

# ARTICLE

## THE QUESTION CONCERNING PATENT LAW AND PIONEER INVENTIONS

JOHN R. THOMAS<sup>†</sup>

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### I. INTRODUCTION

Legal scholars recognize the importance of philosophical studies to the analysis of our system of patents and other intellectual property regimes.<sup>1</sup> Many of these scholars apply John Locke's theory

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<sup>†</sup> Research Scholar, Institute of Intellectual Property, Tokyo, Japan. LL.M., George Washington University, 1994; J.D., University of Michigan, 1992; B.S., Carnegie Mellon University, 1989. An earlier version of this Article received the 1994 Marcus B. Finnegan Prize in Intellectual Property Law. The author wishes to acknowledge Harold C. Wegner for his support during the drafting of this Article.

1. See, e.g., Kurt L. Glitzenstein, *A Normative and Positive Analysis of the Scope of the Doctrine of Equivalents*, 7 HARV. J.L. & TECH. 281, 314-22 (1994); Wendy J. Gordon, *A Property Right in Self-Expression: Equality and Individualism in the Natural Law of Intellectual Property*, 102 YALE L.J. 1533, 1535, 1538 (1993); Richard A. Epstein,

of property rights<sup>2</sup> to determine which technological advancements should be eligible for patent protection. Commentators have turned less enthusiastically to Georg Wilhelm Friedrich Hegel, perhaps the most significant philosopher to acknowledge intellectual property laws explicitly in his works.<sup>3</sup> They have ignored the works of Aristotle, Karl Marx, and Martin Heidegger, philosophers who contemplated the nature of technology itself.<sup>4</sup>

The patent system is a regime of technological evaluation.<sup>5</sup> Thus, technology as a philosophical concern aids appreciation of the nature and function of patent law. This article undertakes a philosophical analysis with regard to the doctrine of the pioneer invention. Under the common law principle of pioneer inventions,

International News Service v. Associated Press: *Custom and Law as Sources of Property Rights in News*, 78 VA. L. REV. 85 (1992); Alfred C. Yen, *Restoring the Natural Law: Copyright as Labor and Possession*, 51 OHIO ST. L.J. 517, 517, 522-24 (1990); Linda J. Lacey, *Of Bread and Roses and Copyright*, 1989 DUKE L.J. 1532, 1536-37, 1568-84; Roberta Rosenthal Kwall, *Governmental Use of Copyrighted Property: The Sovereign's Prerogative*, 67 TEX. L. REV. 685, 689-92 (1989); Justin Hughes, *The Philosophy of Intellectual Property*, 77 GEO. L.J. 287 (1988).

2. JOHN LOCKE, *THE SECOND TREATISE OF GOVERNMENT* (Thomas P. Peardon ed., 1952).

3. Hegel notes that:

The purely negative, though the primary, means of advancing the sciences and arts is to guarantee scientists and artists against theft and to enable them to benefit from the protection of their property, just as it was the primary and most important means of advancing trade and industry to guarantee it against highway robbery.

GEORG HEGEL, *PHILOSOPHY OF RIGHT* 55 (1821) (T.M. Knox trans. 1952). Others acknowledging intellectual property include JOHN STUART MILL, *PRINCIPLES OF POLITICAL ECONOMY* Vol. I 145-46 (1909), and JEREMY BENTHAM, *Manual of Political Economy*, in *JEREMY BENTHAM'S ECONOMIC WRITINGS* 219, 260-65 (W. Stark ed., 1952).

4. This Article will not directly address the interesting questions relating to the meaning of such terms as "technology" and "invention." See Robert P. Merges, *Commercial Success and Patent Standards: Economic Perspectives on Innovation*, 76 CAL. L. REV. 805, 806-11 (1988); DON IHDE, *EXISTENTIAL TECHNICS* 9 (1983); ARNOLD PACEY, *THE CULTURE OF TECHNOLOGY* 4-7 (1983); James K. Feibleman, *Pure Science, Applied Science and Technology: An Attempt at Definitions*, in *PHILOSOPHY AND TECHNOLOGY: READINGS IN THE PHILOSOPHICAL PROBLEMS OF TECHNOLOGY* 33 (Carl Mitcham & Robert Mackey eds., 1982) [hereinafter *PHILOSOPHY AND TECHNOLOGY*]. With respect to "technology," it will generally use the word as the patent law does, referring to the physical machines and structures themselves, rather than in the more comprehensive, humanistic sense of the entire system of artifacts, human knowledge and social organization, often labeled "technique." The distinction between these uses of the term, with all of its ramifications, undergirds much of the analysis to follow; therefore, where necessary, this Article will point to the different senses of the term it employs.

5. See *infra* notes 31-42 and accompanying text.

courts may grant a broader scope of protection to patents covering revolutionary technological advances than to those covering more modest achievements.<sup>6</sup> Courts construe pioneer patent claims more broadly than others, thus allowing the claims to encompass a broader range of so-called "equivalents" during an infringement determination.<sup>7</sup>

The pioneer invention doctrine provides a good illustration of the importance of the philosophy of technology for two reasons. First, laypersons and technologists share the view that pioneer inventions are crucial to the sort of technological advance<sup>8</sup> that the patent system is designed to encourage.<sup>9</sup> They are the inventions with which we are most familiar, and those we care most about. Innumerable popular histories of technological progress focus on pioneer inventors and the revolutionary advances they are said to have brought about.<sup>10</sup>

Second, pioneer inventions are of profound interest to scholars of the patent law. Although the studies of these scholars share an economic orientation, their conclusions have been inconsistent. Professor A. Samuel Oddi has proposed the grant of a "revolutionary patent" for pioneer inventions.<sup>11</sup> To obtain a revolutionary patent, an applicant would have to demonstrate that the claimed invention represented an extraordinary technical advance, changed existing production or consumption patterns, and required an extensive development effort. Under this scheme, revolutionary patents would obtain an extended duration and scope of protection in comparison with ordinary utility patents.

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6. *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 608 (1950).

7. See *infra* notes 48-55 and accompanying text.

8. GEORGE BASALLA, *THE EVOLUTION OF TECHNOLOGY* 26 (1988).

9. The Constitution empowers Congress to enact legislation "[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries . . ." U.S. CONST. art. I, § 8, cl. 8.

10. See, e.g., F. CLIFTON BERRY, JR., *INVENTING THE FUTURE* (1993); Donald J. Perralla, *The Influence of the Patent System on the U.S. Economy*, 49 J. PAT. OFF. SOC'Y 52, 52-53 (1967); T.K. DERRY & TREVOR I. WILLIAMS, *A SHORT HISTORY OF TECHNOLOGY* (1960).

11. Samuel Oddi, *Beyond Obviousness: Invention Protection in the Twenty-First Century*, 38 AM. L. REV. 1097, 1128-37 (1989). See also Friedrich-Karl Beier, *Future Problems of Patent Law*, 3 INT'L REV. INDUS. PROP. & COPYRIGHT L. 423, 441-45 (1972) ("Should we not accord preferential treatment to inventions that are of special significance for society, examine them more quickly, publish them earlier, and protect them more broadly?").

In contrast, Professors Robert Merges and Richard Nelson argued that the patent law should, in appropriate instances, favor improvement inventions over pioneer inventions.<sup>12</sup> Such a regime would selectively curtail protection for pioneer patents so that other inventors would be able to develop noninfringing refinements more easily. To achieve this end, courts would employ the reverse doctrine of equivalents<sup>13</sup> and other interpretive tools to maximize the incentives to develop incremental improvements on existing pioneer patents.

This Article does not attempt to choose between these competing views. It appears that further empirical evidence will be required before the economic analysis of pioneer patent law can offer meaningful insights.<sup>14</sup> Instead, this Article will focus on the courts' rationales for the protection of pioneer inventions, and consider how they fare in light of historical experience and philosophical thought.

Part II of this Article describes the courts' current view of technology. It begins by detailing the patent acquisition process, patent infringement suits, and the role of the pioneer invention doctrine. It then discusses the origins of the pioneer invention doctrine in early American cases, its development by subsequent courts, and its current application by the Court of Appeals for the Federal Circuit.<sup>15</sup> The Article then evaluates two rationales offered for the pioneer invention doctrine: judicial recognition of the difficulty in drafting claims that fairly define the invention, and a reward of stronger protection to those inventors who have disclosed such

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12. Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 843-44 (1990).

13. Under the reverse doctrine of equivalents, an accused product which falls within the literal terms of a patent claim may nonetheless escape infringement if it is "so far changed in principle . . . that it performs the same or a similar function in a substantially different way." *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605 (1950).

14. Cf. George L. Priest, *What Economists Can Tell Lawyers About Intellectual Property*, in 8 RESEARCH IN LAW AND ECONOMICS: THE ECONOMICS OF PATENTS AND COPYRIGHTS 19, 19-20 (John Palmer & Richard O. Zerby, Jr. eds., 1986) ("The ratio of empirical demonstration to assumption in this literature [applying economic analysis to the domain of intellectual property] must be very close to zero. . . . I do not believe that it is unfair to say that the . . . literature of which I am aware [has] consisted of little more than assumptions. As a consequence, this literature has taught us almost nothing, nor has it guided research or thinking so that an approach with a firmer empirical base could be developed.").

15. The Court of Appeals for the Federal Circuit, created by the Federal Courts Improvement Act of 1982, Pub. L. No. 97-164, § 101, 96 Stat. 25 (codified in various sections of 28 U.S.C.), possesses exclusive jurisdiction over appeals in patent infringement cases.

important advances. This Article acknowledges that claim drafting is a difficult matter, but contends that in many instances, inventions presenting only a modest advance in a crowded technological field also pose drafting problems of extraordinary intricacy. The Article then considers the second justification: incentives and rewards for the disclosure of revolutionary technological advances. By distinguishing pioneer inventions solely by the extent to which they advance the technological arts, without reference to the place these inventions have assumed in society, patent law is assuming one of two alternative technological values. The first is that technology is a neutral force, with no values beyond the use to which it is put. Therefore, inventions are unworthy of evaluation on any dimension other than the technical. Alternately, the patent law's award of negative property rights may be considered as too meager a means of influencing the development of technology. This Article offers a third possibility to explain current patent policy, technological resignation. Such a view holds that, although the patent system indeed has an impact upon the progress of individual inventions, the advance of technology is an inevitable societal force in which the scheme of patents can play only a marginal role. Part II concludes with an analysis of these three views of technology, and argues that they derive from the philosophy of Aristotle and Marx.

Part III presents an alternate conception of technology that is more in line with both historical experience and with modern philosophical thought. The writings of German existentialist philosopher Martin Heidegger are introduced as a more appropriate conceptual basis for understanding the role of technology in society. Several examples are offered, including the Snowmobile Revolution of the late 1960's in northern Finland, the Opium War between Great Britain and China in the nineteenth century, and the recent United States experience with the Supersonic Transport, to question the assumption behind pioneer invention doctrine that technology is a neutral and inevitable social force. A review of the literature surrounding these experiences indicates that the patent law has not taken proper heed of the work of technological historians and anthropologists, who would vigorously contest patent law's implied perspective that technological change is inevitable and devoid of values. The Article closes in Part IV with brief suggestions of how future scholarship might employ philosophical and historical insights in order to evaluate the patent system, and for how the purely technical criteria for patentability and infringement could be

expanded to include a concern for the societal impact of the patented product.

## II. PATENT LAW: AN INSTRUMENTAL VIEW OF TECHNOLOGY

As patent law, and in particular the pioneer invention doctrine, have emerged, the courts have been virtually silent on the philosophical underpinnings of the value placed on an invention as an improvement over prior technology. This section argues that the philosophies of Aristotle, Hegel, and Karl Marx have influenced American patent law's view of technological change as inevitable and patent law's lack of inquiry into the social benefits of an invention.

### A. Patent Grants and Patent Infringement

Courts and commentators frequently analogize the grant of a patent to that of a contract formed between an inventor and the public.<sup>16</sup> Through ownership of a patent, an inventor obtains the right to exclude others from making, using or selling the patented invention.<sup>17</sup> In exchange, inventors must disclose their discovery to the public with sufficient specificity to allow others knowledgeable in the relevant field to employ the invention.<sup>18</sup> To extend the contract analogy, one could say that the Patent and Trademark Office (PTO) acts as the agent of the public during formation of the contract. The patent acquisition process at the PTO provides an initial, but not incontestable, assurance that only those inventions which fulfill the statutory prerequisites receive a patent grant.<sup>19</sup>

An individual seeking patent protection for an invention must first prepare an application for submission to the PTO. The application primarily consists of the invention's "specification."<sup>20</sup> The specification is an often lengthy description of the technical problem the inventor faced and the invention produced to solve that problem. The specification includes the invention's ingredients and a description of how the ingredients work together.<sup>21</sup> The description

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16. *See, e.g.,* *Fried. Krupp Aktien-Gesellschaft v. Midvale Steel Co.*, 191 F. 588, 594 (3d Cir. 1911); ERNEST BAINBRIDGE LIPSCOMB III, *WALKER ON PATENTS* § 1:6 at 38-41 (3d ed. 1984, Vol. III).

17. 35 U.S.C. § 154 (1988).

18. *See, e.g.,* 35 U.S.C. §§ 111-112 (1988).

19. *See* ROBERT PATRICK MERGES, *PATENT LAW AND POLICY* 30-33 (1992).

20. 35 U.S.C. §§ 111-112 (1988).

21. 35 U.S.C. § 112 (1988).

must be so complete as to enable practitioners in the technical field to use the invention.<sup>22</sup> It also must include what the inventor believes to be the invention's "best mode," the superior method of accomplishing the invention.<sup>23</sup>

The specification serves more as an introduction and foundation than as a source of legal rights. The patent statute reserves that role for the claims, the precise delineations of the invention placed at the close of the specification.<sup>24</sup> The claims are the primary source of the bundle of property rights associated with a patent.<sup>25</sup>

Claims consist of three primary parts.<sup>26</sup> The first, the preamble, is an introductory statement defining the invention in a general way.<sup>27</sup> Next is the transition, a short phrase, usually "comprising" or "consisting."<sup>28</sup> The body, listing all the elements of the invention and how they interact, concludes the claim.<sup>29</sup> The following claim, describing an artificial heart, illustrates this sequence:

A blood pumping device to replace or temporarily assist the natural heart, said device comprising:

a) a blood pumping chamber of flexible wall construction, and having separate blood inlet and outlet means; and

b) an inflatable blood displacement member of elastic wall construction located within said pumping chamber and operable upon periodic inflation to forcibly eject blood from said pumping chamber through said outlet means, an inflatable valve head for periodically blocking said inlet means, said valve head being affixed to said displacement member and operable as a valving means, said valve head including means for operating said valve head separately from said inflation of said inflatable blood

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22. 35 U.S.C. § 112 (1988).

23. *Id.*

24. *Id.*

25. *See, e.g.,* *Env'tl. Designs Ltd. v. Union Oil Co. of Cal.*, 713 F.2d 693, 699 (Fed. Cir. 1985) (the claims, not the specification, measure the invention). Case law establishes, however, that claims must be read in light of the specification, but limitations in the specification are not to be read into the claims. *E.g.,* *Sjolund v. Musland*, 847 F.2d 1573, 1581-82 (Fed. Cir. 1988). Further, if the claim has been drafted in functional form, the sixth paragraph of 35 U.S.C. § 112 requires that "such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereto." *See In re Donaldson*, 16 F.3d 1189, 1193 (Fed. Cir. 1994).

26. ROBERT C. FABER, *LANDIS ON MECHANICS OF PATENT CLAIM DRAFTING* §§ 6-9 (3d ed. 1990).

27. *Id.*

28. *Id.*

29. *Id.*

displacement member to thereby achieve optimum pumping efficiency of said blood pumping device.<sup>30</sup>

Following submission of the application to the PTO, agency officials (titled examiners) determine whether the claimed invention merits patent protection.<sup>31</sup> The Patent Act of 1952 limits patent protection by an invention's subject matter, utility, novelty and nonobviousness.<sup>32</sup> The invention must consist of a process, machine, manufacture, or composition of matter; excluded are laws of nature or purely mathematical algorithms.<sup>33</sup> The invention must also meet a minimum standard of utility (i.e. operability toward some useful purpose).<sup>34</sup> In this regard, the patent law mandates only that the claims set forth a nonfrivolous invention, not that they provide a technology that is commercially viable or superior to prior advancements.<sup>35</sup> The third requirement, novelty, primarily denies patent protection to inventions already known to others, thereby preventing the withdrawal of an invention from the public domain.<sup>36</sup>

The requirement of nonobviousness is typically the most onerous.<sup>37</sup> The patent statute denies protection to those inventions where "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains."<sup>38</sup> An inquiry into nonobviousness primarily entails a comparison of the claimed invention to existing patents, publications and other sources of apposite prior art.<sup>39</sup> Other considerations, such as the sophistication of practitioners in the technical field, the invention's commercial success, or the failure of others to develop the patented invention in the face of an industry need, are also apposite.<sup>40</sup>

PTO examiners reject most patent applications at least once. Any patents that are granted are the product of a dialogue, or so-called

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30. U.S. Patent No. 3,641,591 (Feb. 15, 1972).

31. 37 C.F.R. §§ 1.101-1.109 (1994).

32. *See, e.g.*, 35 U.S.C. §§ 101-103 (1988).

33. *See* 35 U.S.C. § 101 (1988); *Diamond v. Diehr*, 450 U.S. 175 (1981); *Parker v. Flook*, 437 U.S. 584, 588-92 (1978); *Dann v. Johnson*, 425 U.S. 219 (1976); *Gottschalk v. Benson*, 409 U.S. 63, 67-68 (1972).

34. *See* 35 U.S.C. § 101 (1988).

35. 35 U.S.C. § 101 (1988); *See also* DONALD S. CHISUM, PATENTS § 4.01 (1994).

36. *See* 35 U.S.C. § 102 (1988); *In re Wyer* 665 F.2d 221, 226 (C.C.P.A. 1981).

37. *See, e.g.*, *MacLaren v. B-I-W Group, Inc.*, 535 F.2d 1367, 1376 (2nd Cir. 1976).

38. 35 U.S.C. § 103 (1988).

39. *E.g.*, *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966).

40. *Id.*; *see generally* *Merges, supra* note 4.

patent prosecution, between applicant and examiner.<sup>41</sup> The examiner may take a different view of the prior art than the applicant, often reading prior art references more broadly than the applicant. Research may also reveal similar prior inventions that the applicant did not discover, making the applicant's submitted claim language anticipated or obvious. An applicant responds to examiner rejections by amending claims or submitting evidence that suggests the invention merits patent protection. A patent issues when the examiner is satisfied that the invention has met the statutory standards.<sup>42</sup>

Once the PTO issues a patent, the patentee obtains the right to exclude others from making, using or selling the patented invention in the United States.<sup>43</sup> Those who do so without the authority of the patentee commit patent infringement.<sup>44</sup> Because the exclusive rights granted by a patent are measured by the scope of the language of the patent claims, claim interpretation looms extraordinarily large in infringement actions. Claims must be read and interpreted<sup>45</sup> both by competitors seeking to avoid infringement and by courts ultimately resolving the issue. As with texts in other areas of the law, the language of claims is not determinative.

A patent can be infringed literally or nonliterally. Literal infringement occurs only when an accused device exactly embodies each element of the original patent's claim.<sup>46</sup> In such instances, the claim is said to "read on" the accused device.<sup>47</sup> Because the omission of any claim element from the accused device indicates that no literal infringement occurs, patent owners often attempt to expand the scope of their claims by invoking the doctrine of equivalents. The doctrine grew from courts' efforts to stop the piracy of an invention by competitors who would copy the invention with minor modifications

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41. DONALD S. CHISUM & MICHAEL A. JACOBS, UNDERSTANDING INTELLECTUAL PROPERTY LAW § 2D[1] (1992).

42. 35 U.S.C. § 101 (1988).

43. 35 U.S.C. § 154 (1988).

44. 35 U.S.C. § 271(a) (1988). See *Carbice Corp. v. Am. Patents Dev. Corp.*, 283 U.S. 27, 33 (1931).

45. See *Autogiro Co. of Am. v. United States*, 384 F.2d 391, 396-97 (Ct. Cl. 1967).

46. See, e.g., *Key Mfg. Group, Inc. v. Microdot, Inc.*, 925 F.2d 1444 (Fed. Cir. 1991); *Hi-Life Prods. Inc. v. Am. Nat'l Water-Mattress Corp.*, 842 F.2d 323, 325, (Fed. Cir. 1988); *Builders Concrete, Inc. v. Bremerton Concrete Prods. Co.*, 757 F.2d 255 (Fed. Cir. 1985); *Lemelson v. United States*, 752 F.2d 1538 (Fed. Cir. 1985).

47. See, e.g., *Morton International v. Cardinal Chem. Co.*, 5 F.3d 1464, 1468 (Fed. Cir. 1993); *Minnesota Mining & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc.*, 976 F.2d 1559, 1570 (Fed. Cir. 1992); *Lemelson v. General Mills, Inc.*, 968 F.2d 1202, 1206 (Fed. Cir. 1992).

solely to avoid infringement.<sup>48</sup> Under the doctrine, an accused device that "performs substantially the same function in substantially the same way to obtain the same result"<sup>49</sup> as the patented invention may be found to infringe. Although those individuals making, using or selling such devices would escape liability for literal infringement, such minor, "equivalent" changes do not allow them to avoid infringement under the doctrine of equivalents.

Courts employing the doctrine of equivalents face a policy choice when considering the range of equivalents that should be granted to patent holders.<sup>50</sup> The statutory requirements of novelty and nonobviousness ensure that all patents advance the art; the difficulty lies in determining how broadly these advancements should occupy the field of potentially infringing devices. Policy supports the ability of competitors to study patent claims, exercise legitimate engineering efforts, and produce new, noninfringing products. Such a regime should not be extended, however, to allow copyists to defeat legitimate patent rights through minor, insignificant changes.<sup>51</sup>

In determining the suitable breadth of equivalents, courts will often turn to the specification; courts may look to the patent application or the patent's prosecution history for assistance.<sup>52</sup> Because terms used in the patent application's terse claims must comport with their use in the more lengthy specification, the specification is a valuable aid to interpretation of the claims. Courts have made use of a patent's drawings as well.<sup>53</sup> A third important resource is the patent's prosecution history. Under the doctrine of prosecution history estoppel, a patent holder cannot obtain a construction of a claim previously surrendered during prosecution.<sup>54</sup> If, for example, the patent holder overcomes an examiner's prior art

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48. *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 608 (1950). See generally Harold C. Wegner, *Equitable Equivalents: Weighing the Equities to Determine Patent Infringement in Biotechnology and Other Emerging Technologies*, 18 RUTGERS COMPUTER & TECH. L.J. 1 (1992).

49. *E.g.*, *Sanitary Refrigerator Co. v. Winters*, 280 U.S. 30, 42 (1929).

50. See, *e.g.*, *Pennwalt Corp. v. Durand-Wayland Inc.*, 833 F.2d 931 (1987) (Newman, J., dissenting); EMERSON STRINGHAM, PATENT CLAIMS DRAFTING § 5051 (1930).

51. *Graver Tank*, 339 U.S. at 607.

52. *Autogiro Co. of Am. v. United States*, 384 F.2d 391 (Ct. Cl. 1967).

53. *Id.*

54. See, *e.g.*, *Jonsson v. Stanley Works*, 903 F.2d 812, 817 (Fed. Cir. 1990); *Envvtl. Instruments, Inc. v. Sutron Corp.*, 877 F.2d 1561, 1564-66 (Fed. Cir. 1989); *Loctite Corp. v. Ultraseal Ltd.*, 781 F.2d 861, 870 (Fed. Cir. 1985).

rejection by arguing that the claim does not envelop a given feature, the patent holder is bound by that construction in later proceedings.<sup>55</sup>

## B. The Pioneer Invention Doctrine

Courts have developed one principal tool in determining the scope of equivalents: pioneer status.<sup>56</sup> Once a court determines that the patent describes a pioneering invention, the patent enjoys a broad range of equivalents.<sup>57</sup> Patented inventions that constitute marked, but not pioneering, improvements in the art are entitled to a lesser, although still substantial, range of equivalents.<sup>58</sup> Patented inventions that represent narrow technological improvements receive only a limited range of equivalents.<sup>59</sup>

The Supreme Court set out the requirements for pioneer invention status in *Westinghouse v. Boyden Power Brake Co.*,<sup>60</sup> indicating that the term pioneer, "although used somewhat loosely, is commonly understood to denote a patent covering a function never before performed, a wholly novel device, or one of such novelty and importance as to mark a distinct step in the progress of the art, as distinguished from a mere improvement or perfection of what has gone before."<sup>61</sup> As "most conspicuous examples of such patents" it cited the sewing machine of Elias Howe, Jr.; Samuel Morse's electrical telegraph; and the telephone, invented by Alexander Graham Bell.<sup>62</sup>

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55. See, e.g., *Hormone Research Found. v. Genentech, Inc.*, 904 F.2d 1558 (Fed. Cir. 1990); *Diversitech Corp. v. Century Steps, Inc.*, 850 F.2d 675 (Fed. Cir. 1988); *Townsend Eng'g Co. v. Hitec Co.*, 829 F.2d 1086 (Fed. Cir. 1987).

56. See generally, Esther Steinhauser, Note, *Using the Doctrine of Equivalents to Provide Broad Protection for Pioneer Patents: Limited Protection for Improvement Patents*, 12 PACE L. REV. 491 (1992). Under recent scholarly commentary, courts should also consider pioneer status when determining whether to invoke the Doctrine of Equivalents in the first instance. See Wegner, *supra* note 48, at 45.

57. See, e.g. Steinhauser, *supra* note 56, at 495-500 (describing case law interpretation of scope of patent claims for pioneering inventions).

58. *Hughes Aircraft Co. v. United States*, 717 F.2d 1351 (Fed. Cir. 1983); *Continental Oil Co. v. Cole*, 634 F.2d 188, 198 n.7 (5th Cir. 1981); *Price v. Lake Sales Supply R.M., Inc.*, 510 F.2d 388 (10th Cir. 1974); *Wine Ry. Appliance Co. v. Baltimore & Ohio Railroad Co.*, 78 F.2d 312, 317 (4th Cir. 1935).

59. *Brill v. Washington Ry. & Electric Co.*, 215 U.S. 527, 533 (1910); *Continental Paper Bag Co. v. Eastern Paper Bag Co.*, 210 U.S. 405, 415 (1908); *Kokomo Fence Mach. Co. v. Kitzelman*, 189 U.S. 8, 24-25 (1903); *Kinzewbaw v. Deere & Co.*, 741 F.2d 383, 389 (Fed. Cir. 1984); *Thomas & Betts Corp. v. Litton Sys. Inc.*, 720 F.2d 1572, 1580 (Fed. Cir. 1983).

60. 170 U.S. 537 (1898).

61. *Id.* at 561-62.

62. *Id.* at 562.

Various tests for pioneer status have been suggested since *Westinghouse*. Yet the Supreme Court's early formulation in *Westinghouse* remains the most articulate; such inventions must achieve a "function never before performed," be a "wholly novel device," or constitute "a distinct step in the progress of the art."<sup>63</sup> Of these factors, the third appears the most helpful. With some difficulty given the technical subject matter, courts can examine previous patents in the art to determine both the measure of technological advance considered sufficient to merit a patent, as well as the general level of skill in the art, and contrast these findings with the technological leap claimed in the alleged pioneer invention.

In contrast, the first two *Westinghouse* factors appear vague and rather unhelpful. The reach of the first *Westinghouse* factor depends largely upon the meaning a court provides to the term "function." "Function" serves as a broad, general term for the usual, required, or expected activity of some object.<sup>64</sup> Because this term can be read so broadly, it provides scant guidance on which inventions should be considered pioneers. At one semantic level, all patentable inventions perform a new function—the actual words of the claims themselves. At another, if the function of the invention is interpreted broadly, almost no invention could claim to achieve a function never before performed. For example, functions as broadly stated as harvesting grain, transporting individuals, or communicating information are well known. The second *Westinghouse* factor suffers from a similar deficiency. The patent statute includes a requirement for novelty, as it did when the Court wrote *Westinghouse*.<sup>65</sup> Unless the Court meant merely to cast every patentable invention as a pioneer, the term "wholly" must be taken as a very significant modifier.

The famous cotton gin of Eli Whitney serves as an example of how difficult it might be to meet the "new function" or "wholly novel" tests. The cotton gin may well be the archetypical pioneer invention in the lay sense of the word. Both jurists<sup>66</sup> and historians<sup>67</sup>

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63. *Id.*

64. *Cf.*, CHISUM & JACOBS, *supra* note 41, at § 2F[2][b][ii].

65. *See supra* note 32 and accompanying text.

66. *See infra* note 149 and accompanying text.

67. *See, e.g.*, ROGER BURLINGAME, *MARCH OF THE IRON MEN* 170-71 (1938):

The effect of Whitney's machine was felt in the South for more than a century. It changed the ethnological, economic, political, ethical and industrial face of the country. Without it, it is highly conceivable that the issue of the Civil War would never have appeared, that Lincoln would have remained a small-town lawyer,

have attributed a sequence of historical events to this device which reach deep into the American character. Yet, whether the cotton gin could ascend to pioneer status for the attainment of "a function never before performed" or something "wholly novel" is unclear. The manufacture of cotton cloth may be nearly as old as human civilization itself.<sup>68</sup> Indeed, the same court that heaped extravagant praise upon the achievements of the cotton gin also noted that "[t]he cotton plant has furnished clothing to mankind before the age of Herodotus."<sup>69</sup> As the production of cotton cloth requires the laborious manual separation of often intractable cotton fibers from seed, innovative individuals developed primitive mechanical devices for ginning cotton as early as the twelfth century.<sup>70</sup> American cotton growers used descendants of these devices prior to Whitney's invention. These earlier gins employed two rotating grooved cylinders that separated seed from fiber as cotton bolls passed between them.<sup>71</sup>

Gins prior to Whitney's functioned efficiently only with long staple, or Sea Island, cotton, where the fiber is easily removed from its black seed. In contrast, the fibers of short staple or Inland cotton grown in the southeastern United States cling tightly to its green seed. In inventing a device that would effectively gin short staple cotton, Whitney continued to use a pair of rotating cylinders, but added a slotted metal breastwork which immobilized seeds while they were being stripped of fiber.<sup>72</sup>

In the sense of separating cotton fiber from seed, then, Whitney's invention cannot be said to have performed a heretofore unknown function or to have been wholly novel. Nor can mechanically ginning cotton, or ginning cotton through two cylinders, be claimed as its unique function. Only if one describes its function with more

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that the deeper South would have labored under the smoke-clouds of factories, that jazz music and dancing and Sewanee folklore would never have invaded the world, that the fine old traditions of aristocrats, colonels, hospitality, manor-houses, spoon bread and juleps would have "gone with the wind" even more palpably than they did in [Ms.] Mitchell's novel.

68. *Id.*

69. *Whitney v. Carter*, 29 F. Cas. at 1072 (quoting unreported opinion in *Whitney v. Fort*).

70. *Id.*

71. See JEANNETTE MIRSKY & ALLAN NEVINS, *THE WORLD OF ELI WHITNEY* 66-67 (1952).

72. *Id.*

specificity—readily ginning short staple cotton—would Whitney's invention fulfill either of the first two *Westinghouse* factors.

More recent definitions of pioneer inventions comport with the *Westinghouse* factors, although they tend to be considerably more terse. Courts have considered an invention to be a pioneer when it presents a "broad breakthrough,"<sup>73</sup> "major advance,"<sup>74</sup> or "basic operational concept";<sup>75</sup> or is "broadly new"<sup>76</sup> or "devoid of significant prior art."<sup>77</sup> Pioneer inventions have alternatively been called primary,<sup>78</sup> basic,<sup>79</sup> generic,<sup>80</sup> original,<sup>81</sup> or key<sup>82</sup> inventions. The sole index of pioneer status, then, is the position occupied by the invention in its technological field.<sup>83</sup> Patented inventions that represent great technical accomplishments receive a broader range of equivalents than other, less technically accomplished inventions. Nontechnical factors, such as the invention's impact on society or commercial success, are of at best fleeting concern.<sup>84</sup> Pioneer status is thus a term of art. In some sense, of course, every patentable invention is a technological pioneer in the common meaning of the term due to the

73. *Sun Studs Inc. v. ATA Equip. Leasing Inc.*, 872 F.2d 978, 987 (Fed. Cir. 1989).

74. *Universal Gym Equip. Inc. v. ERWA Exercise Equip. Ltd.*, 827 F.2d 1542, 1548 (Fed. Cir. 1987).

75. *Hughes Aircraft Co. v. United States*, 717 F.2d 1351, 1362, (Fed. Cir. 1983).

76. *Brothers v. United States*, 250 U.S. 88, 89 (1919).

77. *Texas Instruments, Inc. v. United States Int'l Trade Comm'n*, 805 F.2d 1558, 1572 (Fed. Cir. 1986).

78. *Diamond Rubber Co. v. Consolidated Rubber Tire Co.*, 220 U.S. 428, 435 (1911); *Continental Paper Bag Co. v. Eastern Paper Bag Co.*, 210 U.S. 405, 413-14 (1908); *Cimiotti Unhairing Co. v. Am. Fur Refining Co.*, 198 U.S. 399, 414 (1905); *Singer Mfg. Co. v. Cramer*, 192 U.S. 265, 278 (1904); *Kokomo Fence Mach. Co. v. Kitselman*, 189 U.S. 8, 10 (1903); *Hobbs v. Beach*, 180 U.S. 383, 400 (1901); *Morley Sewing-Mach. Co. v. Lancaster*, 129 U.S. 263, 273 (1889).

79. *Wine Ry. Appliance Co. v. Baltimore & Ohio R.R. Co.*, 78 F.2d 312, 317 (4th Cir. 1935).

80. *Hildreth v. Mastoras*, 257 U.S. 27, 28 (1921). The use of the term "generic" in this context should not be confused with its contemporary application in claiming practice. See CHSUM, *supra* note 35, at § 12.03 [3].

81. *Westinghouse v. Boyden Power Brake Co.*, 170 U.S. 537, 546 (1898).

82. *Buehler AG v. Ocrim SpA*, 836 F. Supp. 1305, 1311 (N.D. Tex. 1993).

83. E.g., *MAC Corp. of Am. v. Williams Patent Crusher & Pulveriser Co.*, 767 F.2d 882, 884 n.3 (Fed. Cir. 1985) ("Pioneer" status has to do with the position occupied by the invention in the art to which it pertains, or which it creates . . .").

84. See *Alpex Computer Co. v. Nintendo Co.*, 770 F. Supp. 161, 167 (S.D.N.Y. 1991) (no support shown for "assumption . . . that a determination of pioneer status turns on a showing of commercial success."); *Perkin-Elmer Corp. v. Westinghouse Elec. Corp.*, 822 F.2d 1528, 1532 (Fed. Cir. 1987) ("That an improvement enjoys commercial success and has some industry impact, as many do, cannot compel a finding that an improvement falls within the pioneer category.").

strict prerequisites of the Patent Act.<sup>85</sup> For an invention to be considered a pioneer within the meaning of the pioneer invention doctrine, however, it must meet what amounts to a test of extraordinary nonobviousness.<sup>86</sup>

A review of the history of the pioneer invention doctrine provides interesting insights into its rationale and application. One of the first patent cases to reach the Supreme Court, *Evans v. Eaton*,<sup>87</sup> presents the genesis of the pioneer invention doctrine. This infringement suit involved a patent on a hopper-boy, a shaft-shaped container for cooling, drying and distributing meal as part of the process of flour production.<sup>88</sup> The case turned upon the interpretation of a Patent Act provision which voided patents that described inventions that "had been in use, or had been described in some public work anterior to the supposed discovery of the patentee . . ."<sup>89</sup> The accused infringer contended that an earlier invention, the Stouffer hopper-boy, rendered the asserted invention unpatentable. Although the patented invention was not identical to Stouffer's hopper-boy—indeed, it offered some improvements over the prior art—the jury accepted the argument and relieved the defendants of infringement liability.<sup>90</sup>

Writing for the Court, Justice Story affirmed the holding of the circuit court that the patent was invalid for presenting an insufficient improvement over an original, primary invention.<sup>91</sup> The Court approved jury instructions providing that a device not identical to the patented invention, but nonetheless "substantially the same in principle," could be unpatentable.<sup>92</sup> Although the Court did not explicitly employ the doctrine of equivalents, it nonetheless endorsed jury instructions remarkably similar to the modern formulation of the doctrine:<sup>93</sup> "if the two machines be substantially the same, and operate in the same manner, to produce the same result, though they

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85. GEORGE L. ROBERTS, *PATENTABILITY AND PATENT INTERPRETATION* 736 (1927).

86. *But see* *Upjohn Corp. v. Riahom Corp.*, 641 F. Supp. 1209, 1219 (reaching rather odd conclusion that it is not true that "as a matter of law, the pioneer status of a patent helps to establish its validity.").

87. 20 U.S. (7 Wheat.) 356 (1822).

88. An earlier decision by the Court, *Evans v. Eaton*, 16 U.S. (3 Wheat.) 454, 456-71 (1818), includes the text of the asserted patent.

89. Patent Act of 1793 § 6, Ch. 11, 1 STAT. 318-23 (February 21, 1793).

90. *Evans*, 20 U.S. at 383.

91. *Id.* at 362-363.

92. *Id.* at 370.

93. *See supra* note 49 and accompanying text.

may differ in form, proportions, and utility, they are the same in principle . . . ."<sup>94</sup> While *Eaton* did not specifically name the Stouffer hopper-boy as a pioneer, the Court offered the principle that an original, primary invention could render subsequent narrow improvements unpatentable.<sup>95</sup>

To the extent *Eaton* employed the doctrine of equivalents and the pioneer invention concept, it did so in the context of patent validity. Modern cases, of course, would employ these notions in infringement suits.<sup>96</sup> The use of the pioneer invention concept in infringement suits had occurred at least by the time the Supreme Court decided *Morley Sewing-Machine Co. v. Lancaster*,<sup>97</sup> often cited as its first recognition of the pioneer invention doctrine.<sup>98</sup> The Court noted that

Where an invention is one of a primary character, and the mechanical functions performed by the machine are, as a whole, entirely new, all subsequent machines which employ substantially the same means to accomplish the same result are infringements, although the subsequent machine may contain improvement in the separate mechanisms which go to make up the machine.<sup>99</sup>

The incorporation of the pioneer invention doctrine into an infringement analysis is unsurprising given the extent to which patentability and infringement determinations resemble one another.<sup>100</sup> Indeed, with respect to an obviousness bar to patentability and literal infringement, the mode of reasoning is identical,<sup>101</sup> supporting the maxim that "that which infringes if later, anticipates if earlier."<sup>102</sup> The recent, surprisingly controversial<sup>103</sup> decision by the Court of Appeals for the Federal Circuit in *Wilson Sporting Goods Co. v. David Geoffrey & Associates*<sup>104</sup> affirms the parallel nature of these

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94. *Evans*, 20 U.S. at 361.

95. *Id.*

96. See *supra* notes 44-49 and accompanying text.

97. 129 U.S. 263 (1889).

98. E.g., CHISUM, *supra* note 35, at § 18.04[2].

99. 129 U.S. at 273.

100. See MERGES, *supra* note 19, at 706 (1992).

101. See *supra* notes 44-49 and accompanying text.

102. *Peters v. Active Mfg. Co.*, 129 U.S. 530, 537 (1889). See also *Miller v. Eagle Mfg. Co.*, 151 U.S. 186, 203 (1894); *Commercial Mfg. Co. v. Fairbank Canning Co.*, 135 U.S. 176, 194 (1890); *Lewmar Marine Inc. v. Barient Inc.*, 827 F.2d 744, 747-48 (Fed. Cir. 1987). But see ROBERT HARMON, PATENTS AND THE FEDERAL CIRCUIT 85 (2d ed. 1991).

103. See Parker, *Doctrine of Equivalents Analysis after Wilson Sporting Goods: The Hypothetical Claim Hydra*, 18 AM. INTELL. PROP. L. ASS'N Q.J. 262 (1990).

104. 904 F.2d 677 (Fed. Cir.), *cert. denied*, 498 U.S. 992 (1990).

patent law doctrines. The court provided that, when attempting an infringement analysis under the doctrine of equivalents,

it may be helpful to conceptualize the limitation on the scope of equivalents by visualizing a *hypothetical* patent claim, sufficient in scope to *literally* cover the accused product. The pertinent question then becomes whether that hypothetical claim could have been allowed by the PTO over the prior art. If not, then it would be improper to permit the patentee to obtain that coverage in an infringement suit under the doctrine of equivalents. If the hypothetical claim could have been allowed, then *prior art* is not a bar to infringement under the doctrine of equivalents.<sup>105</sup>

The *Wilson Sporting Goods* test thus enunciated a standard comparing the accused device with the prior art, in contrast to both tests of patentability which measure the claimed invention against the prior art, and ordinary infringement inquiries which contrast the accused device with the claimed invention.<sup>106</sup> Other Federal Circuit cases have also remarked upon the similarity between obviousness and equivalents determinations,<sup>107</sup> and it should be noted that some European patent systems consider whether a proposed infringing equivalent would have been obvious to a skilled technician.<sup>108</sup> So, just as Stouffer's primary invention in *Eaton* obtained a breadth of equivalents sufficient to render the asserted patent invalid, so too did the *Morley* court impart a reading to the claims of the patented pioneer invention broad enough to capture the accused device. Whether in the context of validity or infringement, under the doctrine of equivalents recognition that the known technologies surrounding pioneer inventions are relatively meager suggests that patent claims

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105. *Id.* at 684.

106. See *MERGES*, *supra* note 19, at 706.

107. See *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989) ("equivalents [is] a legal theory that is pertinent to obviousness under Section 103, not anticipation under Section 102"); *Lewmar Marine Inc. v. Bariant Inc.*, 827 F.2d 744, 748 (Fed. Cir. 1987) ("if one wished to draw a parallel, [the doctrine of equivalents] is somewhat akin to obviousness"). *But See* *Malta v. Schulmerich Carillons, Inc.*, 952 F.2d 1320 (Fed. Cir. 1991), *cert. denied*, 504 U.S. 974 (1992) ("obviousness is simply non-probative of the three-part test of equivalence").

108. See, e.g., *Improver Corp. v. Rymond*, [1991] F.S.R. 233 (citing *Improver Corp. v. Remington Consumer Prods.*, [1990] F.S.R. 181 and *Catnic Components Ltd. v. Hill & Smith Ltd.*, [1982] R.P.C. 183); Stephen M. Bodenheimer, Jr. & Dr. John Beton, *Infringement by Equivalents in the United States and Europe: A Comparative Analysis*, 15 EUROPEAN INTELL. PROP. REV. 83, 89 (1993); Comment, 12 INT'L REV. INDUS. PROP. & COPYRIGHT L. 699 (1981).

describing pioneer inventions should be given a broad range of equivalents.<sup>109</sup>

### C. Justifying the Pioneer Invention Doctrine

The courts have offered little justification for the application of pioneer invention doctrine. However, one justification, the Reward-for-Invention rationale, has begun to emerge. This doctrine is rooted in an effort to foster innovation, by giving enhanced rewards to groundbreaking inventions. However, in determining pioneer status, by focusing only on whether an invention makes a significant technological advance in the field, the courts are ignoring social and other nontechnical factors relevant to whether an invention should be considered revolutionary.

Although the pioneer invention doctrine originated in the context of patent validity, courts have since pursued this doctrine with a surprising vigor in the infringement context. The dearth of policy statements accompanying use of the pioneer invention doctrine in the case law betrays an uncertainty as to its contextual origins and its justifications.

Courts have granted pioneer inventions a broad range of equivalents in part due to the view that it is difficult to draft an adequate claim for a pioneering invention. Under this view, courts consider pioneer inventions so difficult to define that the pioneer inventor should be granted some flexibility during infringement determinations. According to one court:

The doctrine finds its roots in the judicial recognition that drafting the disclosure and claims for a pioneer patent is a difficult task because of the new scientific ground being broken by the unique invention. Thus, in one sense the doctrine of equivalents remedies the anomaly in the law that exists whenever a pioneer patent is not literally infringed by the very subject matter which was spawned by the disclosure of that pioneer patent.<sup>110</sup>

Courts have thus identified claims describing breakthrough inventions as particularly difficult to draft. Compared with drafters'

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109. See *Texas Instruments Inc. v. United States Int'l Trade Comm'n*, 846 F.2d 1369, 1370 (Fed. Cir. 1988) (denying rehearing of 805 F.2d 1558 (Fed. Cir. 1986)) ("The judicially 'liberal' view of both claim interpretation and equivalency accorded a 'pioneer' invention . . . is not a manifestation of a different legal standard based on an abstract legal concept denominated 'pioneer.' Rather the 'liberal' view flows directly from the relative sparseness of prior art in nascent fields of technology . . .").

110. *Moore v. United States*, 211 U.S.P.Q. (BNA) 800, 806 (Ct. Cl. 1981).

attempts at claims describing more modest technological advances, courts believe that drafters of pioneer invention claims are less able to capture the significance of the inventor's contribution, and to predict the shape the technology will take in the future.<sup>111</sup>

A review of the art of claim drafting reveals that these concerns are genuine, albeit somewhat misplaced.

### 1. THE ART OF CLAIM DRAFTING

When approached by an inventor seeking patent protection, a patent prosecutor is to craft claims broad enough to provide the patent owner with meaningful commercial protection.<sup>112</sup> Drafters therefore attempt to write claims as broadly as the PTO will allow to issue.<sup>113</sup> Well-written claims do not merely describe a product the inventor would consider putting into commercial practice. Ideally, the claims are somewhat abstract, and broadly describe a range of technologies surrounding the narrowly focused commercial embodiment of the invention. Competitors find efforts to design competing technologies that do not fall within the scope of such claims more difficult, and thus avoid literal infringement less easily.<sup>114</sup>

Claim drafting is thus among the more difficult feats of technical writing.<sup>115</sup> It requires considerable analytic, research and writing skills, as well as scientific and technological competence.<sup>116</sup> Claims submitted to the PTO must reduce sophisticated technical concepts to a single sentence, and yet present an accurate description of the invention.<sup>117</sup> Claims must also be written with a keen awareness of the technical field in which the invention lies. Often only a few carefully chosen words of limitation mark a patentable distinction between the claimed invention and prior technical knowledge.

Formalized drafting conventions further limit the linguistic tools available to a patent prosecutor.<sup>118</sup> None of these conventions are found in the patent statute,<sup>119</sup> and many are startlingly arcane, dating

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111. See also *In re Hogan*, 559 F.2d 595, 606 (C.C.P.A. 1977); *In re Goffe*, 542 F.2d 564, 567 (C.C.P.A. 1976); *Merges & Nelson*, *supra* note 12, at 848.

112. *Merges*, *supra* note 19, at 11.

113. See *id.*

114. *Id.* at 11-18.

115. *Topliff v. Topliff*, 145 U.S. 156, 171 (1892).

116. See *CHISUM & JACOBS*, *supra* note 41, at § 2D[1].

117. *FABER*, *supra* note 26, at § 4A.

118. See, e.g., *Merges*, *supra* note 19, at 12.

119. *CHISUM & JACOBS*, *supra* note 41, at § 2D[3][d].

back to the earliest days of United States patent claiming practice.<sup>120</sup> Among these conventions are that claims ordinarily cannot employ alternative expressions;<sup>121</sup> may refer only indirectly to intangible elements such as holes, grooves and recesses;<sup>122</sup> and must be presented as a single English sentence.<sup>123</sup> References to illustrations in the specification are also held not to affect the meaning of the claim,<sup>124</sup> and although photographs and models may be submitted in unusual instances,<sup>125</sup> their use does not impact the scope of patent protection.<sup>126</sup>

Further, the choice of format by which a drafter may describe an invention is, for practical purposes, quite limited. Years of PTO interpretation and judicial precedent have resulted in a discrete number of well-known claim formats: apparatus,<sup>127</sup> method,<sup>128</sup> article of manufacture,<sup>129</sup> composition of matter,<sup>130</sup> means-plus-function,<sup>131</sup> product-by-process,<sup>132</sup> Markush,<sup>133</sup> and Jepson.<sup>134</sup> While we need not step back to the reign of the House of Lancaster to trace the origin of these stylized claiming methods,<sup>135</sup> the weight of precedent often appears to be the best justification for their continued use.

120. Although the first patent statute appeared in 1790, a claiming requirement first appeared in the Patent Act of 1836. See MERGES, *supra* note 19, at 7.

121. MANUAL OF PATENT EXAMINING PROCEDURE § 706.03(d) (5th ed., 15th rev., 1993) [hereinafter MPEP]. The MPEP "'is primarily a set of instructions to the examining corps of the Patent Office from the Commissioner.' It governs the details of PTO examination, is made available to the public, and describes procedures on which the public can rely." *Patlex Corp. v. Mossinghoff*, 771 F.2d 480, 486 (citing *In re Kaghan*, 387 F.2d 398, 401 (C.C.P.A. 1967)). See also FABER, *supra* note 26, at § 24; RISDALE ELLIS, PATENT CLAIMS §§ 299-312 (1949).

122. FABER, *supra* note 26, at § 26.

123. MPEP, *supra* note 121 at § 608.01(m); FABER, *supra* note 26, at § 4A.

124. MPEP, *supra* note 121, at § 608.01(m); FABER, *supra* note 26, at § 2.

125. 35 U.S.C. §§ 113, 114 (1988); 37 C.F.R. § 1.91 (1992); MPEP, *supra* note 121, at § 608.02.

126. *Id.*

127. These claims are also called machine claims. FABER, *supra* note 26, at §§ 14-35; ELLIS, *supra* note 121, at §§ 429-39.

128. These claims are also known as process claims. FABER, *supra* note 26, at §§ 36-39; ELLIS, *supra* note 121, at §§ 366-70.

129. FABER, *supra* note 26, at §§ 45-48; ELLIS, *supra* note 121, at §§ 440-46.

130. FABER, *supra* note 26, at §§ 49-59; ELLIS, *supra* note 121, at §§ 478-85.

131. FABER, *supra* note 26, at § 34.

132. MPEP, *supra* note 121, at § 706.03(e); FABER, *supra* note 26, at § 46.

133. MPEP, *supra* note 121 at § 803.02; ELLIS, *supra* note 121, at §§ 243-54.

134. FABER, *supra* note 26, at § 57.

135. See O.W. Holmes, *The Path of the Law*, 10 HARV. L. REV. 457, 469 (1897) (source of the famous aphorism that it is "revolting to have no better reason for a rule of law than that so it was laid down in the time of Henry IV.>").

A similar phenomenon has occurred with respect to frequently employed technological terms; as these words have been interpreted by the courts and the PTO over time, settled meanings have evolved.<sup>136</sup> Although patentees ostensibly possess the ability to coin their own terms for use in claims,<sup>137</sup> they have scant incentive to stray from established meanings, and often confront interpretive problems in subsequent litigation when they dare to do so.<sup>138</sup> The result of these forces is a rigid and formalized system of patent claiming. This phenomenon is not limited to patent law, of course; terms used in other legal documents, such as insurance contracts and commercial leases, also become entrenched. But stagnation in claim language presents an extreme difficulty in a field designed to develop with advancing technologies.

The rigid, formalistic art of claim drafting erects considerable barriers against the accurate description of technological inventions. Of course, the lack of opportunity to study the art of claim drafting in an educational setting presents additional challenges to the would-be patent prosecutor. While an increasing number of law schools include intellectual property courses in their curricula, only a handful offer would-be patent attorneys the opportunity to draft even a single patent claim. Although patent prosecutors must pass an examination which tests knowledge of PTO procedures, the extent to which this procedure enhances claim drafting skills is dubious. A patent bar review course, typically lasting no more than a week, is the usual

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136. MERGES, *supra* note 19 at 13. See Louis B. Applebaum, *The Art of Describing Structures in Patent Drawings Including a Glossary of Mechanical Terms*, in FABER, *supra* note 26, at 475.

137. See, e.g., *Hormone Research Found., Inc. v. Genentech, Inc.*, 904 F.2d 1558, 1563 (Fed. Cir. 1990) ("It is a well-established axiom in patent law that a patentee is free to be his or her own lexicographer . . .").

138. See, e.g., *ZMI Corp. v. Cardiac Resuscitator Corp.*, 844 F.2d 1576 (Fed. Cir. 1988). Here, the Federal Circuit found error in the district court's interpretation of a claim on an external cardiac pacemaker, overturning a finding of infringement. The claims drafter's use of the term "electrode," a well-known term in the electrical arts, proved to be the undoing of the patent owner here. A limitation of the claim at issue recited "a pair of electrodes having nonmetallic skin-contacting members that provide low current density to reduce stimulation of local sensory nerves and resulting pain." *Id.* at 1578. The district court agreed with the patentee that because electrodes do not ordinarily provide current—this task instead being accomplished by the pacemaker's generators—the claim read on the accused devices. *ZMI Corp. v. Cardiac Resuscitator Corp.*, 2 U.S.P.Q.2d 1985, 1992 (D. Or. 1987). On appeal, however, the Federal Circuit concluded over a dissent that to fall within the language of the claim, the accused device's electrodes must themselves provide electrical current. 844 F.2d at 1580. *But see* MARTIN J. ADELMAN, *PATENT LAW PERSPECTIVES* § 3.2[2] (1993) (agreeing with Federal Circuit decision).

preparation for the examination,<sup>139</sup> ensuring only a minimal level of drafting competence. Further, although the PTO imposes certain educational requirements upon those sitting for the examination, these relate only to scientific and technological training.<sup>140</sup> Astonishingly, the PTO does not even consider training or experience in technical writing as a prerequisite for qualification as a patent prosecutor.<sup>141</sup>

## 2. PIONEER INVENTION CLAIMS ARE NOT THE BIGGEST CLAIMS DRAFTING CHALLENGE

Within this framework, it can be seen that the conventional wisdom underlying the pioneer invention doctrine is subject to question. The stylized art of claim drafting always presents a complex undertaking. But it may be at its most difficult when an invention presents only a narrow advance in a crowded technological art, rather than a revolutionary advance. When a field is rife with prior technological achievements, drafters must often create fine distinctions from what already is patented or lies within the public domain. Such claims typically become extraordinarily lengthy, as drafters must impart a narrow scope to the claimed invention, distinguishing and contrasting it from dozens of other references.<sup>142</sup> These efforts require drafters to resort to every instrument in their tool kits, carving a sometimes precarious technological niche with the narrowest of margins. Indeed, in the event of modest advancements, one must sometimes wonder whether the most worthy accomplishment presented by the patent is the invention it sets forth, or the clever drafting of the claim to somehow fulfill the requirements of the patent statute.

In comparison, pioneer inventions are not always accompanied by such difficulty in drafting claims. Because the field of endeavor in which the pioneer invention sits is sparse, inventors can draft short claims using sweeping language with ample technological scope.<sup>143</sup>

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139. See William Y. Hawes, *A Survey of Recent PTO Admitees*, 75 J. PAT. & TRADEMARK OFF. SOC'Y 331, 335, 337 (1993).

140. See *General Requirements for Admission to the Examination for Registration to Practice in Patent Cases before the U.S. Patent and Trademark Office* ("PTO General Requirements Bulletin"); 37 C.F.R. § 10.7 (1993).

141. *Id.*

142. Of course, as a claim increases in length, it provides a diminishing scope of protection, as accused devices must embody every element of the claim in order to be found to infringe. See *supra* notes 46-47 and accompanying text.

143. See Merges & Nelson, *supra* note 12, at 848. Where possible, the drafter will supplement these broad claims with more narrowly worded claims. Typically, only

Further, as the patent examiner lacks a significant number of prior inventions to reference as the basis for rejection of the pioneer claims, the application often advances readily through the prosecution process. The decreased dialogue between the applicant and examiner results in a meager prosecution history, and thus a lesser basis for prosecution history estoppel that may limit the scope of the claims in subsequent litigation.<sup>144</sup>

Brief research on recent patents judicially declared to claim pioneer inventions confirms this reasoning. A consideration of the prosecution history, or file wrapper, of these patents indicated that the paucity of prior art was, if anything, the forerunner of a smooth prosecution despite the sweeping claims generally found in these patents.<sup>145</sup> Conversations with patent practitioners confirm this short study. One noted that he would be a more effective drafter of claims describing a pioneer semiconductor device than a simple mechanical kitchen appliance, given the notoriously crowded state of the art. Although this brief research certainly cannot be accorded any sort of empirical validity, it provides some support for the reasoning employed in this article.

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drafters writing claims on substantial technological advancements are able to employ this technique, as existing technological knowledge substantially detracts from the ability of the drafter to vary the scope of the claims. Drafters often form these narrower claims by adding additional words of limitation to the language of earlier claims, creating something of a pyramidal structure to the patent claims. See ELLIS, *supra* note 123, at §§ 113-23. This technique allows the patent holder to enjoy both the robust protection of broad claims and the certainty of more tightly drafted claims as well. During subsequent litigation, where the patent owner asserts individual claims rather than the entire patent against an accused infringer, these narrower claims may present a more snug fit with respect to accused infringements, and are also less susceptible to validity challenges.

144. See *supra* notes 54-55 and accompanying text. But see *Laitram Corp. v. Cambridge Wire Cloth Co.*, 863 F.2d 855, 861 (Fed. Cir. 1988) ("It is commonplace for claims to inventions, pioneer and non-pioneer, to be amended during prosecution.").

145. See, e.g., *Read Corp. v. Portec, Inc.*, 748 F. Supp. 1078, 1095 (D. Del. 1990), *aff'd in part and rev'd in part, on other grounds*, 970 F.2d 816 (Fed. Cir. 1992) (U.S. Pat. No. 4,197,194); *Loral Corp. v. B.F. Goodrich Co.*, 14 U.S.P.Q.2d (BNA) 1081, 1087 (S.D. Ohio 1989) (U.S. Patent No. 3,650,357); *Insta-Foam Prods., Inc. v. Universal Foam Sys., Inc.*, 1988 U.S. Dist. LEXIS 17582, \*16 (E.D. Wis. August 19, 1988) (U.S. Pat. No. 3,784,110); *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 671 F. Supp. 1369, 1377 (S.D.N.Y. 1987), *aff'd*, 868 F.2d 1251 (Fed. Cir. 1989); *Rallston Purina Co. v. Far-Mar-Co, Inc.*, 586 F. Supp. 1176 (D. Kan. 1984), *aff'd in part and rev'd in part, on other grounds*, 772 F.2d 1570 (Fed. Cir. 1985) (U.S. Pat. No. 3,940,495); *Nomadic Structures, Inc. v. Portable Exhibit Factory, Inc.*, 224 U.S.P.Q. (BNA) 937, 946 (C.D. Cal. 1984) (U.S. Pat. No. 4,290,244).

The difficult and time-consuming process of claim drafting concerns courts that adjudicate infringement suits. As the Federal Circuit recognized, "[w]e are up against what we must realistically consider a growing inability of speakers and writers, lawyers, technicians, and layman, to say what they intend to say with accuracy and clarity."<sup>146</sup> Indeed, given all the difficulties associated with our formal system of claiming, a surprising paucity of literature questions the emphasis our patent system places upon claims, or justifies the access inventors need to attorneys specializing in claim drafting in order to obtain meaningful intellectual property rights, as compared to those seeking copyright or trademark protection. Thus, to justify the pioneer invention doctrine, courts are relying, inappropriately, on the rationale that claims for pioneer inventions are difficult to draft. Rather, it seems that such claims may be relatively easy to draft. If courts are concerned with the difficulty of claim drafting, they should address the problem directly rather than using pioneer status as a poor proxy for claim drafting difficulties. Courts could, for instance, consider the source of the prosecution of an individual patent itself, by examining its file wrapper and eliciting testimony from the inventor, examiner and claims drafter.

### 3. REWARDING INVENTORS IS A BETTER RATIONALE FOR THE PIONEER INVENTION DOCTRINE

A second, more intuitive premise for the recognition of pioneer inventions is that the doctrine enhances the award given to revolutionary inventors, and thus heightens incentives for others to generate significant technological advances and disclose them to the public. The patent system offers inventors a single reward: exclusive rights in a technology, as set forth by the claims of a patent.<sup>147</sup> By liberally interpreting claims describing pioneer inventions, courts increase this range of exclusivity. Such a liberal interpretation flows from the belief that in the exchange of technological disclosure for exclusive rights,<sup>148</sup> the public received an extraordinary bargain, for which the pioneer inventor should receive additional compensation.

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146. *ZMI Corp. v. Cardiac Resuscitator Corp.*, 844 F.2d 1576, 1583 (Fed. Cir. 1988) (Nichols, J., dissenting).

147. See, e.g., *United States v. General Electric Co.*, 272 U.S. 476, 489 (1926); *In re Schoenwald*, 964 F.2d 1122, 1124 (Fed. Cir. 1992); *Merges*, *supra* note 4, at 811 ("The basic requirements for a patent reflect the dual functions of disclosure and reward.").

148. See *supra* notes 16-18 and accompanying text.

Few could doubt the sense of gratitude felt by one jurist towards the cotton gin of Eli Whitney:

The whole interior of the Southern states was languishing, and its inhabitants emigrating, for want of some objects to engage their attention, and employ their industry, when the invention of this machine at once opened views to them which set the whole country in active motion. From childhood to age, it has presented us a lucrative employment. Individuals who were depressed with poverty, and sunk in idleness, have suddenly risen to wealth and respectability. Our debts have been paid off, our capitals increased, and our lands have trebled in value. We cannot express the weight of obligation which the country owes to this invention; the extent of it cannot now be seen.<sup>149</sup>

Justification of the pioneer invention doctrine, however, does not answer the question of how the patent law distinguishes those favored few inventions from the remainder of the technologies. Identification of precisely which inventions the patent law awards broad property rights provides interesting insights into the nature and functions of the patent system as a whole.

The Seventh Circuit and Supreme Court opinions in *Kokomo Fence Machine Co. v. Kitselman*<sup>150</sup> illustrate two fundamentally different approaches a court could take under this reward-for-invention rationale. Pioneer status could be granted either for inventions that represent major technical breakthroughs, or those that promise or achieve a major impact on society. Kitselman asserted several patents against the Kokomo Company in an infringement suit.<sup>151</sup> The key patent at issue claimed a fence-making machine that could be used in the field at the site where the fence would ultimately stand.<sup>152</sup> Both the patented and accused machines employed twisting gears and spindles to weave a wire mesh.<sup>153</sup> Both machines achieved a mesh by supplying wire, which was wrapped around spools, to the appropriate spindle during the weaving process.<sup>154</sup> But the two devices used different methods to feed wire into the weaving apparatus.<sup>155</sup> Kitselman's patent described spool-carriers that were

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149. *Whitney v. Carter*, 29 F. Cas. 1070, 1072 (C.C.D. Ga. 1810) (No. 17,583). Despite this passage, Whitney's thwarted efforts to enforce the cotton gin patent are legendary. See Wegner, *supra* note 48, at 10.

150. 189 U.S. 8 (1903).

151. *Id.* at 9.

152. *Id.* at 12.

153. *Id.* at 17-18.

154. *Id.* at 23-24.

155. *Id.*

controlled by an adjustable hand lever, connected so as to move identically, and transferred among spindles while stationary.<sup>156</sup> In contrast, the Kokomo machine employed spool-carriers that were controlled by a rotating crank, arranged to move independently, and transferred while rotating.<sup>157</sup> The differences between the two spool-carriers were such that the spool-carrier described in the Kitselman patent would not operate in the Kokomo device without modification.<sup>158</sup>

These disparities indicated that the Kokomo device did not literally infringe the Kitselman patent.<sup>159</sup> A comparison of the Kitselman patent claims with the Kokomo device, however, presented a close case for infringement under the doctrine of equivalents.<sup>160</sup> The suit ultimately turned upon the scope of the equivalents to be accorded these claims.<sup>161</sup> If the court read the claims narrowly, the accused device would not infringe.<sup>162</sup> A more liberal interpretation, however, would ensnare the Kokomo Company's device.<sup>163</sup> The crux of Kitselman's case, then, was whether he could successfully argue that his patent claimed a pioneer invention and thus that his claims deserved a liberal interpretation.<sup>164</sup>

In an unreported decision, the district court held that the Kitselman patent was not a pioneer, and that the Kokomo Company was not an infringer.<sup>165</sup> On appeal, the Court of Appeals for the Seventh Circuit reversed.<sup>166</sup> First, the court presented a detailed analysis of the technological field, including the advances in the art offered by Kitselman.<sup>167</sup> The court concluded that the distinctions between Kitselman's invention and prior technological knowledge

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156. *Id.*

157. *Id.*

158. *Id.* at 24.

159. *Id.*

160. *See id.* ("The circuit court of appeals held that the Kitselman patent was entitled to be treated as embodying primary invention, and to such liberal construction as brought defendants' machine within it." (emphasis added)).

161. *Id.* at 24.

162. *Id.*

163. *Id.*

164. *Id.*

165. *Kokomo Fence Mach. Co. v. Kitselman*, 108 F. 632, 654 (7th Cir. 1901) (discussing the decision of the district court).

166. *Id.* at 659.

167. *Id.* at 658-659.

were subsidiary and simple.<sup>168</sup> Nonetheless, it called the results achieved by the patented invention revolutionary.<sup>169</sup> Reasoning that "Kitselman disclosed to the world for the first time a practical means of supplying the farmer with a highly useful fence," it accorded the claims at issue a broad construction.<sup>170</sup> A broad reading of the claims was then held to encompass the accused device, which the court characterized as "the direct offspring of Kitselman's thought. . . ."<sup>171</sup> Following the grant of certiorari, the Supreme Court reversed. After a painstaking review of the other inventions in the field, it held that Kitselman's wire-weaving method was known to the art. In the Court's view, Kitselman had merely turned a known fence-making machine on its side and mounted it on a truck.<sup>172</sup> That effort, along with other minor improvements, could not make Kitselman's invention a pioneer. According a narrow construction to the claims of the Kitselman patent, the Court held that they did not read upon the accused device.<sup>173</sup>

The series of opinions in *Kokomo Fence* demonstrates that a determination of pioneer status can be of crucial importance in infringement determinations. Of equal interest, however, is the distinction between the approaches taken by the Seventh Circuit and the Supreme Court in the *Kokomo Fence* opinions. The circuit court emphasized the unique accomplishment of Kitselman's invention—the production of a workable fence in the field—and reasoned that often subtle changes to existing technologies may produce inventions with revolutionary effects.<sup>174</sup> The Supreme Court instead considered only the extent of technological advance of Kitselman's invention over the prior art. Contemporary cases have maintained an approach similar

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168. *Id.* at 659.

169. *Id.*

170. *Id.*

171. *Id.* at 94.

172. *Kokomo Fence Mach. Co. v. Kitselman*, 189 U.S. 8, 13 (1903).

173. *Id.* at 24.

174. See also *Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 U.S. 45, 63 (1923) ("Indeed, when one notes the crude working of machines of famous pioneer inventions and discoveries, and compares them with the modern machines and processes exemplifying the principle of pioneer discovery, one hesitates in the division of credit between the original inventor and the improvers . . ."); HENRY PETROSKI, *THE EVOLUTION OF USEFUL THINGS* (1992); BASALLA, *supra* note 7, at 24-25 (describing the continuous nature of technological development); Harold S. Meyer, *Utility Requirement in the Statute*, 49 J. PAT. OFF. SOC'Y 533, 540 (1967) ("Every student of invention knows that the truly revolutionary inventions of greatest social importance first make their appearance in crude form, of little or no immediate value.").

to the Supreme Courts when deciding whether an invention should be awarded with pioneer status.<sup>175</sup>

In the context of the pioneer invention doctrine, courts honor technological advance above all else.<sup>176</sup> In implementing the doctrine, courts follow the Supreme Court's lead in *Kokomo Fence* and solely consider the place of the claimed invention in relation to prior technical knowledge. Those inventions that broadly advance the art receive broad protection. Other considerations regarding the worth of a particular development—such as the invention's affects on society—are irrelevant. The most striking feature of the pioneer invention doctrine is that by granting a broad scope of protection to only the most technically clever artifices, a court blinds itself to the social consequences of the technologies placed before it.<sup>177</sup> Thus, for example, a patented medical device with tremendous life-saving properties, which was nonetheless judged a marginal technological advance, would receive a narrow range of equivalents. In contrast, the pioneer invention doctrine would grant a broad reading of the claims to, say, an extraordinarily sophisticated device which quickly manufactures inexpensive handguns. Although this approach may appear unusual, not only the pioneer invention doctrine, but also the entire structure of the patent system reflects a similar design: the chief bar to patentability, the requirement of nonobviousness, is primarily a measure of technological accomplishment.<sup>178</sup> While secondary considerations supplement the nonobviousness test, they are commercial in orientation, reflecting marketplace success rather than social benefit.<sup>179</sup>

A review of early American case law indicates that the patent law has not always had such a narrow focus on technological advance to the exclusion of considerations of social benefit. In the patent law's formative years, courts considered the social impact of technology when determining the invention's utility.<sup>180</sup> The most famous formulation of the patent statute's utility requirement belongs to

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175. 189 U.S. at 24.

176. See *supra* notes 56-65 and accompanying text.

177. One is reminded of the amusing lyrics:

When the rockets go up who cares where they come down?

"That's not my department," says Wernher Von Braun.

TOM LEHRER, THAT WAS THE YEAR THAT WAS.

178. See *supra* notes 37-39 and accompanying text.

179. See *supra* note 40 and accompanying text.

180. See generally Meyer, *supra* note 176, at 533; Note, *The Utility Requirement in the Patent Law*, 53 GEO. L.J. 153 (1964).

Justice Story, a prominent figure in the early development of the patent law<sup>181</sup> who remains of considerable interest to students of patent law.<sup>182</sup> Story noted that an invention would be considered statutorily "useful" if it could be used beneficially in society, but not if it were frivolous, insignificant, or detrimental to the morals, health, or good order of society.<sup>183</sup> Inventions designed, for example, "to poison people, or to promote debauchery, or to facilitate private assassination" would therefore be ineligible for patent protection.<sup>184</sup> As the patent law matured, however, the utility requirement became increasingly diluted. Subsequent case law concerning utility primarily considered whether gambling devices or inventions designed for fraudulent purposes could receive patent protection.<sup>185</sup> Today, the requirement that an invention be "useful" essentially presents no bar to patentability for mechanical patents. So long as an invention is nonfrivolous and presents more than a mere curiosity, the courts and PTO consider the utility requirement satisfied.<sup>186</sup>

In the meantime, few have questioned whether patent grants for inventions as lethal as Gatling's machine gun,<sup>187</sup> as environmentally

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181. See CHISUM, *supra* note 35, at v; Wegner, *supra* note 48, at n.29.

182. E.g., Jordan P. Karp, Note, *Experimental Use as Patent Infringement: The Impropriety of a Broad Exception*, 100 YALE L.J. 2169 (1991); Rebecca S. Eisenberg, *Proprietary Rights and the Norms of Science in Biotechnology Research*, 97 YALE L.J. 177 (1987).

183. *Manson v. Brenner*, 383 U.S. 519, 533 (citing Story, Note on the Patent Laws, 3 Wheat. App. 13, 24). Also, see Justice Story's comments in the early case of *Lowell v. Lewis*, 15 F. Cas. 1018, 1019 (No. 8568) (C.C.D. Mass. 1817), that an invention would not be considered statutorily "useful" if it were "injurious to the well-being, good policy, or sound morals of society."

184. *Id.*

185. See CHISUM, *supra* note 35, at § 4.03.

186. See CHISUM, *supra* note 35, at § 4.01[1] (quoting W. ROBINSON, TREATISE ON THE LAW OF PATENTS FOR USEFUL INVENTIONS 463 (1890)). The utility requirement sometimes presents difficulties for inventors of new chemical compounds who have yet to realize a practical application for those compounds. See David A. Anderson & Edward E. Dyson, Note, *Some Special Problems with the Utility Requirement in Chemical Patents*, 35 GEO. WASH. L. REV. 809 (1967). Additionally, where the claimed invention is a drug or therapeutic, the applicant must demonstrate that acceptable test procedures establish some medical effectiveness. See, e.g., *In re Ferens*, 417 F.2d 1072, 1074-75 (C.C.P.A. 1969) (therapeutic cure for male pattern baldness); *In re Irons*, 340 F.2d 974, 977-78 (C.C.P.A. 1965) (new compound claimed to possess an anti-arthritis utility). For most other sorts of inventions, however, the utility requirement primarily acts to prohibit the grant of a patent on applications describing inventions as valueless as a perpetual motion machine. See, e.g., *Puharich v. Brenner*, 415 F.2d 979, 981-82 (D.C. Cir. 1969) (device for augmenting powers of extra sensory perception).

187. U.S. Patent No. 36,836 (Nov. 4, 1862).

unsound as polystyrene-foam clamshell hamburger packaging,<sup>188</sup> or as rifle with deleterious health consequences as a cigarette-making device<sup>189</sup> were beneficial to society or in keeping with sound patent policy. A fleeting trace of these notions is perhaps left in the Atomic Energy Act, which provides that "[n]o patent shall hereafter be granted for any invention or discovery which is useful solely in the utilization of special nuclear material or atomic energy in an atomic weapon."<sup>190</sup> Beyond this, however, neither the pioneer invention doctrine nor the patent law as a whole pays even a backward glance to the social consequences of the technologies it awards with exclusive rights.

#### D. The Underlying View of Technology

The pervasiveness of the dismissal of nontechnical factors in determining whether an invention is revolutionary calls into question the core values of the patent law. Paramount among these values is the traditional conception of technology as a neutral tool. As expressed in everyday slogans such as "guns don't kill people—people kill people," individuals see technology not as an end unto itself, but as a means that empowers people to achieve their own ends. If technology represents something "essentially amoral, a thing apart from values, an instrument which can be used for good or ill,"<sup>191</sup> patent law need not evaluate inventions at any level beyond the technological.

Alternatively, patent law may recognize that rather than being a mere neutral means, technology often serves as a transformative end unto itself.<sup>192</sup> Few could doubt, for example, the tremendous impact of the automobile on modern American life. The automobile is the

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188. U.S. Patent No. 4,132,344 (Jan. 2, 1979). See PETROSKI, *supra* note 181, at 223-25.

189. E.g., U.S. Patent No. 5,012,823 (May 7, 1991).

190. Atomic Energy Act of 1954, § 152 (codified at 42 U.S.C. § 2181a).

191. ROBERT A. BUCHANAN, *TECHNOLOGY AND SOCIAL PROGRESS* 163 (1965). Accord WADE SIKORSKI, *MODERNITY & TECHNOLOGY: HARNESSING THE EARTH TO THE SLAVERY OF MAN* 19 (1993); Joseph C. Pitt, *The Autonomy of Technology*, in *TECHNOLOGY AND RESPONSIBILITY* 99, 113 (Paul T. Durbin ed., 1987) [hereinafter *TECHNOLOGY & RESPONSIBILITY*].

192. See Laurence H. Tribe, *Technology Assessment and the Fourth Discontinuity: The Limits of Instrumental Rationality*, 46 S. CAL. L. REV. 617, 642 (1972) ("More persuasive than the realm of technologies pursued as ends is that of technologies which, although pursued largely as means, have the effect of significantly altering the ends—and indeed the basic character—of the individuals and communities that choose them.").

ultimate product of an immense industry, the motivation for vast civil engineering projects, the cause of demographic shifts, a source of tension among international trading partners, and a liberalizing influence on sexual mores. Recognition of the automobile as a distinct, neutral, nonhuman activity is, for many technological thinkers, an unrealistic proposition.<sup>193</sup>

We may decide that, although technology is not a neutral tool, patent law should nevertheless view it as such. Under this view, the grant of patents to individual inventions, and the award of pioneer status to the most technologically accomplished, is held to benefit society in a more ecumenical sense: the patent law seeks to advance the whole of human knowledge,<sup>194</sup> rather than act as some sort of technological gatekeeper.<sup>195</sup> Cultural, economic, political and other forces then select those patented inventions best fit to be commercialized and disseminated within the social fabric.<sup>196</sup>

In so doing, the patent law would, to some extent, follow the tradition of copyright law, which refuses to judge the artistic merits of the works it considers.<sup>197</sup> But even recognizing that the patent law has loftier aspirations, to some degree judging the technical skill of patent applicants, many might consider it a poor instrument for discriminating among inventions. As a property right, a patent ultimately grants its owner only the right to exclude others from making, using or selling an invention, rather than the positive right to employ the invention.<sup>198</sup>

193. See Webster F. Hood, *The Aristotlean Versus the Heideggerian Approach to the Problem of Technology*, in *PHILOSOPHY AND TECHNOLOGY*, *supra* note 4, at 350.

194. See LIPSCOMB, *supra* note 16, § 1:6 at 39.

195. The approach of the patent law may even contain a constitutional dimension. The Constitution empowers Congress to enact legislation "[t]o promote the Progress of Science and useful Arts," U.S. CONST. art. I, § 8, cl. 8, rather than, say, "to promote social welfare through the Progress of Science and useful Arts." As suggested in *The Federalist*, technological advance presumably leads to social benefit automatically:

The utility of this [patent and copyright] power will scarcely be questioned. The copy right of authors has been solemnly adjudged in Great Britain to be a right at common law. The right to useful inventions seems with equal reason to belong to the inventors. The public good fully coincides in both cases, with the claims of individuals.

THE FEDERALIST No. 43 (James Madison) (Garry Wills ed., 1982).

196. See CHISUM, *supra* note 35, at § 18.04[2][c].

197. See *Bleistein v. Donaldson Lithographing Co.*, 188 U.S. 239, 251 (1903).

198. See *supra* notes 43-44 and accompanying text. See also *Panduit Corp. v. Stahlin Bros. Fibre Works, Inc.*, 572 F.2d 1152, 1158 n.5 (6th Cir. 1979); ROGER SHERMAN HOAR, *PATENTS* 5 (1926).

Taken to its logical limits, though, such a view raises questions about why our society suffers "the embarrassment of an exclusive patent" in the first instance.<sup>199</sup> If patent law has such scant impact on the progress of individual inventions, then we may be well advised to abandon it, particularly in light of repeated concessions that whether the patent system helps or hinders the United States economy is unknown on an empirical level.<sup>200</sup> As advocates of the patent system note, however, those technologies blessed with the imprimatur of the PTO are far more likely to make their way to the market than those that are not. For those without the resources to develop and market their own invention, the possession of a patent is crucial to attracting private investment or government grants.<sup>201</sup> Similarly, those entities with sufficient resources to develop a technology—typically large corporations—are also far more likely to do so if patent protection is available.<sup>202</sup> The capacity of the patent system to promote some inventions over others cannot be denied.

Patent law's refusal to question whether technology has a moral component may represent an even more fundamental passivity. Under this stance, the pioneer invention doctrine does not look beyond technology because it essentially recognizes that any other inquiry into the worth of a particular invention would be futile. This viewpoint suggests a belief in technological inevitability, which comports with the views of contemporary technological dystopians, including Jacques Ellul, Lewis Mumford and Theodore Roszak.<sup>203</sup> Under this view, technological progress is quantifiable, consistent,

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199. See *Graham v. John Deere Co.*, 383 U.S. 1, 9 (1966) (quoting Thomas Jefferson).

200. See Oddi, *supra* note 11, at 1112, 1148; Priest, *supra* note 14, at 21 (noting that "in the current state of knowledge, economists know almost nothing about the effect on social welfare of the patent system or of other systems of intellectual property."); STAFF OF THE SUBCOMM. ON PATENTS, TRADEMARK, AND COPYRIGHTS OF THE SENATE COMM. ON THE JUDICIARY, 85TH CONG., 2D SESS., AN ECONOMIC REVIEW OF THE PATENT SYSTEM 79 (Comm. Print 1958) (Study No. 15) (Fritz Machlup) ("No economist, on the basis of present knowledge, could possibly state with certainty that the patent system, as it now operates, confers a net benefit or a net loss on society.").

201. See RICHARD C. LEVY, *THE INVENTOR'S DESKTOP COMPANION: A GUIDE TO SUCCESSFULLY MARKETING AND PROTECTING YOUR IDEAS* 7 (1991).

202. Edmund Kitch, *Graham v. John Deere Co.*: *New Standards for Patents*, 1966 SUP. CT. REV. 300-01 n.35; H.A. TOULMIN, JR., *PATENTS AND THE PUBLIC INTEREST* 15 (1939).

203. See SAMUEL C. FLORMAN, *THE EXISTENTIAL PLEASURES OF ENGINEERING* 45-56 (1976).

and inescapable.<sup>204</sup> Further, as inventions technically superior to those in the prior art appear, their adoption by society is inevitable.<sup>205</sup> Thus, society is unable to halt the unavoidable march of technology, which "reigns alone, a blind force and more clear-sighted than the best human intelligence."<sup>206</sup> Patent law serves as merely the gentlest of prods in an era of "autonomous technology," which progresses according to its own needs, rather than those of humankind.<sup>207</sup>

Although such a view may seem extreme, it is supported by considerable economic literature aimed at identifying, illustrating and predicting technological growth. Some theories describe a linear process of growth,<sup>208</sup> others, a geometric progression;<sup>209</sup> and still others, including those advanced by Joseph Schumpeter, a leading figure in the economics of technological change who continues to influence many patent scholars,<sup>210</sup> a cyclical pattern with long waves of industrialization.<sup>211</sup> Relying upon such factors as energy efficiency, agricultural yields, the improving performance of various machines, and often patent statistics, these economic studies invariably show a steady, ceaseless pattern of technological progress. Such theories imply not just a steady stream of invention, of course, but their inevitable adoption by society.

One need not spend many hours leafing through the federal reporters to find the influence of the philosophy of technological inevitability in published patent decisions. One example is Judge

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204. Marvin Kranzberg, *Confrontation: Technology and Social Environment*, in *THE TECHNOLOGICAL CATCH AND SOCIETY* 68-69 (Iraj Zandi ed., 1975) ("...technology determines the entire patterns of our lives, actions, values and institutions").

205. *Id.* at 69.

206. JACQUES ELLUL, *THE TECHNOLOGICAL SOCIETY* 94 (John Wilkinson trans., 1964).

207. See John E. Jalbert, *Phenomenology and the Autonomy of Technology*, in *TECHNOLOGY AND RESPONSIBILITY*, *supra* note 191, at 85.

208. See, e.g., EDWARD J. MALECKI, *TECHNOLOGY AND ECONOMIC DEVELOPMENT: THE DYNAMICS OF LOCAL, REGIONAL AND NATIONAL CHANGE* 114-17 (1991).

209. See ELLUL, *supra* note 206, at 91.

210. See Merges, *supra* note 4, at 843-46.

211. See JOSEPH A. SCHUMPETER, *BUSINESS CYCLES* 86-87 (1939); Nathan Rosenberg & Claudio R. Frischtak, *Technological Innovation and Long Waves*, in *DESIGN, INNOVATION AND LONG CYCLES IN ECONOMIC DEVELOPMENT* 5 (Christopher Freeman ed., 1986); S. Gomulka, "Technological Revolution" as an Innovation Superwave in the World Technological Frontier Area, in *TECHNOLOGICAL AND SOCIAL FACTORS IN LONG TERM FLUCTUATIONS* (Massimo Di Matteo et al. eds., 1986); NIKOLAI KONDRATIEFF, *THE LONG WAVE CYCLE* 65-69 (Guy Daniels trans., 1984); COLIN NORMAN, *THE GOD THAT LIMPS: SCIENCE AND TECHNOLOGY IN THE EIGHTIES* 104-09 (1981). As Arnold Pacey notes, this theory tends to be at its most attractive during periods of economic recession. PACEY, *supra* note 4, at 31.

Posner's opinion in *Roberts v. Sears, Roebuck and Co.*, which concluded that the patent at issue was invalid for obviousness because the invention it disclosed "would have been made anyway, and soon."<sup>212</sup> Underlying this position, of course, is the Spencerian conviction that fundamental economic forces render some measure of technological progress unavoidable.<sup>213</sup> Chief Justice Burger confirmed this notion of the relentless march of technology in *Kewanee Oil Co. v. Bicron Corp.*:

The ripeness-of-time concept of invention, developed from the study of the many independent multiple discoveries in history, predicts that if a particular individual had not made a particular discovery others would have, and in probably a relatively short period of time. If something is to be discovered at all very likely it will be discovered by more than one person.<sup>214</sup>

A more extreme version of this view is not an uncommon one outside of patent law. The guidebook to the Chicago World's Fair of 1933 described how "science discovers, genius invents, industry applies, and man adapts himself to, or is moulded by, new things." Ultimately, "entire races of men" are compelled to "fall into step with . . . science and industry . . . Science finds—Industry applies—Man conforms."<sup>215</sup> This belief has led to such statements as "the development of steam for the factory . . . produced a new economic system: capitalism"<sup>216</sup> and "safe elevators developed by Otis and his successors are perhaps the sole element responsible for the towering cities of today."<sup>217</sup>

A theory of technological neutrality stands in ironic opposition to the theories of technology of early supporters of the patent system.

212. 697 F.2d 796, 798 (7th Cir.), *rev'd, en banc*, 723 F.2d 1324 (7th Cir. 1983). Here, the court relied upon Professor Kitch's seminal article on *Graham v. John Deere Co.*, which advanced the view that the patent system operates most effectively when it grants exclusive rights only to "those innovations that would not be developed absent a patent system." Kitch, *supra* note 211, at 293, 301. See also Robert P. Merges, *Uncertainty and the Standard of Patentability*, 7 HIGH TECH. L.J. 1, 29 (1992).

213. Kitch, *supra* note 202, at 302. ("But the central point is that not every innovation needs the patent system to induce its appearance. In fact in many cases, the desire to obtain a superior competitive position by being known as 'advanced' and first on the market will induce the appearance of the new product or process."). Among the conclusions of the nineteenth century sociologist and philosopher Herbert Spencer was that human progress was inevitable. See RICHARD HOFSTADTER, *SOCIAL DARWINISM IN AMERICAN THOUGHT* 40 (1967).

214. 416 U.S. 470, 490 (1974) (citations omitted).

215. PACEY, *supra* note 4, at 25.

216. *Id.* at 18 n.12.

217. Patent Office Historical Collection, U.S. Patents: 1994 Calendar (1994).

Consider Jeremy Bentham, who reasoned that the availability of patent protection "cause[d] that to be produced which, had it not been for this security given to the fruits of industry, would not have been produced . . . ." <sup>218</sup> Few contemporary supporters of the patent system would go as far as Bentham did. Observers instead view the patent law as fulfilling lesser roles, such as encouraging research and development efforts <sup>219</sup> or channeling technological efforts toward inventions society considers useful. <sup>220</sup> Given the patent law's vitiated utility requirement, this last goal must also be considered extremely suspect.

### E. Philosophical Underpinnings

A claim of this Article is that by paying scant attention to technology as a philosophical concern, patent law scholars have neglected extraordinarily interesting thought capable of providing valuable insights into the patent system. To demonstrate, this section will review the thought of Aristotle, Marx and Heidegger, three philosophers who, in varying degrees, have addressed technology as a philosophical concern in their works. It will then apply their teachings to the problem of the pioneer invention. It is the position of this Article that the thought of Aristotle and Marx provides an historical basis for the fundamental technological values prevalent in modern Western thought and embedded in the patent law.

"Every art and every inquiry, and similarly every action and pursuit, is thought to aim at some good . . . ." <sup>221</sup> With these words Aristotle opened his *Nicomachean Ethics*, a work in which he attempted to describe the best way of life for humanity. Aristotle reasoned that the best good for humankind is happiness, and that the best way to achieve happiness is through thought and reason. <sup>222</sup> Therefore, to Aristotle, a life of theoretical contemplation presents the highest good: it is desirable in and of itself, a source of happiness independent of the activities of others, and something we

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218. BENTHAM, *supra* note 3, at 261-64.

219. E.g., STAFF OF THE SUBCOMM. ON PATENTS, TRADEMARKS, AND COPYRIGHTS OF THE SENATE COMM. ON THE JUDICIARY, 84TH CONG., 2D SESS., *THE PATENT SYSTEM AND THE MODERN ECONOMY* 4 (Comm. Print 1957) (Study No. 2) (George E. Frost).

220. E.g., ARTHUR C. PIGOU, *THE ECONOMICS OF WELFARE* 185 (4th ed. 1952); FRANK W. TAUSSIG, *INVENTORS AND MONEY-MAKERS* 50 (1915).

221. ARISTOTLE, *THE NICOMACHEAN ETHICS* 1 (David Ross trans., revised by J.L. Ackrill and J. O. Urmson, reprinted 1986) (1925).

222. E.g., *id.* at 266.

can perform continuously.<sup>223</sup> Aristotle thus subordinated pragmatic activity to the theoretical to an extraordinary degree. The famous commentary of St. Thomas Aquinas, perhaps the supreme interpreter of Aristotle, summarizes this position well:

All knowledge is obviously good because the good of any thing is that which belongs to the fulness of being which all things seek after and desire; and man as man reaches fulness of being through knowledge. Now of good things some are just valuable, namely, those which are useful in view of some end—as we value a good horse because it runs well; whilst other good things are also honourable: namely, those that exist for their own sake, for we give honor to ends, not to means. Of the sciences some are practical, others speculative; the difference being that the former are for the sake of some work to be done, while the latter are for their own sake. The speculative sciences are therefore honourable as well as good, but the practical are only valuable.<sup>224</sup>

However, Aristotle also recognized that, as humans, we cannot always lead a contemplative life. Not all of us have such a disposition; and even those capable of the contemplative lifestyle possess essential needs and irrational aspects that reason alone cannot fulfill. Further, a stable society that fulfills basic needs must exist before a contemplative life can occur. Thus, Aristotle reasoned that a secondary sort of happiness lies in virtuous public activity. Political science is the supreme discipline within the state, responsible for ordering other disciplines and setting their proper limits.<sup>225</sup>

Aristotle viewed technological pursuits as a lower sort of endeavor beneath philosophical and political activity. Aristotle recognized that technology is necessary to humankind, as a source of sustenance and shelter; but it is only necessary.<sup>226</sup> It is thus not

223. *Id.* at 263-64.

224. ARISTOTLE'S DE ANIMA IN THE VERSION OF WILLIAM OF MOERBEKE AND THE COMMENTARY OF ST. THOMAS AQUINAS 45 (Kenelm Foster & Silvester Humphries eds., 1954).

225.

And politics appears to be of this nature; for it is this that ordains which of the sciences should be studied in a state, and which each class of citizens should learn and up to what point they should learn them; . . . now, since politics uses the rest of the sciences, and since, again, it legislates as to what we are to do and what we are to abstain from, the end of this science must include those of the others, so that this end must be the good for man.

ARISTOTLE, *supra* note 221, at 2.

226. ARISTOTLE, *Metaphysics*, in THE COMPLETE WORKS OF ARISTOTLE, Vol. II 1552, 1553 (Jonathan Barnes ed., 1984) (Book IA at 981b1).

inherently a value-laden activity, instead being only a means to accomplish activities which express values. To Aristotle, then, the worth of technology could only be judged by the use to which it is put; it has no other meaning.

Given the pragmatism of Aristotle's writings, his view on technology is somewhat surprising and therefore perhaps particularly profound. Indeed, this same individual, who practiced the medical arts, propounded an early version of empiricism,<sup>227</sup> and gathered everything from zoological specimens to state constitutions in the grove of the Lyceum, nonetheless found practical pursuits to be merely the understanding of the "variable, contingent and relative," and therefore less worthy.<sup>228</sup> Aristotle's works include detailed treatises on how to construct an argument, or write a poem or speech, but little on the creation of anything that would be described today as technological.<sup>229</sup> And although Aristotle often expresses admiration for the works of nature in his writings, his regard for the products of human artificers was undoubtedly far less.<sup>230</sup>

Aristotle's treatment of technology, which he groups with a number of other disciplines like economics and military science, cannot said to be a thorough one. Nonetheless, even this brief review of Aristotle's view on technology indicates the stress he places upon technology's neutrality. That such a conception of technology is not the product of casual reasoning, but instead has roots in fundamental Western thought, is perhaps the most significant insight into the structure of patent law that we can gain from his works.

As this Article will argue, however, the position of technological neutrality is overly simplistic.<sup>231</sup> It is perhaps far more fitting for ancient Greek society than contemporary life. In stark contrast to a modern world where the reach of technology seemingly has no visible boundaries, the Greeks were notorious technological underachievers.<sup>232</sup> Numerous aspects of their society showed little

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227. JOHN HERMAN RANDALL, JR., *ARISTOTLE* 95-98 (1960). Empiricism, as later propounded by such figures as Locke, George Berkeley and David Hume, holds that human knowledge fully or partly depends upon sense-based experience. A.R. LACEY, *A DICTIONARY OF PHILOSOPHY* 61-62 (2d ed. 1986).

228. RANDALL, *supra* note 227, at 163.

229. See ARISTOTLE, *Topics*, in Barnes, Vol. I *supra* note 226, at 167; ARISTOTLE, *Rhetoric*, in Barnes, Vol. II, *supra* note 226, at 2152; ARISTOTLE, *Poetics*, in Barnes, Vol. II, *supra* note 226, at 2316.

230. RANDALL, *supra* note 227, at 163.

231. See *infra* notes 321-342 and accompanying text.

232. See, e.g., DANIEL J. BOORSTIN, *THE CREATORS* 55-56 (1992).

regard for technologists; many city-states, for example, denied artisans and technicians the opportunity to become citizens. Of course, what we know of Greek thought comes primarily from their writers, not their technologists. In this vein, observers such as Samuel Florman find little wonder that philosophers like Aristotle recommend the pursuit of a philosophical way of life.<sup>233</sup> Florman finds alternative conceptions in Greek thought in sources such as Homer, noting his admiration of technical skill and the material world of human-made objects.<sup>234</sup>

After the early works of Aristotle, philosophy had little to offer students of technology until the nineteenth century, when Karl Marx developed a body of technological thought.

233. FLORMAN, *supra* note 203, at 102.

234. *Id.* at 104-10. Florman quotes extensively from *The Odyssey* of Homer. He includes the following passage, a significant example of technological description:

She gave him a great ax that was fitting to his palms and headed  
 With bronze, with a double edge each way, and fitted inside it  
 A very beautiful handle of olive wood, well hafted;  
 Then she gave him a well-finished adze, and led the way onward  
 To the far end of the island where there were trees, tall grown,  
 Alder and black poplar and fir that towered to the heaven,  
 But all gone dry long ago and dead, so they would float lightly.  
 But when she had shown him where the tall trees grew, Kalypso,  
 Shining among divinities, went back to her own house  
 While he turned to cutting the timbers and quickly had his work  
 finished.

He threw down twenty in all, and trimmed them well with his bronze  
 ax,

And planed them expertly, and trued them straight to a chalkline.  
 Kalypso, the shining goddess, at that time came back, bringing him  
 An auger, and he bored through them all and pinned them together  
 With dowels, and then with cords he lashed his raft together.  
 And as great as is the bottom of a broad cargo-carrying ship,  
 When a man well skilled in carpentry fashions it, such was  
 The size of the broad raft made for himself by Odysseus.  
 Next, setting up the deck boards and fitting them to close uprights  
 He worked them on, and closed in the ends with sweeping gunwales.  
 Then he fashioned the mast, with an upper deck fitted to it,  
 And made in addition a steering oar by which to direct her,  
 And fenced her in down the whole length with wattles of osier  
 To keep the water out, and expended much timber upon this.

FLORMAN, *supra* note 203, at 106-107 (quoting *THE ODYSSEY OF HOMER* Bk. 5, ll. 234-57 (Richmond Lattimore trans., 1965)).

At first blush, Marx seems an extremely unlikely source of insights into patent law. His ceaseless call for the abolition of private property leaves little doubt as to whether he would support exclusive rights to individual inventors.<sup>235</sup> Ignoring the profound emphasis Marx placed upon technology in his thought, however, would be extremely short-sighted in reviewing the philosophical underpinnings of patent law. In its necessarily but brutally brief review of Marxian philosophy, this Article will focus upon Marx's technological views and compare them with the values underpinning patent law.

Most readers are undoubtedly familiar with the primary elements of Marx's works. Marx emphasized humans as material beings, compelled by our nature to meet organic demands for things like food and shelter. The pressure of these needs is, to Marx, our motivating force, causing humanity to enter into conscious production; that is its unique trait.<sup>236</sup> Historically, productive forces may be arranged into five so-called "modes of production"—Asiatic, ancient, feudal, capitalist and socialist—each period marked by an essential technology directed towards the fulfillment of human needs. Marx viewed the capitalist mode of production as dominated by the factory system, and accompanied by such institutions as private property, market production and the use of money.

The technologies that comprise the material modes of production play a central role in Marxian thought.<sup>237</sup> Marx conceived modes of production as the ultimate environment in which humankind exists. In a Marxian sense, individuals define themselves through their interaction with their environment—their mode of production—and with each other. Thus, technology embodies what humanity is in a quite fundamental way.<sup>238</sup>

Marx asserted that although the modes of production have changed throughout history, they share the common feature of control by a few, to the detriment of the masses. As individuals grow increasingly dependent upon others and alienated from their own

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235. E.g., KARL MARX & FRIEDRICH ENGELS, BASIC WRITINGS ON POLITICS AND PHILOSOPHY 23-24 (Lewis S. Feuer ed., 1959) (quoting KARL MARX, THE MANIFESTO OF THE COMMUNIST PARTY).

236. Joseph Cropsey, *Karl Marx*, in HISTORY OF POLITICAL PHILOSOPHY 802, 803 (Leo Strauss & Joseph Cropsey eds., 3d ed. 1987) [hereinafter HISTORY OF POLITICAL PHILOSOPHY].

237. KOSTAS AXELOS, ALIENATION, PRAXIS, & TECHNE IN THE THOUGHT OF KARL MARX 331 (Ronald Bruzina trans., 1976).

238. *Id.*

existence, their loss is reflected in greater society through the formation of competing classes. This process reaches its heights in capitalist societies, where increasingly specialized laborers become less than human, achieving only a fraction of what is possible for them and coming to dread the labor that should serve as a source of satisfaction to them. Marx predicted that these destructive aspects of capitalism are the key to its own collapse.<sup>239</sup> In its place would rise a socialist-communist society marked by cooperation and rational planning. Humans will then cease to live at each other's expense, and, with the help of technology designed to lessen the burdens of workers, become masters of themselves and their society.<sup>240</sup>

Although the extraordinary wealth of Marx's thought has inspired countless interpretations, our review of his thought can fortunately be more limited to his technological observations. As Joseph Schumpeter has suggested, the traditional view of Marxian technological theory encompasses both technological determinism and inevitability.<sup>241</sup> This reading of Marx first holds that technological development is unavoidable. As stated in the *Grundrisse*:

[O]nce absorbed into the production processes of capital, the means of labour undergoes various metamorphoses, of which the last is the machine, or rather, an automatic system of machinery ("automatic" meaning that this is only the most perfected and most fitting form of the machine, and is what transforms the machinery into a system). This is set into motion by an automaton, a motive force that moves of its own accord. The automaton consists of a number of mechanical and intellectual organs, so that the workers themselves can be no more than the conscious limbs of the automaton.<sup>242</sup>

Further, under this reading of Marx, not only is technological development inevitable, but the shape technology assumes has a controlling effect upon the rest of society. The entire fabric of society results from the conditioning of men by their manmade environment, i.e., by their mode of production. Under this reading, social change is solely determined by technological advance.<sup>243</sup> Humans are thus unable to choose their ethical, religious and political systems, which

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239. HISTORY OF POLITICAL PHILOSOPHY, *supra* note 236, at 813.

240. See ARNOLD PACEY, THE MAZE OF INGENUITY: IDEAS AND IDEALISM IN THE DEVELOPMENT OF TECHNOLOGY 273-275 (1974).

241. JOSEPH A. SCHUMPETER, CAPITALISM, SOCIALISM, AND DEMOCRACY 11-12 (3d ed. 1950).

242. KARL MARX, GRUNDRISSE 132 (David McLellan trans., 1971).

243. See LESLIE A. WHITE, THE SCIENCE OF CULTURE 365 (1971); Tribe, *supra* note 192, at 650 n.116.

instead depend upon the forces of production available to that society. This view of extraordinary technological determinism has ample textual support. Consider, for example, a passage from Marx's letter to P.V. Annenkov:

Assume a particular state of development in the productive forces of man and you will get a particular form of commerce and consumption. Assume particular stages of development in production, commerce and consumption and you will have a corresponding social structure, a corresponding organization of the family, of orders or of classes, in a word, a corresponding civil society. Presuppose a particular civil society and you will get particular political conditions which are only the official expression of civil society.<sup>244</sup>

As he stated more concisely in *The Poverty of Philosophy*: "The handmill gives you society with the feudal lord; the steam-mill, society with the industrial capitalist."<sup>245</sup>

Scholarly debate continues, however, on whether the entirety of Marx's thought reflects both determinism and inevitability. Indeed, other portions of his works suggest diametrically opposed views of technology. As Marx repeatedly noted, "men make their own history" and are not captive to external forces such as autonomous technology.<sup>246</sup> Others further excuse Marx for his various statements of technological determinism, considering them to be misinterpreted

244. Letter from Marx to P.V. Annenkov (December 28, 1846) in KARL MARX, *THE POVERTY OF PHILOSOPHY* 151, 152 (C.P. Dutt & V. Chattopadhyaya eds., 1935) [hereinafter MARX, *THE POVERTY OF PHILOSOPHY*]. See also KARL MARX, *A CONTRIBUTION TO THE CRITIQUE OF POLITICAL ECONOMY* 20-21 (1971):

In the social production of their existence, men inevitably enter into definite relations, which are independent of their will, namely relations of production appropriate to a given stage in the development of their material forces of production. The totality of these relations of production constitutes the economic structure of society, the real foundation, on which arises a legal and political superstructure and to which correspond definite forms of social consciousness. The mode of production of material life conditions the general process of social, political and intellectual life. It is not the consciousness of men that determines their existence, but their social existence that determines their consciousness. At a certain stage of development, the material productive forces of society come into conflict with the existing relations of production or—this merely expresses the same thing in legal terms—with the property relations within the framework of which they have operated hitherto. From forms of development of the productive forces these relations turn into their fetters.

245. MARX, *THE POVERTY OF PHILOSOPHY*, *supra* note 244, at 105.

246. Karl Marx, *The Eighteenth Brumaire of Louis Bonaparte*, in *BASIC WRITINGS ON POLITICS AND PHILOSOPHY: KARL MARX AND FRIEDRICH ENGELS* 318, 320-21 (Lewis S. Feuer ed., 1959).

aphorisms or to have arisen in the heat of debate.<sup>247</sup> Additional passages from Marx suggest that technological progress is not immune to social forces. Marx indicated that "it would be possible to write quite a history of inventions, made since 1830, for the sole purpose of supplying capital with weapons against the revolts of the working class" and that science "is the most powerful weapon for repressing strikes, those periodical revolts of the working class against the autocracy of capital[.]"<sup>248</sup> The familiar opening of the *Communist Manifesto* also suggests that technology need not be the sole determinant of social changes;<sup>249</sup> to similar effect is language buried in

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247. See Nathan Rosenberg, *Marx as a Student of Technology*, in INSIDE THE BLACK BOX: TECHNOLOGY AND ECONOMICS 34 (1982). Cf. FRIEDRICH NIETZSCHE, THE GAY SCIENCE (Walter Kauffman trans., 1974). 182 n.20 (commentary by Walter Kaufmann on the danger of the false assumption that Nietzsche's THE GAY SCIENCE is "merely a random collection of 'aphorisms' that are intended for browsing.").

248. KARL MARX, CAPITAL 475 (Frederich Engels ed., International Publishers edition 1992). See Richard W. Miller, *Social and political theory: Class, state, revolution*, in THE CAMBRIDGE COMPANION TO MARX 55, 57 (Terrell Carver ed., 1991) ("First, the capitalists determine the shape of technology. In the face of any long-term shortage of labor power, they can instruct their engineers to emphasize labor-saving innovations.").

249.

The discovery of America, the rounding of the Cape, opened up fresh ground for the rising bourgeoisie. The East-Indian and Chinese markets, the colonization of America, trade with the colonies, the increase in the means of exchange and in commodities generally, gave to commerce, to navigation, to industry, an impulse never before known, and thereby, to the revolutionary element in a tottering feudal society, a rapid development.

The feudal system of industry, under which industrial production was monopolized by closed guilds, now no longer sufficed for the growing wants of the new markets. The manufacturing system took its place. The guild-masters were pushed on one side by the manufacturing middle class; division of labor between the different corporate guilds vanished in the face of division of labor in each single workshop.

Meantime the markets kept ever growing, the demand ever rising. Even manufacture no longer sufficed. Thereupon, steam and machinery revolutionized industrial production. The place of manufacture was taken by the giant, Modern Industry, the place of the industrial middle class, by industrial millionaires, the leaders of whole industrial armies, the bourgeois.

Modern industry has established the world-market, for which the discovery of America paved the way. This market has given an immense development to commerce, to navigation, to communication by land. This development has, in its turn, reacted on the extension of industry; and in proportion as industry, commerce, navigation, railways extended, in the same proportion the bourgeoisie

a footnote from *Capital*.<sup>250</sup> The simple expedient of providing a broader reading to the term "modes of production" to encompass not simply technology, but also labor power as well as human skill and experience, is itself a potent counter argument to the traditional reading of Marxian technological philosophy.<sup>251</sup>

Even if one accepts the traditional reading of Marx's views on technology as deterministic and inevitable, any nexus between Marx and patent law doctrines may seem quite attenuated. Yet the founder of Marxism was also among the intellectual forebears of the American technological utopianism movement, which shifted utopian hopes for America from Puritanical notions of divine providence to a more pragmatic, technologically based vision of a better society.<sup>252</sup> By the late nineteenth century, millions of Americans subscribed to a belief in the inevitability of technological progress and its social effects.<sup>253</sup> The rule of law developed during that era reflects these beliefs. Indeed, the correlation between the decline in the vigor of the patent system<sup>254</sup> and growing social distrust in technology is quite noticeable. A lesser, but still notable, nexus can also be drawn between Marx and

developed, increased its capital, and pushed into the background every class handed down from the Middle Ages.

MARX & ENGELS, *supra* note 235, at 59-60.

250.

A critical history of technology would show how little any of the inventions of the 18th century are the work of a single individual. Hitherto there is no such book. Darwin has interested us in the history of Nature's Technology, i.e., in the formation of the organs of plants and animals, which organs serve as instruments of production for sustaining life. Does not the history of the productive organs of man, of organs that are the material basis of all social organisation, deserve equal attention? And would not such a history be easier to compile, since, as Vico says, human history differs from natural history in this, that we have made the former, but not the latter? Technology discloses man's mode of dealing with Nature, the process of production by which he sustains his life, and thereby also lays bare the mode of formation of his social relations, and of the mental conceptions that flow from them.

MARX, *supra* note 248, at 352 n.2.

251. See, e.g., Donald MacKenzie, *Marx and the Machine*, 25 *TECH. & CULTURE* 473, 476-77 (1984).

252. HOWARD P. SEGAL, *TECHNOLOGICAL UTOPIANISM IN AMERICAN CULTURE* 69-72 (1985).

253. *Id.* at 19-44.

254. CHISUM, *supra* note 35, at OV-9.

patent law as one of his keenest observers, Joseph Schumpeter,<sup>255</sup> strongly influenced patent law scholarship.<sup>256</sup>

The traditional reading of Marx's position is now rendered too extreme to be acceptable.<sup>257</sup> Marx's determinist views of technology must be seen as rather disappointing. The emphasis Marx ultimately placed upon class struggle resulted in a movement away from his focus on man as a material, observable being. Thus, Marx stepped away from an analysis of the everyday world which makes up man's environment, and thus from technology as well.<sup>258</sup>

Legal scholars have frequently, and productively, borrowed from philosophical studies as a means of considering the various regimes of intellectual property.<sup>259</sup> In doing so, they have stressed intellectual property regimes as systems of property. Certainly the foundational philosophic text for these studies is Locke's *Second Treatise*,<sup>260</sup> which has recently received several exhaustive treatments. A second source lies in the works of Hegel, who discussed intellectual property laws in his most important political text, *The Philosophy of Right*.<sup>261</sup>

The crux of Locke's celebrated argument concerning property is that divine authority created the world as a universal common, in which all individuals possessed an equal right.<sup>262</sup> An exception to this rule lies in the person of each individual, over which each individual enjoys a property right.<sup>263</sup> Not only is an individual's person his own, but "the labor of his body and the work of his hands, we may say, are properly his," as the immediate extension of his person.<sup>264</sup> A significant condition qualifies this labor-based property right: whenever an individual removes something from the common, there must remain "enough and as good left in common for others."<sup>265</sup>

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255. See Nathan Rosenberg, *Schumpeter and Marx: How Common A Vision?*, in *TECHNOLOGY AND THE HUMAN PROSPECT* 197 (Roy M. MacLeod ed., 1986).

256. See *supra* note 210.

257. See *infra* notes 343-368 and accompanying text.

258. ALBERT BORGMANN, *TECHNOLOGY AND THE CHARACTER OF CONTEMPORARY LIFE* 84-85 (1984).

259. See *supra* note 1.

260. LOCKE, *supra* note 2.

261. HEGEL, *supra* note 3.

262. LOCKE, *supra* note 2, at § 25.

263. *Id.* at § 27.

264. *Id.*

265. *Id.*

Applied to the production of technological ideas, Locke's labor theory of property provides a compelling rationale for the patent system.<sup>266</sup>

In contrast, Hegel reasoned that property results from the expression of individual will.<sup>267</sup> To Hegel, personality and other aspects of human existence are due to the will's continuous effort to impose itself upon the world.<sup>268</sup> Hegel recognized that the interaction of human will with the external world occurs in part through the occupation and embodiment of external, enduring objects, which society recognizes as property.<sup>269</sup> Importantly for students of intellectual property, however, Hegel realized that physical objects need not be the only subject of property protection; creative expression and the embodiment of ideas are also worthy of protection through a system of exclusive rights.<sup>270</sup> As expressed in intellectual property schemes such as patent protection, Hegelian notions of property provide a suitable mechanism for self-actualization, personal expression, and recognition of the dignity and worth of an individual person.<sup>271</sup>

Although a rather extensive literature applies Lockean and Hegelian thought to our system of patents and other intellectual property rights, scant comparison of other philosophical studies to the patent system has occurred. Surprisingly enough, thinkers such as Aristotle, Karl Marx and Martin Heidegger,<sup>272</sup> who assigned technology a role in their thought from peripheral to central, have received little attention in relation to the patent law. This absence is unexpected but not inexplicable. Theories of property, particularly that espoused by Locke, are fundamental to our constitutional order, of broad application to many legal settings, and well understood by a wide audience.<sup>273</sup> In contrast, the philosophy of technology presents a

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266. See Hughes, *supra* note 1, at 296-330. But see Gordon, *supra* note 1; ROBERT NOZICK, ANARCHY, STATE AND UTOPIA 181-82 (1974) (both discussing limits to intellectual property rights under Lockean theories).

267. HEGEL, *supra* note 3, at 40.

268. *Id.*

269. *Id.* at 40-41.

270. *Id.* at 40-41. See Hughes, *supra* note 1, at 337-39.

271. Hughes, *supra* note 1, at 340.

272. This list is by no means exhaustive. For instance, John Dewey is another important thinker who has considered technology. See LARRY A. HICKMAN, JOHN DEWEY'S PRAGMATIC TECHNOLOGY (1990). In a recent work, Paul Durbin names contemporary thinkers Albert Borgmann, Don Ihde, Carl Mitcham, Kristen Shracer-Frechette and Langdon Winner as the foremost technological philosophers. PAUL DURBIN, BROAD AND NARROW INTERPRETATIONS OF PHILOSOPHY OF TECHNOLOGY xvi n.1 (1990).

273. See, e.g., RICHARD EPSTEIN, TAKINGS—PRIVATE PROPERTY AND THE POWER OF EMINENT DOMAIN (1985).

nascent field of study. One noted scientific philosopher remarked that the philosophy of technology "is still immature and uncertain of its very object, and does not exploit the entire scope of its own possibilities. That it is an underdeveloped branch of scholarship is suggested by the fact that so far no major philosopher has made it his central concern or written an important monograph about it."<sup>274</sup> Although these claims are certainly overstated, few would doubt that philosophers have come late to technology.<sup>275</sup>

Additionally, many scholars may not wish to confine themselves to the patent law, instead considering the full spectrum of intellectual property doctrines. As the systems of copyright, trademark, trade secret and unfair competition law do not embrace technology to the extent the patent law does, critical thinking regarding technology may be relevant only at the peripheries of these other intellectual property regimes.<sup>276</sup> The possibility of a philosophy of technology is also simply one that has not occurred to many individuals. Indeed, such a philosophy may seem almost incongruous, as the workings of technology appear extraordinarily far removed from the abstract contemplation that traditionally comprises philosophical inquiry. Samuel Florman notes the common perception that:

If people are entranced with trinkets, how can they plumb the depths of their spirit? If they are absorbed in analyzing systems and designing physical objects, how can they remain open for an encounter with Being? If they seek comfort, how can they expect to find truth?<sup>277</sup>

At a minimum, such conceptions make little of the Husserlian turn of philosophy to phenomenology, a school of thought which seeks to describe the phenomena of existence as they appear, without the intervention of theoretical constructions.<sup>278</sup> Ultimately, however, critical thinking about technology—that which is called the controlling power of our age—needs no justification.<sup>279</sup>

274. Mario Bunge, *Five Buds of Techno-Philosophy*, 1 *TECH. IN SOC'Y* 68 (1979).

275. See, e.g., Albert Borgmann & Carl Mitcham, *The Question of Heidegger and Technology*, 31 *PHIL. TODAY* 97, 108 (1987).

276. As the other intellectual property regimes are forced to address technology, though, this claim is increasingly less true. See e.g. Arthur R. Miller, *Copyright Protection for Computer Programs, Databases, and Computer-Generated Works: Is Anything New Since CONTU?*, 106 *HARV. L. REV.* 997 (1993).

277. FLORMAN, *supra* note 203, at 101.

278. See Edmund Husserl, *Philosophy as Rigorous Science*, in *PHENOMENOLOGY AND THE CRISIS OF PHILOSOPHY* (Q. Lauer trans., 1965).

279. See, e.g., Hood, *supra* note 193, at 356; Thomas Carlyle, *The Mechanical Age*, in *NATURE AND INDUSTRIALIZATION: AN ANTHOLOGY*, 229, 229 (Alasdair Clayre ed.,

### III. AN ALTERNATE CONCEPTION OF TECHNOLOGY

The case for technological neutrality and inevitability is not made beyond question. History provides examples both of non-neutral technologies that have profoundly altered social systems and of technologies that seemed inevitable but were rejected or not adopted by societies. A look at the work of Martin Heidegger provides the philosophical basis for rejecting patent law's view of technology as a dominating, neutral, inevitable force.

#### A. To A New Philosophy of Technology: Beyond Aristotle and Marx

Martin Heidegger, a twentieth-century German existentialist philosopher, presents a figure of extreme controversy. Sometimes dismissed for his tortuous style, often disregarded as a linguistic charlatan,<sup>280</sup> and uniformly held in contempt for his detestable affiliation with the Nazi movement,<sup>281</sup> Heidegger still remains an intriguing figure, for many would place him as the foremost philosopher of the century, with an influence on a bewildering array of disciplines.<sup>282</sup> Regardless of the status one would accord Heidegger, he was the first to consider technology as an issue of central philosophical interest,<sup>283</sup> and his writings, particularly his 1953 lecture *The Question Concerning Technology*<sup>284</sup> and his seminal work *Being and Time*,<sup>285</sup> are of extreme interest to the task at hand.<sup>286</sup>

In contrast to Aristotle and Marx, Heidegger provides a normative basis for technological understanding, which patent law

1977) ("Were we required to characterise this age of ours by any single epithet, we should be tempted to call it, not an Heroical, Devotional, Philosophical, or Moral Age, but, above all others, the Mechanical Age. It is the Age of Machinery . . .").

280. See GEORGE STEINER, *MARTIN HEIDEGGER* 4 (1989).

281. Charles B. Guignon, *Introduction*, in *THE CAMBRIDGE COMPANION TO HEIDEGGER* 26-36 (Charles Guignon ed., 1993) [hereinafter *HEIDEGGER COMPANION*].

282. For example, literary theory, artificial intelligence, and psychology. STEINER, *supra* note 280, at 5-6.

283. IHDE, *TECHNICS AND PRAXIS* 103 (1979).

284. MARTIN HEIDEGGER, *The Question Concerning Technology*, in *BASIC WRITINGS* (David Farrell Krell ed., 1977) [hereinafter *HEIDEGGER, The Question Concerning Technology*].

285. MARTIN HEIDEGGER, *BEING AND TIME* (John Macquarrie & Edward Robinson trans., 1962).

286. See generally Leo Marx, *On Heidegger's Conception of "Technology" and Its Historical Validity*, 25 *MASS. REV.* 638 (1984); JOHN LOSCERBO, *BEING AND TECHNOLOGY: A STUDY IN THE PHILOSOPHY OF MARTIN HEIDEGGER* (1981).

scholars should study more closely. Heidegger's goal was to rejuvenate Western thought by recovering a clearer, more vital sense of existence, or being.<sup>287</sup> To Heidegger, concepts central to Western thought such as Platonic Forms, Cartesian mind-body dualism, and Kantian noumena, were the results of derivative, theoretical thinking too far removed from the physical world.<sup>288</sup> Heidegger instead offered a sort of phenomenology: that our most fundamental sense of things comes not from our relationship with objects of knowledge, but with those instrumental objects that fit naturally into our ordinary lives.<sup>289</sup>

Heidegger's most famous example involves the simple use of a hammer.<sup>290</sup> The wielder of the hammer—say, a cobbler in her workshop—takes up her tool within an integrated context of interrelated activities and objects of which the hammer is a part. Other elements of this totality, including tools, nails, materials which make up a shoe, and even the crafting of the product, are assigned a contextual meaning through their interrelationship. The hammer thus must be seen as relative to a context, not as an object in itself. An awareness of this relationship becomes more pronounced as the hammer is used, as the tool itself withdraws from the cobbler's direct experience of hammering, and becomes instead the means of the hammering experience itself.<sup>291</sup> Importantly for Heidegger's argument, skilled use of the hammer implies an understanding which is practical, not conceptual.<sup>292</sup> To Heidegger, this concealed working of pragmatic things defines their being in the physical world.<sup>293</sup>

It is in this sense that Heidegger writes: "Technology is therefore no mere means. Technology is a way of revealing."<sup>294</sup> The essence of technology is thus not merely a mode of production, transportation, or other task, nor can it be described as itself technological.<sup>295</sup> It is instead a fundamental way in which we uncover the presence of things; a "clearing" in which specific forms of human existence, along with the environment of made things, become visible

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287. Guignon, *supra* note 281, at 4-5.

288. *Id.* at 4.

289. *Id.* at 10.

290. See DON IHDE, *TECHNOLOGY AND THE LIFEWORLD* 31-34 (1990).

291. Guignon, *supra* note 281, at 10.

292. IHDE, *PHILOSOPHY OF TECHNOLOGY*, *supra* note 241, at 40.

293. Guignon, *supra* note 281, at 10-11.

294. HEIDEGGER, *supra* note 284, at 318.

295. *Id.* at 311.

in their reciprocal interdependence.<sup>296</sup> According to Heidegger, then, being is a temporal event, a "movement into presence" in which both humans and things are appropriated into intelligibility, and the world objectified.<sup>297</sup>

Paradoxically, we are perhaps most aware of the network of relations in which tools are embedded when something goes awry, such as when a tool is damaged.<sup>298</sup> We then obtain a rudimentary understanding of the complex functional relationships of which the tool was a part. If the breakdown persists, however, individual technologies become increasingly noticeable only in their dysfunction.<sup>299</sup> Individuals then begin to believe the tool is without meaning, its usefulness merely determined by human desires and interests.

But such an understanding—viewing the world as an instrumental tool fit for the disposal of humanity—is inauthentic. Among Heidegger's theses is that Western society reflects this mistaken understanding of being, leading to pragmatic and deleterious consequences: the spread of apocalyptic weaponry, environmental devastation, and ultimately nihilism.<sup>300</sup> Heidegger considers this conception of being as itself a technological one. Thus, in humanity's technological encounter with the world, the world is seen as available for whatever use we care to make of it.<sup>301</sup> The Rhine River itself becomes merely another resource to be tapped:

The hydroelectric plant is set into the current of the Rhine. It sets the Rhine to supplying its hydraulic pressure, which then sets the turbines turning. This turning sets those machines in motion whose thrust sets going the electric current for which the

296. Hood, *supra* note 193, at 357.

297. Guignon, *supra* note 281, at 13.

298. "When an assignment has been disturbed—when something is unusable for some purpose—then the assignment becomes explicit . . . . When an assignment to some particular 'towards this' has been thus circumspectly aroused, we catch sight of the 'towards this' itself, and along with it everything connected with the work—the whole workshop—as that wherein concern always dwells." HEIDEGGER, *supra* note 285, at 105 (emphasis in original). See also Harrison Hall, *Intentionality and the world: Division I of Being and Time*, in HEIDEGGER COMPANION, *supra* note 281, at 122, 127.

299. Guignon, *supra* note 281, at 12-13.

300. Drew Leder, *Modes of Totalization: Heidegger on Modern Technology and Science*, 29 PHIL. TODAY 245, 249 (1985); Michael Gillespie, *Martin Heidegger*, in HISTORY OF POLITICAL PHILOSOPHY, *supra* note 236, at 888, 890.

301. T. Maarten & T. Coolen, *Philosophical Anthropology and the Problem of Responsibility in Technology*, in TECHNOLOGY & RESPONSIBILITY, *supra* note 191, at 41-50; Leder, *supra* note 300, at 246; HEIDEGGER, *The Question Concerning Technology*, *supra* note 284.

long-distance power station and its network of cables are set up to dispatch electricity. In the context of the interlocking processes pertaining to the orderly disposition of electrical energy, even the Rhine itself appears to be something at our command.<sup>302</sup>

Our distorted conception of the being of technology has an even worse consequence. By failing to inquire into the essence of things, and instead viewing them as mere instruments, humans allow all their relations to become technical ones. Everything becomes an asset to be exploited in a calculated way: individuals as useful operators and consumers,<sup>303</sup> friends as efficient members of a network,<sup>304</sup> and natural resources as reserves left for our use,<sup>305</sup> with marginal habits and customs left behind. All activity thus becomes technically oriented, and the only goal of individuals the optimal ordering of resources, for its own sake.<sup>306</sup> To Heidegger, the greatest danger is that "the approaching tide of technological revolution in the atomic age could so captivate, bewitch, dazzle, and beguile man that calculative thinking may someday come to be accepted and practiced *as the only way of thinking.*"<sup>307</sup>

Heidegger is no Luddite, however; he never took the route of so many contemporary observers, who naively yearn for a simpler society based upon idealized views of earlier, less technologically sophisticated eras.<sup>308</sup> He realized that "[i]t would be foolish to attack technology blindly. . . . We depend on technical devices; they even challenge us to ever greater advances."<sup>309</sup> Instead, Heidegger's works suggest two solutions for curbing the "tide of technological revolution."

First, Heidegger teaches the concept of releasement, of stepping beyond a purely instrumental conception of technology.<sup>310</sup> Heidegger

302. HEIDEGGER, *supra* note 284, at 321.

303. Leder, *supra* note 300, at 248.

304. Hubert L. Dreyfuss, *Heidegger on the Connection Between Nihilism, Art, Technology and Politics*, in HEIDEGGER COMPANION, *supra* note 281, at 289, 310.

305. Leder, *supra* note 300, at 250.

306. "Everywhere everything is ordered to stand by, to be immediately at hand, indeed to stand there just so that it may be on call for a further ordering." Heidegger, *supra* note 284, at 322.

307. MARTIN HEIDEGGER, DISCOURSE ON THINKING 56 (emphasis in original) (John M. Anderson & E. Hans Freund trans., 1966).

308. See FLORMAN, *supra* note 203, at 54-55, 72-73 (noting and criticizing such commentators).

309. HEIDEGGER, *supra* note 307, at 53.

310. "Releasement toward things and openness to the mystery belong together. They grant us the possibility of dwelling in the world in a totally different way. They promise us a new ground and foundation upon which we can stand and endure in

argues that we must return to meditative, rather than calculative, thinking;<sup>311</sup> one commentator summarizes Heidegger's position as the belief that "[i]f more people were to question, and to live with their questions, then technological thinking might be slowed down and the saving power fostered."<sup>312</sup> Heidegger thus argues for a shift of paradigms, with greater emphasis placed on the humanizing character of insignificant things—those marginal cultural practices we celebrate for the precise reason that they resist efficiency.<sup>313</sup> Thus "[w]e can affirm the unavoidable use of technical devices, and also deny them the right to dominate us, and so to warp, confuse, and lay waste our nature."<sup>314</sup>

Heidegger also suggests the revival of technology as what the Greeks called *techne*. "Techne is the name not only for the activities and skills of the craftsman, but also for the arts of the mind and the fine arts. Techne belongs to bringing forth . . ." <sup>315</sup> We can thus enrich our understanding of technological artifacts as part of the created world, appreciating them without reducing them to mere instruments.<sup>316</sup> Heidegger writes that "when we once open ourselves expressly to the essence of technology, we find ourselves unexpectedly taken into a freeing claim."<sup>317</sup> Thus, we will be grateful for technology as we realize it is a primary source through which we can come to understand our lived existence. In this, Heidegger refers to the environment of human artifacts within which we interact for virtually every moment of our lives.<sup>318</sup> Once we attain an understanding of being which embraces technology, then we can see that what is most important to us is not amenable to efficient technological enhancement.<sup>319</sup>

the world of technology without being imperiled by it." HEIDEGGER, *supra* note 307, at 55. See Hood, *supra* note 193, at 353.

311. HEIDEGGER, *supra* note 307, at 56.

312. Jana Sawicki, *Heidegger and Foucault: Escaping Technological Nihilism*, 13 PHIL. & SOC. CRITICISM 155, 167 (1987).

313. Dreyfuss, *supra* note 304, at 310-11.

314. HEIDEGGER, *supra* note 307, at 54.

315. HEIDEGGER, *supra* note 284, at 318.

316. See Sawicki, *supra* note 312, at 166.

317. HEIDEGGER, *supra* note 284, at 331.

318. See CHELLIS GLENDINNING, *WHEN TECHNOLOGY WOUNDS: THE HUMAN CONSEQUENCES OF PROGRESS* 43 (1990) (noting "the technological encounter").

319. Dreyfuss, *supra* note 304, at 307. The popular novel *ZEN AND THE ART OF MOTORCYCLE MAINTENANCE* offers another option, arguing that humankind can reassert its mastery over the machinery of technology by carefully attending to technological

Application of Heidegger's teachings to patent law does not require an extraordinary leap of reasoning. The fundamental technological value expressed in the patent system suffers from the symptom he most decries: a nearsighted view of artifacts, processes and other technologies as simple tools. Seemingly unaware of the diverse cultural factors influencing technological advance, patent law leaves little room for review of policies and nontechnical concerns. Instead, notions of technological neutrality and inevitability prevail, but, as one observer realizes, "if Martin Heidegger is correct, the belief in the neutrality and heteronomy of technology may be the most insidious way of being delivered over to it."<sup>320</sup>

The question remains, however, whether Heidegger was indeed correct. Many of his followers accept the not uncommon view that humankind currently faces some sort of technologically-oriented crisis, a crisis so potent that arguments seeking changes in technological norms are welcome. Others recognize that Heidegger's thought best comports with a perceptive analysis of historical experience and persuasively displays the inadequacies of popular conceptions of technology as rooted in Western thought. Fortunately, the propriety of his approach need not be resolved here. One does not have to accept all of Heidegger's claims to appreciate his provocative arguments, and to consider whether legal values regarding technology deserve reevaluation.

## B. The Historical Case against Technological Neutrality

A look at the societal effects of the snowmobile and other technological inventions shows that technological change is not necessarily neutral.<sup>321</sup> First we consider the case of the snowmobile, familiar to students of technology. Although inventors obtained the first patents on motorized snow vehicles in the 1920s, these early devices were expensive and unreliable.<sup>322</sup> The invention of the Ski-Doo by Joseph-Armaund Bombadier revolutionized the snowmobile

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objects. ROBERT PIRSIG, *ZEN AND THE ART OF MOTORCYCLE MAINTENANCE: AN INQUIRY INTO VALUES* (1974).

320. John E. Jalbert, *Phenomenology and the Autonomy of Technology*, in *TECHNOLOGY AND RESPONSIBILITY*, *supra* note 191, at 85.

321. See, e.g., PERTTI J. PELTO, *THE SNOWMOBILE REVOLUTION* 6-12; 165-181 (1973).

322. PELTO, *supra* note 321, at 6-7.

field in the late 1950s.<sup>323</sup> Snowmobiles ultimately became a huge commercial success around the world, adopted by a wide spectrum of cultures for a variety of uses.

At first blush, the snowmobile appears to be a technologically neutral invention. Whether a snowmobile is used for cross-country racing in Michigan, reindeer herding in Finland, fox trapping on Canada's Banks Island, oil prospecting in Alaska, or any of a number of other purposes, the engineering principles are the same. It appears to be a neutral tool, adopted by a number of differing societies for their own objectives.

A more thorough examination of history, however, demonstrates that the introduction of the snowmobile into various socio-economic systems resulted in sometimes remarkable shifts within those systems. Rather than being a mere instrument to serve existing social goals, the snowmobile altered those goals themselves. As with the automobile, a host of human consequences attended the introduction of the snowmobile to North America. Ownership of a snowmobile, and the skilled ability to use it, became a status symbol.<sup>324</sup> The snowmobile also brought about tourist trails, driving schools, and organized races.<sup>325</sup> As its users found themselves increasingly dependent upon others to supply fuel and spare parts, the institution of snowmobiling caught the attention of legislatures, which enacted laws limiting the ecologically destructive uses of snowmobiles.<sup>326</sup>

Perhaps the most startling societal change caused by the introduction of the snowmobile was presented by Professor Partti J. Pelto in his classic study of the Skolt Lapps of northeastern Finland.<sup>327</sup> The Skolts were a reindeer-herding people, using the animals to provide food, transportation, clothing and other needs.<sup>328</sup> Following their exodus from Russia after World War II, the Skolts built a remarkably egalitarian society.<sup>329</sup> Wealth varied little

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323. The Ski-Doo, which combined prior snowmobile technology with an extremely efficient two-stroke, single-cylinder engine, see PELTO, *supra* note 321, at 6-7, likely constitutes a classic "combination" invention that under Supreme Court precedent may not even be eligible for patent protection. E.g., *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 281 (1976); *Anderson's Black Rock, Inc. v. Pavement Salvage*, 396 U.S. 57, 62 (1969); *Great Atlantic & Pacific Tea Co. v. Supermarket Equip. Co.*, 340 U.S. 147, 152 (1950) (an invention combining old elements must achieve "synergism" to be patentable).

324. PACEY, *supra* note 4, at 2-3.

325. *Id.*

326. PELTO, *supra* note 321, at 7-8.

327. *Id.*

328. *Id.* at 22-23.

329. *Id.* at 26-29.

among individuals; the transported families even lived in identical, government-constructed cabins.<sup>330</sup>

Prior to the advent of the snowmobile, Skolt reindeer herding was a controlled, cyclical process.<sup>331</sup> As winter approached, the scattered, free-roaming reindeer would gather into herds for breeding and to obtain protection from the elements. At this time, ski-clad Skolt herders would gather to lead the reindeer into corrals. This was ordinarily accomplished by a single skier leading a kilometer-long, single file of reindeer into a corral, with herdsman and dogs set along the flanks to ensure an orderly procession. The Skolts would then divide the animals based upon individual ownership, as indicated by ear markings. Owners would then butcher or otherwise process individual reindeer. Following calving in the spring, unidentified animals were marked and the herds set loose.

The situation dramatically changed when the Skolts first purchased snowmobiles in the early 1960s. Snowmobiles possessed extraordinary advantages in speed over traditional reindeer sleds, reducing trips once taking several days to a few hours.<sup>332</sup> The Skolts quickly applied the snowmobile to the task of reindeer herding, replacing ski-clad herders with snowmobile drivers.<sup>333</sup> Given the high fuel costs of operating snowmobiles and the speeds of which they were capable, reindeer herding quickly devolved into a quick, frenzied process. The months-long, intensive herding practices of the past had produced relatively domesticated reindeer; but the loss of control associated with accelerated herding left the animals increasingly wild and difficult to gather. Further, herding became less of an interaction between herder and reindeer than a scene of frantic capture, as the reindeer were considerably frightened by the noise and smell of the snowmobiles. Due to the lack of domestication, as well as the deleterious effect of the roundups on calves and pregnant females, the Skolts gathered drastically smaller herds following their adoption of the snowmobile.

The snowmobile's effects upon Skolt society were significant and detrimental.<sup>334</sup> The Skolts increasingly became dependent on cash and, in some cases, debt, in order to purchase snowmobiles, fuel and spare parts. Families began to leave herding due to insufficient

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330. *Id.* at 28.

331. *Id.* at 39-47.

332. *Id.* at 73.

333. *Id.* at 97-121.

334. *Id.* at 137-63.

resources and loss of control over the reindeer, often migrating to the south or becoming dependent upon government welfare programs. Further, Skolt society gradually experienced stratification. Ownership of the animals became concentrated among a few families, and the once uniform Skolt homes were augmented or replaced by the wealthy few.

This example is not intended to provide a nostalgic lament for the Skolt way of life as it existed thirty years ago, nor a sort of Luddite vision of the effects of technological change. Other factors impacted the shape of the Skolt society.<sup>335</sup> But this example should demonstrate that a view of technology as a neutral tool is too narrow. Inventions such as the snowmobile present implicit values, beyond their technological sphere, which are susceptible to evaluation.

Another example of the non-neutrality of technology concerns the works of the well-known civil engineer Robert Moses.<sup>336</sup> Among his many public projects were the parkways on Long Island, New York, which are marked by conspicuously low overpasses. Motivated by racial and social bias, Moses wished to keep the poor and racial minorities off the parkways, leaving them for the affluent owners of automobiles. He therefore designed the overpasses so that buses would be too tall to pass beneath them. Although Moses has long since passed on, his roads continue to shape life in New York, and stand as well as a monument to social inequality. Moses is hardly unique in designing cityscapes with social concerns in mind. Instead he reflects a tradition established by numerous other engineers, architects and city planners. Many would be surprised to learn that the lovely, broad avenues of Paris were designed to quell street fighting, or that American university officials in the 1970's requested that campuses feature broad plazas in order to restrain student demonstrations.<sup>337</sup> Similarly, among Congress' motivations in promulgating the Americans with Disabilities Act<sup>338</sup> was a recognition of the countless ways in which buildings, sidewalks, public

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335. *Id.* at 9.

336. This example is drawn from Langdon Winner, *Do artifacts have politics?*, in *THE SOCIAL SHAPING OF TECHNOLOGY* 26, 28-31 (Donald MacKenzie & Judy Wajcman eds., 1985) [hereinafter *THE SOCIAL SHAPING OF TECHNOLOGY*]. See also ROBERT A. CARO, *THE POWER BROKER: ROBERT MOSES AND THE FALL OF NEW YORK* (1974).

337. Winner, *supra* note 336, at 29.

338. Americans with Disabilities Act of 1990, Pub. L. No. 101-336, 104 Stat. 327 (codified at 42 U.S.C.A. §§ 12101-12213 (West Supp. 1991)).

transportation and other structures systematically discriminate against handicapped people.<sup>339</sup>

A final example of a non-neutral, value-laden technological advance is factory mechanization. Numerous studies have concluded that factory owners have encouraged research and development of technologies at least in part to increase management control over the workforce.<sup>340</sup>

The cultural effects of the snowmobile, calculated urban planning, and factory mechanization suggest that Friedrich Nietzsche's comments concerning the pursuit of science are particularly well applied to patentable technology:

During the last centuries science has been promoted, partly because it was by means of science that one hoped to understand God's goodness and wisdom best—this was the plain motive of the great Englishmen (like Newton); partly because one believed in the absolute utility of knowledge, and especially in the most intimate association of morality, knowledge, and happiness—this was the main motive of the great Frenchmen (like Voltaire); partly because one thought that in science one possessed and loved something unselfish, harmless, self-sufficient, and truly innocent, in which man's evil impulses had no part whatever—the main motive of Spinoza who felt divine when attaining knowledge—in sum, owing to three errors.<sup>341</sup>

Technology should not be considered a neutral force. It possess its own values, which we can evaluate and compare with our own. As Langdon Winner notes, "[i]f our moral and political language for evaluating technology includes only categories having to do with tools and uses, if it does not include attention to the meaning of the designs and arrangements of our artifacts, then we will be blinded to much that is intellectually and practically crucial."<sup>342</sup> To the extent that patent law in general, and the pioneer invention doctrine in particular, rely upon a belief in technological neutrality, they rest upon a particularly assailable foundation.

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339. See, e.g., Scott S. Moore, *The Americans with Disabilities Act Title III—The "New" Building Code*, 71 NEB. L. REV. 1145 (1992); Karen E. Field, *The Americans with Disabilities Act "Readily Achievable" Requirement for Barrier Removal: A Proposal for the Allocation of Responsibility between Landlord and Tenant*, 15 CARDOZO L. REV. 569 (1991); Bonnie Tucker, *The Americans with Disabilities Act: An Overview*, 1989 U. ILL. L. REV. 923.

340. E.g., Tine Bruland, *Industrial Conflict as a Source of Technical Innovation: The Development of the Automatic Spinning Mule*, in *THE SOCIAL SHAPING OF TECHNOLOGY*, *supra* note 336, at 84-90.

341. NIETZSCHE, *supra* note 247 at 105-06 (footnote omitted).

342. Winner, *supra* note 336, at 30.

### C. The Case Against Technological Inevitability

This Article cannot yet conclude its analysis of the foundations of the reward rationale of the pioneer invention doctrine, having reasoned that the patent law may possess an alternative technological value, inevitability.<sup>343</sup> Considerable anthropological evidence confirms a contrasting view: far from invariably adopting technology, societies are selective in choosing new technologies.<sup>344</sup> This Article first considers the nineteenth century Opium War between China and Great Britain.

At least until the fifteenth century, China was the technological equal of, if not superior to, the European powers. Many technologies considered fundamental to the rise of modern Europe—gunpowder, paper-making, printing and the magnetic compass—in fact owe their origins to Chinese inventors.<sup>345</sup> By the sixteenth century, however, the technological balance had swung to Renaissance Europe. While technological advance continued at a breakneck pace in the West, such development in China proceeded more gradually or ceased. The technological disparity between Europe and China was highlighted in the First Anglo-Sino Conflict, better known as the Opium War.

By the close of the eighteenth century, Chinese society had developed a drug problem: in return for Chinese tea, the Chinese imported opium from the British. The British East India Company grew opium—a commodity Chinese consumers could not obtain domestically—on its Bengalese lands.<sup>346</sup> As ever greater numbers of Chinese became addicted to opium, a lively drug trade developed. Strict control of foreign commerce by Chinese officials resulted in an impressive amount of smuggling.<sup>347</sup>

Determined to vindicate its own authority and limit the spread of opium addiction, the ruling Manchu regime heightened enforcement of prohibitions on opium trade that had been promulgated as early as 1729.<sup>348</sup> By 1839, vigorous enforcement efforts included seizure of opium and detention of British importers.<sup>349</sup>

Of course, naval strength was the font of British power. China, a land empire with few coastal cities, was therefore extremely

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343. See *supra* notes 203-220 and accompanying text.

344. See BASALLA, *supra* note 8, at 186-87.

345. PACEY, *supra* note 240, at 59, 87 and 189.

346. MAURICE COLLIS, FOREIGN MUD 63 (1946).

347. P.C. KUO, A CRITICAL STUDY OF THE FIRST ANGLO-CHINESE WAR 29-33 (1935).

348. *Id.* at 28-29, 63.

349. *Id.* at 98-111.

resistant to British military coercion. The inability of British ships to proceed up inland streams left the British with little choice but to accept the Chinese measures.<sup>350</sup>

The situation changed with the invention of the gunboat, a technology that would at last allow British forces to enter the Chinese interior. The gunboat was a steam-powered iron vessel, specially constructed to operate in shallow waters<sup>351</sup> and initially used for transportation throughout the British Empire.<sup>352</sup> After adding heavy armament and employing the boats to decisive advantage in the Anglo-Burmese War in the mid-1820s, the British considered the gunboat an important military asset.<sup>353</sup>

The arrival of the *Nemesis*, a 184-foot long, 29-foot wide, heavily armed gunboat, at last provided the British a means to negotiate China's inland rivers.<sup>354</sup> In early 1841, a *Nemesis*-led gunboat fleet launched an expedition up the Pearl River towards Canton. Superior in every sense to the more primitive defenses available to the Chinese,<sup>355</sup> the fleet decimated fortresses and warships at will. The next year, after the British fleet sailed up the Yangtze River and entered the Grand Canal, the Chinese government signed a peace treaty highly favorable to the British.<sup>356</sup>

Was the Opium War the result of technological inevitability? Left to face the gunboat, seemingly the certain result of technological advances in steamboats and artillery, the Chinese crumbled, helpless in the face of superior technology which they ultimately adopted themselves. Yet three centuries in the past, a relatively stable Chinese society had developed a core of technologies similar to that of Europe, and in the decades preceding the Opium War, the Chinese had grown quite familiar with the technologies of their European trading partners. Yet, at neither point did Chinese society adopt the supposedly inevitable march of technology. A common explanation is that some deficiency in Chinese society, for example, that the Chinese were overwhelmed by Confucian themes of cultural superiority and viewed Western technology with blinding suspicion,

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350. DANIEL R. HEADRICK, *THE TOOLS OF EMPIRE: TECHNOLOGY AND EUROPEAN IMPERIALISM IN THE NINETEENTH CENTURY* 45 (1981).

351. See generally ANTONY PRESTON & JOHN MAJOR, *SEND A GUNBOAT! A STUDY OF THE GUNBOAT AND ITS ROLE IN BRITISH HISTORY 1854 - 1904* (1967).

352. HEADRICK, *supra* note 350, at 21-23.

353. *Id.* at 20-21.

354. *Id.* at 47-48. See also PACEY, *supra* note 240, at 143.

355. PACEY, *supra* note 240 at 289.

356. See KUO, *supra* note 347, at 160-75.

prevented such advances. Other historians attribute the technological defeat of the Chinese to a Manchu regime ill-suited to deal with foreign policy decisions, or to the pressures and distractions of provincial government.<sup>357</sup>

But another analysis considers the events surrounding the Opium War to represent a contrast between two societies which had made different technological choices. Western society was generally accepting of rapid technological advance, in keeping with the vast intellectual, social and political changes which marked Renaissance and post-Renaissance Europe. In contrast, Chinese society was relatively more stable. The highly trained officials of early nineteenth-century China undoubtedly recognized the superiority of British technologies, particularly in their military applications. Yet they preferred to risk defeat rather than adopt advances which would have fundamentally altered the centuries-old humanistic culture in which they held power.<sup>358</sup>

None of this is to say that the technological impact of gunboats was insignificant. Even historians of the Opium War hesitate, however, to declare technological advance as inevitable, and instead separate gunboat technology from the continuity of the period's cultural, social, temporal and commercial elements.<sup>359</sup> Other examples of societal choices on whether to adopt or retain a particular technology could be cited: the rejection of firearms in seventeenth-century Japan, for example, or the disappearance of the canoe and bow and arrow from ancient Oceania.<sup>360</sup> But lest one think such examples are confined to other places and times, a more contemporary illustration exists: the ill-fated Supersonic Transport (SST), a commercial aircraft designed to fly at supersonic speed.<sup>361</sup>

In the late 1950s, major United States aircraft manufacturers began studying the feasibility of developing an SST. As Great Britain, France and the Soviet Union initiated state-sponsored SST programs, international prestige and leadership in world aviation technology increasingly became relevant to the United States' decision to also fund SST research. Ultimately, the Federal Aviation Agency was given enormous funding and a leadership role in the SST

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357. See JAMES M. POLACHEK, *THE INNER OPIUM WAR* (1992); FREDERIC WAKEMAN, JR., *STRANGERS AT THE GATE* (1966).

358. BASALLA, *supra* note 8, at 175-76.

359. HEADRICK, *supra* note 350, at 54.

360. BASALLA, *supra* note 8 at 185-89.

361. MEL HORWITZ, *CLIPPED WINGS: THE AMERICAN SST CONFLICT 1* (1982).

project. An attitude of extraordinary optimism, fueled by confident predictions, most notably by the Rand Corporation, that commercially feasible SSTs could be developed by about 1970, carried the day.<sup>362</sup> Experts indicated that SST technology was "inevitable"<sup>363</sup> and the next step in a natural progression of technological advancement.<sup>364</sup>

The SST quickly became a topic of intense public concern. Those familiar with supersonic travel recognized that the sonic boom, an explosive, disruptive noise that is a consequence of travel at supersonic speeds, threatened to become part of everyday life near major airports. Studies also indicated that the SST would cause extensive damage to the upper atmosphere, leading to ozone depletion and increased incidence of skin cancer. The economic impact of the SST program further began to loom large in an era of rising fuel prices.<sup>365</sup> Perhaps most importantly, the SST began to symbolize "big government acting in behalf of big business and unbridled technology without regard for the rights and well-being of ordinary citizens."<sup>366</sup> In the face of considerable public protest, the project quickly unraveled. Congress, responding to an extraordinary grassroots lobbying effort, rejected the project in 1971.<sup>367</sup>

A concerned public demonstrated that the SST was not a neutral, necessary or inevitable advance.<sup>368</sup> Careful evaluation of the environmental and economic consequences of the SST had prevailed over the supposedly inescapable forces leading to technological advance. Examples such as the Chinese non-adoption of the gunboat technology and the United States' rejection of SST research funding demonstrate that escalating technological advance is not inevitable. To the extent that patent law accepts the position that technological change is inevitable, its doctrines bear reconsideration.

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362. *Id.* at 7.

363. *Id.* at 8.

364. *Id.* at 21-22.

365. BASALLA, *supra* note 8 at 154-158.

366. *Id.* at 157.

367. *Id.*

368. See also PETROSKI, *supra* note 174, at 224 (we should recognize "that we are capable of rearing up and bucking off things that we find too burdensome or that we feel are taking us in the wrong direction."); Allan Mazur, *Public Protests Against Technological Innovations*, in *TECHNOLOGY AND SOCIAL CHANGE IN RURAL AREAS* 29 (Gene F. Summers ed., 1983).

#### IV. A NEW DOCTRINE OF PIONEER INVENTIONS

If we are to benefit from the teachings of either Heidegger or historical experience, we must consider whether patent law can be changed to better reflect an understanding of the scope and impact of technology. Although we cannot, as one Heidegger scholar notes, "legislate a new understanding of being,"<sup>369</sup> we can redirect patent law to better reflect both our understanding of technology and of our own, nontechnological values.

If the pioneer invention doctrine's values of technological neutrality and inevitability are misplaced, then a reformulation of this doctrine rewarding inventions with broad technological protection is in order. An alternate conception of pioneer inventions is straightforward: rather than confining themselves to arguments about the technical aspects of an invention, the courts could also accept arguments on the perceived social consequences of a patent owner's claimed invention. Such an inquiry would allow for nontechnical arguments addressing the pioneer status of an invention. Only if a court judged an invention as a pioneer within this context would it award that patent's claims with generous infringement protection.

The possible factors that bear upon pioneer status are many, and judges should consider all the facts and circumstances surrounding a technology before labeling a particular invention a pioneer. One appropriate factor is the social impact of the invention independent of its advance over the prior art. If an invention broadly changes the way individuals accomplish a technical task, pioneer status may be appropriate even if its progress beyond existing technologies was subtle. The Sixth Circuit's decision in *Deyerle v. Wright Mfg. Co.*<sup>370</sup> provides an apt example of how a new doctrine of pioneer inventions might have achieved a better result. The district court had held that the defendant infringed the claims of the asserted patent, which described a device for fixing fractures during hip surgery. After according the patent's claims a narrow construction as merely disclosing a small improvement in a crowded art, the Court of Appeals overturned the trial court's finding of infringement under the Doctrine of Equivalents. Given the appellate court's acknowledgment that the patented invention was the first to reduce immobilization periods for hip fracture patients from up to six months to as short as

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369. Dreyfuss, *supra* note 304, at 310.

370. 496 F.2d 45 (6th Cir. 1974).

one week, however, a finding of pioneer status and a more liberal claim construction may have been more appropriate.

Courts should also turn to more general policy concerns in determining pioneer status. Numerous federal statutes, ranging from the Clean Air Act<sup>371</sup> to the National Mobile Home Construction and Safety Standards Act of 1974,<sup>372</sup> provide a strong indication of current federal regulatory policies and purposes in the area of technology. The compatibility of a given technology with the goals of these statutes, as well as apposite federal regulations—such as the Consumer Product Safety Rules<sup>373</sup> or occupational health and safety standards—should be considered.<sup>374</sup> Stark incongruity with these sources of law appears unlikely to be of recurring significance in pioneer invention cases, however, given the unremarkable fact that a technology is unlikely to be considered a pioneer in any sense of the term if it cannot be legally marketed. More useful may be statements of congressional findings and policy, which can further inform the pioneer invention inquiry.<sup>375</sup>

Another factor for the courts to consider, whether Congress has enacted apposite regulatory legislation or not, is evidence regarding the health, safety, environmental, energy, economic and social influences of a particular invention. The historical examples considered by this Article illustrate more specific elements which might bear upon pioneer status: courts should consider the direction of a particular invention towards a life-saving or lethal purpose; its generation of pollutants or other undesirable byproducts; its consumption of fuels and dependence upon local or external energy sources; its effect upon employment; and its role in the displacement or maintenance of traditional production methods that embody cultural values. These factors would relate to the impact of a given invention upon United States society, which is the ultimate assessment a court should make when determining whether an invention deserves the reward of broad intellectual property protection.

An approach towards pioneer inventions that does not limit itself to strictly technical concerns may present difficulties in

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371. Clean Air Act Amendments of 1990, Pub. L. No. 101-549, 104 Stat. 2399 (codified at 42 U.S.C. §§ 7401-7642 (Supp. 1991)).

372. National Mobile Home Construction and Safety Standards Act of 1974, Pub. L. No. 93-383, 88 Stat. 700 (codified at 42 U.S.C. §§ 5401-5426 (1988)).

373. See 15 U.S.C. § 2058 (1988).

374. See 29 U.S.C. § 655 (1988).

375. E.g., Noise Control Act of 1972, Pub. L. No. 92-574, 86 Stat. 1234, § 2 (codified at 42 U.S.C. § 4901 (1988)).

comparison to the prevailing standard. Courts must be certain not to substitute mere commercial success for a more legitimate policy approach. The remarkable success of a particular invention may be due to elements such as extraordinary marketing efforts and technological fads,<sup>376</sup> which may falsely suggest that an undeserving invention is worthy of an award of broad patent protection.<sup>377</sup> Additionally, the limited patent term may, in some instances, present an inadequate period in which to assess the impact of an invention, despite the fast-moving pace of modern technology.<sup>378</sup> Finally, although laypersons often view new products as a single technological entity, they typically comprise numerous inventions in the sense of patent law. The video cassette recorder, for example, embodied advances in magnetics, materials and electronics, each subject to multiple patents.<sup>379</sup> Out of the many possible patent claims represented in a single product, selection of those eligible for a broad construction as pioneers may prove difficult.

The approach suggested by this Article would certainly cause a shuffling among inventions currently considered pioneers under patent law. When one looks beyond the mere technical cleverness of a particular artifact, many inventions currently considered marginal technical advances may be elevated to pioneer status, while current pioneers could be relegated to a less encompassing claim construction. Thus, inventions such as Kitselman's fence-making machine might well be considered pioneers.<sup>380</sup> Similarly, under this approach courts would be unlikely to make similar declarations regarding inventions such as the machine guns of Lindner or Browning.<sup>381</sup> None of this is to suggest, however, that "there is no new thing under the sun."<sup>382</sup> The view that pioneering inventors have crafted, and will continue to craft revolutionary advances should not be rejected. No doubt exists that some inventions are more important, and more worthy of reward, than others. The important point is that we should pay heed to broader policy concerns when deciding which inventions we should reward with generous technological protection.

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376. See BASALLA, *supra* note 8, at 176-85 (discussing atmospheric railways and nuclear propulsion vehicles).

377. Cf. Merges, *supra* note 4; Kitch, *supra* note 202, at 330-35.

378. Utility patents currently have a term of 20 years from the date of filing.

379. See generally JAMES LARDNER, *FAST FORWARD: HOLLYWOOD, THE JAPANESE AND THE ONSLAUGHT OF THE VCR* 54-60 (1987).

380. See *supra* notes 150-173 and accompanying text.

381. See *McClellan v. Bradley*, 282 F. 1011, 1022 (N.D. Ohio 1922).

382. *Ecclesiastes* 1:9.

This argument is not a novel one; as previously noted, it has existed in some form since the beginning of the United States patent system in the utility requirement. Indeed, the suggestion of this Article may be seen as little more than a robust interpretation of Justice Story's utility standard in the pioneer invention context—limiting broad protection to those inventions “which may be applied to a beneficial use in society, in contradistinction to an invention injurious to the morals, health, or good order of society . . . .”<sup>383</sup> Regrettably, the utility standard has become increasingly attenuated over the years,<sup>384</sup> and, at least according to some commentators, was abolished by the 1966 Supreme Court decision, *Brenner v. Manson*.<sup>385</sup>

But perhaps we should reconsider commentators' interpretations of the *Manson* decision, and the utility requirement as well. In *Manson*, an inventor appealed from the PTO's rejection of his application for its failure to disclose a specific, known usefulness for his invention. His application described a chemical process for producing steroids although it did not provide evidence of a specific use for those steroids, but rather only a hypothetical utility based upon structural similarity to another chemical compound. The Court upheld the PTO rejection, indicating that an invention must produce “specific benefit . . . in currently available form”<sup>386</sup> in order to be eligible for a patent. Writing for the Court, Justice Fortas was distinctly unimpressed with Justice Story's standard, indicating that:

Justice Story's language sheds little light on our subject. Narrowly read, it does no more than compel us to decide whether the invention in question is “frivolous and insignificant”—a query no easier of application than the one built into the statute. Read more broadly, so as to allow the patenting of any invention not positively harmful to society, it places such a special meaning on the word “useful” that we cannot accept it in the absence of evidence that Congress so intended. There are, after all, many things in this world which may not be considered “useful” but which, nevertheless, are totally without a capacity for harm.<sup>387</sup>

What was not before the Court, however, and is of at least equal importance, is that the patent system must also address inventions that are undoubtedly useful, but toward purposes society cannot

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383. *Note on the Patent Laws*, 3 *Wheat. App.* 13, 24 (cited in *Brenner v. Manson*, 383 U.S. 519, 533 (1966)).

384. *See supra* note 34 and accompanying text.

385. 383 U.S. 519 (1966). *See, e.g.*, Salim A. Hasan, *A Call for Reconsideration of the Strict Utility Standard in Chemical Patent Practice*, 9 *HIGH TECH. L.J.* 245, 251-257 (1994).

386. 383 U.S. at 534-35.

387. *Id.* at 533.

condone. The Court's belittling of Justice Story's standard should be taken within the context of the patentability of chemical processes, rather than within the context of broader concerns for social benefit.<sup>388</sup> Thus, although commentators commonly view the *Manson* decision as amplifying the utility requirement for patentability,<sup>389</sup> such an expansion could only be in a quite narrow sense. Justice Story's standard remains substantially unobserved, as no meaningful test of sound public or patent policy remains in the utility requirement.

The Court of Customs and Patent Appeals, predecessor court to the Federal Circuit, had occasion to consider, at least in passing, the possibility of a patent policy that steps beyond technical considerations in *In re Hartop*.<sup>390</sup> Here, the PTO rejected for want of utility an application claiming an anesthetic that included certain acidic compounds, stating that the inventor had not demonstrated that these compounds were safe for human use. The court overturned the PTO's rejection, indicating that existing anesthetics possessed potentially dangerous side effects and that safety, particularly in the medical arts, was a relative matter. Stating that it "anticipated" arguments regarding congressional purpose with respect to the patent statute, the court went on to provide in dicta that:

there is no question, but that the public must be protected absolutely against the advertising and sale and other distribution of harmful drugs, medicines, and the like in all situations, including this one if such be the case. We believe that Congress has recognized this problem and has clearly expressed its intent to give statutory authority and responsibility in this area to Federal agencies different than that given to the Patent Office. This is so because the standards established by statute for the advertisement, use, sale or distribution of drugs are quite different than the requirements under the Patent Act for the issuance of a patent. For example, the Federal Trade Commission has been given the responsibility of enforcing the Wheeler-Lea amendments to the Federal Trade Commission Act. Also, the Food and Drug Administration has been given the responsibility of enforcing the Food, Drug, and Cosmetic Act.<sup>391</sup>

This Article raises no objection to the narrow *Hartop* holding that therapeutics, even those with potentially deleterious side

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388. See also *In re Kirk*, 376 F.2d 936 (C.C.P.A. 1967); *In re Joly*, 376 F.2d 906, 908 (C.C.P.A. 1967) (claimed chemical compounds do not satisfy utility requirement where only use is as starting material or intermediate as part of a process of making other compounds, and the application does not specify a utility for the end result).

389. E.g., Hasan, *supra* note 385 at 258-260.

390. 311 F.2d 249 (C.C.P.A. 1962).

391. *Id.* at 257-58 (footnotes omitted).

effects, fulfill the utility requirement;<sup>392</sup> it is this dicta that it finds objectionable. The court failed to consider that the statutory utility requirement is sparsely drafted<sup>393</sup> and has, since its initial inclusion in the Patent Act of 1790, been driven from the PTO and the bench. A drafter of the current patent statute indicated that it merely followed existing law on this point.<sup>394</sup> Further, although the court cited apposite regulatory legislation, its holding essentially placed the patent statute at cross purposes with that legislation.<sup>395</sup> Greater effect to congressional purpose may have been given through taking advantage of the utility requirement, rather than avoiding the decision by deferring to the FDA. Nor did the court have an opportunity to consider what the impact of the utility requirement should be in areas where other legislation could not be said to control.

Contemplation of *Manson* and *Hartop*, two cases concerning the utility requirement, leads to the obvious possibility that we should reconsider utility as well. If the pioneer invention doctrine should embrace nontechnical concerns, then a reinvigoration of the utility requirement for patentability, and thus for all inventions, may also seem appropriate.<sup>396</sup> The reinstatement of this requirement leads to certain benefits, given the lengthy delays currently prevailing in patent prosecution. Notoriously overworked examiners must currently consider inventions clearly bereft of positive social worth, and even those which cannot be marketed due to law or regulation. Devotion of scarce examiner hours to such technologies presents a puzzling allocation of resources.

However, several important factors weighing against increases in prosecution efficiency indicate that maybe the current scope of the utility standard should not be expanded. The first factor is technological disclosure, one of the primary goals of a patent system.<sup>397</sup> The technical community is interested in learning about inventions even if their present use does not improve on existing technologies or would not comport with public policy. Later technical

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392. See also *In re Anthony*, 414 F.2d 1383, 1394-95 (C.C.P.A. 1969); *In re Krimeal*, 292 F.2d 948, 953-54 (C.C.P.A. 1961).

393. See 35 U.S.C. § 101 (1988) (stating only that a patentable invention must be "useful.").

394. P.J. Federico, *Commentary on the New Patent Act*, 75 J. PAT. & TRADEMARK OFFICE SOC'Y 161, 176 (1993) (reprint) (noting that current statute follows the phrasing of the previous legislation).

395. 311 F.2d at 258.

396. See *supra* notes 180-186 and accompanying text.

397. See *supra* notes 16-17 and accompanying text.

developments or changes in social mores may make an invention far more useful, rendering it environmentally sound or allowing society to accept or neutralize its harmful side effects. Further, inventions with no currently known end uses could serve as a bridge to later, more socially beneficial technological developments.<sup>398</sup> In contrast, concerns over disclosure do not play an independent role in the pioneer invention inquiry. As an inventor has already obtained a patent and is attempting to enforce it, the scope of protection of the claims becomes the primary concern.

A second factor is that an enhanced utility requirement might present considerable difficulties for patent applicants in relation to a purely technological patentability standard. Forecasting is as difficult with respect to technology as it is in other fields, and a requirement that patent applicants explain the possible impact of their inventions may simply present an impossibility. Consider the example of Thomas Edison, who thought his newly invented phonograph would best serve as a dictation machine. He paid far less heed to its use as a medium for music and initially resisted this use as demeaning to the technology.<sup>399</sup> Again, however, arguments about forecasting carry less weight with respect to whether a court should designate a particular invention as a pioneer. By the time infringement litigation has commenced, the ability of patent owners to consider the nontechnological consequences of their inventions should be greatly enhanced.

Other concerns counsel against a broadly focused utility standard. For example, an assessment of an invention's societal impact draws far more from the social sciences than the technological arts in which the corps of PTO examiners received its training. The competence of an examiner to complete this inquiry during an *ex parte* patent prosecution therefore remains questionable. Extensive safety and performance testing requirements, which are today more typical of regulatory agencies than the PTO, would also be a time-consuming burden during prosecution. Additionally, in the absence of international agreement placing the utility requirement within a nontechnological domain, any lone jurisdiction adopting this approach

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398. See *Manson v. Brenner*, 383 U.S. 519, 539 (1966) (Harlan, J., concurring in part and dissenting in part).

399. BASALLA, *supra* note 8, at 139-40.

would impose a particular liability to its domestic applicants in the current era of global patent harmonization.<sup>400</sup>

As even this brief review reveals, whether the utility requirement should also reflect broad social concerns raises thorny issues, implicating both the procedural limits of prosecution and the fundamental purposes of the patent system. Judicial experience with a similarly focused pioneer invention standard would be the best testing ground of the merits of a more broadly oriented patentability determination. If the historical analysis and critical thinking this Article has reviewed endure in this setting, experience should show that the law will enrich our understanding of technology by accepting it within its broadest human context, rather than merely within a narrowly focused celebration of technical skill.

A consideration of the pioneer invention doctrine suggests that the patent law has lost its way in a fundamental sense. The pioneer invention doctrine's moorings are unsteady: if its central premises of technological neutrality and inevitability are upset, then the focus of the patent law's reward structure seems significantly misaligned.

Few would doubt we live in an age uniquely marked by its technology. Nor does much debate persist over the role of patent law as one of the shapers of our nation's central technology policies. Indeed, the patent system is likely the technological program most accessible to each citizen, a remarkable trait in a society where crucial technological decisions are often claimed to fall to a ruling technocratic elite.<sup>401</sup> Astonishingly, however, all meaningful dialogue about the value of technology on a level beyond the technical has been stripped from patent law.

An alternative vision of the patent system suggests a radical new role for the PTO, the courts, or the Congress. Patent law could, and perhaps should, serve as a clear vehicle for technological policy making. We would be wise to question patent grants for inventions such as handguns, machines for processing chewing tobacco, and ozone-

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400. Article 4quater of the Paris Convention for the Protection of Industrial Property imposes one potential difficulty. It requires that:

The grant of a patent shall not be refused and a patent shall not be invalidated on the ground that the sale of the patented product or of a product obtained by means of a patented process is subject to restrictions or limitations resulting from the domestic law.

Paris Convention for the Protection of Industrial Property, March 20, 1883, as revised on July 14, 1967. For general information on patent harmonization, see HAROLD C. WEGNER, PATENT HARMONIZATION (1993).

401. See FLORMAN, *supra* note 203, at 50-52 (noting such claims).

depleting spray canisters. At the least, courts should consider the social impact of patented technologies when they decide to elevate those technologies to pioneer status. Courts should also more broadly weigh the extraordinary problems of technological description underlying any written summary of an invention when reaching patent infringement decisions.

Hopefully, this Article has struck the reader as something more than a romantic reaction to the current literature on the pioneer invention problem, draped as these analyses are in the quantitative language of economics.<sup>402</sup> This Article has purposefully avoided an economic orientation, however, out of a belief that economic theories are particularly unsuited to determining how we should form our world.<sup>403</sup> It has instead argued that the patent law should appreciate and reflect its own role in the shaping of society by technology. Considerations of technology as a philosophical concern can assist in this process of technological evaluation, which ought to be central to our patent system, with the potential to invigorate patent law scholarship and perhaps the regime of patents itself.

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402. See *supra* notes 11-13 and accompanying text.

403. See Priest, *supra* note 14, at 24 ("Personally, I believe there is little hope that economic analysis can resolve the question of the appropriate scope of the protection of intellectual property. . . . [T]he influence of the economist on the law of intellectual property will always be limited. The lawyer must look to other sources for guidance.").

