



## CHAPTER TWENTY-ONE

# Non-Obviousness

### Introduction

Non-obviousness is in many ways the heart of the patent system, the place where we draw the most important line between sub-patentable and patentable innovation. As you learned in the previous chapter, lack of novelty—or “anticipation”—is a complete bar to patentability. Yet as we saw in that chapter, for an invention to be anticipated, every element of it needs to be present in a single prior art reference. The person alleging anticipation is effectively saying “we’ve already got it” and the “it” is a single thing.

Obviousness is different. The person alleging that an invention is obvious is not necessarily saying it already exists. She is saying that it consists of a trivial recombination of elements of the prior art, that a Person Having Ordinary Skill in The Art (or PHOSITA) would have been able to make the leap from those prior art references to come up with the new invention. This is an inherently synthetic task. It requires us to consider a counterfactual—to put ourselves in the shoes of an imaginary PHOSITA before the new invention, to consider all the resources in the art that would have been available to that person, as well as the nature of the problem to be solved, and then to ask the question “was this combination of elements obvious”?

#### **§ 103 Conditions for patentability; non-obvious subject matter.<sup>1</sup>**

**A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.**

The story of the non-obviousness statutory requirement is rooted in some wrangling between the courts and Congress. The courts, led by the Supreme Court, had set out tests for what counted as a patentable invention that many believed to be too high. Some referred to them as requiring “a flash of genius.” Congress responded by passing the predecessor of § 103. It was the interpretation of that section, and the analysis of whether it trammelled on constitutionally forbidden territory, that was at stake in a case you have read before, *Graham v. John Deere*. We will be interested to see if your reaction to that case is different when you read it in the specific context of non-obviousness.

---

<sup>1</sup> [USPTO Editor’s Note: Applicable to any patent application subject to the first inventor to file provisions of the AIA (see 35 U.S.C. 100 (note)). See 35 U.S.C. 103 (pre-AIA) for the law otherwise applicable.]

***Graham v. John Deere Co.***  
383 U.S. 1 (1966)



Mr. Justice CLARK delivered the opinion of the Court.

After a lapse of 15 years, the Court again focuses its attention on the patentability of inventions under the standard of Art. I, § 8, cl. 8, of the Constitution and under the conditions prescribed by the laws of the United States. Since our last expression on patent validity, *Great A.&P. Tea Co. v. Supermarket Equipment Corp.* (1950), the Congress has for the first time expressly added a third statutory dimension to the two requirements of novelty and utility that had been the sole statutory test since the Patent Act of 1793. This is the test of obviousness, i.e., whether ‘the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.’ 35 U.S.C. § 103.

The questions, involved in each of the companion cases before us, are what effect the 1952 Act had upon traditional statutory and judicial tests of patentability and what definitive tests are now required. We have concluded that the 1952 Act was intended to codify judicial precedents embracing the principle long ago announced by this Court in *Hotchkiss v. Greenwood* (1851) and that, while the clear language of § 103 places emphasis on an inquiry into obviousness, the general level of innovation necessary to sustain patentability remains the same.

## I.

### The Cases.

(a). No. 11, *Graham v. John Deere Co.*, an infringement suit by petitioners, presents a conflict between two Circuits over the validity of a single patent on a ‘Clamp for vibrating Shank Plows.’ The invention, a combination of old mechanical elements, involves a device designed to absorb shock from plow shanks as they plow through rocky soil and thus to prevent damage to the plow. In 1955, the Fifth Circuit had held the patent valid under its rule that when a combination produces an ‘old result in a cheaper and otherwise more advantageous way,’ it is patentable. *Jeoffroy Mfg., Inc. v. Graham*. In 1964, the Eighth Circuit held, in the case at bar, that there was no new result in the patented combination and that the patent was, therefore, not valid. We granted certiorari. Although we have determined that neither Circuit applied the correct test, we conclude that the patent is invalid under § 103 and, therefore, we affirm the judgment of the Eighth Circuit.

...

## II.

At the outset it must be remembered that the federal patent power stems from a specific constitutional provision which authorizes the Congress ‘To promote the Progress of . . . useful Arts, by securing for limited Times to . . . Inventors the exclusive Right to their . . . Discoveries.’ Art. I, s 8, cl. 8. The clause is both a grant of power and a limitation. This qualified authority, unlike the power often exercised in the sixteenth and seventeenth centuries by the English Crown, is limited to the promotion of advances in the ‘useful arts.’ It was written against the backdrop of the practices—eventually curtailed by the Statute of Monopolies—of the Crown in granting monopolies to court favorites in goods or businesses which had long before been enjoyed by the public. The Congress in the exercise

of the patent power may not overreach the restraints imposed by the stated constitutional purpose. Nor may it enlarge the patent monopoly without regard to the innovation, advancement or social benefit gained thereby. Moreover, Congress may not authorize the issuance of patents whose effects are to remove existent knowledge from the public domain, or to restrict free access to materials already available. Innovation, advancement, and things which add to the sum of useful knowledge are inherent requisites in a patent system which, by constitutional command, must “promote the Progress of . . . useful Arts.” This is the standard expressed in the Constitution, and it may not be ignored. And it is in this light that patent validity “requires reference to a standard written into the Constitution.”

Within the limits of the constitutional grant, the Congress may, of course, implement the stated purpose of the Framers by selecting the policy which, in its judgment, best effectuates the constitutional aim. This is but a corollary to the grant to Congress of any Article I power. Within the scope established by the Constitution, Congress may set out conditions and tests for patentability. It is the duty of the Commissioner of Patents and of the courts in the administration of the patent system to give effect to the constitutional standard by appropriate application, in each case, of the statutory scheme of the Congress.

Congress quickly responded to the bidding of the Constitution by enacting the Patent Act of 1790 during the second session of the First Congress. It created an agency in the Department of State headed by the Secretary of State, the Secretary of the Department of War and the Attorney General, any two of whom could issue a patent for a period not exceeding 14 years to any petitioner that ‘hath . . . invented or discovered any useful art, manufacture, . . . or device, or any improvement therein not before known or used’ if the board found that ‘the invention or discovery (was) sufficiently useful and important. . . .’ 1 Stat. 110. This group, whose members administered the patent system along with their other public duties, was known by its own designation as ‘Commissioners for the Promotion of Useful Arts.’

Thomas Jefferson, who as Secretary of State was a member of the group, was its moving spirit and might well be called the ‘first administrator of our patent system.’ See Federico 238 (1936). He was not only an administrator of the patent system under the 1790 Act, but was also the author of the 1793 Patent Act. In addition, Jefferson was himself an inventor of great note. His unpatented improvements on plows, to mention but one line of his inventions, won acclaim and recognition on both sides of the Atlantic. Because of his active interest and influence in the early development of the patent system, Jefferson’s views on the general nature of the limited patent monopoly under the Constitution, as well as his conclusions as to conditions for patentability under the statutory scheme, are worthy of note.

Jefferson, like other Americans, had an instinctive aversion to monopolies. It was a monopoly on tea that sparked the Revolution and Jefferson certainly did not favor an equivalent form of monopoly under the new government. His abhorrence of monopoly extended initially to patents as well. From France, he wrote to Madison (July 1788) urging a Bill of Rights provision restricting monopoly, and as against the argument that limited monopoly might serve to incite ‘ingenuity,’ he argued forcefully that ‘the benefit even of limited monopolies is too doubtful to be opposed to that of their general suppression.’

His views ripened, however, and in another letter to Madison (Aug. 1789) after the drafting of the Bill of Rights, Jefferson stated that he would have been pleased by an express provision in this form: ‘Art. 9. Monopolies may be allowed to persons for their own productions in literature, & their own inventions in the arts, for a term not exceeding \_\_ years, but for no longer term & no other purpose.’ *Id.*, at 113. And he later wrote: ‘Certainly an inventor ought to be allowed a right to the benefit of his invention for some certain time. . . . Nobody wishes more than I do that ingenuity should receive a liberal encouragement.’

Jefferson's philosophy on the nature and purpose of the patent monopoly is expressed in a letter to Isaac McPherson), a portion of which we set out in the margin.<sup>2</sup> He rejected a natural rights theory in intellectual property rights and clearly recognized the social and economic rationale of the patent system. The patent monopoly was not designed to secure to the inventor his natural right in his discoveries. Rather, it was a reward, an inducement, to bring forth new knowledge. The grant of an exclusive right to an invention was the creation of society—at odds with the inherent free nature of disclosed ideas—and was not to be freely given. Only inventions and discoveries which furthered human knowledge, and were new and useful, justified the special inducement of a limited private monopoly. Jefferson did not believe in granting patents for small details, obvious improvements, or frivolous devices. His writings evidence his insistence upon a high level of patentability.

As a member of the patent board for several years, Jefferson saw clearly the difficulty in 'drawing a line between the things which are worth to the public the embarrassment of an exclusive patent, and those which are not.' The board on which he served sought to draw such a line and formulated several rules which are preserved in Jefferson's correspondence. Despite the board's efforts, Jefferson saw 'with what slow progress a system of general rules could be matured.' Because of the 'abundance' of cases and the fact that the investigations occupied 'more time of the members of the board than they could spare from higher duties, the whole was turned over to the judiciary, to be matured into a system, under which every one might know when his actions were safe and lawful.' Letter to McPherson, *supra*, at 181, 182. Apparently Congress agreed with Jefferson and the board that the courts should develop additional conditions for patentability. Although the Patent Act was amended, revised or codified some 50 times between 1790 and 1950, Congress steered clear of a statutory set of requirements other than the bare novelty and utility tests reformulated in Jefferson's draft of the 1793 Patent Act.

### III.

The difficulty of formulating conditions for patentability was heightened by the generality of the constitutional grant and the statutes implementing it, together with the underlying policy of the patent system that 'the things which are worth to the public the embarrassment of an exclusive patent,' as Jefferson put it, must outweigh the restrictive effect of the limited patent monopoly. The inherent problem was to develop some means of weeding out those inventions which would not be disclosed or devised but for the inducement of a patent.

---

<sup>2</sup> Stable ownership is the gift of social law, and is given late in the progress of society. It would be curious, then, if an idea, the fugitive fermentation of an individual brain, could, of natural right, be claimed in exclusive and stable property. If nature has made anyone thing less susceptible than all others of exclusive property, it is the action of the thinking power called an idea, which an individual may exclusively possess as long as he keeps it to himself; but the moment it is divulged, it forces itself into the possession of everyone, and the receiver cannot dispossess himself of it. Its peculiar character, too, is that no one possesses the less because every other possesses the whole of it. He who receives an idea from me receives instruction himself without lessening mine, as he who lights his taper at mine, receives light without darkening me. That ideas should freely spread from one to another over the globe, for the moral and mutual instruction of man and improvement of his condition, seems to have been peculiarly and benevolently designed by nature when she made them, like fire, expansible over all space, without lessening their density in any point, and, like the air in which we breathe, move, and have our physical being, incapable of confinement or exclusive appropriation. Inventions then cannot, in nature, be a subject of property. Society may give an exclusive right to the profits arising from them, as an encouragement to men to pursue ideas which may produce utility, but this may or may not be done according to the will and convenience of the society, without claim or complaint from anybody." VI Writings of Thomas Jefferson at 180–181 (Washington ed.).

This Court formulated a general condition of patentability in 1851 in *Hotchkiss v. Greenwood*. The patent involved a mere substitution of materials—porcelain or clay for wood or metal in doorknobs—and the Court condemned it, holding:

‘(U)nless more ingenuity and skill . . . were required . . . than were possessed by an ordinary mechanic acquainted with the business, there was an absence of that degree of skill and ingenuity which constitute essential elements of every invention. In other words, the improvement is the work of the skilful mechanic, not that of the inventor.’

. . . The *Hotchkiss* test laid the cornerstone of the judicial evolution suggested by Jefferson and left to the courts by Congress. The language in the case, and in those which followed, gave birth to ‘invention’ as a word of legal art signifying patentable inventions. . . . The *Hotchkiss* formulation, however, lies not in any label, but in its functional approach to questions of patentability. In practice, *Hotchkiss* has required a comparison between the subject matter of the patent, or patent application, and the background skill of the calling. It has been from this comparison that patentability was in each case determined.

#### IV.

##### The 1952 Patent Act.

The Act sets out the conditions of patentability in three sections. An analysis of the structure of these three sections indicates that patentability is dependent upon three explicit conditions: novelty and utility, as articulated and defined in § 101 and § 102, and nonobviousness, the new statutory formulation, as set out in § 103. The first two sections, which trace closely the 1874 codification, express the “new and useful” tests which have always existed in the statutory scheme and, for our purposes here, need no clarification. The pivotal section around which the present controversy centers is § 103. It provides:

“§ 103. Conditions for patentability; non-obvious subject matter” “A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.”

The section is cast in relatively unambiguous terms. Patentability is to depend, in addition to novelty and utility, upon the “non-obvious” nature of the “subject matter sought to be patented” to a person having ordinary skill in the pertinent art.

The first sentence of this section is strongly reminiscent of the language in *Hotchkiss*. Both formulations place emphasis on the pertinent art existing at the time the invention was made, and both are implicitly tied to advances in that art. The major distinction is that Congress has emphasized “nonobviousness” as the operative test of the section, rather than the less definite “invention” language of *Hotchkiss* that Congress thought had led to “a large variety” of expressions in decisions and writings. In the title itself, the Congress used the phrase “Conditions for patentability; non-obvious subject matter” (*italics added*), thus focusing upon “nonobviousness,” rather than “invention.” The Senate and House Reports reflect this emphasis in these terms:

“Section 103, for the first time in our statute, provides a condition which exists in the law and has existed for more than 100 years, but only by reason of decisions of the courts. An invention which has been made, and which is new in the sense that the same thing has not been made before, may still not

be patentable if the difference between the new thing and what was known before is not considered sufficiently great to warrant a patent. That has been expressed in a large variety of ways in decisions of the courts and in writings. Section 103 states this requirement in the title. It refers to the difference between the subject matter sought to be patented and the prior art, meaning what was known before as described in section 102. If this difference is such that the subject matter as a whole would have been obvious at the time to a person skilled in the art, then the subject matter cannot be patented. . . . That provision paraphrases language which has often been used in decisions of the courts, and the section is added to the statute for uniformity and definiteness. This section should have a stabilizing effect and minimize great departures which have appeared in some cases.”

It is undisputed that this section was, for the first time, a statutory expression of an additional requirement for patentability, originally expressed in *Hotchkiss*. It also seems apparent that Congress intended by the last sentence of § 103 to abolish the test it believed this Court announced in the controversial phrase ‘flash of creative genius,’ used in *Cuno Engineering Corp. v. Automatic Devices Corp.* (1941).

It is contended, however, by some of the parties and by several of the amici that the first sentence of § 103 was intended to sweep away judicial precedents and to lower the level of patentability. Others contend that the Congress intended to codify the essential purpose reflected in existing judicial precedents—the rejection of insignificant variations and innovations of a commonplace sort—and also to focus inquiries under § 103 upon nonobviousness, rather than upon ‘invention,’ as a means of achieving more stability and predictability in determining patentability and validity.

The Reviser’s Note to this section, with apparent reference to *Hotchkiss*, recognizes that judicial requirements as to ‘lack of patentable novelty (have) been followed since at least as early as 1850.’ The note indicates that the section was inserted because it ‘may have some stabilizing effect, and also to serve as a basis for the addition at a later time of some criteria which may be worked out.’ To this same effect are the reports of both Houses, *supra*, which state that the first sentence of the section ‘paraphrases language which has often been used in decisions of the courts, and the section is added to the statute for uniformity and definiteness.’

We believe that this legislative history, as well as other sources, shows that the revision was not intended by Congress to change the general level of patentable invention. We conclude that the section was intended merely as a codification of judicial precedents embracing the *Hotchkiss* condition, with congressional directions that inquiries into the obviousness of the subject matter sought to be patented are a prerequisite to patentability.

## V.

Approached in this light, the § 103 additional condition, when followed realistically, will permit a more practical test of patentability. The emphasis on nonobviousness is one of inquiry, not quality, and, as such, comports with the constitutional strictures.

While the ultimate question of patent validity is one of law, the § 103 condition, which is but one of three conditions, each of which must be satisfied, lends itself to several basic factual inquiries. Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or

nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy.

This is not to say, however, that there will not be difficulties in applying the nonobviousness test. What is obvious is not a question upon which there is likely to be uniformity of thought in every given factual context. The difficulties, however, are comparable to those encountered daily by the courts in such frames of reference as negligence and *scienter*, and should be amenable to a case-by-case development. We believe that strict observance of the requirements laid down here will result in that uniformity and definiteness which Congress called for in the 1952 Act.

While we have focused attention on the appropriate standard to be applied by the courts, it must be remembered that the primary responsibility for sifting out unpatentable material lies in the Patent Office. To await litigation is—for all practical purposes—to debilitate the patent system. We have observed a notorious difference between the standards applied by the Patent Office and by the courts. While many reasons can be adduced to explain the discrepancy, one may well be the free rein often exercised by Examiners in their use of the concept of “invention.” In this connection we note that the Patent Office is confronted with a most difficult task. Almost 100,000 applications for patents are filed each year. Of these, about 50,000 are granted and the backlog now runs well over 200,000. 1965 Annual Report of the Commissioner of Patents 13–14. This is itself a compelling reason for the Commissioner to strictly adhere to the 1952 Act as interpreted here. This would, we believe, not only expedite disposition but bring about a closer concurrence between administrative and judicial precedent.

Although we conclude here that the inquiry which the Patent Office and the courts must make as to patentability must be beamed with greater intensity on the requirements of § 103, it bears repeating that we find no change in the general strictness with which the overall test is to be applied. We have been urged to find in § 103 a relaxed standard, supposedly a congressional reaction to the “increased standard” applied by this Court in its decisions over the last 20 or 30 years. The standard has remained invariable in this Court. Technology, however, has advanced—and with remarkable rapidity in the last 50 years. Moreover, the ambit of applicable art in given fields of science has widened by disciplines unheard of a half century ago. It is but an evenhanded application to require that those persons granted the benefit of a patent monopoly be charged with an awareness of these changed conditions. The same is true of the less technical, but still useful arts. He who seeks to build a better mousetrap today has a long path to tread before reaching the Patent Office. . . .

### Questions:

1.) As we saw in Chapter Two, in the context of copyright law the Supreme Court has taken a very deferential approach towards Congress’s interpretation of its powers under the Intellectual Property Clause. *Golan*, for example, appeared to set no limits on Congress’s ability to withdraw material from the public domain and place it back under copyright. In other words, the *Golan* court allowed Congress to do the very thing the *Graham* court says can never be done.

The Congress in the exercise of the patent power may not overreach the restraints imposed by the stated constitutional purpose. Nor may it enlarge the patent monopoly without regard to the innovation, advancement or social benefit gained thereby. **Moreover, Congress may not**

**authorize the issuance of patents whose effects are to remove existent knowledge from the public domain, or to restrict free access to materials already available.**

Is *Graham* still good law, at least in the context of Congress's ability to make *patent* as opposed to copyright law? Why might we think the two areas would receive different levels of scrutiny or deference from the courts?

2.) How is the non-obviousness requirement (and for that matter the requirement of novelty) implicated by the bolded sentence above? How does it set boundaries on the statutory definitions of novelty and non-obviousness that Congress may set forth? Without an adequate definition of novelty or non-obviousness, what knowledge could otherwise be withdrawn from the public domain, what access impeded to materials already available? The answer seems relatively clear when it comes to the limits of Congress's powers with respect to *novelty*. If the thing already exists and the public has access to it, then putting it under patent is exactly what *Graham* says Congress cannot authorize and thus, presumably, the courts and the PTO cannot do. But what about *non-obviousness*? What knowledge is being removed from the public domain? What free access to material already available is being restricted? Is the court presuming that the public domain consists not merely of discrete objects of knowledge, but of the *connections* that could be made between those objects by any reasonably skilled practitioner of the art?

3.) Question 2 leads to the question whether the Intellectual Property Clause—as interpreted by *Graham*—requires something *at least as rigorous* as the current standard for non-obviousness. Nearly as rigorous? What are the constitutional limits? Imagine Congress had rewritten § 103 to read

**A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, unless the inventor thought fairly hard about his work. (The courts should not construe this to require any kind of rocket scientist stuff, but the inventor has to make a mild effort to look beyond the blatantly obvious.) Patentability shall not be negated by the manner in which the invention was made.**

Is this constitutional under *Graham*'s standard?

4.) As we will see in a moment, *Graham*'s four part analysis of obviousness is central to the doctrine in this area. Beyond that does *Graham*'s constitutional analysis give courts any guidance about *how* to conduct that inquiry?

## 1.) A Four Step Test for Obviousness

*Graham* laid down the basic structure under which analysis of obviousness proceeds to this day.

- 1.) **“The scope and content of the prior art are to be determined.”**
- 2.) **“Differences between the prior art and the claims at issue are to be ascertained”**
- 3.) **“and the level of ordinary skill in the pertinent art resolved.”**
- 4.) **“Such secondary considerations as commercial success, long felt**



**but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.”**

**Reciprocal Definitions?** The alert amongst you will have noticed that some of these inquiries are mutually dependent. How do I know what the scope and content of the prior art is, unless I know who the PHOSITA is and *vice versa*? If most people working in the field of developing new cryptographic software tools are mathematics PhDs with extensive knowledge of prior cryptographic schemes, then the “scope of the prior art” will include much more than if they are computer scientists who dabble in cryptography. But conversely, the relevant art literally defines the field in which the PHOSITA can be described.

**Hindsight Bias?** *Graham* describes one danger for patent law—that too lax a standard for inventions will give us a patent system that withdraws material from the public domain and conveys statutory monopolies for mere tinkering. But there is an opposing danger: the psychological literature strongly confirms the existence of a bias that is conventionally referred to as 20/20 hindsight vision. In retrospect, *everything* looks obvious. How do we “de-bias” our decisions about whether an innovation *was* obvious or not?

One answer is the *Graham* structure itself. By formalizing the steps of the analysis, forcing the examiner, or the court, to “show their work,” we might hope that we would avoid hindsight bias. A second answer is provided by the “secondary considerations.” While courts have put varying weights on them, secondary considerations force one to consider the counterfactual. If this was so obvious, and yet everyone in the industry wanted it, why did no one do it before? If it was so obvious, why did others fail repeatedly? If it was so obvious—to use another secondary consideration not mentioned here—why is it that many firms are willing to *license* the technology, apparently in the belief the patent is sound?

The rest of the chapter proceeds as follows. We will start with a case that goes through all of the *Graham* steps *en route* to a decision on obviousness. Then we will turn to a few instructive cases fleshing out some of the individual steps of the *Graham* inquiry. What is the scope and content of the prior art? Who bears the burden of proof on obviousness? Is an invention obvious if there are thousands of possible solutions to a problem and the PHOSITA would know to try them, one after another? How do we define the PHOSITA?

### ***Stratoflex, Inc. v. Aeroquip Corp.***

*713 F.2d 1530 (Fed. Cir. 1983)*



MARKEY, Chief Judge.

## **II. Background**

### **A. The Technology**

Stratoflex and Aeroquip manufacture electrically conductive polytetrafluoroethylene (PTFE) [also referred to as “Teflon”] tubing used in the aircraft and missile industry to convey pressurized fuel, lubricants, and other fluids.

PTFE has replaced organic and synthetic rubbers and plastic in fuel hoses because it has a number of superior characteristics. Though pure PTFE is dielectric (non-conductive), it can be made with fillers to make it conductive, though the “filled” tubing is more susceptible to leakage when voids form between the PTFE and filler particles.

This handout is excerpted from [James Boyle & Jennifer Jenkins, \*Intellectual Property: Law & the Information Society—Cases and Materials\*](#), and is used under a [Creative Commons Attribution, Non Commercial, Share-Alike license](#).