

# Filing a Patent

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## Introduction

Filing a patent is a critical skill that many engineers and scientists will need during their career. However, it is rarely taught in engineering curricula. To this end, this report has been prepared to give students a reference.

## What can be patented?

In order to be patented, an idea needs to be new, nonobvious, and useful. If the invention has been publicly disclosed, it cannot be patented. The only exception is if the inventor publishes a paper on the concept, she may file a patent within one year of the publication.

The invention must not be obvious. It may not be an intuitive extension of existing concepts. For example, a person cannot simply “invent” a bigger version of a machine that already exists and file a patent on that.

The invention must be useful.

## Patent Search

As soon as you begin considering filing a patent, an inventor should conduct a preliminary patent search. Historically, patents were searched by classification and inventors needed to hire attorneys to conduct the search. Of course, attorneys will still gladly conduct a patent search for a fee, but with the advent of the internet, there are several powerful tools that aid inventors in searching prior art. Google Patents (<https://www.patents.google.com>) and Free Patents Online (<http://www.freepatentsonline.com/>) are some examples. For tutorials on patent search and other patent search resources see <https://www.uspto.gov/patents-application-process/search-patents>.

## Patent Types

There are two stages of patents. The first, optional stage is the provisional patent. This can be submitted in any format and is simply a placeholder. Filing the provisional patent establishes the date that patent protection will begin if a non-provisional patent is granted. Provisional patents expire one year from their filing. In order to extend the protection, a non-provisional patent must be filed before the provisional patent expires.

The second stage of a patent is the non-provisional patent. This is the actual patent. It has strict formatting and content requirements. Non-provisional patents are reviewed by the United States Patent and Trademark Office. If granted, a non-provisional patent lasts 20 years.

There is also a separate type of patent called a Design Patent. This is for protecting a shape or design form. For example, someone could patent the shape of a cookie cutter or the print of a fabric. Design patents have a different fee schedule and different submission requirements. Patents that are not Design Patents are called Utility Patents.

## Motivations for Filing a Patent

Filing a patent has two results. First, you receive legal protection of your rights to your invention for 20 years. The other result is that the details of your invention are published to the public. This means that others can learn about your idea and build upon it. Someone may, for example, see your patent, and use it for inspiration for further development of the idea. Even if their new idea is based on your patented invention, if they improved or changed the invention in a significant way, it may no longer be protected under your patent. Also, it is possible for foreign companies to use your idea in countries where US patent law does not hold.

In order to more thoroughly protect their intellectual property, some companies will not file a patent, but will rather maintain an invention as a Trade Secret. A trade secret is an invention that an inventor protects simply by not revealing the details of the invention. For example the composition of Coca-Cola has never been patented and therefore, the company maintains exclusive access to the recipe.

## Cost

Filing a patent can be very costly. The United States Patent and Trademark Office charges a number of fees throughout the process. Also, many inventors hire a patent attorney to help them through the patent search and filing process. Attorney fees vary based on the experience of the law firm, and by the complexity of the invention. Sample pricing for attorney fees are shown in Table 1 below.

<b>Type of Invention</b>	<b>Examples</b>	<b>Attorneys Fees to Filing</b>	<b>Patent Search with Opinion</b>
<b>Extremely Simple</b>	<i>electric switch; coat hanger; paper clip; diapers; earmuffs; ice cube tray</i>	<b>\$5,000 to \$7,000</b>	<b>\$1,000 to \$1,250</b>
<b>Relatively Simple</b>	<i>board game; umbrella; retractable dog leash; belt clip for cell phone; toothbrush; flashlight</i>	<b>\$7,000 to \$8,500</b>	<b>\$1,000 to \$1,250</b>
<b>Minimally Complex</b>	<i>power hand tool; lawn mower; camera</i>	<b>\$8,500 to \$10,000</b>	<b>\$1,250 to \$1,500</b>
<b>Moderately Complex</b>	<i>ride on lawn mower; simple RFID devices; basic solar concentrator, cell phone</i>	<b>\$10,000 to \$12,000</b>	<b>\$1,500 to \$1,750</b>
<b>Relatively Complex</b>	<i>shock absorbing prosthetic device;</i>	<b>\$12,000 to \$14,000</b>	<b>\$1,750 to \$2,000</b>
<b>Highly Complex</b>	<i>MRI scanner; PCR; telecommunication networking systems; satellite technologies</i>	<b>\$14,000 to \$16,000</b>	<b>\$2,000 to \$2,500</b>
<b>Software Related</b>	<i>Software, automated systems, business methods</i>	<b>\$16,000 +</b>	<b>\$2,500 to \$3,000</b>

Table 1 Estimates of Attorney Fees for Different Steps of the Patent Filing Process. Courtesy of ipwatchdog.com

Fees charged by The United States Patent and Trademark Office vary depending on the size of the entity filing the patent. There are three categories of patent assignees. They are (in order from most expensive to least) Large Entity, Small Entity, and Micro Entity. Micro Entities are individuals or companies with fewer than 500 employees who are earning less than \$170,000 per year. Institutions of higher learning also pay fees at the Micro Entity level. Small Entities are

companies with fewer than 500 employees or non-profit companies. Large Entities are companies who do not qualify as Small Entities or Micro Entities.

Application filing fees are shown in Table 2 below.

	Large Entity	Small Entity	Micro Entity
Provisional Filing Fee	\$260	\$130	\$65
Utility Filing Fee (Non-Provisional)	\$1,600	\$730	\$400
Design Filing Fee	\$760	\$380	\$190
Reissue Filing Fee	\$3,040	\$1,520	\$760

*Table 2 Patent Filing Fees*

There are also additional fees for patents that have many or complicated claims. These increase on a prorated basis.

Patents also have what are called Maintenance Fees. These are fees that occur three times throughout the life of a patent that an inventor must pay to maintain the patent active. The Maintenance Fee schedule is shown in Table 3 below.

	Large Entity	Small Entity	Micro Entity
1st Maintenance Fee (3.5 Years)	\$1,600	\$800	\$400
2nd Maintenance Fee (7.5 Years)	\$3,600	\$1,800	\$900
3rd Maintenance Fee (11.5 Years)	\$7,400	\$3,700	\$1,850

*Table 3 Patent Maintenance Fees*

## Patent Contents

Before writing her or his first patent application, an inventor should read through several issued patents to get an idea of the format. Patent applications generally consist of five sections:

- Background of the Invention
- Brief Summary of the Invention
- Drawings
- Brief Description of the Drawings
- Detailed Description of the Invention
- Claims

The Background of the Invention explains the state of the art and gives examples of relevant prior art that is related to the present invention (the invention being patented).

The Brief Summary of the Invention is essentially an abstract of the concept. It is a high level explanation of key aspects of the invention.

Drawings have specific format requirements. They must be simple, black and white line drawings. Elements of the drawings should be numbered with a unique identification number not repeated elsewhere in the patent.

The Brief Description of the Drawings describes at a high level what each drawing represents and other information that is important to understanding the drawing such as what is shown in the drawing and from what angle is the drawing depicting.

The Detailed Description of the Invention explains in excruciating detail each element of each drawing and explains various preferred embodiments of the invention. In other words, it explains examples of how the invention could be used.

The Claims section is the shortest and yet most important section of the patent application. The claims are what are legally binding if an infringement case is brought to court. The claims concisely outline exactly what ideas and concepts are protected by the patent.

## Claims

When writing claims, it is important that an inventor be specific enough to distinguish the invention from prior art. It is also important to include the elements of the invention that need legal protection. However, it is important that the claims not be unnecessarily specific. For example, if a claim describes an element of the invention within a specific application, the patent will not protect the invention from being used in other applications.

## Who are Inventors?

Inventors are those who contributed to the conception of the invention and who have contributed to at least one of the claims. Inventors should not be gratuitously added to patent applications the way authors are added to journal articles.

## Guidelines for Optics Related Patents

Drawings have special requirements for optics related patents. In patent application drawings, if light rays are depicted, they should be shown with dashed lines. The frequency of the dashes can be varied to differentiate electromagnetic waves of different frequencies. Color images should not be used unless the color of the invention is intrinsic to its novelty or usefulness.

## Resources

The following websites are useful for more information about patents:

[www.uspto.gov](http://www.uspto.gov)

(<https://www.patents.google.com>)

(<http://www.freepatentsonline.com/>)