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## Technical Speech: Patents, Expert Knowledge, and the First Amendment

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# Technical Speech: Patents, Expert Knowledge, and the First Amendment

**Dr. Feroz Ali\***

*Patent law, in its simplest abstraction, is the study of what inventors say. History notes the documentation of the inventor's speech as a revolutionary departure in the representation of inventions that focused on material embodiments like working models. The patent specification textualized the invention, paving the path for the development of the modern patent system that concerned itself chiefly with the ways in which these documents were drafted, registered, and interpreted. Patent specifications articulated and codified the technical speech of inventors who were usually experts in their fields. The United States Patent and Trademark Office (Patent Office or PTO) performed the task of verifying such speech by checking the validity of the patent for its novelty and adequacy of disclosure. By doing so, it acquired the new function of certifying expert knowledge. The First Amendment, through the value of democratic competence, preserves the disciplinary practices that create and certify expert knowledge. It protects the peer-review of expert knowledge from the intervention of the state. Peer-review of patents is critical, especially when the state performs the role of certifying such knowledge through the Patent Office. The absence of ex ante peer-review in the patent system undermines the process of certifying expert knowledge. The value of democratic competence is potentially at risk when the state compromises the transmission of expert knowledge.*

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## INTRODUCTION

Of all constitutional values, the value of freedom of speech and expression enshrined in the First Amendment<sup>1</sup> represents an extraordinary system that champions the cause of liberal democracy for the world.<sup>2</sup> As the “guardian of our democracy,” the First Amendment protects the free exchange of ideas for the formation of public opinion.<sup>3</sup> While the First Amendment offers protection for free speech by letting everyone express their opinion, it also, counterintuitively, forms the foundation for the specialized disciplines that strictly regulate the freedom to express for the creation of expert knowledge.<sup>4</sup>

Another constitutional value, the one promoting the progress of useful arts enshrined in the “Progress Clause” of the Constitution, lays the foundation for the patent system.<sup>5</sup> It is believed that the power to grant patents “made the American people the first in the world for the number and ingenuity of the inventions . . . .”<sup>6</sup> As the world’s first modern patent institution, the system was designed to stimulate public participation and to promote invention and diffusion of technological information.<sup>7</sup> By granting patents, the patent system performs the function of disclosure and certification of

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1. U.S. CONST. amend. I.

2. *See, e.g.*, LEE C. BOLLINGER, UNINHIBITED, ROBUST, AND WIDE-OPEN: A FREE PRESS FOR A NEW CENTURY 162–63 (2010) (making a case for projecting the First Amendment based American free press system onto the world for creating a free press for the global society).

3. *See* *Brown v. Hartlage*, 456 U.S. 45, 60 (1982).

4. *See infra* Part IV.A.3.

5. U.S. CONST. art. I, § 8, cl. 8. *Cf.* LAWRENCE LESSIG, FREE CULTURE: HOW BIG MEDIA USES TECHNOLOGY AND THE LAW TO LOCK DOWN CULTURE AND CONTROL CREATIVITY 131 (2004) (arguing that the “Progress Clause,” with the clear intention to promote progress rather than benefiting publishers or rewarding authors, is the source of the congressional power to establish “creative property” rights).

6. HENRY SUMNER MAINE, POPULAR GOVERNMENT: FOUR ESSAYS 247 (3d ed. 1886).

7. This was achieved by “reserving patent rights for the true and first inventor in the world,” providing an “efficient centralized processing and examination of applications,” affording a low fee structure that the public could afford, and including “countervailing checks and balances in the legal system.” B. ZORINA KHAN, THE DEMOCRATIZATION OF INVENTION: PATENTS AND COPYRIGHTS IN AMERICAN ECONOMIC DEVELOPMENT 1790–1920, at 29 (2005).

expert knowledge developed in various scientific and technical disciplines.<sup>8</sup>

Both of these values promote the creation and certification of expert knowledge and support the idea of democracy as the engine of social and economic progress.<sup>9</sup> Despite their overlapping fields of operation, not much analysis has proceeded on how the two values interact with each other. How does the constitutional value that protects the *creation* of expert knowledge affect the value that controls the *certification* of such knowledge? What does the value that isolates the creation of knowledge from a state's interference offer for the process of certification of knowledge under the state's control? In short, what is the effect of the First Amendment on patents?

Studying the effect of First Amendment doctrine on patents offers fresh insights in shaping the patent reform process. Though scholars focus on the lack of effective third party intervention in the patent prosecution process,<sup>10</sup> and also advocate for the inclusion of a peer-review mechanism for patents in response to their denigrating quality,<sup>11</sup> the effect of the constitutional value enshrined in the First Amendment on the constitutional value of promoting the progress of useful arts remains unexplored. Most intellectual property (IP) law scholars who study the impact of the First Amendment on copyright do not extend its application to patents.<sup>12</sup> Those who do tend to conclude that the doctrine only has minimal impact on patents.<sup>13</sup> IP law scholarship on patent law largely ignores

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8. See *infra* Part IV.C.2. (declaring that the U.S. in 1885 was leading the world in innovation due to the patent system, and that this system has influenced the course of economic development and technological change).

9. *Id.*

10. See, e.g., Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U.L. REV. 1495, 1522 (2000).

11. See, e.g., Beth Simone Noveck, "Peer to Patent": *Collective Intelligence, Open Review, and Patent Reform*, 20 HARV. J.L. & TECH. 123, 138–55 (2006) (advocating for the inclusion of a non-traditional open review system).

12. See, e.g., Dan L. Burk, *Software as Speech*, 8 SETON HALL CONST. L.J. 683, 691 (1998) (explaining that "patent law... is not designed to accommodate First Amendment interests.").

13. See, e.g., DAVID L. LANGE & H. JEFFERSON POWELL, NO LAW: INTELLECTUAL PROPERTY IN THE IMAGE OF AN ABSOLUTE FIRST AMENDMENT 179 (2009) (arguing that, once the right of appropriation under the First Amendment is extended to not only personal use but competitive or commercial use, although some patents might be affected to the extent that

the diversity offered by First Amendment scholarship, especially with regard to exploring the role of the doctrine in the creation of expert knowledge. Patents are not generally regarded as embodiments of expert knowledge, though there have been efforts to explore the value of patent disclosure and its role in the dissemination of new knowledge.<sup>14</sup>

A traditional approach of analyzing patents in the light of the First Amendment may not yield much, as it would necessarily involve extending First Amendment protection to patents.<sup>15</sup> This paper acknowledges this limitation. Rather than focusing on extending First Amendment *protection* for patents, this paper argues that, to the extent that the Patent Office performs the function of certifying expert knowledge, such processes should be the subject of First Amendment *coverage*.<sup>16</sup>

This paper revolves around the central idea that the disciplinary processes that generate expert knowledge should also inform the processes by which such knowledge is certified. The First Amendment preserves the disciplinary practices that create and certify expert knowledge.<sup>17</sup> This is done through the value of democratic competence, which protects, among other things, the peer-review process from the intervention of the state.<sup>18</sup> Peer-review should also be a central value in the certification of expert knowledge, especially when the state performs the role of certifying such knowledge through the patent system.<sup>19</sup> The value of democratic competence that is integral for the growth of modern democracies is potentially at risk if the state compromises the transmission of knowledge.<sup>20</sup> The absence of peer-review of patents undermines the process

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subject matters touched upon speech or press interests, many other patentable subject matters would not).

14. See, e.g., Jeanne C. Fromer, *Patent Disclosure*, 94 IOWA L. REV. 539, 541 (2009).

15. See *infra* Part IV.A.2.

16. See *infra* Part IV.A.2.

17. See *infra* Part IV.B.

18. See ROBERT C. POST, *DEMOCRACY, EXPERTISE, AND ACADEMIC FREEDOM: A FIRST AMENDMENT JURISPRUDENCE FOR THE MODERN STATE* 33–34 (2012).

19. See *infra* Part IV.D.

20. POST, *supra* note 18.

of certifying expert knowledge, exacerbating much of what ails the patent system today.<sup>21</sup>

This paper begins by tracing the evolution of patent specification as the speech of the inventor.<sup>22</sup> In its simplest abstraction, patent law can be defined as the study of what inventors say. History notes the documentation of the speech of the inventor as a revolutionary departure in patent law, which focused on the material embodiment of the invention, often represented by way of working models.<sup>23</sup> For a variety of reasons, the speech of the inventor that described the invention in words replaced the action of the inventor that created the invention.<sup>24</sup> The patent specification textualized the invention, paving the path for the development of the modern patent system that concerned itself chiefly with the ways in which these documents were drafted, registered, and interpreted.

Patent specification evolved differently in the United Kingdom and the United States—two jurisdictions that share a common past.<sup>25</sup> These differences pose difficulties in simultaneously analyzing their development within a common time frame.<sup>26</sup> Instead, the development of the patent specification is studied by generally focusing on the

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21. See discussion *infra* Part III.B.3, II.C.

22. See *infra* Part I.C.

23. In the United States, the Patent Act of 1836 required the inventor to submit a model of his invention in cases that allow for such representation to bring out its advantages. See, e.g., GERARD DOORMAN, PATENTS FOR INVENTIONS IN THE NETHERLANDS DURING THE 16TH, 17TH AND 18TH CENTURIES 26 (Joh Meijer trans., The Patent Board 1942); Kendall J. Dood, *Patent Models and the Patent Law: 1790–1880 (Part I)*, 65 J. PAT. OFF. SOC'Y 187, 188 (1983) (describing the patent model requirement as “a uniquely American phenomenon”). However, in Europe the law required compulsory exploitation of the patented invention within the stipulated time after the grant.

24. See generally Dood, *supra* note 23, at 200–08 (discussing the development of the model requirement from 1793 to 1836).

25. KHAN, *supra* note 7, at 30–39, 49–65 (discussing the development of the English and American patent systems, respectively). See generally CHRISTINE MACLEOD, INVENTING THE INDUSTRIAL REVOLUTION: THE ENGLISH PATENT SYSTEM, 1660–1800, at 40–57 (1988) (discussing the development of the British patent system).

26. Historians in the United States and the United Kingdom have studied the history of patent law by classifying them into various periods. See, e.g., KHAN, *supra* note 7, at 49–65 (studying the role of patents in the American economic development from 1790 to 1920); MACLEOD, *supra* note 25, at 10–57 (studying the development of British patent system during the industrial revolution from 1550–1660 to 1660–1800).

transformation of the registration-centric patent system into the examination-centric patent system, and concurrently analyzing the change in the representation of the invention from the material embodiment in models to the textual description in paper.<sup>27</sup> Interestingly, these transitions were distinguished by the state of advancement of the patent specification—the registration system focusing on minimal requirements while the examination system requiring full and complete disclosure by the patent specifications.<sup>28</sup> To capture the history spread across different time periods, the narrative shifts between developments in the United States and the United Kingdom, tracing the evolution of the patent specification to its modern form.

Patent specifications perform the task of articulating and codifying technical speech.<sup>29</sup> As embodiments of technical knowledge, they communicate the ideas covered by the invention while complying with the disclosure requirements of the patent system.<sup>30</sup> Patents disclose scientific and legal information.<sup>31</sup> The varying complexity of the subject matter, the entanglements of dual knowledge, and the multiple audiences that patents address ensure that patent specifications are created by a professional class of speechwriters: patent attorneys and patent agents skilled in the art of preparing and prosecuting patent specifications.<sup>32</sup> On its part, the Patent Office evaluates the technical speech by checking its validity.<sup>33</sup> The process of patent prosecution certifies the statement made by the inventor, and, as the patent system requires adequate disclosure of knowledge that

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27. See generally BRAD SHERMAN & LIONEL BENTLY, *THE MAKING OF MODERN INTELLECTUAL PROPERTY LAW: THE BRITISH EXPERIENCE, 1760–1911*, at 180–193 (1999) (ebook) (discussing transformations in intellectual property registration systems).

28. *Id.* at 180–82 (noting that the reduction of intellectual property to a paper inscription helped to overcome the difficulties of space and distance, i.e., those created by the size of buildings occupied by the Registry and those generated by the centralization of the Registers).

29. See *infra* Part II.

30. See 35 U.S.C. § 112 (2012).

31. SHERMAN & BENTLY, *supra* note 27, at 109, 139 n.45.

32. *Id.*

33. See *infra* Part III.



is novel and useful, the Patent Office performs the new function of certifying expert knowledge.<sup>34</sup>

First Amendment analysis of technical speech offers new insights into the constitutional status of patents.<sup>35</sup> First Amendment theory, by simultaneously promoting the constitutional values of democratic legitimacy and democratic competence, allows for the protection of free speech and the creation of expert knowledge in contrasting ways.<sup>36</sup> The value of democratic competence protects the disciplines involved in the creation and certification of expert knowledge. Viewing patents as certificates of expert knowledge raises First Amendment issues on the validation of such knowledge. Thus, from a First Amendment perspective, *ex ante* peer-review, which is critical for the creation of expert knowledge, may become a necessary condition for its validation.<sup>37</sup>

From this brief introduction, the paper unfolds as follows: Section I charts the evolution in the representation of the invention, first through its material embodiment as working models and later through the textual embodiment as patent specification capturing the speech of the inventor, and simultaneously analyzes the development of patent scrutiny under the representative registration system and the examination system. Section II presents patents as technical speech and describes the manner in which such speech is articulated and codified. It looks at the duality of the inventor's speech in simultaneously covering matters that are scientific and legal, and how the complexity of the instrument and the expertise it covered gave rise to a professional group of speechwriters. Section III describes the process by which the Patent Office validates technical speech and identifies the new function it acquired of certifying expert knowledge. Section IV analyzes the First Amendment implications of considering patents as technical speech and makes a case for *ex ante* validation of patents. Section V summarizes the conclusions.

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34. *See infra* Part IV.C.2.

35. *See infra* Part IV.A.

36. *See infra* Part IV.A.3.

37. *See infra* Part IV.D.

## I. PUTTING ACTION INTO WORDS

Patents grant property rights in creative labor.<sup>38</sup> As the intangible nature of the creative labor posed problems of identification, patent specifications developed as tools for demarcating its limits.<sup>39</sup> Patent specifications underwent substantial changes in their development from a minimalistic form under the registration system, to their full-fledged modern day incarnation mandated by the examination system.<sup>40</sup>

### A. THINGS SPEAK FOR THEMSELVES

The history of patent law makes little mention of the inventor.<sup>41</sup> During most of its initial years of development, patent law placed greater emphasis on the material invention, thereby sidelining the inventor.<sup>42</sup> Initially, while seeking a patent, the Patent Office required the inventor to submit a working model of the invention as material proof of invention.<sup>43</sup> Any need for further interpretation was not required, as a model served as the most reliable evidence of the invention.<sup>44</sup> In this way, what the inventor *said* was less relevant than what the inventor *did*. The significance accorded to the inventor changed with the emergence of the patent specification, bringing forth to prominence the speech of the inventor.<sup>45</sup>

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38. See SHERMAN & BENTLY, *supra* note 27, at 44.

39. See generally ALAIN POTTAGE & BRAD SHERMAN, FIGURES OF INVENTION: A HISTORY OF MODERN PATENT LAW 1–18 (2010) (discussing the interplay between intangibility, inventive ideas, and mechanical jurisprudence).

40. See *id.*

41. See generally *supra* text accompanying notes 23–24 (describing how the patent system began as a relatively model-centric regime, as opposed to an inventor-speech focused system). For the sake of simplicity and coherence, and in keeping with the scope of this paper, the term “inventor” is used alternatively with the more precise terms “patentee” and “applicant.”

42. Cf. Dood, *supra* note 23, at 188 (discussing the former legal tradition of requiring inventors to submit physical models of their inventions, thereby implying a focus on the physical invention).

43. Dood, *Patent Models and the Patent Law: 1790–1880 (Part II - Conclusion)*, 65 J. PAT. OFF. SOC’Y 234, 243 (1983).

44. POTTAGE & SHERMAN, *supra* note 39, at 107.

45. The term “patent specification” is used to refer to the document embodying the entire invention including the claims. In the United Kingdom the term was used to signify the description contained in the specification and

During the medieval era, the period generally associated with the origin of patents, the focus of patent grants was primarily on the actions of the individuals.<sup>46</sup> In Britain, patents evolved from Royal privileges granted to promote actions aimed at “instructing the English in a new industry.”<sup>47</sup> The early grants promoted manufacture, thus encouraging makers of textile, clocks, silk, and salt to immigrate to Britain.<sup>48</sup> The focus on making things came with some restrictions on how the products were made: the grants came with the threat of forfeiture of privilege on proof of defective manufacture or on failure to practice the grant within the stipulated time.<sup>49</sup> That the grants were aimed at teaching the locals can be noticed from the “training clauses” in some of the early licenses granted to foreigners with stipulations that “at the least two of the servants of the patentees shall be of native birth” or that the grant “insists on the employment and instruction of one English apprentice to every foreigner employed.”<sup>50</sup> The reduction of the invention to writing was yet to appear on the scene though there were instances where the “secrets of manufacture” had to be reduced in writing before claiming the promised reward.<sup>51</sup>

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the “separate part of the specification primarily designed for delimitation . . . call[ed] the claim.” *AssiDoman Multipack Ltd. v. Mead Corp.* (1995) 112 RPC 321, 328–29 (citing *British United Shoe Machinery Co. Ltd. v. A. Fussell & Sons Ltd.* (1908) 25 RPC 631, 650). In the United States, “specification” when used alone refers to the part preceding the claims. 35 U.S.C. § 112 (2012).

46. See generally Wyndham Hulme, *History of the Patent System Under the Prerogative and at Common Law*, 12 L.Q. REV. 141, 141–46 (1896) (discussing the beginnings of protection for inventions to have occurred in the Middle Ages).

47. *Id.* at 142.

48. *Id.* at 143–44.

49. *Id.* at 145–46. In 1565, a special mining license granted to German miners by the Queen of Britain was challenged by the Earl of Northumberland on the ground that work was within the Royalties granted to his family in the earlier reign. The Earl lost the case on the ground of neglect of the Earl’s family to work the mines for seventy years. *Id.* at 147.

50. *Id.* at 145, 147–48.

51. *Id.* at 145 (noting an early license granted by the Crown for the manufacture of saltpeter in United Kingdom requiring the “secrets of manufacture” to be reduced in writing before the promised reward of £300 was paid).

### 1. Representative Registration

The primary goal of the early patent system was to introduce new industries and manufacturing techniques from abroad.<sup>52</sup> The patent-like privileges, initially aimed at attracting foreign talent, evolved to reward creative labor such as the actions of inventors.<sup>53</sup> The right of the first inventor evolved from the right of the first importer of the invention.<sup>54</sup> In Britain, until the late eighteenth century, patents for inventions remained a minority of all letters patent granted.<sup>55</sup> This period provided for registration of patents, usually a simple clerical act, without any examination.<sup>56</sup> The minimal scrutiny of applications allowed them to be shrouded in secrecy.<sup>57</sup> Patent specifications in their early incarnation did not perform any role in the dissemination of information as they were intended to shield competitors from acquiring British technology.<sup>58</sup> The obligation to file the patent specification came about in the early eighteenth century, requiring the inventor to make a detailed description of the invention within two to four months of the grant of the patent.<sup>59</sup>

In Britain, the requirement of filing a patent specification as a more detailed description of the invention was used exceptionally.<sup>60</sup> The call for accurate and full disclosure of the invention came with the decision in *Liardet v. Johnson*, which required the patent specification to be sufficiently full and detailed to enable anyone skilled in the art to understand and

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52. MACLEOD, *supra* note 25, at 11–13.

53. *Id.* at 40 (“[P]atents ceased to be the perquisite of courtiers, office-holders and immigrant tradesmen. They began to assume a more distinct and recognizable form as instruments of protection and competition among native inventors and entrepreneurs and, increasingly, if hesitantly, to leave London for the provinces.”).

54. *Id.* at 13.

55. *Id.* at 2.

56. *See id.* at 41; John N. Adams & Gwen Averley, *The Patent Specification: The Role of Liardet v. Johnson*, 7 J. LEGAL HIST. 156, 159–60 (1986).

57. *See* MACLEOD, *supra* note 25, at 42 (“By the ‘non-obstante’ provision in royal grants the patentee was absolved from making public the exact nature of his invention. Specification, introduced in the early eighteenth century, still allowed the grant to be sealed before any details need be revealed.”).

58. KHAN, *supra* note 7, at 59; MACLEOD, *supra* note 25, at 51.

59. MACLEOD, *supra* note 25, at 41.

60. *Id.* at 48–49.

apply the invention without further experimentation.<sup>61</sup> For the first time the disclosure made in the patent was recognized as a *quid pro quo* for the grant of the patent.<sup>62</sup> The call for representative disclosure by technical drawings and description came at a time when textbooks were rare and the primary mode of disseminating technical information was by personal demonstration.<sup>63</sup> Under the registration system, the minimal patent specifications evolved as a means to shift the responsibility from the law officers who granted them to the courts as they established the terms of the dispute in infringement proceedings.<sup>64</sup> The British also developed the practice of insuring the public “against a damaging patent being passed without their knowledge” by allowing anyone to enter a caveat with the law officers.<sup>65</sup>

Though the British patents system is considered the predecessor of the United States patent system,<sup>66</sup> the law developed differently here.<sup>67</sup> The recognition of property rights in creative labor in the United States began with inclusion of the IP clause in the Constitution.<sup>68</sup> The system, in its early days, encouraged the introduction of new and useful inventions from abroad as well as their development at home.<sup>69</sup> Patents were initially granted without any examination into the technical merits of the invention.<sup>70</sup> In contrast with the culture

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61. *Liardet v. Johnson* (1778) 1 WPC 53, 53–54 (KB).

62. MACLEOD, *supra* note 25, at 49.

63. *Id.*

64. *Id.* at 51.

65. *Id.* at 43–44 (noting one seventeenth century case where a caveat was obtained instead of a patent to protect an invention as a cheaper, albeit less secure, device).

66. EDITH TILTON PENROSE, *THE ECONOMICS OF THE INTERNATIONAL PATENT SYSTEM* 7 (1951) (describing the Statute of Monopolies in Britain as the “direct ancestor” of the United States patent law).

67. The differences were not nominal, but significant, which had an impact on the course of technological change and industrialization. See KHAN, *supra* note 7.

68. *Id.* at 49 (“Policy makers recognized the importance of the ‘fuel of interest,’ and acknowledged that inventive efforts were significantly influenced by security of property rights and by the prospects for material gain.”). For clarity, the “IP clause” is in reference to the United States Constitution. See U.S. CONST. art. I, § 8, cl. 8.

69. BRUCE WILLIS BUGBEE, *GENESIS OF AMERICAN PATENT AND COPYRIGHT LAW* 137 (1967).

70. See B. Zorina Khan & Kenneth L. Sokoloff, *Patent Institutions, Industrial Organization and Early Technological Change: Britain and the*

of secrecy in Britain, the United States made efforts to make copies of the patent specification and models of the invention available to the public at an affordable cost.<sup>71</sup> This was in tune with the objective of the Patent Act of 1790, which required inventors to submit a specification fully disclosing the invention in writing.<sup>72</sup> The patent system in the United States differed from the British system, not only in its lower fees and costs, but also in the rationalization of patent administration.<sup>73</sup> Prosecution of the patent application in the United States, compared to Britain, was “straightforward, and involved impersonal, routine administrative procedures.”<sup>74</sup> Though the examination of novelty was initially done by the Board of Examiners under the Patent Act of 1790, this practice was soon dropped as the Board could not cope with the workload and the law provided for the filing of patent specification only where required.<sup>75</sup>

The reduced significance of the patent specification bolstered the function of working models of inventions. The Patent Act of 1836<sup>76</sup> required the submission of models, as they were seen as more authentic embodiments of the invention than written description or drawings.<sup>77</sup> Models performed the function of disclosing the invention. The requirement that the textual description had to enable anyone skilled in the art to make or use the invention made no sense for models as they were the inventions themselves.<sup>78</sup> The Patent Office and the inventors accepted models as indisputable proof of prior invention.<sup>79</sup>

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*United States, 1790–1850, in* TECHNOLOGICAL REVOLUTIONS IN EUROPE: HISTORICAL PERSPECTIVES 292, 296 (Maxine Berg & Kristine Bruland eds., 1998).

71. KHAN, *supra* note 7, at 59.

72. POTTAGE & SHERMAN, *supra* note 39, at 54–55 (noting that the role of the patent specification as a means of public disclosure remained theoretical for many decades since 1790).

73. Khan & Sokoloff, *supra* note 70, at 295–96.

74. *Id.* at 296.

75. Adams & Averley, *supra* note 56, at 159.

76. Patent Act of 1836, ch. 357, 5 Stat. 117–25 (1836).

77. *Cf.* Dood, *supra* note 23, at 210 (noting that written description and the drawings, which existed as parallel requirements along with the submission of models, had to convey more information than in the models).

78. *Id.* at 211.

79. *Id.*

Both in the United States and in Britain, the eighteenth century witnessed the recognition of the individual creator as the source of the creation.<sup>80</sup> There was no recognition of intellectual property as a branch of law though there was agreement that the law recognized and granted property rights in mental labor.<sup>81</sup> The grant of patents was focused on rewarding creative labor embodied in the subject matter of manufacture.<sup>82</sup> The courts too recognized the importance of securing property rights in inventions and were concerned about the enforcement of patents as “some of the dearest and most valuable” of property rights.<sup>83</sup>

While early forms of protection were concerned with the creative labor that was embodied in the product, as the law developed, the focus shifted from the creative labor embodied in the product to the object on its own right.<sup>84</sup> This transformation was brought about by the system of representative registration for patents which insisted on submitting representations of the invention rather than the invention itself.<sup>85</sup>

## B. THE TEXTUALIZATION OF INVENTION

It was in the latter half of the nineteenth century that patent law acquired its modern form.<sup>86</sup> During this period, the focus on the material embodiment (the creative labor embodied in the manufactured product or process) shifted to the textual embodiment (the description of the creative labor in writing).<sup>87</sup> The move toward registration led to greater importance being accorded to paper description created by the system and the subsequent sidelining of the mental labor that produced the artifact.<sup>88</sup> The idea of constituting the inventive idea in writing, in the form of the patent specification, was achieved through the emerging patent regimes.<sup>89</sup> The nature of intellectual property was radically changed by representative registration,

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80. SHERMAN & BENTLY, *supra* note 27, at 35.

81. *Id.* at 3.

82. *See id.* at 44.

83. *See Ex parte Wood & Burndage*, 22 U.S. 603, 608 (1824).

84. SHERMAN & BENTLY, *supra* note 27, at 173.

85. *Id.* at 181–82.

86. *Id.* at 181.

87. *Id.* at 181–82.

88. *Id.*

89. POTTAGE & SHERMAN, *supra* note 39, at 46.

as it allowed patentees to secure exclusive rights by the demonstration of the invention in writing, thereby providing a stable reference point to ascertain the identity of the intangible.<sup>90</sup> With the emergence of the registration system, the speech of the inventor assumed the central role, creating a practice that focused exclusively on the ways in which the inventor's speech was "drafted, registered, and interpreted."<sup>91</sup>

One of the advantages of the registration system was that it permitted intangible property to be enclosed in a stable and indefinitely repeatable format.<sup>92</sup> This helped ascertain the identity of the intangible by providing a stable reference point.<sup>93</sup> As the patent specification described the limits of the intangible, the need to ascertain the essence of the intangible property or to check the degree of creativity involved was eliminated.<sup>94</sup> By entrusting the administrative agencies with the task of identification, the problems in identifying the owner and the scope of the invention were solved.<sup>95</sup>

Initially, the process of patent administration was "convoluted, expensive and uncertain."<sup>96</sup> The fortification of the registration system took place due to the political developments of the time. It was feared that the "great patent controversy of the Nineteenth century" would result in the abolition of the patent system in parts of Europe.<sup>97</sup> However, this was not to be. On the contrary, it led to the reformation of the patent system in a manner that sought to "prevent abuses of the monopoly grant."<sup>98</sup>

The Patent Law Amendment Act of 1852 in Britain introduced substantial changes to patent law.<sup>99</sup> This began a

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90. SHERMAN & BENTLY, *supra* note 27, at 182 and accompanying text.

91. *Id.* at 186.

92. *Id.* at 181.

93. *Id.* at 186.

94. *Id.* at 181–82. But the issue of creativity does appear in inventorship cases involving joint inventors, raising difficult situations for the judges which led one of them to call it "one of the muddiest concepts in the muddy metaphysics of patent law." *Mueller Brass Co. v. Reading Indus., Inc.*, 352 F. Supp. 1357, 1372 (E.D. Pa. 1972).

95. SHERMAN & BENTLY, *supra* note 27, at 186.

96. *Id.* at 82.

97. Fritz Machlup, *Foreword* to EDITH TILTON PENROSE, *THE ECONOMICS OF THE INTERNATIONAL PATENT SYSTEM*, at vii (1951).

98. *Id.*

99. SHERMAN & BENTLY, *supra* note 27, at 130.



reformation of the patent system.<sup>100</sup> However, there were some problems with the registration system despite the changes. The examination of patents was ineffective; no form was stipulated as to the drafting of the patent application, and therefore, the nature of the patent specification was uncertain.<sup>101</sup> This led to the development of patent agents as a class of professionals, and this affected the manner in which people came to trust and rely on the description of the invention on paper.<sup>102</sup> The complexity of the British system augmented the role of agents who specialized in activities that reduced transaction costs for inventors.<sup>103</sup> Around the 1790s, the commercial publication of specification occurred,<sup>104</sup> but the Patent Office did not publish the specification of patents until 1852.<sup>105</sup> Though trade journals published a list of inventions, they did so in a belated and incomplete manner.<sup>106</sup> This led to further proliferation of patent agents in the British system who gained from the inability of the inventors to obtain copies of granted patents and see those descriptions.<sup>107</sup>

Textualizing the invention, however, created a gap between the patent specification and the intangible property—a gap between the form and the essence—which was unlikely to occur in other forms of IP, such as ornamental designs, where the form matched the essence.<sup>108</sup> The problems that accompanied the complexity of the patent, such as intangible property being hard to identify from its textual representation, led to the dependence on other methods of identification recognized by the registration system.<sup>109</sup> Although models were perceived as authentic prototypes of inventions, they diminished in evidentiary value toward the end of the nineteenth century when they were seen as compromising the ambiguity of the textual representation of the invention in the

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100. *Id.*

101. *Id.* at 130.

102. *Id.* at 133.

103. KHAN, *supra* note 7, at 58.

104. MACLEOD, *supra* note 25, at 50.

105. Khan & Sokoloff, *supra* note 70, at 312 n.28.

106. *Id.*

107. *Id.* at 300.

108. SHERMAN & BENTLY, *supra* note 27, at 187.

109. *Id.* at 153.

patent specification.<sup>110</sup> When text and drawings replaced the function of models, the Patent Office recommenced substantive examination of patent applications as “the patent texts began to reach the courts as records of an administrative judgment as to novelty or adequacy of disclosure.”<sup>111</sup>

### 1. Substantive Examination

In the United States, patent applications were examined initially for novelty and contribution to knowledge.<sup>112</sup> The system of examining patents, done by an illustrious board comprised of Secretary of State Thomas Jefferson, Secretary of War Henry Knox, and Attorney General Edmund Randolph was abandoned and replaced by a registration system.<sup>113</sup> Due to concerns about conflicting rights, the examination system was reintroduced by the Patent Act of 1836, which called for the scrutiny of a new application by skilled and specialized examiners.<sup>114</sup> This led to the constitution of a committee under Senator John Ruggles to conduct an inquiry into the patent system.<sup>115</sup> The examination system that exists today was suggested by the 1836 Act where each new invention was examined “by technically trained examiners to ensure that the invention conformed to the law, and constituted an original advance in the state of the art.”<sup>116</sup> The examination system was one of America’s enduring contributions to the development of patent law around the world, as it established a discipline of gathering a significant number of men and women into one body focused on performing the difficult duty of examining patent applications.<sup>117</sup> The introduction of the examination system in 1836 probably increased the cost for the inventor for preparing the application for examination, and together with the requirements of novelty and utility, the system performed the role of filtering patentable inventions from the ones that were not.

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110. POTTAGE & SHERMAN, *supra* note 44, at 107–08.

111. *Id.* at 119.

112. KHAN, *supra* note 7, at 55.

113. *Id.* at 51–52.

114. *Id.* at 52–53.

115. *Id.* at 52.

116. Khan & Sokoloff, *supra* note 70, at 296.

117. KHAN, *supra* note 7, at 53.

Britain too saw changes with similar objectives.<sup>118</sup> The increase in the cost of registration and the introduction of the examination system were seen as ways to keep trivial inventions away from the patent system.<sup>119</sup> Technical examination of patents was introduced by C. N. Dalton, the head of the British Patent Office during the years 1897 to 1909 and was later made obligatory under law.<sup>120</sup> Earlier, under the Act of 1883, the Patent Office was required to conduct a three-point examination—that the invention was described clearly, that the documents submitted conformed to the prescribed conditions, and that the title of the invention was sufficient and corresponded to the textual disclosure of the invention.<sup>121</sup> In introducing technical examination of patent specification, the Patent Office had to prepare and print abridgments of patent specifications, detailed indexes, and classifications; it also had to change the title of its journal from *Commissioners of Patents' Journal* to *The Official Journal of the Patent Office*.<sup>122</sup> The Patent Office began to publish diagrams which clearly explained the patent along with the abridgements in 1889 and consequently renamed the journal's title to *The Illustrated Official Journal (Patents)*.<sup>123</sup> The diagrams were again dropped in 1931 when the number of patents grew immensely, making it difficult to accommodate them with the abridgements.<sup>124</sup>

The primary aim behind the introduction of examination was to ensure that a new patent application did not correspond to previous ones.<sup>125</sup> It was not to make examination a matter of opinion, like that of “men of scientific eminence.”<sup>126</sup> The

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118. SHERMAN & BENTLY, *supra* note 27, at 177–78.

119. *Id.*

120. THOMAS HENRY O'DELL, INVENTIONS AND OFFICIAL SECRECY: A HISTORY OF SECRET PATENTS IN THE UNITED KINGDOM 64 (1994).

121. *Id.*

122. *Id.* at 65.

123. *Id.*

124. *Id.*

125. The introduction of examination was regarded at that time as “a most extraordinary change in the existing law.” Questions were raised as to how the Patent Office would look into the records of the past fifty years of old patent specifications every time a new application was examined. The use of abridgments and classifications was expected to provide the way out. *Id.* at 66.

126. The proposal to examine patent application was not accepted by the British Parliament until the twentieth century, either because of the expense or because no one, at that time, knew clearly how it could be done. O'DELL, *supra* note 120, at 57. In 1852, a new bill called for an examination system

examination of all new patent applications was introduced by the Patent Law Amendment Act of 1902.<sup>127</sup> Examiners were expected to do the three-point check under the Act of 1883 as well as “make a further investigation for the purpose of ascertaining whether the invention claimed had been wholly or in part claimed or described in any patent specification (other than a provisional specification not followed by a complete specification) published before the date of the application.”<sup>128</sup> Even though the patent specification came to be published, there were some cases where they could be kept secret by express Act of Parliament.<sup>129</sup>

In the modern era, the registration of patents became a matter of public concern.<sup>130</sup> It symbolized a form of public memory.<sup>131</sup> The registration process shifted the focus from the created object to the representation of the created object, thereby introducing the concept of managing and demarcating

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styled on the U.S. patent system, but was left out by an amendment in the House of Commons. The Parliament rejected several bills in the nineteenth century. KHAN, *supra* note 7, at 34. In 1875, a bill was introduced which

proposed a proper examination of the specifications that applicants for patents submitted, and this work was to be done by ‘men of scientific and manufacturing eminence’ . . . who would be ‘willing, as a mark of distinction [that is, without payment], to serve on the Commission and perform the duties that will be imposed upon them.’

O’DELL, *supra* note 120, at 40. This bill did not become an Act and the further bills introduced in 1876 and 1877 suffered the same fate. The British were desperate to avoid any expense in operating the patent system that the new examination process would impose. While debating and expecting “men of scientific and manufacturing eminence” to work for free, they were ridiculing the large staff established by the USPTO in Washington, D.C. at that time and the manner in which “US examiners passed all the old British ideas as new ones.” O’DELL, *supra* note 120, at 40–41.

127. Patent Law Act 1902, 2 Edw. 7, c. 34 (Eng.).

128. *Id.* § 1(1). The Act “introduced a limited investigation into the novelty of the invention before granting a patent.” Intellectual Property Office, *History of patents in the 20th century*, THE NATIONAL ARCHIVES (June 3, 2014), <http://webarchive.nationalarchives.gov.uk/20140603093549/http://www.ipo.gov.uk/types/patent/p-about/p-what-is/p-history/p-history-20century.htm>.

129. In the United Kingdom, for example, the first case of the government prohibiting the publication of a patent specification occurred in 1855 under the section 12 of the Patent Law Amendment Act of 1852 when the Secretary of State for War suppressed John Macintosh’s application for *Certain Improvements in the Application of Incendiary Materials to be Used in Warfare*. O’DELL, *supra* note 120, at 4, 18.

130. SHERMAN & BENTLY, *supra* note 27, at 4.

131. *Id.* at 71–72.

the limits of intangible property.<sup>132</sup> The new registration system increasingly relied on paper inscriptions, which facilitated the classification, measurement, and communication of intangible property.<sup>133</sup> The system also offered the first chance to prove ownership.<sup>134</sup> The examination system reduced uncertainty about the validity of patents and the economies of scale in certification by having a centralized process.<sup>135</sup>

## 2. Modern Patent Specification

The development of the patent specification can be charted by studying its evolution under the registration system that existed until the eighteenth century and under the examination system that began during the nineteenth century. There was no emphasis on detailed and distinguished disclosure during the early days.<sup>136</sup> Because disclosures were considered sufficient under the registration system, it made the government's task of distinguishing ostensibly similar inventions easy. However, the patent specifications soon evolved to define the invention clearly so that a person skilled in the art could determine without difficulty the nature and extent of the right conferred by the patent upon reading the specifications.<sup>137</sup> In this manner, it shifted the working of the invention (earlier demonstrated by the inventor) to the hypothetical standard of the person skilled in the art that the Patent Office employed in determining whether the invention was enabled or not.<sup>138</sup>

The shift to the standard of the person skilled in the art was enhanced by the transformation of the material embodiment of the invention in the product—the fact that the invention worked when practiced—to the textual embodiment of the invention in the patent specification—the fact that the invention worked as disclosed.<sup>139</sup> The requirement to work the invention was replaced by the obligation to disclose the

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132. *Id.* at 4–5.

133. *Id.* at 72.

134. *See id.* at 184, 186.

135. KHAN, *supra* note 7, at 60.

136. *See* MACLEOD, *supra* note 25, at 51.

137. SHERMAN & BENTLY, *supra* note 27, at 187.

138. *Id.* at 185–87.

139. Feroz Ali Khader, Picket Patents: Local Working in Global Economy 11 (Feb. 18, 2013) (unpublished manuscript) (on file with author).

invention, as both had the common objective of “making the new art known, and training others in the practice of it.”<sup>140</sup> The obligation to disclose relieved the patentee of the burden of putting the invention to practice and instead placed upon her the requirement to disclose the invention so as to enable a person skilled in the art to make and use the invention.<sup>141</sup> As the doctrine of enabling disclosure evolved, the requirement of working the invention increasingly became restricted to what the patentee said in the patent specification and what the skilled person could do with it.<sup>142</sup>

The Patent Office lacked the time and the ability to construct or reproduce the invention to see if it worked, but it relieved itself of this responsibility by evolving the hypothetical standard of the person skilled in the art.<sup>143</sup> The unwillingness of the Patent Office to verify the disclosure in the document with what was actually invented resulted in the prescription of standards for checking the validity of the statements made by the inventor.<sup>144</sup> Thus, the disclosure requirement evolved as an obligation on the inventor to textually describe the invention. The disclosure requirement was initially focused on disclosure of the invention by the inventor, but later evolved into modern standards like the requirement of written description, enablement, and disclosure of best method.<sup>145</sup> As the administrative demands of the Patent Office grew, the task of demonstrating the working of the invention was textualized in embodiments by which the inventor described the working of the invention.<sup>146</sup>

The problem of identifying the invention from the statements made by the inventor also existed. This required the inventor to make her invention unique. The fact that an invention was unique was demonstrated by a two-way process: the inventor distinguished the invention from what had gone

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140. PENROSE, *supra* note 66, at 138.

141. *Id.*

142. ROBERT P. MERGES & JOHN F. DUFFY, PATENT LAW AND POLICY: CASES AND MATERIALS 265 (5th ed. 2011) (noting that the enablement requirement “requires the inventor to describe her invention clearly enough so that one skilled in her art can understand it well enough to make and use it”).

143. *See* PENROSE, *supra* note 66, at 138–39.

144. *Id.* at 139.

145. *See infra* Part III.A.1.

146. *See* 35 U.S.C. § 112 (2012).

before (the external aspect of validity) and the inventor also described the new addition to knowledge that the invention brought forth (the internal aspect of validity).<sup>147</sup> Though the burden to describe the invention was on the inventor, the Patent Office was still responsible for checking the validity of the statements made by the inventor for both the external and internal aspects of uniqueness. Thus, validity checks emerged as a way by which the statements of the inventor could be verified and validated.

### C. INVENTORS' SPEECH

Patents are granted on the basis of what inventors say. A patent can be seen as a recollection of the inventor, as prior to the expression of a patent, the subject matter existed as a secret.<sup>148</sup> Written in first person, addressed to the world, and focused on a problem in a specialized field, every patent specification imitates a monologue. Typical of documents embodying technical knowledge, patent monologues state the prior art and declare what they add.<sup>149</sup> They also disclose secret information that presumably would not have entered the public domain if not for the limited exclusivity granted by the patent system.<sup>150</sup> These patent monologues can be seen as a part of a larger conversation, as each monologue builds upon its predecessor and adds something on its own, creating a network of cumulatively aggregated knowledge.<sup>151</sup> By recording and validating the inventor's recollections, the patent system symbolizes the public memory.<sup>152</sup>

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147. See *infra* Part III.A.

148. POTTAGE & SHERMAN, *supra* note 44, at 60 (describing the specification figuratively as a "recollection"—"the process of committing something to memory and then recalling and communicating that thing").

149. See *id.* at 61 ("[A]n inventor had to perceive the invention in such a way that they made 'an actual addition' to their own 'fund of knowledge,' which could then be communicated to the public . . .").

150. See *id.* at 60 ("[T]he patent rewarded inventors for disclosing what they could otherwise keep to themselves.").

151. Even individual conversations can contribute to public discourse. See POST, *supra* note 18, at 46 (noting that public opinion can be formed one conversation at a time so long as knowledge is potentially relevant to the formation of public opinion and holding that it does not matter whether it is distributed to one person or to a thousand).

152. SHERMAN & BENTLY, *supra* note 27, at 71–72 ("[T]he system of registration . . . ensure[d] that information was both mobile and visible. Like

Speech in its written form is protected by copyright. But the inventor's speech in the patent specification evolved to seek protection for subject matters beyond the scope of copyright.<sup>153</sup> These nineteenth century debates clearly bring out the distinctions between copyright and patent as both involve mental labor and creativity.<sup>154</sup> The subject matter protected by copyright is the author's text and not the ideas expressed in it. Though the text of a patent is also entitled to copyright, the patent concerns itself with the ideas in the text of the patent regardless of the manner in which it is expressed or written.<sup>155</sup> The protection of copyright was limited as it could not "prevent readers . . . making use of what they learnt by reading it."<sup>156</sup> Thus, patents evolved to do what copyright could not: grant protection to expression of ideas.

Unlike copyrights, the process of formation of the patent right is divested from the process of formation of the protected matter.<sup>157</sup> When an invention is created, it does not translate into a patent until the written description is completed, the claims are drafted, and the patent is filed with the Patent Office. The process of creation of the patent is different and distinct from the process of creation of the invention itself.

### 1. The Creative Process

The emphasis on creative labor accentuated the distinction between the inventor and the discoverer.<sup>158</sup> Unlike the discoverer, the inventor was a transformer: he took the

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[encyclopedias] and libraries, registration acted as a form of collective or public memory.").

153. *Id.* at 155.

154. *Id.* at 173.

155. O'DELL, *supra* note 120, at 31.

156. T.A. BLANCO WHITE & ROBIN JACOB, PATENTS, TRADE MARKS, COPYRIGHT AND INDUSTRIAL DESIGNS 164 (3d ed. 1986).

157. *See id.* at 14 (noting that "copyright . . . arises when the work is made so that the owner of the copyright gets immediate protection" while the patent right cannot be obtained without applying through the patent office).

158. THOMAS WEBSTER, ON PROPERTY IN DESIGNS AND INVENTIONS IN THE ARTS AND MANUFACTURES 7 (1853) (noting that the subject matter of the invention did not exist like land and air such that it could be discovered). This distinction reflects the difference in science between the "logic of discovery" and the "logic of demonstration." Lars Håkanson, *Creating Knowledge: The Power and Logic of Articulation*, 16 INDUS. & CORP. CHANGE 51, 60 (2007). Articulation and codification are possible for inventions. *See infra* text accompanying notes 187 and 188.



abstract principles and reduced them to practice; by doing so, he individualized Nature.<sup>159</sup> It was the contribution of the inventor which transformed and individualized the objects and processes that came to be attributed as the creative effort. The contribution of the inventor, much like that of an author who distinguishes a general idea from a personalized expression, makes the invention patentable, and absent that contribution, the invention is not.<sup>160</sup> Thus, the subject matter of protection was the creative contributions made by the inventor embodied in the created product. As the manifestation of the creative effort became evident in the process of creation—the manufacturing of the invention—the right to manufacture came to be seen as the source of the right of exclusivity in a patent.<sup>161</sup>

True to the fact that the creative effort was embodied in the invented product, early inventors would take their inventions to the Patent Office for inspection and the Patent Office too insisted on models, often only for the ones that worked, before granting protection.<sup>162</sup> In this sense, the origin of intellectual property was pinned to its production.<sup>163</sup> As intellectual property law protects matters that are both reproducible and repeatable, the creative effort of the inventor, now embodied in the product, had to be unique and identifiable from similar efforts of others.<sup>164</sup> Thus, the creative effort came to be linked with the individuality of the creator's efforts.<sup>165</sup> The identity of the protected invention, its individuality, became the aspect by which it could be distinguished from others.<sup>166</sup>

Regardless of the degree of transformation, the belief that the creations exhibited the unique mark of their creator

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159. SHERMAN & BENTLY, *supra* note 27, at 46.

160. *Id.* at 35–36.

161. Hulme, *supra* note 46, at 153 (noting the supremacy of the right to manufacture during the Elizabethan reign, a time when English patent law regarded the exclusive right of sale as the right subsequent to and derived from the sole right to manufacture).

162. See PENROSE, *supra* note 66, at 138–39.

163. *Jefferys v. Boosey* (1854) 10 Eng. Rep. (HL) 681, 703.

164. See SHERMAN & BENTLY, *supra* note 27, at 152.

165. *Id.* at 47.

166. Thus, when the invention was textualized in the specification, the identity of the invention was ascertained by the tests of novelty and nonobviousness.

assured that it would be always possible to identify and distinguish intangible property.<sup>167</sup> However, there were doubts as to how the inventor left traces of himself in the created product which could be used to identify the intangible property.<sup>168</sup> This led to a fundamental change in the way intellectual property was perceived: it resulted in the shift from the creative product as expressed to the essence of the creation, thereby allowing for instances of indirect infringement.<sup>169</sup>

## 2. Proof of Invention

As instruments that self-policed the speech of the inventor, the patent specification evolved to spare the government the task of tedious investigation.<sup>170</sup> Though the speech encompassed technical knowledge beyond the ability of the Patent Office to verify, the Patent Office defined its role to include validating the knowledge with regard to what has gone before (by comparison) and what the speech communicates (by disclosure).<sup>171</sup> The speech of the inventor encompassed aspects of claimed novelty, non-obviousness, and utility, which were checked by the Patent Office.<sup>172</sup> However, the Patent Office did not verify the veracity of the technical knowledge.<sup>173</sup>

As noted, the approach of demonstrating the material proof of the invention was replaced by a purely textual approach, where the inventor textualized the invention in the form of patent specification.<sup>174</sup> The material proof always came with the “principle of the machine” or “mode of operation” which was linked to the working of an invention.<sup>175</sup> The textual proof absolved the inventor of needing any proof of actual working, and faced with the increasing demands over the time, expertise, and resources to work out the assertions made in the patent specification, the Patent Office shifted the focus on to

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167. SHERMAN & BENTLY, *supra* note 27, at 53.

168. *Id.* at 54.

169. *Id.* at 56.

170. MACLEOD, *supra* note 25, at 53.

171. *See infra* Part III.A.

172. Patent Law Act 1902, 2 Edw. 7, c. 34 (Eng.).

173. This is the other validation which is performed by peer-reviewed scientific journals, the validation of scientific and technical knowledge. *See infra* Part II.B.2.

174. *See supra* text accompanying notes 139–42.

175. POTPAGE & SHERMAN, *supra* note 44, at 69.

the textual proof of the invention—the description, drawing, and embodiments.<sup>176</sup> In an infringement suit, the task of proving the validity of the invention fell on the inventor's competitor.<sup>177</sup> Intriguingly, the burden of proving the working of the invention shifted to the person challenging the patent.<sup>178</sup>

This change in the way in which the Patent Office required the invention to be presented radically changed the role of the inventor. There was no need for the inventor to prove that her invention worked.<sup>179</sup> The inventor only needed to describe the invention textually.<sup>180</sup> This historical transformation in the proof of the invention eliminated the need to put the invention to test before the patent was granted. What the inventor said would now be sufficient to get an exclusive right.

## II. SPEAKING TECHNICALLY

Patent specification articulates and codifies technical knowledge. It describes the technical aspects, and demarcates the legal boundaries and claims protection for the invention.<sup>181</sup> Though patents cover technical aspects of the invention, they are not meant to be the final word on the technical aspects for many reasons. The technical knowledge is usually generated by experts in a specialized discipline, the validation of which happens within the discipline by peer-review.<sup>182</sup> The validation by the Patent Office is non-technical in that it is confined to the fact that the knowledge is new and non-obvious, and that such knowledge is disclosed adequately.<sup>183</sup> Much of the confusion with regard to a patent's role in disclosing technical knowledge arises from the failure to distinguish what is validated and what is not.<sup>184</sup>

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176. *Id.* at 107–08.

177. 35 U.S.C. § 282 (2012).

178. *Id.*

179. Noveck, *supra* note 11, at 134–35.

180. See POTTAGE & SHERMAN, *supra* note 44, at 107–08.

181. William Redin Woodward, *Definiteness and Particularity in Patent Claims*, 46 MICH. L. REV. 755, 765 (1948) (noting that “the claims of patents have become highly technical in many respects as the result of special doctrines relating to the proper form and scope of claims that have been developed by the courts and the Patent Office from time to time.”).

182. See *infra* Part II.C.

183. Noveck, *supra* note 11, at 134–35.

184. See *infra* Part III (discussing patent validation's development and process).

## A. PATENT AS TECHNICAL SPEECH

Speech, as a form of communication, necessitates a speaker to address an audience. In patent law, the speech of the inventor is embodied in the patent document addressed to the “person having ordinary skill in the art” (PHOSITA).<sup>185</sup> Patents are different from normal speech as they convey technical knowledge generated by experts. The consideration of patents as technical speech is for the limited purpose of understanding the manner in which the patent system serves as a platform for disclosure and communication. The function of a patent as technical speech helps in understanding the role of the Patent Office as the facilitator of patent discourse.<sup>186</sup>

### 1. Articulation and Codification

The expression of knowledge into symbolic representation involves the processes of articulation and codification.<sup>187</sup> Articulation refers to the process by which knowledge is made explicit.<sup>188</sup> The development of patent law evidences the process shift from demonstrable articulation of invention, by way of working models, to textual articulation by patent specification.<sup>189</sup> Articulation in writing required certain norms and standards to be followed.

Codification refers to the expression of knowledge in a standardized fixed form.<sup>190</sup> For seeking a patent, the speech of the inventor is presented to the Patent Office in the form of a patent application.<sup>191</sup> A patent application comprises two main parts: the specification of the invention and the claims.<sup>192</sup> These two elements are interrelated and often their functions overlap.<sup>193</sup> The specification refers to the description of the

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185. See 35 U.S.C. § 112 (2012); see also *In re Nelson*, 280 F.2d 172, 181 (C.C.P.A. 1960) (noting that the description in patents is not addressed to the public but to those skilled in the art to which the invention pertains).

186. See *infra* Part IV.C.2 (explaining the role of the Patent Office as “Gatekeepers”).

187. Håkanson, *supra* note 158, at 61.

188. *Id.* at 51–52, 61.

189. Fromer, *supra* note 14, at 574–75.

190. Håkanson, *supra* note 158, at 61.

191. 35 U.S.C. § 111 (2012).

192. See 35 U.S.C. § 112 (2012) (referring to the two main parts).

193. See Michael Risch, *The Failure of Public Notice in Patent Prosecution*, 21 HARV. J.L. & TECH. 179, 224–25 (2007) (“Improving a patent’s specification in the initial application is an important way to clarify the patent’s claims.”).

invention, which needs to satisfy the requirements of written description, enablement, and best mode.<sup>194</sup> The claims disclose that part of the invention for which protection is claimed defining the scope of the invention.<sup>195</sup> The specification and the claims perform different functions, and together they mandate the disclosure requirements under the Patent Act.<sup>196</sup>

As noted, the disclosure requirement was historically necessitated by the textualization of the invention.<sup>197</sup> There are four statutory disclosures mandated by the Patent Act which facilitate the communication of the inventor's speech.<sup>198</sup> Section 112 of the Patent Act describes the ingredients of adequate disclosure as requirements of the specification.<sup>199</sup> First, the Act requires the specification to contain a written description of the invention (written description).<sup>200</sup> Second, the specification should describe the invention clearly enough to enable a skilled person to make and use it (enablement).<sup>201</sup> Third, the specification shall conclude with the claims, pointing out and distinctly claiming the invention (definiteness of claims).<sup>202</sup> Fourth, the specification shall set forth the best mode contemplated by the inventor.<sup>203</sup>

The process of codification renders the knowledge into transferrable artifacts that facilitate its communication.<sup>204</sup> Since patents disclose technical information and are instruments devised to make these disclosures, the

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194. See 35 U.S.C. § 112(a).

195. See *id.* § 112(b).

196. See *id.* §§ 112(a)–(b) (detailing the requirements for the specification and the claims of a patent); MPEP § 608 (9th ed. rev. 7, Mar. 2014) (requiring disclosure for patent applications).

197. See *supra* text accompanying notes 139–42.

198. Cf. Fromer, *supra* note 14, at 546 (discussing a similar list of disclosure requirements comprising specification ending with claims, written description, enablement and best mode).

199. 35 U.S.C. § 112 (2012).

200. *Id.* § 112(a).

201. *Id.*

202. *Id.* § 112(b).

203. *Id.* § 112(a). This requirement can still be technically regarded as a disclosure requirement, though it is no longer a ground for invalidating a patent. See also Lee Petherbridge & Jason Rantanen, *In Memoriam Best Mode*, 64 STAN. L. REV. ONLINE 125, 126 (2012), <http://www.stanfordlawreview.org/sites/default/files/online/articles/64-SLRO-125.pdf>.

204. Håkanson, *supra* note 158, at 62.

communication of technical knowledge can be regarded as one of the objectives of the patent system.<sup>205</sup> The communication of technical knowledge, using the patent system as a facilitating platform, can be witnessed by the disclosures made by the individual applications.<sup>206</sup>

## 2. Disclosure Function

The Patent Act requires an inventor to provide a full and clear description of the invention and to include the exact terms to enable any skilled person to make and use it.<sup>207</sup> Apart from stipulating statutory disclosure requirements, the Patent Office also imposes “a duty of candor and good faith” in making disclosures.<sup>208</sup> The publication of the patent document, which usually happens eighteen months after its filing, discloses the invention to the public.<sup>209</sup> The Patent Act allows for the inventor to publish her research preemptively and then file a patent within one year of the publication.<sup>210</sup> As disclosures can kill the novelty of an invention, the information about the invention is first published through the patent system.<sup>211</sup>

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205. Sean B. Seymore, *The Teaching Function of Patents*, 85 NOTRE DAME L. REV. 621, 624 (2009) (stating that the patent document, through the disclosure of technical information, can serve as a form of technical literature).

206. *See id.* (highlighting the teaching function of patents via the disclosure of technical information).

207. 35 U.S.C. § 112(a) (2012).

208. 37 C.F.R. § 1.56(a) (2014).

209. 35 U.S.C. § 122(b)(1) (2012). In case the inventor wishes not to file an application in other countries, the application can be kept unpublished until the grant. *Id.* § 122(b)(2)(B)(i).

210. 35 U.S.C. § 102(a)–(b)(1) (2012). *See also* Gideon Parchomovsky, *Publish or Perish*, 98 MICH. L. REV. 926, 940 (1999) (noting that “preemptive publication reduces the cost of information to society and other firms.”).

211. The focus of the patent text is exclusively tuned towards communication. POTTAGE & SHERMAN, *supra* note 44, at 125 (“What mattered was not the axis of reference—the relation between the text and the thing—but the axis of communication: what sense of the invention had the patent text effectively communicated to the public?”). As a result, patents form an important tool in the disclosure of knowledge which is essential for the progress of science. *See* Pamela Samuelson & Suzanne Scotchmer, *The Law and Economics of Reverse Engineering*, 111 YALE L.J. 1575, 1662 (2001) (identifying the other tools for dissemination of know-how such as publication and reverse engineering).

Disclosure is regarded as the primary reason for granting exclusivity.<sup>212</sup> It brings new technologies into the public domain that would otherwise be kept secret.<sup>213</sup> The centrality of disclosure is evident from the move toward a first-to-file system, which pins the grant of patents to the fact that it is first disclosed in an application and not the fact that it is invented first as was the case under the first-to-invent system.<sup>214</sup> Despite the central role played by disclosure in modern patent systems, there is wide disagreement as to whether the disclosure function is the primary rationale of the patent system and its effectiveness in performing that function.<sup>215</sup>

In theory, the disclosure in patents is expected to facilitate further innovation, avoid duplicative research, and result in more efficient investment in innovation.<sup>216</sup> But in practice, firms appear to use non-patent sources as tools for learning about developments in technology.<sup>217</sup> By disclosing the invention at an early stage, the firm may benefit by deterring

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212. See *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 63 (1998) (comparing the grant of patent to “a carefully crafted bargain that encourages both the creation and the public disclosure of new and useful advances in technology, in return for an exclusive monopoly for a limited period of time.”). Cf. *Brenner v. Manson*, 383 U.S. 519, 533–34 (1966) (noting that in practice patentees disclose very little information).

213. The history of the patent system can be viewed as a move from secrecy to disclosure. Cf. Robert G. Bone, *A New Look at Trade Secret Law: Doctrine in Search of Justification*, 86 CALIF. L. REV. 241, 266 (1998) (expressing reasons to doubt whether trade secret law improves the efficiency for patentable inventions). Patents in fact evolved as a tool to disclose trade secrets. Cf. J.H. Reichman, *Legal Hybrids Between the Patent and Copyright Paradigms*, 94 COLUM. L. REV. 2432, 2529–30 (1994) (arguing that the failure of classical trade secret law to balance the interests of innovators and borrowers accounted for the tendencies to deform the patent paradigm).

214. This change was brought about by the America Invents Act. See Charles R. Macedo, *First-to-File and First-to-Invent Priority: An American Historical Perspective*, 8 J. INTELL. PROP. L. & PRAC. 1, 1 (2013) (noting that the AIA creates a hybrid “first-to-file”/“first-to-publish” grace period).

215. Fromer, *supra* note 14, at 542–43 (advocating for the centrality of disclosure in the patent system while arguing that much of scholarship has, in coming to the correct conclusion that disclosure is underperforming, taken the incorrect view that the disclosure function is not important).

216. Benjamin N. Roin, Note, *The Disclosure Function of the Patent System (or Lack Thereof)*, 118 HARV. L. REV. 2007, 2009 (2004).

217. Wesley M. Cohen et al., *Links and Impacts: The Influence of Public Research on Industrial R&D*, 48 MGMT. SCI. 1, 16 (2002) (reporting patents as subordinate means of conveying content of university research to industry).

the entry of competitors.<sup>218</sup> But disclosure only performs a minimal role for self-disclosing inventions.<sup>219</sup> The disclosure made in the claims determines the scope of the protection granted.<sup>220</sup> Kitch noted that the early disclosure of the invention would need to have broad scope attributed to the patent claims to allow the inventor to co-operate with others to further develop the invention.<sup>221</sup> Others have noted that granting broader patents may not have the predicted effects, as it merely shifts the rush to patent prior in time.<sup>222</sup>

The disclosure rationale is evident from some of the functions that patents are attributed to perform. Like “invisible colleges,” using the medium of the written word, they communicate to gain appreciative audience, to secure priority, and to be informed of work done by others.<sup>223</sup> In their communication and disputation with each other, members in the patent system act like an invisible college of technology.<sup>224</sup> Patents, to some extent, perform the function of teaching and instruction which is done by the written description.<sup>225</sup> “[A] patent need not teach . . . what is well known in the art.”<sup>226</sup> The effectiveness of the teaching function depends on the ability of patents to disseminate technical knowledge.<sup>227</sup> As a move to enhance the teaching function of the disclosure, it has been

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218. John F. Duffy, *Rethinking the Prospect Theory of Patents*, 71 U. CHI. L. REV. 439, 497–98 (2004).

219. Katherine J. Strandburg, *What Does the Public Get? Experimental Use and the Patent Bargain*, 2004 WIS. L. REV. 81, 105–11 (2004).

220. 35 U.S.C. § 112(b).

221. See Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265, 267–69 (1977).

222. Donald G. McFetridge & Douglas A. Smith, *Patents, Prospects, and Economic Surplus: A Comment*, 23 J.L. & ECON. 197, 201 (1980).

223. Derek J. De Solla Price & Donald Beaver, *Collaboration in an Invisible College*, 21 AM. PSYCHOL. 1011, 1011 (1966).

224. See Carolyn C. Cooper, *Nineteenth-Century American Patent Management as an Invisible College of Technology*, in LEARNING AND TECHNOLOGICAL CHANGE 40, 41–42 (Ross Thomson ed., 1993).

225. See *Univ. of Rochester v. G.D. Searle & Co.*, 358 F.3d 916, 922 (Fed. Cir. 2004).

226. *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384 (Fed. Cir. 1986).

227. See Seymour, *supra* note 205, at 638–39 (revealing how patentese, or legal patent jargon, can obscure the invention, and proposing that by stripping away the patentese, an interested party could better understand the technology).



suggested that working examples should replace language as the principal measure of claim scope.<sup>228</sup>

The disclosure made in the patent also functions as a signal.<sup>229</sup> Each individual patent disperses some knowledge into the public domain which was not there before.<sup>230</sup> The system is based on broad, pioneer patents upon which follow-on patents are built, creating a system of citation on earlier knowledge.<sup>231</sup> New patents are built on existing patents, which, in turn, become the basis for future patents.<sup>232</sup> Patents are seen as a mechanism for privatizing information and the disclosure acts as a signal in the broad economic sense of informational mechanisms.<sup>233</sup> Since patents convey a wealth of quantitative information, they are seen as a means of credibly publicizing information about less readily measurable attributes.<sup>234</sup>

## B. THE DUALITY OF SPEECH

The speech of the inventor embodied in the patent is both technical and legal in nature.<sup>235</sup> While the science is described and disclosed in the description of the invention, the claims demarcate the legal boundaries.<sup>236</sup> Usually, the scientific knowledge is disclosed first in the form of a scientific publication and then again in the form of a granted patent.<sup>237</sup>

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228. *Id.* at 642 (proposing a new examination protocol for the USPTO with the ability to request working examples when the disclosure's teaching is doubtful).

229. See Clarisa Long, *Patent Signals*, 69 U. CHI. L. REV. 625, 628 (2002) (arguing that the signal sent by a patent document can, in some cases, be more valuable than the substantive rights of the patent).

230. See 35 U.S.C. § 102 (2012) (establishing the novelty requirement).

231. Samuelson & Scotchmer, *supra* note 211, at 29 (“[A]lmost all technological progress builds on a foundation provided by earlier innovators.”).

232. Edward F. Levitas et al., *Survival and the Introduction of New Technology: A Patent Analysis in the Integrated Circuit Industry*, 23 J. ENGINEERING & TECH. MGMT. 182, 190 (2006).

233. Long, *supra* note 229, at 627 (“The ability to convey information credibly to observers at low cost is a highly valuable function of patents that has been completely overlooked in the literature.”).

234. *Id.* at 646.

235. See Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 844–45 (1990) (noting that patent specification encompasses the technical and the patent claims cover the legal).

236. *Id.*; see also 35 U.S.C. §§ 112 (a)–(b).

237. Fiona Murray & Scott Stern, *When Ideas Are Not Free: The Impact of Patents on Scientific Research*, 7 INNOVATION POL'Y & ECON. 33, 36 (2006).

Patents are read for scientific reasons when the object of the reading is to look at the technical content that is not published as a research paper or to determine the areas in which patents would be relevant.<sup>238</sup> Patents are also read for legal reasons, such as to ascertain if their research is patentable or for keeping track of competition.<sup>239</sup> The differences between the scientific and legal aspects are more evident in the means by which they are validated.

### 1. Scientific and Technical Knowledge

Disclosure in the scientific community happens primarily by way of publishing.<sup>240</sup> The importance of scientific publication ensures not only the professional recognition of the scientist's work, but also allows other scientists to test and develop the earlier work.<sup>241</sup> Peer-review is one of the most significant social institutions; science has evolved to eliminate deficiencies in knowledge.<sup>242</sup> Modern peer-review systems can be seen as mechanisms for certifying new knowledge.<sup>243</sup>

### 2. Significance of Peer-Review

Peer-review could be of different types: intramural when the review is done for career advancement, extramural when it is done to identify the research which deserves a grant, and journal when it involves editorial review of manuscripts submitted for publication.<sup>244</sup> One of the vibrant examples of the

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238. See Lisa Larrimore Ouellette, *Do Patents Disclose Useful Information?*, 25 HARV. J.L. & TECH. 545, 574 (2011) (reporting that the majority of scientists read patents to see if their research is patentable, while many are looking for technical information).

239. *Id.*; see also H. Ernst, *The Use of Patent Data for Technological Forecasting: The Diffusion of CNC-Technology in the Machine Tool Industry*, 9 SMALL BUS. ECON. 361, 378 (1997) (recommending the incorporation of continuous monitoring of patenting activity into a company's overall competitor monitoring intelligence).

240. See Cohen et al., *supra* note 217, at 14.

241. See HENRY H. BAUER, *SCIENTIFIC LITERACY AND THE MYTH OF THE SCIENTIFIC METHOD* 47 (1992) (stating how publishing research allows others to make use of the published work by modifying and extending it, while the original researcher gains recognition as their work gets widely cited).

242. See *id.* at 44–46 (illustrating the evolution of science).

243. Carol Berkenkotter, *The Power and the Perils of Peer Review*, 13 RHETORIC REV. 245, 245 (1995).

244. Edwin S. Flores Troy, *Publish and Perish: Patentability Aspects of Peer Review Misconduct*, 5 TEX. INTEL. PROP. L.J. 47, 50 (1996).

peer-review system for scientific works can be seen among the peer-reviewed journals. Peer-review of scientific works originally began in the field of medical journalism.<sup>245</sup> Review in scientific and medical journals, commonly referred to as editorial peer-review, operates at two levels: the review done by the editors of the journal (editorial review) and the review done by the peer (peer-review).<sup>246</sup> The editors perform the role of moderating the review process, while the referee acts in an advisory role to the editors.<sup>247</sup>

The review process employed by scientific journals is expensive and time-consuming.<sup>248</sup> The review process in journals, such as the *New England Journal of Medicine*, relies on an initial screening by the editor before the manuscript is assigned to the associate editors and sent out for review.<sup>249</sup> The referee, who is a peer, offers specific technical comments and criticism that will be transmitted to the author through the editor and also gives a confidential assessment of the manuscript exclusively for the editors.<sup>250</sup> Upon receipt of the review from the referee, the manuscript is put to further consideration at the editorial meetings before a call is taken on publication.<sup>251</sup> While the initial screening by the editors eliminates roughly ten percent of the manuscripts, the further review by the peer followed by the meetings of the editorial board eliminates another eighty percent of the manuscripts.<sup>252</sup>

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245. See John C. Burnham, *The Evolution of Editorial Peer Review*, 263 J. AM. MED. ASS'N 1323, 1323-24 (1990).

246. Arnold S. Relman, *Peer Review in Scientific Journals-What Good Is It?*, 153 W.J. MED. 520, 520 (1990).

247. See *id.*; see also BAUER, *supra* note 241, at 46 ("The inchoate ferment that research scientists produce cannot become part of the accepted canon of science until it has been published; but getting published means convincing editors and referees that something about the work is sound and useful.")

248. Relman, *supra* note 246, at 521 (estimating in 1990 that \$1 million was spent on in-house peer-review at *The New England Journal of Medicine*).

249. *Id.* at 520.

250. *Id.*

251. *Id.*

252. *Id.* (noting that during the time of review at *The New England Journal of Medicine*, which may take up to seven weeks, the manuscripts may go through one or three revisions and will have been seen by two to six referees, in addition to an associate editor, a deputy editor, the executive editor and the editor in chief).

The fact that the referee could be a scientific rival or an ally raises issues of referee bias.<sup>253</sup> To an extent, referee bias is eliminated by vesting the supervening final decision with the editors.<sup>254</sup> One of the important considerations for editorial review is that the referees should not make the final decision: they “are consultants, not arbiters of publishability.”<sup>255</sup> In addition to referee bias, in scientific publications there could be cases involving economic conflict of interest.<sup>256</sup>

Peer-review is not infallible, and like all human enterprises, it does not guarantee the validity or truthfulness of the work.<sup>257</sup> Since discourse between scientists is based on trust, the scope of the peer-review process is limited to checking “the soundness of the design, the appropriateness of the methods, the quality of the evidence, the interpretation and analysis, and the conclusions.”<sup>258</sup> It does not extend to detecting fraud or misconduct.<sup>259</sup> Despite the shortcomings, the peer-review process offers the best option, as it achieves the reliability of the sciences by the consensus of scientists.<sup>260</sup> Reviewers perform the role of the gatekeepers of science, as they decide what gets published and what does not.<sup>261</sup> Peer-review holds manuscripts to the highest current standards by making the authors realize that their manuscripts must pass a rigorous review to materialize as a publication.<sup>262</sup> It also screens flawed and invalid manuscripts and contributes to the

253. *Id.*

254. *Id.* at 521.

255. *Id.*

256. *Id.* Some journals like *The New England Journal of Medicine* which do not ask the referees to disclose their economic conflict of interests have taken the step of not considering for scientific review articles written by anyone with a substantial economic conflict of interest. *Id.* The journal no longer accepts a review article or an editorial on a scientific subject written by a person who is economically connected, by equity, advisory role, consultancy or employment, with a corporation selling products relevant to the topic under review. *Id.*

257. *Id.*

258. *Id.*

259. *Id.*

260. See MICHAEL POLANYI, *SCIENCE, FAITH AND SOCIETY* 16 (1964) (noting that science exists as a body of wide-ranging authoritative knowledge as long as the consensus of scientists continues).

261. Mohammadreza Hojat et al., *Impartial Judgment by the “Gatekeepers” of Science: Fallibility and Accountability in the Peer Review Process*, 8 *ADVANCES HEALTH SCI. EDUC.* 75, 75 (2003).

262. Relman, *supra* note 246, at 522.

quality of manuscripts by requiring revisions, more data, reanalysis and changes to the manuscript.<sup>263</sup> It also improves the readability of the published works.<sup>264</sup>

### 3. Scientific Disclosures in Patents

Given the credibility of scientific knowledge developed by the peer-review process, it is understandable why scientists do not rely on patents as much as they do on scientific publications.<sup>265</sup> Patents are criticized as a poor medium for communicating technical information.<sup>266</sup> Inventors do not rely on patent disclosures made by other inventors for their research.<sup>267</sup> The ineffectiveness of the disclosure function is one of the chief reasons for the apathy of the scientific community.<sup>268</sup> However, the calls to strengthen the disclosure function of patents may not address all the issues.<sup>269</sup> There are other reasons why the technical information disclosed in the patents is not relied upon. These include: the absence of peer-review,<sup>270</sup> the closed nature of the document that prohibits it

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263. *Id.*

264. *Id.*

265. Cohen et al., *supra* note 217, at 14, 16 (stating that patents are subordinate to publications, among others, as sources of knowledge); POLYANI, *supra* note 260 (describing how peer-review leads to good science).

266. NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., A PATENT SYSTEM FOR THE 21ST CENTURY 63 (Stephen A. Merrill et al. eds., 2004) (noting some of the reasons that make a patent less than ideal vehicle for communication of technical information).

267. Cohen et al., *supra* note 217, at 14–15 (reporting that only 17.5% of the Industrial Research and Development respondents polled listed patents as important sources for research). *Cf.* James Bessen, *Patents and the Diffusion of Technical Information*, 86 ECON. LETTERS 121, 127 (2005) (suggesting, based on an economic model, that diffusion of the technical information embodied in inventions is not enhanced by the patent system).

268. *See* Alan Devlin, *The Misunderstood Function of Disclosure in Patent Law*, 23 HARV. J.L. & TECH. 401, 403–04 (2009) (stating that disclosure is ineffective and that patents are largely ignored by inventors).

269. *See* Roin, *supra* note 216, at 2027 (arguing that the Federal Circuit's willful infringement rules and the loopholes within the publication rules for patent applications provide incentives to ignore patents and allow companies to sidestep existing disclosure requirements). *Cf.* Fromer, *supra* note 14, at 551 (concluding that the rules and operation of patent law negatively affect the quality of the disclosure and proposing how the patent system might be overhauled to strengthen the disclosure function with which it is justifiably charged).

270. *See* Noveck, *supra* note 11, at 124–25 (describing the review procedure of a patent examiner).

from being corrected,<sup>271</sup> and its creation by members outside the scientific community.<sup>272</sup>

Patents are not peer-reviewed.<sup>273</sup> When experts mutually review each other's works, it operates as a self-correcting mechanism.<sup>274</sup> For this reason, scientists insist that they would read patents if they were peer-reviewed.<sup>275</sup> The absence of peer-review is one of the critical factors that distinguishes patents from scientific publications.<sup>276</sup> This has also resulted in the grant of dubious patents for pseudoscience,<sup>277</sup> as pseudoscience results when individuals isolate themselves from the scientific community.<sup>278</sup> Though the logic of early disclosure in patent law imitates the one in academic discourse,<sup>279</sup> the review mandated in the patent system is not like the one that exists in academic discourse of scientific communities.<sup>280</sup> Unlike

271. 37 C.F.R. §§ 1.510–25 (2014).

272. See Noveck, *supra* note 11, at 133–38 (detailing the patent process in which the only two parties are the inventor and the patent examiner).

273. *Id.* at 124–25 (explaining a patent examiner's lack of communication with the scientific community).

274. Cf. ROBERT K. MERTON, *The Normative Structure of Science*, in *THE SOCIOLOGY OF SCIENCE: THEORETICAL AND EMPIRICAL INVESTIGATIONS* 221, 274 (Norman W. Storer ed., 1973) (“The institutional conception of science as part of the public domain is linked with the imperative for communication of findings. Secrecy is the antithesis of this norm; full and open communication its enactment.”).

275. Ouellette, *supra* note 238, at 573.

276. Cf. Rebecca S. Eisenberg, *Proprietary Rights and the Norms of Science in Biotechnology Research*, 97 *YALE L.J.* 177, 207 (1987) (noting considerable congruence between patent law policy and scientific norms concerning disclosure). See Noveck, *supra* note 11, at 139 (stating that peer-review is linked to “good science” in scientific journal publications); *id.* at 124–25 (discussing the information deficit for patent examiners).

277. Daniel C. Rislove, *Case Study of Inoperable Inventions: Why Is the USPTO Patenting Pseudoscience?*, 2006 *WIS. L. REV.* 1275, 1305–06 (2006) (illustrating that because the average patent examiner is unlikely to differentiate complex scientific principles from nonsensical principles, “even a competent examiner may fail to distinguish innovation from pseudoscience.”).

278. BAUER, *supra* note 241, at 43–44.

279. See Margo A. Bagley, *Academic Discourse and Proprietary Rights: Putting Patents in Their Proper Place*, 47 *B.C. L. REV.* 217, 254 (2005) (proposing an “opt-in system whereby academic researchers could choose to have two years from the time they first disclose the invention to the public to file an application with the USPTO.”).

280. Compare Noveck, *supra* note 11, at 124–25 (describing the review procedure of a patent examiner), with Berkenkotter, *supra* note 243, at 245 (describing the peer-review system commonly utilized by scientific publications).

scientists and peers, the patents are reviewed by administrative agencies that do not participate in the creation of new knowledge.<sup>281</sup>

Patents are not open to correction.<sup>282</sup> Once granted, they can only be revoked on limited grounds most of which have nothing to do with the validity of science.<sup>283</sup> In contrast, scientific knowledge changes all the time. Scientific knowledge “advances by the continual discovery and correction of past error.”<sup>284</sup> As the scientific method is based on verification, it offers infinite opportunities to correct and update with new knowledge.<sup>285</sup> Scientific speech is capable of being verified as true or false.<sup>286</sup> Part of the problem arises from the legal system’s preoccupation with certainty, fortified by the court’s view of scientific truth as elusive and their reluctance to settle scientific controversies by litigation.<sup>287</sup>

Patents are not created by the scientific community.<sup>288</sup> The form of the patents plays a critical role in their usefulness to the scientific community. Patents are replete with professional jargon created with a preference for elaborate phrases over simple terms.<sup>289</sup> They are not drafted in scientific format that is “straightforward” and “easy to read” for the scientists.<sup>290</sup> Rather, they are drafted to circumscribe the right of the inventor in the invention.<sup>291</sup> The language of the claims is more an indicator of the inventor’s right to exclude than an indicator

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281. See Noveck, *supra* note 11, at 133–38 (detailing the patent review process).

282. 37 C.F.R. §§ 1.510–25 (2014).

283. *Id.*

284. Relman, *supra* note 246, at 521.

285. See Berkenkotter, *supra* note 243 (stating that peer-review leads to certification of new knowledge).

286. Christopher P. Guzelian, *Scientific Speech*, 93 IOWA L. REV. 881, 899 (2007).

287. *Underwager v. Salter*, 22 F.3d 730, 735–36 (7th Cir. 1994).

288. See Noveck, *supra* note 11, at 124–25 (detailing the patent creation process).

289. Woodward, *supra* note 181, at 755 (identifying some of the literary monstrosities in patent drafting).

290. See Ouellette, *supra* note 238, at 571, 573 (listing the six common concerns researchers have with patents and noting that scientists would read patents if they were drafted in the scientific format).

291. 35 U.S.C. §§112(a)–(b) (2012).

of the thing invented.<sup>292</sup> They are written by patent attorneys to persuade the Patent Office to grant or the courts to uphold a right.<sup>293</sup>

The dual nature of a patent's purpose has attracted the criticism that it does not serve the function of disclosure well.<sup>294</sup> The fact that it simultaneously addresses technical and legal audiences has led some scholars to conclude that the patent document is layered, envisaging the part of the patent document relevant to each audience as a "layer" of the document capable of separation.<sup>295</sup> The concepts in patent law such as enablement, possession of invention, and reduction to practice, make it futile to argue for a separation of technical and legal layers.<sup>296</sup> Layer implies the involvement of the process of laying something over another which could potentially be undone.<sup>297</sup> But it is the inability to separate the legal from the scientific that has kept scientists from reading patents.<sup>298</sup> The legal part is at times intricately intertwined

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292. See Giles S. Rich, *Foreword* to DONALD S. CHISUM ET AL., *PRINCIPLES OF PATENT LAW: CASES AND MATERIALS*, at iii, v–vi (2d ed. 2001) (noting that the claims are the measure of the patentee's right to exclude and not the measure of what was invented).

293. NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., *supra* note 266, at 63.

294. See Roin, *supra* note 216, at 2024–25 (listing delayed disclosure, inadequate disclosure and opaque disclosure as criticisms of the disclosure function of patents).

295. See, e.g., Fromer, *supra* note 14, at 564–66 (indicating that the technical layer of the patent document, if structured and completed properly, fulfills the patent system's disclosure function and observing that most of the thinking about the patent document has concentrated on the legal layer). The suggestion of marking of layers is impractical and misses the issue that patents are hybrids created at the intersection of multiple disciplines involving various experts. It will be a step backward for patent attorneys who have over the years gained substantial training at the interface of the law and the sciences to dissect the layers into legal and technical. Moreover, such a suggestion can have grave consequences: the legal layer, by contrast, can then be used (without the technical layer) to give legal meaning to the patent claims. *Cf. id.* at 569–70 (admitting that a clean division between the technical and legal layers will sometimes be difficult to maintain and the trickiest part about making or separating the layers is that the technical layer addresses enablement).

296. *Cf.* Fromer, *supra* note 14, at 569–70. Perhaps it is the use of the terminology "layer" borrowed from the field of digital documentation that causes the confusion and the eagerness to "tease" them apart. *Id.* at 543.

297. *Id.* at 569 (referring to the overlapping nature of the two layers).

298. *Cf.* Ouellette, *supra* note 238, at 573 (noting that scientists would read patents "[i]f it was easier to search for patents' scientific content.>").



with the technical part: like the inclusion of the technical information in the claims employing a “comprising” transition,<sup>299</sup> or restrictions to technical information itself introduced through ranges.<sup>300</sup>

Patents play a complex role in the scientific community.<sup>301</sup> They allow inventors to build upon each other’s work.<sup>302</sup> They fall neither within the category of legal documents nor the scientific publications that disseminate new knowledge.<sup>303</sup> They should be seen as game-changing instruments evolved for “scientific exchange, scientific credit, and the commercialization opportunities arising from scientific discovery.”<sup>304</sup>

### C. EXPERT KNOWLEDGE

Expert knowledge refers to reliable knowledge verified by experts.<sup>305</sup> The knowledge of an expert could be explicit or tacit.<sup>306</sup> Explicit knowledge refers to the things that are known and can be discussed by others, knowledge that is expressed, captured, and codified.<sup>307</sup> An expert is a person who has superior knowledge within a specific domain of activity.<sup>308</sup> The

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299. See *Moleculon Research Corp. v. CBS, Inc.*, 793 F.2d 1261, 1271 (Fed. Cir. 1986) (holding that “comprising” opens a method claim to the inclusion of steps in addition to those stated in the claim).

300. *In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990) (observing that a claim to a subset of a range disclosed in a prior art patent would be allowed if the applicant shows that the claimed range achieves unexpected results relative to the prior art range).

301. See Murray & Stern, *supra* note 237, at 33 (“[P]atents seem to be changing the ‘rules of the game’ for scientific exchange, cooperation, and credit.”).

302. Suzanne Scotchmer & Jerry Green, *Novelty and Disclosure in Patent Law*, 21 RAND J. ECON. 131, 132 (1990).

303. Fromer, *supra* note 14, at 565 (noting that patents are part legal and part technical).

304. Adam Jaffe et al., *Academic Science and Entrepreneurship: Dual Engines of Growth?*, 63 J. ECON. BEHAV. & ORG. 573, 575 (2007).

305. POST, *supra* note 18, at 8 (“We rely on expert ‘knowledge’ precisely because it has been vetted and reviewed by those whose judgment we have reason to trust.”).

306. John H. Bradley et al., *Analyzing the Structure of Expert Knowledge*, 43 INFO. & MGMT. 77, 77 (2006).

307. *Id.*

308. *Id.* See also Joseph Blocher, *Public Discourse, Expert Knowledge, and the Press*, 87 WASH. L. REV. 409, 439–40 (2012) (noting that the press

experts are presumed to know the truth about their disciplines.<sup>309</sup> The knowledge of the expert consists of a cognitive element, the expert's viewpoints and beliefs, and a technical element, the expert's domain skills and abilities.<sup>310</sup>

Expert knowledge has played a significant role in modern litigation.<sup>311</sup> Courts allow expert evidence on matters concerning "scientific, technical, or other specialized knowledge."<sup>312</sup> They have allowed expert testimony that is reliable.<sup>313</sup> The reliability of the expert knowledge is tested by assessing the scientific validity of the reasoning or methodology of the expert's testimony.<sup>314</sup> One way the courts have ensured the reliability of such knowledge is by determining whether the reasoning or methodology has been subject to peer-review and publication.<sup>315</sup> This standard applies to all expert knowledge, not just testimony based in science.<sup>316</sup>

Modern societies need expert knowledge—the knowledge experts build through speculation, observation, analysis, and experiment—in order to prosper.<sup>317</sup> Expert knowledge is created by the process of peer-review.<sup>318</sup> Peer-review plays a

sometimes creates expert knowledge through investigative journalism when it reports unknown facts).

309. See Alvin I. Goldman, *Experts: Which Ones Should You Trust?*, 63 PHIL. & PHENOMENOLOGICAL RES. 85, 91 (2001) ("To qualify as a cognitive expert, a person must possess a substantial body of truths in the target domain.").

310. Bradley et al., *supra* note 306, at 77.

311. Jan T. Chilton & Nell B. Strachan, *Experts*, 8 LITIG. 7, 7 (1981–82) ("As society becomes increasingly complex, as fields of knowledge expand, subdivide, and diverge, as litigation encroaches on more complicated subject matters, experts play an ever larger role in the preparation and trial of cases.").

312. FED. R. EVID. 702 ("A witness who is qualified as an expert by knowledge, skill, experience, training, or education, may testify in the form of an opinion or otherwise if: (a) the expert's scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue.").

313. *Weisgram v. Marley Co.*, 528 U.S. 440, 455 (2000) (noting that since *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), parties relying on expert evidence must be aware of the exacting standards of reliability such evidence needs to meet).

314. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 592–95 (1993).

315. *Id.* at 593.

316. See *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 149–51 (1999).

317. POST, *supra* note 18, at ix.

318. *Berkenkotter*, *supra* note 243, at 245.

significant role in the creation of expert knowledge by allowing communication between experts.<sup>319</sup> Strategically, peer-review has prevailed as a prerequisite for the creation of expert knowledge.<sup>320</sup>

### 1. Patents and Expertise

Patents codify knowledge.<sup>321</sup> They can be perceived as embodiments of expert knowledge. Patents have been used for developing new knowledge.<sup>322</sup> In some industries, such as the integrated circuits industry, patents play a significant role in signaling innovation, quality, and expert knowledge.<sup>323</sup> Evidence shows that in the opinion of peer reviewers and inventors, highly cited patents are of greater technical importance than less frequently cited ones.<sup>324</sup> The citations in patents perform the task of delineating the prior art, thereby improving the quality of the patent, and act as a proxy for innovation.<sup>325</sup> They are likely to tell the industry the future areas of high impact technology.<sup>326</sup> Unlike scientific citations, the citations in a patent are controlled by the examiner.<sup>327</sup>

### D. SPEECHWRITERS

True to the complexity of the modern patent specification, which requires the elements of validity to be incorporated into the technical details, there arose the need for special expertise in preparing them.<sup>328</sup> As the practice of drafting, filing, and

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319. Troy, *supra* note 244, at 48 (“The peer review system requires that scientists divulge confidential information to their peers in order to evaluate the merit of the research.”).

320. *Cf.* Berkenkotter, *supra* note 243, at 245 (“While peer review is not infallible, it remains the primary means through which authority and authenticity are conferred upon scientific and scholarly papers by journal editors and the expert judges they have consulted.”).

321. Dan L. Burk, *The Role of Patent Law in Knowledge Codification*, 23 BERKELEY TECH. L.J. 1009, 1012 (2008).

322. See Sungjoo Lee et al., *Using Patent Information for Designing New Product and Technology: Keyword Based Technology Roadmapping*, 38 R&D MGMT. 169 (2008).

323. Levitas et al., *supra* note 232, at 189–90.

324. M.B. Albert et al., *Direct Validation of Citation Counts as Indicators of Industrially Important Patents*, 20 RES. POL’Y 251, 251 (1991).

325. *Id.* at 253; Levitas et al., *supra* note 232, at 190.

326. Albert et al., *supra* note 324, at 258.

327. *Id.* at 253.

328. SHERMAN & BENTLY, *supra* note 27, at 139 n.45.

prosecuting patents developed, a new class of professionals, the patent attorneys, assumed the task of scripting them.<sup>329</sup> Like speechwriters, they composed the speech of the inventor.<sup>330</sup> The need for speechwriters arose historically in keeping with the complex tasks required of the patent specification,<sup>331</sup> not because scientists are not good at the descriptive task,<sup>332</sup> but as a response to the complexity of the instrument in addressing different objectives and different audience.

### III. VALIDATION OF SPEECH

The inventor's speech thus became the tool for identifying the invention and patent prosecution the process for establishing the validity of what the inventor said. The role of the Patent Office in establishing the validity was limited to the non-technical aspects.<sup>333</sup> The speech performs two significant functions: demonstrate the novelty of the invention by distinguishing it from what went before it and describe the utility by articulating the making of the invention.<sup>334</sup> As the representative registration system developed, it not only required self-policing of the inventor's speech, but also the validation of such speech.

The process of examination establishes the *threshold validity* of the patent. Granted patents were presumed to be valid, which meant that the infringer challenging the patent had the burden of proving its invalidity.<sup>335</sup> This presumption is analogous to the courts' deference to the decision of the PTO in granting or refusing a patent in the light of its technical and

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329. *Id.* at 109.

330. The extent to which the special skills enabled them to do the task better is disputed. Some studies have partly attributed patent's role as a poor medium of communicating technical information to the fact that the speech is written by an attorney or a patent agent for persuading the PTO or the court. NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., *supra* note 266, at 63.

331. See KHAN *supra* note 7, at 58; SHERMAN & BENTLY, *supra* note 27, at 153.

332. *But see* Peter Lipton, *The Medawar Lecture 2004: The Truth about Science*, 360 PHIL. TRANSACTIONS: BIOLOGICAL SCI. 1259, 1259 (2005).

333. See *supra* Parts II.B.1 and II.B.2 (describing the validation of technical aspects within the respective scientific and technical disciplines by peer-review mechanism).

334. 35 U.S.C. §§ 102–03 (2012).

335. See 35 U.S.C. § 282 (2012).

administrative competence.<sup>336</sup> Further proof of *continuing validity* is left to the competitors who, faced with an infringement suit by the inventor, are permitted to question the validity of the patent.<sup>337</sup>

#### A. BY COMPARISON AND DISCLOSURE

Patent validity has two sides. On one hand, the patent office ascertains that the invention is valid by comparing it with the prior art.<sup>338</sup> On the other hand, it determines that the patent is valid with regard to the disclosure it makes. The two sides of validity can be referred to as “validity of comparison” and “validity of disclosure.”<sup>339</sup> The Patent Office performs the function of validating disclosures made in the patent by checking it backward with the prior art and matching it forward with the knowledge of a skilled person.<sup>340</sup>

The validity of a patent generally refers to the checks the patent office does before it grants a patent.<sup>341</sup> As the patent office examines the threshold validity, on *ex parte* basis where only the inventor is represented,<sup>342</sup> the patents that are granted carry a presumption as to their validity.<sup>343</sup> This presumption is rebuttable as it can be questioned in post-grant review before the PTO or in litigation when invalidity of a patent can be raised as a defense to patent infringement.<sup>344</sup> The PTO has “the sole authority to adjudicate the validity of

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336. MERGES & DUFFY, *supra* note 142, at 53.

337. 35 U.S.C. § 282 (2012).

338. Noveck, *supra* note 11, 134–35.

339. *Cf.* Fromer, *supra* note 14, at 545 (“Patents are granted after successfully undergoing examination by the PTO to ascertain that an invention meets patentability conditions and its description in the patent application satisfies the disclosure requirements . . .”).

340. Noveck, *supra* note 11, 134–37.

341. *See also* Fromer, *supra* note 14, at 545; *see* Arti K. Rai, *Engaging Facts and Policy: A Multi-Institutional Approach to Patent System Reform*, 103 COLUM. L. REV. 1035, 1049 (2003).

342. *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1564 (1988) (noting that the patent is obtained in *ex parte* proceedings in the PTO); *see also* Russell E. Levine et al., *Ex Parte Patent Practice and the Rights of Third Parties*, 45 AM. U. L. REV. 1987, 1989 (1995).

343. 35 U.S.C. § 282 (2012) (stating that “[a] patent shall be presumed valid . . . . The burden of establishing invalidity of a patent or any claim thereof shall rest on the party asserting such invalidity.”).

344. *See id.* §§ 282(b), 321(b).

patent applications.”<sup>345</sup> Though the PTO does the initial validation, the law provides an opportunity for the infringer to question the inventor’s speech, signifying the role of the public in resolving questions of patent validity.<sup>346</sup> But the courts, it has been pointed out, are not the best place for enforcing the things that go amiss in the patent.<sup>347</sup>

Thus, under current law, there are two avenues for challenging patents: by way of “*inter partes* review” and “post-grant review” before the PTO<sup>348</sup> and by way of infringement suits and declaratory judgment actions before the courts.<sup>349</sup> The right to exclude others is tightly tied to the concept of validity, as it is not possible to exclude others with a patent that is invalid.<sup>350</sup> This explains why the courts allow the presumption of validity to be rebutted in infringement suits.<sup>351</sup>

Though the statute does not impose any standard of proof, the Federal Circuit has interpreted the presumption of validity of issued patents to require the infringer to prove invalidity of the patent by “clear and convincing evidence” in lieu of “preponderance of evidence.”<sup>352</sup> This standard was initially diluted by the Supreme Court when it observed that the rationale underlying the presumption of validity that the PTO,

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345. Arti K. Rai, *Patent Validity Across the Executive Branch: Ex Ante Foundations for Policy Development*, 61 DUKE L.J. 1237, 1268 (2011).

346. See *Cardinal Chemical Co. v. Morton Int’l, Inc.*, 508 U.S. 83, 100 (1993).

347. See Joseph Farrell & Robert P. Merges, *Incentives to Challenge and Defend Patents: Why Litigation Won’t Reliably Fix Patent Office Errors and Why Administrative Patent Review Might Help*, 19 BERKELEY TECH. L.J. 943, 947 (2004); see also Fromer, *supra* note 14, at 544 (referring to litigation as “an inadequate and disjointed place to enforce adequate disclosure systemically.”).

348. 6 DONALD S. CHISUM, CHISUM ON PATENTS § 6.1 (2015) (noting the distinction between “311 to 319 for ‘inter partes’ review and from 321 to 329 for ‘post-grant’ review.”).

349. *Id.* at § 19.02 [1] (2015).

350. See 35 U.S.C. § 282. Cf. *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int’l, Inc.*, 534 U.S. 124, 142 (2001) (“The disclosure required by the Patent Act is ‘the quid pro quo of the right to exclude.’”).

351. See 35 U.S.C. § 282(a) (2012).

352. See *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1359 (Fed. Cir. 2007) (“[D]eference to the decisions of the USPTO takes the form of the presumption of validity under 35 U.S.C. § 282.”); see also Jay P. Kesan & Gwendolyn G. Ball, *How Are Patent Cases Resolved? An Empirical Examination of the Adjudication and Settlement of Patent Disputes*, 84 WASH. U.L. REV. 237, 243 (2006).

in its expertise, has approved the claim was much diminished when the defense of invalidity rested on evidence that was not before the PTO.<sup>353</sup> However, in 2011 the Supreme Court reaffirmed that an invalidity defense in a patent infringement suit must be proved by “clear and convincing evidence.”<sup>354</sup> Nevertheless, there continues to be some controversy around this presumption.<sup>355</sup> Some studies have argued that a high probability of invalidity does not merit a guarantee of its validity.<sup>356</sup>

It is difficult to justify the presumption of validity historically, as patent law did not require the patentee to demonstrate validity in the first place.<sup>357</sup> Though the argument proceeds on the deference given to the technical and administrative expertise of the PTO,<sup>358</sup> not much has been said about the standard of disclosure required of the inventor. The textualization of the invention absolved the inventor of the burden and strangely cast on the PTO the burden of showing that the inventor’s speech does not deserve a patent.<sup>359</sup>

There is a consistent move to make the determination on validity at an early stage of the life of a patent. Not only have patent offices welcomed the challenge to the validity of a patent in the patent office, as opposed to the earlier option of challenging them before the courts in an infringement or validity suit, but the courts have also moved in the direction of appreciating evidence on presumption of validity at the pre-

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353. See *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 426 (2007).

354. *Microsoft Corp. v. i4i Ltd. P’ship*, 131 S.Ct. 2238, 2239, 2252–53 (2011).

355. See, e.g., Robert P. Merges, *As Many as Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform*, 14 BERKELEY TECH. L.J. 577, 615 (1999).

356. See generally Michael J. Meurer, *The Settlement of Patent Litigation*, 20 RAND J. ECON. 77 (1989) (providing a model that analyzes patent licensing).

357. 35 U.S.C. § 282(a) (2012) (“A patent shall be presumed valid.”).

358. See *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1359 (Fed. Cir. 2007) (“[D]eference to the decisions of the USPTO takes the form of the presumption of validity under 35 U.S.C. § 282.”).

359. DAN L. BURK & MARK A. LEMLEY, *THE PATENT CRISIS AND HOW THE COURTS CAN SOLVE IT* 133 (2009) (“The arguments against a strong presumption of validity are compounded by the rather startling fact that the patentee never has the burden of proving to the PTO that it should be entitled to a patent; rather, it is the PTO that carries the burden of showing that an application is not deserving of a patent.”).

trial stage.<sup>360</sup> This lends credence to the finding that about thirty to fifty percent of litigated patents are held invalid.<sup>361</sup> Since validity depends on what the inventor discloses, there could be liability for non-disclosure under other laws.<sup>362</sup> Rather than focusing on the litigation, which may not give the desired results, proposals hint at bringing competitors, who are expected to possess the best information about patent validity, into the patent process as early as possible.<sup>363</sup>

The PTO is entrusted with the task of checking the initial validity of the patent.<sup>364</sup> The validity of the patent can best be defined as those attributes in a patent, the absence of which will make the patent invalid or give a cause for regarding it as invalid. In this approach, the factors that contribute to the validity of the patent, viewed from the aspect of things that can invalidate a patent in their absence, can be classified into two broad headings: external requirements and internal requirements.<sup>365</sup> The external requirements, or what is commonly known as patentability requirements, refers to the comparison of the invention with the prior art.<sup>366</sup> This includes checks on novelty and non-obviousness.<sup>367</sup> We refer to these as external validity or validity of comparison (with what has gone before). The internal requirements are those which the patent has to satisfy internally to merit a grant. These include written description, enabling disclosure, and disclosure of utility.<sup>368</sup>

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360. See generally Joshua D. Sarnoff, *Bilcare, KSR, Presumptions of Validity, Preliminary Relief, and Obviousness in Patent Law*, 25 CARDOZO ARTS & ENT. L.J. 995, 1018–26 (2007) (highlighting the importance of providing an opportunity for evidentiary rebuttal of the presumption of validity in all procedural contexts, even at preliminary stages of patent litigation).

361. See also John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J. 185, 205 (1998).

362. See *Merges*, *supra* note 355, at 599 (noting rare cases where the applicant can be liable under the antitrust laws for knowingly prosecuting an invalid patent application with the object of monopolizing a product market).

363. *Id.* at 610 (discussing reexamination requests as an alternative to litigation).

364. 35 U.S.C. § 131 (2012); *Fromer*, *supra* note 14, at 545.

365. The internal and external requirements can be deciphered from the language of § 282 of the Patents Act. They correspond to the two kinds of validity mentioned in the section which states invalidity of patentability and the invalidity of disclosure. See *Fromer*, *supra* note 14, at 544.

366. 35 U.S.C. § 282 (2012).

367. See *Fromer*, *supra*, note 14, at 545.

368. *Id.* at 546.



Together we refer to these as internal validity or validity of disclosure.

### 1. External Validity

The patent is validated with regard to what has gone before, either the prior art,<sup>369</sup> or the knowledge of a person having ordinary skill in the art.<sup>370</sup> Patent applicants are expected to submit (disclose) the relevant prior art known to them, but there is no obligation to search and report the prior art.<sup>371</sup> Most applicants do not search the prior art and consequently do not cite them to avoid the danger of knowledge and treble damages.<sup>372</sup> Even when the applicants cite the prior art, the Patent Office rarely relies upon them to narrow claims.<sup>373</sup> The Patent Office relies on prior art that results from its own efforts. In fact, the citing of prior art is seen as an indicator of the work done in examining a patent.<sup>374</sup>

Before a patent is granted, a patent is compared to the prior art.<sup>375</sup> The validity of the patent is checked by comparison. Two tests are done: one with regard to novelty<sup>376</sup> (to ensure that the patent is not anticipated), and the other with regard to non-obviousness<sup>377</sup> (that the patent was not obvious to a person skilled in the art). These two methods are used for comparing the validity of a patent which is done by

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369. 35 U.S.C. § 102(a) (2012).

370. *Id.* § 103.

371. Lemley, *supra* note 10, at 1500. *Cf.* Jay P. Kesan & Marc Banik, *Patents as Incomplete Contracts: Aligning Incentives for R&D Investment with Incentives to Disclose Prior Art*, 2 WASH. U. J.L. & POL'Y 23, 36 (2000) (arguing for a greater burden to be placed on the patent applicant to disclose the prior art).

372. 37 C.F.R. § 1.56 (2014).

373. Christopher A. Cotropia et al., *Do Applicant Patent Citations Matter?*, 42 RES. POL'Y 844, 847 (2013).

374. *See* Mark A. Lemley & Bhaven Sampat, *Examiner Characteristics and Patent Office Outcomes*, 94 REV. ECON. & STAT. 817, 826 (2011) ("The finding that more senior examiners systematically cite less prior art reinforces the inference that senior examiners are doing less work, rather than that they are merely getting it right more often than junior examiners.").

375. 35 U.S.C. § 102 (2012).

376. *See id.*

377. *Id.* § 103. That patents should not be granted on exempted matter, mathematical formulas and natural laws, and products of nature, is regarded as the fourth requirement of patentability. *See* Merges & Nelson, *supra* note 235, at 844 n.20.

comparing the patent with something external, what has gone before. The approach of validation can be regarded as a backward validation, as the Patent Office checks the patent with what has gone before,<sup>378</sup> either by published disclosures or by what was in the knowledge of a person skilled in the art.<sup>379</sup> Together with utility,<sup>380</sup> these requirements are called the requirements of patentability.<sup>381</sup> The claims are crafted to meet these requirements.

## 2. Internal Validity

The validity of disclosure refers to checking the validity of the disclosure made by the applicant. This kind of disclosure usually does not compare the application with what has gone before.<sup>382</sup> Unlike external validity, there is no comparison involved here in determining the validity, but only an internal check. The validity is checked with regard to the adequacy of the disclosure: whether the disclosure is sufficient to merit a grant.<sup>383</sup> Thus this kind of validity can be regarded as a forward looking requirement, as the things stated in the application would be checked to see if they are communicated well to the person reading the document or to whom the document is addressed. The level of knowledge of the addressee will be relevant for determining this kind of validity.

Patent prosecution is an *ex parte* process by which the speech of the inventor is validated.<sup>384</sup> Earlier, the process of validation, especially with regard to the disclosure of the invention, required submission of a working model to the Patent Office.<sup>385</sup> With the evolution of the examination system and the reliance on the textual approach to prove working of invention, this requirement was dropped.<sup>386</sup> One of the

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378. 35 U.S.C. § 102.

379. *Id.* at § 103.

380. *See id.* at §101.

381. *See, e.g., id.*

382. *Cf. Merges & Nelson, supra* note 235, at 848 (noting that the validity of disclosure may sometimes involve a comparison with the prior art when the PTO rejects an application by relying on a prior art that shows that some embodiments of the invention will be impossible to make without further information from the inventor).

383. *Id.*

384. *See Lemley, supra* note 10, at 1499.

385. Fromer, *supra* note 14, at 574–75.

386. *See supra* text accompanying notes 139–142.

consequences of dropping the demonstration requirement for an invention can be witnessed in the manner in which proof of enablement developed.

To check enablement, a skilled person will have to work the invention by following the instructions in the patent application to see if it results in the invention without undue experimentation.<sup>387</sup> But if that skilled person worked the invention for any purpose other than “for amusement, to satisfy idle curiosity, or for strictly philosophical inquiry,” it would amount to an infringement falling outside the purview of the experimental use exception.<sup>388</sup> The object which the enablement standard seeks to achieve is hindered in its working by a narrow reading of the experimental use exception, which does not incentivize the skilled person who is a competitor to question the validity of the enabling disclosure.<sup>389</sup> Just as the narrow experimental use exception is inconsistent with the patent policy of providing useful technical information,<sup>390</sup> it is also inconsistent with the enablement requirement, which can be verified only by working and experimenting with the invention.

## B. THE FUNCTION OF CERTIFYING EXPERT KNOWLEDGE

Historically, the patent system in the United States encouraged participation of a wide range of inventors regardless of their technical qualifications, a fact which contributed to the value of incremental innovations and minor improvements in technology.<sup>391</sup> Patent law in its formative years focused on what individuals invented.<sup>392</sup> Though inventing evolved as an individual endeavor, the modern day version of invention is a multi-disciplinary, cumulative, and cooperative effort initiated and managed by enterprises.<sup>393</sup> As

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387. *Liardet v. Johnson* (1778) 1 WPC 53, 53–54 (KB).

388. *Madey v. Duke Univ.*, 307 F.3d 1351, 1362 (Fed. Cir. 2002) (quoting *Embrex, Inc. v. Service Eng'g Corp.*, 216 F.3d 1343, 1349 (Fed. Cir. 2000)).

389. *Madey v. Duke Univ.*, 307 F.3d at 1361–62.

390. *Cf. Integra Lifesciences I, Ltd. v. Merck KGaA*, 331 F.3d 860, 873–78 (Fed. Cir. 2003) (Newman, J., dissenting) (noting the court's disapproval and its elimination of the common law research exemption).

391. KHAN, *supra* note 7, at 54.

392. *See supra* Part I.A.

393. *See* USPTO, *Patenting by Organizations (Utility Patents) 2014*, tbls.A1-1b & 2b, [http://www.uspto.gov/web/offices/ac/ido/oeip/taf/topo\\_14.htm](http://www.uspto.gov/web/offices/ac/ido/oeip/taf/topo_14.htm) (last visited Oct. 12, 2015).

most of the present day patents filed by enterprises in high-technology involve cutting-edge knowledge of the field of art, the patent documents which embody this knowledge can be considered as statements expressing expert knowledge.

Viewed from the constitutional backdrop of promoting progress, every grant of a patent is, in reality, a state certification of expert knowledge. The promotion of progress happens in many ways: disclosure, coming with new products in the market, or increasing investment in innovation.<sup>394</sup> The process of certification, commonly known as the prosecution of a patent, involves review of the patent application by the patent office.<sup>395</sup> Through this process, the patent office certifies the validity of a patent. The review of knowledge by an external group and its approval of it defines the making of expert knowledge.

A patent application is filed in its uncertified state. The knowledge disclosed in the application is neither reviewed by the Patent Office nor subject to any form of peer-review.<sup>396</sup> The contents of the patent application could be subject to at least two kinds of reviews: first, the review of its scientific merit and second, the review of the legal conformity of the contents of the application that entitle it for a patent, i.e., patentability. The Patent Office is concerned only with the patentability review: it checks whether the knowledge disclosed is predated, disclosed, or obvious, apart from checking aspects of utility (in some cases) and enablement.<sup>397</sup>

The patents that are granted go through the process of review by the Patent Office and can therefore be regarded as certificates of expert knowledge and concomitantly, the rejected applications are considered, by the fact of refusal, as knowledge that is not worthy of protection by virtue of it being disclosed earlier or being obvious to a skilled person.<sup>398</sup>

The value of the examination process raises issues of information asymmetry, as the patent applicant being an expert in his field possesses more knowledge than the

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394. Fromer, *supra* note 14, at 541, 546.

395. *See id.* at 561 n.105.

396. *See id.* at 591–92.

397. 35 U.S.C. §§ 101–103 (2012).

398. *See id.* at §§ 102–103.

examiner.<sup>399</sup> This is partly due to the fact that the patent office examines only the threshold validity, though recent developments indicate the strengthening of the scrutiny procedure at the patent office.<sup>400</sup>

### 1. Devolution

The central theme in patent law is ‘validity.’ Prospective patent applicants are encouraged to search for it,<sup>401</sup> the grant of a patent presumes it, and, as the best defense in an infringement suit, the market constantly seeks to challenge it.<sup>402</sup> Patent law is so structured that the validity of an issued patent can only be questioned by the market.<sup>403</sup> The law recognizes that external validation—the comparison of the patent with the prior art—requires information which may not readily be available to the Patent Office at the time of examination. *Graham v. John Deere Co.* and *KSR Int’l Co. v. Teleflex Inc.* are stark reminders of popping prior art that evaded an examiner.<sup>404</sup>

Historically the market has been the sole check on the validity of a patent, which happened in the courts in most cases years after the grant. But the recent years have witnessed a global phenomenon of moving the point of challenge—in raising the issue of patent validity—from the courts to the patent offices.<sup>405</sup> In effect, a patent that could only be challenged in the court when an infringement suit was filed can now be challenged in the patent office soon after the grant by way of a

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399. Sivaramjani Thambisetty, *Patents as Credence Goods*, 27 OXFORD J. LEGAL STUD. 707, 717 (2007) (noting the patent applicant as an expert on the field of his invention).

400. *Id.* at 735 (referring to the peer to patent project, which provides a community patent review mechanism).

401. 37 C.F.R. § 1.56(a) (2014).

402. 35 U.S.C. § 282(a) (2012).

403. *See id.*

404. *See Graham v. John Deere Co.*, 383 U.S. 1, 36 (1966) (noting a newly discovered prior art made certain features obvious because “no one apparently chose to avail himself of [the] knowledge” even though it was readily available at the time of invention). *See generally KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007) (stating that an inventor is deemed to know all the relevant prior arts in the field).

405. *See, e.g., CHISUM, supra* note 348 (introducing the inter partes review and post grant review procedures before the USPTO).

post-grant review procedure.<sup>406</sup> The recent reform of putting validity in issue before the Patent Office within one year of grant, by a post-grant review introduced by the America Invents Act,<sup>407</sup> will not only make the market quicker in questioning validity but also address the prevailing information asymmetry at the Patent Office. Despite the shift in the point of challenge, from the courts to the Patent Office, the reform initiative remains a modest one as the process of validation of patents still remains *ex post*.

## 2. History of Third Party Interventions

Though the examination of patent applications has been historically on an *ex parte* basis, reform measures have constantly sought the introduction of third party proceedings into the prosecution process.<sup>408</sup> Over the last seven decades, there has been a consistent effort to introduce a system of opposition of patents into the United States patent system and on all occasions the move has been resisted.<sup>409</sup> Instead of having a full-fledged system of third-party opposition, the United States adopted a re-examination procedure in 1980.<sup>410</sup> Though the procedure could be initiated by a third-party, it proceeded on an *ex parte* basis.<sup>411</sup> As the procedure focused only on patentability based on prior art that was not considered during examination, it was ineffective.<sup>412</sup> In 1992, the Advisory Commission on Patent Law Reform proposed that third parties should play a more active role in the re-examination and also called for broader grounds for challenges in re-examination.<sup>413</sup> These suggestions were incorporated to a limited extent in the American Inventor's Protection Act of 1999.<sup>414</sup>

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406. Leahy-Smith America Invents Act, Pub. L. No. 112-29, § 6, 125 Stat. 284 (2011).

407. *Id.*

408. CHISUM, *supra* note 348.

409. ADAM B. JAFFE & JOSHUA LERNER, INNOVATION AND ITS DISCONTENTS: HOW OUR BROKEN PATENT SYSTEM IS ENDANGERING INNOVATION AND PROGRESS, AND WHAT TO DO ABOUT IT 151 (2004).

410. *Id.* at 153.

411. CHISUM, *supra* note 348.

412. JAFFE & LERNER, *supra* note 409, at 153–54 (explaining several reasons the re-examination procedure adopted in 1980 failed).

413. *Id.* at 154.

414. *Id.*

The process of re-examination in the United States was used only by a few.<sup>415</sup> The procedure was not popular as the challengers were often precluded from challenging the validity later in infringement suits.<sup>416</sup> Though there were approximately 150,000 patents granted in 2002, none of the re-examinations led to the withdrawal or rejection of patents pursuant to third party re-examination.<sup>417</sup> The inadequacies in the earlier reforms were addressed by the America Invents Act by amending the provisions on *inter partes* re-examination in Chapter 31 of Title 35 and renaming it as “*Inter Partes Review*” and by creating a new *inter partes* procedure titled “Post-grant review” in Chapter 32.<sup>418</sup>

### 3. The Absence of Peer-Review

The patent system employs a two-stage review process.<sup>419</sup> Patents are reviewed by the Patent Office before the grant and by the market after the grant.<sup>420</sup> They correspond to two different types of validation, one akin to the editorial review (pre-grant) and the other to peer-review (post-grant). The real review of validity happens after grant, either in the Patent Office or in the court when a peer is involved.<sup>421</sup> This review is done by the market, usually by a competitor who faces an infringement action.<sup>422</sup>

As a peer stands in a better position than the examiner to prove the invalidity of a patent,<sup>423</sup> there have been efforts to include a third party review mechanism into the patent law.

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415. H.R. REP. NO. 112-98, pt. 1, at 46 (2011) (“Over the 5-year period studied by the USPTO, it issued 900,000 patents and received only 53 requests for inter partes reexamination.”).

416. 35 U.S.C. § 315(c) (2012) (stating that the challenger is not estopped only when the new assertion of invalidity is “based on newly discovered prior art unavailable to the third-party requester and the Patent and Trademark Office at the time of the inter partes reexamination proceedings”). See also Mark D. Janis, *Inter Partes Patent Reexamination*, 10 FORDHAM INTELL. PROP., MEDIA & ENT. L.J. 481, 493 (2000).

417. JAFFE & LERNER, *supra* note 409, at 186.

418. CHISUM, *supra* note 348.

419. *Id.*

420. *Id.*

421. Cf. JAFFE & LERNER, *supra* note 409, at 184 (explaining that post-grant re-examination gives parties challenging a patent a better opportunity to make their case when compared to pre-grant opposition).

422. See CHISUM, *supra* note 348.

423. Lemley, *supra* note 10, at 1522.

Some scholars have called for a peer-review mechanism for patents.<sup>424</sup> Those supportive of peer-review advocate it at an early stage of the application.<sup>425</sup> Others have pointed out that a peer-review system may not be feasible for patents.<sup>426</sup> They argue that the way a patent is drafted does not suit them for peer-review.<sup>427</sup> Much of the critique against the peer-review mechanism emerges from the failure of the disclosure function of patents.<sup>428</sup> Since patents with inadequate disclosure result from not complying with the existing standards of disclosure,<sup>429</sup> peer-review can be seen as a tool for enhancing the disclosure requirements.

#### IV. TECHNICAL SPEECH AND THE FIRST AMENDMENT

Like speech, patents too symbolize the communication of ideas. Often they convey expert knowledge that is hitherto unknown.<sup>430</sup> The constitutional status of technical speech embodied in patents has not been analyzed from a First Amendment perspective. Though there has been a rush in comparing copyright in the skein of the First Amendment and even extending protection for software by comparing it with speech, intellectual property law scholars do not see a case for extending First Amendment principles to patents.<sup>431</sup> When patents are viewed as technical speech of experts, First Amendment theory offers new perspectives on their role in democracy.

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424. See generally Noveck, *supra* note 11 (providing a comprehensive account of the peer-to-patent system).

425. Rebecca S. Eisenberg, *Obvious to Whom? Evaluating Inventions from the Perspective of PHOSITA*, 19 BERKELEY TECH. L.J. 885, 905 (2004).

426. Sivaramjani Thambisetty & Kartik Kumaramangalam, *Peer-Review and Patents: Why the Goose that Lays the Golden Egg Is a Red Herring*, 30 EUR. INTEL. PROP. REV. 171, 171 (2008) (arguing that “peer-review of patents can distort existing incentives of patent users to gather information about the quality of patents.”).

427. F. Scott Kieff, *The Case for Registering Patents and the Law and Economics of Present Patent-Obtaining Rules*, 45 B.C. L. REV. 55, 112 (2003) (“[P]atents are legal documents drafted by lawyers for interpretation by judges and lawyers, and not technical documents evaluated by peer review.”).

428. Roin, *supra* note 216, at 2024–25.

429. *Id.*

430. Fromer, *supra* note 14, at 541.

431. Burk, *supra* note 12, at 691.



## A. THE CONSTITUTIONAL STATUS OF PATENTS

Though early constitutionalists did not fully explore the possibility of conflict between the two areas of law, free expression, and intellectual property,<sup>432</sup> the courts have remained “sensitive to any infringement on genuinely serious literary, artistic, political, or scientific expression” when it involved the area of free expression.<sup>433</sup>

### 1. Free Expression and Intellectual Property

The common origin of copyright and patent rights is in the American Constitution, which confers the power on the Congress “[t]o promote the progress of science and the useful arts, by securing for limited times, to authors and inventors, the exclusive right to their writings and discoveries” often results in viewing copyrights and patents through the same lens.<sup>434</sup> This is particularly so in the case of studying the impact of intellectual property law on the First Amendment. Scholars have found the need to reconcile copyright and the First Amendment.<sup>435</sup> The impact of copyright law on the First Amendment has been a subject of intense study because copyright law imposes restrictions on free expression.<sup>436</sup> Unlike copyright,<sup>437</sup> patents are not usually linked with the First Amendment.<sup>438</sup> This is because patents are not primarily seen as instruments of expression.<sup>439</sup> Even scholars who have taken

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432. LANGE & POWELL, *supra* note 13, at 294 (arguing that the Congress shall make no law abridging freedom of speech or of the press by conferring monopolies in expression that otherwise would belong to the universe of discourses in which all are free to share and share alike and proposing intellectual property to be refashioned in the image of an absolute First Amendment).

433. *Miller v. California*, 413 U.S. 15, 22–23 (1973).

434. U.S. CONST. art. I, § 8, cl. 8.

435. See Melville B. Nimmer, *Does Copyright Abridge the First Amendment Guarantees of Free Speech and Press*, 17 UCLA L. REV. 1180, 1180 (1970).

436. See, e.g., Paul Goldstein, *Copyright and the First Amendment*, 70 COLUM. L. REV. 983, 984 (1970); LANGE & POWELL, *supra* note 13, at 308.

437. Neil Weinstock Netanel, *Locating Copyright Within the First Amendment Skein*, 54 STAN. L. REV. 1, 3 (2001).

438. LAURENCE R. HELFER & GRAEME AUSTIN, HUMAN RIGHTS AND INTELLECTUAL PROPERTY: MAPPING THE GLOBAL INTERFACE 312 (2011) (“Freedom of expression issues have not typically arisen in the context of patents.”).

439. LANGE & POWELL, *supra* note 13, at 308 (“Utility patent rights that do not amount to a confinement of expression can retain their exclusivity: drug

a broad view of the First Amendment hold that the effect of First Amendment on patents would extend only to subject matter that touches upon speech or press interest.<sup>440</sup>

## 2. First Amendment Coverage of Patents

First Amendment theory explains the scope of First Amendment coverage and distinguishes it from First Amendment protection.<sup>441</sup> Understanding the distinction between First Amendment *coverage* and First Amendment *protection* is critical to locating the status of patents. First Amendment coverage “refers to the kinds of government regulation that should be subject to special scrutiny exemplified by the distinctive doctrinal tests of the First Amendment.”<sup>442</sup> First Amendment protection “refers to the content of these tests, which determines what courts will allow and what they will forbid.”<sup>443</sup> First Amendment theory explains the scope and application of First Amendment coverage.<sup>444</sup> It determines the cases where the courts “are authorized to deploy the distinctive doctrinal tests and principles of the First Amendment.”<sup>445</sup>

## 3. Free Speech and Expert Knowledge

First Amendment theory recognizes the difference between “speech” and “action.”<sup>446</sup> Some forms of conduct that realize the First Amendment values can be classified as “speech,”

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and medical patents, for example, are unlikely candidates for change; but patentable rights in designs will almost surely be altered.”).

440. *Id.* at 179–80 (“Patentees would no longer enjoy the exclusive right to make, sell and use the subject matter of the patent, at least to the extent that subject matter touched upon speech or press interests. Not all patentable subject matter does: chemical process, for example, presumably do not; nor would pharmaceuticals; probably most of the subject matter of utility patents would escape the reach of the First Amendment. But . . . some of the subject matter that we think would be affected (many aspects of business method patents), and others no doubt would be as well, design patents most obvious among them.”).

441. POST, *supra* note 18, at 1.

442. *Id.*

443. *Id.*

444. *Id.*

445. *Id.*

446. Frederick Schauer, *Categories and the First Amendment: A Play in Three Acts*, 34 VAND. L. REV. 265, 268 (1981).

triggering First Amendment coverage.<sup>447</sup> Speech communicates ideas and uses language. As we have seen, the separation of the action of the inventor from his speech was achieved by the patent specification.<sup>448</sup> By considering the patent specification as a document used to communicate ideas, we can appreciate the application of doctrinal principles of the First Amendment. First Amendment protection extends to various types of speech.<sup>449</sup> Even software, which is technical in nature, has been brought under the scope of the First Amendment.<sup>450</sup> The First Amendment promotes free speech as a necessary element of public discourse.<sup>451</sup> Outside of public discourse, the First Amendment functions quite differently.<sup>452</sup>

The First Amendment treats free speech and expert knowledge as two different things covering two different sets of constitutional values.<sup>453</sup> The normative foundation of free speech is based on the value of “democratic legitimation,” which explains why the First Amendment is committed to the egalitarian premise that every person is entitled to communicate his or her own opinion.<sup>454</sup> The First Amendment principle capable of sustaining the disciplinary practices that produce expert knowledge depends upon the constitutional value called “democratic competence.”<sup>455</sup> The creation of expert knowledge, which is essential for modern democracies to prosper, is protected by democratic competence.<sup>456</sup>

The distinction is made by looking at the two spheres in which the First Amendment operates: the sphere of democratic legitimacy and that of democratic competence.<sup>457</sup> The difference

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447. *Id.*

448. *See supra* Part I.C.

449. Frederick Schauer, *Free Speech and the Cultural Contingency of Constitutional Categories*, 14 CARDOZO L. REV. 865, 867 (1993) (noting that the large group of constitutional categories come from cultural constructs that determine what events will be considered members of what class).

450. *See* *Bernstein v. U.S. Dep't of State*, 922 F. Supp. 1426, 1435 (N.D. Cal. 1996); *see also* *Burk, supra* note 12, at 686–88 (questioning whether software should be protected as speech under the First Amendment).

451. POST, *supra* note 18, at 15.

452. *Id.* at 44.

453. *Id.* at 9.

454. *Id.* at 9–10.

455. *Id.* at 35.

456. *Id.* at ix, 33.

457. *Id.* at 33–34.

between democratic legitimacy and democratic competence could be summed up as such: legitimacy will allow you to hold a view that the world is flat, allow you to write about it, and even convince others, to the extent that you can. But while operating in the realm of competence, statements made as an expert that the world is flat will not be tolerated.<sup>458</sup> Disciplines that are regarded as contributing to the value of democratic competence will receive First Amendment coverage as distinct from First Amendment protection.<sup>459</sup>

Strictly applied, First Amendment doctrine is confined to the realm of political speech.<sup>460</sup> The protection is offered to “public discourse,” “the forms of communication constitutionally deemed necessary for formation of public opinion.”<sup>461</sup> But First Amendment theory extends the purpose of First Amendment doctrine broadly to areas beyond political speech.<sup>462</sup> Thus, First Amendment coverage extends not only to political norms but also to apolitical norms.

While free speech entitles everyone to address the public freely, expert knowledge is developed by imposing constraints on the public from engaging in its creation.<sup>463</sup> Expert knowledge is reliable as it goes through the disciplinary

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458. It is a different story if you are Thomas Friedman writing a book on globalization. See generally THOMAS L. FRIEDMAN, *THE WORLD IS FLAT: A BRIEF HISTORY OF THE TWENTY-FIRST CENTURY* (2007) (analyzing globalization in the twenty-first century).

459. First Amendment scrutiny will be triggered when expert communication is hindered. See *Conant v. Walters*, 309 F.3d 629, 636 (9th Cir. 2002) (extending First Amendment coverage to communications between a doctor and a patient involving recommendation of the use of medical marijuana). Extending First Amendment coverage to such communication, though may not lead to invalidation of laws that restrict such communication (like the federal law prohibiting the prescription and use of marijuana) it could result in citizens petitioning the government to change the law. Restricting the doctor’s ability to recommend marijuana for medical uses would amount to a prohibition compromising a patient’s participation in public discourse. *Id.* at 634.

460. POST, *supra* note 18, at 15–16.

461. *Id.* at 15.

462. The three broad First Amendment theories identified are political theory, ethical theory, and the marketplace of ideas theory. See Robert Post, *Reconciling Theory and Doctrine in First Amendment Jurisprudence*, 88 CALIF. L. REV. 2353, 2359 (2000).

463. THOMAS S. KUHN, *THE STRUCTURE OF SCIENTIFIC REVOLUTIONS* 168 (3d ed. 1996) (“One of the strongest, if still unwritten, rules of scientific life is the prohibition of appeals to heads of state or to the populace at large in matters scientific.”).

standards of verifiability and reproducibility.<sup>464</sup> Such standards cannot be enforced within public discourse.<sup>465</sup> Rather, they are enforced in select spheres outside the public discourse where “the need for producing reliable knowledge subordinates the egalitarian principle of democratic legitimation.”<sup>466</sup>

## B. DEMOCRATIC COMPETENCE AND EXPERT KNOWLEDGE

Democratic competence refers to the First Amendment doctrines designed to protect the social practices that produce and distribute disciplinary knowledge.<sup>467</sup> In allowing the development of disciplinary knowledge, the value of democratic competence protects the formation of specialized disciplines that operate outside the public discourse.<sup>468</sup> Commercial speech is one such doctrine that “protects the dissemination of factual information outside the public discourse.”<sup>469</sup> The courts extend First Amendment coverage to commercial advertising by holding that practices that regulate speech are more dangerous than those that regulate conduct and such practices hamper the “essential role that free flow of information plays in a democratic society.”<sup>470</sup> Relying on commercial speech jurisprudence, First Amendment scholars observe that “[i]f the circulation of commercial information serves the value of democratic competence, so also does the circulation of expert knowledge.”<sup>471</sup>

### 1. Universities and Academic Freedom

Academic freedom is another discipline which is protected by the value of democratic competence. Universities are built on the value of academic freedom, encouraging scholars to experiment, hypothesize, and speculate.<sup>472</sup> Academic freedom is

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464. POST, *supra* note 18, at 29.

465. *Id.*

466. *Id.*

467. *Id.* at 33.

468. *Id.* at 35.

469. *Id.* at 34–35.

470. *Liquormart, Inc. v. Rhode Island*, 517 U.S. 484, 512 (1996).

471. POST, *supra* note 18, at 43. It is unfortunate that the constitutional status of expert knowledge needs to be articulated with something as materialistic as commercial speech. This is probably the way the justice delivery system works: those who have the ability can get their rights clarified.

472. *Id.* at 79.

necessary both to the effective functioning of universities and to the realization of the constitutional value of democratic competence.<sup>473</sup> As such, academic writings offer a closer comparison to patents than commercial speech.<sup>474</sup> The ideal of a marketplace of ideas, which is so closely associated with First Amendment doctrine, does not operate in the realm of democratic competence. In spheres of disciplinary knowledge where speech is regulated and verified, the ideal of a marketplace of ideas can only cause confusion.<sup>475</sup> Viewpoint and content neutrality that are the hallmarks of democratic legitimacy have no place in the realm of democratic competence.<sup>476</sup> Apart from developing new knowledge and engaging in pedagogical tasks, by virtue of their role in graduate training, modern universities also certify experts and their expertise.<sup>477</sup> Universities which create disciplinary knowledge have to distinguish between good and bad ideas.<sup>478</sup> Universities are institutions which try to balance “progress” with “the complete and unlimited freedom to pursue inquiry and publish results.”<sup>479</sup> Thus the First Amendment principle of equality does not operate in the academic sphere which requires “ideas to be treated unequally, that they be assessed, weighed, accepted, and rejected.”<sup>480</sup> Like scientists who are not answerable to the state, academic freedom insulates scholars from political pressure of public opinion.<sup>481</sup> This exception to equality offered under the umbrage of democratic competence

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473. *Id.* at 83–84.

474. Stephen L. Carter, *Academic Tenure and “White Male” Standards: Some Lessons from the Patent Law*, 100 *YALE L.J.* 2065, 2083–84 (1991) (comparing academic writings to patents and highlighting their need to be novel and nonobvious).

475. POST, *supra* note 18, at 62.

476. *Id.* at 28. See also Steven J. Heyman, *Spheres of Autonomy: Reforming the Content Neutrality Doctrine in First Amendment Jurisprudence*, 10 *WM. & MARY BILL RTS. J.* 647, 650 (2002).

477. POST, *supra* note 18, at 76.

478. R. George Wright, *The Emergence of First Amendment Academic Freedom*, 85 *NEB. L. REV.* 793, 806 (2007) (noting the possible conflict between individual academic freedom and the power of the university to set academic standards).

479. Bagley, *supra* note 279, at 225.

480. Robert Post, *The Structure of Academic Freedom*, in *ACADEMIC FREEDOM AFTER SEPTEMBER 11*, 72–73 (Beshara Doumani ed., 2006).

481. POST, *supra* note 18, at 67–68.

recognizes the fact that disciplinary knowledge in the natural sciences is created by hypothesis and speculation.<sup>482</sup>

## 2. Scientific Journals

Though scientific speech has not been treated as a traditional category of speech under the First Amendment,<sup>483</sup> a case can be made for technical speech that covers expert knowledge. Scientific journals operate in a highly regulated environment where editors and referees impose strict entry restrictions and special methodologies for allowing content to be published.<sup>484</sup> The institutional structure of scholarly journals serves to reinforce disciplinary hierarchies with the reviewers operating under the editors who decide what gets published and what does not.<sup>485</sup>

Experts produce new knowledge. In democracies that depend on public opinion, expert knowledge attains a constitutional value.<sup>486</sup> The value of “democratic competence can be constitutionally protected only if the disciplinary practices that create expert knowledge are themselves invested with constitutional status.”<sup>487</sup>

## C. CERTIFICATION OF KNOWLEDGE

As expert knowledge that is developed in different fields of science and technology is disclosed through patents, and in keeping with the constitutional mandate of promoting the

482. See *Sweezy v. New Hampshire*, 354 U.S. 234, 262–63 (1957) (Frankfurter, J., concurring).

483. Guzelian, *supra* note 286, at 883.

484. Alvin I. Goldman & James C. Cox, *Speech, Truth, and the Free Market for Ideas*, 2 LEGAL THEORY 1, 13 (1996). Scientific, professional, and academic journals are widely thought (certainly by scientists and academics) to be the best forums available for discovering and learning truths, yet these communication systems are highly regulated. Editors and referees impose stringent criteria for the publication of submitted manuscripts. Attempts to “speak” in these forums are often rigidly controlled. People lacking the methodologies and technical skills demanded by these journals have no chance of getting their thoughts aired therein, and even well-trained practitioners encounter difficulties. But regulated journals of this sort are widely thought to be effective in promoting truth. *Id.*

485. Wolfram W. Swoboda, *Disciplines and Interdisciplinarity: A Historical Perspective*, in INTERDISCIPLINARITY AND HIGHER EDUCATION 49, 78–79 (Joseph J. Kockelmans ed., 1979).

486. POST, *supra* note 18, at 72–73.

487. *Id.* at 96.

progress of useful arts, the patent system can be seen as an essential component in developing the constitutional value of democratic competence. In the spheres of democratic competence, the disciplinary practices that develop new knowledge are protected.<sup>488</sup> The patent system is not a discipline that develops expert knowledge, or even reliable knowledge; rather, it is the means for disclosure and certification of new knowledge.<sup>489</sup> Patents are certificates of new knowledge, and the process of certification of new knowledge, like its creation, should also receive First Amendment coverage.

In the certification of knowledge, both the community and the gatekeepers play crucial roles.

### 1. The Community

Contemporary science is a social activity. Scientists need to rely on each other for samples, results, techniques, and more importantly, for verification.<sup>490</sup> Kuhn regards communities as “the producers and validators of scientific knowledge.”<sup>491</sup> Fittingly, Kuhn ends his book by comparing scientific knowledge with language as “the common property of a group” and with a reminder that “[t]o understand it we shall need to know the special characteristics of the groups that create and use it.”<sup>492</sup> Validation of expert knowledge is the domain of the community.<sup>493</sup> The state can have measures such as the patent system for validation of expert knowledge, but then it would have to ensure that such measures are aimed at enhancing and not diluting or weakening expert knowledge.<sup>494</sup> The grant of dubious patents certainly does not go well with the dissemination of expert knowledge. First Amendment coverage may arise when the state seeks to dilute, rather than enhance, the validation of expert knowledge.

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488. *Id.* at 59.

489. Shubha Ghosh & Jay Kesan, *What Do Patents Purchase? In Search of Optimal Ignorance in the Patent Office*, 40 HOUS. L. REV. 1219, 1225 (2004) (“Rather, in assessing the requirements of novelty, utility, and nonobviousness, the USPTO is certifying, by a grant of exclusivity in exchange for public disclosure, that the invention may be worth investing in.”).

490. KUHN, *supra* note 463, at 175–77.

491. *Id.* at 178.

492. *Id.* at 210.

493. *Id.* at 178.

494. *See* Ghosh & Kesan, *supra* note 489.



## 2. The Gatekeepers

The Patent Office, by virtue of its position as an evaluator, acts as a gatekeeper in deciding which invention gets a patent and which does not, and in doing so, it performs the role of certification of expert knowledge.<sup>495</sup> While scientific knowledge is developed in the individual disciplines, the government, through the Patent Office, offers a platform for the dissemination and certification of such knowledge.<sup>496</sup> There are things, other than scientific merit, that the Patent Office certifies. It certifies that the knowledge is workable and hitherto unknown.<sup>497</sup> By putting patents through the tests of patentability and by gauging them for the adequacy of disclosure, the Patent Office reviews and certifies certain aspects of scientific knowledge.<sup>498</sup>

This certification is done administratively without the involvement of experts.<sup>499</sup> The process of patent prosecution does not offer a venue for certification by experts.<sup>500</sup> The government regulates the field of certification of expert knowledge without allowing experts to communicate without restraint.<sup>501</sup> Scholars hold that “[t]he value of democratic competence is potentially at risk only if the state compromises the transmission of actual knowledge.”<sup>502</sup> The constitutional value protects not only the creation of expert knowledge but also the process of its certification.<sup>503</sup> As we are reminded, “[i]nsofar as the value of democratic competence safeguards the circulation of expert knowledge, it must necessarily also incorporate the disciplinary methods by which expert knowledge is created and certified.”<sup>504</sup> For “the value of democratic competence is undermined whenever the state acts

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495. *Id.*

496. *Id.*

497. See Carter, *supra* note 474, at 2082–83.

498. See, e.g., 35 U.S.C. § 303(a) (2012) (“On his own initiative, and any time, the Director may determine whether a substantial new question of patentability is raised . . .”). The power of the patent office to review patents is unilateral.

499. Noveck, *supra* note 11, at 125.

500. *Id.*

501. *Id.*

502. POST, *supra* note 18, at 56.

503. *Id.* at 58.

504. *Id.*

to interrupt the communication of disciplinary knowledge that might inform the creation of public opinion.”<sup>505</sup>

The doctrinal structure, identified by Post, “safeguards the independence of key liberal institutions that produce expert knowledge.”<sup>506</sup> The state should abstain from interfering with the creation and certification of expert knowledge, as these disciplinary practices enjoy constitutional status allowing “citizens to demand accountability from their government.”<sup>507</sup>

The patent system came into existence by way of constitutional mandate,<sup>508</sup> and its continuance, as a body that verifies and validates expert knowledge, will depend on its incorporating measures to certify expert knowledge, by means of peer-review. The impossibility of knowing the state of mind of PHOSITA necessitates the inculcation of peer knowledge from the industry, without which, substantive safeguards like the test of nonobviousness run the danger of becoming a bookish test where nonobviousness is determined, like novelty, against published works and not against what could be known by a person working in the industry.<sup>509</sup>

The two streams, the disciplines that create expert knowledge and the discipline that certifies such knowledge, should come together. As the *gatekeeper*, the Patent Office should perform a function similar to that of the Editorial Board of peer-reviewed journals. It should be the final arbiter of the certification process. The *community*, represented by peers in each discipline, should perform the role of consultants in helping the Patent Office in the decision-making process. For the process of peer-review to be effective, it should happen *ex ante* before the grant of the patent. Thus, expert knowledge encompassed in patents should be subject to peer-review before it is certified.

#### D. A CASE FOR *EX ANTE* VALIDATION OF PATENTS

A patent system can be viewed as a state-controlled discipline for validating expert knowledge.<sup>510</sup> Patent

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505. *Id.* at 61.

506. *Id.* at 59.

507. *Id.* at 59–60.

508. U.S. CONST. art. I, § 8, cl. 8.

509. Eisenberg, *supra* note 425, at 888 (noting that tacit knowledge of ordinary practitioners in the field cannot be documented in writing).

510. Ghosh & Kesan, *supra* note 489.

specifications textualize the invention as the speech of the inventor.<sup>511</sup> They cover technical knowledge usually generated by experts.<sup>512</sup> The technical speech captured and disclosed in patents can be regarded as expert knowledge.<sup>513</sup> While free speech requires content and viewpoint neutrality, expert knowledge, in turn, requires verification by a peer.<sup>514</sup> Expert knowledge is created in the different streams of science and technology and the patent system performs an important role of validating the expert technical knowledge by the grant of a patent.<sup>515</sup> One of the foremost means of validating expert knowledge is by peer-review.<sup>516</sup> Peer-validation of expert knowledge to be effective, like that of an article published in peer-reviewed journal,<sup>517</sup> must occur *ex ante*, i.e., before the grant of the patent.

The peer-validation process would attract First Amendment coverage. Since validity is the most significant aspect of the patent system, it is possible to argue for constitutional status of an *ex ante* peer-review within the patent system on the ground that it is essential for safeguarding the value of democratic competence. In fact, for constitutionally protecting democratic competence, it becomes necessary not only to protect the disciplinary practices that *create* expert knowledge but also to protect the practices that *validate* expert knowledge.<sup>518</sup> Viewed from this perspective, the constitutionality of a patent system which does not provide for an *ex ante* peer-validation mechanism is suspect and could possibly raise First Amendment issues.

If the process of granting patents amounts to the certification of expert knowledge, then such process would also be entitled to First Amendment coverage.<sup>519</sup> It would mean that the process should be free of restraints over the creation of expert knowledge. But since the process is done by the state, it would require the state to seek peer assistance to make the

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511. *See supra* Part II.

512. *See* Fromer, *supra* note 14.

513. *Id.*

514. *See* Berkenkotter, *supra* note 243.

515. *Cf. id.*

516. *Id.*

517. *Id.*

518. *See* POST, *supra* note 18, at 95–98.

519. *See supra* Part IV.A.2.

process meaningful and effective.<sup>520</sup> Private entities which review expert knowledge have their own peers to help them in certifying expert knowledge.<sup>521</sup> But when the state takes up the task of certifying expert knowledge, it has to open the doors to the peers at large and make the process democratic.<sup>522</sup> The process of certification will be suspect if peers are barred from having a say in the creation and certification of expert knowledge. The only way a peer can enter the patent discourse, as it stands today, is by questioning the validity after the grant, either before the court or at the Patent Office.<sup>523</sup>

Thus, a case for *ex ante* validation of patents can be made within the constitutional structure.<sup>524</sup> By bringing out the importance of peer-review procedure for embodiments of expert knowledge, it should be possible to shift the point of validation of patents to the prosecution stage preferably through an *inter partes* proceeding, as opposed to its present position after the grant.<sup>525</sup> If it works well, the process of *ex ante* validation could lead to improved quality in the grant.<sup>526</sup> Some scholars regard patents as “probabilistic property rights” and note as one of the reasons for the uncertainty, “the inability of third parties to participate effectively in determining whether a patent should issue.”<sup>527</sup> Others have been more specific in linking patent’s unreliability to the lack of peer-review.<sup>528</sup>

The proposal to introduce *ex ante* validation should not be seen as a move towards detailed examination of *all* patents.<sup>529</sup>

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520. Noveck, *supra* note 11, at 125.

521. See Relman, *supra* note 246.

522. Noveck, *supra* note 11, at 125.

523. See *supra* text accompanying notes 348–49.

524. For a common sense case see Merges, *supra* note 355, at 590 n.34.

525. The knowledge that peer-review certifies is grounded entirely in argument. Berkenkotter, *supra* note 243, at 247.

526. Cf. Marietta Del Favero, *Faculty Research and Scholarship, Assessment of*, in 3 ENCYCLOPEDIA OF EDUCATION 786, 788 (James W. Guthrie ed., 2d ed. 2003) (“Publications subjected to a peer-review process are typically considered to be of higher quality in that they are thought to have undergone a more rigorous critique than published work that is not reviewed.”).

527. Mark A. Lemley & Carl Shapiro, *Probabilistic Patents*, 19 J. ECON. PERSP. 75, 95 (2005).

528. Cf. Ouellette, *supra* note 238, at 571–72.

529. Cf. Lemley, *supra* note 10, at 1514 (“Even if we relax those assumptions beyond all reasonable bounds, the fundamental fact remains that litigation of a few patents is a far more efficient way of determining validity than giving a detailed *ex ante* examination to all patents.”).

Peer-review of every application will not be efficient.<sup>530</sup> The process of *ex ante* review should be an option which could be exercised in the case of valuable patents.<sup>531</sup> Peer-review mechanism by way of *inter partes* opposition proceedings could "give the PTO greater access to relevant industry knowledge . . ."<sup>532</sup> Peer-review of patents may not eliminate all the problems in the patent system. To be sure, peer-review did not do that for science.<sup>533</sup> The patent system could gain by emulating the scientific method, as theoretically, the standards of patenting and scientific publishing are the same.<sup>534</sup>

## V. CONCLUSION

"[H]ow we are able to constitute ourselves is profoundly tied to how we are already constituted by our own distinctive history."<sup>535</sup> The development of patents as the speech of the inventor augments the fact, more than it did anytime in the past, that patents are tools of communication by which we disseminate and validate scientific and technological advancements.<sup>536</sup> At no time in history has the interaction between the twin constitutional values, one promoting unhindered communication between experts and the other promoting the progress of useful arts, been so critical to the development of democratic societies. It will not be possible to make a constitutional case for *ex ante* validation of patents in a democracy devoid of First Amendment values. Democracy is governance by public opinion and for democracy to flourish there should be free flow of communication amongst novices and experts.<sup>537</sup>

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530. Eisenberg, *supra* note 425.

531. *Id.*

532. Rai, *supra* note 341, at 1134.

533. Publication, the quality of which is enhanced by the peer-review process, only makes the research available to a larger audience. It does not make the published knowledge scientific. BAUER, *supra* note 241, at 47.

534. Ouellette, *supra* note 238, at 546 ("In theory, however, the standards for obtaining a patent mirror those for publishing in a prestigious peer-reviewed scientific journal: researchers identify discoveries that are useful, novel, and nonobvious, and disclose those discoveries so other researchers can build on them.").

535. Hanna Fenichel Pitkin, *The Idea of a Constitution*, 37 J. LEGAL EDUC. 167, 169 (1987).

536. See *supra* Part II & Part III.

537. See POST, *supra* note 18, at 87.

“[S]cience is successful because of the scientific method.”<sup>538</sup> While scientific communities develop scientific knowledge, the role of the patent system with regard to such knowledge is limited to its validation.<sup>539</sup> For patents to achieve their purported goal of promoting the progress of useful arts, patent law should emulate a similar methodology for validation. By considering patent specifications as embodiments of technical speech, this paper makes a case for greater scrutiny of patents. Every time the Patent Office grants a patent, it certifies the expert knowledge covered by it. This paper argues that the disciplinary processes that generate expert knowledge should also inform the processes by which such knowledge is certified and, in the light of First Amendment principles protecting expert knowledge, makes a case for *ex ante* peer-review in the patent system.

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538. BAUER, *supra* note 241, at 44.

539. Ghosh & Kesan, *supra* note 489.