710 for others)

The application for patent is not forwarded for examination until all required parts are received. **Strict format requirements are enforced for a patent application.**

**Provisional applications** are less formal but require the same information. They are not examined on their merits. Instead they establish a filing date and provide one year’s time to develop and submit a non-provisional application.
The Patent Specification

The following order of arrangement is required for the specification:

- Title of the Invention.
- Cross reference to related applications (if any).
- Background of the Invention.
- Brief Summary of the Invention.
- Brief Description of the Drawings (if any).
- Detailed Description of the Invention.
- Claim or Claims.
- Abstract of the Disclosure
- Drawings (if any).

The application also requires fee forms and a notarized oath of invention. Furthermore the order and format of each item is prescribed.
What is a Claim

Each claim identifies precisely what the applicant regards as the invention.

- The claims are used by the courts to determine the scope of the protection afforded by the patent.
- Claims are “independent” or “dependent.” The first claim is always independent. A claim that includes all the features of a previous claim and adds features is said to be “dependent.”
- Multiple independent and dependent claims may be provided as long as they differ substantially from each other. (Fees are required additional claims)
- The meaning of terms and phrases used in the claims must be able to be determined by reference to the description.

The description is known as the “preferred embodiment” of the invention, and must be a completely described workable system. It is an example of the invention NOT the invention itself.
What is Infringement

Infringement of a patent consists of the unauthorized making, using, offering for sale or selling any patented invention within the United States or United States Territories, or importing into the United States of any patented invention during the term of the patent.

If a patent is infringed, the patentee may sue for relief in the appropriate Federal court. The patentee may ask the court for an injunction to prevent the continuation of the infringement and may also ask the court for an award of damages because of the infringement.

The defendant usually responds by:
- questioning the validity of the patent (inventorship, anticipation, obviousness), which must then be decided by the court;
- claiming that the accused device is not described by the language of the claim (literal infringement); and
- that there are substantial differences between the device and the invention described by each claim (doctrine of equivalents).
- questioning the fairness, or equity, of the damages.
Structure of a Claim

A patent claim generally consists of a preamble and a list of elements.

- The **preamble** generally describes the invention and the context in which it is used. This paragraph usually ends in the word “comprising,” or some variation. This preamble does not limit the invention in any way.
- The series of statements that follow the preamble are the **elements** that define the invention, and are often called “limitations.”
- In order to **infringe** the claim, a device must include each and every claim element.
- The usual strategy to “design around” a patent is to find a design in which a claim element can be eliminated.

The claim elements should be kept to the minimum needed to define the invention.
Claim Language

The collection of all the claim elements must be complete enough that all the components of the “preferred embodiment” can be found in the claim language in some form.

However, the components are usually identified by nouns that are as generic as possible. Technical language is usually eliminated in order avoid introducing unnecessary limitations. The criterion for understanding this language is “one of ordinary skill in the art.”

Elements in a claim are defined by either their “structure” or “function:”

- A **structural element** is described by its physical characteristics and how it is located and coordinated with other components;
- A **means-plus-function element** is generally denoted by the phrase “a means for.” In this case, the part is defined by the function that it accomplishes rather than its physical characteristics.
Claim 38 of the ‘223 Patent

- Preamble (an independent claim)
- 7 Claim elements
  - 2 Structural elements
  - 5 “Means plus function” elements

38. An apparatus for carrying out radiosurgery by selectively irradiating a target region of living tissue within a living organism, comprising:
   a digital data storage memory having stored therein a 3-dimensional mapping of at least a portion of the living organism, the mapping covering a mapping region which includes and is larger than the target region;
   a beaming apparatus which, when activated, is adapted to emit a collimated radio surgical beam of a strength sufficient to cause the target region to become necrotic;
   means for selectively activating the beaming apparatus;
   means for passing first and second diagnostic beams, which are separate and distinct from said radiosurgical beam, through the mapping region substantially simultaneously, the first and second diagnostic beams being at a known non-zero angle relative to one another, to produce respective first and second projections within the mapping region;
   means for producing first and second digital electronic images representative of the first and second images;
   means for digitally comparing the 3-dimensional mapping in digital form with the electronic images representative of the first and second images sufficiently close in time after said images are produced to derive therefrom data representative of a real time location of the target region; and
   means for adjusting the relative positions of the beaming apparatus and the living organism as needed due to any movement of the target region relative to the collimated beam in response to the data representative of the real time location of the target region in such a manner that the collimated beam, when activated, is continuously focused onto the target region.
Claim Construction

The process of reading a claim and interpreting its meaning is called **claim construction**.

The interpretation of a claim generally focuses on the definition of the generic words used to define its elements:
- The first step is to determine meanings that are consistent with the claim itself;
- The description of the invention in the specification provides an example that can be used to clarify this meaning;
- In addition, the interactions between the patent office and the inventor which generally consist of discussions and revisions of claims are available to identify this meaning. This documentation is called the “prosecution history” (or file wrapper) of the patent.
- If this “intrinsic evidence” is not enough to remove all ambiguity in a claim, then an expert is used to provide “extrinsic evidence.”

In patent infringement cases the construction of the claims at issue is a matter of law for the court to decide.
Validity

A patent that is not valid cannot be infringed. However, this is a matter for the court to decide.

An inventor who knowingly infringes a patent is subject to severe penalties (triple damages), even if he or she believes the patent to be invalid.

The usual reasons for challenging the validity of a patent are “anticipation” and “obviousness” of the invention prior to the application date:

- **Anticipation** refers to the existence of identical, or substantially equivalent, devices in the prior art, or generally known.
- **Obviousness** refers to the fact that the claim is not substantially different from a combination of devices in the prior art, or generally known.

The conclusion of a patent examiner does not shield these issues from challenge.
Infringement Analysis

The process of determining whether or not a device infringes a “properly construed claim” is called “infringement analysis.”

In order for the device to infringe it must be possible to find each and every element of the claim in the device either literally or in an equivalent form. This is called “reading the claim onto the device.”

It is important to notice that it is the “claim at issue” and the “accused device” that are to be compared, not the description in the specification or any product manufactured which embodies the patent.
Reading a Claim onto a Device

For purposes of illustration only.
Literal Infringement

A claim element is **literally** present if it describes exactly a component of the device.

For **structural elements**,
- The words of the claim element must describe exactly the features, location, and relative coordination of components in the device.

For **means-plus-function elements**, a more subtle analysis is required.
- First, it must be determined that a component in the device performs exactly the function described in the element; then
- It must be determined that the structure of this component is equivalent to the structure that performs this function in the patent specification.
Doctrine of Equivalents

The U.S. Supreme Court has stated:
"One who seeks to pirate an invention, like one who seeks to pirate a copyrighted book or play, may be expected to introduce minor variations to conceal and shelter the piracy. Outright and forthright duplication is a dull and very rare form of infringement."

One of the primary tests for equivalency is described by the Supreme Court as:
"If two devices do the same work in substantially the same way, and accomplish substantially the same result, they are the same, even though they differ in name, form, or shape."
- This is called the “function, way, result” test.
- Another test is if the claim element can be substituted into the accused device without changing its operation.
- This is a subtle area of infringement analysis that is continually evolving in the courts.

A component and an element are equivalent if their differences are insubstantial.
Damages

If it is determined that a device infringes a patent then the court generally orders an injunction against making, using, offering for sale, selling or importing the device. This applies not only to the manufacturer, but all distributors, clients, and customers.

Furthermore, the court can also award a financial payment, or damages, to the patent owner:

- “Damages experts” are relied upon to produce a “hypothetical negotiation” of a royalty agreement; this can be 5% (or more) of gross sales of the entire product line that contains the infringing device.

- If the infringement is found to be willful then triple damages can be ordered.
Laches and Estoppel

Even if a product is found to infringe a patent, the court can refuse to award damages, or reduce the damages. In this case, the argument is based on fairness, or equity, and the court has broad power to deny relief to a patent owner who has been deemed to have acted “unfairly.” This is generally referred to as laches and estoppel:

- **Laches:** An unreasonable delay in filing a suit after patent owner knew, or should have known, of the infringement and the delay hindered the ability of the infringer to prepare a defense due to economic or practical reasons. *If awarded then damages are usually limited to the time after the suit was filed.*
- **Inequitable Conduct:** Information in the patent disclosure is incorrect, incomplete and intended to mislead, that is there was intent to mislead the patent examiner. *If awarded then the claims can be rendered unenforceable.*
- **Equitable Estoppel:** Misleading information or communication from the patent owner to a producer regarding a willingness to not enforce a patent. *If awarded then there can be no recovery of damages.*
- **Prosecution History Estoppel (File Wrapper Estoppel):** The claim construction used for infringement was surrendered in the prosecution of the patent. The recent Festo case has expanded this to preclude the application of the doctrine of equivalents to elements that have been amended during prosecution. *If awarded then the infringement judgment for the claim can be negated.*
Conclusions

- A patent does NOT grant the right to manufacture, use or sell an invention…it grants the right to exclude others from doing so.
- It is the responsibility of designer/inventors to ensure that their products or processes do not infringe an unexpired patent.
- It is worth the effort to become comfortable with claim language.
- Expect to be the author of most all aspects of a patent application: title, prior art, background, summary, drawings, description of drawings, description of invention and claims.
- Rely on a patent attorney primarily to maintain the strict procedural requirements of the PTO and to assist in wording the claims.
- Remember that fairness is an important concern in issues involving patents.
- When “designing around” a patent strive for an invention that eliminates a claim element.
- Do your own patent search at http://www.uspto.gov. It is easy and informative.

Disclose your designs for product improvements.
A portfolio of patents is an important defense against infringement actions by competitors.