NOTES

RELATING THE TWO EXPERIMENTAL USES IN PATENT LAW: INVENTOR'S NEGATION AND INFRINGER'S DEFENSE

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INTRODUCTION

> *I believe that there is no philosophical high-road in science, with epistemological signposts. No, we are in a jungle and find our way by trial and error, building our roads behind us as we proceed.*[1]
>
> *It does not make any difference how beautiful your guess is. It does not make any difference how smart you are, who made the guess, or what his name is – if it disagrees with experiment it is wrong.*[2]

The above-quoted Nobel Prize–winning physicists are famous for discovering laws of nature, which are not patentable under the U.S. patent system.[3] The two processes of experimentation that they describe, however, apply with equal vigor to the discovery of useful inventions, which *are* patentable in the Unites States.[4] In the first class of experiments, the lost inventor forges through a "jungle" of uncertainty, using experiments as a machete, often changing course, and, if lucky, finding useful inventions along the way. When this inventor/pioneer reports back to the community, he tells (rather than shows) the community about his discoveries in writing. In the second class of experiments, the scientific community, armed with this written account and a healthy skepticism, attempts to retrace and expand the original inventor's path. The scientific community performs the identical experiments that the inventor performed, as well as new experiments, all in an effort to corroborate or debunk the inventor's supposed discovery.[5] During this verification phase, a member of the community may stumble upon her own discoveries, becoming an inventor herself and triggering another cycle of

[1] Max Born, *quoted in* GERALD HOLTON, THEMATIC ORIGINS OF SCIENTIFIC THOUGHT: KEPLER TO EINSTEIN 18 (1973).

[2] RICHARD FEYNMAN, THE CHARACTER OF PHYSICAL LAW 156 (1965).

[3] *See* Diamond v. Chakrabarty, 447 U.S. 303, 309 (1980) ("The laws of nature, physical phenomena, and abstract ideas have been held not patentable.").

[4] *See* Diamond v. Diehr, 450 U.S. 175, 187 (1981) ("It is now commonplace that an *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.").

[5] *See, e.g.*, K.C. Schwab et al., *Comment on "Evidence for Quantized Displacement in Macroscopic Nanomechanical Oscillators,"* 95 PHYSICAL REV. LETTERS 248901, 248901 (2005) (disputing a fellow scientist's research conclusions); *see also* Rebecca S. Eisenberg, *Patents and the Progress of Science: Exclusive Rights and Experimental Use*, 56 U. CHI. L. REV. 1017, 1051 (1989) ("[S]cience advances through ever more rigorous efforts of scientists to prove prevailing theories wrong." (citing KARL R. POPPER, THE LOGIC OF SCIENTIFIC DISCOVERY 278-81 (Karl R. Popper, Julius Freed & Lan Freed eds. & trans., 1st English ed., Hutchinson & Co. 1959) (1934))).

verification and possible discovery.[6] Thus, the inventor captured in Born's words serves the function of making the initial and costly foray into uncharted scientific territory; the public, as Feynman envisions, authenticates those results and facilitates follow-on innovation.

The U.S. patent system strikes a "delicate balance" between the *inventor* and the *public*.[7] The inventor, for his part, receives an exclusive monopoly over the patented invention for a limited time.[8] The inventor's right to exclude the public from practicing the patented invention is meant to "promote the Progress of Science and useful Arts."[9] In return, the public receives the benefit of the inventor's disclosure of a novel invention as well as the right to practice the invention once the patent expires.[10] Together, the give-and-take between the inventor and the public is termed the patent "bargain" or "quid pro quo."[11] If, however, the invention was previously known or available to the public, there would be no basis for granting a patent on the known invention because "[t]here would be no quid pro quo – no price for the exclusive right or monopoly conferred upon the inventor."[12] Such a patent, if "anticipated" by

[6] The patent system reflects this incremental process of innovation. *See* 35 U.S.C. § 101 (2000) (defining patentable subject matter to include "any new and useful improvement" of an existing invention).

[7] Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722, 731 (2002); *see also* Bonito Boats, Inc. v. Thunder Craft Boats, Inc., 489 U.S. 141, 150-51 (1989) (calling the patent system "a carefully crafted bargain for encouraging the creation and disclosure of new, useful, and non-obvious advances in technology").

[8] 35 U.S.C. § 154(a)(1) ("Every patent shall contain . . . a grant to the patentee, his heirs or assigns, of the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States or importing the invention into the United States . . . ."); *id.* § 154(a)(2) (setting the patent term to begin on the date the patent issues and to end twenty years from the date the patent application was filed).

[9] U.S. CONST. art. I, § 8, cl. 8; *see also* Aronson v. Quick Point Pencil Co., 440 U.S. 257, 262 (1979) ("First, patent law seeks to foster and reward invention . . . .").

[10] *See* 35 U.S.C. § 112 para. 1 (setting forth the level of detail an inventor must provide in the disclosure); *see also Aronson*, 440 U.S. at 262 (stating that the patent system "promotes disclosure of inventions to stimulate further innovation and to permit the public to practice the invention once the patent expires"); *In re* Alappat, 33 F.3d 1526, 1571 (Fed. Cir. 1994) (Newman, J., concurring) ("It is estimated that 85-90% of the world's technology is disclosed only in patent documents.").

[11] *See, e.g.*, J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc., 534 U.S. 124, 142 (2001) ("The disclosure required by the Patent Act is 'the *quid pro quo* of the right to exclude.'" (quoting Kewanee Oil Co. v. Bicron Corp., 416 U.S. 470, 484 (1974))); Brenner v. Manson, 383 U.S. 519, 534 (1966) ("The basic *quid pro quo* . . . for granting a patent monopoly is the benefit derived by the public from an invention with substantial utility."); 3 DONALD S. CHISUM, CHISUM ON PATENTS: A TREATISE ON THE LAW OF PATENTABILITY, VALIDITY AND INFRINGEMENT § 7.01 (2006) ("The requirement of adequate disclosure assures that the public receives 'quid pro quo' for the limited monopoly granted to the inventor.").

[12] Pennock v. Dialogue, 27 U.S. 1, 23 (1829).

the prior art, would be invalid for lacking novelty.[13] When invalidating an inventor's patent for lack of novelty or finding that a member of the public infringes a patent, courts apply similar, yet time-shifted, tests: "That which infringes, if later, would anticipate, if earlier."[14] This "symmetry" between anticipation and infringement tends to balance the roles of the two key parties to the patent bargain – the inventor and the public.[15]

This Note explores how U.S. courts have crafted exceptions to both the inventor's anticipation test and the public's infringement test in cases where the parties perform experiments on an invention in order to understand or improve upon it. These judge-made exceptions are the inventor's experimental use *negation* of 35 U.S.C. § 102(b) invalidity and the infringer's experimental use *defense* to 35 U.S.C. § 271(a) infringement.[16] The two experimental use doctrines have developed separately because U.S. courts have historically applied them as they arise in their separate contexts. As a result of this

[13] *See* 35 U.S.C. § 102; *see also* ATD Corp. v. Lydall, Inc., 159 F.3d 534, 545 (Fed. Cir. 1998) ("A patent is invalid for anticipation when the same device or method, having all of the elements and limitations contained in the claims, is described in a single prior art reference.").

[14] Peters v. Active Mfg. Co., 129 U.S. 530, 537 (1889) (quoting Peters v. Active Mfg. Co., 21 F. 319, 321 (C.C.S.D. Ohio 1884)); *see also* Upsher-Smith Labs., Inc. v. Pamlab, L.L.C., 412 F.3d 1319, 1322 (Fed. Cir. 2005) ("A century-old axiom of patent law holds that a product 'which would literally infringe if later in time anticipates if earlier.'" (quoting Schering Corp. v. Geneva Pharms., Inc., 339 F.3d 1373, 1379 (Fed. Cir. 2003))).

[15] *See* ROBERT PATRICK MERGES & JOHN FITZGERALD DUFFY, PATENT LAW AND POLICY: CASES AND MATERIALS 272 (3d ed. 2002) ("[T]his rule establishes a common sense symmetry between anticipation and infringement: Patentees should not get exclusionary rights covering anything that already existed in the public domain prior to their work."); *see also* 1 CHISUM, *supra* note 11, § 3.02[1][f] (stating that "the symmetry between the tests" may prove fatal to a patent's validity if the accused infringer establishes that its device is prior art).

[16] The difference between a "negation" and an "affirmative defense" (or "exemption") is procedural rather than substantive. Both operate to excuse a researcher's activities from qualifying as an invalidating or infringing use of the patent. The difference is whether the researcher bears the burden of proving experimental use. *Compare* TP Labs., Inc. v. Prof'l Positioners, Inc., 724 F.2d 965, 971 (Fed. Cir. 1984) (stating that, in the context of a patent challenge based upon a claim of § 102(b) invalidity, the researcher/patent owner need not prove that a public use was experimental to assert an experimental use defense), *with* Madey v. Duke Univ., 307 F.3d 1351, 1361 (Fed. Cir. 2002) (stating that, in the context of a § 271(a) infringement claim, the researcher/infringer must prove experimental use as part of an affirmative defense). This Note addresses only the substantive features of the two experimental uses. For an argument that the researcher should bear the burden of proving experimental use in order to negate § 102(b) invalidity, see William C. Rooklidge & Stephen C. Jensen, *Common Sense, Simplicity and Experimental Use Negation of the Public Use and On Sale Bars to Patentability*, 29 J. MARSHALL L. REV. 1, 42-46 (1995) (explaining that the burden of proof should lie with the party that asserts the affirmative defense and possesses greater knowledge of the alleged experimental activities).

disconnected treatment, the delicate balance of the patent bargain has shifted sharply in favor of the inventor and against the public. In fact, whereas the Supreme Court recently reaffirmed the vitality of the inventor's negation,[17] the Court of Appeals for the Federal Circuit has severely curtailed the public's infringement defense[18] – even questioning its very existence.[19] Thus, the public's follow-on research (i.e., Feynman's "experiment") currently receives almost no protection from infringement, while the inventor's research (i.e., Born's "experiment") is excused from what would otherwise invalidate his patent. This pro-patentee asymmetry creates a strong incentive for inventors in the short-term to obtain and enforce patent rights, but threatens to undermine longer-term progress by barring the public from verifying, circumventing, and improving patented technology.

Scholars favoring a broad experimental use defense to § 271(a) infringement have based their arguments on such policies as the research needs of the scientific community,[20] mounting transaction costs to cross-licensing,[21] the cumulative nature of innovation,[22] the long history of the defense,[23] and the goal of promoting the competitiveness of U.S. companies in the global

[17] *See* Pfaff v. Wells Elecs., Inc., 525 U.S. 55, 64 (1998) ("[A]n inventor who seeks to perfect his discovery may conduct extensive testing without losing his right to obtain a patent for his invention – even if such testing occurs in the public eye. The law has long recognized the distinction between inventions put to experimental use and products sold commercially.").

[18] *See Madey*, 307 F.3d at 1362 ("[T]he experimental use defense is very narrow and strictly limited.").

[19] *See* Embrex, Inc. v. Serv. Eng'g Corp., 216 F.3d 1343, 1353 (Fed. Cir. 2000) (Rader, J., concurring) ("The Supreme Court's recent reiteration that infringement does not depend on the intent underlying the allegedly infringing conduct, to my eyes, precludes any further experimental use defense . . . .").

[20] *See* Eisenberg, *supra* note 5, at 1021, 1086 (citing "the needs of the research science community"); Rebecca S. Eisenberg, *Proprietary Rights and the Norms of Science in Biotechnology Research*, 97 YALE L.J. 177, 230 (1987) (arguing that the defense "offers a potential mechanism for reconciling the patent monopoly with the interest of the research community").

[21] *See* Maureen A. O'Rourke, *Toward a Doctrine of Fair Use in Patent Law*, 100 COLUM. L. REV. 1177, 1206 (2000) (proposing that courts factor in the nature and strength of market failure that frustrates licensing when weighing the defense).

[22] *See* Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1648 (2003) (citing "the needs of iterative industries"); Katherine J. Strandburg, *What Does the Public Get?: Experimental Use and the Patent Bargain*, 2004 WIS. L. REV. 81, 83 (arguing that an experimental use defense "can promote faster cumulative technological progress").

[23] *See* Janice M. Mueller, *The Evanescent Experimental Use Exemption from United States Patent Infringement Liability: Implications for University and Nonprofit Research and Development*, 56 BAYLOR L. REV. 917, 927-36 (2004) (tracking the Federal Circuit's evisceration of what was once a much broader defense).

marketplace.[24] In contrast, this Note looks to the existence of the *other* judge-made experimental use exception – the inventor's § 102(b) negation – to support the need for an infringer's § 271(a) experimental use defense that better balances the roles of the inventor and the public within the statutory scheme of the patent bargain.[25] Part I and Part II provide separate overviews of the inventor's negation and the infringer's defense, principally to show that these two experimental use doctrines share a common historical origin in Justice Joseph Story and serve similar policy goals. Part III.A underscores the doctrines' combined role in preserving the symmetry of the patent bargain and identifies which objective factors currently used in judging the inventor's negation can be extended to the infringer's defense. The result is a framework, applied in Parts III.B and III.C, for ensuring that a researcher's activities – whether under the inventor's negation or the infringer's defense – are primarily experimental and not commercial.

I. INVENTOR'S EXPERIMENTAL USE NEGATION OF § 102(B) INVALIDITY

Congress expressly bars an inventor from receiving a patent under 35 U.S.C. § 102(b) if the inventor publicly used or sold the invention more than one year before applying for the patent. This statute embodies a policy that protects the public's side of the patent bargain: the receipt of a *new* invention. The Supreme Court, however, excuses the inventor's public use or sale if the inventor demonstrates that the use or sale served a bona fide experimental purpose. This common law doctrine serves the inventor's interest in performing the research necessary to secure a patent, thereby promoting the progress of science.

A. *Invalidity Under 35 U.S.C. § 102(b)*

Section 102(b) of the Patent Act of 1952 creates a statutory bar to patentability if "the invention was . . . in *public use* or *on sale* in this country, more than one year prior to the date of the application for patent in the United

[24] *See* Harold C. Wegner, *Post-*Merck *Experimental Use and the "Safe Harbor,"* 15 FED. CIR. B.J. 1, 37 (2005) (positing that the absence of an experimental use defense in the United States may encourage R&D companies to move their operations offshore); *see also* John F. Duffy, *Harmony and Diversity in Global Patent Law*, 17 BERKELEY TECH. L.J. 685, 718-19 (2002) (same).

[25] At least one group of academics has compared the two experimental use doctrines, arguing for a consistent treatment. *See* Brief of Intellectual Property Professors as Amici Curiae in Support of Neither Party at 7, Merck KGaA v. Integra Lifesciences I, Ltd., 545 U.S. 193 (2005) (No. 03-1237) (arguing for a similar statutory construction of the word "use" in the statutory-bar and infringement provisions so as to exclude experimental uses from § 102(b) and § 271(a)). This Note differs insofar as it does not rely on a similar textual construction of the two statutes, but rather focuses on the doctrines' roles in maintaining the symmetry of the patent bargain as well as the doctrines' overlapping historical origins, policies, and factual inquiries.

States."[26] The statute speaks in general terms, invalidating the patent even in cases where the public-use or on-sale activities were conducted by the inventor herself.[27] The policy behind this statutory bar is the protection of the public's side of the patent bargain. In particular, § 102(b) ensures the free and continued use of knowledge already available in the public domain, and prohibits the inventor from commercially exploiting the invention for longer than the statutory patent term.[28]

Similar policies supporting both the public-use and on-sale bars have led to the formulation of similar tests for triggering each statutory bar. The Supreme Court, in *Pfaff v. Wells Electronics, Inc.*,[29] crafted a two-prong test to determine the applicability of the on-sale bar of § 102(b): the on-sale bar to patentability arises where, before the one-year critical date, the invention was both "the subject of a commercial offer for sale,"[30] and "ready for patenting."[31] In *Pfaff*, the invention became "the subject of a commercial offer for sale" when the inventor offered to sell over 10,000 units of the invention for over $90,000.[32] Moreover, the invention was "ready for patenting" because the

[26] Patent Act of 1952, ch. 950, § 102(b), 66 Stat. 792, 797 (codified as amended at 35 U.S.C. § 102(b) (2000)) (emphasis added). From its inception, the Patent Act had always had either an implicit or explicit requirement that the invalidating use or sale be public. *See* Act of July 4, 1836, ch. 357, § 6, 5 Stat. 117, 119 (codifying the "public use" and "on sale" bars to patentability); Pennock v. Dialogue, 27 U.S. 1, 17-19 (1829) (interpreting the words "not known or used before the application" in the Patent Act of 1793 as meaning "not known or used by the *public*" (emphasis added)).

[27] *See* Invitrogen Corp. v. Biocrest Mfg., L.P., 424 F.3d 1374, 1381 (Fed. Cir. 2005) ("[Section] 102(b) can apply to the inventor's own actions.").

[28] *See* Bonito Boats, Inc. v. Thunder Craft Boats, Inc., 489 U.S. 141, 148 (1989) (stating that § 102(b) expresses "a congressional determination that the creation of a monopoly in [publicly available] information would not only serve no socially useful purpose, but would in fact injure the public by removing existing knowledge from public use"); Tone Bros. v. Sysco Corp., 28 F.3d 1192, 1198 (Fed. Cir. 1994) ("We have enumerated the policies underlying section 102(b), albeit in the 'on sale' context, as follows: (1) discouraging the removal, from the public domain, of inventions that the public reasonably has come to believe are freely available; (2) favoring the prompt and widespread disclosure of inventions; (3) allowing the inventor a reasonable amount of time following sales activity to determine the potential economic value of a patent; and (4) prohibiting the inventor from commercially exploiting the invention for a period greater than the statutorily prescribed time." (citing King Instrument Corp. v. Otari Corp., 767 F.2d 853, 860 (Fed. Cir. 1985))).

[29] 525 U.S. 55 (1998).

[30] *Id.* at 67. In determining whether a "commercial offer for sale" has taken place, courts will typically look to the Uniform Commercial Code definition for guidance. *See, e.g.*, Minn. Mining & Mfg. Co. v. Chemque, Inc., 303 F.3d 1294, 1307 (Fed. Cir. 2002).

[31] *Pfaff*, 525 U.S. at 67-68 (explaining that this prong "may be satisfied in at least two ways: by proof of reduction to practice . . . or by proof that . . . the inventor had prepared drawings or other descriptions of the invention that were sufficiently specific to enable a person skilled in the art to practice the invention").

[32] *Id.* at 58, 67.

inventor prepared detailed drawings of the design, dimensions, and materials to be used in making the invention.[33]

Following the *Pfaff* Court's lead in the on-sale context, the Federal Circuit fashioned a similar two-prong test for the public-use bar in *Invitrogen Corp. v. Biocrest Manufacturing, L.P.*[34] The public-use bar of § 102(b) arises where, before the one-year critical date, the invention was both "ready for patenting" and "in public use."[35] The court explained further that "[t]he proper test for the public use prong . . . is whether the purported use: (1) was accessible to the public; or (2) was commercially exploited."[36] The invention in *Invitrogen*, for example, was not "in public use" because the corporate patentee kept the invention strictly confidential within the company and did not sell the invention or any products made by the patented process.[37]

B. *Historical Development of the Inventor's Experimental Use*

Notwithstanding the recent articulations of the tests for the statutory bars, the *Pfaff* Court made clear that it did not intend to disrupt the inventor's long-recognized experimental use negation of those bars.[38] The *Pfaff* Court, quoting one of the earliest experimental use cases, *Elizabeth v. Pavement Co.*,[39] noted that the statutory bars arise when the inventor attempts "'*to use* [*the invention*] *for a profit, and not by way of experiment*.'"[40] Thus, the Court continues to recognize the difference between an inventor's activities that are "commercial rather than experimental in character."[41] The continued vitality of the early common law doctrine of an inventor's experimental use justifies a review of its historical origins.

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[33] *Id.* at 58, 68.

[34] 424 F.3d 1374 (Fed. Cir. 2005).

[35] *Id.* at 1379; *see also* SmithKline Beecham Corp. v. Apotex Corp., 365 F.3d 1306, 1317 (Fed. Cir. 2004) ("[Section] 102(b) erects a bar where, before the critical date, the invention was ready for patenting and was used by a person other than the inventor who is under no confidentiality obligation.").

[36] *Invitrogen*, 424 F.3d at 1380.

[37] *Id.* at 1382-83.

[38] *See Pfaff*, 525 U.S. at 67 ("The experimental use doctrine, for example, has not generated concerns about indefiniteness, and we perceive no reason why unmanageable uncertainty should attend a rule that measures the application of the on-sale bar of § 102(b) against the date when an invention that is ready for patenting is first marketed commercially." (footnote omitted)).

[39] 97 U.S. 126 (1877).

[40] *Pfaff*, 525 U.S. at 65 (quoting *Elizabeth*, 97 U.S. at 137).

[41] *Id.* at 67; *see also* Monon Corp. v. Stoughton Trailers, Inc., 239 F.3d 1253, 1258 (Fed. Cir. 2001) ("[E]vidence that the . . . sale of the patented device was primarily experimental may negate an assertion of invalidity.").

1. Justice Story's Legacy

Of all the early American jurists, Justice Joseph Story contributed most to shaping the law surrounding the inventor's experimental use.[42] In 1825, Supreme Court Justice Story, sitting as circuit justice in *Mellus v. Silsbee*,[43] opined that a patent should not be found invalid for lack of novelty if the inventor had licensed "a few persons" to use his invention in order to "ascertain its utility" prior to applying for the patent.[44] Four years later, Justice Story delivered the opinion of the Supreme Court in *Pennock v. Dialogue*,[45] a case determining whether a patent on a new kind of hose was valid even though the patentee had sold thirteen thousand feet of the hose to several companies in Philadelphia during the seven years prior to applying for the patent.[46] Counsel for the party challenging the validity of the patent argued that the purpose of the sale was "not to experiment with [the invention], in order to bring the invention to perfection; but for public use, as a thing already completed, and adapted to the purpose of arresting the ravages of fire."[47] Justice Story determined that the words in the statute, "*used before the application*," implicate only those uses or sales that are public.[48] While finding public use and sale in this case, and thus holding against the patentee, Justice Story reiterated his proposition in *Mellus* that the inventor may "employ others to assist in the original structure" without abandoning his right to a patent.[49]

These statements demonstrate that Justice Story was sympathetic to the practical difficulties that inventors face when bringing an idea to fruition. Justice Story revisited the doctrine twice more as circuit justice,[50] firmly establishing that an inventor's experimental use – whether to "bring the

[42] *See* Rooklidge & Jensen, *supra* note 16, at 10 n.38 ("No other jurist would contribute as much to the law of experimental use until Judge (later Chief Judge) Helen Nies of the United States Court of Appeals for the Federal Circuit. Perhaps no other jurist has contributed as much to patent law as Justice Story." (citations omitted)).

[43] 16 F. Cas. 1332 (C.C.D. Mass. 1825) (No. 9404).

[44] *Id.* at 1334.

[45] 27 U.S. 1 (1829).

[46] *Id.* at 3.

[47] *Id.* at 9 (offering as proof the fact that the hose was "never materially altered or improved" during the seven years prior to the patent application).

[48] *Id.* at 18-19 ("The words then, to have any rational interpretation, must mean, not known or used by others, before the application.").

[49] *Id.* at 19.

[50] Wyeth v. Stone, 30 F. Cas. 723, 726 (C.C.D. Mass. 1840) (No. 18,107) ("If it was merely used occasionally by himself in trying experiments . . . that would not take away his right to a patent."); Ryan v. Goodwin, 21 F. Cas. 110, 111 (C.C.D. Mass. 1839) (No. 12,186) ("[I]f the use be merely experimental, to ascertain the value or utility, or success of the invention, by putting it in practice, that is not such a use, as will deprive the inventor of his title.").

invention to perfection"[51] or to "ascertain its utility"[52] – does not invalidate the inventor's patent.

2. The Pavement Cases

In 1877 and 1892, the Supreme Court reached opposite outcomes in two strikingly similar "Pavement Cases," thus illustrating the fact-sensitive nature of experimental use. In *Elizabeth v. Pavement Co.*,[53] the patentee sued the city of Elizabeth, New Jersey, for infringing a patent on an improved wooden pavement.[54] In its defense, the city alleged that the patent was invalid because the inventor had publicly used the invention during the six years prior to his application for the patent.[55] Indeed, the inventor had laid seventy-five feet of the pavement on a frequently traveled road in Boston, directly in front of a tollbooth that collected money on behalf of a corporation in which the inventor was a stockholder and treasurer.[56] The inventor's purpose, however, was to test the new pavement's durability to both wear and decay.[57] The location was ideally suited for his experiment because the privately owned road facilitated both inspection and improvement, and the high volume of stop-and-go traffic leading to and from Boston provided a rigorous testing ground.[58] The inventor constructed the pavement by himself at his own expense, inspected the site almost daily, and informed the toll-keeper that this was his experiment.[59]

The Court, in deciding that this was not a public use under the patent laws, looked first at the nature of the invention. Here, the street pavement was an invention whose utility and durability had to be tested in public[60] for an extended period of time.[61] This aspect of the inquiry reflected the Court's belief that, without an experimental use doctrine, the patent system would create a disincentive to research those types of inventions that can only be tested in public.

Next, the Court analyzed the motivations behind the public use, finding that the inventor's own labor and routine inspection evidenced the "good faith . . .

[51] *Pennock*, 27 U.S. at 9.

[52] Mellus v. Silsbee, 16 F. Cas. 1332, 1334 (C.C.D. Mass. 1825) (No. 9404).

[53] 97 U.S. 126 (1877).

[54] *Id.* at 128-29.

[55] *Id.* at 129.

[56] *Id.* at 133.

[57] *Id.*

[58] *Id.* at 134.

[59] *Id.* at 133-34.

[60] *Id.* at 134 ("[T]he nature of a street pavement is such that it cannot be experimented upon satisfactorily except on a highway, which is always public."); *id.* at 136 ("The only way in which they could use it was by allowing the public to pass over the pavement.").

[61] *Id.* at 135 ("If durability is one of the qualities to be attained, a long period, perhaps years, may be necessary to enable the inventor to discover whether his purpose is accomplished.").

purpose of ascertaining whether [the invention] was what he claimed it to be."[62] As such, the Court appreciated the inventor's interest in understanding and perfecting his invention.[63] The fact that the tollbooth and the public may have derived a benefit from the inventor's use was not, in the Court's view, fatal to his case, as the benefit was secondary to the inventor's experimental purpose.[64]

The case of *Root v. Third Avenue Railroad Co.*[65] appears to present very similar facts: the inventor of an improved cable-car railway wanted to test the durability of the cable tracks on San Francisco streets for three years before applying for a patent.[66] Here, however, the inventor was the superintendent of the project – a position he was awarded after disclosing the invention to the railroad company directors.[67] He did not install the road at his own expense, nor did he retain any control over the experiment.[68] The inventor never inspected the conditions of the road, nor could he have made any changes to it even if he wanted to.[69] Accordingly, the Court found that the inventor's use and sale did not qualify as experimental.[70] These two "Pavement Cases" demonstrate that the Court assesses an inventor's experimental negation by closely examining the surrounding facts, including the methods and design of the experiment, the inventor's supervision of the invention, and the consideration received for its disclosure.

3. Public – Albeit Hidden – Use or Sale

Two other Supreme Court cases stand for the proposition that an invention need not be in public view to trigger the public-use or on-sale bars. In neither case did the Court excuse the use or sale as being experimental, as the inventors' alleged experiments were half-hearted at best.

In *Egbert v. Lippmann*,[71] the famous "Corset Case," the inventor conceived of an invention in 1855 after hearing two female acquaintances complain about how the metal steels on their corsets were prone to breaking.[72] Shortly

[62] *Id.* at 136.

[63] *Id.* at 137 (stating that an inventor may properly seek to "bring his invention to perfection, or to ascertain whether it will answer the purpose intended").

[64] *See id.* at 135 ("Whilst the supposed machine is in such experimental use, the public may be incidentally deriving a benefit from it.").

[65] 146 U.S. 210 (1892).

[66] *See id.* at 215-16 (explaining that the inventor did not want to pursue a patent application if his design "proved weak or undesirable").

[67] *Id.* at 214-15.

[68] *Id.* at 225.

[69] *Id.* at 221.

[70] *Id.* at 225 ("We think that the present case does not fall within the principles laid down in *Elizabeth v. Pavement Co.*").

[71] 104 U.S. 333 (1881).

[72] *Id*. at 335.

thereafter, the inventor presented one of the women – whom he later married – with an improved pair of corset-steels that he himself had constructed.[73] During the eleven years before the patent application, the woman wore the steels under her clothes both at home and in public.[74] Importantly for the Court, the inventor "imposed no obligation of secrecy, nor any condition or restriction whatever" on the woman's use of the new invention.[75] Although the invention had ostensibly remained out of public view,[76] the lack of restrictions and control created the possibility that the woman "*might* have exhibited them to any person, or made other steels of the same kind, and used or sold them without violating any condition or restriction imposed."[77] As for the inventor's experimental intent, he presented no evidence that he altered or improved upon the invention during the aforementioned eleven-year period.[78] Accordingly, the Court concluded that this was a public use – not an experimental use.[79]

Analogously, the invention in *Smith & Griggs Manufacturing Co. v. Sprague*[80] was hidden from public view inside the patentee's factory, but was used without restriction to manufacture products that were sold to the public.[81] The patented invention was a machine for making shoe buckles.[82] During the four years prior to seeking patent protection, the company operated the machine within its factory to produce and sell over seven million buckles.[83] Throughout that time, the machine was located in a room that customers, suppliers, and even competitors were able to access without restriction.[84] The company asserted an experimental use negation, which it claimed was evidenced by certain improvements made to the machine over the course of the four-year period.[85]

The Court, however, did not find this argument persuasive. The improvements were made to parts of the machine that were not claimed in the patent.[86] The company's witness could not provide any dates or details of those improvements.[87] Additionally, the sale of over seven million buckles

[73] *Id.*

[74] *Id.* at 337.

[75] *Id.*

[76] *Id.* at 336.

[77] *Id.* at 337 (emphasis added).

[78] *Id.*

[79] *Id.* at 338.

[80] 123 U.S. 249 (1887).

[81] *Id.* at 260.

[82] *Id.* at 251-53.

[83] *Id.* at 264.

[84] *Id.* at 260.

[85] *Id.* at 264.

[86] *Id.* at 256.

[87] *Id.* at 265 ("He gives no account of the dates of any such experiments, nor any particulars respecting them. He does not say whether more than one mode of overcoming

was evidence that the improvements were unnecessary to the successful operation of the machine.[88] Thus, the Court concluded that the experimental use was "merely incidental and subsidiary" to the machine's overriding commercial use.[89]

The Court's strong emphasis in these cases on confidentiality and control over the invention indicates that it saw the underlying purpose of § 102(b) as protecting the public from the inventor's removal of publicly available information. Commercial exploitation of an invention as a trade secret violates the policies of encouraging an inventor's prompt disclosure and preventing the inventor's exploitation of an invention beyond the statutory patent term.[90] Thus § 102(b) can be seen as a tool that forces an inventor to choose between patent protection and trade secret protection. Moreover, an experimental use will not be found if the inventor makes half-hearted and undocumented attempts at perfecting her invention.

C. *Policies Supporting the Inventor's Experimental Use*

Whereas § 102(b) was primarily designed to protect the public interest, the inventor's experimental use negation is justified by policies that serve the inventor's interest. Two such policies are described below.

1. Adequate Disclosure

The inventor's negation allows the inventor to perform the research necessary to provide the public with an adequate disclosure of the invention. A patent may not be granted on an invention unless the inventor provides the Patent Office with information sufficient to satisfy statutory requirements.[91] Such a detailed disclosure, however, would be impossible if the inventor himself did not adequately understand the invention.[92] Therefore, public testing may be necessary, as Justice Story envisioned, for the inventor to "bring the invention to perfection"[93] and "ascertain its utility"[94] before

the difficulties experienced was suggested and tried, or not; nor, if more than one device was attempted, what they were.").

[88] *Id.*

[89] *Id.* at 266.

[90] *See* Metallizing Eng'g Co. v. Kenyon Bearing & Auto Parts Co., 153 F.2d 516, 520 (2d Cir. 1946) ("[I]t is a condition upon an inventor's right to a patent that he shall not exploit his discovery competitively after it is ready for patenting; he must content himself with either secrecy, or legal monopoly.").

[91] *See* 35 U.S.C. § 112 para. 1 (2000) (setting forth the written description, enablement, and best mode requirements); *see also id.* § 101 (requiring that the invention be "useful").

[92] *See* RCA Corp. v. Data Gen. Corp., 887 F.2d 1056, 1061 (Fed. Cir. 1989) (defining experimental use as "perfecting or completing an invention to the point of determining that it will work for its intended purpose").

[93] Pennock v. Dialogue, 27 U.S. 1, 9 (1829).

[94] Mellus v. Silsbee, 16 F. Cas. 1332, 1334 (C.C.D. Mass. 1825) (No. 9404).

applying for a patent. Whereas the public will benefit from a well-researched invention upon the expiration of the patent,[95] it is the inventor who, with the aid of an experimental use negation, is better able to satisfy the disclosure requirements and receive the immediate benefit of the patent.

At first blush, an experimental use negation based on a policy that "the invention should be perfect and properly tested"[96] appears unnecessary in light of other patent doctrines. For instance, there is no requirement that the invention be "perfect" to be patentable.[97] Additionally, an inventor need not create an actual working embodiment of the invention: a constructive reduction to practice supported by "prophetic examples" makes it possible for an inventor to receive a patent without performing a single experiment.[98]

While these arguments may undercut the need for an inventor's experimental use negation in some circumstances, as with relatively simple inventions whose utility and function are apparent from theory, the need for actual experiments arises in most factual and legal circumstances. First, although an invention need not be perfect, "its practical efficacy and utility must be demonstrated."[99] In the biochemical field, for instance, an inventor may need to submit data from actual experiments to prove the invention's substantial and specific utility.[100] But even in less technologically complex fields, such as with the improved wooden pavement in *Elizabeth*, an inventor may need experiments to determine whether the invention is in fact an improvement over existing technology.[101] Second, all patent applications,

[95] *See* Aronson v. Quick Point Pencil Co., 440 U.S. 257, 262 (1979) (stating that the patent system "promotes disclosure of inventions . . . to permit the public to practice the invention once the patent expires"). To be sure, the disclosure itself is a benefit to the public store of knowledge, but the inventor's additional experiments benefit the public by eliminating duplicative research only once the public can finally practice the invention.

[96] Elizabeth v. Pavement Co., 97 U.S. 126, 137 (1877).

[97] *See* Van Auken v. Cummings, 49 F.2d 490, 492 (C.C.P.A. 1931) ("Reduction to practice does not require a device embodying the invention to be mechanically perfect, or a commercial success . . . .").

[98] *See* Pfaff v. Wells Elecs., Inc., 525 U.S. 55, 61 (1998) ("It is well settled that an invention may be patented before it is reduced to practice."); 1 MANUAL OF PATENT EXAMINING PROCEDURE § 608.01(p), at 600-99 (8th ed., rev. no. 5, 2006) ("Simulated or predicted test results and prophetical examples (paper examples) are permitted in patent applications. . . . Paper examples describe the manner and process of making an embodiment of the invention which has not actually been conducted.").

[99] *Van Auken*, 49 F.2d at 492.

[100] *See* Brenner v. Manson, 383 U.S. 519, 531-32 (1966) (holding that structural similarity to one molecule already known to be useful is, by itself, insufficient evidence that a second molecule satisfies the § 101 utility requirement); *see also In re* Fisher, 421 F.3d 1365, 1373-74 (Fed. Cir. 2005) (holding that none of the applicant's hypothetical uses for expressed sequence tags met the "substantial" utility requirement, in part because they had never been so used in the real world).

[101] *Elizabeth*, 97 U.S. at 133.

whether actually reduced to practice or not, must disclose not only that the inventor is in possession of the invention,[102] but also how to make and use the invention such that a person skilled in the art would not require undue experimentation.[103] Each of these disclosure requirements, to various degrees and in different circumstances, may force an inventor "to test the [invention], and ascertain whether it will answer the purpose intended."[104]

The experimental use negation mitigates the whipsaw effect of two opposing statutory provisions: § 102(b) barring patentability for too much testing, and § 101 and § 112 barring patentability for too little testing. As a practical dividing line, the Federal Circuit has decided that the inventor's experimental use only negates those public uses or sales leading up to and including an actual reduction to practice,[105] i.e., when "the inventor has determined that the invention will work for its intended purpose."[106] After such time, any experiment performed in public or in connection with a sale is not supported by the policy favoring the collection of information needed to make an adequate disclosure, because the inventor has already "ascertain[ed] its utility"[107] and brought "the invention to perfection."[108]

2. Promoting the Progress of Science

Additionally, the inventor's experimental use negation promotes the progress of science in those fields that by their nature require public testing. For example, the invention in *Elizabeth* was a wooden street pavement, and as the Court explained, "the nature of a street pavement is such that it cannot be experimented upon satisfactorily except on a highway, which is always

[102] The "written description" requirement of § 112 para. 1 is heightened in the case of chemical inventions such as DNA, where "'what is required is a description of the DNA itself,'" usually by having sequenced it – i.e., actually reducing it to practice. Regents of Univ. of Cal. v. Eli Lilly & Co., 119 F.3d 1559, 1566-67 (Fed. Cir. 1997) (quoting Fiers v. Revel, 984 F.2d 1164, 1170 (Fed. Cir. 1993)).

[103] The "enablement" requirement of § 112 para. 1 necessitates a more extensive disclosure in unpredictable fields or where the inventor is claiming a large genus. *See In re* Wands, 858 F.2d 731, 737 (Fed. Cir. 1988) (stating that the test for enablement considers such factors as "unpredictability of the art" and "breadth of the claims"); *see also In re* Vaeck, 947 F.2d 488, 495 (Fed. Cir. 1991) ("[T]he scope of the claims must bear a reasonable correlation to the scope of enablement provided by the specification." (citing *In re* Fisher, 427 F.2d 833, 839 (C.C.P.A. 1970))).

[104] *Elizabeth*, 97 U.S. at 135.

[105] *See* Zacharin v. United States, 213 F.3d 1366, 1369 (Fed. Cir. 2000) ("[O]nce an invention has been reduced to practice, it can no longer meet the experimental use exception."); Cont'l Plastic Containers v. Owens Brockway Plastic Prods., Inc., 141 F.3d 1073, 1079 (Fed. Cir. 1998) ("[E]xperimental use can not occur after a reduction to practice.").

[106] Estee Lauder Inc. v. L'Oreal, S.A., 129 F.3d 588, 593 (Fed. Cir. 1997).

[107] Mellus v. Silsbee, 16 F. Cas. 1332, 1334 (C.C.D. Mass. 1825) (No. 9404).

[108] Pennock v. Dialogue, 27 U.S. 1, 9 (1829).

public."[109] Without an experimental use negation, the public testing of the pavement would have invalidated the patent, which in turn would have discouraged subsequent inventors from performing similar research. Thus, in a patent system that aims to "promote the Progress of Science,"[110] an experimental use negation is necessary to encourage future inventors to commit scarce resources to investigating technologies that require long-term public testing.[111]

In determining whether to allow a negation, courts look to the nature of the invention and ask whether the experiments needed to be conducted in public.[112] For instance, *In re Smith*[113] involved a carpet freshener invention, samples of which were distributed to seventy-six housewives for use in their own homes.[114] Although the patent applicant argued that it was testing the "fragrance and vacuumability aspects" of the invention, the court found that "such data could have been easily obtained in their own facilities . . . without the assistance of 'typical housewives.'"[115] The court explained that those housewives were the intended future customers of the patentee's product, and therefore the alleged experiments appeared more like market testing than scientific experimentation.[116] Where an inventor is able to adequately test and perfect his invention away from the public eye, there is no policy that supports the negation of public use.

II. INFRINGER'S EXPERIMENTAL USE DEFENSE TO § 271(A) INFRINGEMENT

Part I examined the judge-made doctrine that immunizes an inventor's experiments from invalidating his own patent. Part II analyzes a different judge-made doctrine: the exemption given to everyone who is not the patentee (i.e., the public) who performs experiments on that patented invention.

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[109] *Elizabeth*, 97 U.S. at 134.

[110] U.S. CONST. art. I, § 8, cl. 8; *see also* Aronson v. Quick Point Pencil Co., 440 U.S. 257, 262 (1979) ("First, patent law seeks to foster and reward invention . . . .").

[111] *See, e.g.*, Burk & Lemley, *supra* note 22, at 1648 (stating that the experimental use negation is important in the software industry, where extensive "beta testing" of prototypes with consumers occurs before the product's commercial release).

[112] *See* Electromotive Div. of Gen. Motors Corp. v. Transp. Sys. Div. of Gen. Elec. Co., 417 F.3d 1203, 1213 (Fed. Cir. 2005) (listing "necessity of public testing" as an objective factor to be considered when determining whether a public use or sale is experimental).

[113] 714 F.2d 1127 (Fed. Cir. 1983).

[114] *Id.* at 1128-30.

[115] *Id.* at 1135.

[116] *Id.*; *see also Gen. Motors Corp.*, 417 F.3d at 1213 (listing "nature of contacts made with potential customers" as an objective factor); Shashank Upadhye, *To Use or Not To Use: Reforming Patent Infringement, the Public Use Bar, and the Experimental Use Doctrine as Applied to Clinical Testing of Pharmaceutical and Medical Device Inventions*, 4 MINN. INTELL. PROP. REV. 1, 13 (2002) (stating that the testing in *Smith* "is more akin to gauging commercial acceptability than invention operability").

Ordinarily, members of the public are excluded from making or using the patented invention under 35 U.S.C. § 271(a), which embodies the inventor's side of the patent bargain: the receipt of a limited monopoly. Some courts, however, have held that the inventor's monopoly does not extend to those members of the public who perform scientific experiments on the patented invention. The *infringer's experimental use defense* protects the public's interest in testing the adequacy of the inventor's patent disclosure and promotes the progress of science. Notably, these are the same two policies that the *inventor's experimental use negation* ultimately aims to achieve, albeit by different means.

A. *Infringement Under 35 U.S.C. § 271(a)*

Every patent confers on its owner "the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States or importing the invention into the United States."[117] Under § 271(a), any member of the public who performs those acts "without authority" thereby "infringes the patent."[118] The test for patent infringement is one of factual identity between the patented and accused devices: "Infringement requires that every limitation of a claim be met, either literally or equivalently, by the accused device."[119] The Supreme Court has stated that infringement is a strict liability offense irrespective of whether the infringer knew about the patent.[120]

The policy underlying the inventor's patent monopoly is to promote the progress of science by encouraging inventors to undertake costly research.[121] The mechanics of this incentive system are best understood in economic terms. A rational inventor will undertake a research program if the expected profit from the sales of the resultant invention exceeds the expected cost of inventing it.[122] In the absence of a patent system, those research costs are difficult to recoup because competitors can easily exploit the public good characteristics of the invention.[123] For instance, in a purely competitive market, the price of the invention offered to the customer would be equal to the cost of producing

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[117] 35 U.S.C. § 154(a) (2000).

[118] *Id.* § 271(a).

[119] Koito Mfg. Co. v. Turn-Key-Tech, LLC, 381 F.3d 1142, 1149 (Fed. Cir. 2004).

[120] *See* Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17, 35 (1997) ("Application of the doctrine of equivalents, therefore, is akin to determining literal infringement, and *neither requires proof of intent*." (emphasis added)).

[121] *See* Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722, 730-31 (2002) (characterizing the patent incentive system as one in which inventors make an "investment in innovation" based on "rel[iance] on the promise of the law").

[122] *See* GEOFFREY WYATT, THE ECONOMICS OF INVENTION 49-50 (1986) (equating the "incentive to invent" to "the demand price of the invention" or "the maximum that the buyer is willing to pay for the invention").

[123] *See id.* at 49 (listing "non-rivalry in consumption" and the "high cost of exclusion in the absence of a well-policed property assignment" as public good characteristics).

it, thus eliminating the sales profit – and with it the incentive to invent.[124] On the other hand, a patent that grants an exclusive monopoly on either a new product or a new cost-reducing process allows the inventor to fix a sales price above the manufacturing cost.[125] If the inventor expects this monopoly profit (i.e., gross revenue minus gross manufacturing cost) to exceed the research costs of discovering the invention, then the inventor will invest in the research.[126] Thus, the essence of the monopoly right is to allow the inventor to pick a sales price and sales quantity that maximize his profit without competitors (i.e., patent infringers) undercutting the price or diverting customers. Accordingly, any experimental use defense that allows the public to freely use the invention must be sufficiently limited so as to protect future patentees' incentive to invest in research.[127]

B. *Historical Development of the Infringer's Experimental Use*

Justice Story is the originator of both the inventor's and the infringer's experimental uses. However, while the Supreme Court subsequently memorialized the inventor's experimental use negation in *Elizabeth*, the Court has never squarely faced the infringer's experimental use defense. This absence of Supreme Court precedent has allowed the Court of Appeals for the Federal Circuit to narrow considerably the infringer's defense, effectively "eliminat[ing] the exception for all practical purposes."[128] The following sections track the history of the experimental use defense and consider the views of commentators who believe that the recent Federal Circuit cases should have been decided under Justice Story's original understanding.

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[124] *See id.* at 51 (illustrating "the case of pure competition in which the supply curve is identical to the constant long-run marginal cost curve").

[125] Although the result is the same, the economics are slightly different between new products and new cost-reducing processes. A new product invention creates an entirely new market, i.e., no previous supply curve existed. *See id.* at 52-53. A new cost-reducing process invention allows the inventor to charge a price slightly below the existing production cost, which drives competitors out of the market. *See* ERICH KAUFER, THE ECONOMICS OF THE PATENT SYSTEM 25 (1989).

[126] This calculation is performed by the inventor *before* the decision to invest in the research. The customers' demand, the ability to supply the invention, and the likelihood of even discovering the invention are anything but certain. *See* WYATT, *supra* note 122, at 49 (stating that the "incentive to invent" is best called the "*potential* incentive to invent").

[127] *See* Integra Lifesciences I, Ltd. v. Merck KGaA, Nos. 02-1052, 02-1065, 2003 U.S. App. LEXIS 27796, at *44, *46 (Fed. Cir. June 6, 2003) (Newman, J., concurring in part and dissenting in part) (stating that the common law exemption "is a narrow exemption, for it must preserve the patentee's incentive to innovate," and that the exemption does not extend to "activity associated with development and commercialization of infringing subject matter"), *amending* 331 F.3d 860 (Fed. Cir. 2003), *vacated on other grounds*, 545 U.S. 193 (2005).

[128] Duffy, *supra* note 24, at 718.

1. Justice Story's Legacy

The experimental use defense to patent infringement is widely attributed to Justice Joseph Story, who sat as circuit justice in the case of *Whittemore v. Cutter*.[129] There, the patentee appealed a jury instruction that limited infringement to situations where the infringer developed the patented invention "fit for use, and with a design to use it for profit."[130] On appeal, Justice Story posited that such a profit-driven motive was necessary because "it could never have been the intention of the legislature to punish a man, who constructed such a machine merely for philosophical experiments, or for the purpose of ascertaining the sufficiency of the machine to produce its described effects."[131] Numerous authorities have explained that the word "philosophical" meant "scientific" at the time Justice Story wrote his opinion in *Whittemore*.[132] Using this definition of "philosophical," the dividing line between an exempted experimental use and an infringing use can be understood as the line between research and development ("R&D"), where "research" pertains to pure science and "development" pertains to applied engineering.[133] Additionally, commentators understand the "fit for use" and "ascertaining the sufficiency" language as permitting experimentation *on* the claimed invention to better understand it, but prohibiting experimentation *using* it for its intended end-use.[134] Unfortunately, Justice Story did not apply this rule to the particular facts, but disposed of the case on other grounds.[135]

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[129] 29 F. Cas. 1120 (C.C.D. Mass. 1813) (No. 17,600); *see, e.g.*, Eisenberg, *supra* note 5, at 1023 (stating that *Whittemore* was the first case in which the defense appeared); Mueller, *supra* note 23, at 927 (calling *Whittemore* the "foundational U.S. decision approving an experimental use exemption").

[130] *Whittemore*, 29 F. Cas. at 1121.

[131] *Id.*

[132] *See, e.g.*, *Integra*, 2003 U.S. App. LEXIS 27796, at *41 n.4 (Newman, J., concurring in part and dissenting in part) ("By 'philosophical' experiments Justice Story was referring to 'natural philosophy,' the term then used for what we today call 'science.'"); Mueller, *supra* note 23, at 929 ("Multiple authorities confirm that in Story's day philosophical meant scientific. At that time the noun philosophy referred to natural philosophy, which in turn meant science generally.").

[133] *See Integra*, 2003 U.S. App. LEXIS 27796, at *45 (Newman, J., concurring in part and dissenting in part) (stating that the distinction is "a matter of scale, creativity, resource allocation, and often the level of scientific/engineering skill needed for the project").

[134] *See* REPORT OF THE NATIONAL INSTITUTES OF HEALTH (NIH) WORKING GROUP ON RESEARCH TOOLS app. D (1998), *available at* http://www.nih.gov/news/researchtools (distinguishing between "experimenting *on* a patented invention – i.e. using a patented invention to study the underlying technology or perhaps to invent around the patent, which is what the exemption covers – and experimenting *with* a patented invention to study something else, which the exemption does not cover"); Wegner, *supra* note 24, at 11-12 ("If the patented invention is *fit for use* and thus simply used for its intended purpose or to *experiment* to determine its commercial worth or to establish that the invention is safe or meets contractual requirements, this is not an experiment *on* the patented invention for a

In *Sawin v. Guild*,[136] Justice Story – again as circuit justice – revisited the experimental use defense and elaborated on it in greater detail. He cited *Whittemore* as establishing the rule that infringement requires

> the making [of the invention] with an intent to use [it] for profit, and not for the mere purpose of philosophical experiment, or to ascertain the verity and exactness of the specification. In other words, . . . the making must be with an intent to infringe the patent-right, and deprive the owner of the lawful rewards of his discovery.[137]

"Philosophical" or verification experiments, therefore, do not constitute infringement; patents are awarded to facilitate the inventor's downstream commercialization of the invention, whereas the public's upstream research activities are believed not to interfere with that end-use.[138]

This does not mean, however, that infringement can only occur where the defendant's acts deprive the inventor of actual profits. Indeed, in the very same *Whittemore* opinion, Justice Story rejected the defendant's argument that infringement is predicated on actual damages. His response was that "where the law gives an action for a particular act, the doing of that act imports of itself a damage to the party. Every violation of a right imports some damage, and if none other be proved, the law allows a nominal damage."[139] Thus, Justice Story distinguished between actual harms and legal harms, where only the latter is a necessary condition for infringement.[140] In contrast, the public's experimentation on the claimed invention is not a legal harm that violates the "*lawful* rewards"[141] of the inventor's discovery.

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scientific study of that invention. Rather, this is simply the infringing use of the patented invention for its intended purpose.").

[135] *Whittemore*, 29 F. Cas. at 1123 (explaining that the case turned on improper jury instructions and erroneous calculation of damages).

[136] 21 F. Cas. 554 (C.C.D. Mass. 1813) (No. 12,391).

[137] *Id.* at 555 (citation omitted).

[138] This is not the case with "research tools" (such as a microscope) whose end-use is intended to facilitate experimentation on something else. *See Integra*, 2003 U.S. App. LEXIS 27796, at *50 (Newman, J., concurring in part and dissenting in part) ("Use of any existing tool in one's research is quite different from study of the tool itself."); Eisenberg, *supra* note 5, at 1078 (excluding from exemption the use of a patented invention "with a primary or significant market among research users"); Janice M. Mueller, *No "Dilettante Affair": Rethinking the Experimental Use Exception to Patent Infringement for Biomedical Research Tools*, 76 WASH. L. REV. 1, 54-55 (2001) (proposing a "reach-through" royalty approach to experimental uses with research tools).

[139] *Whittemore*, 29 F. Cas. at 1121.

[140] *See* Mueller, *supra* note 138, at 20 (refuting a contention that Justice Story supported the principle of "*injuria absque damno*," or "wrong without damage").

[141] *Sawin*, 21 F. Cas. at 555 (emphasis added).

Within five years of these decisions, the Supreme Court adopted Justice Story's language from *Whittemore* in the case of *Evans v. Eaton*.[142] Chief Justice Marshall delivered the opinion, though Justice Story was a member of the Court at the time. The Court appended a comprehensive summary of the state of patent law, in which it stated that "the making of a patented machine *fit for use, and with a design to use it for profit*, in violation of the patent right, is, of itself, a breach of this section, for which an action lies."[143] While the Court did not directly address the experimental use defense to patent infringement, Justice Story's comments on the matter gained general acceptance[144] and appeared in several lower court holdings as a successful defense.[145]

2. Court of Claims' Adoption of a Broad Experimental Use Defense

Between 1936 and 1976, the U.S. Court of Claims – a predecessor to the Court of Appeals for the Federal Circuit, which is bound by the Court of Claims' prior decisions[146] – found an experimental use defense valid in two of the three cases in which it arose.[147] All three cases involved patent infringement suits against the federal government for using patented technology in military settings.

In *Ordnance Engineering Corp. v. United States*,[148] the plaintiff had patented certain explosive projectiles (or "illuminating shell") that the federal government subsequently made and used without his permission shortly after

[142] 16 U.S. (3 Wheat.) 454 (1818).

[143] *Evans*, 16 U.S. app. at 26 (citing *Whittemore*, 29 F. Cas. at 1121).

[144] *See, e.g.*, Poppenhusen v. Falke, 19 F. Cas. 1048, 1049 (C.C.S.D.N.Y. 1861) (No. 11,279) (calling the doctrine "well-settled"); 3 WILLIAM C. ROBINSON, THE LAW OF PATENTS FOR USEFUL INVENTIONS § 898, at 55-57 (Boston, Little, Brown & Co. 1890) (restating the doctrine).

[145] *See, e.g.*, Ruth v. Stearns-Roger Mfg. Co., 13 F. Supp. 697, 703 (D. Colo. 1935), *rev'd on other grounds*, 87 F.2d 35 (10th Cir. 1936); Beidler v. Photostat Corp., 10 F. Supp. 628, 630 (W.D.N.Y. 1935); Poppenhusen v. N.Y. Gutta Percha Comb Co., 19 F. Cas. 1059, 1063 (C.C.S.D.N.Y. 1858) (No. 11,283); *see also* Eisenberg, *supra* note 20, at 222 n.234 (listing additional cases); Mueller, *supra* note 138, at 18 n.87 (explaining that the relative paucity of defendants successfully using the defense is not surprising, given that litigation costs will deter suits not involving significant sales or other profit taking from the patentee). *But see* Eisenberg, *supra* note 20, at 222 nn.235-36 (noting that the experimental use defense is not allowed "to excuse otherwise infringing activities" or when claimed by "commercial companies").

[146] *See* Federal Courts Improvement Act of 1982, Pub. L. No. 97-164, 96 Stat. 25 (creating the Court of Appeals for the Federal Circuit through merger of the jurisdictions of the Court of Claims and the Court of Customs and Patent Appeals).

[147] In a fourth case in which the defense was raised, the court declined to reach a decision on the merits. *See* Douglas v. United States, 510 F.2d 364, 365 (Ct. Cl. 1975) (per curiam).

[148] 84 Ct. Cl. 1 (1936).

World War I.[149] The court, in its special findings of fact, divided the shell into three categories based on their intended uses.

> Illuminating shell are of three categories: (1) Regular or service shell, (2) ballistic shell, and (3) experimental shell. Regular or service shell are shell built to approved service designs and specifications, intended for issue to ships as battle or practice ammunition. Ballistic shell are not intended for battle or practice use, but are samples fired for test purposes from each lot manufactured before the lot is issued or sent to store. Experimental shell are shell built for experimental purposes.[150]

Although each of these devices fell within the literal scope of the patent claim,[151] the court concluded that only the first category – regular shell – infringed the patent.[152]

Subsequent opinions criticized *Ordnance Engineering* for providing no description of the "experimental purposes" and no rationale for immunizing the second and third categories of shell under the experimental use defense.[153] On closer inspection, however, the three categories of shell are listed in decreasing order of commerciality. At one extreme, the so-called regular shell are intended for battle and practice – a clear example of an end product that is "fit for use, and with a design to use it for profit." The federal government was the major (and only) end-user of this product, making over 190,000 of these regular shell.[154] The Court of Claims, therefore, was correct in finding the regular shell ineligible for the experimental use defense because this category of shell represented "the infringing use of the patented invention for its intended purpose"[155] and typified the infringing "development" side of the R&D dichotomy.[156]

At the other extreme, so-called experimental shell were "*built for* experimental purposes,"[157] suggesting that the government used design specifications and manufacturing settings not readily adaptable for regular use.[158] These experimental shell comprised approximately 1.5% of the total

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[149] *Id.* at 1-2.

[150] *Id.* at 2.

[151] *Id.*

[152] *Id.* at 4.

[153] *See* Pitcairn v. United States, 547 F.2d 1106, 1125 (Ct. Cl. 1976) ("There is no elucidation as to the determinants of 'experimental purposes.'").

[154] *Ordnance Eng'g Corp.*, 84 Ct. Cl. at 4.

[155] Wegner, *supra* note 24, at 12.

[156] *See supra* note 133 and accompanying text (discussing the distinction between "research" and "development").

[157] *Ordnance Eng'g Corp.*, 84 Ct. Cl. at 2 (emphasis added).

[158] *See Pitcairn*, 547 F.2d at 1125 (interpreting the phrase "built for experimental purposes" as requiring that the devices be "built solely for experimental purposes").

number of illuminating shell made during the relevant time period.[159] If the government used these experimental shell only to learn about their underlying technology or to improve upon their design, then the Court of Claims properly exempted the government's use of experimental shell as falling on the noninfringing "research" side of the R&D dichotomy.

Somewhere in between these two extremes fell the so-called ballistic shell used for "test purposes," rather than for "experimental purposes."[160] Although the Court of Claims held that, under the experimental use defense, this category of shell did not amount to an infringement,[161] today's proponents of the experimental use defense would probably conclude otherwise. Ballistic shell, according to the brief description in *Ordnance Engineering*, appeared to serve the routine purpose of quality control in the manufacture of regular shell. Ballistic shell were a random sampling of regular shell, manufactured identically as regular shell, and then fired in order to ensure the quality level of a particular batch. These were necessary tests in the manufacture of regular shell and, as such, should have fallen closer to the infringing "development" side of the R&D dichotomy.

In *Chesterfield v. United States*,[162] the invention in dispute involved a metal alloy useful in high-speed cutting tools.[163] The patent specification stated that such alloys must possess two distinct properties: "red hardness" (ability to maintain hardness when it becomes red hot) and "abrasive hardness" (resistance to flake, crack, or splinter during use).[164] The inventor claimed to have discovered an alloy composition that possessed both of these properties, thereby achieving a "superior cutting tool" over the prior art.[165] The federal government admitted that it procured a total of 3679 pounds of the patented alloy without the plaintiff's consent to test the material's usefulness in turbo-supercharger jet engines, but asserted an experimental use defense.[166] The trial commissioner found:

> [T]he evidence shows that a portion of the . . . alloy procured by the defendant was used only for testing and for experimental purposes, and

[159] *Ordnance Eng'g Corp.*, 84 Ct. Cl. at 3-4 (stating that 3157 were experimental out of a total of 200,049).

[160] *Id.* at 2.

[161] *Id.* at 4.

[162] 141 Ct. Cl. 838 (1958).

[163] *Id.* at 840.

[164] *Id.* at 841; *see also* Alloy and Method of Making the Same, U.S. Patent No. 1,698,934 col.1 ll.8-23 (filed Dec. 1, 1924) (describing "red hardness" and "abrasive hardness"); High-Speed Alloy, U.S. Patent No. 1,698,935 col.1 ll.7-21 (filed Dec. 1, 1924) (same).

[165] *Chesterfield*, 141 Ct. Cl. at 841 (stating that using both cobalt *and* nickel made the tool superior to tools using either cobalt *or* nickel); '934 Patent col.1 l.29 (same); '935 Patent col.1 l.27 (same).

[166] *Chesterfield*, 141 Ct. Cl. at 864.

> there is no evidence that the remainder was used other than experimentally. Experimental use does not infringe.[167]

Subsequent opinions have criticized this statement as unnecessary to the resolution of the case, because the trial commissioner had already found the patent claims invalid.[168] Nevertheless, the Court of Claims expressly adopted the findings and opinions of the commissioner,[169] and stated in its "Conclusion of Law" section that "[i]t is also found that the claims are not infringed by the defendant."[170] The finding of experimental use in this case reflects the policy of allowing the public to "ascertain the verity and exactness of the specification"[171] where the inventor claims to have achieved specific advantages over the prior art, such as increased red hardness and abrasive hardness. Additionally, the experimental use defense promotes the progress of science in cases such as *Chesterfield* where the inventor first patents a composition of matter based on its utility in one field of use (cutting tools) and the infringer later seeks new uses for that composition (jet engines).[172]

In contrast to these two cases, the Court of Claims found no experimental use in *Pitcairn v. United States*.[173] Between 1946 and 1964, the federal government spent over $639 million on the purchase of over 2200 helicopters from five different suppliers.[174] None of these suppliers was plaintiff's company, Autogiro Company of America, which owned eleven patents covering the helicopters held to infringe.[175] Indeed, in 1947 the plaintiff sought to grant the government a license to use the patented technology, and the government flatly refused.[176]

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[167] *Id.* at 845-46.

[168] *See, e.g.*, Pitcairn v. United States, 547 F.2d 1106, 1125 (Ct. Cl. 1976) ("The court's statement in its opinion there that experimental use does not infringe constituted pure *obiter dictum*.").

[169] *Chesterfield*, 141 Ct. Cl. at 839-40.

[170] *Id.* at 866.

[171] Sawin v. Guild, 21 F. Cas. 554, 555 (C.C.D. Mass. 1813) (No. 12,391).

[172] If a new use of an already patented product is discovered, the second inventor can obtain a "process" patent on the newfound use, but would thereafter be barred from commercializing it due to the first inventor's "product" patent. *See* 35 U.S.C. § 100(b) (2000) (defining a patentable process to include "a new use of a known . . . composition of matter"); Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 903 (1990) ("This process patent would not enable the patent holder to produce the product in question, but rather only to control its new use.").

[173] 547 F.2d 1106 (Ct. Cl. 1976).

[174] *Id.* at 1110-11.

[175] *Id.* at 1110 (citing Autogiro Co. of Am. v. United States, 384 F.2d 391 (Ct. Cl. 1967)).

[176] *Id.* at 1117 n.8.

Of the 2200 helicopters covered by the patents, the government attempted to exclude ninety-three under the experimental use defense.[177] It asserted that these ninety-three aircraft were used "for testing, evaluational, demonstrational or experimental purposes."[178] The *Pitcairn* court dismissed the proffered tests as failing to qualify as experimental use:

> Obviously every new helicopter must be tested for lifting ability, for the effect of vibration on installed equipment, flight speed and range, engine efficiency, and numerous other factors. Tests, demonstrations, and experiments of such nature are intended uses of the infringing aircraft manufactured for the defendant and are in keeping with the legitimate business of the using agency. Experimental use is not a defense in the present litigation.[179]

The "test" helicopters found to infringe in this case should be distinguished from the "*truly* experimental helicopters" that the plaintiff never included in its complaint.[180] The latter were "static test mechanisms" that the government had used, presumably to measure the performance of an experimental class of helicopters while fixed to the ground.[181]

This distinction in *Pitcairn* between "test" helicopters and "truly experimental" helicopters is analogous to that in *Ordnance Engineering* between infringing "ballistic" shell used for "test purposes" and noninfringing "experimental" shell used for "experimental purposes."[182] The in-flight tests performed on every new helicopter (e.g., lifting ability, vibration performance, flight speed and range, engine efficiency),[183] like those performed using ballistic shell fired systematically from each lot,[184] are a necessary part of the manufacturing process in maintaining quality control. These tests are properly characterized as "intended uses"[185] of the invention, or, in Justice Story's words, "fit for use, and with a design to use it for profit," which therefore fall on the infringing "development" side of the R&D dichotomy. On the other hand, the experimental helicopters that were not included in the suit are akin to the experimental shell built for experimental purposes; they utilized different design specifications and manufacturing parameters than those helicopters employed in regular service. These land-based experiments, if they had been before the court, would not have been intended uses of commercial helicopters

[177] *Id.* at 1124.

[178] *Id.* at 1125.

[179] *Id.* at 1125-26.

[180] Mueller, *supra* note 23, at 931 (emphasis added).

[181] *Pitcairn*, 547 F.2d at 1125.

[182] Ordnance Eng'g Corp. v. United States, 84 Ct. Cl. 1, 2 (1936).

[183] *See Pitcairn*, 547 F.2d at 1125.

[184] *See Ordnance Eng'g Corp.*, 84 Ct. Cl. at 2.

[185] *Pitcairn*, 547 F.2d at 1125.

and therefore would have fallen on the noninfringing "research" side of the R&D dichotomy.

Overall, between 1936 and 1976, the Court of Claims remained faithful to Justice Story's vision of the infringer's experimental use defense. In particular, the court focused on the nature of the experiments and distinguished between those uses that were infringing "intended uses"[186] and those that were exempted because the defendant sought to understand or improve upon the underlying patented technology.[187] Recently, however, the Federal Circuit severely narrowed the scope of this doctrine, despite being bound by the Court of Claims' precedent.

3. Federal Circuit's Misquoting of *Pitcairn* and the Vanishing Defense

Currently, the Federal Circuit purports to follow *Pitcairn* in its application of the experimental use defense. It has failed, however, to maintain the Court of Claims' practical distinction between infringing "intended uses" of a patented invention and noninfringing experimentation on a patented invention. Rather than focusing on *how* the experiments are performed, as the Court of Claims did, the Federal Circuit now focuses on *who* the defendant is. Had the Court of Claims applied this rule in all of the cases where the defendant was the federal government (the largest consumer and end-user of military technology), the Court of Claims would have never found experimental uses where it did.

The clear divergence between these courts can be traced to the Federal Circuit's loose paraphrasing (if not outright misquoting) of *Pitcairn* in the 1984 case of *Roche Products, Inc. v. Bolar Pharmaceutical Co.*[188] Compare the original language in *Pitcairn*, explaining why the particular tests in that case did not qualify as experimental,[189] with the rule announced in *Roche*: "'[t]ests, demonstrations, and experiments . . . [which] are in keeping with the

[186] *See supra* notes 154-56, 182-85 and accompanying text (discussing the developmental and quality-control tests in *Ordnance Engineering* and *Pitcairn*).

[187] *See supra* notes 157-58, 166-67 and accompanying text (discussing the early-stage or new-use experiments in *Ordnance Engineering* and *Chesterfield*).

[188] 733 F.2d 858, 860 (Fed. Cir. 1984) (holding that "the *use* of a patented drug for federally mandated premarketing tests" is infringing), *superseded by statute*, Drug Price Competition and Patent Term Restoration Act of 1984, Pub. L. No. 98-417, 98 Stat. 1585 (revising the procedures for new drug applications under the Food, Drug, and Cosmetic Act). Section 202 of the Act included what is essentially a safe harbor provision, creating a *statutory* experimental use defense which applies only to the pharmaceutical industry when seeking regulatory approval for a new drug. *See* 35 U.S.C. § 271(e)(1) (2000). This Note focuses only on the *common law* experimental use defense, which applies to all industries and bears no relation to the substantive scope of the statutory safe harbor.

[189] "Tests, demonstrations, and experiments of such nature are intended uses of the infringing aircraft manufactured for the defendant and are in keeping with the legitimate business of the using agency. Experimental use is not a defense in the present litigation." *Pitcairn*, 547 F.2d at 1125-26.

legitimate business of the . . . [alleged infringer]' are infringements for which '[e]xperimental use is not a defense.'"[190] By cherry-picking and reformulating the *Pitcairn* language in such a way, the *Roche* court disregarded the *Pitcairn* court's focus on the nature of both the invention and testing performed. The *Roche* court may have reached the correct result – no experimental use exemption for the defendant[191] – but it used the wrong reasoning. Instead of characterizing Bolar's bioequivalency studies as intended uses of Roche's patented drug,[192] the court cared only that Bolar was a generic drug manufacturer that was "furthering [its] legitimate business interests."[193]

It follows that the Federal Circuit's inquiry has now shifted away from *how* the experiments were performed (research-stage experimenting "on" the invention vs. development-stage testing "with" the invention) to asking *who* performed the experiments (idle tinkerer vs. research institution). *Madey v. Duke University*[194] illustrates this point. There, the defendant's experimental use defense should have properly been denied on the ground that Duke University was using the patented laser technology not to study how the laser worked or to improve upon its performance, but to study the physical properties of other materials – i.e., exactly how such research tools are intended to be used.[195] Instead, the *Madey* court based its holding on the fact that the use of the patented laser technology was "in furtherance of the alleged infringer's legitimate business," namely "educating and enlightening students and faculty participating in these projects," and "pursuing an aggressive patent licensing program."[196] Unfortunately for the research community, *Madey*'s

[190] *Roche*, 733 F.2d at 863 (alterations in original) (quoting *Pitcairn*, 547 F.2d at 1125-26).

[191] *See id.* at 867.

[192] *See* Mueller, *supra* note 23, at 933-34 ("From doctrinal and policy points of view, the Federal Circuit's denial of experimental use immunity in *Roche* was almost certainly correct. Bolar's experiments were not the truly scientific experiments Story contemplated, which would not deprive Roche of its just reward for inventing the active ingredient in Dalmane. Nor were the experiments performed in an attempt to find a new use for Roche's drug or to improve upon it; they added nothing new to the store of knowledge. Bolar's unlicensed use of Roche's invention was purely 'superceding' in Justice Story's sense of the word. Moreover, the experiments were simply a necessary incident to Bolar's intended goal of commercial sales of a generic equivalent of Dalmane. Proof of bioequivalency between a patented drug and its generic version is mandatory for FDA approval of the generic. Bolar's immediate purpose in using the patented invention was clearly commercial." (footnotes omitted)); Wegner, *supra* note 24, at 13 ("The tests involved in *Roche* clearly had nothing to do with studying the patented invention in any of the classical senses of an experiment *on* the invention.").

[193] *Roche*, 733 F.2d at 863.

[194] 307 F.3d 1351 (Fed. Cir. 2002).

[195] *See* Mueller, *supra* note 23, at 940-41.

[196] *Madey*, 307 F.3d at 1362 & n.7.

"sweeping dictum"[197] appears to eliminate "*any* real-world case of experimentation that would win immunity from infringement liability."[198]

That the focus should be on the nature of the invention and experimental activity is clear when one recalls the inquiry respecting the *inventor's experimental use negation*, discussed in Part I. There, the legal determination hinged on the purpose of the inventor's experimental use, which must be to understand and perfect the invention, not to secretly profit from it.[199] To make that determination, courts look closely at the nature of the invention and the thoroughness of the inventor's experiments. When assessing an infringer's experimental use defense aimed at understanding and improving the patented invention, courts should likewise focus on how and why the infringer performed the experiments as evidenced by the particular facts surrounding the experimentation.

C. *Policies Supporting the Infringer's Experimental Use*

Whereas § 271(a) seeks to reward the inventor for undertaking the costly work of discovering the invention,[200] any defense that shields an infringer from this statute will necessarily cut against the inventor while favoring the infringing public. At least two reasons have been offered to justify the infringer's experimental use defense: ensuring that the public receives its adequate disclosure and promoting the progress of science. Notably, these are the same two policy goals that the *inventor's experimental use negation* generally seeks to achieve, albeit by a different yet complimentary path.

1. Adequate Disclosure

The first purpose of the infringer's experimental use defense is to allow the public "to ascertain the verity and exactness of the [patent] specification."[201] The patent specification is the portion of the written patent document where the inventor describes his invention to the world in as much detail as is necessary to enable someone skilled in the art to make and use that invention.[202] The test for whether the disclosure properly performs its

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[197] Integra Lifesciences I, Ltd. v. Merck KGaA, Nos. 02-1052, 02-1065, 2003 U.S. App. LEXIS 27796, at *50 n.6 (Fed. Cir. June 6, 2003) (Newman, J., concurring in part and dissenting in part) ("The facts of Madey v. Duke do not invoke the common law research exemption, despite the broad statement in that opinion. I do not disagree with that decision on its facts; I disagree only with its sweeping dictum . . . .").

[198] Mueller, *supra* note 23, at 942.

[199] *See supra* notes 91-94 and accompanying text.

[200] *See supra* notes 125-26 and accompanying text.

[201] Sawin v. Guild, 21 F. Cas. 554, 555 (C.C.D. Mass. 1813) (No. 12,391); *see also* Brief of Intellectual Property Professors as Amici Curiae in Support of Neither Party, *supra* note 25, at 7 ("[P]ermitting others to engage in research after the patent is granted is crucial to effectuating the social bargain underlying the grant of a patent.").

[202] *See* 35 U.S.C. § 112 para. 1 (2000).

enablement function is whether a person of ordinary skill in the art could make and use the claimed invention without "undue experimentation."[203] Because persons skilled in the art are the intended audience of the patent specification, they are best situated to determine whether experimentation is "undue."[204] Allowing these members of the public to experiment on the patented invention without being held liable for infringement is the public's check against an inventor who claims more than is legally permitted.

In practice, the scientific community routinely attempts to corroborate a fellow inventor's alleged discovery.[205] An inventor's overreach is more likely in today's era of patent expediency, where various rules allow an inventor to forego time-consuming experiments. For example, "constructive reduction to practice" allows for the filing of a patent application without an actual working embodiment of the invention;[206] "prophetic examples" – hypothetical descriptions of experiments not actually performed – are also sufficient for a successful patent application;[207] and depositing samples of the claimed invention with the Patent Office is purely optional and only permitted in the biological field.[208]

Under this policy of verifying the sufficiency of the patent disclosure, the patented invention being investigated ought to be of such a nature that its inventive ideas are "non-self-disclosing" by simply looking at its commercial

[203] *See In re* Wands, 858 F.2d 731, 737 (Fed. Cir. 1988) (listing factors that determine whether a disclosure would require undue experimentation: "(1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims").

[204] *See* Eisenberg, *supra* note 20, at 222.

[205] *See, e.g.*, Schwab et al., *supra* note 5, at 248901 (arguing in a scientific review article that, contrary to previous reports, "the magnetomotive impedance jumps, which Gaidarzhy *et al.* observed by driving their resonator to very high amplitude, are not a manifestation of quantum phenomena"); *see also* Eisenberg, *supra* note 20, at 224 ("[A]llowing the defense where the use is for the purpose of testing the adequacy of the specification . . . parallels the scientific community's interest in replication of published claims.").

[206] *See* Pfaff v. Wells Elecs., Inc., 525 U.S. 55, 61 (1998) ("It is well settled that an invention may be patented before it is reduced to practice."); Hyatt v. Boone, 146 F.3d 1348, 1352 (Fed. Cir. 1998) ("The filing of a patent application serves as conception and constructive reduction to practice of the subject matter described in the application.").

[207] 1 MANUAL OF PATENT EXAMINING PROCEDURE, *supra* note 98, § 608.01(p), at 600-96 ("Simulated or predicted test results and prophetical examples (paper examples) are permitted in patent applications. . . . Paper examples describe the manner and process of making an embodiment of the invention which has not actually been conducted.").

[208] *See* 37 C.F.R. § 1.802(a) (2005) ("Where an invention is, or relies on, a biological material, the disclosure *may* include reference to a deposit of such biological material." (emphasis added)).

embodiment.[209] For example, inventions such as industrial processes or complex software programs are likely to be "non-self-disclosing" because they are difficult to reverse engineer,[210] and may require the public's "experimentation on" them in order to fully understand how they work.[211] Bona fide experiments would include, for instance, reproducing the inventor's purported results or methods disclosed in the patent, and applying additional tests to the resultant product to better understand its underlying principles.[212] Such experimentation on a patented invention is plainly not the invention's "intended use," i.e., how the inventor intended his customers to use the end product, but is better understood as being part of the patent's original disclosure, i.e., what the inventor dedicated to the public.[213]

In addition to being limited in scope (experimenting "on" and not "with"), the experimental use defense under this rationale is also limited in time. The defense only extends up to and including the user's reasonable determination that the patented invention works for its intended purpose as described in the patent specification. Such a rule mirrors the inventor's experimental use negation of § 102(b) invalidity – a negation that is designed to allow the inventor to better understand his invention and which must end at the time of an actual reduction to practice, i.e., when "the inventor has determined that the invention will work for its intended purpose."[214] Thus, any infringing experiments performed after the defendant reasonably knows that the patent disclosure enables and describes the patentee's claimed invention would no longer qualify for an experimental use defense under this first policy of ensuring adequate disclosure.

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[209] Strandburg, *supra* note 22, at 107 (distinguishing between "self-disclosing inventions" that can be easily copied from their commercial embodiments and "non-self-disclosing inventions" that can be marketed without revealing the inventive ideas behind them).

[210] *See id.* at 106.

[211] *See id.* at 119 ("[T]he analysis of 'experimentation on' the subject matter of an invention shows that it is essentially a species of enabling disclosure.").

[212] *See* Brief of Intellectual Property Professors as Amici Curiae in Support of Neither Party, *supra* note 25, at 5 (stating that "exploring the properties of the patented invention" is an example of "experimenting on" the invention); 3 MARTIN J. ADELMAN ET AL., PATENT LAW PERSPECTIVES § 3.6[2] (2d ed. 2005) ("A [noninfringing] scenario would be to generate information for administrative agencies or courts. For example a member of the public may seek to check prophetic examples (paper examples in a patent) to see whether the patent itself has a fatal flaw. Of course even those examples that the patentee actually carried out can be checked to see if the patentee made a serious experimental error . . . . In essence these tests would be designed for use either in court or in the PTO.").

[213] *See* Strandburg, *supra* note 22, at 119.

[214] *See supra* notes 105-08 and accompanying text (discussing the Federal Circuit's test for determining when the inventor's experimental use negation of § 102(b) invalidity can no longer be invoked).

2. Promoting the Progress of Science

Even if a defendant knows that a disclosure is perfectly adequate, the defendant may still be immune from infringement if she experiments on the patented invention to improve upon, modify, or "design around" the invention.[215] This type of research furthers a second policy goal of promoting the progress of science through competitive follow-on innovation.[216] Indeed, Congress has recognized the importance of competitive follow-on innovation by expressly authorizing the patenting of both improvements on existing inventions[217] and newfound uses for existing inventions.[218] For instance, the inventor in *Elizabeth* obtained a patent on an *improved* wooden pavement,[219] and the federal government in *Chesterfield* found a new use for a patented metal alloy.[220] These types of improvement patents are valuable and efficient incentives in an era of cumulative knowledge, where improvements are often more practically useful than the original "pioneer" patents.[221] If the pioneer inventor could exclude the public from attempting to improve or design around his patent, then he would effectively curtail all public improvements in that field.[222] To avoid an ensuing technological bottleneck, the patent system must have a mechanism that immunizes scientific *research* activities aimed at securing these improvement patents, while properly blocking commercial

[215] *See* Integra Lifesciences I, Ltd. v. Merck KGaA, Nos. 02-1052, 02-1065, 2003 U.S. App. LEXIS 27796, at *42 (Fed. Cir. June 6, 2003) (Newman, J., concurring in part and dissenting in part).

[216] *See id*. (citing the "routine appearance of improvements on patented subject matter, as well as the rapid evolution of improvements on concepts that are patented"); *see also* Brief of Intellectual Property Professors as Amici Curiae in Support of Neither Party, *supra* note 25, at 12 (stating that a goal of the experimental use defense is "protecting certain basic research" for the purpose of improving or designing around a patent).

[217] 35 U.S.C. § 101 (2000) (making patentable "any new and useful improvement" of a patented invention).

[218] *See id.* (making patentable "any new and useful process"); *id.* § 100(b) (defining "process" to include "a new use of a known process, machine, manufacture, composition of matter, or material").

[219] *See supra* note 54 and accompanying text.

[220] *See supra* notes 165-66 and accompanying text.

[221] *See* Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 TEX. L. REV. 989, 997 n.32 (1997) (citing numerous economists for the proposition that efficient creation of new works requires access to and use of old works).

[222] *See* Integra Lifesciences I, Ltd. v. Merk KGaA, Nos. 02-1052, 02-1065, 2003 U.S. App. LEXIS 27796, at *42 (Fed. Cir. June 6, 2003) (Newman, J., concurring in part and dissenting in part) ("Were such research subject to prohibition by the patentee the advancement of technology would stop, for the first patentee in the field could bar not only patent-protected competition, but all research that might lead to such competition, as well as barring improvement or challenge or avoidance of patented technology.").

development if the improvements incorporate all the claimed elements of the pioneer invention.[223]

Arguably, an experimental use defense aimed at securing improvement patents is unnecessary in light of patent rules that obviate the need for actual research data. For instance, an improver might simply rely on a "constructive reduction to practice" together with "prophetic examples" to secure improvement patents without actually infringing the pioneer patent. Still, actual research data is not only desirable to the extent that it provides greater scientific certainty of the validity of a discovery, but it is often legally required. To satisfy the utility, written description, and enablement requirements of obtaining a patent, an improver may need to submit actual data to the Patent Office. Because an improver who invokes the experimental use *defense* herself becomes an inventor, the improver's interest in satisfying the disclosure requirements to obtain her improvement patent parallel those of an inventor who invokes the experimental use *negation* in order to satisfy those same disclosure requirements to obtain his original "pioneer" patent. Shielding an improver's research activities from liability via the experimental use defense therefore mitigates the whipsaw effect between two sets of opposing statutes: § 271(a) barring the public from practicing a patented invention, and § 101 and § 112 para. 1 barring the public from patenting an improvement on that invention for failing to adequately "possess" and "enable" the improvement.

The limit on such a defense under this policy of permitting follow-on innovation is the line between "research" and "development." The improver's scientific research allows her to properly understand and disclose her improvement to the Patent Office. On the other hand, any development and commercialization of this improvement is an "intended use" of the underlying, pioneer invention and can only be practiced with the permission of the pioneer inventor.[224] Thus, the experimental use defense promotes the progress of science through follow-on innovation, but is sufficiently limited to preserve the first inventor's reward.

III. COMPARING AND CONTRASTING THE TWO EXPERIMENTAL USES

As seen in Parts I and II, American courts have historically treated the two experimental uses separately: the inventor's negation in the context of a patent

[223] *See id.* at *46-47 ("That is how the patent system has always worked: the patent is infringed by and bars activity associated with development and commercialization of infringing subject matter, but the research itself is not prohibited, nor is comparison of the patented subject matter with improved technology or with designs whose purpose is to avoid the patent.").

[224] *See* Merges & Nelson, *supra* note 172, at 860-62 (describing the concept of "blocking patents" on improved or new-use technology); *see also* MERGES & DUFFY, *supra* note 15, at 237 ("An inventor who obtains a patent for a product, e.g., a particular molecule, has the right to exclude all others from making, using or selling that product for *all* purposes, including those discovered later by other inventors.").

validity challenge, and the infringer's defense in the context of a patent infringement claim. The problem with this disconnected treatment is that the doctrines have grown out of alignment, thus skewing the "delicate balance" of the patent bargain in favor of the inventor. When Justice Story created both of these experimental use exceptions, he gave both parties of the patent bargain the freedom to perform scientific research without being penalized under the literal text of the patent statutes. This research is socially desirable, it is the type of research the patent system is intended to foster, and the objective evidence uncovered by both types of research is factually similar. The Federal Circuit has embraced the *inventor's experimental use negation*, providing lower courts with a list of objective factors to consider when negating a statutory bar under § 102(b). The remainder of this Note argues that the *infringer's experimental use defense* should be restored to a role commensurate with that of the inventor's negation.

A. *The Two Experimental Uses Maintain the Symmetry of the Patent Bargain*

The patent bargain (or "quid pro quo") is predicated on the public's receipt of a new, useful, and nonobvious invention in return for the inventor's exclusive rights.[225] Section 102(b) helps ensure that the invention is "new," while § 271(a) specifies those acts the inventor may exclude the public from performing. The test for whether an invention fails to be new (i.e., is "anticipated"), and the test for whether an invention is infringed, are symmetrical: "That which infringes, if later, would anticipate, if earlier."[226]

The experimental use doctrines carve out limited exceptions for certain research activities that would otherwise qualify as either anticipatory activities (by the inventor) or infringing activities (by the public). As with the tests for anticipation and infringement, the tests for these doctrines should also be symmetrical. Presently, however, there is an asymmetry in Federal Circuit jurisprudence unduly favoring the inventor. It *permits* an inventor to experiment on his invention in public and violate the literal text of § 102(b), but *precludes* those same activities under § 271(a) if later performed by a member of the public. Therefore, in order to maintain the "delicate balance" of the patent bargain between the inventor and the public, an experimental use exception must either be given to both inventors *and* the public, or to neither of them. The better choice is to give to both.

If carefully implemented, both the inventor's negation of § 102(b) invalidity and the infringer's defense to § 271(a) infringement contain safeguards so as not to undermine the policies of these two statutes. For instance, the inventor's negation requires that experiments be performed under tight control without commercially exploiting the invention. Additionally, an inventor must produce laboratory documents that demonstrate a bona fide experimental protocol, which ends with an actual reduction to practice. These requirements respect

[225] *See supra* notes 7-12 and accompanying text.

[226] *See supra* notes 14-15 and accompanying text.

the aims of § 102(b) in protecting the public from (1) relying on open information that is later patented and (2) being subjected to a monopoly under both a trade secret and a patent that is effectively longer than the patent term.[227] Similarly, the infringer's defense requires that testing be performed on the patented invention for the sole purpose of understanding or improving upon it, as evidenced by objective laboratory procedures. Whereas the purpose of § 271(a) is to allow a patentee to commercialize an invention without competitors undercutting its sale price and quantity, the public's activities performed on the "research" side of the R&D dichotomy do not unduly compromise that goal.[228]

In addition to respecting the policies of § 102(b) and § 271(a), the two experimental uses work together to further additional policies of the Patent Act, as well as the Constitution's Progress Clause.[229] First, the detailed disclosure required by § 112 para. 1 of the Patent Act may often necessitate actual testing, not just theoretical conjecture.[230] The inventor's negation allows the inventor to experiment on the invention in public in order to satisfy the disclosure requirements for receiving a patent. Likewise, to ensure that this disclosure meets these statutory requirements, the public should be free to scrutinize this disclosure under the shield of the infringer's defense.[231]

Second, both experimental uses further the constitutional imperative of promoting the progress of science. By preserving the validity of a patent against the public-use or on-sale bars, the inventor's negation preserves the incentive to invest research dollars in technological fields that require testing in public – e.g., roadways, weather-resistant materials, and clinical medicine. After a pioneer inventor has made the initial inroads in a given field, the infringer's defense permits members of the public to improve upon that pioneer invention and to become inventors themselves, such as by acquiring patents on improvements or new uses.

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[227] *See supra* note 90 and accompanying text.

[228] The experimental use defense implicates the market for research products, which can indeed be substantial. However, a sample of a patented invention, made and used only for experimental purposes – i.e., experimenting *on* and not *with* it – is not the type of product that the patentee's monopoly can legitimately reach. Where a member of the public chooses to construct such a sample herself for purposes of experiment, the patentee's lost sale is not a legal harm that violates the "lawful rewards" of his discovery. *See supra* notes 140-41 (quoting Justice Story).

[229] U.S. CONST. art. I, § 8, cl. 8.

[230] *See supra* notes 99-104 and accompanying text (providing instances in which a pioneer inventor or improver may need to submit research data to the Patent Office).

[231] *See* Brief of Intellectual Property Professors as Amici Curiae in Support of Neither Party, *supra* note 25, at 7 ("[J]ust as permitting inventors to learn more about their inventions *before* they are required to apply for a patent was held by this Court to be a necessary limitation on the scope of 'use' in § 102(b), permitting others to engage in research *after* the patent is granted is crucial to effectuating the social bargain underlying the grant of a patent." (emphasis added)).

Thus, for each policy advanced by an inventor operating *prior* to the grant of a patent under the inventor's negation, the infringer's defense advances those same goals through the public's activities *after* the patent is granted. The current Federal Circuit jurisprudence, however, sacrifices these latter, long-term policies in favor of pro-patentee incentives in the short term. To ensure that the patent system strikes a "delicate balance," not only between the inventor and the public but also between short- and long-term policy goals, courts ought to restore the infringer's experimental use defense to its original scope as established by Justice Story and solidified in the Court of Claims' jurisprudence. The proper scope of an experimental use defense for infringers would be nearly coextensive with that of the inventor's negation, thereby ensuring that both parties receive ample consideration in the patent bargain.

B. *Dissimilar Factors Are Attributed to the Word "Public" in § 102(b)*

The Federal Circuit has compiled an extensive list of thirteen objective factors for courts to consider when deciding whether to excuse an inventor's public research activities under the inventor's experimental use negation of § 102(b) invalidity. These factors are:

> (1) the necessity for public testing; (2) the amount of control over the experiment retained by the inventor; (3) the nature of the invention; (4) the length of the test period; (5) whether payment was made; (6) whether there was a secrecy obligation; (7) whether records of the experiment were kept; (8) who conducted the experiment; (9) the degree of commercial exploitation during testing; (10) whether the invention reasonably requires evaluation under actual conditions of use; (11) whether testing was systematically performed; (12) whether the inventor continually monitored the invention during testing; and (13) the nature of the contacts made with potential customers.[232]

The Supreme Court has expressed its approval of the Federal Circuit's approach to the inventor's negation: "The experimental use doctrine, for example, has not generated concerns about indefiniteness."[233] The Federal Circuit's unwillingness to extend a similar experimental use to infringers may be partly due to concerns that such a defense would lead to greater uncertainty in patent litigation.[234] But by focusing on the Federal Circuit's list of objective factors, courts can draw an infringer's § 271(a) defense that is as definite and workable as the inventor's § 102(b) negation. The parallels between the infringer's defense and the inventor's negation are summarized in Figure 1.

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[232] Electromotive Div. of Gen. Motors Corp. v. Transp. Sys. Div. of Gen. Elec. Co., 417 F.3d 1203, 1213 (Fed. Cir. 2005).

[233] Pfaff v. Wells Elecs., Inc., 525 U.S. 55, 67 (1998).

[234] *See* Mueller, *supra* note 23, at 963 (citing the Federal Circuit's "preference for bright-line rules over more nuanced, multi-factored, 'totality of the circumstances' standards" as a reason for the court's hostility to the infringer's defense).

Figure 1. Comparison of the Two Experimental Uses

		I. Inventor's Negation of § 102(b)	**II. Infringer's Defense to § 271(a)**
Historical Origin		Justice Story in *Mellus, Pennock, Ryan,* and *Wyeth.*	Justice Story in *Whittemore* and *Sawin.*
Policies of Statute		§ 102(b) protects the **public** from patentees' removal of public knowledge and secret commercial exploitation.	§ 271(a) protects the **inventor** from the public's non-rivalrous consumption of property right.
Policies of Common Law Exception to Statute		(A) Protects the **inventor**'s interest in collecting information to make an adequate disclosure. (B) Promotes progress of science by protecting the **inventor**'s ex ante research incentive.	(A) Protects the **public**'s interest in ensuring an adequate disclosure. (B) Promotes progress of science by permitting the **public**'s follow-on innovation.
Factors Supporting Experimental Use	Dissimilar Factors	Secrecy and Control: (1) Necessity for public testing; (2) Amount of control over the experiment retained by the inventor; (6) Whether there was a secrecy obligation; (8) Who conducted the experiment; (10) Whether the invention reasonably requires evaluation under actual conditions of use.	Secrecy and control are not relevant in defending against a claim of direct infringement, but may be relevant in defending against indirect infringement.
	Similar Factors	Experimental Protocol: (3) Nature of the invention; (4) Length of the test period; (7) Whether records of the experiment were kept; (11) Whether testing was systematically performed; (12) Whether the inventor continually monitored the invention during testing.	
		Commerciality: (5) Whether payment was made; (9) Degree of commercial exploitation; (13) Nature of contacts made with potential customers.	

The first step in this comparison is to identify which factors do not apply to the infringer's defense. One obvious difference between the two experimental uses is that § 102(b) bars an inventor's use that is "public," whereas § 271(a) bars infringers from "using" the invention whether or not such use is performed in public. The inventor's negation, therefore, requires an inventor to maintain secrecy and control over his experiments. These secrecy-and-control requirements are embodied in Factors 1, 2, 6, 8, and 10. In contrast, a member of the public who invokes the infringer's experimental use defense need *not* perform her experiments in secrecy. Indeed, when attempting to reproduce a patentee's alleged results to better understand the invention, the public is free to perform these experiments in open air.

There are, however, two reasons why a researcher operating under the infringer's defense still ought to retain some secrecy and control over her experiments. First, even if the researcher only performs experiments *on* the patented invention and never crosses into commercial "development," the researcher may still be liable for contributory or induced infringement if other members of the public directly infringe the patent.[235] For instance, a casual observer might take the open nature of the experiments as a representation that the invention is free for public use. Or, a third party research firm that the defendant hired to perform experiments without any restrictions might later infringe the patent by using the invention for its intended purpose. In either scenario, the defendant may be liable for indirect infringement.

The second reason that a researcher ought to retain secrecy and control, even if she does not infringe the patent, is that any improvements discovered while she experiments on the underlying patent may themselves then be barred from patentability under § 102(b). Indeed, the researcher performing follow-on innovation under the infringer's defense may herself become an inventor who, in turn, must worry about whether her activities can properly qualify for an experimental use negation of the § 102(b) public-use or on-sale bars.

To illustrate the differences between the two experimental uses, consider the hypothetical case of what would have happened if the inventor of the improved street pavement in *Elizabeth* had additionally been sued for infringing the "basic" patent he was attempting to improve. In the actual case, the inventor had successfully argued that his public use of the pavement should not invalidate his improved patent under § 102(b). First, he pointed out that he needed to evaluate the pavement under actual conditions of use (Factor 10) in order to test its durability against exposure to wagons and weather.[236] Thus, the experiments were performed in public only because they had to be (Factor

[235] *See* 35 U.S.C. § 271(b)-(c) (2000) (defining induced and contributory infringement). *See generally* Charles W. Adams, *A Brief History of Indirect Liability for Patent Infringement*, 22 SANTA CLARA COMPUTER & HIGH TECH. L.J. 369 (2006).

[236] Elizabeth v. Pavement Co., 97 U.S. 126, 134 (1877) ("[T]he nature of a street pavement is such that it cannot be experimented upon satisfactorily except on a highway, which is always public.").

1).[237] Moreover, the inventor built the pavement on his company's privately owned property and inspected it almost daily (Factor 2).[238] He personally constructed and inspected the pavement (Factor 8), and he told the toll-keeper who worked near the site that this was his invention (Factor 6). All of these factors helped to minimize the possibility that the public would rely on the free use of the invention – a necessary requirement for the *inventor's negation* of § 102(b) invalidity.

In contrast, the *defense* to § 271(a) infringement does not inherently contain a concern for public reliance. If the inventor in *Elizabeth* had been forced to defend himself against an allegation of infringement, none of these secrecy-and-control factors (Factors 1, 2, 6, 8, and 10) would have been helpful in proving that he was experimenting *on* the "basic" patent being improved, or that he was performing scientific "research" rather than commercial "development." Where these factors might come into play as a defense, however, is if the inventor were sued for indirect infringement by allegedly inducing or contributing to a third party's infringement of the "basic" patent. For instance, the defendant could point to various restrictions he had imposed on third party researchers to rebut the claim that he induced the third party to use the underlying patent for profit rather than primarily for experiment.

Nevertheless, these secrecy-and-control factors are insufficient by themselves to establish either the inventor's negation or the infringer's defense, because an experimental use must still be "primarily experimental and not commercial."[239]

C. *Similar Factors Ensure That the Use Is Primarily Experimental and Not Commercial*

In the context of the inventor's negation, the Supreme Court has stated, "The law has long recognized the distinction between inventions put to *experimental use* and products *sold commercially*."[240] The thirteen objective factors of an inventor's negation, according to the Federal Circuit, "simply represent various kinds of evidence relevant to the question of whether pre–critical date activities involving the patented invention . . . were primarily *experimental* and *not commercial*."[241] The concern that a researcher could use an invention for commercial gain is equally great in the context of the infringer's defense: "[T]he patent is infringed by and bars activity associated with *development and commercialization* of infringing subject matter, but the

[237] *Id.* at 136 ("The *only* way in which they could use it was by allowing the public to pass over the pavement." (emphasis added)).

[238] *See supra* notes 56, 59 and accompanying text.

[239] Electromotive Div. of Gen. Motors Corp. v. Transp. Sys. Div. of Gen. Elec. Co., 417 F.3d 1203, 1213 (Fed. Cir. 2005).

[240] Pfaff v. Wells Elecs., Inc., 525 U.S. 55, 64 (1998) (emphasis added).

[241] *Gen. Motors Corp.*, 417 F.3d at 1213 (emphasis added).

research itself is not prohibited . . . ."[242] Thus, both classes of experimental use are coextensive insofar as the researcher's activities must be primarily experimental and not commercial. Factors 3, 4, 7, 11, and 12 examine the soundness of the experimental regimen. Factors 5, 9, and 13 examine the extent to which the activities were commercial. Together, these factors help ensure that an experimental use – whether the inventor's negation or the infringer's defense – is granted only for activities on the "research" side of the R&D dichotomy.

A properly designed and carefully monitored experiment makes it more likely that a researcher is attempting, in the case of the *inventor's negation*, "to test the [invention], and ascertain whether it will answer the purpose intended, and make such alterations and improvements as experience demonstrates to be necessary,"[243] or, in the case of the *infringer's defense*, "to understand it, or to improve upon it, or to find a new use for it, or to modify or 'design around' it."[244] The experimental protocol in either case is the same, except that the infringer experimenting on a patented invention has the benefit of the patentee's written disclosure and, therefore, ought to closely examine its contents.

For instance, in *Elizabeth*, the nature of the invention (Factor 3) was such that it possessed enhanced durability to wear and decay – a feature better proven through experiment than theory. Accordingly, the inventor designed an experiment that would subject the pavement to a large volume of stop-and-go traffic, yet could still be accessed for inspection and improvement (Factor 11).[245] As further evidence of his bona fide experimental intent, the inventor returned to the site almost daily, prodding the pavement with a stick to check its durability and asking the toll-keeper "a great many questions about it" (Factor 12).[246] The nature of the invention and the problem to be solved also dictated the appropriate length of time for these experiments (Factor 4), which in this case required "a long period, perhaps years."[247]

An actual reduction to practice is another limit on the amount of time a researcher may spend on either type of experimental use, be it the inventor's negation or the infringer's defense. For instance, an inventor similar to the one

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[242] Integra Lifesciences I, Ltd. v. Merck KGaA, Nos. 02-1052, 02-1065, 2003 U.S. App. LEXIS 27796, at *46 (Fed. Cir. June 6, 2003) (Newman, J., concurring in part and dissenting in part) (emphasis added).

[243] Elizabeth v. Pavement Co., 97 U.S. 126, 135 (1877).

[244] *Integra*, 2003 U.S. App. LEXIS 27796, at *42 (Newman, J., concurring in part and dissenting in part).

[245] *Compare Elizabeth*, 97 U.S. at 133 (stating that the inventor installed the pavement on his company's private property), *with* Root v. Third Ave. R.R. Co., 146 U.S. 210, 221 (1892) (stating that the inventor installed the pavement in the city in a location where "he would not be permitted to make any changes in it by way of experiment").

[246] *Elizabeth*, 97 U.S. at 133.

[247] *Id.* at 135; *see also* Rooklidge & Jensen, *supra* note 16, at 31 (explaining the relationship between the nature of the invention and the length of the test period).

in *Elizabeth* is permitted to experiment on his improved pavement until he knows that the improved feature "will work for its intended purpose."[248] After that point, his continued public use would not negate the invalidity of his future improvement patent, nor would it render him immune from claims that he infringed the underlying "basic" pavement if it had been patented by another. Thus, Factors 3, 4, 7, 11, and 12 help answer the question relevant to both experimental uses: was the researcher attempting to study and improve upon the invention, or was the researcher using it for its intended purpose as a thing already completed?

Evidence of commercial exploitation (Factors 5, 9, and 13) undermines a researcher's contention that his activities were primarily experimental.[249] Arguably, the inventor in *Elizabeth* received a financial benefit as a stockholder and treasurer of the company that was collecting tolls alongside his experimental setup.[250] But the Supreme Court found any potential financial gain too attenuated from the inventor's actual use to compromise his bona fide experimental purpose. This strained financial relationship is similar to that in *Madey* between Duke University's use of patented technology and its legitimate business of "educating and enlightening students and faculty participating in these projects."[251] In *Madey*, the Federal Circuit's undue focus on the identity of the infringer who invoked the experimental use defense[252] was equally inapposite as the unsuccessful argument in *Elizabeth* that the inventor's use was commercial simply because he was a stockholder and treasurer of that company. The proper focus, for either the inventor's negation or the infringer's defense, is on the actual use of the invention in commerce as a thing already completed.

For instance, the inventor of the cable-car railway in *Root v. Third Avenue Railroad Co.* received a substantial benefit that was directly tied to his disclosure and use of his invention: after the inventor presented the invention to the directors (Factor 13), the invention was selected as a public work at a

[248] Estee Lauder Inc. v. L'Oreal, S.A., 129 F.3d 588, 593 (Fed. Cir. 1997). In addition to a limit on the temporal scope of the experimental use, there is also a limit on which features of the invention a researcher may study. The inventor's negation only negates experimentation directed to features that appear in the patent claims. *See* EZ Dock, Inc. v. Schafer Sys., Inc., 276 F.3d 1347, 1353 (Fed. Cir. 2002) ("[E]xperimentation negates a bar when the inventor tests claimed features of the invention."). On the other hand, the infringer's defense will immunize experimentation on the patented invention either alone or in combination with improvement features.

[249] *See* Upadhye, *supra* note 116, at 46 ("Commercialization is antithetical to experimental use."). Although the two classes of experimental use are adverse to commercialization for different reasons, the experimental uses prohibit the same type of activity: use of the invention for profit as a thing already perfected.

[250] *See Elizabeth*, 97 U.S. at 133.

[251] Madey v. Duke Univ., 307 F.3d 1351, 1362 (Fed. Cir. 2002).

[252] *Id.* ("[O]ur precedent does not immunize any conduct that is in keeping with the alleged infringer's legitimate business, regardless of commercial implications.").

high price and the inventor was promoted to superintendent of the project (Factor 5).[253] As a matter of scale, the two miles of cable-car railway in *Root* constituted operating at commercial levels (Factor 9),[254] in contrast to the mere seventy-five feet of pavement in *Elizabeth*.[255] If, hypothetically, the inventor in *Elizabeth* were sued for infringing the "basic" pavement patent he was trying to improve, he would be able to rely on these same factors to establish his defense. In this *Elizabeth* hypothetical, the inventor neither received a substantial payment for the disclosure or use of the invention (Factor 5), produced the invention at an industrial scale (Factor 9), nor marketed the invention to potential buyers or end-users (Factor 13). His use of the "basic" pavement patent would therefore be immune from infringement while his experiments were ongoing. However, once the inventor finally perfected the improvement, the continued use of the "basic" pavement would be an intended use that infringed the "basic" pavement patent under § 271(a), just as this public use would invalidate his own patent on the improvement under § 102(b).

CONCLUSION

The inventor and the public are two co-equal parties to the patent bargain. The symmetry between the inventor's test for § 102(b) anticipation and the public's test for § 271(a) infringement is disrupted if only one party is given a judge-made "experimental use" exception. The infringer's experimental use defense to § 271(a) should be drawn roughly equal to the inventor's experimental use negation of § 102(b) because both exceptions share common historical origins in Justice Story, further similar policy goals, and are evidenced by similar objective factors of experimentation. Moreover, as a practical matter in today's era of cumulative innovation, a member of the public who experiments on a patented invention under the *infringer's defense* can often become an inventor of an improvement, which she may need to reduce to practice in public by invoking the *inventor's negation.*

[253] Root v. Third Ave. R.R. Co., 146 U.S. 210, 215 (1892).

[254] *Id.* at 215.

[255] *Elizabeth*, 97 U.S. at 133.