The Patent Law Origins of Science Fiction

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ABSTRACT

This Article reveals the surprising role of patent law in shaping the literary genre of science fiction. Drawing on previously unpublished sources, the Article shows that Hugo Gernsback—the so-called "father" of science fiction who started the first all-science-fiction magazine in 1926—believed that works of science fiction are analogous to patents. Like patents, science fiction stories can disclose useful information to the public about new inventions. Like patents, science fiction stories can influence future inventors and drive innovation. Gernsback went even further, positing that some of the inventions depicted in science fiction should themselves be patentable. In 1952, he urged Congress to reform the Patent Act to make so-called "Provisional Patents" available to science fiction authors who depicted major technological developments before their time. He argued that science fiction authors who filed for Provisional Patents should get an extra thirty years in which to show their invention worked. If they could do so, they would thereafter be able to obtain an ordinary patent, to last another twenty years.

Many will find Gernsback's proposal deeply problematic from the perspective of patent policy, and rightly so. Granting patent rights too early in an invention's lifecycle creates new and unjustified opportunities to hold up innovation. A science fiction author who obtained a Provisional Patent for a theoretical invention could crawl out of the woodwork half a century

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later and sue the very people who figured out how to make the invention work. Gernsback's ideas for patent reform were half-baked and, the Article shows, probably self-serving. Nonetheless, exploring the connection he cultivated between patents and science fiction yields many surprising insights for science fiction and for innovation policy. Science fiction has more in common with patents than it might seem. Although science fiction does not typically impart enough information to "enable" others to make and use the inventions it describes, science fiction can inspire readers and supply them with a motivation—in Gernsback's words, a "stimulus"—to implement science fictional inventions in the real world. Science fiction, like patents, can play a role in promoting innovation.

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"I love you sons of bitches. You're all I read any more. You're the only ones who'll talk about the really *terrific changes going on . . . . You're the only ones with guts enough to really care about the future . . . ."*

Eliot Rosewater, addressing a convention of science fiction writers[1]

INTRODUCTION

In the 1950s, a young professor of biochemistry at Boston University School of Medicine came up with a computer system called "MULTIVAC." MULTIVAC was an early version of a supercomputer and an unimaginably powerful form of artificial intelligence. MULTIVAC had some downsides compared to today's PCs and smartphones. For one thing, MULTIVAC was several miles long. But its data collection and analytical capabilities were so advanced that it could answer nearly any question posed to it and instantaneously derive solutions to quandaries that had long bedeviled humankind, from energy production to space travel.

MULTIVAC might sound familiar.[2] But MULTIVAC was not a real computer or even a real "invention" by ordinary standards. MULTIVAC was a product of the literary genre of science fiction. MULTIVAC's "inventor" was the science fiction author, Isaac Asimov, who published a series of short stories featuring MULTIVAC. The best-known of these stories is *The Last Question* (1956), in which MULTIVAC, after many millions of years, answers "the last question" confronting humankind by solving the eternal problem of entropy and re-starting the universe with a new burst of energy akin to the Big Bang.[3]

Asimov has sadly passed away, but we imagine he would be amazed, and perhaps disturbed, to see how far artificial intelligence has come and how closely some of its applications resemble his supercomputer. Indeed, as we write, a new artificial intelligence called ChatGPT is beginning to achieve many of the same feats as MULTIVAC. ChatGPT can answer specific and open-ended questions coherently. It can write code. It can write a course syllabus. It can write essays, plots for novels, and op-eds. It can develop strategies for preventing the next global pandemic or for halting global warming.[4] ChatGPT can even compare itself to MULTIVAC and explain to you that, "[w]hile I may be able to provide information and assistance to users in a similar

1. KURT VONNEGUT, GOD BLESS YOU, MR. ROSEWATER 21 (Panther Mod. Fiction 1967). Eliot Rosewater, a character in the novel, made this address while on a bender.

2. That is because in 1941, around ten years earlier, two inventors at University of Pennsylvania, Presper Eckert and John Mauchly, made and patented an early version of a computer called "ENIAC," which stands for Electronic Numerical Integrator and Computer. In 1951, Eckert and Mauchly made a similar computer for the federal government called UNIVAC. Asimov "somehow got it into [his] head" that the prefix "uni" implied "one vacuum tube" and that a computer of the future should have many more tubes. Thus, MULTIVAC was born. ISAAC ASIMOV, IN MEMORY YET GREEN: THE AUTOBIOGRAPHY OF ISAAC ASIMOV 663 (Doubleday 1979). *See also* WALTER ISAACSON, THE INNOVATORS: HOW A GROUP OF HACKERS, GENIUSES, AND GEEKS CREATED THE DIGITAL REVOLUTION 35–85, 108–21 (Simon & Schuster 2014).

3. Isaac Asimov, *The Last Question*, *in* THE BIG BOOK OF SCIENCE FICTION 300, 301–09 (Jeff VanderMeer & Ann VanderMeer eds., Penguin 2016).

4. *Cf. ChatGPT Cannot Write Opinion Pieces—Yet*, BLOOMBERG BUSINESSWEEK, Dec. 19, 2022, at 7.

manner to Multivac[,] I do not possess the same level of intelligence or capabilities as [that computer] system."[5] We feel confident in adding "yet."

There is plenty more where MULTIVAC came from. Countless inventions have been described in the annals of science fiction. To name just a few: using a cannon,[6] and later rockets,[7] to send someone to the moon; using radio waves to detect aircraft and flying objects, now called "radar";[8] machines that are capable of experiencing human-like emotions;[9] machines that are outwardly indistinguishable from humans;[10] human laborers whose physical capabilities are augmented by machines;[11] instantaneous inter-planetary communication;[12] treating cancer by altering DNA;[13] and a virtual reality world called the Metaverse in which humans can appear as avatars and interact in a virtual space.[14] Several of these inventions have been put into practice, more or less. Some we are still waiting on.

It may seem incorrect to call the fabrications of science fiction authors "inventions." They were not posited by professional scientists or engineers (for the most part).[15] They did not work at the time they were described by the authors. And they were not patentable. If they did not fall into the category of unpatentable "abstract ideas,"[16] they would have failed patent law's requirement of "enablement"[17]—and also would have been excluded by the doctrine of "incredible utility"—because they were inoperable and

5. This is the response we received several times when we asked ChatGPT whether it is like MULTIVAC. *See* ChatGPT, OPENAI, https://chat.openai.com [https://perma.cc/5QND-J4H7] [https://web.archive.org/web/20231019165538/https://chat.openai.com/auth/login] (last visited Oct. 23, 2022).

6. *See* JULES VERNE, FROM THE EARTH TO THE MOON (Bantam Classics 1993).

7. *See* ROBERT A. HEINLEIN, ROCKET SHIP GALILEO (Ace Books 1947); *see also* ARTHUR C. CLARKE, PRELUDE TO SPACE (Harcourt, Brace & World, 1954).

8. *See* Hugo Gernsback, *Ralph 124C 41 +*, 4 MOD. ELECS. 593 (Dec. 1911). This was published as a book in 1925, but the basic elements of radar were first disclosed in the magazine MODERN ELECTRICS.

9. *See* Robert Bloch, *Almost Human*, *in* 1 THE COMPLETE STORIES OF ROBERT BLOCH 11 (1990); *see also, e.g.*, KAZUO ISHIGURO, KLARA AND THE SUN (Faber & Faber 2021).

10. *See* Philip K. Dick, *Second Variety*, SPACE SCIENCE FICTION, May 1935, at 102; *see also* PHILIP K. DICK, DO ANDROIDS DREAM OF ELECTRIC SHEEP? (Doubleday 1968).

11. *See* SAMUEL DELANEY, NOVA (Doubleday 1968).

12. *See* URSULA K. LE GUIN, ROCANNON'S WORLD (Ace Books 1966); *see also* ORSON SCOTT CARD, ENDER'S GAME (Tor Books 1985).

13. *See* OCTAVIA E. BUTLER, DAWN (Grand Cent. Publ'g 1987).

14. *See* NEAL STEPHENSON, SNOW CRASH (Bantam Books 1992); *see also* WILLIAM GIBSON, NEUROMANCER (Ace 1984).

15. However, some of them were. Asimov himself was a biochemist who wrote hundreds of nonfiction books on science. ASIMOV, *supra* note 2, at 643–79; *see also* ISAAC ASIMOV, I, ASIMOV: A MEMOIR (Bantam Books 1995).

16. The "abstract ideas" bar stems from the Supreme Court's interpretation of § 101 of the Patent Act—even though the statutory text of this provision does not mention this limitation. *See* Alice Corp. v. CLS Bank Int'l, 573 U.S. 208, 216 (2014) (reciting longstanding rule that under § 101 of the Patent Act "abstract ideas" are not patentable) (citing 35 U.S.C. § 101).

17. "Enablement" generally refers to the Patent Act's requirement that an inventor disclose enough information about their invention in the patent to "enable" a person with ordinary skill in the art to make and use the invention at the time the patent is filed. 35 U.S.C. § 112 (2011). *See infra* note 121.

had little support in contemporary science at the time they were described.[18] Indeed, patent law's requirements of workability and credible, presently-availing utility are precisely what differentiate patentable inventions from mere science fiction.[19]

However, this Article reveals that Hugo Gernsback—founder of the first all-science-fiction magazine, the so-called "father" of science fiction, and the man for whom the Hugo Awards are named[20]—believed that a work of science fiction is a lot like a patent, and that at least some science fiction should be patentable. Gernsback made several claims. First, like patents, works of science fiction can disclose useful information about new and nonobvious inventions. Second, similar to patents, science fiction stories can inspire readers to manufacture and improve upon inventions that they learned about while reading. Finally, some science fictional inventions are depicted in such detail that they should themselves be patentable or at least qualify as "prior art" against other peoples' patents.[21] In 1952, Gernsback tried to turn his ideas into reality. In a speech he gave to the World Science Fiction Convention, entitled "The Impact of Science Fiction on World Progress," Gernsback urged Congress to reform the patent system to give prescient science fiction authors—those who predicted future inventions before they came to pass—new opportunities to obtain patents for the inventions they described in their stories. At the very least, Gernsback argued, patent examiners should review more science fiction when doing prior art searches.[22]

Gernsback's ideas were iconoclastic, and his proposal to make patents obtainable for inventions that are not yet reduced to practice is deeply troubling from a policy perspective.[23] Nevertheless, taking a critical look at Gernsback's philosophy and the historical connection between patents and science fiction generates surprising insights for both science fiction and innovation policy. First, the fact that patent law played a role in shaping the modern genre of science fiction provides a new and different justification for the role of science fiction in society. From the Gernsbackian perspective, a work of science fiction is supposed to act like a patent. It describes technologies of the future in a way that might inspire readers to, literally, pursue those

18. "Utility" generally refers to the Patent Act's requirement that an invention must be operable for its intended purpose and have a presently availing utility that is not incredible from the standpoint of contemporary scientific principles. 35 U.S.C. § 101 (2011). *See infra* note 122.

19. *See* Camilla A. Hrdy & Daniel H. Brean, *Enabling Science Fiction*, 27 MICH. TECH. L. REV. 399, 403–13 (2021) (comparing patent law's requirement that an invention be currently possible and described in sufficient detail, with norms in literary science fiction, which pressure authors to depict science and technology in ways that are at least plausible to readers).

20. There are several important sources on Gernsback's role in the development of science fiction. *See* MICHAEL ASHLEY, THE HISTORY OF THE SCIENCE FICTION MAGAZINE: 1926–1935, at 11–51 (1974) [hereinafter ASHLEY, HISTORY]; JAMES E. GUNN, ALTERNATE WORLDS: THE ILLUSTRATED HISTORY OF SCIENCE FICTION 113–28 (A&W Visual Libr. 1975); MICHAEL ASHLEY, THE TIME MACHINES: THE STORY OF THE SCIENCE-FICTION PULP MAGAZINES FROM THE BEGINNING TO 1950, at 45–92 (2001) [hereinafter ASHLEY]; GARY WESTFAHL, HUGO GERNSBACK AND THE CENTURY OF SCIENCE FICTION (2007); GARY K. WOLFE, HOW GREAT SCIENCE FICTION WORKS 44–46 (2016); *see also* THE PERVERSITY OF THINGS: HUGO GERNSBACK ON MEDIA, TINKERING, AND SCIENTIFICTION (Grant Wythoff ed., 2016) [hereinafter Wythoff] (assessing Gernsback's role in technological revolutions occurring in television and radio, and reprinting and commenting on several of Gernsback's stories and editorials).

21. We provide direct quotes supporting these claims in Part III *infra*.

22. We review the details of these proposals in Part IV *infra*.

23. *See infra* Part V.A.

inventions in the real world. As we will show, science fiction "teaches" readers in a very different way from patents and imparts different forms of information from patents, stretching the bounds of what patent theorists call "disclosure theory."[24] Yet, at the end of the day, patents and science fiction are, among other things, supposed to perform a similar function by disclosing useful technical information that the world would not otherwise obtain. As Gernsback put it, science fiction supplies information "in a very palatable form . . . imparting knowledge, and even inspiration, without once making us aware that we are being taught."[25]

Second, if we think patents are an important part of the innovation ecosystem because patents disseminate useful technological teachings and insights, then science fiction might be too. Even if science fiction does not directly influence someone to make the precise inventions it discloses, it can impact peoples' career choices, inspiring them to go into science or to pursue a general line of inquiry, like virtual reality or space travel.[26] If Gernsback was right—and we believe that in some cases he was—science fiction has inspired some of the inventions we have today. We cannot perform a comprehensive empirical assessment of science fiction's impact on innovation. The data is just too vast, too dispersed, and often simply unavailable. That said, we do have evidence that particular inventions—and particular patents—were influenced by science fiction.[27] When an invention has a precursor in literary science fiction, this is surely sometimes independent invention, the result of multiple thinkers responding to the same technological developments and contemporary trends.[28] But sometimes it is not.

One extraordinary example of science fiction's direct influence on invention is Simon Lake's reliance on the great French writer Jules Verne. When Lake obtained a patent for a submarine at the end of the nineteenth century, he gave explicit credit to Verne, who had vividly depicted a submarine decades earlier in his famous novel, *Twenty Thousand Leagues Under the Seas*.[29] This example shows that at least some inventors read science fiction and are deeply moved by it. Its ideas inspire them in ways that traditional sources—including patents—do not. Gernsback put it best: Science fiction "fires the reader's imagination more perhaps than anything else of which we know," leaving readers "deeply thrilled," as their "imagination is fired to the nth degree . . . ."[30] Few people would ever say that about reading patents.

This history should be of great interest to scholars of science fiction and to scholars of patent and intellectual property law (many of whom are themselves science fiction

24. *See infra* Part III.

25. Hugo Gernsback, *A New Sort of Magazine*, 1 AMAZING STORIES 3, 3 (1926).

26. *See infra* Part VI.A.

27. *See infra* Part VI.A.

28. *See* Mark A. Lemley, *The Myth of the Sole Inventor*, 110 MICH. L. REV. 709 (2012).

29. *See infra* Part VI.A. The original French title was *Vingt mille lieues sous les mers* (1869–70).

30. Hugo Gernsback, *The Lure of Scientifiction*, 1 AMAZING STORIES 195, 195 (1926) [hereinafter Gernsback, *Scientifiction*]; Hugo Gernsback, *Imagination and Reality*, 1 AMAZING STORIES 579, 579 (1926) [hereinafter Gernsback, *Imagination*].

fans).[31] This history should also be of special interest to those who care about innovation and study how innovation emerges and diffuses throughout society.[32]

The Article proceeds as follows:

Part I contextualizes Gernsback within the literary genre of science fiction. It explains his unique view of what science fiction should be, and how his view influenced later editors and writers, shaping the genre of science fiction as we know it.

Part II reveals Gernsback's extensive experience with, and thoughts about, the patent system. By parsing through Gernsback's published and unpublished materials, we show that not only was Gernsback himself a patent veteran, with many patents to his name, but he also frequently gave advice to others on how to get patents, and he wrote several early editorials espousing unorthodox, sometimes critical views on patents and the patent system. These opinions clearly informed Gernsback's eventual proposal to make patents available for science fiction authors.

Part III reveals a pivotal piece of history which, so far as we can discern, has gone completely unnoticed. We show that, in editorials he wrote for his famous science fiction magazine, *Amazing Stories*, Gernsback quite explicitly adopted the theory that a work of science fiction is like a patent. Drawing on a theoretical framework that closely resembles patent law's "disclosure theory," he argued that both patents and science fiction stories disclose useful information to the world that can influence later inventors. He further argued that some science fiction stories depict inventions in such detail that the author can, quite literally, file for a patent. At the very least, their story can be considered as prior art against other peoples' patents.

Part IV analyzes Gernsback's 1952 patent reform proposal. This proposal has been noted briefly by scholars of science fiction—usually in the context of explaining that it is "regularly ridiculed."[33] It has yet to be discussed or assessed in any depth, let alone by those familiar with patent law. We do so here, explaining the details of Gernsback's proposal for a Provisional Patent, exactly how this was supposed to work, and how it diverged from patent law's current rules. We also reveal Gernsback's highly creative recommendation for how to entice the Patent Office to read more science fiction when searching for prior art—which so far as we know has not been assessed before, in part because the published version of Gernsback's 1952 speech deleted most of it.

Part V demonstrates why Gernsback's proposal for Provisional Patents is a bad idea from the perspective of patent policy. Giving patents to science fiction authors has the potential to hold up future innovation in the worst way—allowing those who propose innovative yet half-baked ideas to crawl out of the woodwork decades later and sue the

31. *See* Jorge L. Contreras, *Science Fiction and the Law: A New Wigmorian Bibliography*, 13 HARV. J. SPORTS & ENT. L. 65 (2022).

32. *See, e.g.*, EVERETT ROGERS, DIFFUSION OF INNOVATIONS (5th ed. 2003); JOSH LERNER, THE ARCHITECTURE OF INNOVATION: THE ECONOMICS OF CREATIVE ORGANIZATIONS (2012); Colleen Chien, *Opening the Patents System: Diffusionary Levers in Patent Law*, 89 S. CAL. L. REV. 793, 793–862 (2016).

33. In one of the few scholarly references we have found to Gernsback's patent reform proposal, Gary Westfahl observes that Gernsback's "innovative suggestion" to award patents for inventions depicted in science fiction "is regularly ridiculed." Westfahl insightfully rejects this easy conclusion, arguing that Gernsback's ideas in fact "played a key role in validating science fiction as a uniquely significant form of literature which could play a role not only in predicting, but actually creating, the future . . . ." WESTFAHL, *supra* note 20, at 19.

very people who get those ideas to work. We further posit that Gernsback's proposal for patent reform might have been more than just naïve; it might have been motivated in part by self-interest and hope for financial gains. We find some support for this hypothesis in Gernsback's life history, as well as in certain statements he made in his magazines and to the media.

Part VI contends that Gernsback's ideas, however flawed, contain kernels of truth. By building on patent law's disclosure theory, we posit that, just as patents disclose useful information that can affect future innovation, so too can science fiction. Science fiction can disclose various forms of information to society. Moreover, because science fiction is drafted in such an engaging medium, and because it is liberated from patent law's imperative of current-workability, science fiction can impact innovation in ways that most patents never can or will. Science fiction can supply a stimulus to readers, inspiring them to become inventors. Science fiction can predict future technological developments decades or millennia before they come to pass, and in doing so provide useful insights about how to achieve future technological feats or avoid future problems. Science fiction can also explore the moral implications of emerging technologies, flagging the potential moral dangers inherent to certain inventions or lines of inquiry. Science fiction can even enter the broader culture and, in doing so, prepare and acclimate the general public to the inventions of the future.

We conclude by summarizing the implications of science fiction's patent law origins for the genre of science fiction and for innovation policy, and by providing a bit of advice we suspect Gernsback might have given today's science fiction authors.

I. THE HUGO GERNSBACK CONNECTION

The connection between patents and science fiction originates with a single historic figure—Hugo Gernsback. Before Gernsback, there was excellent fiction that we today put on the science fiction shelves in bookstores. This includes the "scientific romances" by the nineteenth century giants, Mary Shelley, Edgar Allen Poe, Jules Verne, and H.G. Wells. But there was no dedicated place to get science fiction until Gernsback started an exclusively-science-fiction pulp magazine called *Amazing Stories*.[34] Gernsback

34. AMAZING STORIES was considered a "pulp" magazine because it was published on cheap pulp paper. However, it was originally published in a much larger size and was slightly more expensive than the usual pulp. It sold for twenty-five cents an issue. Issues of AMAZING STORIES from 1926 to 1959 are available at *Amazing Stories*, THE ONLINE BOOKS PAGE, https://onlinebooks.library.upenn.edu/webbin/serial?id=amazingstories [https://perma.cc/RQU8-QTR6] [https://web.archive.org/web/20230929175925/https://onlinebooks.library.upenn.edu/webbin/serial?id=amazingstories] (last visited Oct. 23, 2023). ASHLEY, HISTORY, *supra* note 20, at 11–49, 22; WESTFAHL, *supra* note 20, at 17; *see also* ALEC NEVALA-LEE, ASTOUNDING: JOHN W. CAMPBELL, ISAAC ASIMOV, ROBERT A. HEINLEIN, L. RON HUBBARD, AND THE GOLDEN AGE OF SCIENCE FICTION 5–6 (2018) (writing that while there had been prior writers who wrote science fiction, its "emergence as a viable genre was thanks largely" to Gernsback, "who first published science fiction in the cheap magazines known as the pulps, culminating in the debut of *Amazing Stories* in 1926").

initially used the term "scientifiction," before eventually pivoting to the more easily-pronounceable term "science fiction."[35]

Gernsback did more than give the genre a name. He was also in large part responsible for defining it as a new form of fiction focused on science.[36] In editorials that Gernsback wrote for *Amazing Stories*, he identified two main criteria as essential to science fiction story, and which distinguished it from other kinds of fiction or romance.[37] First, science fiction must have a grounding in real "scientific fact." Although the writer has the "perfect right to use [their] imagination," he wrote, the "fundamental scientific theory must be correct."[38] Gernsback once hypothesized, not in jest, that the "ideal proportion" was "seventy-five percent literature interwoven with twenty-five percent science."[39] Second, and uniquely important for Gernsback, a science fiction story must contain what he called "prophetic" science—that is, a scientific development that might be possible in the future, even if it was not possible when the author described it.[40] All his life, Gernsback maintained his belief that the "wonder ingredient" for science fiction was "true or prophetic science."[41]

The best exemplar of Gernsback's preferred style of science fiction—one that is based on scientific fact and that contains "prophetic" science—comes from Gernsback's own series of stories, called *Ralph 124C 41+* (the string of symbols is supposed to be read as "one to foresee for all").[42] In one of these stories, Ralph 124C 41+, a genius from the year 2660, uses a "pulsating polarized ether wave" to pursue a Martian in his "space flyer." Gernsback called this invention an "Actinoscope." This methodology was

35. Michael Ashley asserts that when Gernsback started the new magazine, SCIENCE WONDER STORIES, he "coined the new phrase 'science fiction.'" That said, Ashley notes that the term "science fiction" was around already and had intermittently appeared in AMAZING STORIES. ASHLEY, *supra* note 20, at 66*; see also* Gernsback, *Scientifiction*, *supra* note 30, at 195.

36. WESTFAHL, *supra* note 20, at 13 ("Science fiction is a successful institution in large part, because Hugo Gernsback ably supervised its initial construction. He provided the genre with a name, a critical theory justifying its importance and value, and a literary history.").

37. Gary Westfahl has identified similar "Gernsbackian" criteria: "[T]he work must be a narrative; it must incorporate passages of scientific explanation; and it must describe an imaginary but scientifically logical new invention or breakthrough." Gary Westfahl, *"The Jules Verne, H.G. Wells, and Edgar Allan Poe Type of Story": Hugo Gernsback's History of Science Fiction*, 19 SCI. FICTION STUD. 340, 340 (1992).

38. Hugo Gernsback, *How To Write "Science" Stories*, 21 SCI. FICTION STUD. 268 (1994); *see also* Gernsback, *supra* note 25, at 3 ("By 'scientifiction' I mean . . . a charming romance intermingled with scientific fact and prophetic vision."); Hugo Gernsback, *Editorially Speaking*, 1 AMAZING STORIES 483, 483 (Sept. 1926) [hereinafter Gernsback, *Editorially Speaking*] (discussing three criterion as "amazing," grounded in a "scientific background," and possessing "originality"); Hugo Gernsback, *Fiction Versus Fact*, 1 AMAZING STORIES 291, 291 (1926) (arguing that although an author of scientifiction "may take some liberties," the author should "draw the line" when "the entire plot becomes frankly impossible, or far too improbable"); Hugo Gernsback, *Plausibility in Scientifiction*, 1 AMAZING STORIES 675, 675 (1926) ("[Authors of scientifiction] often take poetic license, sometimes disregarding true scientific facts, although still retaining enough scientific accuracy to make the plot or story seem probable and at the same time interesting.").

39. Hugo Gernsback, *Fiction Versus Fact*, 1 AMAZING STORIES 291, 291 (1926).

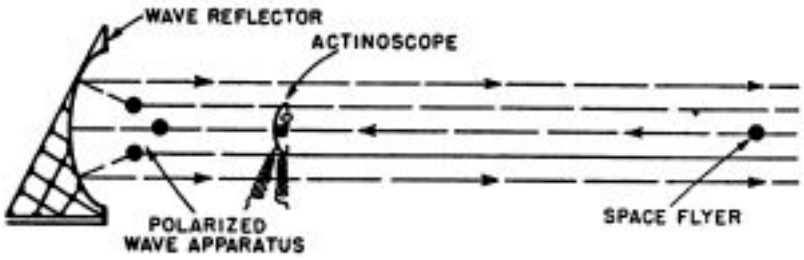
40. Gernsback, *supra* note 25, at 3.

41. Hugo Gernsback, *Guest Editorial*, AMAZING STORIES 5, 5 (1961) ("As we look back over the vista of modern science fiction, we are struck by the fact that the outstanding stories in the field—the one that endure—are those that almost invariably have as their wonder ingredient true or prophetic science.").

42. These were first published in one of Gernsback's magazines in 1911. Gernsback, *supra* note 8. Gernsback published all the stories together as a complete book in 1925. WESTFAHL, *supra* note 20, at 97–148 (conducting line-by-line comparison of early and later versions of *Ralph*).

eventually put into practice. We now call it "radar."[43] As can be seen below, Gernsback provided substantial technical details and imagery. We have printed the image and text in full below to illustrate an important point: Apart from the fact that this story involves chasing a Martian space flyer, the image and description resemble those seen in real patent documents. As we will explain in the next part, this is not a coincidence.[44]

Figure 1: Using an "Actinoscope" to track a space flyer[45]



A *pulsating polarized ether wave*, if directed on a metal object can be reflected in the same manner as a light-ray is reflected from a bright surface or from a mirror. The reflection factor, however, varies with different metals. Thus the reflection factor from silver is 1,000 units, the reflection from iron 645, alomagnesium 460, etc. If, therefore, a polarized wave generator were directed toward space, the waves would take a direction as shown in the diagram, provided the parabolic wave reflector was used as shown. By manipulating the entire apparatus like a searchlight, waves would be sent over a large area. Sooner or later these waves would strike a space flyer. A small part of the waves would strike the metal body of the flyer, and these waves would be reflected back to the sending apparatus. . . . From the intensity and the elapsed time of the reflected impulses, the distance between the earth and the flyer can then be accurately and quickly calculated.[46]

43. The term "radar" is an acronym that stands for "radiodetection and ranging." *See Radar*, MERRIAM-WEBSTER, https://www.merriam-webster.com/dictionary/radar [https://perma.cc/7878-Y2YJ] [https://web.archive.org/web/20240204202923/https://www.merriam-webster.com/dictionary/radar] (last visited Feb. 4, 2024). Radar began to be widely adopted by militaries during the World War II era. Merrill I. Skolnik, *History of Radar*, BRITANNICA, https://www.britannica.com/technology/radar/Advances-during-World-War-II [https://perma.cc/RX2F-VQTC] [https://web.archive.org/web/20240204202425/https://www.britannica.com/technology/radar/Advances-during-World-War-II] (last visited Feb. 4, 2024).

44. One even wonders if Gernsback had considered patenting this but abandoned the idea. Or perhaps he did in fact try to patent it and was rejected. This application, if rejected, was not published. Unlike today, applications were not published unless ultimately granted. *Cf.* 35 U.S.C. § 122 (2011). *See generally* Lidiya Mishchenko, *Thank You for Not Publishing (Unexamined Patent Applications)*, 47 B.Y.U. L. REV. 1563 (2022) (discussing and critiquing modern rules requiring publication of rejected or non-final patent applications).

45. Gernsback, *supra* note 8. You can read the full story for free at *Ralph 124C 41+*, PROJECT GUTENBERG, https://www.gutenberg.org/files/60944/60944-h/60944-h.htm [https://perma.cc/8E28-Z9S3] [https://web.archive.org/web/20230929204740/https://www.gutenberg.org/files/60944/60944-h/60944-h.htm] (last visited Oct. 24, 2023). The photo has been retrieved from the free eBook.

46. HUGO GERNSBACK, RALPH 124C 41 +, at 152 (Frederick Fell, Inc. 1950) (1925).

This is clearly a more restrictive version of science fiction than most people have for the genre. Modern science fiction has a lot more action, plot, and characterization—and a lot less technical detail—than *Ralph 124C 41+*. But nonetheless, Gernsback's philosophy was highly influential for future generations of science fiction. Subsequent writers, editors, and producers carried forward Gernsback's interest in scientific plausibility, as well as his interest in describing inventions of the future.[47] A case in point is Gernsback's influence on the famed editor, John W. Campbell.[48] Another important figure who ascribed wholeheartedly to Gernsback's theory that science fiction can affect real science was the British writer Arthur C. Clarke. We discuss Clarke's views further in Part VI.[49]

II. GERNSBACK AND THE PATENT SYSTEM

Gernsback's conviction in the centrality of science to science fiction stemmed from the fact that he was himself a scientist and inventor, and was initially trying to market his magazines to others who were like-minded. As Grant Wythoff has compellingly shown,[50] Gernsback's famous science fiction magazine *Amazing Stories* began as merely an offshoot of Gernsback's technical magazines in the fields of radio, wireless, and television.[51] Gernsback's technical magazines were marketed towards amateur inventors and an emerging community of "tinkerers"—people interested in inventing outside the typical corporate or academic structure.[52] In these magazines, Gernsback sometimes found that he needed to fill space. To do so, he would publish—and sometimes write himself—stories that featured science in a fictional setting. Often written at the eleventh hour, these "scientifiction" stories had only a very loose plot. They usually featured an inventor or genius of some kind who would basically just

47. *See* WESTFAHL, *supra* note 20, at 17–40 (discussing many subsequent editors who adopted Gernsback's philosophy that science fiction would anticipate and effect the technology of the future); WOLFE, *supra* note 20, at 3 ("One of the first requirements [for a work to be considered science fiction is that it] should be possible—involving things that we might actually create, places we might actually go, or societies that might actually evolve.").

48. Campbell, who published his first story in Gernsback's AMAZING STORIES, went on to become the highly influential editor of a competing science fiction magazine, ASTOUNDING STORIES, in 1938. ASTOUNDING STORIES was where many famous "Golden Age" authors got their start, such as Isaac Asimov, Robert Heinlein, and L. Ron Hubbard. A major part of Campbell's legacy, though, was due to the fact that he revived Gernsback's focus on scientific plausibility and accurate predictions of future inventions. ASHLEY, *supra* note 20, at 107–09; WOLFE, *supra* note 20, at 48–52; NEVALA-LEE, *supra* note 34, at 73–83, 121–25.

49. *See infra* Part VI.B.

50. *See* Wythoff, *supra* note 20, at 2–3.

51. Many of the issues of Gernsback's non-science fiction magazines are available digitally at *Hugo Gernsback Library*, WORLD RADIO HIST., https://worldradiohistory.com/BOOKSHELF-ARH/Bookshelf_Gernsback.htm [https://perma.cc/LD9K-HUHY] [https://web.archive.org/web/20230929212641/https://worldradiohistory.com/BOOKSHELF-ARH/Bookshelf_Gernsback.htm] (last visited Oct. 24, 2023). Many excerpts, with insightful commentary, are provided in Wythoff, *supra* note 20, at 60–284. Gernsback also went on to produce more "general interest" magazines such as SEXOLOGY. CRAIG YOE, THE BEST OF SEXOLOGY: KINKY AND KOOKY EXCERPTS FROM AMERICA'S FIRST SEX MAGAZINE (2008).

52. Wythoff, *supra* note 20, at 45.

describe all of the amazing devices they had invented. [53] We already showcased an example of the "Gernsbackian" style in *Ralph 124C 41+* to give the reader an idea of what these stories looked like. The intended audience for Gernsback's early scientifiction stories was, at least initially, precisely the same people who read Gernsback's technical magazines. They were interested in science and invention per se. They were often scientists and inventors themselves.

What no one has paid much attention to is the tremendous influence that patents and patent law had on the evolution of this uniquely "Gernsbackian" form of science fiction.[54] Gernsback's writings confirm that his philosophy of science fiction—including his unique conviction that it be grounded in real science—was greatly influenced by his understanding of patents and how the patent system is supposed to work.

A. GERNSBACK'S PATENTS

Gernsback was a frequent patentee who sought to obtain exclusive rights to many of his inventions. He died with more than thirty patents to his name in the United States alone.[55] His journey with patents and inventing began at a very young age. He spent his childhood in Luxembourg experimenting with communications, batteries, and electrical equipment. At age thirteen, his understanding was apparently so advanced that he was asked to install a telephonic system in a local convent.[56]

After emigrating to New York, Gernsback started a company called *The Electro Importing Company* (Telimco) to import wireless and electrical equipment from Europe and re-sell it to U.S. customers.[57] Gernsback's first magazine, *Modern Electrics*, actually began as a catalog used to market Telimco's radio and electrical equipment.[58] *Modern Electrics* soon evolved into a magazine in its own right, marketed to would-be

53. *See* SAM MOSKOWITZ, HUGO GERNSBACK: FATHER OF SCIENCE FICTION, at 14–22 (1959); ASHLEY, *supra* note 20, at 30–35; WESTFAHL, *supra* note 20, at 97–99; Wythoff, *supra* note 20, at 14–16.

54. A few sources do mention Gernsback's views on patents, albeit in passing. *See, e.g.*, WESTFAHL, *supra* note 20, at 19.

55. Google Patent Search with "Hugo Gernsback" as Inventor, GOOGLE PATENTS, https://patents.google.com/?inventor=Gernsback+Hugo [https://perma.cc/KSW4-82W3] [https://web.archive.org/web/20231024134142/https://patents.google.com/?inventor=Gernsback+Hugo]. However, sometimes he filed using different names, such as "Hougo Gernsback." Google Patent Search with "Hougo Gernsback" as Inventor, GOOGLE PATENTS, https://patents.google.com/?inventor=Gernsback+Hougo [https://perma.cc/QA9B-A42A] [https://web.archive.org/web/20230929213922/https://patents.google.com/?inventor=Gernsback+Hougo]. His NEW YORK TIMES obituary states that at the time of his death he "held 80 scientific patents." *Hugo Gernsback Is Dead at 83*, N.Y. TIMES, Aug. 20, 1967, at 83, https://www.nytimes.com/1967/08/20/archives/hugo-gernsback-is-dead-at-83-author-publisher-and-inventor-father.html [https://perma.cc/9QZZ-DB2M] [https://web.archive.org/web/20230929214209/https://www.nytimes.com/1967/08/20/archives/hugo-gernsback-is-dead-at-83-author-publisher-and-inventor-father.html].

56. Gernsback was also fascinated by life on other planets. Legend has it that after reading a book about life on Mars, he became so excited and intellectually engaged that he gave himself a fever. MOSKOWITZ, *supra* note 53, at 9–10; ASHLEY, *supra* note 20, at 28.

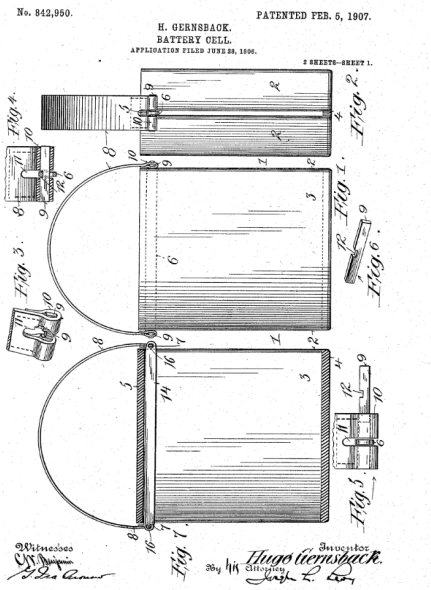
57. MOSKOWITZ, *supra* note 53, at 12–14; ASHLEY, *supra* note 20, at 28; Wythoff, *supra* note 20, at 1.

58. *See, e.g.*, Wythoff, *supra* note 20, at 1.

inventors. The magazine featured descriptions of current science research and guidance about how to make certain electrical devices. It also printed patents in the field, advertisements for books on patents, and even ads from patent attorneys willing to do patent searches or reports on patentability.[59]

Gernsback frequently obtained patents for his own inventions. In fact, Gernsback's decision to emigrate to the United States was driven in part by his failure to obtain patents for one of his battery inventions from the European patent offices. After France and Germany rejected his applications,[60] Gernsback emigrated to the United States, where he fared better, obtaining a U.S. patent for a new method for manufacturing dry-cell batteries in 1907.[61]

Figure 2: Gernsback's Battery Cell Patent[62]



59. For example, the first issue of MODERN ELECTRICS contained a section called "Electrical Patents of the Month." *Electrical Patents of the Month*, 1 MOD. ELECS. 25, 25–26 (1908). Issues of MODERN ELECTRICS are available digitally at *Modern Electrics from Hugo Gernsback*, WORLD RADIO HIST., https://worldradiohistory.com/Modern_Electrics_Magazine.htm [https://perma.cc/28ZN-PA4R] [https://web.archive.org/web/20230929211829/https://worldradiohistory.com/Modern_Electrics_Magazine.htm]; *see also* WESTFAHL, *supra* note 20, at 61 (listing contents of MODERN ELECTRICS, including descriptions of new inventions from readers and patents of month).

60. ASHLEY, *supra* note 20, at 28; MOSKOWITZ, *supra* note 53, at 9–10.

61. *See* U.S. Patent No. 842,950 (issued Feb. 5, 1907); *see also* MOSKOWITZ, *supra* note 53, at 11–12; ASHLEY, *supra* note 20, at 28; Wythoff, *supra* note 20, at 13–15.

62. U.S. Patent No. 842,950 (issued Feb. 5, 1907).

He would go on to acquire many more patents relating to electrical devices such as radio and telephone components.[63]

Gernsback also obtained patents for far less practical inventions. A representative sampling of Gernsback's more imaginative patents includes: a "combined electric hair brush and comb"; a "submersible amusement device," which appears to have been a variation on the Ferris wheel that, along with rotating in the air, would take riders underwater; an "apparatus for landing flying machines" that relied on magnets; an ear cushion for telephone receivers; an "acoustic apparatus" he called an Osophone, which provided a compact instrument for sending sound vibrations directly into the bones; and a "hydraulic fishery," which used a massive suction device to catch fish.[64]

B. GERNSBACK'S ADVICE ON PATENTING

Through his interactions with the patent system as an inventor and entrepreneur, Gernsback learned a great deal about patents and formed a number of opinions about them. He seemed to relish this hard-earned expertise. In his role as a magazine editor, he fielded questions from (by his count) thousands of inventors seeking his advice.[65] In 1933, he drew on this experience in a short booklet, called "Inventing—as a Business, A Plan to Safeguard Inventors."[66] The booklet provides surprisingly wise advice on how to protect inventions in the early stages and the importance of obtaining patents. "Just the mere fact that you invent something," Gernsback intoned, "is not sufficient to bring you riches. Many other things are necessary before this is accomplished."[67] "The first and best advice I always give inventors is 'if you have a good invention, you must eventually patent it.' There is no way to get around this . . . ."[68]

63. *See, e.g.*, Relay, U.S. Patent No. 978,999 (issued Dec. 20, 1910); Potentiometer, U.S. Patent No. 988,456 (issued Apr. 4, 1911); Cord Terminal, U.S. Patent No. 1,557,248 (issued Oct. 13, 1925); Electrical Switch, U.S. Patent No. 1,585,485 (issued May 18, 1926).

64. U.S. Patent No. 1,016,138 (issued 1912) ("combined electric hair brush and comb"); U.S. Patent No. 1,384,750 (issued 1921) ("submersible amusement device"); U.S. Patent No. 1,392,140 (issued 1921) ("apparatus for landing flying machines"); U.S. Patent No. 1,514,152 (issued 1924) ("ear cushion"); Patent No. 1,521,287 (issued 1924) ("acoustic apparatus"); U.S. Patent No. 2,718,083 (issued 1955) ("hydraulic fishery"). An informative, humorous description of Gernsback's patents can be found in Michael Banks, *The Man Who Invented the Future*, NUTS & VOLTS (Aug. 2004), https://www.nutsvolts.com/magazine/article/the_man_who_invented_the_future [https://perma.cc/48K4-FL5D] [https://web.archive.org/save/https://www.nutsvolts.com/magazine/article/the_man_who_invented_the_future]. Banks has also written a short biography of Gernsback. *See* MICHAEL BANKS, HUGO GERNSBACK: THE MAN WHO INVENTED THE FUTURE (2008).

65. Hugo Gernsback, Inventing—as a Business, a Plan To Safeguard Inventors 1 (1933) (unpublished manuscript) (on file with authors) ("I have come into contact with some 36,000 inventors by mail and in person.").

66. Hugo Gernsback, Inventing—as a Business, a Plan To Safeguard Inventors (1933) (unpublished manuscript) (on file with authors). It is not clear if or how he distributed the booklet, but he did publish a similar, albeit much shorter, version of this advice in one of his editorials. *See* Hugo Gernsback, *Inventing as a Business*, 12 SCI. & INVENTION 11 (May 1924).

67. Hugo Gernsback, Inventing—as a Business, a Plan To Safeguard Inventors 1 (1933) (unpublished manuscript) (on file with authors) (underlines in original).

68. *Id.* at 2 (underlines in original).

The booklet shows that Gernsback had a decent, albeit not highly technical, understanding of how patents work, and was aware of the major criteria of patentability. In particular, he emphasized to readers that, to be patented, an invention must be "absolutely new" as compared to the "prior art"[69]—that is, the patents, publications, and other publicly available knowledge that existed before the invention.[70] Gernsback did not, in this booklet, discuss the fact that, to be patented, the invention must actually *work*. Yet it is clear from his other writings that he understood that the Patent Office would demand the inventions work in accordance with accepted scientific principles. For example, in a 1921 editorial, Gernsback poked fun at inventors seeking to build perpetual motion machines—those hypothetical, elusive devices that supply infinite energy and are widely believed to be impossible—and informed readers (largely correctly) that the Patent Office "accepts no patent application for any device that smacks even remotely of perpetual motion—unless a working model is submitted. Needless to say, so far no model that worked has been submitted or ever will be."[71]

C. GERNSBACK'S COMPLAINTS ABOUT THE PATENT SYSTEM

For Gernsback, the patent system, though generally virtuous in protecting inventors like himself, left a lot to be desired. His major gripe, which he frequently articulated, was that patents do not protect mere "ideas." In a provocative 1934 editorial, entitled "'Idea' Patents?," Gernsback proposed making it easier to patent "ingenious" ideas, even if the inventor did not have a specific device or mechanism in mind. For example, the person who thinks of applying liquid color to hands (i.e., nail polish) should be able to apply for an "Idea Patent" on the whole idea, apart from any particular mechanism for carrying it out. He expressed his hope that "in the near future the U.S. Patent Office will be authorized to issue 'Idea Patents' as such."[72]

Another complaint, which Gernsback returned to on numerous occasions, was his perception that the Patent Office does only a cursory job of screening for prior art.[73] As a result, it was too easy to challenge a patent in litigation by digging up old prior art. "[I]f you have (let us assume) invented a new mousetrap," he wrote, "and someone else makes exactly the same mousetrap specified in your patent, the patent will not be of much use to you; because, if the offender has money, he can fight the case. He will try to demonstrate that your patent was not original as nearly the same mousetrap was

69. *See id.* at 4–5.

70. Camilla A. Hrdy & Sharon K. Sandeen, *The Trade Secrecy Standard for Patent Prior Art*, 70 AM. U. L. REV. 1269, 1271 n.1 (2021) (citing Sean B. Seymore, *Rethinking Novelty in Patent Law*, 60 DUKE L. J. 919, 922 (2011); Timothy Holbrook, *Patent Prior Art and Possession*, 60 WILLIAM & MARY L. REV. 123, 127 (2018)).

71. Hugo Gernsback, *Perpetual Motion*, 9 SCI. & INVENTION 394 (1921); *see also* Bruce Kramer, *In Re Newman: The Federal Circuit Dismantles an Obstacle for Perpetual Motion Patent Applicants*, 21 AKRON L. REV. 121 (1988) (discussing the Patent Office's and Federal Circuit's approach to perpetual motion machines).

72. Hugo Gernsback, *"Idea" Patents*, 5 EVERYDAY SCI. & MECHANICS 584 (1934).

73. Some argue that the Office's cursory review in determining patentability is by design. *See* Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. L. REV. 1495 (2001). *But see* Michael D. Frakes & Melissa F. Wasserman, *Irrational Ignorance at the Patent Office*, 72 VAND. L. REV. 975 (2019) (arguing the patent system would benefit from giving examiners more time to review each application).

printed in a farm journal back in 1884."[74] It would be better, he urged, for the Patent Office to use greater "diligence in looking up ALL antecedents of the mousetrap, and running down all available comparisons, and satisfy itself that the mousetrap is really new." That way, the inventor would be in a position to obtain a patent that "would be worth something."[75]

Both of these complaints—insufficient protection for ideas and the vulnerability of patents due to examiners' ineptness or incapacity in searching the prior art—would become common refrains for Gernsback. Both would reappear years later in his 1952 proposal for patents for science fiction authors. But before we get there, we must first delve deeper into Gernsback's patent-inspired theory of science fiction.

III. GERNSBACK'S THEORY OF SCIENCE FICTION AS PATENT

Gernsback's views on patents were central to his understanding of the nature and function of science fiction. Gernsback founded *Amazing Stories* in April 1926.[76] As noted above, *Amazing Stories* was initially an offshoot of Gernsback's more serious technical magazines, where Gernsback had begun to publish occasional fictional stories featuring science and inventions of the future. Over time, Gernsback saw that there was demand for these stories—indeed, potentially more demand than there was for his purely scientific content. He thus decided to publish a magazine featuring *exclusively* "scientifiction." He did not want to leave the science behind, but he believed the fictional format would attract a larger, more generalist audience. In fact, he chose the name *Amazing Stories*, rather than *Scientifiction*, for the magazine's title because he believed many of the readers he hoped to attract—"the masses," as he called them—would not be inherently scientifically minded and might be put off by the word "science."[77] In later years, he would add the word "science" back into his titles, apparently having concluded that the masses could take it.[78]

It seems Gernsback concluded that "the masses" could also handle philosophical musings about the nature of science fiction. At the beginning of each issue of *Amazing Stories*, Gernsback provided an in-depth editorial in which he would discuss what the genre of science fiction was and the important role it played in promoting innovation

74. Hugo Gernsback, *The Inventor and His Patent*, 6 EVERYDAY SCI. & MECHANICS 792 (1935).

75. *Id.*

76. Gernsback was the founder as well as the magazine's editor for its three years. Thereafter, Gernsback actually lost ownership of the magazine. He went into debt and worked out a deal with creditors that involved the sale of AMAZING STORIES to another company. He started other science fiction magazines thereafter, including WONDER STORIES and SCIENCE-FICTION PLUS. MOSKOWITZ, *supra* note 53, at 26–27; ASHLEY, *supra* note 20, at 258–59.

77. By the "masses," we suspect that Gernsback meant children and women. He stated that he avoided using the word "science" in the title of his magazine because "anything that smacks of science seems to be too 'deep' for the average type of reader." Gernsback, *Editorially Speaking*, *supra* note 38, at 483. In the same passage he noted that "a great many women" were reading the magazine, suggesting a gender bias may have been at work. *Id.*

78. Ashley provides a full list of Gernsback's science fiction magazines. ASHLEY, *supra* note 20, at 258–59. Gernsback's final science fiction magazine was SCIENCE-FICTION PLUS, which folded after only seven issues in 1953. MOSKOWITZ, *supra* note 53, at 31–32.

and improving society. It is apparent from these editorials that Gernsback viewed the inventions described in stories as *directly analogous* to the inventions described in real patents. This analogy, in turn, explains why Gernsback was so adamant, all his life, that science fiction needed to contain real science. It explains why his own stories (like *Ralph 124C 41+*) looked the way they did. And it explains why, decades later, he would come out with such a seemingly bizarre proposal to award patents to science fiction authors.

A. PATENT LAW'S DISCLOSURE THEORY

To understand Gernsback's philosophy of science-fiction-as-patent, it is necessary to understand some patent theory. The primary justification for patents is that patents promote innovation—generating new products and processes that add value to society.[79] Under the conventional view, patents promote innovation in two ways.

First, patents are believed to promote innovation by providing inventors with incentives to invent and to "commercialize" (perfect and bring to market) inventions when they might not otherwise do so.[80] Patents confer a limited period of exclusivity, during which no one else can make, use, or sell the invention. This gives the owner the potential to obtain greater market power and to charge higher prices than would otherwise be possible in a world of free copying. In other words, through the mechanism of exclusivity, patents are thought to induce innovation by pushing inventors to invent when they are on the margins and by giving them financial motives to come up with, and bring to market, new and nonobvious innovations over the prior art. At the very least, patent law is thought to accelerate the pace at which innovation occurs.[81]

Second—and far more relevant in this context—patents are believed to promote innovation by giving inventors incentives to disclose useful information to the public when they might not otherwise do so.[82] Pursuant to the so-called "disclosure theory," the patent document has a very particular function for society. It shares information about the invention with others. The U.S. patent system does not require inventors to physically make the invention themselves. It does not require literal "reduction to practice" in the way of a product, prototype, or other physical embodiment of the invention that works for its intended purpose.[83] Rather, the patent must provide

79. Importantly, not all innovation is patentable and not all patents lead to true innovation. Most patents are not commercialized. Patents are only a rough estimate of innovation. *See* Camilla A. Hrdy, *Commercialization Awards*, 2015 WIS. L. REV. 13 (2015).

80. SUBCOMM. ON PATENTS, TRADEMARKS, AND COPYRIGHTS OF THE COMM. ON THE JUDICIARY, 85TH CONG., AN ECONOMIC REVIEW OF THE PATENT SYSTEM 21 (1958) (report by Fritz Machlup) [hereinafter Machlup].

81. Robert P. Merges, *Uncertainty and the Standard of Patentability*, 7 HIGH TECH. L.J. 1, 2–3 (1992); Michael Abramowicz & John F. Duffy, *The Inducement Standard of Patentability*, 120 YALE L.J. 1590, 1599 (2011).

82. Machlup, *supra* note 80, at 21–22; *see also* Camilla A. Hrdy & Mark A. Lemley, *Abandoning Trade Secrets*, 73 STAN. L. REV. 1 (2021).

83. *See* Janice M. Mueller, *Conception, Testing, Reduction To Practice: When Is It Really on Sale?*, 80 J. PAT. & TRADEMARK OFF. SOC'Y 305, 306 (1998); Mark Lemley, *Ready for Patenting*, 96 B.U. L. REV. 1171, 1172–73 (2016).

enough information to allow others—specifically, the law's hypothetical "person having ordinary skill in the art"—to reduce the invention to practice at the time of filing.[84] This is called "constructive" reduction to practice. The theory is that, when inventors supply this information in their patents, this benefits society at large because others can build upon the invention, design around it, and, once the patent expires, have all the information they need to make and use it.[85]

Today, would-be inventors can go onto the Patent Office's website or Google Patent and review millions of patent documents containing a plethora of useful information. Some dispute that scientists read these patents for their technical teachings.[86] In fact, the assumption that people do not always read patents is baked into the patent bargain: A central tenet of patent infringement is that it is "strict liability," meaning a patent can be infringed, and the owner can get a pay out, even if no one read and copied from the patent.[87] But some scientists do read patents and find them useful. The degree to which patents disclose useful information varies tremendously by field and by patent.[88]

B. DRAWING THE ANALOGY BETWEEN SCIENCE FICTION AND PATENTS

The function of science fiction is, in Gernsback's view, very similar to the "disclosure function" ascribed to patents. Science fiction, he explained in several editorials, discloses ideas for new inventions and provides a "stimulus" or "incentive" to readers to try to make those inventions in the real world.[89] Unlike patents, science fiction stories do not explain how to make these inventions work at the time the author writes about them, and the author usually does not know themself how to do so. This, however, was immaterial to Gernsback because the fictional work inspires readers to make the inventions in the future. [90]

Gernsback frequently referred to science fiction authors who inspire others to make inventions as "original inventors."[91] "The author who works out a brand new idea in a scientifiction plot," Gernsback wrote in one editorial, "may be hailed as an original inventor years later, when his brain-child will have taken wings and when cold-

84. 35 U.S.C. § 112 (2011).

85. *See* Jeanne C. Fromer, *Patent Disclosure*, 94 IOWA L. REV. 539 (2009).

86. *See, e.g.*, Lemley, *supra* note 28, at 745 (arguing that, on the whole, "inventors don't learn their science from patents").

87. *But see* Mark A. Lemley, *Should Patent Infringement Require Proof of Copying?*, 105 MICH. L. REV. 1525 (2007) (challenging this approach).

88. *See* Lisa Ouellette, *Do Patents Disclose Useful Information?*, 25 HARV. J. LAW & TECH. 545 (2012).

89. *See, e.g.*, Gernsback, *Scientifiction*, *supra* note 30, at 195 ("Frequently the author himself does not realize that his very fantastic yarn may come true in the future . . . . But the seriously-minded scientifiction reader absorbs the knowledge contained in such stories with avidity, with the result that such stories prove an incentive in starting someone to work on a device or invention suggested by some author of scientifiction."); Gernsback, *Imagination*, *supra* note 30, at 579 (1926) ("[M]any of the so-called wild ideas which we read in our scientifiction stories . . . [may] give an actual stimulus to some inventor or inventor-to-be who reads the story.").

90. *See, e.g.*, Hugo Gernsback, *$300.00 Prize Contest: Wanted: A Symbol for Scientifiction*, 3 AMAZING STORIES 5, 5 (1928) ("An author may not know how to build or make his invention . . . but he may know how to predict, and often does predict, the use of such a one. The professional inventor or scientist then comes along, gets the stimulus from the story and promptly responds with the material invention.").

91. *Id.*

blooded scientists will have realized the author's ambition."[92] Although the "author may not know how to build or make his invention . . . he may know how to predict, and often does predict, the use of such a one. The professional inventor or scientist then comes along, gets the stimulus from the story and promptly responds with the material invention."[93] The key for inventorship status was that the author's story might inspire others to make the invention work at a later date; the author did not need to do so themself in order to qualify as an "inventor" in Gernsback's mind.

Gernsback drew the analogy to patents explicitly. In one key editorial, Gernsback argued that science fiction "contributes something to progress that probably no other kind of literature does."[94] To make this point, he compared a work of science fiction to a patent. Like a patent, a work of science fiction has the capacity to spur follow-on innovation because others will read the story, learn from it, and then go on to make and improve upon the story's inventions in the real world. Gernsback described a science fiction author who vividly depicts "wild ideas" in a story, and thereby gives a "stimulus" to "some inventor or inventor-to-be who reads the story."[95] This science fiction author, he argued, is similar to the proverbial "inventor" who obtains a patent on a "mouse-trap" and then sells "the patent to a manufacturer."[96] The manufacturer learns from the patent and improves upon it, discovering "that an excellent burglar alarm could be made from the mouse-trap, with but a few changes."[97]

In other words, the work of science fiction is like a patent. The author is like an inventor. The reader who makes the invention described in the story is like a manufacturer who buys a patent and brings the invention to life. Both situations, Gernsback stated, are a "case of an original stimulus which, perhaps, went wrong, but finally became righted."[98] This shows that Gernsback thought science fiction stories acted like patents by disclosing new information and inspiring future scientists to build science fictional inventions in the real world.

C. PATENTABLE SCIENCE FICTION

This was not purely an analogy. Gernsback also opined that some science fictional inventions can, quite literally, qualify for patents at the time they are depicted by the author.

92. *Id.*

93. *Id.*

94. Gernsback, *Imagination*, *supra* note 30, at 579. Gernsback's continual use of the term "progress" may be an intentional reference to the U.S. Constitution's "Progress Clause," which gives Congress power to grant copyrights and patents. The Progress Clause states: "To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries." U.S. CONST. art. I, § 8, cl. 8.

95. *Id.* ("[Ideas in scientifiction stories may] give an actual stimulus to some inventor or inventor-to-be who reads the story. And as long as there is a stimulus of any sort, we have no reason to complain because we never realize where progress in any direction may lead us.").

96. *Id.* ("There is the well-known story of the inventor who had patented a mouse-trap, and finally sold the patent to a manufacturer, who found that an excellent burglar alarm could be made from the mouse-trap, with but a few changes.").

97. *Id.*

98. *Id.*

Gernsback recognized the practical difficulties involved in patenting science fiction inventions. He was aware that inventions had to actually work in order to qualify for patents. But he thought these difficulties could be overcome in some instances, so long as the author was able to provide enough details about the invention's "functions, its purpose and so forth." He also noted that the author would have to file their patent application in a timely manner, soon after publishing their story, in order to avoid the statutory bar.[99] At the very least, Gernsback contended, such stories should qualify as "prior art" against other peoples' patents. When doing a novelty search, patent examiners review prior art, including printed publications. This prior art should technically include science fiction stories that disclose inventions in sufficient detail.[100] Gernsback argued that the U.S. Patent Office should review more science fiction when doing these prior art searches.[101]

These views would coalesce decades later when Gernsback proposed that Congress adopt a special form of patent for science fiction authors and that the science fiction community develop a system for sending qualifying science fiction to the Patent Office to serve as prior art. We now turn to these unorthodox proposals.

IV. GERNSBACK'S 1952 PATENT REFORM PROPOSAL

In 1952, Gernsback took his theories to the next level, using them as the basis for a proposal for patent reform in which he urged Congress to make it feasible for more science fiction authors to obtain patents.

At the Tenth World Science Fiction Convention, held in Chicago on August 30, 1952, Gernsback gave a speech entitled "The Impact of Science Fiction on World Progress." The timing for this speech was probably not a coincidence. That summer, Congress had passed the most momentous patent reform bill in history, which resulted in a version of patent law that remains the foundation for U.S. patent law today and which has influenced the patent laws of nations throughout the world.[102] The speech was mentioned in the media[103] and published the following year in Gernsback's magazine, *Science-Fiction Plus*, which was then edited by Sam Moskowitz.[104] We have also obtained the original typed manuscript of the speech, which included more details

99. He recommended the author file within two years of publishing because two years was then the length of the statutory bar's grace period. *Id.* The U.S. statutory bar is now only one year. *Cf.* 35 U.S.C. § 102 (2011).

100. *See infra* Part IV.B.

101. He even suggested—albeit without evidence—that "the patent offices of most countries" already "follow scientifiction stories pretty closely, because in many of these the germ of an invention is hidden." Gernsback, *Imagination*, *supra* note 30, at 579.

102. *See generally* P.J. Federico, *Commentary on the New Patent Act*, 35 U.S.C.A. 1 (1954), *reprinted in* 75 PAT. & TRADEMARK OFF. SOC'Y 161 (1993).

103. *See, e.g.*, John K. Hutchens, *On the Books, on an Author*, N.Y. HERALD TRIB., Sept. 14, 1952, at E2.

104. Hugo Gernsback, *The Impact of Science-Fiction on World Progress*, SCIENCE-FICTION PLUS, Mar. 1953, at 2. The full text of the speech, as published in SCIENCE-FICTION PLUS, is available at *Full Text of "Science Fiction Plus v01n01 1953-03)"* INTERNET ARCHIVE, https://archive.org/stream/Science_Fiction_Plus_v01n01_1953-03_/Science%20Fiction%20Plus%20v01n01%201953-03%20%28pdf%29_djvu.txt [https://perma.cc/9C7C-SBQ9] (last visited Oct. 24, 2023).

on Gernsback's ideas relating to patents and which—we believe—is closer to the speech he actually delivered.[105] Although they are similar in most respects, the original manuscript lacks certain logical errors which appear in the published version Moskowitz edited. The published version also makes some rather substantive changes, noted below. We suspect that these alterations indicate simple misunderstanding of the details of what Gernsback had proposed. In some cases, however, the edits may indicate the editor's (presumably Moskowitz's) disagreement with what Gernsback proposed or the editor's concern that readers would disagree with Gernsback's ideas.

The reform proposal contained two elements: a new kind of patent for science fiction inventions, called a "Provisional Patent," and a novel system for utilizing science fiction as prior art. Below we explain his proposal on each issue and contextualize it within current patent law and theory.

A. "PROVISIONAL PATENTS" FOR SCIENCE FICTION

Gernsback began with his usual theme, expressed in numerous prior editorials, that "Science Fiction"[106] often contains early iterations of inventions that are eventually reduced to practice and adopted many years later. He argued that these early descriptions of inventions often provide "stimulus" to later inventors, who are moved to put these inventions into practice.[107] "Inventors, manufacturers, and others understandingly do not like to admit that a Science Fiction story sparked them into activity on the road to a new invention or a new machine," he pronounced, "but it is an established fact that a host of Science Fiction ideas have been successfully translated into paying realities."[108]

Gernsback even suggested that these later inventors intentionally *take advantage* of science fiction authors' labor, copying their inventions and patenting and commercializing them without paying the authors.[109] "Frequently," he stated, the author "is the one who furnished untold inspirations for the modern technical world in which we live."[110] The author is the "actual inventor."[111] But the author is "rarely interested commercially in his brain child."[112] Instead, what "continuously" happens is that "five, ten, or thirty years later someone who read [the author's] original story will remember the idea, lard it with a few of his own, patent it and start a new billion dollar industry on it."[113]

To eliminate this injustice, Gernsback urged Congress to reform the patent system so that science fiction authors could get more credit as real inventors and patent their

105. Hugo Gernsback, Address at the 10th World Science Fiction Convention (Aug. 30, 1952) (on file with authors).

106. By this point, Gernsback had now pivoted from the term "scientifiction" to "Science Fiction." Unlike in the published version of this text, he did not use a hyphen in his original manuscript. *Id.*

107. *Id.* at 2.

108. *Id.* ("A number of inventions, processes, machines thus came to life thanks to Science Fiction.").

109. *Id.* at 4.

110. *Id.*

111. *Id.*

112. *Id.*

113. *Id.*

ideas in a broader range of cases. As we saw above, Gernsback had been thinking about "Idea Patents"[114] for quite some time. This new proposal, though, was far more detailed and was specifically tailored to "Science Fiction authors," not just any inventors. At present, Gernsback stated, the "fundamental requirement for a patent is that it must be new and it must work."[115] Yet "many Science Fiction authors are so far ahead of their times that most of their devices are impractical or non-workable at the time they describe them."[116] Thus, they cannot meet this workability requirement, no matter how ingenious their inventions otherwise are. He gave two examples: his own description of "radar" in 1911 and Jules Verne's description of a submarine in 1870.[117] "Accordingly," Gernsback proposed, "our patent laws should be revised so that ideas which appear feasible and technically sound to a qualified board of technical examiners will be given"—what Gernsback called—"'a Provisional Patent.'"[118]

The details were not fully fleshed out. But the gist is that science fiction authors could apply for a Provisional Patent if they described a new invention in a work of science fiction that was at least "*feasible and technically sound*," even if not yet workable or near commercial viability. The Provisional Patent would have a "life of, say, 30 years," during which the inventor could demonstrate the "workability or feasibility of the device." If the inventor *could* eventually demonstrate "workability or feasibility," *then* an ordinary patent could be applied for based on the Provisional Patent. Otherwise, the Provisional Patent would lapse.[119]

Gernsback proposed Provisional Patent was essentially sui generis. Despite the similarity in name, Gernsback's proposed Provisional Patent was only vaguely reminiscent of today's "provisional patent application."[120] It diverged from normal patents in two major ways.

114. *See supra* Part II.C.

115. Gernsback, *supra* note 105, at 5.

116. *Id.*

117. *Id.*

118. *Id.*

119. This description comes from the original manuscript. *Id.* The published version, in contrast, contains significant errors. It mixes up some of the phrases, making it appear that a patent could be applied for if the inventor could *not* get the invention to work! *Compare* Gernsback, *supra* note 104 ("If, during this period the inventor cannot demonstrate the workability or feasibility of the device, the Provisional Patent will lapse. If he can, a regulation patent can then be applied for. For this purpose, the Provisional Patent will be the basis for the final patent."), *with* Gernsback, *supra* note 105 ("Let us assume that such a patent has a life of, say, 30 years. If, during this period the inventor cannot demonstrate the workability or feasibility of the device, the Provisional Patent will lapse. A regulation patent can then be applied for. The Provisional Patent will be the basis for the final patent.").

120. Today—though not in Gernsback's time—inventors have the option to file a "provisional patent application" in order to secure their priority before filing a completed patent application. However, provisional patent applications must include a specification that meets the enablement standard of § 112(a), and they are abandoned after only *one year* if the provisional application is not completed and converted into an ordinary patent. 35 U.S.C. § 111(b) (1995); *see also* Gene Quinn, *Provisional Patents: What Are They and Why Do You Need Them?*, IPWATCHDOG (Aug. 13, 2016), https://ipwatchdog.com/2016/08/13/what-are-provisional-patents/ [https://perma.cc/ML3B-6MQW] [https://web.archive.org/web/20230923034259/https://ipwatchdog.com/2016/08/13/what-are-provisional-patents/]. Another analogy is the "first-to-invent" priority system under the 1952 Patent Act, which allows an inventor to claim priority based on an earlier conception. However, under the 1952 Act, priority generally goes to the first inventor to reduce the invention to practice—meaning "the inventor

1. Relaxing the Enablement and Utility Requirements

First, the Provisional Patent relaxed patent law's enablement and utility requirements. In the current system, an inventor can only obtain a patent once they satisfy (along with novelty and nonobviousness) the law's requirements of "enablement"[121] and "utility."[122] While the details of the two doctrines differ, both are based on the rule that the inventor must be able to demonstrate that their invention works for its intended purpose *at the time the patent application is filed*. These doctrines, along with others,[123] are intended to weed out patents for "inoperative" inventions and inventions whose utility to society is not yet known.[124]

Gernsback rightly saw that some science fiction authors—those who conceive and describe in detail operable inventions—might be able to obtain patents.[125] But he

establishes that the claimed invention works for its intended purpose"—and the first to *conceive* of the invention can get only priority if they have "a definite idea of a complete and operative invention"—which is stricter than what Gernsback had in mind for science fiction authors—and, among other things, "is reasonably diligent in her effort to reduce the claimed invention to practice," "accomplishes the reduction to practice," and "does not abandon, suppress, or conceal the claimed invention after reducing it to practice." PETER S. MENELL ET AL., INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE: 2022, at 207 (2022) (explaining 35 U.S.C. § 102(g) (1952)).

121. Satisfying enablement generally requires disclosing enough information about the invention to "enable" a person having ordinary skill in the art to make and use the invention. 35 U.S.C. § 112 (2011) ("The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same . . . ."); *see also* Incandescent Lamp Pats., 159 U.S. 465 (1895).

122. Generally speaking, an invention fails the utility requirement if it is not operable—meaning it does not work for its intended purpose—or if it lacks a credible, presently-availing utility that comports with scientific principles known at the time of the filing. 35 U.S.C. § 101 (2011) (providing that an invention must be both new and "useful"); *see also* Newman v. Quigg, 877 F.2d 1575, 1581 (Fed. Cir. 1989) (holding applicant's "perpetual motion machine" invention "unpatentable under 35 U.S.C. § 101 because [the] device lacks utility (in that it does not operate to produce what [applicant] claims it does)") (internal quotations omitted); In re Swartz, 232 F.3d 862, 863–64 (Fed. Cir. 2000) ("The utility requirement of § 101 mandates that the invention be operable to achieve useful results[, and, in this case,] those skilled in the art would 'reasonably doubt' the asserted utility and operability of cold fusion."). For more on the enablement and utility doctrines, *see, e.g.*, DANIEL BREAN & NED SNOW, PATENT LAW: FUNDAMENTALS OF DOCTRINE AND POLICY 98–99, 397–404 (2020); ROBERT PATRICK MERGES & JOHN FITZGERALD DUFFY, PATENT LAW AND POLICY: CASES AND MATERIALS 211–32 (5th ed. 2011); CRAIG A. NARD, THE LAW OF PATENTS 116–29, 508–15 (6th ed. 2022); JONATHAN S. MASUR & LISA LARRIMORE OUELLETTE, PATENT LAW: CASES, PROBLEMS AND MATERIALS 167–223 (2d ed. 2022).

123. The "abstract ideas" bar, though not explicit in the statutory text, has been developed by the courts to ensure inventions are sufficiently concrete to warrant an exclusive right. *See, e.g.*, Alice Corp. v. CLS Bank Int'l, 573 U.S. 208, 216 (2014) (discussing a judge-made rule that claims that ideas which are too abstract are not patent eligible under § 101).

124. *See, e.g.*, Jorge Contreras, *Patent Reality Checks: Eliminating Patents on Fake, Impossible and Other Inoperative Inventions*, 102 J. PAT. & TRADEMARK OFF. SOC'Y 2, 5–6, 9–13 (2021); Janet Freilich, *Prophetic Patents*, 53 U.C. DAVIS L. REV. 663, 666 (2019); *see also* Sean B. Seymore, *Making Patents Useful*, 98 MINN. L. REV. 1046, 1048–49 (2014) (critiquing modern utility doctrine for creating "a bias against patentability for certain types of inventions," including "inventions in nascent technologies, fields which have a poor track record of success . . .").

125. Gernsback noted that, so long as they were able to reduce to practice, at least constructively, and took all the steps needed to apply for an ordinary patent within one year, some science fiction authors could get patents. Gernsback, *Imagination*, *supra* note 30, at 579.

recognized that most good science fiction stories posit inventions that do not yet work or do not give enough detail to permit actual practice. They fail enablement because they cannot be reduced to practice at the time of filing,[126] and they fail utility because their utility is too speculative or incredible (not credible) based on current science.[127]

To get around these barriers, Gernsback envisioned a different patent system. In his alternate system, the critical moment was not reduction to practice. It was the idea-generation stage. Rights and priority would set in much earlier in the inventive process, long before reduction to practice is possible. So long as the invention was new (and presumably also not obvious) and so long as it appeared "feasible and technically sound," the originator could apply for one of Gernsback's "Provisional Patents" and gain at least the opportunity to reserve their priority and convert this Provisional Patent into a real patent within thirty years. The author did not have to satisfy enablement, utility, or all the other requirements.

2. Lengthening the Timeframe for Patenting

Second, Gernsback's Provisional Patent recalibrated the timeframe for obtaining a patent in order to give science fiction authors a longer period of time in which to demonstrate that their inventions could be reduced to practice.

In patent law, the assumption is that the inventor typically conceives of the invention, reduces the invention to practice after some experimentation, and then files a patent whose term approximates when it would take the inventor to earn enough profit to make their research and development worthwhile.[128] Initially the term was fourteen years, then it was seventeen years, and now it is twenty years.[129] The clock starts ticking at the filing date—and in fact, the real clock starts ticking at the date of invention because the inventor needs to avoid generating prior art that will bar their patent. If they publish about their invention or start selling it, they will need to file the patent within a year to avoid being anticipated by their own prior art.[130]

Gernsback saw the innovation timeline as proceeding in phases, spanning many decades and across multiple generations of inventors. One generation of inventors—

126. *See, e.g.*, Genentech, Inc. v. Novo Nordisk A/S, 108 F.3d 1361, 1366 (Fed. Cir. 1997) ("Patent protection is granted in return for an enabling disclosure of an invention, not for vague intimations of general ideas that may or may not be workable.").

127. *See, e.g.*, In re Swartz, 232 F.3d 862, 864 (Fed. Cir. 2000) (rejecting cold fusion patent because people in the field would "reasonably doubt" the present workability of cold fusion and the patent document did not provide enough guidance on how to actually make cold fusion work).

128. *See, e.g.*, WILLIAM D. NORDHAUS, INVENTION, GROWTH, AND WELFARE: A THEORETICAL TREATMENT OF TECHNOLOGICAL CHANGE (1969) (developing a model for calculating "optimal" life of a patent).

129. Until June 8, 1995, patents lasted seventeen years from the date the patent was issued. *See* Uruguay Round Agreements Act, Pub. L. 103-465, 108 Stat. 4809, 4984 (1994).

130. *See* 35 U.S.C. § 102(b) (1952) (providing that patent is barred by prior art that falls within the defined categories, including "described in a printed publication," and that comes out one year or more before filing the patent); *see also* 35 U.S.C. § 102(b) (2011) (providing a one-year grace period for, among other things, "disclosures" produced by the inventor); Amy Motomura, *Innovation and Own Prior Art*, 72 HASTINGS L. J. 565 (2021) (discussing various ways that one's own prior art can anticipate one's own later invention).

the science fiction writers, or "prophets," as Gernsback liked to call them[131]—foresees the invention's adoption decades before it happens. Then a second generation of inventors—the "cold-blooded scientists" or "manufacturers," focused only on profit—ultimately gets the invention to work, "realiz[ing] the author's ambition" and "respond[ing] with the material invention."[132]

To match this altered timeframe for innovation, Gernsback had to alter the timeframe for obtaining a patent. His goal, after all, was to enable science fiction authors—the prophets—to be rewarded with patent rights. But an exclusive right to make and use an invention that is still decades away from being practiced is not very valuable. For example, if a science fiction author somehow obtains a patent on an invention that is still several decades away from being possible, this patent would be largely worthless, even if it were valid (which it is not), because there would be nothing to commercialize and no one to sue for infringement. Theoretically, the author could try to sell the patent, but who would buy it?

Instead, to permit science fiction authors to obtain some of the patent spoils, they needed to be able to lock in their rights long before reduction to practice was possible and to thereafter get some remaining term of exclusivity. This is why, in Gernsback's system, the science fiction author who achieved a Provisional Patent could lock in a thirty-year placeholder of sorts—a three-decade window of time during which an ordinary patent might spring into being if and when the invention is proven to work.[133] Once converted into a real patent, ordinary patent rules would presumably apply to confer the usual twenty years of exclusive rights (or, back in Gernsback's time, seventeen years).[134] This means the patent might not expire until fifty years after the invention was first posited in science fiction.

Obviously, this timeframe goes against all the rules. It gives the applicant an unprecedented extra thirty years in which to prove workability and utility. That said, Gernsback's timeframe may provide a somewhat realistic estimate for how long it would take for science fiction authors to profit from patents. Gernsback believed that he had calculated the timeframe that would be required: twenty-seven years. He achieved this number by examining two of his favorite examples of "prophetic" science fiction—the submarine, posited by Jules Verne in 1869, and radar, posited by Gernsback himself in 1911.[135]

131. *See supra* Part I (discussing Gernsback's belief that science fiction stories had to be based on true or "prophetic" science).

132. Gernsback, *supra* note 90, at 5.

133. During that thirty-year window, the author could presumably describe their invention in a publication (i.e., in their story or novel) without incurring the consequences of a statutory bar.

134. Because Gernsback said nothing about it, we can only assume those twenty years included the usual rights to an injunctive remedy as well as the opportunity to obtain damages in the form of lost profits or, more likely, a "reasonable royalty" fee that estimated what the infringer would have agreed to pay to the science fiction author if they had bargained for the right to use the author's ideas. 35 U.S.C. § 154 (2011) (twenty-year term); *id.* §§ 283–84; *cf.* 35 U.S.C. § 154 (1952) (seventeen-year term).

135. It took "*The Nautilus*," Gernsback stated, "so vividly described in *20,000 Leagues Under the Sea*, 27 years to become an actuality . . . . Radar, accurately predicted in all its technical elements in my novel *RALPH 124C 41+* in 1911, did not become a reality till about 27 years later." Gernsback, *supra* note 104, at 2.

This twenty-seven-year estimate loosely tracks reality, at least for these two examples. Gernsback described the use of radar to identify aircraft in 1911. The technology was adopted by the military in the late 1930s or early 1940s.[136] This represents a term of twenty-seven years, more or less, between Gernsback's disclosure in science fiction and real-world deployment of the technology. (That said, radar was described in patents earlier than 1911, and below in Part VI.A.1 we explain why radar is a highly imperfect illustration of some of Gernsback's theories.)

The submarine example also fits this timeframe. Jules Verne described an underwater vessel, "The Nautilus," in *20,000 Leagues Under the Seas*, which was first serialized between 1869 and 1870. It featured the unforgettable Captain Nemo living quite comfortably with a full crew aboard an electrically powered submarine.[137] The inventor Simon Lake designed and submitted plans to the navy for a submarine in 1892. He patented aspects of his submarine starting in 1896. As with the radar example, there was a period of about twenty-seven years between disclosure in science fiction and reduction to practice. We discuss this example further below, revealing that Lake was in fact directly influenced by Verne.[138]

These examples clearly informed Gernsback's determination that a thirty-year period was needed for the Provisional Patent. His "27 years" number was probably a decent estimate of how long someone like Verne or Gernsback would need to wait before they could make any significant money off their patents. Whether the timeframe is generalizable to other examples, of course, is less clear. Many science fiction inventions—such as AI chat bots—took a lot longer.[139] Some may never come to pass. That said, the patent system as we know it is not currently tailored to individual inventions or technology field, either. The assumption is that the twenty-year term length works well for most inventions.[140]

We will critique Gernsback's Provisional Patent proposal in Part V, but we will first move to his second proposal: enhancing science fiction's function as prior art.

B. ADVOCATING FOR SCIENCE FICTION AS PRIOR ART

The second piece of Gernsback's patent reform proposal was designed to enhance the status of science fiction as prior art. Despite his early optimism on this point,[141] he was now fed up with the U.S Patent Office's continual failure to take science fiction

136. *See* Skolnik, *supra* note 43.

137. The novel was first serialized in a French magazine between 1869 and 1870. ASHLEY, *supra* note 20, at 8. The full text of the Jules Verne story is available at *Twenty Thousand Leagues Under the Sea*, PROJECT GUTENBERG, https://www.gutenberg.org/files/164/164-h/164-h.htm [https://perma.cc/PG7U-A5LE] [https://web.archive.org/save/https://www.gutenberg.org/files/164/164-h/164-h.htm] (last visited Oct. 24, 2023).

138. *See infra* Part VI.A.

139. *See supra* Introduction (discussing Asimov's fictional MUILTIVAC of the 1950s relative to ChatGPT, unveiled in 2022).

140. *See, e.g.*, Michael Carroll, *One Size Does Not Fit All: A Framework for Tailoring Intellectual Property Rights*, 70 OHIO STATE L. J. 1361 (2009).

141. Decades earlier, Gernsback asserted that patent offices around the world routinely read science fiction. *See supra* Part II.

seriously in performing prior art searches. He was now "quite certain that the Patent Office today does not routinely scan all the Science-Fiction stories which appear either in the Science-Fiction press or in general magazines." He hypothesized that the reason for this negligence was that "[n]either Science Fiction authors nor Science Fiction publishers" took science fiction seriously or were interested in promoting science fiction as potential prior art that might be used in assessing the novelty of real inventions. "Why should the Patent Office treat Science Fiction press seriously when neither author nor publisher are serious about it?"[142]

As the "remedy" for this oversight, Gernsback proposed a novel methodology for getting science fiction stories to the Patent Office. He argued that authors and publishers should "get together" to review science fiction manuscripts to ascertain whether they contained "a new and feasible idea." If so, the story should be published with "a distinguishing mark or design" to be "adopted by all publishers" in order to certify that a particular story contained a new and technically feasible idea. In fact, Gernsback proclaimed, he himself had already designed a mark that publishers could use to identify qualifying science fiction stories—"a five-pointed star resting on top of a sphere. The center of the sphere shows the letters SF." Any science fiction stories that had been marked in this distinctive way should then be sent directly to the Patent Office, with "the idea or device clearly marked with a color crayon."[143]

Gernsback had been thinking about adopting such "a distinguishing mark or design"—a certification mark, really[144]—for quite a while. He began his search for a "Symbol for Scientifiction" in 1928, when he ran a contest in *Amazing Stories* offering a $300.00 prize for a winning design. "[W]hat scientifiction needs," Gernsback proclaimed to his readers, "is some sort of label—an emblem, or a trade-mark, so to speak."[145] Below is the result of the contest, the Symbol for Scientifiction as drawn by Gernsback's illustrator Frank Paul.

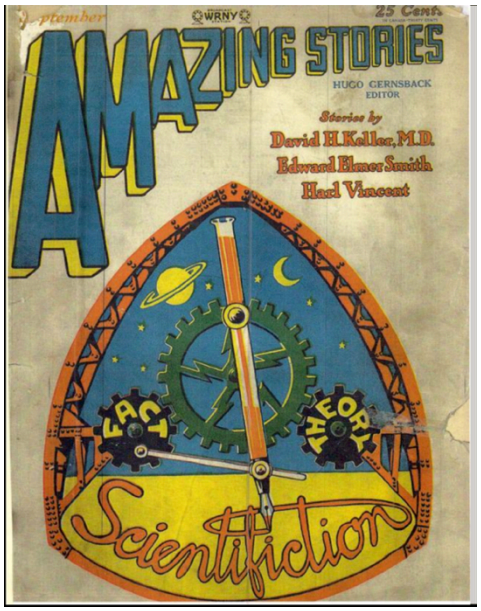
142. The published version deleted Gernsback's expression of frustration with authors and publishers for not taking science fiction seriously enough. Perhaps Gernsback was more willing to express anger at his own community orally than he was in print, or perhaps the other editors at SCIENCE FICTION-PLUS did not agree with what he was saying. *Compare* Gernsback, *supra* note 105, at 6, *with* Gernsback, *supra* note 104, at 2.

143. For whatever reason, these details about marking stories with a crayon and delivering them to the Patent Office were entirely deleted in the published version, even though they were critical to what he was proposing. *Compare* Gernsback, *supra* note 105, *with* Gernsback, *supra* note 104, at 2.

144. Unlike trademarks, which identify the source of goods or services, certification marks certify that a good or service meets a standard. 15 U.S.C. § 1127 (1946).

145. Gernsback, *supra* note 90, at 5. The winning symbol was actually a combination—literally a mish-mash—of the first three winning entries. It contains a gear wheel, a pen/test tube, the words "fact" and "theory" written on gears, the moon, stars, and a planet. *See* Gernsback, *supra* note 90, at 5; *see also* WESTFAHL, *supra* note 20, at 47.

Figure 3: *Amazing Stories* Cover with Symbol of Scientifiction[146]



Regardless of which symbol was applied, Gernsback's hope was that the Patent Office would shortly be deluged with marked-up versions of science fiction stories. That is why he ended with the somewhat ominous prediction that "sooner or later the patent office will take notice."[147]

Compared to his Provisional Patent concept, this part of Gernsback's proposal has far more grounding in the law, both today and in 1952. We can argue over the merits of Gernsback's idea to operate what was essentially a certification program and send selected science fiction to the Patent Office.[148] But it is hard to disagree with his broader point that science fiction can *theoretically* count as prior art. As explained above, patent prior art includes printed publications and other publicly available content, including published works of science fiction.[149] The main legal barrier keeping science fiction out of prior art is enablement. To anticipate an invention on novelty grounds, prior art

146. This image is in the public domain. Gernsback's original run of AMAZING STORIES was not copyrighted. *See Amazing Stories*, ONLINE BOOKS, https://onlinebooks.library.upenn.edu/webbin/serial?id=amazingstories [https://perma.cc/5R6K-TQAK] [https://web.archive.org/save/https://onlinebooks.library.upenn.edu/webbin/serial?id=amazingstories] (last visited Oct. 24, 2023).

147. Gernsback, *supra* note 105, at 6.

148. *See* Daniel H. Brean, *Keeping Time Machines and Teleporters in the Public Domain, Fiction as Prior Art for Patent Examination*, 7 U. PITT. J. TECH. L. & POL'Y 1, 19–27 (2007) (discussing more practical ways to help examiners locate fiction as prior art quicker).

149. *See* text and notes *supra* Part II.

must be enabled, meaning others must be able to practice the invention from reviewing the prior art reference.[150]

A lot of science fiction will fail patent law's enablement standard. However, for a variety of reasons, some science fiction can still qualify as prior art, even without altering the usual rules. First, the enablement bar is in certain respects more lenient for prior art than for patent applications. For example, prior art does not need to show how to *use* an invention to anticipate it—only how to make it.[151] Second, as a procedural matter, it is rather easy for examiners to get away with citing prior art that is only loosely enabled.[152] Third, and most importantly, science fiction is far more likely to enter the patent system as *obviousness* prior art than as novelty prior art. Whereas anticipation for lack of novelty requires each element to be enabled by a single prior art reference, obviousness rejections permit combining multiple references that need not, on their own, enable the invention.[153] Thus, even if a science fiction author's disclosure does not enable every aspect of an invention, the author's depiction could, in combination with other references, help render the final result obvious.

Considering science fiction for obviousness purposes raises one additional legal hurdle that perhaps best showcases why, from a normative standpoint, Gernsback cared so much about prior art status. Obviousness prior art must additionally be "analogous" to a given invention—meaning it must either be from the "same field of endeavor" as the claimed invention or "reasonably pertinent" to the particular problem faced by the inventor.[154] Science fiction, to the extent it is considered merely a medium of entertainment, might not be deemed analogous under this standard. However, Gernsback's view was that it should be. The whole point of his proposal to send science fiction to the Patent Office was to force examiners, and the science fiction community

150. *See, e.g.*, Amgen Inc. v. Hoechst Marion Roussel, Inc., 314 F.3d 1313, 1354–55 (Fed. Cir. 2003) ("[A] non-enabled disclosure cannot be anticipatory (because it is not truly prior art) if that disclosure fails to 'enable one of skill in the art to reduce the disclosed invention to practice.'") (citation omitted).

151. In addition, if a prior art reference enables a single species, this can anticipate a patent to a whole genus. In contrast, a patent applicant may need to disclose more than a single species in order to enable a claim covering an entire genus. *See, e.g.*, Mishchenko, *supra* note 44, at 1591 n.136 (citing In re Hafner, 410 F.2d 1403, 1405 (C.C.P.A. 1969); In re Lukach, 442 F.2d 967, 970 (C.C.P.A. 1971)); *see also* Dmitry Karshtedt, Mark A. Lemley & Sean B. Seymore, *The Death of the Genus Claim*, 35 HARV. J.L. & TECH. 1, 22–54 (discussing various developments in the law that make it harder to enable a genus claim by disclosing only a few species within the genus).

152. According to the Office's own rules, any prior art reference asserted by the patent examiner "is presumed to be operable. Once such a reference is found, the burden is on applicant to rebut the presumption of operability . . . ." That said, "[w]here a reference appears to not be enabling on its face . . . an applicant may successfully challenge the cited prior art for lack of enablement by argument without supporting evidence." MANUAL OF PATENT EXAMINING PROCEDURE (MPEP) § 2121 (2023); *see also* Janet Freilich, *Ignoring Information Quality*, 89 FORD. L. REV. 2113, 2124 (2021) (citing *Amgen Inc.*, 314 F.3d at 1355) ("[I]n patent prosecution the examiner is entitled to reject application claims as anticipated by a prior art patent without conducting an inquiry into whether or not that patent is enabled . . . .").

153. To quote the Federal Circuit, for an obvious rejection, the reference must only enable "the relied-upon portion of its own disclosure . . . [A] reference that does not provide an enabling disclosure for a particular claim limitation may nonetheless furnish the motivation to combine, and be combined with, another reference in which that limitation is enabled." Raytheon Techs. Corp. v. Gen. Elec. Co., 993 F.3d 1374, 1380–81 (Fed. Cir. 2021).

154. In re Bigio, 381 F.3d 1320, 1325–26 (Fed. Cir. 2004).

itself, to take science fiction "seriously"[155] as a scientifically-grounded resource—a resource that, unlike patents, is actually read by persons working in technical fields.

Still, despite science fiction's legal status as potential prior art, the reality is that it is not used that way very often. And this was Gernsback's point. Unfortunately, we cannot know for sure how often examiners have resorted to science fiction as prior art. For most of the U.S. patent system's history, patent applications that were filed but never granted remained secret—no records were made available to the public. This changed for patent applications filed after the year 2000, but even today, there are various ways to prevent applications from publishing.[156] Despite this evidentiary barrier, we have found some instances where examiners cited to science fiction as prior art. For example, when the inventor Charles Hall applied for a patent directed to a waterbed, the examiner rejected the patent initially by citing to Robert Heinlein's disclosure in *Stranger in the Strange Land* (1961) of a "hydraulic bed."[157]

But we suspect formal citations to science fiction as prior art are comparatively small. The reason is that no one has very strong incentives to cite to science fiction during the examination process. Patent examiners have little time to spare. They are unlikely to spend time searching for science fiction references when other types of references are more analogous and more easily searchable.[158] Inventors, meanwhile, are not required to identify all the prior art that influenced them. They only have to identify prior art that is critical to the technical merits of the invention and that is not "cumulative" of other prior art already cited in the application record.[159] Even if an inventor was genuinely inspired by a work of science fiction, the technical teachings in the work of science fiction may be cumulative of other nonfictional prior art, and so would not have to be cited. For example, if the inventor of a new form of artificial intelligence was deeply inspired as a teenager by an Isaac Asimov story about an all-intelligent computer, the inventor would not be required to reveal the story to the Patent Office, so long as *other* prior art—such as old patents and journal articles—contains the same technical details as Asimov disclosed, and is already cited in the record. The upshot is that science fiction probably qualifies as prior art far more than anyone actually cites to it.

155. Gernsback, *supra* note 105, at 6 ("Why should the Patent Office treat Science Fiction press seriously when neither author nor publisher are serious about it?").

156. *See* 35 U.S.C. § 122 (1999); *see also* Mishchenko, *supra* note 44, at 1565 n.1.

157. Hall was eventually able to get a patent on his waterbed anyway by adding additional technical details that allowed Hall to differentiate his invention from Heinlein's description. U.S. Patent No. 3,585,356 (issued June 15, 1971); *see* Brean, *supra* note 148, at 3–4.

158. Frakes & Wasserman, *supra* note 73, at 978; *see also* Christopher A. Cotropia, Mark A. Lemley & Bhaven Sampat, *Do Applicant Patent Citations Matter?*, 42 RSCH. POL'Y 844, 846 (2013) (noting that examiners use prior art they find themselves to reject applications); Brean, *supra* note 148, at 4 ("[P]atent examiners do not presently search through fiction in a way that effectively locates those works that are relevant to particular inventions.").

159. Applicants must cite any prior art known to be "material" to the patentability of their inventions, but materiality is defined as both invalidating and not cumulative of other prior art. 37 C.F.R. § 1.56 ("[Reference] is material . . . when [i]t is not cumulative to information already of record or being made of record in the application, and establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim . . . .").

Gernsback's insistence that the Patent Office review more science fiction as prior art presumably stemmed from his long-standing view that the Patent Office should do more to ensure issued patents are vetted against prior art so that inventors can get patents that are actually "worth something" at the end of the day.[160] However, his proposal to introduce even more prior art is in serious tension with his complaint that it is too easy to invalidate patents. He had said in earlier years that he was worried that defendants in patent lawsuits could find obscure prior art, like some old "farm journal" article, and use it to "fight the case."[161] Yet here he was, advocating for science fiction as a potential source of prior art, which defendants could presumably raise in litigation.

Still more surprising, Gernsback apparently wanted the Patent Office to review more science fiction partly *so that science fiction could be used to narrow the scope of granted patents*. Gernsback stated in his speech that if examiners used science fiction to reject patent applications, this could prevent a patent applicant from getting "the sweeping patent claims he could obtain, had he not been thus anticipated."[162] In other words, Gernsback recognized that treating science fiction as prior art had power to constrain the scope of patents in the real world and ensure that what was in the public domain stayed there.[163]

This appeal to science fiction as a way to weaken patents is surprising, given Gernsback's lifelong advocacy for strong patents. It is certainly possible that by this time Gernsback had changed his mind. But we think it more likely that Gernsback's search for credit simply took precedence over all else. If science fiction authors could not get patents for their inventions, at least their work could be cited as prior art. A mere citation in a patent would not directly help authors financially, but it could give them new recognition among scientists and elevate the reputation of science fiction as an institution.

It is not hard, in context, to see why Gernsback cared so much about this issue. Gernsback's entire reputation and legacy was tied up with the field of "scientifiction" which he started back in 1926. But the genre had grown far beyond his original focus on inventions of the future and had reached far more members of society than he ever envisioned it could. More than anything, Gernsback wanted to reward science fiction authors who were like him, who dwelt on the technical details and successfully "prophesied" the future of technology. Gaining this style of fiction the status of prior art could at least give such science fiction authors a bit more credit and a status akin to "inventor."

160. *See* notes and text *supra* Part II.C.

161. *See* discussion of Gernsback's op-ed *supra* Part II.C.

162. Gernsback, *supra* note 105, at 6 ("Often the Patent Office will cite a magazine article which describes the identical device submitted by an inventor for a new patent. *In that case the inventor will not be able to get the sweeping patent claims he could obtain, had he not been thus anticipated.*") (emphasis added).

163. *See* Brean, *supra* note 148, at 4 ("Works of fiction should be searched by the PTO as part of its patent examinations to further ensure that inventions are not appropriated from the public domain.").

V. CRITIQUING GERNSBACK

Gernsback's proposal to award Provisional Patents to science fiction authors is a fascinating piece of history. As discussed in the next part, we are very sympathetic to his idea that science fiction can play a role in innovation policy. And, as just alluded to, we also do not see any clear legal or policy justification for categorically excluding science fiction from prior art, especially when it is being used to render a later invention obvious.

However, Gernsback's proposal to award science fiction authors patents is a remarkably bad idea from the perspective of patent policy. Even assuming we decide science fiction suffers from a problem of under-production and that a government subsidy of some kind is needed, patents—exclusive rights—are not the best way to achieve this goal. Patents are not, even if they sometimes seem to be, a "free lunch."[164]

As we discuss below, Gernsback did not appear to understand that patents come with social costs. More protection for inventors is not always better for society. Gernsback also had a curiously inflated view of the value of early-stage ideas as compared to the hard work and costly, time-consuming research and development that are usually required to reduce inventions to practice and make them commercially viable. Finally, we suspect that Gernsback's proposals for new forms of patents were in part motivated by self-interest rather than purely a genuine concern for the public good.

A. IGNORING THE COSTS OF PATENTS

Gernsback thought of patents *only* as rewards for an inventor's ingenuity. Thus, the notion that some "ingenious" ideas might remain unprotected by patents was anathema.[165] But as any patent lawyer knows, patents are not just rewards. They create exclusive rights and, as such, generate social costs in the form of higher prices, restrictions on access, and obstacles to future research and innovation.[166] Gernsback never acknowledged the social costs of patents. He simply ignored them.

If patents have no costs, then it makes sense to say that doctrines like enablement and incredible utility should be relaxed to make sure that more inventors—even those whose medium is science fiction—can get patents. But patents do have costs, and these doctrines are not empty mandates. The reason they exist is to prevent inventors from getting rights so early in the process that they gain the power to block off future technological developments. The person who conceives of an invention that is not yet

164. Robert Merges, *The Economic Impact of Intellectual Property Rights: An Overview and Guide,* 19 J. CULTURAL ECON. 103, 111 (1995) (noting that legally granted monopolies, because they involve no direct expenditure of government funds, represent "something of a free lunch in the eyes of government: a valuable benefit for which business constituents will be grateful, but which also has a zero impact on the federal budget deficit"); *see also* Daniel J. Hemel & Lisa Larrimore Ouellette, *Beyond the Patents–Prizes Debate*, 92 TEX. L. REV. 303 (2013) (discussing comparative costs and benefits of grants, prizes, R&D tax incentives, and patents); Hrdy, *supra* note 79 (discussing non-patent alternatives for promoting commercialization of new inventions).

165. Gernsback, *supra* note 72, at 584.

166. *See* Lisa Larrimore Ouellette, *Patent Experimentalism*, 101 VA. L. REV. 65, 75 (2015) (identifying the various costs of patents).

reduced to practice, no matter how useful it sounds in theory, is not supposed to be able to pop up years later and sue the very people who get the invention to work and realize its true value to society. Otherwise, as the Federal Circuit aptly puts it, the prematurely-proclaimed "'inventor' would be rewarded the spoils instead of the party who demonstrated that the [invention] actually worked."[167]

These doctrines also help control patents' scope. The enablement requirement ensures that the disclosure provided in a patent is commensurate with the scope of the patent's right to exclude. For example, if the inventor drafts a patent to cover all types of "flying cars," but only discloses how to make one type of flying car—like a flying car that is kept aloft using rapidly spinning helicopter blades—she cannot use that broad claim to control the many other possible variations of flying cars that she did not consider, like flying cars that use a jet engine.[168] By making a patent's scope commensurate with its disclosure, the law ensures that inventors cannot claim broadly and then control every variation of the invention.[169]

One of the most important cases establishing the modern enablement doctrine was the so-called *Incandescent Lamp Patent* case. In 1880, two inventors, Sawyer and Man, had obtained a patent for a light bulb, called an "electric lamp."[170] The patent covered a huge range of materials for the conductor, even though they themselves only got a few materials to work—and not well at that. The owner of the Sawyer and Man patent sued companies that had adopted Thomas Edison's far superior lighting system for patent infringement. Edison's system used *bamboo* for the conductor but still fell under the Sawyer and Man patent's broad claims.[171] However, the Supreme Court held the Sawyer and Man patent was invalid because it did not sufficiently teach others how to practice the full scope of its claims without "undue experimentation." Edison's meticulous and time-consuming experimentation, through which he determined bamboo was a superior conductor, helped prove that Sawyer and Man's patent did not provide enough details and also illustrated the injustice of allowing them to use such a broad patent to "put under tribute" the very person who perfected the invention that Sawyer and Man themselves never achieved.[172]

If Gernsback had his way, these rules would be broken. Science fiction authors would be able to obtain Provisional Patents for literal science fiction—inventions that do not work at all—and use those patents to block off future developments. The situation would be even worse than in the *Incandescent Lamp Case.* At least Sawyer and Man invented *something* that worked and taught the public how to make and use it. But imagine if Isaac Asimov had obtained a Provisional Patent in the year 1956 for a "smart automatic computer capable of answering any question posed to it." Asimov, despite

167. Rasmusson v. SmithKline Beecham Corp., 413 F.3d 1318, 1325 (Fed. Cir. 2005).

168. Kevin Bonsor, *How Flying Cars Will Work*, HOWSTUFFWORKS, https://auto.howstuffworks.com/flying-car.htm [https://perma.cc/8MA7-T5NJ] [https://web.archive.org/save/https://auto.howstuffworks.com/flying-car.htm] (Apr. 11, 2023).

169. This issue comes up frequently in regard to so-called "genus claims." Karshtedt, Lemley & Seymore, *supra* note 151, at 10.

170. Consol. Elec. Light Co. v. McKeesport Light Co., 159 U.S. 465 (1895).

171. *See id.*

172. *Id.* at 474–75.

not having taught the public how to make any working computer with such capabilities, could have chosen to activate this patent until the year 1986. The computer industry would have been forced to deal with the specter of the "Isaac Asimov smart computer" patent until 2006, when Asimov's patent finally expired (assuming a twenty-year term). The fifty-year looming uncertainty about who would own what in the space could have deterred people from investing in the technology and founding computer companies.

B. OVERCONFIDENCE IN THE IMPORTANCE OF EARLY-STAGE IDEAS

Gernsback also overestimated the value of mere ideas as compared to execution. In the current system, patents go to the first person to get the invention to work, not the first person who sees the invention's possibility and predicts its eventual workability. As discussed in Part IV, Gernsback believed this status quo unfairly devalued the work of science fiction authors. By focusing on reduction to practice, patents reward the "cold-blooded scientist" or the mere "manufacturer" rather than the true inventor. An inventor must, in Gernsback's view, be a "prophet" who is capable of inventing "something that has not existed or been known on earth previously."[173] The people who come later were just mechanics, engineers, and profiteers, there to execute the author's grand ambition by figuring out all the boring, practical details. This is why, when proposing his sui generis Provisional Patent, Gernsback placed his thumb on the scale of the person who gives the first description of a future invention that is technically sound, rather than the people who ultimately get the invention to work.[174]

But this is not how innovation works in practice. Ideas can be valuable, but there is usually a lot of work to do to complete the chain between mere idea and true innovation that has an impact on society.[175] Ironically, one of the people Gernsback most admired was Thomas Edison.[176] As discussed above, it was Edison's diligent, expensive, and time-consuming experimentation that the Supreme Court used to show that Sawyer and Man did not deserve a broad patent covering lighting innovations they did not themselves possess. Edison understood better than anyone that ideas usually required significant testing before they were ready to be implemented and marketed to the public. In fact, Gernsback himself interviewed Edison in 1919 for his magazine, *The Electrical Experimenter*, and Edison's advice to Gernsback and his readers was: "Ideas are easy . . . but working them into commercial shape is generally a long, tedious, and expensive job." Thus, Edison recommended "that if the young inventor has an idea he had better reduce it to actual practise and be sure that it works before applying for a

173. *See supra* Part III; *see also, e.g.*, Hugo Gernsback, *Predicting Future Inventions*, 11 SCI. & INVENTION 319 (Aug. 1923) ("Every inventor must be a prophet. If he were not, he could not think up inventions that will only exist in the future.").

174. *See supra* Part IV.A.

175. *See* Hrdy, *supra* note 79, at 16 n.1 (citing, e.g., Robert P. Merges, *Commercial Success and Patent Standards: Economic Perspectives on Innovation*, 76 CALIF. L. REV. 803, 806–08, 843–46 (1988); Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 Va. L. Rev. 1575, 1615–16 n.128 (2003); Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. 341, 343–44 (2010)).

176. ASHLEY, *supra* note 20, at 28 (noting that Edison and Tesla were Gernsback's heroes).

patent."[177] Although Edison patented many of his inventions and brought his fair share of patent lawsuits,[178] he revealed to Gernsback that in his "later years" he "made a rule . . . not to patent anything for which I knew there was no actual demand. Merely collecting patents is a waste of time, money, and energy."[179]

Even though he claimed Edison was his role model, Gernsback pursued the opposite strategy. Whereas Edison recommended meticulous testing and making sure the invention works and is commercially practical, Gernsback seemed to think the more outlandish and impractical the idea was, the better. He obtained many patents and disclosed countless ideas for future technologies—almost none of which he put into practice, let alone manufactured at scale.[180] One notorious Gernsback invention was the Menisol. The Menisol was a concentration-enhancing device and method that required wearing a very large, enclosed metal helmet on one's head to block out all sound and limit visual distractions. The wearer could not see, except straight ahead, and could not breathe, thus necessitating an oxygen tube to be inserted at the back of the helmet.[181] Another Gernsback invention, which appeared to baffle a journalist reporting on it for the *American Weekly*, was a massive ocean-skimming liner, sort of a combination between a boat and a plane, that "would, literally, skim the water" at "100 miles an hour, or better," whisking passengers across the Atlantic in "30 hours." While this is an awe-inspiring image, it was, to quote the journalist, hugely "impractical if not impossible . . . ."[182]

Gernsback wanted to give Provisional Patents to idea-generators like himself who thought up these sorts of awe-inspiring yet impractical inventions, regardless of how much work they did to make them work as a mechanical or a practical matter. But Gernsback thought ideas were more important than they actually are, and he did not seem to understand the costs such patents would place on the people, like Edison, who figured out the practical and commercial details.

C. THE SHADOW OF SELF-INTEREST

A different problem with Gernsback's Provisional Patents proposal is that it comes across as highly self-interested. Gernsback titled his 1952 speech "The Impact of Science

177. Hugo Gernsback, *Thomas A. Edison Speaks To You*, 7 THE ELECTRICAL EXPERIMENTER 748, 804 (1919).

178. Adam Mossoff, *Thomas Edison Was a "Patent Troll,"* SLATE (May 19, 2014), https://slate.com/technology/2014/05/thomas-edison-charles-goodyear-and-elias-howe-jr-were-patent-trolls.html [https://perma.cc/FSX6-VSDJ] [https://web.archive.org/web/20230917171739/https://slate.com/technology/2014/05/thomas-edison-charles-goodyear-and-elias-howe-jr-were-patent-trolls.html].

179. Gernsback, *supra* note 177, at 806. In support of this position, see, e.g., Christopher A. Cotropia, *The Folly of Early Filing in Patent Law*, 61 HASTINGS L.J. 65 (2009) (arguing that patent law should require that an invention have "proceeded further down the development timeline" before patents become available).

180. Gernsback's radio set and early electrical inventions, mentioned above, are important exceptions. *See supra* Part II.

181. Murray Robinson, *Hugo's Invention (On Paper) Is a Vacuum Hat To Shut Out Noise* (1952) (discussing Gernsback's publication FORECAST) (on file with authors).

182. *See "Express Liner That Would Skim the Ocean,"* AM. WKLY., 1933 (quoting and providing image of Gernsback's description of the ocean liner in EVERYDAY SCIENCE AND MECHANICS) (on file with authors).

Fiction on World Progress" and repeatedly implied to his audience that his interest lay with the "public at large . . . ."[183] However, in light of Gernsback's personal history and some of the statements he made during his lifetime, it is hard not to suspect that Gernsback in fact wanted this type of patent reform because it would be good for *him*.

Gernsback did not die a rich man. He was constantly reminded of this fact because he kept a sign in his office that said, "If you're so smart, why aren't you rich?" When asked about it, he responded, "I keep it there as a humbling reminder that it's one question I can never answer."[184] A Provisional Patent for each Gernsback prediction that came to pass would certainly have been a way to change Gernsback's financial status. We have some evidence that Gernsback considered this very possibility. He did not say so directly. But reading between the lines of what he did say leads us to the conclusion that Gernsback saw Provisional Patents as a way to profit from his successful predictions of future inventions.

In an interview in 1951, Gernsback raised the prospect that "from some points of view the radio and other industries owe him several hundred million dollars for inventions and devices he disclosed in his various publications over the past 45 years, but did not patent." Gernsback told the interviewer—apparently lightheartedly—that he would "not press his claims at this late date. 'What would I do with a zillion dollars?'" "'I couldn't buy anything worth more than the satisfaction of having contributed creatively to technical progress.'"[185]

This expression of humility and disinterest in profit does not come across as authentic. Gernsback must have known that, under the law, he could *not* have asked for money for inventions he did not patent and freely disclosed to the public. Gernsback must also have known that, in most cases, he could not patent those inventions. He had no problems patenting when he came up with a patentable invention and where he thought it was worth the fees to do so. It is also not credible that he would not have attempted to sell, license, or commercialize the patents that he did have. In fact, we have documentation showing that Gernsback attempted, apparently unsuccessfully, to generate interest in his hydraulic fishery patent among fisheries and engineering companies.[186]

183. Gernsback, *supra* note 104, at 2 ("The public at large is beginning to take Science seriously. People look to it confidently because they know for the first time in the history of mankind—through the medium of Science-Fiction—man can now gaze into our future world with all its wonders . . . .").

184. Sidney Fields, *Only Human*, N.Y. DAILY MIRROR, Jan. 1954, at 25 (on file with authors).

185. Hugo Gernsback, *s-f pioneer*, AUTHENTIC SCI. FICTION, May 1952, at 112, 112 (discussing comments Gernsback made in his publication, FORECAST 1952 (Christmas 1951)).

186. For example, a series of letters from 1957 reveals that Gernsback sought to have Williams Brothers Company (which apparently had experience in marine installations) construct a hydraulic fishery according to the specifications in Gernsback's patent. The company's Chief Engineer, Wilson N. Gilliat, found the idea "quite novel and intriguing" and posited that "such an installation could be designed and installed from a practical viewpoint." Gilliat stated that the company "would be privileged to prepare a preliminary engineering report for any client you might acquire." Letter from Wilson N. Gilliat, Chief Engineer, Williams Bros. Co., to Hugo Gernsback (Apr. 10, 1957) (on file with authors). But the final letter, dated April 12, 1957, is from Gernsback. It states: "Unfortunately, I have not been able to make any arrangements yet with the larger fisheries, but I am plugging along with them. . . . New things of this type are always difficult to industrialize. If anything tangible comes along, I will of course get in touch with you." Letter from Hugo Gernsback to Wilson N. Gilliat, Chief Engineer, Williams Bros. Co. (Apr. 12, 1957) (on file with authors).

To the contrary, we suspect that Gernsback would have tried to patent as many inventions as possible and done what he could to monetize those legal rights. Adding a Provisional Patent option—especially if it were directed specifically at his favored medium of science fiction—would have changed the status quo for him. Assuming he kept up his track record as a predictor of future inventions, he would have obtained a new stream of profits without any additional effort on his part, besides filing for the provisional rights. Nice work if you can get it.

VI. HOW SCIENCE FICTION CAN AFFECT INNOVATION

Gernsback's lifelong conviction that science fiction should be recognized as true invention was eccentric. His Provisional Patents proposal was poorly thought out from many angles. His views subjected him to the ridicule of others within the science fiction community. Even as they showed him grudging respect as a "father-figure," they did not embrace Gernsback's theory of what science fiction was and his "overriding interest in sf as a vehicle for prediction . . . ."[187] Nor did they like Gernsback's writing style. One influential critic and historian of the genre opined that Gernsback's tunnel vision for "gadgets" of the future introduced a "deadening literalism" that negatively affected how science fiction was written for decades.[188]

Such dismissive judgments are a missed opportunity. Gernsback had a truly unique perspective. He was one of a short list of people with combined experience and influence in both the world of science fiction, on the one hand, and the world of patents and inventing, on the other.[189] Taking Gernsback seriously forces us to consider the possibility that, even though he was wrong about some things, he might be right about his bigger-picture intuition that science fiction can influence innovation in a similar way to patents.

As discussed in Part III.A, traditional disclosure theory posits that patents impart useful technical information about how to make inventions work so that others can replicate and build upon those inventions in the real world.[190] On this view,

187. John Clute and Peter Nichol's entry on Gernsback in the influential ENCYCLOPEDIA OF SCIENCE FICTION is illustrative. "While deficient as fiction," they write—referring specifically to Gernsback's *Ralph 124C 41+*—"the tale clearly shows [Gernsback's] overriding interest in sf as a vehicle for prediction, being a catalogue of the marvellous [sic] technology of the 27th century." JOHN CLUTE & PETER NICHOLLS, ENCYCLOPEDIA OF SCI. FICTION 490–91 (1995).

188. *See, e.g.*, BRIAN ALDISS, BILLION YEAR SPREE: THE TRUE HISTORY OF SCIENCE FICTION 209–12 (1973) (discussing evolution of the genre across time and describing Gernsback's views as outdated and too focused on inventions and "gadgets"); *see also* WOLFE, *supra* note 20, at 45 ("In terms of style, characterization, plot, and just about all the qualities of good fiction, *Ralph 124C 41+* is almost unreadably awful.").

189. This is not to say he was the only science fiction author who was also a scientist. *See, e.g.*, Jena Brown, *13 Science Fiction Books Written by Actual Scientists*, THE PORTALIST (July 26, 2023), https://theportalist.com/sci-fi-books-written-by-actual-scientists [https://perma.cc/6U59-XG3H] [https://web.archive.org/web/20230917193912/https://theportalist.com/sci-fi-books-written-by-actual-scientists].

190. *See supra* Part III.A.

informational disclosures for inventions that *do not yet work* have little value.[191] However, by drawing on Gernsback's theories, we argue that science fiction can in fact impart useful information that is not predicated on immediate reduction to practice. Even though science fiction stories fall short when it comes to enablement and operable utility, they can provide information that is important to innovation and technology development and is broadly useful to society. What is more, in certain respects, science fiction can match or exceed patents' potential impact on innovation. It can fill gaps in innovation policy by supplying teachings, insights, and motivations that are beyond the purview of the patent system.

We identify below three types of information that science fiction can supply and through which science fiction can potentially influence innovation. To be clear, the fact that science fiction has the capacity to affect innovation does not mean *patents* are a necessary or appropriate reward system for science fiction. If anything, copyright law would seem to be the more natural vehicle for rewarding a science fiction author's work. This is especially true given the high importance that Gernsback placed on the expressive medium through which science fiction imparts information.[192]

A. SUPPLYING A STIMULUS TO LATER INVENTORS

First, science fiction can supply inspiration and (what Gernsback termed) a "stimulus" to readers, who may go on to pursue the inventions they learn about in science fiction and put them into practice.[193] This section explains this stimulus theory and how it can affect innovation. It also explores how stimulating future inventions relates to, and yet differs from, the mere *prediction* of future inventions.

1. The Stimulus Theory

A science fiction author can inspire someone and give them a stimulus to pursue an invention without explaining how to make the invention work at all. If the author

191. Janet Freilich, *The Replicability Crisis in Patent Law,* 95 IND. L. J. 431, 439 (2020) ("[P]atents are supposed to disclose useful information about how to make and use new technologies and . . . instructions on how to make and use a product that does not work . . . are not helpful.").

192. Gernsback never looked to copyright as a solution to the problems he perceived in remunerating and recognizing science fiction authors. He never copyrighted his original run of AMAZING STORIES. *See supra* note 146. We think this choice was quite deliberate. The Copyright Act expressly denies protection for mere ideas and inventions themselves, and yet that is exactly what Gernsback wanted. *See* 17 U.S.C. § 102(b) (1976) ("In no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work."); *see also* 17 U.S.C. § 101 (1976) (largely denying protection for "useful articles"). Thanks to Michael Madison and Zvi Rosen for their helpful comments on this issue. For scholarship discussing the fluid boundaries between copyright and patent (as well as trade dress protection), see, e.g., Pamela Samuelson, *Strategies for Discerning the Boundaries of Copyright and Patent Protection*, 92 NOTRE DAME L. REV. 1493, 1497 (2017), and Christopher Buccafusco & Mark A. Lemley, *Functionality Screens*, 103 VA. L. REV. 1293 (2017). *See also* Mark Bartholomew & John Tehranian, *Historical Kinship & Categorical Mischief: The Use and Misuse of Doctrinal Borrowing in Intellectual Property Law*, 109 IOWA L. REV. 101 (2023).

193. Gernsback, *supra* note 30, at 195.

paints a vivid enough picture of the invention and showcases its potential utility to society, this alone can drive readers to make it in the future, even without providing the practical details.

Supplying a stimulus to later generations is something that patents cannot do, or at least not to the same degree. Because patents are granted later in the innovation lifecycle and require actual or constructive reduction to practice, patents cannot supply stimulus to someone else to make an invention whose feasibility is still many years away. As explained, even though patent law does not require the author to produce a working model, let alone a marketable product, the inventor still needs to supply enough details to permit a person having ordinary skill in the art to make and use the invention at the time of filing. The invention must be operable and have a utility that is supported by current science. [194] Patents cannot, under these doctrines, reveal a possible invention that might be useful one day; patents are only awarded upon successful completion of such an invention. As the Supreme Court famously put it, "[we are not] blind to the prospect that what now seems without 'use' may tomorrow command the grateful attention of the public . . . . But a patent is not a hunting license. It is not a reward for the search, but compensation for its successful conclusion." [195]

In contrast, science fiction can inspire and push readers into action well before the conventional—i.e., patentable—invention lifecycle begins. A reader, tantalized by an attractive fictional technology, can be spurred to study the state of the art, learn its limitations, and generate new knowledge or create new technical tools to bring the state of the art closer to the imagined reality. *Star Wars* fans have gone to great lengths to come up with ways to make real-world lightsabers.[196] Fans of *Back to the Future: Part II* are engineering actual hoverboards.[197] When seen in this way as a stimulus, the *earliness* of the science fiction author's disclosure is an advantage, not a downside. It is

194. 35 U.S.C. § 112; *see also* citations *supra* Part III.A.

195. Brenner v. Manson, 383 U.S. 519, 535–36 (1966) (invalidating patent for a new process for making a steroid where the asserted utility, the possibility of treating tumors, was unproven and only suspected due to the fact that the steroid was similar in structure to steroids known to inhibit tumors in mice).

196. *See, e.g.*, Connie Suggitt, *World's First Retractable Lightsaber Created Russian YouTuber*, GUINNESS WORLD RECS. (Jan. 21, 2022), https://www.guinnessworldrecords.com/news/2022/1/worlds-first-retractable-lightsaber-created-by-russian-youtuber-689867 [https://perma.cc/W9P2-BX79] [https://web.archive.org/web/20231111185242/https://www.guinnessworldrecords.com/news/2022/1/worlds-first-retractable-lightsaber-created-by-russian-youtuber-689867]; Hannah Sparks, *YouTuber Creates Real-Life 'Star Wars' Lightsaber that Slices Steel*, N.Y. POST (Oct. 13, 2020), https://nypost.com/2020/10/13/youtuber-creates-real-life-star-wars-lightsaber-that-slices-steel/ [https://perma.cc/UJ96-4R99] [https://web.archive.org/web/20231111185538/https://nypost.com/2020/10/13/youtuber-creates-real-life-star-wars-lightsaber-that-slices-steel/].

197. *See, e.g.*, Matthew Hart, *Real-Life Back To the Future Hoverboard Actually Works*, NERDIST (Jan. 11, 2021), https://nerdist.com/article/real-life-back-to-the-future-hoverboard-working/ [https://perma.cc/F5PK-9XVS] [https://web.archive.org/web/20231111185904/https://nerdist.com/article/real-life-back-to-the-future-hoverboard-working/]; Bonnie Burton, *Skateboard Legend Tony Hawk Rides a Real Hoverboard*, CNETK (Nov. 17, 2014), https://www.cnet.com/culture/skateboard-legend-tony-hawk-rides-a-real-hoverboard/ [https://perma.cc/89ZW-3TSG] [https://web.archive.org/web/20231111190533/https://www.cnet.com/culture/skateboard-legend-tony-hawk-rides-a-real-hoverboard/].

precisely because science fiction supplies information about future inventions long before they are possible that science fiction can induce innovation. The fact that the author—the originator of the idea for the invention—does not endeavor to reduce the invention to practice does not destroy the efficacy of their disclosure, assuming that the story is inspiring enough.[198]

On this view, science fiction's entertaining fictional format is an advantage as compared to how patents are presented. The more likely people are to encounter science fiction and be inspired by it, the more likely science fiction is to affect innovation. Of course, people can learn about inventions in textbooks, journal articles, and patents. But if the purpose is to inspire and supply a stimulus, then science fiction is arguably a superior medium because, to quote Gernsback, it supplies this information "in a very palatable form . . . imparting knowledge, and even inspiration, without once making us aware that we are being taught."[199] It "fires the reader's imagination more perhaps than anything else of which we know," leaving readers "deeply thrilled" as their "imagination is fired to the nth degree."[200] Outside a small community of inventors, patent attorneys, and law professors, few people can honestly say they are "deeply thrilled" by reading patents.

As a strictly empirical matter, it is of course hard to prove whether science fiction in fact inspires readers and stimulates them to bring science fictional inventions into practice. We recognize that limitation—which, notably, also hampers efforts to judge the patent system's influence on innovation.[201] Be that as it may, many commentators have perceived science fiction's influence on some of the world's most consequential innovations.[202] A few popular examples of science fictional inventions that supposedly inspired real-world inventions include Jules Verne's 1869 depiction of a submarine and Gernsback's 1911 description of using "radar" to find a flying object,[203] as well as numerous inventions from Gene Roddenberry's *Star Trek*.[204] More recently, commentators have theorized that Neil Stephenson's virtual reality world, the Metaverse, inspired "Big Tech" to invest billions of dollars in developing virtual reality

198. *Cf.* Abramowicz & Duffy, *supra* note 81, at 1599.

199. Gernsback, *supra* note 25, at 3.

200. Gernsback, *Imagination*, *supra* note 30, at 579.

201. As patent scholars frequently observe, it is hard to locate good evidence that the patent system drives innovation. *See, e.g.*, Mark A. Lemley, *Faith-Based Intellectual Property*, 62 UCLA L. REV. 1328 (2015).

202. Kevin Bankston, *Prototyping a Better Tomorrow: How Science Fiction Can Help Us Create a Better Future*, SLATE (June 12, 2017), https://slate.com/technology/2017/06/more-science-fiction-can-help-us-create-a-better-tomorrow.html [https://perma.cc/LZV7-Q7E7] [https://web.archive.org/web/20231024222319/https://slate.com/technology/2017/06/more-science-fiction-can-help-us-create-a-better-tomorrow.html].

203. As explained directly *infra* at notes 210 to 215 and accompanying text, the radar and submarine examples are quite nuanced under scrutiny.

204. William Shatner, the show's star, attests that the series inspired countless real-world inventions. *See* WILLIAM SHATNER, I'M WORKING ON THAT: A TREK FROM SCIENCE FICTION TO SCIENCE FACT (2001). We recognize that Shatner is not an authoritative source. Some of these examples, including the communicator-to-cell phone linkage, have been challenged. Brian Cronin, *Did Star Trek Communicators Inspire the Invention of the Cell Phone?*, CBR (Jan. 6, 2019), https://www.cbr.com/star-trek-communicators-martin-cooper-cell-phone/ [https://perma.cc/PPH2-8JT4] [https://web.archive.org/web/20230917195721/https://www.cbr.com/star-trek-communicators-martin-cooper-cell-phone/]. We explore this claim further in note 231 *infra* and accompanying text.

systems,[205] and that, for better or worse, science fiction inspired three technology moguls—Jeff Bezos,[206] Richard Branson,[207] and Elon Musk[208]— to start private space companies with the goal of taking humanity to the stars.[209]

It is unlikely that all of these examples prove that science fiction had a direct influence on inventors. Some of them do. For example, one of the most convincing

205. Steven Levy, *Neal Stephenson Named the Metaverse. Now, He's Building It*, WIRED (Sept. 16, 2022), https://www.wired.com/story/plaintext-neal-stephenson-named-the-metaverse-now-hes-building-it/ [https://perma.cc/795D-XHFS]
[https://web.archive.org/web/20231024223250/https://www.wired.com/story/plaintext-neal-stephenson-named-the-metaverse-now-hes-building-it/] ("'Metaverse' became a buzz word, and Big Tech raced to productize it."); *see also* Charles R. Macedo, Douglas A. Miro & Thomas Hart, *The Metaverse: From Science Fiction To Commercial Reality—Protecting Intellectual Property in the Virtual Landscape*, 31 BRIGHT IDEAS, 2022, at 13 ("Since Stephenson's writing of *Snow Crash*, what was once only science fiction is now becoming increasingly technologically feasible and scientific fact.").

206. Bezos took the actor who played *Star Trek*'s Captain Kirk into space. Marcia Dunn & Rick Taber, *William Shatner Goes To Space on Blue Origin Rocket*, PBS (Oct. 13, 2021), https://www.pbs.org/newshour/arts/watch-live-william-shatner-goes-to-space-on-blue-origin-rocket [https://perma.cc/PCD7-F36M]
[https://web.archive.org/web/20231024224344/https://www.pbs.org/newshour/arts/watch-live-william-shatner-goes-to-space-on-blue-origin-rocket]. He is also personally responsible for saving the Syfy Channel's space opera, *The Expanse*, based on the books by James A. Corey, from cancellation by picking it up on Amazon Prime. Scott Snowden, *How Amazon (and Jeff Bezos) Saved 'The Expanse,'* SPACE.COM, Jan. 3, 2020, https://www.space.com/the-expanse-how-amazon-jeff-bezos-saved-scifi.html [https://perma.cc/X5DJ-ZQRA]
[https://web.archive.org/web/20230917202443/https://www.space.com/the-expanse-how-amazon-jeff-bezos-saved-scifi.html].

207. Branson loves *Star Trek*. Callum Paton, *Space, the Final Frontier for Billionaire Richard Branson*, PHYS.ORG (July 9, 2021), https://phys.org/news/2021-07-space-frontier-billionaire-richard-branson.html [https://perma.cc/MSD4-S9L2]
[https://web.archive.org/web/20230917202948/https://phys.org/news/2021-07-space-frontier-billionaire-richard-branson.html].

208. Musk has stated his love for Isaac Asimov's *Foundation* trilogy, which features an intergalactic empire. Taylor Locke, *Elon Musk Shares the Science Fiction Book Series that Inspired Him To Start SpaceX*, CNBC (Feb. 22, 2020), https://www.cnbc.com/2020/02/21/elon-musk-recommends-science-fiction-book-series-that-inspired-spacex.html [https://perma.cc/J236-WEDG]
[https://web.archive.org/web/20231024225133/https://www.cnbc.com/2020/02/21/elon-musk-recommends-science-fiction-book-series-that-inspired-spacex.html]; *see also* Marina Koren, *Elon Musk Is Maybe, Actually, Strangely, Going To Do This Mars Thing,* THE ATLANTIC (May 6, 2021), https://www.theatlantic.com/science/archive/2021/05/elon-musk-spacex-starship-launch/618781/ [https://perma.cc/UE6S-7KYU]
[https://web.archive.org/web/20231024225339/https://www.theatlantic.com/science/archive/2021/05/elon-musk-spacex-starship-launch/618781/].

209. Caroline Mimbs Nyce, *Welcome To the Era of Private Space Travel*, THE ATLANTIC (July 20, 2021), https://www.theatlantic.com/newsletters/archive/2021/07/welcome-to-the-era-of-private-space-travel/619513/ [https://perma.cc/A3LS-D69P]
[https://web.archive.org/web/20231024231129/https://www.theatlantic.com/newsletters/archive/2021/07/welcome-to-the-era-of-private-space-travel/619513/]; *see also* Alexandra Alter, *A Sci-Fi Writer Returns To Earth: 'The Real Story Is the One Facing Us,'* N.Y. TIMES (June 22, 2023), https://www.nytimes.com/2022/05/11/books/kim-stanley-robinson-sci-fi.html [https://perma.cc/V8BA-JK7U]
[https://web.archive.org/web/20230917204010/https://www.nytimes.com/2022/05/11/books/kim-stanley-robinson-sci-fi.html] (noting that Kim Stanley Robinson has "grown skeptical" of tech billionaire's aspirations to take humanity to the stars, even as he adds, "I'm partially responsible for that fantasy").

examples is the theory that Jules Verne inspired Simon Lake to build a submarine. There is extraordinarily good evidence that Verne's description of the Nautilus in *Twenty Thousand Leagues under the Seas* directly led to Lake's invention. Verne was not the first to describe a submarine. He was not even the first to name it the Nautilus.[210] However, in his 1930 autobiography, Lake described Verne as "the director-general of my life." He attested that Verne's book left him with a lifelong obsession with making, and improving upon, Verne's Nautilus. He wrote that he became "so excited" that he began to read "everything which might have a bearing on the problems attending my proposed penetration of the depths of the sea."[211] When Lake completed construction of his much-anticipated submarine, the *Argonaut*, he received a congratulatory telegram from none other than Verne himself, which Lake described as "one of the finest moments of my life."[212] The submarine depicted in Lake's 1896 patent looks and works very much like how Verne's Nautilus was described—even including how water tanks could be filled or emptied as needed to change the buoyancy for diving and surfacing.[213] This chain of events—from a work of science fiction, to an inventor's imagination, to the Patent Office—is very hard to dispute.

On the other hand, other oft-cited examples of science fiction's impact are not as compelling. For example, Gernsback's description of radar in *Ralph 124C 41+* is a very poor illustration of the theory that science fiction affects real-world innovation by supplying stimulus to later inventors. The reason is that it seems quite clear that the person who eventually patented working radar technology in 1917,[214] the British physicist and inventor Sir Robert Watson-Watt, did not know about Gernsback's story until much later. According to Sam Moskowitz, "no one was more surprised by [Gernsback's radar] prophecy than Sir Robert Watson-Watt."[215]

Instead, Gernsback's depiction of radar is a much better illustration of the second type of informational disclosure that science fiction can provide—predicting a future invention, while not necessarily inspiring anyone to make it. Gernsback's description of radar is a testament of his prescience and his ability to predict future developments,

210. A "Nautilus" had been commissioned decades earlier. In the 1790s, Napoleon, then Emperor of France, commissioned a submarine from the famous American inventor, Robert Fulton, who chose the name "Nautilus." The submarine was tested in the year 1800 but never widely used (it leaked). Napoleon abandoned the project. HERBERT R. LOTTMAN, JULES VERNE: AN EXPLORATORY BIOGRAPHY 131 (1997).

211. In Lake's own words: "Jules Verne was in a sense the director-general of my life. When I was not more than ten or eleven years old I read his *Twenty Thousand Leagues Under the Sea* and my young imagination was fired . . . . [W]ith the impudence which is a part of the equipment of the totally inexperienced I found fault with some features of Jules Verne's Nautilus and set about improving on them." SIMON LAKE, SUBMARINE: THE AUTOBIOGRAPHY OF SIMON LAKE 10 (1930).

212. *Id.* at 117 ("Jules Verne whose Nautilus had been responsible for my descent into the sea in a submersible cabled congratulations. That was one of the finest moments of my life.").

213. *See, e.g.*, Submarine Locomotive, U.S. Patent No. 557,835 (issued 1896); *see also* Combined Surface and Submarine Vessel, U.S. Patent No. 650,758 (issued 1900).

214. Watson-Watt obtained a UK patent in 1917. *See* Improvements in and Relating To Aerial Circuits for Wireless Telegraphy and Other Purposes, British Patent No. GB 129336 (filed Oct. 24, 1917). Note that there were other claims to priority and other patents as well.

215. Daniel Stashower, *A Dreamer Who Made Us Fall in Love with the Future*, SMITHSONIAN MAG., Aug. 1990, at 48.

not of his ability to inspire readers and give them a stimulus to put his inventions into practice**.**

2. Distinguishing Stimulus from Mere Prediction

Science fiction can potentially affect innovation merely by *predicting* inventions and future technological developments before they arrive. Few people think generating predictions is the genre's main purpose.[216] But prediction is what a lot of science fiction authors end up doing. This was true in Gernsback's day, and it remains true today. The highly acclaimed modern author, Kim Stanley Robinson, "likens the genre" of science fiction "to a pair of old-fashioned 3-D glasses," which offer "predictions about the future" through one lens and "metaphors for our own time" through the other.[217]

When it comes to predictive capacity, science fiction treads where patents cannot. Patents cannot effectively "predict" what is to come. The enablement and utility doctrines ensure that inventors do not get credit for "guessing correctly." For example, a patent that describes a remarkable new compound that might *hypothetically* cure a deadly disease but provides little proof for this hypothesis would be invalid—even if it ultimately turns out later that the compound does cure the disease.[218] Patents cannot provide insight on the inventions of the far future because those inventions cannot be

216. Alexandra Samuel, *Can Science Fiction Predict the Future of Technology?*, JSTOR DAILY (Feb. 19, 2019), https://daily.jstor.org/can-science-fiction-predict-the-future-of-technology/ [https://perma.cc/3K5C-8TVV] [https://web.archive.org/web/20231024232837/https://daily.jstor.org/can-science-fiction-predict-the-future-of-technology/] ("Science fiction isn't limited to predicting tech developments: It's more broadly concerned with imagining possible futures, or alternative presents.").

217. Joshua Rothman, *Can Science Fiction Wake Us Up To Our Climate Reality?*, THE NEW YORKER (Jan. 24, 2022), https://www.newyorker.com/magazine/2022/01/31/can-science-fiction-wake-us-up-to-our-climate-reality-kim-stanley-robinson [https://perma.cc/ZW6Q-UNBX] [https://web.archive.org/web/20230928234501/https://www.newyorker.com/magazine/2022/01/31/can-science-fiction-wake-us-up-to-our-climate-reality-kim-stanley-robinson]; *see also* Lynell George, *The Visions of Octavia Butler*, N.Y. TIMES (Nov. 17, 2022), https://www.nytimes.com/interactive/2022/11/17/arts/octavia-butler-vision-kindred.html [https://perma.cc/FXN3-RPC8] [https://web.archive.org/web/20230928235810/https://www.nytimes.com/interactive/2022/11/17/arts/octavia-butler-vision-kindred.html] (discussing Octavia Butler's science fiction's "predictive qualities: Her vision about the climate crisis, political and societal upheaval and the brutality and consequences of power hierarchies seems both sobering and prescient").

218. *See, e.g.*, In re 318 Pat. Infringement Litig., 583 F.3d 1317, 1327–28 (Fed. Cir. 2009) (finding patent on use of galantamine for treating symptoms of Alzheimer's disease invalid due to lack of utility and lack of enablement given that patent did not provide sufficient evidence that using galantamine could be effective in treating Alzheimer's at time of filing, despite the fact that efficacy was later shown and galantamine was later approved by the FDA for this purpose); Rasmusson v. SmithKline Beecham Corp., 413 F.3d 1318, 1325 (Fed. Cir. 2005) (observing that a plausible hypothesis is not enough to justify granting patents for "'inventions' consisting of little more than respectable guesses as to the likelihood of their success . . . "); *see also* Sean Seymore, *Patents Law's Role in Protecting Public Health*, NOTRE DAME L. REV. (forthcoming 2023) (manuscript at 6–21) (available through SSRN), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4361765 [https://perma.cc/43A4-ASSS] [https://web.archive.org/web/20230929004827/https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4361765] (discussing practice of denying patents for public health inventions that are not credible or lack foundation in contemporary science).

patented.[219] Science fiction, in contrast, can do far more predicting precisely because it is liberated from the doctrinal requirements of enablement and presently-availing utility. Science fiction can disclose information about technologies of the future far in advance of their arrival.

In Gernsback's day, predicting the future was seen as an impressive and worthy endeavor. Starting in the late nineteenth century, there was a "flood" of so-called "forecasting literature" in which writers sought to tell readers what awaited humanity in subsequent centuries.[220] Jules Verne was praised for his "anticipatory inventions" and successful track record of prediction.[221] Verne's *The Day of an American Journalist in 2889*—which is now rumored to have been authored by his son, Michael—is a short story told from the perspective of a journalist in the year 2889. It describes all sorts of technological novelties that have, in some form, come to pass—from the "aero-train" and the "telephote" to the use of solar energy as a power source. [222] H.G. Wells, another crucial figure in the history of science fiction, was also praised for his forecasting abilities. In 1901, Wells authored a popular series of articles short-titled the "Anticipations," in which Wells accurately predicted various developments—like "motor carriages" and "flying machines."[223]

Following in the tradition of his idols, Verne and Wells, Gernsback carved out his own reputation for making accurate predictions about the future. He became a fixture in the popular press, which referred to him using honorifics like "The Remarkable Mr. G" or the "Prophet of Science." While Gernsback's "description of radar" was considered his "most brilliant stroke," his contemporaries praised the success of his *Ralph 124C 41+* series "as a vehicle for scientific prediction" which "accurately prophesied advances in

219. Compare the trademark system: Trademark registrations, which require use in commerce *or* bona fide intent to use in commerce followed by actual use, can provide limited insight on the future. *See* Amanda Levendowski, *Dystopian Trademark Revelations*, 55 CONN. L. REV. 681, 681 (2023); *see also* 15 U.S.C. § 1051(a)–(b) (1988) (use and intent to use registrations).

220. Some academics tried to turn this into a serious field called "futurology" or "future studies." *See* CLUTE & NICHOLLS, *supra* note 187, at 457–58; *see also* JILL LEPORE, IF, THEN: HOW THE SIMULMATICS CORPORATION INVENTED THE FUTURE 24–26 (1st ed. 2020) (recounting how the government's computer, UNIVAC, famously predicted the results of the 1952 presidential election to much fanfare).

221. *See* H.G. WELLS, *Preface*, *in* THE COMPLETE SCIENCE FICTION TREASURY OF H.G. WELLS iii, iii-vi (Avenel 1978) (reprinting Well's 1934 Preface praising Verne's ability to conceive of "anticipatory inventions" that represented "actual possibilities of invention and discovery . . .").

222. *See* Jules Verne, *The Day of an American Journalist in 2889*, *in* GOTHIC SCIENCE FICTION SHORT STORIES: ANTHOLOGY OF NEW AND CLASSIC TALES 411, 411–20 (2018).

223. Wells got quite a bit wrong too. On submarines, for example, Wells wrote, "[M]y imagination, in spite even of spurring, refuses to see any sort of submarine doing anything but suffocate its crew and founder at sea." *Anticipations of the Reaction of Mechanical and Scientific Progress Upon Human Life and Thought*, PROJECT GUTENBERG, https://www.gutenberg.org/files/19229/19229-h/19229-h.htm#IV [https://perma.cc/GWV7-RY26] [https://web.archive.org/web/20230929010654/https://www.gutenberg.org/files/19229/19229-h/19229-h.htm#IV] (last visited Oct. 24, 2023). On Wells's *Anticipations*, see CLAIRE TOMALIN, THE YOUNG H.G. WELLS: CHANGING THE WORLD 114, 134 (2021); *see also* KEITH FERRELL, H.G. WELLS CITIZEN OF THE FUTURE 96–107 (1983).

dozens of other new fields: fluorescent lighting, sky writing, plastics, [and] automatic packaging machines . . . ."[224]

However, predicting a future technology is materially different from supplying inspiration for it. We are highly skeptical that predicting future technologies has independent value for innovation, on its own, apart from the potential to supply some form of stimulus. As the case of Gernsback's early—but largely un-read—description of radar illustrates, predicting entails correctly anticipating what is to come; it does not entail influencing anyone to make an invention or stimulating action of any kind. Successful predictions by science fiction authors can certainly be impressive. They show off the intelligence and clairvoyance of the author. But they are arguably not valuable to innovation or society at large *unless* others act upon those predictions in some way.

To be sure, accurate predictions of the future have value for the simple reason that they tell those who listen what is to come before it happens. In some spheres, like finance, the benefits of such foreknowledge are hard to deny. Who wouldn't want to place a bet today on next year's World Series champion, or buy stock in the next Apple or Twitter before it explodes in popularity?[225] However, predicting the future, while impressive, cannot directly affect innovation if it does not induce action, or at least affect people's perceptions and understandings of technological ideas. Science fiction authors whose predictions do not inspire action or affect others' perceptions are like the mythical Cassandra, cursed with the ability to predict the future but never listened to.

This is not to suggest science fiction's predictions cannot have an impact. So-called "dystopian" science fiction—which we discuss further in Part VI.C—often describes problems humanity will face in the future, foreseeing "tomorrow's crises" and describing the many ways technology might go wrong.[226] This type of story can have "negative" utility. It can tell us which doors are best left unopened and which technologies future generations should avoid. It can even offer potential solutions. Kim Stanley Robinson, for example, often writes science fiction depicting futures in which global warming will have wrought catastrophe. His books vividly imagine apocalyptic futures—such as New York City in the year 2140 submerged under water—and also describe ways in which humans might learn to adapt and thrive in the harsh new

224. Paul O'Neil, *The Amazing Hugo Gernsback, Prophet of Science, Barnum of the Space Age*, LIFE MAG., July 1963, at 62, 66. *See also* Eric Hutton, *His Pipe Dreams Are Tomorrow's Inventions*, MAG. DIGEST, 1947, at 7–12 ("As far back as his 'Ralph 124C41+' days, he not only described but provided an accurate technical blueprint for radar."); Inez Robb, *The Remarkable Mr. G.*, SIGNAL MAG., Oct. 1957, at 28–29 (writing that Gernsback has "earned a place in the sun" along with others like Robert Fulton and Jules Verne "who have thrilled mankind with their inventive ideas and contributions to society . . .").

225. Incidentally, Stanley Weinbaum wrote a story in 1936 for one of Gernsback's magazines, in which a professor invents a method for helping people uncover future knowledge, enabling his son-in-law to capitalize on foreknowledge of the 1929 stock market crash. *See* Stanley Weinbaum, *The Circle of Zero*, originally published in Gernsback's magazine THRILLING WONDER STORIES, as reprinted in MICHAEL ASHLEY, THE HISTORY OF THE SCIENCE FICTION MAGAZINE: VOL. 2: 1936–1945, at 77–94 (1975).

226. As the science fiction scholar James Gunn puts it, "[t]his ability to foresee tomorrow's crises, to dramatize their human implications and consequences, and to act out alternatives, is one of science fiction's major values." GUNN, *supra* note 20, at 29. That said, Gunn also stated that science fiction's "more celebrated ability to predict fades to insignificance alongside its ability to dramatize." *Id.*

reality.[227] Readers of Robinson's stories might be moved to act and develop solutions to the problems Robinson identifies. They might become more concerned about climate change and more interested in technologies that reduce pollution and increase energy efficiency. They might even drive demand for those technologies, contributing indirectly to their improvement and widespread adoption.

But again, the benefits of such predictions are nil *unless* people absorb and respond to them in some manner. On the other extreme, predictions that are *wholly inaccurate* have even less clear utility, outside of entertainment. Suggesting that time-travelling scientists in the future will romp through time in a telephone booth, for example, makes for a great story. But assuming this fact pattern bears no relationship to what might realistically happen, the impact on real-world innovation is hard to discern. Predictions that do not inspire action—or that are so divorced from reality that they never plausibly could—do not have any clear impact on innovation.

Yet another reason to be skeptical of prediction as an independent benefit of science fiction is that many doubt science fiction authors are better at predicting the future than anyone else. Skeptics—observing that Earth is not populated with flying cars and that humans have not colonized the solar system, as is often depicted in science fiction stories—pronounce that science fiction authors have "conspicuously failed" to anticipate the innovations that predominate in "the world we are now living in."[228] Asimov himself was highly doubtful of science fiction's predictive capacity—and in fact he appeared doubtful that prediction has much utility at all. Like Gernsback, Asimov preferred "hard" science fiction that extrapolates from real science, but he thought predicting the future was beside the point. "[I]f you go through my books," he said in 1975, "the number of things that I've spoken about that have really come true is really quite small."[229] Asimov also insightfully observed that if science fiction authors were only interested in predicting the futures, they would run out of good story material pretty quickly. "[W]e can't just predict," he said. "There isn't enough story material in straight prediction. We make up futures. It doesn't matter whether we really think they'll come to pass or not. . . . [W]e ask ourselves only will this be interesting to deal with, and will this be a nice story? And then if some of them do come true, well good."[230] Robinson is even more blunt about science fiction authors' capacity for prediction: "Nobody makes a successful prediction of the future. Except for maybe by accident."[231]

A final problem with viewing prediction as a stand-alone benefit of science fiction is that it can be very hard to distinguish between predicting and *generating* the future.

227. *See, e.g.*, KIM STANLEY ROBINSON, NEW YORK 2140 (2017) (describing a flooded New York partly submerged under water and how humans live and adapt); KIM STANLEY ROBINSON, THE MINISTRY FOR THE FUTURE (2020) (using fictional eyewitness accounts to describe a future in which climate change has decimated the planet).

228. *See* Gary Westfahl, *Introduction: Of Futures Imagined, and Futures Inhabited*, *in* SCIENCE FICTION AND THE PREDICTION OF THE FUTURE: ESSAYS ON FORESIGHT AND FALLACY 3 (Gary Westfahl et al., eds. 2011); *see also* CLUTE & NICHOLLS, *supra* note 187, at 957 (discussing the "false belief" that science fiction is "a literature of prediction").

229. Lex Clips, *Isaac Asimov: Does Science Fiction Predict the Future?*, YOUTUBE (Jan. 26, 2020), https://www.youtube.com/watch?v=f3kqqQSvLxQ [https://perma.cc/TRE2-V2TU].

230. *Id.*

231. Alter, *supra* note 209.

When is science fiction predicting future developments, and when is it supplying readers with stimulus that leads to future developments? This can be a hard question to answer without smoking-gun evidence. For example, in the case of Verne's submarine, if we did not have direct testimony from Lake in his autobiography, it would be very hard to say with certainty whether Verne predicted livable submarines in his novel, or instead inspired this development. We have an example of this "chicken-and-egg" phenomenon today, as commentators speculate about the motivations of the tech moguls who seek to take humans to space. It will be hard if not impossible to know, hundreds of years hence, whether works of science fiction like *Star Trek* predicted humans' eventual exploration of space or instead inspired humans to go there. As one writer puts the question: Did *Star Trek* predict the future, or is Jeff Bezos going to space because he loves *Star Trek*?[232]

In sum, we think the genre of science fiction is likely performing both functions—predicting future inventions and generating inventions by stimulating readers to action. The two functions are flipsides of the same coin and often come together. When it looks as if a science fiction author accurately predicted the future, we should also consider the possibility that the author's vision in fact inspired it and vice versa. If it turns out that a work of science fiction predicted a future technological development but did not inspire or influence the development in any way, this is impressive foresight on the part of the author. But the value for innovation—as opposed to entertainment—is unclear.

B. ACCLIMATING THE BROADER PUBLIC TO FUTURE INVENTIONS

We have also identified two additional, far less intuitive mechanisms through which science fiction can affect innovation. The first is science fiction's ability to familiarize the broader public with inventions of the future before they arrive. We call this the "acclimation" theory.

Patents have a limited audience. Patents' disclosures and utility to the world are always judged through the lens of a hypothetical "person having ordinary skill in the art" who is knowledgeable and experienced in the precise field of the invention but does not really exist.[233] Science fiction has a broader audience and its teachings are far more likely to spill over into society at large, becoming a part of the cultural conversation in ways that patents do not and arguably cannot. One important aspect of this spillover is science fiction's ability to acclimate the public to what is to come.

Academics who study science fiction theorize that, when science fiction's depictions of the technologies of the future reach the imaginations of the public at large, this can have an unexpected effect: It can soften the "future shock" that would otherwise occur

232. Kristen Houser, *Science Fiction Doesn't Predict the Future. It Inspires It*, BIG THINK (Oct. 23, 2021), https://bigthink.com/the-present/sci-fi-predict-inspire-future/ [https://perma.cc/Z2FD-XA6A] [https://web.archive.org/web/20230929013150/https://bigthink.com/the-present/sci-fi-predict-inspire-future/] ("William Shatner is going to space because Jeff Bezos loves Star Trek . . . . 'Science fiction inspired scores, hundreds, perhaps thousands of people to study, to become engineers.'").

233. *See generally* Mark D. Janis & Timothy J. Holbrook, *Patent Law's Audience*, 97 MINN. L. REV. 72, 93–100 (2012).

and thereby accelerate the pace at which new inventions are ultimately adopted once the technology becomes possible.[234] Gernsback did not discuss this "acclimation" theory in the editorials we reviewed, but we are virtually certain he was aware of it. Gernsback's files contain a clipping from a 1957 *New York Times Magazine* article featuring this theory and mentioning Gernsback as a part of this tradition. The article declares that if science fiction "has a more serious function" than mere entertainment, "it is less that of precisely pin-pointed prophecy than that of creating in its readers a climate of acceptance of new wonders and a willingness to think at least one step ahead."[235]

The most famous adherent of this theory was the British writer Arthur C. Clarke. Clarke, as mentioned above, was an admirer of Gernsback and his magazines. Clarke famously pronounced in a speech that he was "quite sure that by writing about space flight," science fiction authors like himself had "brought its realization nearer by decades . . . . Perhaps even more important, we have helped the public to appreciate what it will mean when it comes."[236] Clarke gave an unforgettable example of the acclimation theory in his last science fiction novel, *Time's Eye*, which he co-authored just before his death. The novel takes place in a future in which time travel has become possible. A time-travelling character, originally from the year 2037, argues that the reason people of his time have an easier time accepting time travel than British time-travelling characters from the early 1800s is that, by the year 2037, everyone had read or heard about H.G. Wells's *The Time Machine*. "For us," the character says, "there has been a *process of acculturation*. After a century of science fiction you and I are thoroughly accustomed to the idea of time travel, and can immediately accept its implications . . . . But that doesn't apply to these Victorian-age Brits."[237]

The acclimation theory is likely easier for many people to accept than the stimulus and prediction theories. The reason is that it does not rely on the premise that science fiction authors are capable of predicting, let alone influencing, what is to come. It does not overstate science fiction authors' expertise and influence in real-world technology development. Instead, it relies on the author's ability to write evocatively about the trends that are already occurring. It takes the "readers will be deeply thrilled" aspect of Gernsback's philosophy, but leaves out Gernsback's theory that science fiction authors have sufficient expertise about the technicalities of future inventions. It does not require them to have a special gift of prescience that others do not possess.

234. *See, e.g.*, GUNN, *supra* note 20, at 29 (discussing the view that science fiction eases the "future shock" for the "great masses of humanity who are fearful of change"); Westfahl, *supra* note 228, at 1 ("[S]upporters of the genre long argued one of science fiction's primary purposes, and virtues, is that it enables people to better prepare for the future with its plausible predictions of things to come.").

235. Anthony Boucher, *Science Fiction Still Leads Science Fact*, N.Y. TIMES MAG., Dec. 1, 1957 (on file with authors).

236. Arthur Clarke, Address at 1956 World Science Fiction Convention, *in* NEIL MCALEER, ARTHUR C. CLARKE: THE AUTHORIZED BIOGRAPHY 126 (1983); *see also* WESTFAHL, *supra* note 20, at 92 (discussing Gernsback's praise for Clarke as an example of "true prophetic science fiction"); Wythoff, *supra* note 20, at 22–23 (noting Arthur C. Clarke's respect for Gernsback).

237. ARTHUR C. CLARKE & STEPHEN BAXTER, TIME'S EYE 66 (Random House Publ'g Grp. 2004) (emphasis added).

The acclimation theory is also likely to be attractive because it allows for the influence of highly skilled but less science-heavy writers, like Ray Bradbury and Ursula K. LeGuin. Bradbury's human-focused stories about colonizing Mars and his novel about a dystopian future in which books are burned are widely beloved and assigned in schools. But they contain very little science.[238] Yet Bradbury's depictions of humans living on Mars or his visions of a government intent on burning books can still have an impact if they enter the broader cultural conversation. They give people the impression that these are realistic possibilities for humanity and acclimate or, to use Clarke's word, "acculturate" the general public to these visions of the future. Science fiction authors can have an impact, even if they do not give a single scientist a useful idea for what to do in a lab, because they can get inside peoples' heads and insert plausible depictions of the future that leave them ready to accept and appreciate it, or perhaps reject and fight it, when it comes.

C. ADDRESSING THE MORAL IMPLICATIONS OF FUTURE INVENTIONS

The second non-intuitive mechanism through which science fiction can affect innovation is its ability to consider the moral implications of future technologies. Patents can disclose useful *technical* information, but patents do not typically disclose any information at all about the morality of the new technologies they protect. Early jurists posited that patent examiners and courts should evaluate so-called "moral utility" as a criterion of patentability. For example, if a new invention was designed "to poison people, or to promote debauchery, or to facilitate private assassination," perhaps it should be deemed unpatentable because surely such an invention would be "injurious to the well-being, good policy, or sound morals of society . . . ."[239] For better or worse, the patent system moved away from this, ostensibly because neither patent examiners nor judges are fit (or perhaps even empowered under the Patent Act) to pass judgment on the morality of new technologies.[240]

Science fiction, in contrast, can, and frequently does, disclose information about the morality of new inventions. Along with speculating on what future technology will or could look like, it can provide insights on what it *should* look like. The author, through their story and characters, can weigh in on what would be socially or ethically desirable for humans to do.[241] Indeed, some of the most famous science fiction is "dystopian."[242] It imparts far more information about what not to do than what to do; it tells us far more about ethics than about technology. To give just one example, several novels written in the first half of the twentieth century, such as Aldus Huxley's *Brave New*

238. *See* RAY BRADBURY, THE MARTIAN CHRONICLES (1950); RAY BRADBURY, FAHRENHEIT 451 (1953).

239. *See* Juicy Whip, Inc. v. Orange Bang, Inc., 185 F.3d 1364, 1364 (Fed. Cir. 1999) (quoting Lowell v. Lewis, 15 F. Cas. 1018, 1019 (C.C.D. Mass. 1817)).

240. *See* MERGES & DUFFY, *supra* note 122, at 223–24 (citing Robert Merges, *IP in Higher Life Forms*, 47 MD. L. REV. 1051, 1062–68 (1988)).

241. *See, e.g.*, Contreras, *supra* note 31, at 71–72 ("[Science fiction is] an ideal medium in which to consider how the law can and should develop in the face of technological change."); *id.* at 88–108 (identifying works of science fiction that explore a range of legal issues in fictional setting).

242. *See* M. KEITH BOOKER & ANNE-MARIE THOMAS, THE SCIENCE FICTION HANDBOOK 65–73 (2009) (discussing dystopian science fiction as a subgenre).

World (1932) and George Orwell's *1984* (1948), feature authoritarian societies in which the populace is effectively sedated and made complacent through mind-altering substances—Soma and Victory Gin respectively. These portrayals of the drugs people might use to find contentment in the future impart significant information about inventions' *moral utility* but very little technical information. The chemical compositions of the drug and the drink, respectively, are not the point.

Gernsback often ignored the moral component of science fiction. He was entirely fixated on the technical side. However, by the editor John Campbell's time, science fiction was more holistic and socially relevant. The stories Campbell published in *Astounding Science Fiction*—which ultimately became the dominant science fiction magazine in lieu of Gernsback's *Amazing Stories*—engaged in significant moralizing. Many contained implicit warnings about the danger of modern technologies, especially weapons. The atomic bomb and nuclear energy, for example, featured prominently in stories written during the World War II era.[243] One *Astounding* story, "Deadline" by Cleve Cartmill, published in March 1944, featured the protagonist attempting to stop the detonation of a nuclear device. This generated interest from federal intelligence agents and calls for Campbell to "restrict the number and content of nuclear stories he published"—which Campbell refused to do.[244]

The modern genre has gone even farther. The so-called "New Wave" of science fiction, which began in the 1960s, focused far more heavily on the morality of future technologies than its forebearers. Science fiction began to deal with a wide range of social issues, from authoritarianism and military aggression, to feminism, gender, and patriarchy, to slavery.[245] Very little technical information is disclosed in some of these stories. Gernsback might not classify them as science fiction at all. But they do impart potentially useful information about the ethical dimensions of the social and technological developments they address.

VII. CONCLUSION

The phrase "science fiction" is often used to evoke the notion of an undeveloped thought experiment, a mere fabrication that does not deserve to be taken seriously. Many technologists and businesspeople use "science fiction" in a derogatory sense to refer to a technology that is not nearly possible or that is still many years away.[246] Patent

243. *See* Michael Ashley, *Introduction: From Bomb To Boom*, *in* MICHAEL ASHLEY, THE HISTORY OF THE SCIENCE FICTION MAGAZINE, VOL. 3: 1946–1955, at 13 (1976) (discussing trends in science fiction and the effect of "the nuclear age" on the genre).

244. This is Ashley's summary of *Deadline* and recounting of this incident. *Id.* at 15–16. *See also, e.g.*, ALDISS, *supra* note 188, at 233 (discussing *Deadline* and how some of Campbell's magazine's stories "seriously predicted" nuclear energy).

245. *See* BOOKER & THOMAS, *supra* note 242, at 86–97, 98–109, 129–30 (discussing, respectively, feminism and gender; science fiction "satires" dealing with issues like military aggression and patriarchy; and Octavia Butler's books and in particular KINDRED (1979), in which a woman is transported back into time into the body of her enslaved ancestor).

246. *See, e.g.*, Tom Krazit, *Why Quantum Computing Is Still Science Fiction*, PROTOCOL (Jan. 6, 2022), https://www.protocol.com/newsletters/protocol-enterprise/quantum-computing-ten-years-gone [https://perma.cc/49S3-CJ2J]

lawyers, too, employ this terminology, classifying a technical disclosure as "something almost like a science fiction novel" when they think it is not sufficiently enabled.[247]

The distinction between patentable invention and mere science fiction makes complete sense from the perspective of traditional patent law and policy. Current workability and presently-availing utility are fundamental criteria for obtaining a patent—and for very good reasons. Yet this is exactly the sort of prophetic science that Hugo Gernsback thought was invaluable to society and that deserved more respect from the patent system. For Gernsback, the underlying theory behind science fiction and patents was analogous. Both have the power to disclose useful information about the inventions of the future. Both may help others make, build upon, and improve those inventions in the real world.

Exploring the connection between patents and science fiction generates surprising insights, both for science fiction and for innovation policy. First, science fiction's patent law origin provides a new and different justification for science fiction's role in society. According to Gernsback and other adherents of his philosophy like Clarke, science fiction is not just a form of entertainment. It is a legitimate component of innovation policy. Gernsback's conception of science fiction is certainly not everyone's view of what science fiction is or should be.[248] But his beliefs, and their underlying reliance on patent theory, were nonetheless highly influential. They shaped the genre of science fiction as we know it.

Second, if we think that patents promote innovation, then maybe science fiction does too. It could be that without science fiction, society would not have many of the innovations that surround us today, or at least would not have obtained them so quickly. We do not necessarily suggest that humanity would not have such inventions "but for" the genre of science fiction. We do not suggest there would be no ChatGPT without Asimov's MULTIVAC. The influence is likely to have been far more subtle and diffuse. Like many technical fields, artificial intelligence has been incrementally advanced by many people over many years, making it impossible to draw defensible but-for conclusions. But nor can we throw up our hands and dismiss all such connections as merely happenstance.

There is also some wisdom in this history for today's science fiction writers. A little more patent-style "enablement" in science fiction might do more for innovation than science fiction writers want to believe. [249] There is nothing wrong with fantasy and so-

[https://web.archive.org/web/20231025004934/https://www.protocol.com/newsletters/protocol-enterprise/quantum-computing-ten-years-gone]; Daniel Clery, *Has a New Dawn Arrived for Space-Based Solar Power?*, 378 SCI. 238 (2022).

247. For example, in a recent case Judge Raymond Chen described a prior art reference as "something almost like a science fiction novel." Perry Cooper, *Raytheon-GE Patent Fight Hinges on NASA's 'Aspirational Engine,'* BLOOMBERG L. (Feb. 3, 2021), https://news.bloomberglaw.com/ip-law/raytheon-ge-patent-fight-hinges-on-nasas-aspirational-engine [https://perma.cc/Z99M-4V4N] [https://web.archive.org/web/20231025005645/https://news.bloomberglaw.com/ip-law/raytheon-ge-patent-fight-hinges-on-nasas-aspirational-engine].

248. *See, e.g.*, ALDISS, *supra* note 188, at 209–12 (discussing the evolution of the genre across time and describing Gernsback's views as outdated and too focused on inventions and "gadgets").

249. *See* Hrdy & Brean, *supra* note 19, at 403–13 (comparing patent law's and science fiction's standards for enablement).

called speculative fiction. It is often tremendously entertaining. But we call it science fiction—and thankfully not scientifiction—for a reason: It is based on kernels of real science. To channel Gernsback, what makes science fiction different from romance and adventure stories is that it is grounded in scientific facts or theories and can be prophetic.[250] It might one day come to pass. Science fiction authors who work to enable their stories, even just a bit, have a better chance to give a stimulus to readers to reduce their inventions to practice. Many, many authors already do this without compromising the quality of the narrative.[251] They might literally affect the future in the way we imagine all inventors hope their patents will.

250. *See supra* Part I.

251. *See, e.g.*, Patrick Armstrong, *The Best Hard Sci-Fi Novels for Newcomers To the Subgenre*, GAMERANT (Sept. 9, 2022), https://gamerant.com/best-hard-sci-fi-novels-newcomers/#the-three-body-problem-mdash-liu-cixin [https://perma.cc/8PSP-JT3R] [https://web.archive.org/web/20231012224003/https://gamerant.com/best-hard-sci-fi-novels-newcomers/]; Lesley L. Smith, *The 25 Best Hard Science Fiction Novels of All Time*, UPJOURNEY (Feb. 21, 2021), https://upjourney.com/best-hard-science-fiction-novels [https://perma.cc/GN4Y-VMPG] [https://web.archive.org/web/20231012224152/https://upjourney.com/best-hard-science-fiction-novels].