Careers in Patent Law for Physics Majors

Douglas L. Oliver, University of Toledo, Toledo, OH

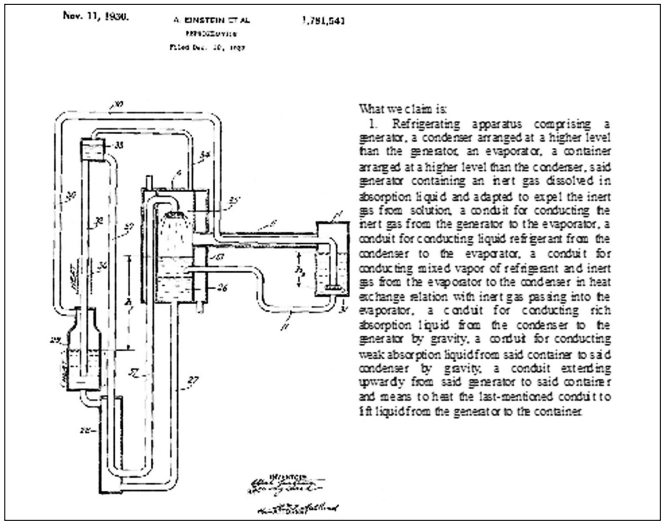
An important question that many undergraduate physics students ask is, "What can one do with a physics degree?" Of course there are many answers to this question. Often a general reference to becoming a lawyer is given as a possible answer. This paper is intended to explain the field of patent law and how a physics degree can lead to an interesting and potentially lucrative career as a patent examiner, a patent agent, or a patent attorney. This information may be of interest to physics students as well as those who recruit or counsel physics students.

A brief introduction to patent law

In the United States, patent law is based on the Constitution, which states that "Congress shall have power . . . to promote the progress of science and useful arts, by securing for limited times to … inventors the exclusive right to their respective … discoveries." A patent gives the inventor an "exclusive right" to the invention. Stated differently, a patent is a government-granted limited monopoly on an invention.

Under today's patent statutes, anyone 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."[1] This portion of the patent statute allows for a broad range of patentable inventions: new devices, processes, chemical compounds, even (controversially) some life forms. Also, an invention must be new and unobvious to practitioners in that field in order to be patentable.

Inventors may write their own patent applications. Usually this is not recommended as there are many technicalities associated with the patent application process. Usually a patent attorney or a patent agent is commissioned to write and submit a patent application to the U.S. Patent and Trademark Office (USPTO). The patent application process is called *patent prosecution.*


Nov. 11, 1930. A. EINSTEIN ET AL 1,781,541

What we claim is:

1. Refrigerating apparatus comprising a generator, a condenser arranged at a higher level than the generator, an evaporator, a container arranged at a higher level than the condenser, said generator containing an inert gas dissolved in absorption liquid and adapted to expel the inert gas from solution, a conduit for conducting the inert gas from the generator to the evaporator, a conduit for conducting liquid refrigerant from the condenser to the evaporator, a conduit for conducting mixed vapor of refrigerant and inert gas from the evaporator to the condenser in heat exchange relation with inert gas passing into the evaporator, a conduit for conducting rich absorption liquid from the condenser to the generator by gravity, a conduit for conducting weak absorption liquid from said container to said condenser by gravity, a conduit extending upwardly from said generator to said container and means to heat the last-mentioned conduit to lift liquid from the generator to the container.

Fig. 1. First claim and figure from U.S. Patent #1,781,541. Inventors: Albert Einstein and Leo Szilard.

Once a patent application has been filed with the USPTO, it is examined by a patent examiner. An examiner reviews the application to insure that the patent application is complete and that the claimed invention is patentable. Usually there is at least one problem with a patent application that results in a rejection of the patent application. In this case, the inventor may usually submit an amendment to the patent application. A negotiation process ensues until the patent application is either issued as a patent or abandoned.

The heart of a patent is the claims. An inventor only has a monopoly on the invention described in the patent claims. Hence, patent claims must be precisely written. If the inventor claims too much, the patent application should be rejected for being too broad. Conversely, if a patent claim is too narrow, then the invention covered by that patent is less than what was actually invented. To illustrate a patent claim, Fig. 1 contains a reproduction of the first claim of a patent issued in 1930 to Albert Einstein and Leo Szilard for an absorption refrigeration unit.[2]

Careers as patent examiners, agents, and attorneys

Patent examiners:

Most physicists are aware that Albert Einstein performed much of his early work related to time-space relations while employed as a patent examiner in Bern, Switzerland, from 1902 to 1909. Interestingly, synchronization of geographically separated clocks was a major technological issue during this time.

All patent examiners (Fig. 2) in the United States are employed by the USPTO, located in Alexandria, VA. Physics majors, as well as other science and engineering majors, have distinct advantages in finding employment as a patent examiner. Generally, a patent examiner must have a four-year degree in science or engineering.

According to the USPTO, the following attributes are valuable for patent examiners:[3]

- have an engineering "common sense,"
- enjoy expressing and articulating decisions,
- be more practical than theoretical,
- have a good memory for details,
- be able to make independent decisions, and
- work well with structured productivity goals.

Fig. 2. Patent examiner reviewing a patent application. (Photo: U.S. Patent and Trademark Office)

Many patent examiners go on to get their law degree with financial support from the USPTO. An informative audio-visual presentation related to patents and patent examiners is available at the USPTO website.[4] Salaries for patent examiners in 2009 ranged from $41,350 (GS 5-1) to $153,200 (GS 15-10).

Patent agents:

A patent agent is simply a person who is registered with the USPTO to prosecute patent applications with the USPTO (yet is not an attorney). A patent agent is allowed to prosecute patents for inventors. No general legal knowledge is required to become a patent agent. However, patent agents must apply with the USPTO to take an intensive exam (the "patent bar") on patent law and procedures.[5] To be eligible to take the patent bar examination, a candidate generally must have a BS in science or engineering.

This exam is based on the Manual of Patent Examining Procedure (MPEP), which is available online.[6] Passage rates for the patent bar are only about 50%. Some help is available for those preparing for the patent bar. There are several for-fee courses designed to help prepare for the patent bar. (An online search for "patent bar course" will result in several commercial test preparation courses.) In addition, some past exams are available online from the USPTO.[7]

Patent examiners are not allowed to perform many associated tasks that patent attorneys may perform. Further, the earning potential for patent attorneys is generally much greater than that of a patent agent. Hence, many patent agents eventually attend law school to become patent attorneys.

Starting salaries for patent agents will vary depending on skills and location. Salaries range from $40,000 to the low six figures.

Patent attorneys:

A patent attorney is effectively a patent agent who is also an attorney. In addition to prosecuting patents before the USPTO, patent attorneys may also litigate in the courts or perform legal services such as drafting contracts related to patents.

Since most attorneys do not have a BS in science or engineering, they are not eligible to take the patent bar examination. Hence most attorneys are not eligible to become patent attorneys. A BS in physics is an excellent pre-law degree for patent attorneys. Further, since many inventions involve more than one field, a broad-based physics degree gives a patent attorney the advantage of a broad technical background.

Patent attorneys are some of the most respected and highest-paid attorneys. Annual earnings for patent attorneys range from $80,000 to the six-, even seven-figure range.

A personal snapshot: Michael Mann—physicist turned patent attorney

Career highlights[8]:

- Patent attorney with Nexsen Pruet
- Former chairman of the South Carolina Bar – Intellectual Property Committee
- Board member of the South Carolina Technical College System
- Board member of South Carolina Governor's School for Science and Mathematics Foundation

Fig. 3. Michael Mann. *(photo courtesy Nexsen Pruet)*

Michael Mann (Fig. 3) graduated from Penn State in 1969 with a BS in physics. Like many young men of his generation, he then served in the U.S. Army. When he got out of the Army he did not find many employment opportunities as a physicist. At that time, nuclear engineering was hot, and his physics degree opened the door to earn a master's degree in nuclear engineering.

Upon graduation with his master's, Mann became a practicing nuclear engineer. However, the position was not all that he expected it to be. Hence, he decided to attend law school. The transition from a technical career to law school was not difficult for Mann—both law and physics require an analytical mind. Upon graduation, he took a position as a regional general counsel for a nuclear waste service company. Within four years he was promoted to general counsel.

After the Three Mile Island accident in 1979, the nuclear industry contracted rapidly. It was time for another career transition. After Mann passed the patent bar, he got plenty of patent work through his contacts and training in nuclear engineering.

His physics background gave him a flexibility that helped him understand many different inventions. According to Mann, "six minutes with a client" and he can "understand most inventions." For example, one of Mann's clients was a polymer chemist with a new method for making hyperbolic polymer-backed mirrors. With his physics background, "it was all too familiar," stated Mann. As a patent attorney, all that he had learned "was now in a self-reinforcing loop."

Mann enjoys working with inventors and finds his work to be fun. According to him, "Practicing patent law requires uncommon verbal skills." Specifically, "preciseness of language" is important, not necessarily great oration skills.

Mann's advice to physics students who are considering becoming patent attorneys is that they acquire flexibility through a broad range of work experiences and education. Thus, physics students would do well to consider several career options open to physics majors and to gain practical work experience prior to attending law school.

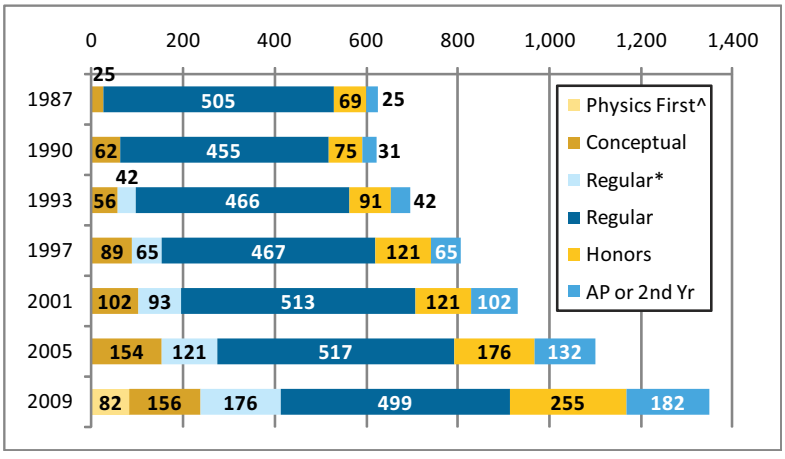
References

1. 35 USC § 101.
2. U.S. Patent #1,781,541.
3. See uspto.connectsolutions.com/patentexaminfosession/.
4. See Ref. 3.
5. For information regarding applying for the patent bar, see uspto.gov/web/offices/dcom/olia/oed/examregist.htm.
6. See uspto.gov/web/offices/pac/mpep/mpep.htm.
7. See uspto.gov/web/offices/dcom/olia/oed/pastexams.htm.
8. See Michael Mann's website at www.nexsenpruet.com/attorneys-126.html.

Physics Curriculum Continues to Diversify

In 1986-87, we saw about 500,000 students enrolled in the regular, algebra-based high school physics course; those students accounted for four-fifths of all physics students. This year we again find that about 500,000 students are taking "regular" high school physics, but they comprise less than half the students taking a high school physics course. (An additional 176,000 are taking "regular" physics taught using a conceptual text.) The figure below depicts the growth in the number of students taking physics and provides the number of students (in thousands) enrolled in each type of course.

Physics Enrollment in U.S. High Schools by Type of Course, 1987–2009
(numbers in 1,000s)



^ Physics First was explicitly included in the list of courses for the first time on the 2008-09 survey.

* Regular course taught using conceptual text.

http://www.aip.org/statistics

In the December issue of *The Physics Teacher*, we will examine enrollment distributions for public and private high schools. If you have any questions or comments, please contact Susan White at swhite@aip.org. Susan is Research Manager in the Statistical Research Center and directs the high school survey.