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Defining Patent Scope by the Novelty of the Idea

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DEFINING PATENT SCOPE BY THE NOVELTY OF THE IDEA

TUN-JEN CHIANG*

ABSTRACT

Patent law defines novelty by the creation of a new embodiment, not an idea. For example, the Wright brothers are deemed to have invented the airplane because nobody made an airplane before, not because they were the first to think of flying.

Patent law then defines monopoly scope through a theory of disclosure of embodiments: despite the airplane being new, the Wright brothers could not patent every airplane, ostensibly because they did not teach how to make every airplane embodiment (such as a jet fighter). Disclosure theory, however, is incoherent. Patent law cannot confine the Wright brothers to the embodiment they actually taught—a barely-flying wooden glider—since doing so would eviscerate incentives. But once we say that patents can cover more, disclosure theory provides no limit. If the Wright brothers could cover some undisclosed airplanes, why not all undisclosed airplanes?

I argue in this Article for a different theory. In order to be fairly credited as the inventor of something, the patentee must be the first to articulate the idea of that thing. The Wright brothers could not patent all airplanes under this theory, not because they did not disclose how to build

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every airplane, but because the idea of airplanes was old. By keying patent scope to the novelty of the idea rather than the disclosure of embodiments, my rule provides a fairer and more accurate measure of the patentee's contribution.

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INTRODUCTION

The standard theory of patent scope is disclosure. It is axiomatic that the invention “claimed by the patent application must be the same as what is disclosed in the specification.”¹ This reflects patent law’s fundamental quid pro quo: the monopoly covers the same invention as what the patentee contributes to society through disclosure.²

Disclosure theory, however, is incoherent. For example, it is often said that the Wright brothers invented the “airplane.”³ But of course the Wright brothers did not invent the *idea* of airplanes. They invented only one airplane *embodiment*: a single barely-flying wooden glider.⁴ A strict application of the quid pro quo principle might therefore say that the Wright brothers should be confined to replicas of their wooden glider. But this would eviscerate patent incentives, because a later pirate would change a few nuts and bolts while copying the core aerodynamic concepts.⁵ Courts therefore define the invention more abstractly, as an “airplane” and not a “wooden glider airplane.”⁶

But once we reject confining patent scope to the precise embodiment that has been disclosed, there is no obvious principled limit to this abstraction process.⁷ For example, did the Wright brothers invent:

- (1) “A wooden flying machine with wings and rudders”?
- (2) “A flying machine with wings and rudders”?
- (3) “A flying machine with wings”?
- (4) “A flying machine”?

Disclosure theory provides no principle to select among these competing levels of abstraction. Clearly some limit is needed, since otherwise the Wright brothers would claim all flying machines, including a future anti-gravity spaceship. As a historical matter, courts limited the Wright

1. Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722, 736 (2002).

2. See J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int’l, Inc., 534 U.S. 124, 142 (2001) (disclosure is the “quid pro quo of the right to exclude”).

3. See, e.g., WENDIE C. OLD, THE WRIGHT BROTHERS: INVENTORS OF THE AIRPLANE (2000).

4. Edwin E. Slosson, *How Man Learned to Fly*, 14 SCIENCE NEWS-LETTER 349, 351 (1928).

5. Graver Tank & Mfg. Co. v. Linde Air Prods. Co., 339 U.S. 605, 607 (1950).

6. The implication, of course, is that the patent covers all airplanes if the invention is defined in these terms. See ROBERT PATRICK MERGES & JOHN FITZGERALD DUFFY, PATENT LAW AND POLICY: CASES AND MATERIALS 28 (4th ed. 2007) (describing “open” claims).

7. See generally Tun-Jen Chiang, *The Levels of Abstraction Problem in Patent Law*, 105 NW. U. L. REV. 1097 (2011).

brothers to airplanes using wings and rudders, and did not give them all flying machines.⁸ But any limit (except to the literal embodiment) is arbitrary from the perspective of disclosure theory. After all, the Wrights did not teach how to make every airplane using wings and rudders—they taught nothing except a single wooden glider. And if they could cover *some* undisclosed flying machines, why not *all* undisclosed flying machines?

In more practical terms, this incoherence is reflected by the conflict between two lines of case law.⁹ One line says that patent scope covers only replication of the embodiments disclosed in the specification.¹⁰ Another line says that patentees must not be confined to the embodiments disclosed in the specification.¹¹ The result of this conflict is “doctrinal chaos” where outcomes are impossible to predict.¹²

Although the problem has been described in previous work by myself and others,¹³ no practical solution has emerged. One proposed solution has been for courts to calibrate patent scope using economic balancing.¹⁴ A patent covering only a wooden glider would eviscerate incentives, while a patent covering all flying machines would create excessive monopoly costs, and so a court should choose something in between. The problem with this economic balancing approach is that courts lack the capability to directly measure such economic variables as social benefits and monopoly costs with any degree of precision.¹⁵ The purpose of this Article is to provide a more practical solution.

The starting point is to note that, conceptually speaking, patent scope is directed to an idea.¹⁶ Although patent claims are often phrased in terms of

8. *Wright Co. v. Paulhan*, 177 F. 261, 264 (C.C.S.D.N.Y. 1910), *rev'd on other grounds*, 180 F. 112 (2d Cir. 1910).

9. See Bernard Chao, *Rethinking Enablement in the Predictable Arts*, 2009 STAN. TECH. L. REV. 3, ¶¶ 50–52 (discussing conflicts in doctrine).

10. *O'Reilly v. Morse*, 56 U.S. (15 How.) 62, 119 (1853) (patent covers “nothing more” than embodiments disclosed); see also *infra* text accompanying notes 82–91.

11. *Dolbar v. Am. Bell Telephone Co.*, 126 U.S. 1, 539 (1888) (“Surely a patent for such a discovery is not to be confined to the mere means [the patentee] improvised to prove the reality of his conception.”); see also *infra* text accompanying notes 92–93.

12. Kevin Emerson Collins, *Enabling After-Arising Technology*, 34 J. CORP. L. 1083, 1085 (2009).

13. See, e.g., Chiang, *supra* note 7; Chao, *supra* note 9; Collins, *supra* note 12; Jeffrey A. Lefstin, *The Formal Structure of Patent Law and the Limits of Enablement*, 23 BERKELEY TECH. L.J. 1141, 1168 (2008).

14. See, e.g., Chiang, *supra* note 7, at 1136–39; Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 842–44 (1990).

15. *Nash v. CBS, Inc.*, 899 F.2d 1537, 1541 (7th Cir. 1990).

16. See *Cont'l Paper Bag Co. v. E. Paper Bag Co.*, 210 U.S. 405, 418–19 (1908) (patents protect the “principle of the invention” (citing 2 WILLIAM C. ROBINSON, THE LAW OF PATENTS § 485 (1890))).

an embodiment—e.g., “a flying machine”—the legal effect of the claim is to cover the underlying idea. A claim to “a flying machine” is really a claim to the idea of artificial flight, since it will cover every flying machine. I mean this as a linguistic point about the mechanics of the patent document, not about whether such a patent would issue. That is, a claim to “a flying machine” might not be granted, but if a patentee submits such a claim to the patent office, every patent lawyer would understand the claim to cover all flying machines notwithstanding the use of the word “a.” This a-to-every linguistic trick is basic patent law.¹⁷

Although this linguistic point is simple, once stated explicitly, it becomes clear that patent law’s fundamental quid pro quo is comparing apples and oranges. While patent protection is enforced in terms of an idea against later accused infringers downstream, the patentee’s contribution over prior inventors is not assessed in those terms. Patent law says that the airplane was novel because the Wright brothers were the first to make one airplane embodiment.¹⁸ Patent law does not ask whether the Wright brothers invented the idea of airplanes: the idea of airplanes has existed since ancient times.

But in order to be fairly credited as the inventor of the idea and obtain a monopoly covering all future implementations of that idea, a patentee should be required to be the first to *think* of the idea in addition to merely creating one embodiment of it. My proposal is thus that a patentee should obtain a monopoly covering the new and non-obvious idea that he is the first to articulate and that is reflected in his embodiment. Importantly, this does not mean that the Wright brothers would receive no patent because the idea of airplanes had already been articulated.¹⁹ Rather, the Wrights would receive a patent covering the idea *at a lower level of abstraction*. The Wrights did not invent the idea of airplanes, because that idea had already been articulated.²⁰ But the Wrights *did* invent the idea of using rudders to control flight (or, more technically, linking yaw to roll via a

17. See MERGES & DUFFY, *supra* note 6, at 28.

18. See *infra* Part I.A.3. As already noted, the Wright brothers’ patent did not cover every airplane. See *supra* text accompanying note 8. This is not because the airplane was considered non-novel, but ostensibly because they did not disclose every airplane. The problem is that disclosure theory then cannot explain why they were permitted to cover *some* undisclosed airplanes.

19. For the same reasons, it does not mean that the inventor of a hyperdrive would receive no patent because of *Star Wars*. I address this “science fiction objection” in Part IV.A.

20. JOHN D. ANDERSON, JR., A HISTORY OF AERODYNAMICS 14–15 (1999).

rudder).²¹ Not fortuitously, as a matter of historical fact they received patent scope closely corresponding to that contribution.²²

The beauty of my proposal is that it provides a coherent principle to select among levels of abstraction. It is important to note that any new and non-obvious²³ embodiment will always contain a new idea among its many levels of abstraction—the new idea is what makes the embodiment non-obvious. My claim is simply that this novel insight, rather than the embodiment itself, represents the patentee’s contribution to downstream improvers and should define patent scope. A later aluminum airplane using rudders for flight control should still infringe the patent, even though the Wright brothers could not make aluminum airplanes, because the aluminum airplane is still using the Wright brothers’ idea of rudders for flight control. But in order to claim rights to the idea, the patentee must really invent the idea *as an idea* (i.e., be the first to articulate it).

The argument that patent scope should be defined by the idea that was actually invented by the patentee is primarily a moral claim. But it can also be cast in economic terms so that it fits comfortably within the dominant economics-based paradigm of patent law.²⁴ Economically speaking, the role of patent protection is to protect against misappropriation of information goods that, in the absence of protection, would be too easily copied.²⁵ Because the misappropriation risk applies to the idea and not the embodiment, the patentee’s insight represents a much better way to conceptualize the invention and what patent law should protect. But unless the idea was original to the patentee, there is nothing to misappropriate.

This Article proceeds in four Parts. Part I provides a brief background on novelty doctrine and the claiming of inventions. A key point here is the

21. G.D. Padfield & B. Lawrence, *The Birth of Flight Control: An Engineering Analysis of the Wright Brothers’ 1902 Glider*, 107 AERONAUTICAL J. 697, 698 (2003) (calling the use of a rudder to link aircraft yaw and roll “one of ‘the’ critical breakthroughs in the history of aviation and aeronautical engineering”).

22. *See* Wright Co. v. Paulhan, 177 F. 261, 264 (C.C.S.D.N.Y. 1910), *rev’d on other grounds*, 180 F. 112 (2d Cir. 1910) (interpreting patent to cover airplanes using a rudder that is linked to aircraft roll). In this way, while my theory is primarily normative, it also provides a better explanation than disclosure theory for many historical cases. *See infra* text accompanying notes 206–15.

23. *See* 35 U.S.C. § 103(a) (2006) (requiring non-obviousness).

24. F. Scott Kieff, *Property Rights and Property Rules for Commercializing Inventions*, 85 MINN. L. REV. 697, 697 (2001) (“The foundation for the American patent system is purely economic.”). *But see* Adam Mossoff, *Rethinking the Development of Patents: An Intellectual History, 1550–1800*, 52 HASTINGS L.J. 1255, 1257 (2001) (arguing that “natural-law philosophers shaped much of the initial common-law definition of patent rights”).

25. WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 294 (2003).

dichotomy between ideas and embodiments, where the patentee contributes a novel embodiment, but claims an idea. Part II then describes how this dichotomy between ideas and embodiments renders conventional disclosure theory incoherent. Part III describes my proposed alternative, where the focus is on the patentee's novel insight rather than the embodiment being disclosed. Part IV then considers some potential objections regarding my proposal, and discusses why these concerns are misplaced. A conclusion follows.

I. THE INVENTION AS IDEA AND EMBODIMENT

This Part provides some doctrinal background to patents. In particular, it is important to note two fundamental features of current patent law. First, novelty is assessed on an embodiment-centric basis, in terms of asking whether prior inventors had made the invention before. Second, patent scope is defined in terms of an idea. These doctrinal features are explained in more detail below.

A. *The Embodiment-Centric Assessment of Novelty*

As a matter of first principles, the contribution of an inventor to society can be conceptualized in two distinct ways: in economic terms as the amount of social welfare benefit that is created by investments in research, and in more philosophical terms as the “invention,” i.e., the product of that research. Although patent law is fundamentally utilitarian and seeks to advance social welfare,²⁶ it does not directly measure a patentee's contribution to society in dollars and utils. Such direct measurement of economic contribution is thought to be too difficult.²⁷ Instead, patent law conceptualizes the inventor's contribution as giving society a new “invention,” and assumes that a monopoly over the invention will confer (indirectly and imperfectly) a profit that matches the proper reward.²⁸ Novelty—giving society something it did not have before—is thus regarded as the key to a patentable contribution.²⁹

26. See *Mazer v. Stein*, 347 U.S. 201, 219 (1954) (“The economic philosophy behind the clause empowering Congress to grant patents and copyrights is the conviction that encouragement of individual effort by personal gain is the best way to advance public welfare . . .”).

27. Louis Kaplow, *The Patent-Antitrust Intersection: A Reappraisal*, 97 HARV. L. REV. 1813, 1844 (1984).

28. See LANDES & POSNER, *supra* note 25, at 298–300 (noting the many imperfections of this mechanism).

29. MERGES & DUFFY, *supra* note 6, at 357 (analogizing novelty to the consideration to make a contract binding).

This philosophical conception of the invention might be further conceptualized in two ways: as a new embodiment or as a new idea. A patent might be valuable because it gives society new gadgets (embodiment), or new knowledge (idea), or both. The point of the remainder of this section is that, when measuring novelty, patent law conceptualizes the invention as an embodiment, not as an idea.

This point can be made intuitively. Why are the Wright brothers considered the inventors of the airplane? Surely it is not that they were the first to think of the idea of machines that fly—that idea had existed since ancient times.³⁰ Rather, the Wright brothers are considered the inventors of the airplane because they were the first to *make* a working airplane embodiment.

Patent doctrine formalizes this common intuition. The process of determining novelty comprises three steps, which simply reflect the intuition we have when we say the Wright brothers invented the airplane. The first step is that the patentee must disclose a working embodiment.³¹ The second step is that the patentee has to identify (or “claim”) the feature that makes this embodiment new.³² The third step is to compare the patentee’s claim against all prior embodiments, to see if the claimed feature is in fact new.³³ The important point, however, is to note that this process is embodiment-centric: it focuses on whether prior inventors have *made* an airplane embodiment before. It does not focus on whether the idea of airplanes has been previously *thought of*.

1. *The Patent Specification Describes an Embodiment*

In simplified terms, the specification is the portion of the patent where technical knowledge about the invention is provided to the public. It is obviously important that the disclosure be detailed and meaningful so that the public can gain the full benefit of the invention once the patent expires.³⁴ Section 112 of the patent statute accordingly mandates that the specification “contain a written description of the invention, and of the

30. See *A Brief History of Rockets*, NAT’L AERONAUTICS & SPACE ADMIN., http://www.grc.nasa.gov/WWW/k-12/TRC/Rockets/history_of_rockets.html (last visited May 26, 2012) (relating the story of Archytas’ mechanical pigeon).

31. 35 U.S.C. § 112 para. 1 (2006).

32. 35 U.S.C. § 112 para. 2 (2006).

33. *Genetics Institute, LLC v. Novartis Vaccines & Diagnostics, Inc.*, 655 F.3d 1291, 1302 (Fed. Cir. 2011) (“Anticipation and obviousness require the court to compare the properly construed claims to the available prior art.”).

34. *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 480–81 (1974) (citing *United States v. Dubilier Condenser Corp.*, 289 U.S. 178, 187 (1933)).

manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art . . . to make and use the same.”³⁵

For example, a specification that describes a table invention would need to describe what it looks like (is it square or round); what it is made of (wood or plastic); how to make it (using nails or screws); and what it is used for (dining tables or reading desks). A helpful way to think about the specification is that it substitutes for a physical deposit of the invention in the patent office. Indeed, where words cannot fully describe the invention, a physical deposit may be used instead.³⁶

What this implies is that the “invention” being spoken of by § 112 is a concrete and tangible *embodiment*, not an idea. It would be nonsensical to require a description of how to “make and use” an idea, since ideas cannot be made. Moreover, the embodiment must be specified down to fairly minute detail, since the description must be “full, clear,” and “exact.”³⁷ This means that a very abstract disclosure, such as only saying that “a table is something with a flat surface supported by legs,” would be inadequate.³⁸ In short, when speaking of the invention being disclosed by the specification, patent law means a specific embodiment or a set of specific embodiments, all of which must be described in detail so that they can be made.³⁹

2. *Claiming the Inventive Features*

The “claim” in a patent is a one-sentence description of the invention.⁴⁰ A patent may (and often does) have multiple claims, since a specification

35. 35 U.S.C. § 112 (2006).

36. *Enzo Biochem, Inc. v. Gen-Probe Inc.*, 323 F.3d 956, 965 (Fed. Cir. 2002).

37. 35 U.S.C. § 112.

38. John F. Duffy, *Rules and Standards on the Forefront of Patentability*, 51 WM. & MARY L. REV. 609, 645 (2009) (“[A]bstraction is the very antithesis of the precision required by the disclosure provisions of the Patent Act.”).

39. See Merges & Nelson, *supra* note 14, at 845 (“Under section 112, the disclosure must be sufficient to enable someone skilled in the art to make and use all the embodiments of the invention claimed in the patent.”); see also Mark A. Lemley et al., *Life After Bilski*, 63 STAN. L. REV. 1315, 1329–30 (2011) (characterizing the present § 112 inquiry as “whether one could make the embodiments claimed”).

40. See 35 U.S.C. § 112 para. 2 (2006) (requiring claims). Strictly speaking, the claim is part of the specification. In conventional parlance, however, the “specification” is used to refer only to the disclosure component of a patent, in contradistinction to the claim. See CRAIG ALLEN NARD, *THE LAW OF PATENTS* 40 (2d ed. 2011). I will follow this conventional usage in this Article.

may contain more than one inventive feature.⁴¹ But like the specification, the claims are supposed to describe the invention,⁴² and this might make them seem redundant at first blush. The redundancy is mitigated by the fact that the specification and claims serve somewhat different roles.⁴³ While the specification is supposed to provide a very detailed scientific and technical disclosure, claims serve the role of identifying the inventive feature and thereby demarcating the legal right, i.e., the boundaries of the patent.⁴⁴

The reason that the specification description does not serve the role of boundary definition very well is that it tends to “mix[] up the new and old.”⁴⁵ That is, in order to explain what is so great about the invention, and what makes it different from older technology, it is usually necessary to describe the older technology itself in the specification, but obviously the older technology is not what is being patented. Additionally, the specification must often provide various other pieces of extraneous background for context. For example, if the invention is a new type of LCD monitor, then in order to make the monitor useful one must connect it to a computer, and so the specification must describe a computer as well—even though the computer is not the core invention that is being patented. Thus, although early patent statutes required only a specification to describe the invention,⁴⁶ from 1836 onwards the requirement was added for a separate claim section in the patent to “particularly specify and point out the part, improvement, or combination, which [the patentee] claims as his own invention or discovery.”⁴⁷

What this means in practice is that claims leave out extraneous details and focus only on the core inventive features. For example, the inventor of a table might make the legs out of oak wood, and the specification would describe the detailed properties of oak wood and why oak is good for

41. See John R. Allison & Mark A. Lemley, *Who's Patenting What? An Empirical Exploration of Patent Prosecution*, 53 VAND. L. REV. 2099, 2121 (2000) (average patent has approximately fifteen claims).

42. *Network, LLC v. Centraal Corp.*, 242 F.3d 1347, 1352 (Fed. Cir. 2001) (“The claims are directed to the invention that is described in the specification . . .”).

43. *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1561 (Fed. Cir. 1991) (“[T]he two standards, while complementary, approach a similar problem from different directions.” (quoting *Rengo Co. v. Molins Mach. Co.*, 657 F.2d 535, 551 (3d Cir. 1981))).

44. *S3 Inc. v. NVIDIA Corp.*, 259 F.3d 1364, 1369 (Fed. Cir. 2001) (“The purpose of claims is not to explain the technology or how it works, but to state the legal boundaries of the patent grant.”).

45. *Evans v. Eaton*, 20 U.S. (7 Wheat.) 356, 434 (1822). See *id.* at 433–35.

46. Patent Act of 1790, § 2, ch. 7, 1 Stat. 109; Patent Act of 1793, § 3, ch. 11, 1 Stat. 318.

47. Patent Act of 1836, § 6, ch. 357, 5 Stat. 117; see also 35 U.S.C. § 112 para. 2 (2006) (requiring “one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention”).

furniture. But obviously it is not particularly important that the legs of a table be made from oak, or even any type of wood at all. Rather, the key features of a table are that it has a flat surface and is supported by legs.⁴⁸ Thus, a typical claim to a table could read:

I claim that my invention is an apparatus comprising
a flat surface that is adjoined to
one or more legs.

The point of the claim is to identify the inventive features in a table—having a flat surface connected to legs—and exclude the irrelevant features, such as that the patentee’s particular table is made of oak wood.

It is worth noting here that the claim must, at least stylistically, be directed to a physical thing. A patentee cannot say, “I claim to have invented the engineering principle that flat surfaces supported by legs will not fall over.” Such a claim would be considered invalid because it does not claim an invention as defined by the statute,⁴⁹ i.e., a process, machine, manufactured article, or composition of matter.⁵⁰ As will be seen in Section B, this stylistic requirement is devoid of substance. But it is worth noting because it reflects the embodiment-centric conception of the invention as a physical thing.

3. *Comparing the Claimed Features to Prior Embodiments*

The third step in determining novelty and contribution is to compare the claimed inventive feature with the prior art—to check if what is claimed to be new really is so.⁵¹ The “prior art” is thus patent law’s version of the public domain.

What is important to understand is that the prior art is a set of preexisting embodiments, not a set of preexisting ideas. Under what is

48. WEBSTER’S THIRD NEW INTERNATIONAL DICTIONARY OF THE ENGLISH LANGUAGE 2324 (1986) (defining table as “a piece of furniture consisting of a smooth flat slab fixed on legs”).

49. *In re Nuijten*, 500 F.3d 1346, 1352 (Fed. Cir. 2007) (claim phrased as directed to a “signal” is non-statutory and invalid); Efthimos Parasidis, *A Uniform Framework for Patent Eligibility*, 85 TUL. L. REV. 323, 364 (2010).

50. 35 U.S.C. § 101 (2006).

51. The recently enacted Leahy-Smith America Invents Act makes this comparison explicit by amending the patent statute to require a comparison between the “claimed invention” and the prior art. Leahy-Smith America Invents Act, § 3, Pub. L. No. 112-29, 125 Stat. 284, 285–93 (2011). This amendment is purely stylistic, as the practice of comparing claims against the prior art had been firmly established even before this. *Key Pharm. v. Hercon Labs. Corp.*, 161 F.3d 709, 714 (Fed. Cir. 1998). The duality of the “claimed invention”—which can either mean an embodiment or an idea—also remains unchanged from the statute.

known as the “enablement requirement for prior art,”⁵² a prior reference such as a book or article must teach how to make an embodiment, or it is not prior art.⁵³ In many ways, this requirement is similar to the requirement of § 112 that the specification teach how to make and use the invention. The two are mirror opposites in their effect: § 112 invalidates a patent where it fails to teach an embodiment;⁵⁴ whereas the enablement requirement for prior art “invalidates” a prior reference.⁵⁵ What both imply is that, conceptually speaking, the invention being disclosed (either in the prior reference or in the specification) must be an embodiment that can be made.

The fact that the prior art is, conceptually speaking, only a set of preexisting embodiments may be somewhat counter-intuitive to those familiar with patent practice. In real life the most frequently encountered types of prior art are printed publications like books and articles,⁵⁶ not physical models and prototypes. But these are still disclosing embodiments, in the same way that patent specifications under § 112 disclose embodiments. A printed publication is only relevant *if*, and to the extent *that*, it teaches how to make an embodiment.⁵⁷ By themselves, the ideas disclosed by articles and books are considered worthless to patent law.⁵⁸ In other words, patent law frequently encounters embodiments that are only *constructively* reduced to practice. But a constructively made embodiment is still “made” nonetheless.⁵⁹

The ostensible policy reason underlying the enablement requirement for prior art is that mere ideas are not socially valuable.⁶⁰ The belief is that unless the prior art is limited to working embodiments, then patent law would end up rewarding science fiction writers with over-active

52. *Impax Labs., Inc. v. Aventis Pharm. Inc.*, 468 F.3d 1366, 1381 (Fed. Cir. 2006).

53. *Seymour v. Osborne*, 78 U.S. 516, 555 (1870) (“[T]he knowledge supposed to be derived from the publication must be sufficient to enable those skilled in the art or science to understand the nature and operation of the invention, and to carry it into practical use.”).

54. *CFMT, Inc. v. Yieldup Int’l Corp.*, 349 F.3d 1333, 1339 (Fed. Cir. 2003). It should be noted that this application of § 112 does not entail a levels of abstraction problem. If the patent teaches no embodiment at all and is entirely invalid, there is nothing to abstract out from. The patentee simply receives no monopoly.

55. *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1355 (Fed. Cir. 2003) (if a prior reference is not enabled, court must exclude the reference from consideration).

56. John R. Thomas, *Collusion and Collective Action in the Patent System: A Proposal for Patent Bounties*, 2001 U. ILL. L. REV. 305, 331.

57. *Amgen*, 314 F.3d at 1355 (non-enabled reference is excluded from evidence).

58. *Dewey & Almy Chem. Co. v. Mimex Co.*, 124 F.2d 986, 989 (2d Cir. 1942) (Hand, J.) (“If the earlier disclosure . . . does not inform the art without more *how to practice* the new invention, it has not correspondingly enriched the store of common knowledge” (emphasis added)).

59. See Collins, *supra* note 12, at 1095–96.

60. *Dewey*, 124 F.2d at 989.

imaginings speculating about future inventions.⁶¹ A science fiction writer who imagines a hyperdrive would preempt a hard-working inventor who actually creates such a device.

What occurs in the novelty comparison, therefore, is to compare the patentee's specification embodiment (constructively made) against the prior art embodiments (also usually constructively made). The comparison is not only for novelty but also for non-obviousness.⁶² Non-obviousness is simply an extension of novelty, in that the invention must not only be new, but it must be so *substantially* new that it is worth giving a monopoly over.⁶³ The claim identifies this new and non-obvious part or feature, and it then defines the boundary of the patent right.⁶⁴ This entire process operates on an implicit conceptualization of the invention as an embodiment, and views a patentable contribution as giving society new embodiments that had not been *made* before.

B. Claims and Downstream Coverage of Ideas

Although every patent claim is phrased as if it were describing the specification embodiment and the assessment of novelty is a comparison of embodiments, it is at the same time important to understand that a patent's downstream coverage (against people *subsequent* to the patentee) is much broader. The claim to *a* table having a flat surface connected to legs does not cover just one table; it covers *every* table. This a-to-every transition is basic patent law.⁶⁵ Yet it creates something of a paradox.⁶⁶

61. See Sean B. Seymore, *Rethinking Novelty in Patent Law*, 60 DUKE L.J. 919, 952 (2011) (arguing that "mere recitation" of an invention "constitute[s] nothing more than speculation about [its] potential or theoretical existence" (quoting *In re Wiggins*, 488 F.2d 538, 543 (C.C.P.A. 1973))).

62. Some people might object that obviousness is different from novelty because "a non-enabling reference may qualify as prior art for the purpose of determining obviousness." *Symbol Techs., Inc. v. Opticon, Inc.*, 935 F.2d 1569, 1578 (Fed. Cir. 1991). But later cases clarify that "[a]lthough published subject matter is 'prior art' for all that it discloses, in order to render an invention unpatentable for obviousness, the prior art must enable a person of ordinary skill to make and use the invention." *In re Kumar*, 418 F.3d 1361, 1368 (Fed. Cir. 2005). What this means is that an *individual* prior reference need not teach a working embodiment, but the prior art *as a whole* (which is the aggregation of all prior references) must. Thus, the prior art as a whole still exists only as a set of embodiments for obviousness purposes.

63. P.J. Federico, *Origins of Section 103*, 5 APLA Q.J. 87, 97 n.5 (1977) ("[N]ot everything which is new is capable of being patented. The newness, that is the difference over what was previously known, must be sufficient in character, or in quantity, or in quality, in order that the new thing may be patented."); see also *Graham v. John Deere Co.*, 383 U.S. 1, 9 (1966).

64. *Astrazeneca AB v. Mut. Pharm. Co.*, 384 F.3d 1333, 1336 (Fed. Cir. 2004) ("It is axiomatic that the claims mark the outer boundaries of the patent right to exclude.").

65. MERGES & DUFFY, *supra* note 6, at 28.

66. Timothy R. Holbrook, *Equivalency and Patent Law's Possession Paradox*, 23 HARV. J.L. & TECH. 1, 6 (2009).

The paradox is that the practical coverage of a claim encompasses far more than the embodiment that is disclosed in the specification.⁶⁷ The patent on a table will cover not only the patentee's specific table made using oak wood, but also tables made of any other material. Notably, this includes later-developed materials such as plastic or steel, and even more futuristic materials that have not even been invented today. In other words, the patent with this claim becomes a monopoly that covers the very *idea* of a table—something with a flat surface and legs. Although ideas are supposed to be unpatentable,⁶⁸ at the same time every patent in practical terms covers an idea of some sort. This paradox has long been recognized,⁶⁹ but it has never been resolved.

Of course, not every kind of idea is subject to patent coverage. Philosophical concepts and mental thoughts in the head are more difficult to claim, simply because a claim must still be phrased as if directed to an embodiment.⁷⁰ The point is not that every idea can be patented, but that every patent covers an idea.

Allowing patent coverage to exceed the precise limits of the specification embodiment makes good policy sense. Were it otherwise, pirates would circumvent the patent too easily. Even the most stupid pirate could take the patentee's oak table and make a cedar table.⁷¹ Thus, from an economic perspective, patents must allow some degree of abstraction, to say that, for example, the precise type of wood does not matter. But once we allow abstraction, then the claim will cover an idea of sorts. An abstraction *is* an idea.⁷² The idea might be comparatively narrow (e.g. wooden tables, made of any type of wood) or comparatively broad (e.g. tables, made of any material); but they are all still ideas.

67. *Id.*; see also Robin C. Feldman, *The Inventor's Contribution*, 2005 UCLA J.L. & TECH. 6, ¶ 60 (2005) ("A patent holder need only identify a single use and a single embodiment for the product to receive rights to a wide range of embodiments and all uses.").

68. *Gottschalk v. Benson*, 409 U.S. 63, 71 (1972) ("[O]ne may not patent an idea.").

69. 1 WILLIAM C. ROBINSON, *THE LAW OF PATENTS* 190–91 (1890) ("No proposition has been more frequently or positively stated by the courts than that a principle is not a patentable invention, and yet with almost equal positiveness and frequency they have declared that the subject-matter covered by a patent is the principle of the invention.").

70. See *In re Comiskey*, 554 F.3d 967, 979 (Fed. Cir. 2009) (holding that a pure mental process is not patentable).

71. See *Royal Typewriter Co. v. Remington Rand, Inc.*, 168 F.2d 691, 693 (2d Cir. 1948) (Hand, J.) ("[I]t is always, or almost always, possible to change the form . . . and yet cull the full advantage of the discovery."). See *id.* at 693–94.

72. See EMERSON STRINGHAM, *DOUBLE PATENTING* 209 (1933) ("In patent law there is no possibility of clear thinking until it is understood that an 'invention' as protected . . . is an abstraction, an idea of means.").

This creates a real tension in patent law's fundamental *quid pro quo*, which is the basis of disclosure theory.⁷³ If the invention for upstream novelty purposes is an embodiment, while the invention that defines downstream coverage is an idea, then the *quid pro quo* equation breaks down. The next Part discusses this problem in detail.

II. THE INCOHERENCE OF DISCLOSURE THEORY

Suppose tomorrow a scientist discovers that a certain type of radiation—call it *X* radiation—cures AIDS when administered at a certain dosage—say 10 rads—and builds a radiation machine to implement this cure. The scientist then files a patent, wherein he discloses this cure in detail, including the 10 rad dosage and the details of the radiation machine. This is surely a new, useful, and non-obvious invention worthy of a patent. But what is the “invention” that has been “disclosed”?

From a certain point of view, we might argue that the patent discloses only a single radiation machine for curing AIDS at a dosage of 10 rads of *X* radiation.⁷⁴ The implication of this characterization of the invention is that a later pirate who uses 11 rads, or builds a slightly different machine, would not infringe the patent. This outcome would eviscerate patent incentives.

But as with the example of the airplane in the Introduction, once we reject confining patent scope to the precise embodiment that has been disclosed, there is no obvious principled limit on permissible abstraction. The patentee may try to claim all cures for AIDS, including a future pill that bears no resemblance to radiation, or perhaps even claim that the invention is “a cure for a previously incurable disease.” In practical terms, the invention might be claimed in the following ways:

- (1) A cure for AIDS
- (2) A cure for AIDS using radiation
- (3) A cure for AIDS using *X* radiation
- (4) A cure for AIDS using 10 rads of *X* radiation

73. See *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l., Inc.*, 534 U.S. 124, 142 (2001) (disclosure is the “*quid pro quo* of the right to exclude”).

74. See, e.g., *O'Reilly v. Morse*, 56 U.S. (15 How.) 62, 119 (1853) (“The specification of this patentee describes his invention or discovery, and the manner and process of constructing and using it; and his patent . . . covers nothing more.”).

Each level of abstraction seems equally accurate in describing the invention.⁷⁵ But translated into patent scope they have very different practical effects. A later-developed pill infringes the first claim but not the others. A court adjudicating infringement thus must choose—it cannot avoid the question. And this dilemma is not limited to courts: any decision-maker who has to decide patent scope, such as the patent office, must select the level of abstraction at which a patentee will be permitted to claim.⁷⁶ The question is the legal principle by which this choice is made.

One way to narrow down the range of choices would be to rely on the well-established doctrines of novelty and non-obviousness.⁷⁷ These doctrines do provide some limit on permissible scope, if the claim reaches already-existing *things*. An even-more-abstract claim to “a cure for disease” would be invalid, because it would cover existing cures for other diseases. But the novelty standard, confined as it is to preexisting embodiments, is obviously inadequate for patent law’s needs. The scientist can argue that “a cure for AIDS” is new, because nobody has made a cure before. Similarly, the Wright brothers could have argued that a claim to all airplanes is new, because nobody had made an airplane before. But granting a patent covering a later pill cure having nothing to do with radiation, or covering a future antigravity airplane, seems obviously excessive. Some other limit is needed. Because novelty is a very lax limit in its embodiment-centric incarnation, patent law relies on disclosure doctrine to provide this additional limit.⁷⁸

75. Cf. Dan L. Burk & Mark A. Lemley, *Quantum Patent Mechanics*, 9 LEWIS & CLARK L. REV. 29, 31–40 (2005) (arguing that claim language has a similar levels of abstraction problem). It is worth noting that I disagree with the Burk and Lemley argument. Burk and Lemley argue that because a court might construe the term “a screw” to cover only wooden screws, or any screw, or any fastening device in general, there is no objectively right answer as to what “screw” means. But the fact that courts can twist language to reach any result does not prove that the word “screw” has no objective meaning to ordinary readers. It simply proves that courts have lots of power. In contrast, the levels of abstraction problem with the invention is not just that courts disagree, but that there is no objectively right answer more generally. Conflict in judicial outcomes here *reflects* the underlying issue. Ordinary people do not think the word “screw” means all fastening devices. They *do* sometimes think that the Wright brothers invented all airplanes.

76. I focus on courts because they have the final say. See 35 U.S.C. §§ 141, 282 (2006) (providing for direct and collateral review of patent office decisions).

77. 35 U.S.C. §§ 102–103 (2006).

78. See *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473, 1480 (Fed. Cir. 1998) (patentee “is entitled to claims as broad as the prior art and his disclosure will allow” (quoting *In re Rasmussen*, 650 F.2d 1212, 1214 (C.C.P.A. 1981))).

A. *Disclosure Theory in Doctrine*

The two primary doctrines that limit permissible abstraction are the disclosure doctrine of § 112, and the abstract idea doctrine.⁷⁹ Both ultimately reflect the disclosure theory. As this section will demonstrate, both are incoherent.

1. *Section 112*

The disclosure theory is most clearly reflected in § 112 of the patent statute, which states that the specification must “contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art . . . to make and use” the invention.⁸⁰ The corollary of the requirement that the specification describe how to make and use the invention is that, should the specification fail to do so, the patent would be invalid.⁸¹

As a textual matter, the most plausible reading of § 112 is that it defines the invention as an embodiment (or set of embodiments) that can be “made.” What follows is that the most conceptually coherent and textually faithful way to implement § 112 is to define claim scope in the same terms. In short, patent scope must be limited to the embodiments whose manufacture and use are taught by the specification. Covering untaught embodiments would be forbidden under this logic.

More or less, this is the dominant understanding of § 112.⁸² I say “more or less” because this line of case law permits one minor fudge at the edges, which is that an infringing embodiment may be *implicitly* taught by the specification, by combining the specification disclosure with the background knowledge of people in the relevant scientific field (or, in patent parlance, the “skill of the art”).⁸³ But an implicitly taught

79. Another doctrine which performs this function is the reverse doctrine of equivalents, which again is tied to disclosure in limiting patentees to their specification embodiment. See *In re Hogan*, 559 F.2d 595, 607 (C.C.P.A. 1977) (reverse doctrine of equivalents requires “interpretation of claims in light of the specification”). I do not discuss this doctrine because it is dead. See *Roche Palo Alto LLC v. Apotex, Inc.*, 531 F.3d 1372, 1378 (Fed. Cir. 2008); Timothy R. Holbrook, *Possession in Patent Law*, 59 SMU L. REV. 123, 145 (2006).

80. 35 U.S.C. § 112 (2006).

81. 35 U.S.C. § 282(3) (2006).

82. Lemley et al., *supra* note 39, at 1329–30 (characterizing the § 112 inquiry as “whether one could make the embodiments claimed”); Merges & Nelson, *supra* note 14, at 845 (“Under section 112, the disclosure must be sufficient to enable someone skilled in the art to make and use all the embodiments of the invention claimed in the patent.”).

83. *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384 (Fed. Cir. 1986) (“[A]

embodiment is still taught, so the amount of stretching is minor.⁸⁴ Thus, in *Automotive Technologies International, Inc. v. BMW, Inc.*,⁸⁵ the Federal Circuit held that a patentee who invented a mechanical crash sensor (to deploy air bags when a crash occurs) could not cover a later-developed electronic sensor using the basic same design, because the patent specification did not adequately teach how to make electronic sensors.⁸⁶

The rule limiting patent claims to the embodiments taught by the specification, however, would eviscerate patent incentives. Confining the patentee to the specific embodiments in the specification would mean that a pirate could change a few nuts and bolts and thereby avoid infringement.⁸⁷ The fudge that specification teaching can be supplemented by background knowledge helps to mitigate, but does not solve, this problem. While background knowledge may allow making very minor changes like paint color, it cannot even bridge the small gap between a mechanical sensor and an electronic sensor of the same design.⁸⁸ Moreover, the relevant time for ascertaining what the specification teaches is when the patent is *filed*,⁸⁹ and supplemental background knowledge is thus likewise frozen at this time.⁹⁰ But technology often evolves very quickly, so the frozen background knowledge becomes outdated in short order.⁹¹

Thus, a contrary line of cases holds that patentees may claim undisclosed future improvements.⁹² This line of cases criticizes the economic effect of limiting patentees to the specification embodiments:

patent need not teach, and preferably omits, what is well known in the art”).

84. *Genentech, Inc. v. Novo Nordisk, A/S*, 108 F.3d 1361, 1366 (Fed. Cir. 1997) (cautioning that the *Hybritech* rule is “merely a rule of supplementation, not a substitute for a basic enabling disclosure”).

85. 501 F.3d 1274 (Fed. Cir. 2007).

86. *Id.* at 1284.

87. *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 607 (1950).

88. *Auto. Techs.*, 501 F.3d at 1284.

89. *Chiron Corp. v. Genentech, Inc.*, 363 F.3d 1247, 1254 (Fed. Cir. 2004).

90. *Id.* (“[A] patentee preferably omits from the disclosure any routine technology that is well known at the time of application.” (emphasis added)).

91. For example, within the term of the Wright brothers’ patent, aviation evolved from their barely-working glider to World War I fighter planes that were much better. *See Padfield & Lawrence, supra* note 21, at 717 (“[A]fter 1908 the rate of progress in aviation was quite startling; progress which, in many ways, would leave the Wright brothers behind . . .”).

92. *See, e.g., SuperGuide Corp. v. DirecTV Enters., Inc.*, 358 F.3d 870, 880 (Fed. Cir. 2004) (“The law ‘does not require that an applicant describe in his specification every conceivable and possible future embodiment of his invention.’” (quoting *SRI Int’l v. Matsushita Elec. Corp.*, 775 F.2d 1107, 1121 (Fed. Cir. 1985) (en banc))); *Spectra-Physics, Inc. v. Coherent, Inc.*, 827 F.2d 1524, 1533 (Fed. Cir. 1987) (“[A] broad claim . . . is not invalid for lack of enablement simply because it reads on another embodiment of the invention which is inadequately disclosed.” (internal citation omitted)).

[Section 112] does not require the inventor to foresee every means of implementing an invention at pains of losing his patent franchise. Were it otherwise, claimed inventions would not include improved modes of practicing those inventions. Such narrow patent rights would rapidly become worthless as new modes of practicing the invention developed, and the inventor would lose the benefit of the patent bargain.⁹³

The two lines of cases under § 112 directly contradict each other. One line forbids claiming beyond the specification embodiments and forbids claiming later-developed technology; the other allows both. A citation to one line or the other can justify any outcome. As Judge Rader of the Federal Circuit summarized when discussing two cases from opposing camps: “In *LizardTech*, this court says that a claim scope in excess of the specification’s embodiments invalidates the claim. In *JVW*, this court says that a claim scope in excess of the specification’s embodiments grants a broader range of infringement. The facts are very similar, the results are not.”⁹⁴ But although the problem is familiar, no solution has appeared.

2. *The Abstract Idea Doctrine*

At first blush, it might seem strange for me to include the abstract idea doctrine in a section about disclosure theory. On its face, the abstract idea doctrine simply holds that an “idea” cannot be patented,⁹⁵ and says nothing about disclosure. But as shall be seen, the abstract idea doctrine in fact shares the same themes, concerns, and problems as the § 112 cases.⁹⁶

This can most easily be seen by comparing and contrasting two famous Supreme Court cases that are classified under the abstract idea doctrine:⁹⁷ Samuel Morse’s invention of the telegraph and Alexander Graham Bell’s invention of the telephone.⁹⁸ On their face, these inventions seem closely analogous: each was a long-sought and revolutionary telecommunications

93. *Invitrogen Corp. v. Clontech Labs., Inc.*, 429 F.3d 1052, 1071 (Fed. Cir. 2005).

94. *LizardTech, Inc. v. Earth Res. Mapping, Inc.*, 433 F.3d 1373, 1376 (Fed. Cir. 2006) (Rader, J., dissenting from denial of rehearing *en banc*).

95. *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. 498, 507 (1874).

96. Indeed, the conflict can be seen throughout the history of patent law, under different doctrinal names. See Karl B. Lutz, *Evolution of the Claims of U.S. Patents*, 20 J. PAT. OFF. SOC’Y 134, 383–84 (1938) (discussing the conflict between “strict” and “liberal” approaches in the Supreme Court’s 1853 Term).

97. See Kevin Emerson Collins, *Bilski and the Ambiguity of “An Unpatentable Abstract Idea”*, 15 LEWIS & CLARK L. REV. 37, 50 (2011) (classifying *Morse* as an abstract idea case).

98. *O’Reilly v. Morse*, 56 U.S. (15 How.) 62 (1853); *Dolbear v. Am. Bell Tel. Co.*, 126 U.S. 1 (1888).

device. What is not at all alike is how they were treated by the Supreme Court, a dissimilarity that has puzzled generations of patent lawyers.⁹⁹

In the first case, when Morse came before the Court, he expressly attempted to claim a very high level of abstraction:

I do not propose to limit myself to the specific machinery or parts of machinery described in the foregoing specification and claims; the essence of my invention being the use of the motive power of the electric or galvanic current, which I call electro-magnetism, however developed for marking or printing intelligible characters, signs, or letters, at any distances, being a new application of that power of which I claim to be the first inventor or discoverer.¹⁰⁰

As the Court interpreted this claim, it covered every mode of “writing or printing at a distance by means of the electric or galvanic current.”¹⁰¹ Thus, under this interpretation, the claim would cover modern fax machines and email.¹⁰²

The Supreme Court held that the claim was “too broad” and thus invalid.¹⁰³ The Court’s reasoning in support of this holding is somewhat murky,¹⁰⁴ but it expressed two basic concerns. First, as a legal matter, the Court cited the then-recent case of *Le Roy v. Tatham*,¹⁰⁵ which had stated in dicta that “a principle is not patentable.”¹⁰⁶ The Court then held that the use of electromagnetic force to transmit characters was an unpatentable principle.¹⁰⁷ Neither *Le Roy* nor *Morse*, however, explained in more detail what the legal test for an unpatentable principle or idea would be.

In addition to the conclusory and uninformative reasoning that the claim was directed to an unpatentable abstract idea, the Court gave a much more practical reason. It reasoned that the claim would cover many future variations and improvements of the telegraph, and would thereby impede

99. See, e.g., Dan L. Burk & Mark A. Lemley, *Fence Posts or Sign Posts? Rethinking Patent Claim Construction*, 157 U. PA. L. REV. 1743, 1768 (2009); Dana Remus Irwin, *Paradise Lost in the Patent Law? Changing Visions of Technology in the Subject Matter Inquiry*, 60 FLA. L. REV. 775, 793 & n.111 (2008).

100. *Morse*, 56 U.S. at 112.

101. *Id.* at 113.

102. Richard H. Stern, *Scope-of-Protection Problems with Patents and Copyrights on Methods of Doing Business*, 10 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 105, 117 n.43 (1999).

103. *Morse*, 56 U.S. at 113.

104. See A. Samuel Oddi, *Regeneration in American Patent Law: Statutory Subject Matter*, 46 IDEA 491, 512 (2006) (describing the Court’s reasoning as “somewhat mystifying”).

105. 55 U.S. (14 How.) 156 (1852).

106. *Id.* at 175.

107. *Morse*, 56 U.S. at 117.

progress.¹⁰⁸ To prevent this, the Court held, patentees should be rigorously limited to the embodiments described in their specification:

The specification of this patentee describes his invention or discovery, and the manner and process of constructing and using it; *and his patent . . . covers nothing more.*¹⁰⁹

From this reasoning, one might interpret the abstract idea doctrine to state a legal rule that patentees are strictly limited to the specific embodiment taught by the specification. Covering anything more would render the claim an impermissible abstraction. This has obvious similarity to the first line of cases under § 112.¹¹⁰

But this rule is directly contradicted by the Court's subsequent decision in *Dolbear v. American Bell Telephone Co.*¹¹¹ In *Bell*, an analogous inventor of an analogous device filed a very similar-looking claim to Morse. Bell's claim read: "The method of, and apparatus for, transmitting vocal or other sounds telegraphically, as herein described, by causing electrical undulations, similar in form to the vibrations of the air accompanying the said vocal or other sounds, substantially as set forth."¹¹² What this means in English (or, more relevantly, as the Court interpreted it) is that it claims using continuous electric current that mimics sound waves to transmit voice across distances.¹¹³ Obviously, transmitting voice using electricity in a telephone is rather analogous to transmitting text using electricity in a telegraph. Despite these similarities, the Court upheld Bell's claim.¹¹⁴ The Court's formal distinction was that Bell's claim identified continuous electric current in a closed circuit, while Morse's claim was to any type of electric current.¹¹⁵ This formal distinction, of course, is rather implausible, since nobody really thinks that Morse was claiming the use of electricity *outside* of a closed circuit (i.e., using lightning).

108. *See id.* at 113.

109. *Id.* at 119 (emphasis added).

110. *See* Duffy, *supra* note 38, at 645 ("[A]bstraction is the very antithesis of the precision required by the disclosure provisions of the Patent Act.").

111. 126 U.S. 1 (1888).

112. *Id.* at 13–14.

113. *See id.* at 537 ("The method, 'as herein described,' is to cause gradual changes in the intensity of the electric current used as the medium of transmission, which shall be exactly analogous to the changes in the density of the air, occasioned by the peculiarities in the shapes of the undulations produced in speech . . .").

114. *Id.* at 535.

115. *Id.* at 534–35.

But the more fundamental problem is that the cases state directly contradictory legal rules for whether a patentee can claim more than the specification embodiment. In *Bell*, the Court rhetorically states, “Surely a patent for such a discovery [as the telephone] is not to be confined to the mere means [Bell] improvised to prove the reality of his conception.”¹¹⁶ Logically, this states a rule: patentees can cover more than the embodiment (or “means”) disclosed in the specification. But in *Morse*, the Court states flatly that a patent covers “nothing more” than “the means [the patentee] specifies.”¹¹⁷ Even taking the factual distinction concerning closed circuits at face value, the legal rules being stated still directly contradict each other.

What this means is that “no one can figure out what constitutes abstract ideas.”¹¹⁸ Commentators have long suspected that outcomes in this area are being determined by extra-legal considerations rather than meaningful legal doctrine.¹¹⁹ This, too, is a lot like § 112.¹²⁰

B. The Economic Balancing Alternative and Its Problems

An interesting contrast to the approach of patent law to scope is the approach of copyright. Copyright law has essentially the same levels of abstraction problem as patent law: limiting copyright scope to verbatim reproduction of the literal text would mean that “a plagiarist would escape by immaterial variations,”¹²¹ but once the law allows more, there is no principled limit on how much abstraction should be allowed.¹²² If changing a few words is still plagiarism, then why not lines, pages, or chapters?

Although the problem is rather similar, copyright courts differ from their patent counterparts in addressing the problem more transparently. Copyright courts acknowledge that the levels of abstraction problem exists and that doctrine cannot resolve it,¹²³ and some courts go so far as to acknowledge that decisions about copyright scope in fact depend on extra-

116. *Id.* at 539.

117. *O'Reilly v. Morse*, 56 U.S. (15 How.) 62, 119 (1853).

118. Michael Risch, *Forward to the Past*, 2010 CATO SUP. CT. REV. 333, 336.

119. *See, e.g.*, 1 DONALD S. CHISUM, CHISUM ON PATENTS § 1.03[2][c] (2011) (“The holding in the Telephone Case was undoubtedly influenced by the desire to secure recognition and reward for Alexander Graham Bell.”).

120. *See* Chiang, *supra* note 7, at 1136–37 (arguing that the incoherence of § 112 doctrine means that courts resort to economic considerations).

121. *See* *Nichols v. Universal Pictures Corp.*, 45 F.2d 119, 121 (2d Cir. 1930).

122. *Id.* (“Nobody has ever been able to fix that boundary . . .”).

123. *Id.*

legal economic balancing.¹²⁴ Patent courts acknowledge none of these things.¹²⁵ However, as described above, patent doctrine equally fails, and the decisions are thus necessarily being driven by extra-legal considerations.

If legal rules will not work and the analysis is being driven by extra-legal considerations, perhaps one answer is that patent law should simply follow the copyright example. That is, instead of trying to make the abstract idea doctrine or § 112 more coherent and meaningful, perhaps they *should* be deemed empty labels. The real decision about appropriate patent scope would be determined by an economic balance between maximizing the incentive benefits of greater patent scope against minimizing the monopoly costs.¹²⁶ Judges would thus first attempt to calculate the optimal patent scope, and then manipulate doctrine to reach these predetermined results, and as in copyright law they would be more honest about what they were doing.

Transparency and candid acceptance of doctrinal failure can be considered a virtue in itself.¹²⁷ But an approach that relies on courts directly measuring and balancing economic costs and benefits has the problem that courts are institutionally ill-equipped to collect the kind of economic information needed to make accurate assessments.¹²⁸ This is an acknowledged problem in copyright law.¹²⁹ Patent courts are unlikely to do any better.¹³⁰

In theory, one advantage of openly acknowledging the role of economic balancing in scope decisions is that it allows litigants to supply courts with the missing information about the relevant economic variables.¹³¹ But even with such help, collecting complete and accurate economic information is still a frightfully expensive exercise.

124. *Herbert Rosenthal Jewelry Corp. v. Kalpakian*, 446 F.2d 738, 742 (9th Cir. 1971) (“The guiding consideration in drawing the line is the preservation of the balance between competition and protection reflected in the patent and copyright laws.”).

125. *Auto. Techs. Int’l, Inc. v. BMW, Inc.*, 501 F.3d 1274, 1281 (Fed. Cir. 2007).

126. Chiang, *supra* note 7, at 1136–37; Merges & Nelson, *supra* note 14, at 868–71.

127. See Mathilde Cohen, *Sincerity and Reason-Giving: When May Legal Decision Makers Lie?*, 59 DEPAUL L. REV. 1091, 1091 (2010).

128. Kaplow, *supra* note 27, at 1844 (“A central reason for reliance on a patent system is that it is thought to be too difficult to determine the appropriate level of reward fairly and accurately on a case-by-case basis.”).

129. *Nash v. CBS, Inc.*, 899 F.2d 1537, 1541 (7th Cir. 1990).

130. See Keith E. Maskus, *Lessons from Studying the International Economics of Intellectual Property Rights*, 53 VAND. L. REV. 2219, 2221 (2000) (noting the “complex calculation among the interests of innovators, consumers, and second comers” and that comparing real life with the theoretical ideal is “fraught with conceptual and practical difficulties”).

131. Chiang, *supra* note 7, at 1139.

An example of a legal regime where litigants do provide courts with the relevant economic information is antitrust law. Modern antitrust law generally relies on the “rule of reason,” where “the factfinder weighs all of the circumstances of a case in deciding whether a restrictive practice should be prohibited as imposing an unreasonable restraint on competition.”¹³² The result is that antitrust cases depend on enormous amounts of economic data collection and battles of experts.¹³³ While most commentators applaud the modern economics-focused approach of antitrust law over the prior approach of relying primarily on legalistic *per se* rules,¹³⁴ there is little doubt that the modern approach results in very costly litigation.¹³⁵ The accuracy benefits are also limited given that judges are ill-equipped to comprehend the complex economic data when the experts are in sharp conflict (as they always are).¹³⁶

Such a costly information-gathering process cannot be justified for the overwhelming majority of patents or copyrights, because the overwhelming majority of patented inventions and copyrighted works eventually prove to be worthless in the market—they are books that nobody wants to read and gadgets (or, more accurately, ideas about gadgets) that nobody wants to use.¹³⁷ In those cases, the relevant intellectual property provides neither benefit to its owner nor monopoly cost to the public, and it is not administratively efficient to engage in a massive economic data collection effort to determine whether the right

132. *Continental T.V., Inc. v. GTE Sylvania Inc.*, 433 U.S. 36, 49 (1977).

133. Andrew I. Gavil, *After Daubert: Discerning the Increasingly Fine Line Between the Admissibility and Sufficiency of Expert Testimony in Antitrust Litigation*, 65 ANTITRUST L.J. 663, 663 (1997).

134. See, e.g., Arndt Christiansen & Wolfgang Kerber, *Competition Policy with Optimally Differentiated Rules Instead of “Per Se Rules vs Rule of Reason”*, 2 J. COMPETITION L. & ECON. 215 (2006) (arguing for “differentiated rules” rather than either a *per se* rule or a rule of reason approach); Frank H. Easterbrook, *On Identifying Exclusionary Conduct*, 61 NOTRE DAME L. REV. 972, 980 (1986) (“What we need is a set of intelligent presumptions, not a stab at the ultimate question of efficiency.”); Thomas A. Lambert, *Dr. Miles is Dead. Now What?: Structuring a Rule of Reason for Evaluating Minimum Resale Price Maintenance*, 50 WM. & MARY L. REV. 1937 (2009) (arguing for a “structured” rule of reason).

135. See *Bell Atlantic Corp. v. Twombly*, 550 U.S. 544, 558 (2007) (citing William H. Wagener, Note, *Modeling the Effect of One-Way Fee Shifting on Discovery Abuse in Private Antitrust Litigation*, 78 N.Y.U. L. REV. 1887, 1898–99 (2003)) (discussing the “unusually high cost of discovery in antitrust cases”); see also, e.g., *United States v. Microsoft Corp.*, 253 F.3d 34, 47 (D.C. Cir. 2001) (noting that it took a seventy-six-day trial to collect relevant facts).

136. Geoffrey A. Manne & Joshua D. Wright, *Innovation and the Limits of Antitrust*, 6 J. COMPETITION L. & ECON. 153, 195–96 (2010); see also Easterbrook, *supra* note 134, at 780 (arguing that judges are making stabs in the dark).

137. Dennis D. Crouch, *The Patent Lottery: Exploiting Behavioral Economics for the Common Good*, 16 GEO. MASON L. REV. 141, 150 (2008).

should be issued in the first place.¹³⁸ Unlike antitrust trials that occur only rarely, the patent office processes over 500,000 patent applications every year.¹³⁹ Conducting a detailed economic study on every patent application is neither feasible nor administratively worthwhile.

Thus, it seems that economic data will not be available in the vast majority of cases. Practically speaking, an economic balancing approach must instead rely on a judge's rough guesses about the relevant economic variables.¹⁴⁰ While candidly using rough economic guesses to reach outcomes is better than outwardly pretending to use legal rules while still relying on the same rough economic guesses *sub rosa*, neither regime can be considered very satisfactory.

C. *The Costs of Incoherence*

Uncertainty about patent scope is almost self-evidently bad. The usual framing of the problem is economic: uncertainty increases litigation cost and business risk.¹⁴¹ Because patentees and their competitors are all risk-averse, an increase in the uncertainty of the patent system harms everyone.¹⁴² As James Bessen and Michael Meurer have shown, in many areas the cost of patent litigation is exceeding the research and development investments that the patent system is supposed to be incentivizing in the first place.¹⁴³

These economic costs are real, but they are not the only costs. A more subtle cost of doctrinal incoherence is that the resulting judicial discretion and use of extra-legal considerations undermines the legitimacy of the patent system and of the judiciary more generally.¹⁴⁴ This is the case

138. Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495, 1497 (2001).

139. U.S. PATENT & TRADEMARK OFFICE, PERFORMANCE AND ACCOUNTABILITY REPORT FISCAL YEAR 2010 125 (2010) (showing 553,549 applications processed).

140. *Nash v. CBS, Inc.*, 899 F.2d 1537, 1541 (7th Cir. 1990) (stating that courts “muddle through”).

141. *See, e.g., Valley Drug Co. v. Geneva Pharm., Inc.*, 344 F.3d 1294, 1308 (11th Cir. 2003) (“Patent litigation is too complex and the results too uncertain for parties to accurately forecast . . .”).

142. *See Kelly Casey Mullally, Legal (Un)certainty, Legal Process, and Patent Law*, 43 LOY. L.A. L. REV. 1109, 1140 (2010) (arguing that uncertainty harms competitors); John W. Schlicher, *Patent Licensing, What to do After Medimmune v. Genentech*, 89 J. PAT. & TRADEMARK OFF. SOC'Y 364, 380 (2007) (arguing that increasing risk harms risk-averse patent owners).

143. JAMES BESSEN & MICHAEL J. MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK 153 (2008).

144. *See Or Bassok, The Sociological-Legitimacy Difficulty*, 26 J.L. & POL. 239, 264–65 (2011) (arguing that courts perceive a need to rely on formal discretion-constraining rules to maintain their legitimacy); Paul J. Mishkin, *Foreword: The High Court, the Great Writ, and the Due Process of Time*

regardless of whether judges achieve good economic results through such extra-legal use of discretion.¹⁴⁵ The promise of the patent system is an automatic monopoly covering the same invention as the patentee contributes,¹⁴⁶ not a monopoly that judges in their wisdom determine is sensible, using unknown and unobservable methods. The very fact that courts rhetorically emphasize the idea of an automatic quid pro quo defining monopoly scope suggests that the idea is important to public confidence in the patent system.¹⁴⁷ The failure of reality to match the rhetoric is itself a harm.¹⁴⁸ This legitimacy cost is difficult to measure,¹⁴⁹ but it surely exists.

The legitimacy cost problem answers one common response to my proposal, which is that the current system is not broken and does not need fixing, because judges ultimately intuit the importance of the patentee's intellectual contribution and thus manipulate doctrine to produce the same outcomes as would occur under my rule.¹⁵⁰ While it is true that my proposal produces many of the same bottom-line outcomes as current cases,¹⁵¹ suggesting that judges are in fact using many of the same intuitions when exercising their discretion, there is a significant difference between surreptitiously using extra-legal intuitions to reach good results and transparently incorporating those same intuitions into formal doctrine.

and Law, 79 HARV. L. REV. 56, 62 (1965) (arguing that “much of courts’ prestige and power” depends on “the strongly held and deeply felt belief that judges . . . exercise no individual choice”).

145. See John W. Salmond, *Introduction*, in SCIENCE OF LEGAL METHOD: SELECT ESSAYS BY VARIOUS AUTHORS lxxv, lxxx (Ernest Bruncken & Layton B. Register trans., 1917) (“In the application and enforcement of a fixed and predetermined rule . . . , a man will willingly acquiesce. But to the ‘ipse dixit’ of a court, however just or impartial, men are not so constituted as to afford the same ready obedience and respect.”); see also Luke K. Cooperrider, *The Rule of Law and the Judicial Process*, 59 MICH. L. REV. 501, 504–05 (1961).

146. See Giles S. Rich, *Principles of Patentability*, 28 GEO. WASH. L. REV. 393, 402 (1960) (“[O]ne of the beauties of the patent system [is that t]he reward is measured automatically by the popularity of the contribution.”).

147. See, e.g., *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 484 (1974).

148. See Barry Friedman, *The Wages of Stealth Overruling (With Particular Attention to Miranda v. Arizona)*, 99 GEO. L.J. 1, 55–56 (2010) (arguing against “stealth overruling” for transparency reasons). *But see* Michael L. Wells, “*Sociological Legitimacy*” in *Supreme Court Opinions*, 64 WASH. & LEE L. REV. 1011, 1014 (2007) (arguing that “the Court’s opinions may serve worthy goals and earn our respect even if other reasons account for outcomes”).

149. See generally Richard H. Fallon, Jr., *Legitimacy and the Constitution*, 118 HARV. L. REV. 1787, 1828–29 (2005) (“Recent studies by social scientists have advanced understanding of judicial legitimacy in numerous ways. Nevertheless, many of the most important questions remain unanswered.”); *id.* at 1832–33.

150. Cf. MERGES & DUFFY, *supra* note 6, at 95–96 (noting that the nexus between Bell’s claim and his intellectual contribution is an important practical consideration in explaining the outcome, but not attempting to incorporate this into doctrine).

151. See *infra* Part III.C.2 (detailing how my proposal would explain the historical case outcomes in *Morse* and *Bell*).

My proposal does the latter, and in this way it enhances the legitimacy of the patent system.

D. The Proposals in Existing Literature

Proposals in academic literature have largely tracked the same deficiencies and difficulties that courts have faced. The literature can be broadly divided between what I will call the “doctrinal” approach and the “economic” approach. The doctrinal approach attempts to create legalistic solutions to the problem, usually by polishing and reforming the disclosure doctrine of § 112.¹⁵² The deficiency of the legalistic approach is that it usually ends up at one or the other extreme, just like the case law. For example, Oskar Liivak argues that patent scope should be defined as the “set of embodiments conceived and disclosed by the inventor in enough detail that they can be reduced to practice,”¹⁵³ which seems to mimic the rule reflected by such cases as *Morse* and *Automotive Technologies* exactly. But Liivak does not explain how his rule would avoid the pitfall of this approach, which is that later improvements cannot be taught at the time of the patentee’s initial conception, but at least some such later improvements (e.g., substituting plastic for wood) should be covered.¹⁵⁴

Other doctrinal proposals go to the opposite extreme. Timothy Holbrook, for example, argues that patent scope should cover everything that the patent specification would teach a person of ordinary skill in the field to make and use *at the time of infringement* (as opposed to current law where disclosure is judged at filing).¹⁵⁵ While this might seem like a sensible compromise at first blush, since this would allow us to substitute new materials like plastic as they arise, in reality the proposal is basically identical to the unlimited-scope line of cases. The reason is that by the time of infringement, by definition at least one person of skill in the field—the infringer—knows how to make and use the accused device, no

152. See, e.g., Holbrook, *supra* note 66, at 40 (purporting to solve the “possession paradox”—another way of stating the levels of abstraction problem—by tying patent scope to disclosure).

153. Oskar Liivak, *Rescuing the Invention from the Cult of the Claim*, 42 SETON HALL L. REV. 1, 5 (2012).

154. Liivak later argues that one can avoid this problem by characterizing the invention abstractly. *Id.* at 49–50. But this contradicts his original test in a way that perfectly reflects the current doctrinal contradiction. An invention is either an abstraction, or it is a concrete set of specifically disclosed embodiments. It cannot be both at the same time. Moreover, to the extent that the invention is an abstraction, the permissible level of abstraction must then be delineated, and Liivak never explains how high he would allow abstraction to go.

155. Holbrook, *supra* note 66, at 40–44. Holbrook places this standard under the doctrine of equivalents. But since infringement can be found either through the claim or by the doctrine of equivalents, the result is ultimately that the more generous standard governs patent scope.

matter what the accused device is. Thus, this proposal for patent scope makes infringement a virtual tautology. The only way to escape infringement would be to argue that the infringing device somehow reflects “extraordinary skill” so that it does not count, a standard that seems clearly too generous to patentees.¹⁵⁶ And if courts start watering down and manipulating this extraordinary skill standard, then the rule would lose its meaning and we end up back at square one where judges have plenary discretion.

Other scholars have more complicated proposals that are less predictably extreme, but still view the problem through the lens of specification disclosure and still sink under the weight of the levels of abstraction quagmire. For example, Jeffrey Lefstin argues that claims can only cover the same genus as what the specification “defines” as the invention.¹⁵⁷ A specification would define a genus, in turn, by distinguishing a particular genus from higher and lower levels of abstraction.¹⁵⁸ Apparently what this means is if the patentee says *in the specification* that his invention is the genus of every cure for AIDS, and distinguishes this from a more narrow patent covering only radiation machines for curing AIDS, then he would be able claim every cure for AIDS because he has distinguished the genus. But this rule is without substance. Claims are already required to define a genus by distinguishing it from all others.¹⁵⁹ All Lefstin’s rule seems to require is that the same definition be repeated in the specification. Allowing patentees to cover high levels of abstraction because they know how to cut and paste is not a useful legal standard.¹⁶⁰

Criticism can similarly be levied at Dan Burk and Mark Lemley’s proposal to change patent law to a central claiming system.¹⁶¹ A central

156. Another reason it becomes a virtual tautology is that the person of skill in the art, under standard doctrine, is imputed with perfect knowledge of the entire public domain at the relevant time point. *In re Winslow*, 365 F.2d 1017, 1020 (C.C.P.A. 1966). So unless the accused infringing product was non-public, it would be automatically included.

157. Lefstin, *supra* note 13, at 1211.

158. *Id.*

159. A point that, ironically, nobody has made better than Lefstin himself. *Id.* at 1168–69 (observing that “essentially all patent claims . . . are genus claims”). See also 35 U.S.C. § 112 para. 2 (2006) (requiring claims to “particularly point[] out and distinctly claim[]” the subject matter being patented (emphasis added)).

160. There is one potential difference. Claims can be amended after filing, while specifications cannot, and Lefstin’s proposal thus protects against opportunistic claim amendment that retroactively broadens scope. See Tun-Jen Chiang, *Fixing Patent Boundaries*, 108 MICH. L. REV. 523, 543–49 (2010) (discussing the *ex post* claiming problem). But Lefstin is not attempting to address this timing problem, and his proposal is not limited to cases where patentees amend their claims.

161. Burk & Lemley, *supra* note 99, at 1783–84.

claiming system is more accurately called a “no claiming” system: the patentee need not have any claims at all, and courts would simply grant scope covering all future embodiments that are substantially similar to the specification embodiment.¹⁶² It can immediately be seen that everything depends on what courts will regard as “substantially similar,” a standard that is obviously very open-ended.¹⁶³ A central claiming system is thus equivalent to plenary judicial discretion. It is, to be sure, more transparent about this than the current regime, but central claiming ultimately still shares all the problems of a regime that relies on judicial discretion to reach good results. Judges (or juries) would still have to rely on extra-legal intuitions like economic balancing to determine what counts as “substantially similar,” and having patent scope depend on the discretion of judges (or juries) would still contradict the basic promise of the patent system to inventors.¹⁶⁴

In contrast to the doctrinal literature, which mirrors the levels of abstraction problem that already plagues the doctrine, a more general literature examines the patent scope problem through an economic lens,¹⁶⁵ with the ultimate goal being to grant the optimal amount of patent scope that balances incentive benefits against monopoly costs. Economists have constructed elaborate models for calculating this optimal balance.¹⁶⁶ The difficulty with this approach is, of course, that courts lack the institutional capability and information to determine the optimal scope of each patent on a case-by-case basis.¹⁶⁷

III. UPSTREAM CAPTURE: A DIFFERENT VIEW OF THE PROBLEM

In this Part, I want to offer a somewhat different perspective on the patent scope problem than the approaches of the prior literature. The approach can still be considered doctrinal rather than economic, but it differs from the existing doctrinal literature that generally focuses on disclosure, in the sense of the number and types of embodiments taught by

162. *Id.* at 1784–85.

163. See John F. Duffy, *The Festo Decision and the Return of the Supreme Court to the Bar of Patents*, 2002 SUP. CT. REV. 273, 309–10 (noting that the uncertainty created by this standard was why we abandoned central claiming in the first place).

164. See *supra* text accompanying notes 144–49.

165. See, e.g., Chiang, *supra* note 7; Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 TEX. L. REV. 989 (1997); Merges & Nelson, *supra* note 14.

166. See, e.g., Richard Gilbert & Carl Shapiro, *Optimal Patent Length and Breadth*, 21 RAND J. ECON. 106 (1990); Paul Klemperer, *How Broad Should the Scope of Patent Protection Be?*, 21 RAND J. ECON. 113 (1990).

167. Kaplow, *supra* note 27, at 1844; see also *supra* Part II.B.

the specification—an approach that leads right back to the levels of abstraction quagmire of existing case law. Once I lay out the approach, I will also explain why my proposed solution produces good economic outcomes, though my starting point is not an economic analysis.

A. *Upstream Capture Versus Downstream Capture*

My approach in this Article differs from the existing literature in that my focus is not on the specification disclosure. Of course, the patentee must still file a specification, and the specification must still disclose at least one working embodiment to receive a patent; but the amount of disclosure (in the sense of the range and number of embodiments, in contradistinction to the novelty of the insight that lies underneath) would have very little to do with the scope of the patent under my approach. What I argue is that patent scope should focus on the novelty of the patentee's intellectual contribution. A more detailed explanation follows.

A starting point is to note, as in Part I, that patent law uses the concept of “invention”—which is synonymous with the patentee's contribution—in two contexts, which I shall call the “upstream” context and the “downstream” context. In the upstream context, the law compares the patentee's contribution against *prior* inventors, or in other words assesses novelty. In the downstream context, the law compares the patentee's contribution against *later* improvers, which is the patent scope problem and which, in current law, is framed as an issue of disclosure under § 112. And as has already been noted, patent law's definition of the invention differs across these two contexts. In the upstream context, patent law defines the invention as an embodiment or set of embodiments.¹⁶⁸ In the downstream context, patent law defines the invention as an idea.¹⁶⁹

This inconsistency can be explored more deeply. The intuitive—not strictly economic—justification for allowing patentees to cover later improvements is that we assume that a later improver copies ideas from the patentee,¹⁷⁰ and that these copied ideas have value.¹⁷¹ For example,

168. See *supra* Part I.A.

169. See *supra* Part I.B.

170. See Doug Lichtman & Mark A. Lemley, *Rethinking Patent Law's Presumption of Validity*, 60 STAN. L. REV. 45, 48 (2007) (arguing that, under “normal circumstances,” patent protection means that the patent “protects the inventor from having his idea stolen”). Chris Cotropia and Mark Lemley argue that copying by infringers is actually very rare. Christopher A. Cotropia & Mark A. Lemley, *Copying in Patent Law*, 87 N.C. L. REV. 1421, 1457 (2009). But they agree with me that the rhetorical and philosophical justification for patent protection is based on copying by infringers. *Id.* at 1431–36. The disconnect between theory and practice, in this view, simply means that patent rights are too strong. *Id.* at 1458–59.

when the Wright brothers create the first airplane and a later improver creates a slightly improved airplane, we assume that the later improver nonetheless copied some principles of aerodynamics that the Wrights first discovered. In the downstream context, patent law recognizes that an earlier inventor contributing ideas to a later improver is a contribution of *value*, and thus requires the later improver to pay for this value.¹⁷²

Not so in the upstream context. As already described, in the upstream context patent law defines the invention as an embodiment, not an idea.¹⁷³ But the inconsistency goes deeper. Patent law defines the invention as an embodiment *because*, in the upstream context, *it deems ideas to have no value*. This sentiment is deeply entrenched in patent law, and was most clearly expressed by Learned Hand as the reason for the enablement requirement for prior art:

No doctrine of the patent law is better established than that [i]f the earlier disclosure . . . does not inform the art without more how to practice the new invention, *it has not correspondingly enriched the store of common knowledge*, and it is not an anticipation.¹⁷⁴

Thus, when the Wright brothers assert their patent against later airplanes, patent law assumes the later improver used ideas from the Wright brothers, and that using ideas amounts to a misappropriation of value. But it never asks whether the Wright brothers themselves used preexisting ideas from even earlier inventors. It never asks the question because upstream ideas are deemed to have no value, absent embodiments.

The gap that emerges is that the idea that the patentee asserts against later improvers—the value the later improver is alleged to have misappropriated—may not in fact originate with the patentee, but rather

171. By “value” here I am using the term in a philosophical, not strictly economic, sense (I will come back to the economic analysis later). To an economist, whether something has value depends on whether someone *is willing* to pay for it. Here, I am saying that the law philosophically recognizes that the idea has value and therefore someone *should be made* to pay for it. See Adam Mossoff, *Saving Locke from Marx: The Labor Theory of Value in Intellectual Property Theory*, 29 SOCIAL PHILOSOPHY & POL’Y 283, 285 (2012), available at <http://ssrn.com/abstract=1983614> (distinguishing between the “natural law” and “economic” concepts of value).

172. An excellent example of this intuition is seen in *In re Fisher*, 427 F.2d 833 (C.C.P.A. 1970), where the court stated: “[A]n inventor should be allowed to dominate the future patentable inventions of others where those inventions were based in some way on his teachings. Such improvements, while unobvious from his teachings, are still within his contribution, since the improvement was made possible by his work.” *Id.* at 839.

173. See *supra* Part I.A.

174. *Dewey & Almy Chem. Co. v. Mimex Co.*, 124 F.2d 986, 989 (2d Cir. 1942) (emphasis added).

with an even earlier inventor. Giving the patentee too much credit upstream then leads to giving the patentee too much credit downstream.

What the enablement requirement for prior art fundamentally misses is thus the reality that prior ideas do have value to the patentee (just as they do to an even later infringer) because invention is a continuous process of ever-more-specific ideas. The patentee's working embodiment is the *culmination* of this chain of ideas. To take the example of the cure for AIDS again, in order to create a working cure for AIDS using X radiation, the following ideas must be developed:

- (1) Someone must diagnose AIDS as a distinct disease that requires a separate cure.¹⁷⁵
- (2) Once AIDS is identified as a distinct disease, someone must suggest radiation therapy (as opposed to pills or other methods) as an avenue to pursue.¹⁷⁶
- (3) Once radiation therapy has been identified as a possible avenue, someone must suggest X radiation in particular as a possible cure.
- (4) Once X radiation has been identified as a potential cure, someone must find the right dosage and calibrate a radiation machine to make X radiation work.

Once we understand that invention is a cumulative process, what emerges is that patent law places far too much emphasis on, and gives far too much credit to, the eventual creator of a working embodiment. Each of these ideas is necessary to the eventual creation of the working embodiment, and are thus contributions of value. But the early inventors will receive no credit from the patent system because they fail to create embodiments: the first person to think of curing AIDS is unlikely to find a cure, and the first person to think of using radiation is unlikely to find the right type of radiation. The patentee who eventually creates the working embodiment

175. In reality, this occurred in the early 1980s when researchers realized some people suffering ordinary symptoms like pneumonia were in fact suffering a distinct condition of weakened immune systems. Michael S. Gottlieb et al., *Pneumocystis carinii Pneumonia and Mucosal Candidiasis in Previously Healthy Homosexual Men: Evidence of a New Acquired Cellular Immunodeficiency*, 305 N. ENGL. J. MED. 1425 (1981) (noting AIDS as a new type of disease).

176. In reality, this has already happened. See Ekaterina Dadachova et al., *Targeted Killing of Virally Infected Cells by Radiolabeled Antibodies to Viral Proteins*, 3 PLOS MED. 2094 (2006), available at <http://www.plosmedicine.org/article/info:doi/10.1371/journal.pmed.0030427>.

should not be able to claim sole credit for all of the prior ideas.¹⁷⁷ In other words, in order to be fairly credited as the inventor of *the* cure for AIDS, a person should be the first to have the idea as well as to create the working embodiment. To do otherwise would be stealing credit from upstream inventors.

This upstream-focused view is different from the standard disclosure paradigm that dominates today's patent law, where the patent scope problem is viewed through the lens of whether the patentee has taught every cure for AIDS, or every radiation cure for AIDS, or every dosage and machine variant of radiation X for curing AIDS. The standard disclosure-focused and embodiment-centric view asks an impossible and thus useless question. My standard, by contrast, asks a question that matches much of the moral intuition of patent law: was the inventor the first to contribute the idea to the public?

From this new perspective, current patent law essentially creates the levels of abstraction problem for itself. What the enablement requirement for prior art does is artificially deem every patentee (who by definition creates the first working embodiment) to be a *sui generis* pioneer. Because all prior ideas by other inventors are excluded from evidence, the first person to create one cure for AIDS is artificially made to seem as if he invented all the ideas within that embodiment, from curing AIDS in the abstract down to discovering the specific dosage of X radiation. The levels of abstraction problem thus arises: the law must choose one idea among all of these options. Abolishing the enablement requirement for prior art then solves the levels of abstraction problem. The next section describes this in more detail.

B. A Proposed Solution: The Patentee's Insight

Once we adopt the perspective that patent law should be logically consistent across the upstream and downstream contexts, a solution to the patent scope problem emerges. What I propose is that a patentee should receive the level of abstraction where he is both the first to create a working embodiment and also the *first to articulate the idea*.

It is important to understand that "articulation" is not just a slightly-weakened version of enablement or a disclosure test by another name. Conventional thinking equates disclosure with the teaching of how to

177. See Mark A. Lemley, *The Myth of the Sole Inventor*, 110 MICH. L. REV. 709, 709 (2012) (arguing that innovation is cumulative and "the canonical story of the lone genius inventor is largely a myth").

make an embodiment: to enable the cure for AIDS means teaching how to make that cure. My articulation standard literally requires no more than a sentence that suggests the possibility, with no details on how to achieve it, such as: “It would be a good idea to have a cure for AIDS.”¹⁷⁸ The difference between articulation and the conventional understanding of disclosure are thus sufficiently distinct to rise to the level of a difference in kind, not merely of degree.

How my proposal operates can be made clearer by reference to the AIDS example. In order to obtain any patent at all, the patentee must first create a working embodiment of a cure for AIDS. Even then, the patentee would not be allowed to claim the highest level of abstraction of all cures for AIDS, because the idea of curing AIDS has already been articulated. But if he was the first person to think of using radiation to cure AIDS (where everyone else, for example, had only thought of using pills), then the proper level of abstraction is the cure of AIDS using radiation, which would encompass every type of radiation. Conversely, if the idea of using radiation had already been articulated by others, but no particular type of radiation had been identified, and the patentee is the first to suggest *X* radiation, then *X* radiation would be the proper level of abstraction (and would cover every dosage and every machine using *X* radiation). In short, the patentee who creates the first working embodiment would be entitled to his insight: the highest level of abstraction reflected in his embodiment that has not previously been articulated by others.

Three points are worth noting about this proposal. The first is that under this rule, the problem of allowing patents of clearly excessive scope (such as all cures for AIDS) largely disappears. In order to obtain a patent, an inventor must still create a working embodiment. But the first person to articulate AIDS as a distinct disease that requires curing is unlikely to also be the first person to create a working cure.¹⁷⁹ And the later person who eventually creates the working cure would now be barred from claiming the super-high level of abstraction of the cure for AIDS, because that high-level idea has already been articulated.

The second point is that there always is *some* conceptual breakthrough, and so a patentee who creates a new working embodiment will always

178. The immediate objection that often arises—that someone merely suggesting a possibility of a cure should get no patent—is addressed in Part IV.A *infra*. The short version is that I would allow mere articulation to act as prior art, but to obtain a patent would still require one (but only one) working embodiment.

179. For why it is sensible to still deny patents to the prior inventors who thought of high-level ideas like curing AIDS without creating embodiments, even without an enablement requirement for prior art, see *infra* Part IV.A.2.

receive a patent. This point is important to emphasize because the immediate criticism of my proposal would be that the inventor of a cure for AIDS would receive no patent because people have been looking for a cure and thus have articulated the idea, or that the inventor of a hyperdrive would receive no patent because of *Star Wars*.¹⁸⁰ The simple answer is that this is not true; instead the patentee will receive the level of abstraction that is proportional to his intellectual contribution. The patentee will not receive every cure for AIDS because he did not invent an idea that will be used in every future cure for AIDS. But to the extent that *his* novel idea is incorporated into future cures (e.g., if the patentee's insightful idea is to use radiation to cure AIDS and future cures use radiation) then he would be compensated *to that same extent*.

The third point, perhaps a restatement of the first two, is that this automatic rule for selecting the level of abstraction works even when the resulting scope is very broad or narrow. For example, suppose that the patentee really *is* the first person to think about using radiation, when everyone else was pursuing pills, and that the patentee succeeds with *X* radiation. Suppose that a later improver, seeing the patentee's success, now changes from researching pills to researching radiation, and discovers a better cure using *Y* radiation. There is no intuitive unfairness in allowing the patentee to cover the later improvement. The intuitive assumption is that because the patentee's teaching induces the later improvement, it is fair to demand a share of the resulting benefit. Conversely, if there had already been prior suggestions to use 10 rads of *X* radiation and the patentee had merely calibrated a radiation machine to make the suggestion work, then he should be limited to his particular calibration and should not receive anything broader.

This intuitive analysis can also be phrased in more economic terms, which is why my rule also works within the utilitarian economics framework that dominates the patent literature.¹⁸¹ Beyond the individualized calculation of incentives and monopoly cost, the overarching economic theory of patent law is to prevent misappropriation of non-rivalrous and otherwise-non-excludable information goods.¹⁸² This standard rationale has two implications. The first is that the fact that patent law protects

180. See *infra* Part IV.A for more detailed discussion of this objection.

181. Kieff, *supra* note 24, at 697.

182. LANDES & POSNER, *supra* note 25, at 294 ("The conventional rationale for granting legal protection to inventions . . . is the difficulty that a producer may encounter in trying to recover his fixed costs of research and development."); Gideon Parchomovsky & R. Polk Wagner, *Patent Portfolios*, 154 U. PA. L. REV. 1, 12–14 (2005).

information goods means that it should protect the idea, not just the specific embodiment or the container for the information. The second is that the fact that patent law protects against *misappropriation* means that protection is only proper when the idea is the patentee's own. Protecting an idea that the patentee really stole from an upstream prior inventor merely confers an undue windfall on the patentee.

C. Implications of the Framework

The basic doctrinal implication of my proposal is to shift patent scope from being primarily governed by doctrines focusing on the specification disclosure (§ 112 and the abstract ideas doctrine) to a focus on the novelty of the contribution. This can be conceived in some ways as a grand bargain: patentees would be relieved from an unpredictable and sometimes (when courts feel like it) impossibly onerous disclosure standard, but would now face a less generous novelty standard. This section will explain each of these components in turn. First, I discuss how the novelty standard will be made more demanding to require that the claimed idea itself be novel. Second, I discuss how the existing cases on the abstract ideas doctrine can be reconceptualized to fit my proposal. Third, I discuss the role of § 112 in this new framework.

1. Abolishing the Enablement Requirement for Prior Art

The simple way to ensure that the patentee's claimed idea is novel is to make ideas part of the prior art. This amounts to abolishing the enablement requirement for prior art. In one sense, this makes my proposal easy to implement, because it only really requires changing one single doctrine. At the same time, because the enablement requirement for prior art is considered deeply entrenched,¹⁸³ some further justification for the change is necessary.

As an initial matter, it is worth noting that the enablement requirement for prior art has no textual support in the statute.¹⁸⁴ This might be considered a rhetorical trick, since the reason for this lack of textual support is that the statute provides no definition of prior art at all,

183. See, e.g., *Elan Pharm., Inc. v. Mayo Found. for Med. Educ. & Res.*, 346 F.3d 1051, 1055 (Fed. Cir. 2003); *Dewey & Almy Chem. Co. v. Mimex Co.*, 124 F.2d 986, 989 (2d Cir. 1942).

184. Janice M. Mueller & Donald S. Chisum, *Enabling Patent Law's Inherent Anticipation Doctrine*, 45 Hous. L. Rev. 1101, 1137 (2008) ("§ 102 of the Patent Act is a patent-defeating provision that says nothing at all about enablement. Rather, the courts have read the enablement requirement into anticipation under § 102.").

requiring instead that the invention not be previously “known” by others without elaborating on what this means.¹⁸⁵ The point, however, is that courts have created the enablement requirement for prior art based on their conceptions of good policy, making the enablement requirement for prior art only as legitimate as its policy rationale. And the policy rationale is wrong.

The rationale for the enablement requirement of prior art is that if a prior disclosure “does not inform the art without more how to practice the new invention, it has not correspondingly enriched the store of common knowledge.”¹⁸⁶ In other words, only embodiments carry social value and contribute to society’s common knowledge. But this is flatly not true. All manner of ideas, from Einstein’s idea of $E=mc^2$ to diagnosing AIDS as a distinct disease requiring a cure, contribute to social knowledge without the inventor having taught the eventual embodiment (a nuclear power plant or a working cure). What the enablement requirement for prior art thus fails to recognize is that innovation is a cumulative process.¹⁸⁷ Patentees necessarily build on the contributions of prior inventors who contributed ideas but not completed embodiments. Allowing patentees to perform an upstream capture of prior insights thus unfairly over-rewards patentees and denigrates the contributions of upstream inventors.

Another way of making this point is to say that the policy rationale rests on a false dichotomy. It says that because prior inventors concededly do not deserve *all* the credit for the eventual success, then those inventors deserve *none* whatsoever. So because the researchers who diagnosed AIDS as a distinct condition requiring cure did not themselves teach how to cure it, they deserve no credit for the eventual cure. But there is a big difference between claiming all the credit and getting none of it. In concrete terms, just because Einstein does not deserve all the credit for the eventual creation of nuclear power does not mean that the first creator of a nuclear power plant should get it; but by excluding Einstein from the prior art, patent law gives all the credit to the power plant builder by default

185. 35 U.S.C. § 102(a) (2006).

186. *Dewey*, 124 F.2d at 989; *see also* *Seymore*, *supra* note 61, at 959–61 (implicitly using this rationale to argue for an even more stringent enablement requirement for prior art, where even “if the document discloses a theoretical method for making X, in the first instance the disclosure would be presumed nonenabling” absent stronger proof that an ordinary artisan could actually use the disclosed method to make an embodiment).

187. *See* Christopher R. Leslie, *Antitrust and Patent Law as Component Parts of Innovation Policy*, 34 J. CORP. L. 1259, 1261 (2009) (“Innovation is a cumulative process in which today’s inventors build on the ideas of yesterday’s creators.”).

(and then arbitrarily takes back some of it by imposing an ill-defined disclosure requirement).

The other rationale for the enablement requirement for prior art is a sense of fairness and symmetry: that for a prior article or book to invalidate a later patent, the disclosure ought to have been enough to obtain a patent. But this is a fallacious assumption: not everything should be patented, and so the fact that a prior thing cannot be patented does not mean it cannot limit a subsequent patent. High level scientific ideas like $E=mc^2$ or the basic idea of curing AIDS fall into this category, because there are preexisting incentives outside of the patent system to discover them, and thus granting patents would be wasteful as well as creating high monopoly costs.¹⁸⁸

Ultimately, not even current law embraces this fairness and symmetry rationale, as the court made clear in *In re Hafner*.¹⁸⁹

In essence, appellant is contending that a double standard should not be applied in determining the adequacy of a disclosure to anticipate under § 102, on the one hand, and to support the patentability of a claim under § 112 on the other. He feels that a disclosure adequate for the one purpose is necessarily adequate for the other but, unhappily for him, this is not so.¹⁹⁰

What courts hold is that the enablement requirement for prior art requires less stringent disclosure than what is required under § 112 to obtain a patent,¹⁹¹ though how much less is never made very clear. The point is that once this concession—that not everything anticipatory must be itself patentable—is made, the fairness and symmetry rationale collapses. And no other rationale appears to support the enablement requirement for prior art.

The fairness and symmetry rationale can also be understood as resting on a false dichotomy. Implicit in the rationale is the intuition that unless

188. See *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 548 U.S. 124, 126–27 (2006) (Breyer, J., dissenting from dismissal of certiorari). This is particularly reflected by the fact that the inventors of high level ideas voluntarily disclose the knowledge even when such disclosure creates a statutory bar to patenting. See Alan Devlin & Neel Sukhatme, *Self-Realizing Inventions and the Utilitarian Foundation of Patent Law*, 51 WM. & MARY L. REV. 897 (2009) (arguing that “self-realizing” inventions should be unpatentable).

189. 410 F.2d 1403 (C.C.P.A. 1969).

190. *Id.* at 1405; see also *Rasmusson v. SmithKline Beecham Corp.*, 413 F.3d 1318, 1325 (Fed. Cir. 2005) (“The standard for what constitutes proper enablement of a prior art reference for purposes of anticipation under section 102 . . . differs from the enablement standard under section 112.”).

191. *SRI Int’l, Inc. v. Internet Sec. Sys., Inc.*, 511 F.3d 1186, 1194 (Fed. Cir. 2008) (stating that “the record meets the lower enablement standard for prior art”).

the patentee can capture the preexisting idea—*all* telegraphs, *all* telephones, and *all* airplanes—the patentee will receive nothing. But, as has already been emphasized, this is not true. The patentee’s achievement of creating a new embodiment demonstrates that there *is* a contribution, and potentially a very great contribution—just not to the full extent of the preexisting idea. Rather, the contribution is a narrower insight, one that is often still very valuable for both society and the patentee. In the case of Morse, the insight was the use of relay stations to re-transmit signals in the telegraph,¹⁹² as well as Morse Code;¹⁹³ in the case of Bell, the insight was continuous electric current that mimicked sound waves;¹⁹⁴ and in the case of the Wright brothers the insight was using a rudder for flight control.¹⁹⁵ In each of these historical cases the patentee ultimately received protection closely corresponding to their actual insight,¹⁹⁶ and in each case they were well remunerated.¹⁹⁷ The next sub-section provides a more detailed discussion of how my proposal provides a better explanation for historical case outcomes than standard disclosure theory.

2. *Reconceptualizing the Abstract Idea Doctrine*

Another area where my proposal might seem to create significant conflict with existing law is with the doctrine that ideas cannot be patented. One response is that the current doctrine is already so incoherent that nothing can really conflict with it. More helpfully, my proposal offers a way to reconcile the case law in the area, showing that the outcomes reflect sensible policy even if the rhetoric and doctrine does not. In my paradigm, the problem with Morse’s claim is not that it was too *abstract*, it is that it was *old*. In comparison to Morse, Bell’s claim was equally abstract, but it was *new*. This does not fully resolve the tension between

192. See VLADIMIR GUREVICH, *ELECTRIC RELAYS: PRINCIPLES AND APPLICATIONS* 11–13 (2006) (describing history and how Morse arguably derived the idea from Joseph Henry).

193. *Id.* at 8 (stating that Morse “believed that patents were to be granted not for fine theories but for constructing practical applications and it was he who applied and joined theory with practice”).

194. See *infra* text accompanying notes 206–13.

195. Padfield & Lawrence, *supra* note 21, at 698.

196. *O’Reilly v. Morse*, 56 U.S. (15 How.) 62, 112 (1853) (upholding Morse’s first seven claims, including the fourth claim to relays, and fifth claim to Morse Code); *Dolbear v. Bell Atl. Tel. Co.*, 126 U.S. 1, 544 (1888) (construing Bell’s claim to be limited to continuous electric current); *Wright Co. v. Paulhan*, 177 F. 261, 264 (C.C.S.D.N.Y. 1910), *rev’d on other grounds*, 180 F. 112 (2d Cir. 1910) (interpreting claim to cover any means where a rudder, which controls yaw, is linked to roll).

197. See RICHARD WINEFIELD, *NEVER THE TWAIN SHALL MEET: BELL, GALLAUDET, AND THE COMMUNICATIONS DEBATE* 21 (1987); George E. Frost, *Let’s Remember Sam*, 76 J. PAT. & TRADEMARK OFF. SOC’Y 277, 279 (1994); *End Patent Wars of Aircraft Makers*, N.Y. TIMES, Aug. 7, 1917.

my proposal and the statutory text that conceptualizes the invention as an embodiment, but the point is that current doctrine already allows ideas—thinly disguised as embodiments described abstractly—to be patented. The protection of ideas is necessary to provide adequate economic incentives. The tension is not between the statutory text and my proposal; it is between the statutory text and economic reality.

The difference between my proposal and current doctrine is only that my proposal is transparent about protecting ideas, while current law fudges the issue, contradicts itself, and causes confusion. There is no meaningful difference in the scope of a monopoly whether denominated as claiming “the idea of airplanes as machines that fly” or “an airplane embodiment,” when the latter is then interpreted to encompass *every* airplane that will ever be made, sold, or used.¹⁹⁸ Current claiming technique purports to describe an embodiment, but really covers an idea through the process of abstraction. Courts that both acknowledge¹⁹⁹ and deny²⁰⁰ that ideas are the basis of patent protection cause only endless confusion.

In contrast to this jumbled mess, my proposal offers a conceptually coherent way to reconcile the case law by looking to see whether the idea being claimed is new or old. A new look at the classic contrast between *Morse* and *Bell* illustrates how this rule brings coherence to the area, reflects good policy outcomes, and fits existing case law, all at the same time.

In *Morse*, the claimed abstraction/idea was the use of electric current to communicate printed characters at a distance.²⁰¹ Evaluated as an idea, the idea was old, even though no one had built an embodiment to achieve it. As the Court noted in its decision, “[V]ery soon after the discovery [of electromagnetism] by Oersted [in 1820], it was believed by men of science that this newly-discovered power might be used to communicate intelligence to distant places.”²⁰² The Court also noted that by “the year 1832, when Professor Morse appears to have devoted himself to the subject, the conviction was general among men of science everywhere that the object could, and sooner or later would be, accomplished.”²⁰³ In the

198. See 35 U.S.C. § 271(a) (defining infringement as making, using, and selling the invention).

199. *Gill v. United States*, 160 U.S. 426, 434 (1896) (“In every case the idea conceived is the invention.”).

200. *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. 498, 507 (1874) (“An idea of itself is not patentable . . .”).

201. *Morse*, 56 U.S. at 112.

202. *Id.* at 107.

203. *Id.*

Court's eyes, Morse's insight was not the use of electric current to print characters: his insights were much more narrowly directed to how to make a specific apparatus for achieving this old idea. To give Morse the broader preexisting idea would have taken knowledge out of the public domain.²⁰⁴

In contrast to Morse, who did not invent his claimed idea, there is a much stronger argument that Bell's conceptual insight was precisely what he claimed. Although the idea of a telephone was preexisting, Bell did not claim all telephones. Instead, he claimed all telephones using *continuous electric current*.²⁰⁵ And Bell's breakthrough insight, at least according to the evidence before the Court, was precisely the idea of using continuous current in a telephone.²⁰⁶

This point requires some historical context. Prior to Bell, a German inventor named Phillip Reis had already created an electric device that could convey musical sounds.²⁰⁷ The Reis device did not work properly as a telephone because it would distort speech to the point of making it unintelligible. Nonetheless, others in the field assumed that Reis had the best overall approach—people assumed that the lack of success was due “to the imperfect mechanism of the apparatus used, rather than to any fault in the principle.”²⁰⁸

Bell's major conceptual breakthrough was understanding that Reis's “failure was due not to workmanship, but to the principle.”²⁰⁹ Reis's device used *intermittent* current, which Bell found “could not be made under any circumstances to reproduce the delicate forms of the air vibrations caused by the human voice in articulate speech.”²¹⁰ Bell's insight was to then operate the current *continuously* while varying its intensity, which he called “undulatory current.”²¹¹ Unlike Morse, who did not invent the idea of electromagnetism for telegraphs, Bell *did* invent the idea of using “electrical undulations” for telephones, which he included in his claim. The Supreme Court further tightened this nexus when it made clear that the claim language of “electrical undulations” meant that the patent covered only telephones using continuous electric current.²¹² As the

204. Cf. *Graham v. John Deere Co.*, 383 U.S. 1, 6 (1966) (“Congress may not authorize the issuance of patents whose effects are to remove existent knowledge from the public domain . . .”).

205. *Dolbear v. Bell Atl. Tel. Co.*, 126 U.S. 1, 536 (1888).

206. See MERGES & DUFFY, *supra* note 6, at 95 (“[U]nlike Morse, Bell limited even his broad fifth claim in a way that corresponded to his specific contribution to the technology.”).

207. *Id.* at 96.

208. *Bell*, 126 U.S. at 544.

209. *Id.*

210. *Id.*

211. *Id.*

212. *Id.* at 13, 544.

Court stated, this idea “was [Bell’s] discovery, and it was new. Reis never thought of it, and he failed to transmit speech telegraphically. Bell did, and he succeeded.”²¹³ To take an analogy, this is like saying that prior to Bell everyone thought that pills were the best approach, and were quibbling over only different chemical formulas. Bell came along and showed that pills were the wrong approach, and suggested using radiation instead. The Court then gave Bell every type of radiation, including those that he had not specifically taught—because Bell taught the *idea* of radiation.

The critical difference between *Bell* and *Morse*, then, is that Alexander Graham Bell invented the idea of using continuous electric current in telephones, and received precisely that idea.²¹⁴ Samuel Morse did not invent the idea of using electric current in telegraphs, and his claim to that was denied. Notably, Morse did invent some other very abstract ideas, such as Morse Code, which is so abstract that it is only a system of signs and signals that can be implemented in an almost-infinite number of undisclosed ways. Yet despite invoking the abstract idea doctrine to invalidate the claim to electromagnetic transmission in the very same case, the Court summarily upheld the claim to Morse Code.²¹⁵

Three points come from this comparison of a classic duo of cases that have puzzled patent lawyers for generations. The first is that my rule provides a much better fit with actual case outcomes than current doctrine. The phenomenon of abstract claims that exceed the embodiments taught by the specification is ubiquitous;²¹⁶ current doctrine cannot explain why some such abstract claims are upheld (*Bell*), while others are invalidated (*Morse*). My rule, focused on the novelty of the idea, matches outcomes exactly.

The second point is that this correspondence between my rule and outcomes is not based on an elaborate *post hoc* reconstruction with extraneous facts that re-litigates history, but instead come from facts that the Court took pains to note and thus presumably were important to its decisions. The *Morse* Court notes that “men of science everywhere” knew of the idea of an electric telegraph and expected it to be reduced to practice

213. *Id.* at 545.

214. See MERGES & DUFFY, *supra* note 6, at 96 (“[E]ven Bell’s broadest claim was still tightly correlated to his own contribution to the art.”).

215. *O’Reilly v. Morse*, 56 U.S. (15 How.) 62, 86 (1853) (Morse’s fifth claim to “the system of signs, consisting of dots and spaces, and of dots, spaces, and horizontal lines, for numerals, letters, words, or sentences, substantially as herein set forth”); *id.* at 112 (sustaining claim).

216. *LizardTech, Inc. v. Earth Res. Mapping, Inc.*, 433 F.3d 1373, 1376 (Fed. Cir. 2006) (Rader, J., dissenting from denial of rehearing *en banc*) (“[A]n issue common to many patent disputes [is] claims that are broader than the disclosed embodiments.”).

eventually.²¹⁷ The *Bell* Court notes that Reis had never thought of continuous electric current.²¹⁸ Yet under the formal doctrine that emanates from these cases, none of these recited facts matter. Whether others had thought of the underlying idea is completely irrelevant under current law, since even if the idea had been articulated, that evidence would be excludable given the enablement requirement for prior art. What this suggests is that the Court intuitively grasped the policy importance of this consideration—the newness of the idea—but was inarticulate in describing its importance and found it difficult to fit within a preexisting doctrinal framework (both common law and statutory) that was embodiment-centric.

The third point is that the Court likely found these facts to be intuitively important (even if it could not articulate why) because these facts *are* important from a social policy perspective. As discussed above, the underlying economic purpose of patent law is to prevent competitors from appropriating the patentee’s idea, not the embodiment.²¹⁹ But this only holds to the extent that the idea is original to the patentee. The newness of the idea thus *should* be, and appears to have *in fact been* (though unarticulated in doctrine), the paramount consideration in assessing the patentee’s contribution and appropriate reward.

3. *Untying Patent Scope from Disclosure*

The third implication of my proposal is that it unties patent scope from disclosure, so § 112 will no longer restrain patent scope. It must be admitted at the start that this can be seen as somewhat radical: the view that patent scope depends on the amount of disclosure is deeply embedded.²²⁰ This is most aptly demonstrated by the Supreme Court’s statement that disclosure is the “quid pro quo” of the right to exclude.²²¹ In the conventional view, more disclosure of more embodiments means more exclusion.²²²

217. *Morse*, 56 U.S. at 107.

218. *Bell*, 126 U.S. at 544.

219. See *supra* text accompanying notes 181–82.

220. *Merges & Nelson*, *supra* note 14, at 844–45 (quid pro quo is “built deep into the history of patent law”).

221. *J.E.M. Ag. Supply, Inc. v. Pioneer Hi-Bred Int’l, Inc.*, 534 U.S. 124, 142 (2001) (quoting *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 484 (1974)); see also *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 736 (2002) (“What is claimed by the patent application must be the same as what is disclosed in the specification . . .”).

222. See, e.g., *In re Vaeck*, 947 F.2d 488, 495 (Fed. Cir. 1991) (disclosure of nine genera of cyanobacteria not enough); *Lemley et al.*, *supra* note 39, at 1330 (characterizing the § 112 inquiry as

The starting point of this Article, however, is that patent law's scope problems will never be resolved under the disclosure framework. Predictable rules cannot rest on vague generalities that "more" disclosure will mean "more" exclusion; it requires defining *what kind* of disclosure results in *what kind* of exclusion. If I disclose ten particular tables, what kind of claim will I be entitled to? And, as seen in Part II.A.1, once we look for a concrete rule, it turns out that § 112 provides no answers because it is mired in self-contradiction. To the extent that the quid pro quo means that the patentee must disclose every embodiment that is claimed (if I disclose ten different tables, I get *only* those specific tables down to the last nut, bolt and paint color), it creates impossibly narrow patents. To the extent that the quid pro quo instead means disclosing one embodiment and claiming the entire class (if I disclose ten tables, I may claim every table), it imposes no meaningful limit on patent scope. And to the extent it means something in between, the test is incoherent.

Under my proposal, the only thing that § 112 will require is a single working embodiment,²²³ and from this single embodiment the patentee can claim the broadest novel idea contained therein. In other words, I would adopt the more patentee-friendly line of cases for § 112. In exchange—in order to prevent unlimited claiming—I would impose a stronger novelty limit to restrain patent scope.

Of course, in one sense my proposal will still require "disclosure." The patentee must still disclose one working embodiment and the underlying ideas and principles that allow that embodiment to be successfully made and used. But I call my theory a "novelty" theory because it is conceptually very different from disclosure theory, where "disclosure" is synonymous with the disclosure of multiple numbers of embodiments.²²⁴ The question under my proposal is no longer *how many* embodiments or even how many ideas are being disclosed, but whether the idea being disclosed and claimed is *new*.

"whether one could make the embodiments claimed").

223. To clarify, all my proposal does is regulate patent scope, so disclosing a single embodiment will be enough to sustain a claim to an idea of much broader scope. But § 112 also has other requirements that do not regulate scope but instead govern whether a patent will issue at all, such as the best mode requirement and the requirement that a disclosed embodiment be *working* as opposed to inoperative. *In re Swartz*, 232 F.3d 862, 863 (Fed. Cir. 2000). My proposal would not affect those requirements.

224. *See supra* text accompanying notes 80–82.

4. *The Role of Non-obviousness*

An idea has to be more than technically “new” to be patentable; it must also be non-obvious.²²⁵ It is important to understand in this context that when patent law speaks of something as “new,” it means that the *exact* same thing has not been previously disclosed.²²⁶ If a prior art book contains the words “a table with four legs,” any reasonable person would immediately understand that a table with five legs would work just as well. But patent law would treat a table with five legs as technically new, because it has not been literally disclosed. Obviousness then comes in to solve the problem by including within the prior art not only the literal disclosure, but also what people would reasonably understand from reading a reference.²²⁷ Because any reasonable person would immediately understand the idea of a table with five legs from reading the words “a table with four legs,” a table with five legs is also considered part of the prior art because it is obvious.²²⁸

Under my proposal, non-obviousness would function identically as it does now, except the enablement requirement for prior art would no longer apply. Practically speaking, the two inquiries are easily separable. Under current law, a determination of obviousness on the five-legged table entails two distinct inquiries: (1) asking whether a five-legged table is obvious given the articulation of a four-legged table;²²⁹ and (2) asking whether the prior art teaches how to *make* a five-legged table.²³⁰ My proposal keeps the first step unchanged, and abolishes the second step.

225. See 35 U.S.C. § 103 (2006) (defining obviousness).

226. *Old Reliable Wholesale, Inc. v. Cornell Corp.*, 635 F.3d 539, 544 (Fed. Cir. 2011) (reiterating the “every element” rule).

227. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1259 (Fed. Cir. 2007) (“[O]bvious variants of prior art references are themselves part of the public domain.”).

228. It is worth noting that obviousness is not simply another iteration of the abstraction process. Articulating “a table with four legs” would also articulate the idea of “tables” in the abstract, and it *happens* to make a table with five legs obvious. But the articulation of a higher level of abstraction (“tables”) does not always make every lower level of abstraction obvious (“tables with X legs”). For example, it does not make the idea of a table with *one* leg obvious, since people might initially assume that a table with one leg would fall over and thus find the concept difficult to imagine. The difference means that my solution to the abstraction problem does not readily carry over to addressing the problems in obviousness doctrine.

229. See 35 U.S.C. § 103 (“A patent may not be obtained though the invention is not identically disclosed . . . if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious . . .”).

230. See *In re Kumar*, 418 F.3d 1361, 1368 (Fed. Cir. 2005) (“[I]n order to render an invention unpatentable for obviousness, the prior art must enable a person of ordinary skill to make and use the invention.”).

A familiar problem with the non-obviousness standard is its fuzzy boundaries.²³¹ Giving more precision to the obviousness doctrine, however, is not the task of this Article. I have elsewhere suggested ways to give obviousness doctrine more conceptual and practical coherence.²³² For present purposes, it is enough to note that while perfect clarity would be best, having only one fuzzy doctrine is better than having two.

IV. RESPONSES TO POSSIBLE CONCERNS

A. *The Science Fiction Objection*

The science fiction objection is that, under my proposal, science fiction writers who are the first to describe imaginary devices like warp drives and time machines would patent those ideas, and preempt the hardworking later inventors who actually reduce those devices to practice. This actually comprises two analytically distinct arguments, which I will address in turn.

1. *Science Fiction Writers Preempting Later Patents*

The first argument is that a work of science fiction, such as *Star Wars* depicting hyperdrives for interstellar travel, would deprive the later inventor of a real working hyperdrive of his reward. This is a more plainspoken way of reiterating the classic argument in favor of the enablement requirement for prior art. The intuition is that the hardworking inventor who contributes the working embodiment (either by actual building or constructive teaching) should receive a patent.²³³

As described in Part III.C.1, the response to this objection is that it rests on a false dichotomy.²³⁴ The implicit assumption is that the only alternative to awarding *no* patent to the first builder of a hyperdrive (a concededly bad outcome) is award him a patent covering *all* hyperdrives. This is simply not true. Rather, the inventor of the first hyperdrive will be able to describe his faster-than-light-device on many levels of abstraction. This point is counter-intuitive today because it is hard to imagine all the

231. *Harries v. Air King Prods. Co.*, 183 F.2d 158, 162 (2d. Cir. 1950) (commenting that obviousness is “as fugitive, impalpable, wayward, and vague a phantom as exists in the whole paraphernalia of legal concepts”).

232. Tun-Jen Chiang, *A Cost-Benefit Approach to Patent Obviousness*, 82 ST. JOHN’S L. REV. 39 (2008).

233. See *supra* text accompanying note 61; see generally Mueller & Chisum, *supra* note 184, at 1134–37 (providing a history of the development of the enablement requirement for prior art).

234. See *supra* text accompanying notes 192–96.

different levels. The highest level is easy to imagine because it has already been articulated: all hyperdrives. Conversely, the lower levels have not been articulated clearly and thus are harder to describe: *how* will that hyperdrive travel faster than the speed of light? Will it use wormholes or something else? In short, we cannot easily describe lower levels of abstraction, such as wormhole-hyperdrives versus Alcubierre-drives, precisely because those sub-ideas have not been articulated yet.²³⁵

This actually demonstrates the beauty of my proposal. The inventor will get rewarded precisely for having the mental breakthrough that is so hard to imagine today. And this makes perfect sense: if the breakthrough were easy, we would have it already, and that means that the idea requires no patent incentives to create. Thus, the idea of hyperdrives in the abstract *should not* be patentable, because George Lucas (and many others) could articulate that idea without any patent incentives at all. What society needs patent incentives to reward are the more specific ideas on *how* to create a hyperdrive, which people cannot readily imagine today.

It is important to emphasize that for any embodiment that would receive a patent today, there always is a conceptual breakthrough that allows it to receive a patent under my proposal.²³⁶ The conceptual breakthrough is what makes the embodiment “non-obvious.” This leads to a corollary, which is that the only time that a work of science fiction will completely preempt a later patent is when there is no insight (i.e., when the work of science fiction so fully describes the patentee’s device that it amounts to a blueprint). But in those circumstances, preempting the patentee is not a bad thing, and under current law the patent would also be invalid.²³⁷ If the earlier work has fully described how to make a working device with so much detail that it amounts to a blueprint for the later patentee, then a patentee who merely builds the device has contributed nothing worth rewarding.²³⁸ Even under the enablement requirement for prior art, science fiction has invalidated patents when they provided

235. The paradox goes deeper. I *am* able to articulate the sub-ideas of wormhole-hyperdrives and Alcubierre-drives, to demonstrate that the “hyperdrive” is not an indivisible concept but has multiple levels of abstraction. But I cannot articulate the actual breakthrough idea that an eventual inventor would be able to patent. If I could, the idea would not be a breakthrough, and it would not deserve a patent.

236. See *supra* text accompanying note 180.

237. See *Cohesive Techs., Inc. v. Waters Corp.*, 543 F.3d 1351, 1364 n.2 (Fed. Cir. 2008) (noting that an ancient alchemy textbook can invalidate a patent on an alloy if it “describes a method that, if practiced precisely, actually produces the claimed alloy”).

238. See *Hotchkiss v. Greenwood*, 52 U.S. (11 How.) 248, 267 (1850) (requiring more skill than “possessed by an ordinary mechanic acquainted with the business” to obtain a patent).

sufficient detail to act as this kind of blueprint.²³⁹ In this sense, my proposal does not grant more or fewer patents than current law. Consequently, it does not deny inventors of non-obvious things like hyperdrives a patent.

2. *Science Fiction Writers Obtaining Their Own Patent*

The second argument is that science fiction writers would be able to obtain their own patent. My proposal would not allow this, however, because it still requires a patentee to describe at least one working embodiment. This is both for legalistic and policy reasons.

The legalistic reason is that § 112 on its face requires the patent specification to teach how to make the invention, and it clearly means an embodiment in this context.²⁴⁰ And the Supreme Court has held in *Brenner v. Manson* that the usefulness requirement of § 101 also requires a working embodiment.²⁴¹ Thus, while the requirement for prior artists to create a working embodiment has no statutory basis,²⁴² the requirement for patentees to create a working embodiment unquestionably does.

The policy reason is that the ideas of science fiction writers do not usually need patent incentives.²⁴³ This is different from the fallacious notion that underlies the enablement requirement for prior art, that prior ideas have no value at all unless they came with embodiments. Rather, the point is that some ideas can be extremely socially valuable, but require no patent incentives to induce them.²⁴⁴ For example, the idea of $E=mc^2$ is very valuable, but Einstein developed it even without patent incentives. And $E=mc^2$ is actually a close call: the objection is surely not that Einstein might receive a patent, but that science fiction writers imagining airplanes and hyperdrives will. The reason that the objection has stronger intuitive force in the airplane and hyperdrive context is that those ideas are easy—almost anyone can come up with the bare idea. But the easier an idea is, the less likely that idea will itself receive a patent under my proposal.

239. Daniel H. Brean, *Keeping Time Machines and Teleporters in the Public Domain: Fiction as Prior Art for Patent Examination*, 7 U. PITT. J. TECH. L. & POL'Y 5, at *3–4 (2007) (giving examples where fiction has fully anticipated a later patent).

240. 35 U.S.C. § 112 (2006).

241. 383 U.S. 519, 534–35 (1966).

242. Mueller & Chisum, *supra* note 184, at 1137.

243. Devlin & Sukhatme, *supra* note 188, at 917–18 (arguing that we should not grant patent rights when the same invention would have been created even without such rights).

244. See Michael Abramowicz & John F. Duffy, *The Inducement Standard of Patentability*, 120 YALE L.J. 1590 (2011) (arguing for the use of an “inducement” standard to determine whether something should be patented); Chiang, *supra* note 232, at 57–72.

Precisely because everyone can imagine an airplane, the idea of an airplane will be articulated well before the first person can actually produce an embodiment and file a patent. This is not saying that the idea of an airplane is valueless—it is essential and thus valuable—but that it is easy to come up with the high-level idea by itself. What is hard is the lower-level ideas for achieving *flight control*, which then lead to a working airplane, and it is these lower-level ideas that I would protect.²⁴⁵

At first blush, this analysis might suggest that the enablement requirement for prior art has a sound intuition after all: prior ideas might have value, but it is not the kind of value that patent law needs to recognize and protect. But this would be a mistake. What my analysis suggests is that highly abstract ideas like the hyperdrive and flying machines do not need patent incentives (because they are easy to imagine) and thus should belong to the public domain. What the enablement requirement for prior art does, in contrast, is *give them to a later patentee* who creates one embodiment. By excluding the fact that everyone had thought of the idea of airplanes, the patentee can now claim this as his own new idea. By excluding the fact that Einstein invented the idea of $E=mc^2$, patent law gives it to the later person who builds a nuclear power plant (an embodiment of the idea that $E=mc^2$).²⁴⁶ This gives an undue windfall to patentees at the public's expense. The fact that disclosure theory then allows this windfall to be taken back, but only at a judge's arbitrary discretion, obviously does not make the situation any better.

Under my proposal, the ideas that do not need patent incentives would be automatically sifted out by the novelty mechanism. The first person to imagine airplanes did not succeed in building one. The first person to imagine a hyperdrive will not be successful in building one. By requiring a working embodiment, I limit patentable ideas only to those that are sufficiently difficult to conceive that they require patent incentives to protect and reward. Once this is satisfied, however, patent scope should be defined by the novel idea and should not be limited to the embodiment. At

245. See *Overview of the Wright Brothers Invention Process*, NAT'L AERONAUTICS & SPACE ADMIN., <http://wright.nasa.gov/overview.htm> (last visited May 26, 2012) (“They decided that control of the flying aircraft would be the most crucial and hardest problem to solve and they had some ideas for solving that problem.”).

246. As a matter of historical reality, Enrico Fermi did receive a very broad patent, though not quite covering every nuclear reaction. But he received relatively little monetary compensation because, ironically, the patent was so essential to atomic power that the U.S. government forced Fermi to sell it to the government at a low price. See generally Simone Turchetti, “*For Slow Neutrons, Slow Pay*”: *Enrico Fermi's Patent and the U.S. Atomic Energy Program, 1938–1953*, 97 *ISIS* 1 (2006) (describing history of the Fermi patent).

the same time, inventors also should not be able to capture upstream ideas, like the general idea of hyperdrives or airplanes, and remove those ideas from the public domain.

B. The Imprecision of Ideas

A second objection to allowing the patenting of ideas is that ideas are thought to be particularly vague and imprecise, so that the boundaries of the patent monopoly would be rendered unclear.²⁴⁷ Clear boundaries for property rights like patents, of course, are generally considered desirable.²⁴⁸ But allowing patents to cover the inventor's insight is not in tension with this goal.

The simple reason is that today's claims *already* cover ideas; they are just not called such.²⁴⁹ For example, a run-of-the-mill claim to a table—"an apparatus comprising a flat surface and legs"—covers every table or the idea of tables in general, rather than any specific table embodiment. All my proposal does is regulate the permissible scope of claims; it does not require any change to claim style.²⁵⁰ To the extent that claims are tolerably clear today, they will continue to be under my proposal (and to the extent that they are not,²⁵¹ that problem will continue too, but is beyond the scope of this Article to address).

One major benefit of my proposal, however, is to address uncertainty in claim interpretation that is not caused by *linguistic* indeterminacy, but by conflicts in doctrine or *legal* indeterminacy. An example will illustrate. Suppose that a patentee writes a claim that facially covers all tables—"an apparatus comprising a flat surface and legs"—but in the specification describes only wooden tables with four legs. Under current doctrine, a court will often find this claim ambiguous. The theory is that although the claim facially covers all tables, the patentee has only described one table in the specification, and judges think that the patentee cannot really mean to claim all tables when he has not described every table.²⁵² The judges then "interpret" the claim that, on its face, would cover all tables to *really*

247. BESSEN & MEURER, *supra* note 143, at 200 (attributing the problem of uncertainty to abstract claims).

248. Chiang, *supra* note 160, at 525.

249. *See supra* Part I.B.

250. In particular, my proposal does not require changing to central claiming. *Cf.* Burk & Lemley, *supra* note 99, at 1783–84.

251. *See, e.g., id.* at 1748–65 (arguing that today's claims are insolubly ambiguous).

252. *See, e.g.,* Netword, LLC v. Centraal Corp., 242 F.3d 1347, 1352 (Fed. Cir. 2001) ("The claims are directed to the invention that is described in the specification; they do not have meaning removed from the context from which they arose.").

cover only wooden tables with four legs.²⁵³ Other judges then protest that the claim plainly covers every table.²⁵⁴

It should be obvious that this extremely frequent fact pattern²⁵⁵ is not really about textual interpretation at all. There is nothing particularly *textually* ambiguous about claims that cover every table. What the judges are really fighting about is whether a claim that covers every table should be permitted, or in other words about the legally permissible scope. Claim interpretation is simply bootstrapping off the claim validity issue—when a judge thinks that a patentee cannot *really mean* to claim every table despite the facially clear language, that is because he thinks a claim covering every table would be invalid.²⁵⁶ The legal indeterminacy arises from the same levels of abstraction problem as described in Part II. By providing a predictable and intuitively appealing rule for valid scope, my proposal would also resolve these proxy conflicts. In this way it would actually reduce the indeterminacy of claims, a subject on which much ink has been spilled.²⁵⁷ To be sure, some claims are linguistically indeterminate in addition to being legally indeterminate, and my proposal does little to resolve that problem. But having one problem is better than having two.

253. See, e.g., *Retractable Techs., Inc. v. Becton, Dickinson & Co.*, 653 F.3d 1296, 1305 (Fed. Cir. 2011) (interpreting the word “body” to really mean “a one-piece body” because this is what the “inventor actually invented”).

254. See *id.* at 1313 (Rader, C.J., dissenting) (arguing that “body” covers bodies made from multiple pieces); see generally *McCarty v. Lehigh Valley R.R. Co.*, 160 U.S. 110, 116 (1895) (“[I]f we once begin to include elements not mentioned in the claim, in order to limit such claim . . . , we should never know where to stop.”).

255. See *Lizardtech, Inc. v. Earth Res. Mapping, Inc.*, 433 F.3d 1373, 1376 (Fed. Cir. 2006) (Rader, J., dissenting from denial of rehearing *en banc*) (“[A]n issue common to many patent disputes [is] claims that are broader than the disclosed embodiments.”); see, e.g., *Marine Polymer Techs., Inc. v. Hemcon, Inc.*, No. 2010-1548, *slip op.* at 6, 11–14 (Fed. Cir. Mar. 15, 2012) (*en banc*) (whether claim to a “biocompatible poly-β-1→4-N-acetylglucosamine . . . which has an elution test score of 2” really means a poly-β-1→4-N-acetylglucosamine with an elution test score of zero, as this is the score in the specification); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*) (whether claim to “steel baffles” really means steel baffles aligned at the angles described in the specification).

256. See *SuperGuide Corp. v. DirecTV Enters., Inc.*, 358 F.3d 870, 896 (Fed. Cir. 2004) (Michel, J., dissenting) (arguing that accepting the plain claim language would result in coverage “far beyond what the named inventors say they actually invented in their application, and what it describes and enables”).

257. See, e.g., Gretchen Ann Bender, *Uncertainty and Unpredictability in Patent Litigation: The Time Is Ripe for a Consistent Claim Construction Methodology*, 8 J. INTELL. PROP. L. 175, 202–17 (2001); Burk & Lemley, *supra* note 99, at 1748–65; Russell B. Hill & Frank P. Cote, *Ending the Federal Circuit Crapshoot: Emphasizing Plain Meaning in Patent Claim Interpretation*, 42 IDEA 1, 2 (2002); Kimberly A. Moore, Markman Eight Years Later: Is Claim Construction More Predictable?, 9 LEWIS & CLARK L. REV. 231, 233, 239 (2005).

C. *The Over- and Under-Inclusiveness of a Rule*

A third objection is that the patentee's insight might not always lead to the economically optimal patent scope, in that my rule will result in over- and under-reward of a patentee in individual cases. For example, one might argue that the first inventor of one working cure for AIDS *should* receive all future cures for AIDS, because the immediate need to have even one cure is so pressing. In comparison to the immediate benefit, paying monopoly prices and being deprived of later (possibly better) cures might be considered a relatively bearable cost.²⁵⁸ Thus, at least for a patent on the first cure for AIDS, one might argue that a higher level of abstraction is warranted under an economic balancing of incentives and monopoly costs.

The difficulty of this objection is that it implicitly assumes there is some way to measure the economic costs and benefits directly for individual patents. Without reliable empirical data on the incentive benefits and monopoly costs of the patent, the argument degrades into nothing more than uninformed speculation. And patent law fundamentally assumes that such direct measurement is not possible, since otherwise it would be better to abolish the patent system and award cash prizes instead.²⁵⁹ As Louis Kaplow has explained:

[T]he more one attempts to vary the patent life and the rules of exploitation industry by industry and case by case, the less compelling becomes the justification for rewarding invention through a patent system at all. In theory, direct reward systems are preferable because they avoid the monopoly costs associated with a general patent system. A central reason for reliance on a patent system is that it is thought to be too difficult to determine the appropriate level of reward fairly and accurately on a case-by-case basis.²⁶⁰

258. JOHN W. SCHLICHER, *PATENT LAW: LEGAL AND ECONOMIC PRINCIPLES* § 1.04[6][a] (2002) (“The only product ‘monopolized’ and sold at too low quantities is a product that would have been sold in even lower quantity—zero—if there were no ‘monopoly.’”).

259. Michael Kremer, *Patent Buyouts: A Mechanism for Encouraging Innovation*, 113 Q.J. ECON. 1137, 1140 (1998) (“[F]inancing research with monopoly profits . . . is generically less efficient than financing research through tax revenue.”). On patent prizes, see generally Michael Abramowicz, *Perfecting Patent Prizes*, 56 VAND. L. REV. 115 (2003); Douglas Gary Lichtman, *Pricing Prozac: Why the Government Should Subsidize the Purchase of Patented Pharmaceuticals*, 11 HARV. J.L. & TECH. 123 (1997).

260. Kaplow, *supra* note 27, at 1844.

I am not saying that my proposed rule will not create such individual case-by-case errors—it will. As the rules-versus-standards literature has established, some amount of over- and under-inclusiveness error is inevitable with any type of rule.²⁶¹ To point out individual errors, however, is not a good way to assess the merits of having a legal rule. The proper point of comparison is with another feasible alternative,²⁶² where the alternative can provide some systematic approach that produces better results overall. The two obvious points of comparison are a regime where the embodiment-centric *quid pro quo* rule was enforced strictly so that patentees were limited to their specification embodiments,²⁶³ or a free-for-all regime where judges simply engaged in economic balancing. As described in Part II, neither alternative is satisfactory.

D. A Rebuttable Presumption as an Extension

One possible (though, as we shall see, far from definitive) exception to the foregoing analysis pertains to the pharmaceutical sector. The problem here is that pharmaceutical research involves a large element of trial-and-error. If I want to find a chemical pill that cures AIDS, there are billions or trillions of potential candidates. Someone can easily generate a gigantic list of all of these potential candidates using a computer. The problem here is that all of these candidates would then be considered “articulated,” but only one or a few of them will actually work. Thus, when an inventor eventually—after extreme amounts of trial-and-error testing—finds the one compound that works, he will discover that the compound is already buried within a gigantic list generated by someone else, and therefore receive no patent. And in this case there really might be *no* patent: there might not be a lower level of abstraction, because the same gigantic list can also specify all the other details such as the uses for the compound (just list every known disease) and the methods of making them (listing every known manufacturing method). Because all the real work occurs with trial-and-error testing and not the initial conception of the chemical formula—which can just be done by computer—the result seems perverse.

261. See Kathleen M. Sullivan, *Foreword: The Justices of Rules and Standards*, 106 HARV. L. REV. 22, 62–69 (1992) (describing trade-offs between rules and standards).

262. See Harold Demsetz, *Information and Efficiency: Another Viewpoint*, 12 J.L. & ECON. 1, 1 (1969) (criticizing “[t]he view that now pervades much public policy economics implicitly presents the relevant choice as between an ideal norm and an existing ‘imperfect’ institutional arrangement”). Winston Churchill made the point more colorfully with his observation that democracy is a terrible form of government, except in comparison to the alternatives.

263. See *supra* text accompanying notes 82–86.

From the perspective of balancing incentives benefits against monopoly costs, surely granting no patent at all would be sub-optimal. The corollary is that perhaps a free-for-all judicial balancing regime would be better than one that would systematically produce results of zero scope.

I concede this to be a serious problem.²⁶⁴ But it is not a problem with my proposal, in the sense that *the exact same problem* exists under current law and under the enablement requirement for prior art.²⁶⁵ As Sean Seymore has explained, the enablement requirement for prior art is usually easily satisfied by a bare list of chemical formulas, because it is considered easy to synthesize a compound after knowing its chemical formula.²⁶⁶ Of course, the real difficulty lies in testing each of millions or billions of compounds to show that the compound works, but the enablement requirement for prior art does not require that a prior reference test or prove the compound's usefulness.²⁶⁷ Keeping current law would thus not solve this problem.²⁶⁸ To the extent that the patent system today has survived without someone gaming the rule to mass-produce computer-generated lists of chemical compounds and foreclose future patents,²⁶⁹ it can be expected to survive under my proposed rule as well.

Generalizing from this specific instance, the problem is that patent law traditionally seeks only to incentivize conduct up to a discrete point in time, which it denotes as “conception” and defines as the formation of a complete mental picture of the invention.²⁷⁰ As Ted Sichelman has pointed out, what this standard means is that patent law inherently assumes that the many steps on the road to commercialization that occur after conception—

264. The problem often manifests in real-life not with an actual computer-generated list, but with a defendant arguing that the patented compound was “obvious to try”—because each of the millions of candidates were all implicitly known to people in the field. Courts respond to that argument by holding that millions of potential candidates cannot all be considered obvious. *Ortho-McNeil Pharm., Inc. v. Mylan Labs., Inc.*, 520 F.3d 1358, 1364 (Fed. Cir. 2008) (requiring that the number of options be “small or easily traversed”). But if the list were explicit, this doctrinal “out” would not be available, because an explicit disclosure would not involve a question of its obviousness.

265. See, e.g., *In re Samour*, 571 F.2d 559, 562–64 (C.C.P.A. 1978) (finding prior disclosure of the compound invalidated patent).

266. Seymore, *supra* note 61, at 958–59 (“X’s mere appearance in a document often places it on the fast track to anticipation.”).

267. *In re Hafner*, 410 F.2d 1403, 1405 (C.C.P.A. 1969).

268. See Andrew Chin, *Artful Prior Art and the Quality of DNA Patents*, 57 ALA. L. REV. 975, 1011–12 (2006) (describing how a computer-generated list of DNA sequences would satisfy the requirements of current law).

269. *But see id.* at 1010 (creating one such list as a “proof of concept”).

270. *Burroughs Wellcome Co. v. Barr Labs., Inc.*, 40 F.3d 1223, 1228 (Fed. Cir. 1994) (“the test for conception is whether the inventor had an idea that was definite and permanent enough that one skilled in the art could understand the invention; . . . an inventor need not know that his invention will work for conception to be complete”).

such as testing, marketing, and commercial manufacturing—are easy.²⁷¹ What the pharmaceutical example demonstrates is that this assumption is false in at least some cases: in trial and error research, coming up with the mental picture or hypothesis (e.g., compound *X* cures cancer) is easy, while testing that hypothesis is hard because there are so many potential candidates. But challenging patent law’s assumption regarding the standard for conception (which, as Sichelman acknowledges, is “dominant” and “undergirds much of today’s law”) is beyond the scope of this Article.²⁷² It suffices to note that because this assumption is independent of the issue I am trying to address, the gigantic-computer-generated-list problem occurs to the same extent under current law as would under my proposal.

Although my proposal does not *cause* the problem, one interesting way to address it would be to adopt the proposal not as a mandatory requirement but as a rebuttable presumption. The patentee’s insight would be the presumptive degree of scope, but courts would have discretion to modify the degree of scope if the patentee or a challenger could prove that some other degree of scope was more economically sound by presenting empirical evidence. As described above, collecting reliable economic information about the benefits and costs of individual patents is usually not feasible. But in rare circumstances it could be done,²⁷³ and to that extent, economic data should trump legal theory. And this would be potentially superior to the current approach: under current law, if a compound appears on a list and is deemed non-novel, there is no discretion: the patent is *per se* invalid.

The reason that a presumption approach is desirable is that any legal rule is necessarily imperfect. The benefit of a presumption approach is thus that it allows patent scope to be optimally tailored to achieve correct rewards in those rare cases where economic information can be collected. Another important benefit is that adopting a presumption approach creates an incentive to collect such information on the part of litigants, and having better empirical data on the operation of the patent system will help

271. Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. 341, 344 (2010) (“The dominant ‘reward’ theory of patenting, which undergirds much of today’s law, perceives little to no need to protect risky and costly post-invention development and commercialization efforts.”).

272. Sichelman proposes a new type of property right to incentivize the post-conception commercialization steps. *Id.* at 345–46.

273. The circumstances where the administrative cost can be justified will almost certainly occur only when a patent reaches litigation, where more is at stake. See Lemley, *supra* note 138, at 1510 (arguing for devoting fewer administrative resources to patent examination and more to patent litigation).

improve its overall efficiency in addition to helping tailor the scope of individual patents.

Weighed against these benefits is the fact that a presumption will involve a greater degree of administrative complexity and hence judicial administration cost.²⁷⁴ The standard of proof required to rebut the presumption and obtain greater or lesser scope will need to be specified, including the type and quantity of economic data, and then trials will need to be held under the new standard. As noted in Part II.B, antitrust law in fact calls for such economics-based fact finding, with expert testimony and empirical data collection. The downside of the approach, however, has been much greater complexity and higher litigation costs.²⁷⁵ Determining the details of how to construct a presumption, and ultimately whether its tailoring benefits outweigh the administrative costs, is a matter for future research.

CONCLUSION

Patent law's traditional disclosure theory focuses on the embodiment disclosed by the specification. Disclosure theory is incoherent because the same disclosed embodiment can always be characterized at many equally plausible levels of abstraction. Courts then lack any principle for choosing.

The incoherence of disclosure theory is confirmed by the fact that the legalistic rules that emanate from the theory become self-contradictory. In both the abstract idea doctrine and the § 112 case law, directly contradictory cases stand for either a principle that patentees may claim undisclosed future embodiments, or that they may not. A citation to one line or the other can justify any outcome. The result is that courts have been forced to pick and choose using extra-legal mechanisms, such as by surreptitiously using intuitions about the proper economic balance between incentive benefits and monopoly costs. While such direct economic balancing could in theory produce good economic results, in practice the lack of adequate information dooms the approach to failure, at least in most cases and for most patents.

274. See generally Richard A. Posner, *Employment Discrimination: Age Discrimination and Sexual Harassment*, 19 INT'L REV. L. & ECON. 421, 423 (1999) ("Rules have higher error costs but lower administrative costs; standards have lower error costs but higher administrative costs. The relative size of the two types of cost will determine the efficient choice between the alternative methods of regulation in particular settings."). Changing my proposed rule into a presumption makes it more like a standard, and thus increases its administrative cost while reducing its error cost.

275. See *supra* text accompanying notes 133–36.

The solution I propose in this Article is to recognize that the patentee's contribution to downstream progress is not an embodiment but an idea. A patentee's moral claim to royalties from subsequent improvers lies in the fact that subsequent improvers presumably derive principles and ideas from a patentee's pioneering work, not on replication of the patentee's embodiment, which is usually rudimentary (e.g., in the form of a barely-flying airplane or a barely-working telephone). It follows that patent protection should extend to all future uses of the patentee's idea, even when the later infringing embodiment is a much-improved airplane or a much-improved telephone. This moral claim can be stated in economic terms: the core purpose of patent law is to protect against misappropriation of information goods, and this means the idea and not the embodiment.

But in order to be fairly credited as the inventor of the idea and obtain a monopoly covering all future implementations of that idea, a patentee should be required to be the first to invent the idea in addition to merely creating one embodiment of it. Inventing an idea means being the first to *articulate* the idea. This standard differs radically from patent law's conventional novelty standard, which focuses merely on whether the patentee is the first to build one embodiment.

The gap that emerges in current law is that the idea that the patentee enforces against downstream improvers may not have originated with the patentee at all, but was itself taken from upstream inventors. This is made possible by the enablement requirement for prior art, which excludes all work by prior inventors who did not create embodiments. But if the patentee's downstream contribution is deemed to be the idea and not the specific embodiment, determining the patentee's contribution vis-à-vis upstream inventors should be done on the same terms. In short, the patentee should be entitled to the insight that he was the first to articulate.

A key point is that every breakthrough invention necessarily contains a new and non-obvious insight, since that insight is what enables the patentee to succeed when all prior attempts failed. The Wright brothers did not invent the idea of airplanes, which had long existed. But they did invent the idea of using rudders for flight control, which then enabled them to build a successful airplane embodiment when all prior attempts failed. The implication of my standard is that the Wright brothers would receive a patent for their breakthrough idea. This also rebuts the science fiction objection that my proposal would result in no patent for the inventors of a hyperdrive: like the Wright brothers developing a new insight to achieve an old dream, the future inventor of a working hyperdrive will need to develop a new insight to achieve faster-than-light travel. My standard would then protect the as-yet-unknown insight.

Adopting this standard has three major advantages. First, it provides a coherent principle to select among competing levels of abstraction. The Wright brothers are not able to patent all airplanes, because they did not invent the idea of airplanes. But neither are they confined to their specific embodiment of a barely-flying wooden glider. Instead, they are given a reasonable middle ground. The second advantage is that my theory provides a much better explanation for actual historical outcomes than the incoherent disclosure theory. In reality, the Wright brothers received protection that closely matches what my theory would predict, as did Samuel Morse and Alexander Graham Bell. Under the traditional disclosure theory, by contrast, the seeming contradiction between *Morse* and *Bell* has puzzled patent lawyers for generations.

The third advantage is that the middle ground provided by my proposal makes a great deal of economic sense. Because the economic role of patents is to protect against misappropriation of information goods, protecting the breakthrough insight comes very close to the economic purpose of the patent system. Of course, as with any legal rule, some amount of over- and under-inclusiveness error is inevitable. I do not claim that my rule will produce optimal economic outcomes every time, but only that it produces reasonable outcomes, and that there is no readily administrable legal rule that does better. A direct economic balancing approach might in theory achieve even more precision in achieving good economic outcomes, but in most cases it would not be administratively feasible.

An extension of this framework would consider adopting the rule as a rebuttable presumption, where economic evidence could be introduced to vary the amount of scope in cases where direct economic balancing were administratively feasible. Such an approach, however, would require further research into the proper standard of proof, and also into whether the higher administrative costs of such a system are justified to achieve the improvement in precision in individual cases.