



School of Law

A NOVELTY-OF-IDEA THEORY OF PATENT SCOPE

**T.J. Chiang,
George Mason University School of Law**

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A Novelty-of-Idea Theory of Patent Scope

T.J. Chiang[†]

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, and not because they were the first to think of flying.

Patent law then limits monopoly scope through a theory of disclosure: despite the airplane being new, the Wright brothers could not patent every airplane, ostensibly because they did not teach how to make every airplane. Disclosure theory, however, is incoherent. Patent law cannot confine the Wright brothers to the embodiment they taught—a barely-flying wooden glider—since doing so will 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 because the idea of airplanes was old. At the same time, a new invention always contains new insights—the Wright brothers succeeded because they invented the idea of using a rudder for flight control, which prior inventors did not have. My proposal would then protect this novel insight by covering every future airplane that uses this idea. 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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[†] Assistant Professor of Law, George Mason University School of Law. Thanks to Kevin Emerson Collins, Dmitry Karshedt, Doug Lichtman, Glynn Lunney, Jonathan Masur, Mark Lemley, Adam Mossoff, Lisa Larrimore Ouellette, Josh Sarnoff, Ted Sichelman, and participants at the Patent Conference, the Works in Progress IP Colloquium, and the Virginia Junior Faculty Forum for comments.

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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

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).

only one airplane *embodiment*: a single barely-flying wooden glider. 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.⁴ Courts therefore define the invention more abstractly, as an “airplane” and not a “wooden glider airplane.”⁵

But once we reject confining patent scope to the precise embodiment that has been disclosed, there is no principled limit to this abstraction process.⁶ 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 brothers to airplanes using wings and rudders, and did not give them all flying machines.⁷ 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.⁸ One line says that patent scope covers only replication of the embodiments disclosed in the specification.⁹

⁴ *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 608 (1950).

⁵ The implication, of course, is that the patent would cover all airplanes if the invention was defined in those terms. See ROBERT PATRICK MERGES & JOHN FITZGERALD DUFFY, *PATENT LAW AND POLICY: CASES AND MATERIALS* 28 (4th ed. 2007) (describing “open” claims).

⁶ See generally Tun-Jen Chiang, *The Levels of Abstraction Problem in Patent Law*, 105 Nw. U. L. Rev. (forthcoming 2011), available at <http://ssrn.com/abstract=1434465>.

⁷ *Wright Co. v. Paulhan*, 177 F. 261, 264 (S.D.N.Y. 1910), *rev'd on other grounds*, 180 F. 112 (2d Cir.).

⁸ See Bernard H. Chao, *Rethinking Enablement in the Predictable Arts*, 2009 STAN. TECH. L. REV. 3, ¶¶ 50–52 (discussing conflicts in doctrine).

⁹ *O'Reilly v. Morse*, 56 U.S. (15 How.) 62, 119 (1853) (patent covers “nothing more” than embodiments disclosed).

Another line says that patentees must not be confined to the embodiments disclosed in the specification.¹⁰ The result of this conflict is “doctrinal chaos” where outcomes are impossible to predict.¹¹

Although the problem has been described in previous work by myself and others,¹² no practical solution has emerged. One proposed solution has been for courts to calibrate patent scope using economic balancing.¹³ 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.¹⁴ 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.¹⁵ Although patent claims are often phrased in terms of 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.¹⁶

Although this linguistic point is simple, once it is 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

¹⁰ *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.”).

¹¹ Kevin Emerson Collins, *Enabling After-Arising Technology*, 34 J. Corp. L. 1083, 1085 (2009).

¹² See, e.g., Chiang, *supra* note 6; Chao, *supra* note 8; Collins, *supra* note 11; Jeffrey A. Lefstin, *The Formal Structure of Patent Law and the Limits of Enablement*, 23 Berkeley Tech. L.J. 1141, 1168 (2008).

¹³ See, e.g., Chiang, *supra* note 6, at 43–44; Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 Colum. L. Rev. 839, 842–44 (1990).

¹⁴ *Nash v. CBS, Inc.*, 899 F.2d 1537, 1541 (7th Cir. 1990).

¹⁵ See *Continental Paper Bag Co. v. E. Paper Bag Co.*, 210 U.S. 405, 418-19 (1908) (patents protect the “principle of the invention”).

¹⁶ See Merges & Duffy, *supra* note 5, at 28.

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.¹⁷ 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 invent 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.¹⁸ 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. But the Wrights *did* invent the idea of using rudders to control flight (or, more technically, linking yaw to roll via a rudder).¹⁹ Not fortuitously, as a matter of historical fact they received patent scope closely corresponding to that contribution.²⁰

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-obvious²¹ 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

¹⁷ See *infra* Part I.A.3. As already noted, the Wright brothers' patent did not cover every airplane. See *supra* text accompanying note 7. 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.

¹⁸ 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.

¹⁹ 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").

²⁰ See *Wright Co. v. Paulhan*, 177 F. 261, 264 (S.D.N.Y. 1910), *rev'd on other grounds*, 180 F. 112 (2d Cir.) (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 189–197.

²¹ See 35 U.S.C. § 103 (2006) (requiring non-obviousness).

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 have invented the idea *as an idea* (i.e. be the first to articulate it).

This 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.²² 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.²³ 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 dichotomy between ideas and embodiments, where the patentee contributes a novel embodiment, but claims cover ideas. Part **Error! Reference source not found.** 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

²² 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.”).

²³ WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 294 (2003).

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,²⁴ 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.²⁵ 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.²⁶ Novelty—giving society something it did not have before—is thus regarded as the key to a patentable contribution.²⁷

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. 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.²⁸ The second step is that the patentee has to identify (or “claim”) the feature that makes this embodiment new.²⁹ The third step is to compare the patentee’s embodiment against all prior embodiments, to see if the claimed feature is in fact new. The

²⁴ 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.”).

²⁵ Louis Kaplow, *The Patent-Antitrust Intersection: A Reappraisal*, 97 Harv. L. Rev. 1813, 1844 (1984).

²⁶ See Landes & Posner, *supra* note 23, at 298–300 (noting the many imperfections of this mechanism).

²⁷ Merges & Duffy, *supra* note 5, at 357 (analogizing novelty to the consideration to make a contract binding).

²⁸ 35 U.S.C. § 112 ¶ 1 (2006).

²⁹ 35 U.S.C. § 112 ¶ 2 (2006).

important point, however, is to note that this process is embodiment-centric: it focuses on whether prior inventors had *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.³⁰ Section 112 of the patent statute accordingly mandates that the specification “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 same.”³¹

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 to satisfy § 112.³²

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 intangible ideas cannot be made. Moreover, the embodiment must be specified down to fairly minute detail, since the description must be “full, clear,” and “exact.”³³ 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.³⁴ In short, when speaking of the invention being disclosed by the specification, patent

³⁰ *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 480–81 (1974).

³¹ 35 U.S.C. § 112 (2006).

³² *Enzo Biochem, Inc. v. Gen-Probe Inc.*, 323 F.3d 956, 965 (Fed. Cir. 2002); *In re Wands*, 858 F.2d 731, 735 (Fed. Cir. 1988).

³³ 35 U.S.C. § 112.

³⁴ John F. Duffy, *Rules and Standards on the Forefront of Patentability*, 51 *Wm. & Mary L. Rev.* 609, 625 (2009) (“abstraction is the very antithesis of the precision required by the disclosure provisions of the Patent Act”).

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.³⁵

2. Claiming the inventive features.

The “claim” in a patent is a one-sentence description of the invention.³⁶ A patent may (and often does) have multiple claims, since a specification may contain more than one inventive feature.³⁷ But like the specification, the claims are supposed to describe the invention,³⁸ 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.³⁹ 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.⁴⁰

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.”⁴¹ 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

³⁵ See Merges & Nelson, *supra* note 13, 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.”).

³⁶ 35 U.S.C. § 112 ¶ 2 (2006). 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.

³⁷ 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 15 claims).

³⁸ *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.”).

³⁹ *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1561 (Fed. Cir. 1991) (“the 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))).

⁴⁰ *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.”).

⁴¹ *Evans v. Eaton*, 20 U.S. (7 Wheat.) 356, 433–35 (1822).

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,⁴² 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.”⁴³

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 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.⁴⁴ 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 linguistically, be directed to a physical thing. A patentee cannot say that “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,⁴⁵ *i.e.* a process, machine, manufactured article, or composition of matter.⁴⁶ As

⁴² Patent Act of 1790, § 2, Ch. 7, 1 Stat. 109; Patent Act of 1793, § 3, Ch. 11, 1 Stat. 318.

⁴³ Patent Act of 1836, § 6, Ch. 357, 5 Stat. 117; *see also* 35 U.S.C. § 112 ¶ 2 (requiring “one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention”).

⁴⁴ WEBSTER’S THIRD NEW INTERNATIONAL DICTIONARY OF THE ENGLISH LANGUAGE 2324 (defining table as “a piece of furniture consisting of a smooth flat slab fixed on legs”).

⁴⁵ *In re Nuijten*, 500 F.3d 1346, 1352 (Fed. Cir. 2007) (claim phrased as directed to a “signal” is non-statutory and invalid); Efthimios Parasidis, *A Uniform Framework for Patent Eligibility*, 85 Tul. L. Rev. 323, 364 (2010).

⁴⁶ 35 U.S.C. § 101 (2006).

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. 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 known as the “enablement requirement for prior art,” a prior reference such as a book or article must teach how to make an embodiment, or it is not prior art.⁴⁷ 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: section 112 invalidates a patent where it fails to teach an embodiment;⁴⁸ whereas the enablement requirement for prior art “invalidates” a prior reference.⁴⁹ 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 is somewhat counter-intuitive to those familiar with patent practice. In real life the most frequently encountered type of prior art are printed publications like books and articles,⁵⁰ 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

⁴⁷ *Seymour v. Osborne*, 78 U.S. 516, 555 (1870) (“the 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”).

⁴⁸ *CFMT, Inc. v. Yieldup Int’l Corp.*, 349 F.3d 1333, 1339 (Fed. Cir. 2003). It should be noted that this application of section 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.

⁴⁹ *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1355 (Fed. Cir. 2003) (if the patentee proves a prior reference is not enabled, trial court must exclude the reference from consideration).

⁵⁰ John R. Thomas, *Collusion and Collective Action in the Patent System: A Proposal for Patent Bounties*, 2001 U. Ill. L. Rev. 305, 331.

embodiment.⁵¹ By themselves, the ideas disclosed by articles and books are considered worthless to patent law.⁵² In other words, patent law frequently encounters embodiments that are only *constructively* reduced to practice. But a constructively made embodiment is still “made” nonetheless.⁵³

The ostensible policy reason underlying the enablement requirement for prior art is that mere ideas are not socially valuable.⁵⁴ 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 imaginations speculating about future inventions.⁵⁵ 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.⁵⁶ Non-obviousness is simply an extension of novelty,⁵⁷ in that the invention must not only be new, but it must be so *substantially* new that it is

⁵¹ *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1355 (Fed. Cir. 2003).

⁵² *Dewey & Almy Chem. Co. v. Mimex Co.*, 124 F.2d 986, 989 (2d Cir. 1942) (“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)).

⁵³ See *Fujikawa v. Wattanasin*, 93 F.3d 1559, 1564 n.5 (Fed. Cir. 1996) (holding the same principles apply between actual and constructive reductions to practice); Collins, *supra* note 11, at 1095.

⁵⁴ *Dewey*, 124 F.2d at 989.

⁵⁵ See Sean B. Seymore, *Rethinking Novelty in Patent Law*, 60 Duke L.J. 919, 952 (2011) (arguing that “mere recitation” of an invention “constitutes nothing more than speculation about its potential or theoretical existence” (quoting *In re Wiggins*, 488 F.2d 538, 543 (C.C.P.A. 1973))).

⁵⁶ 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.

⁵⁷ P.J. Federico, *Origins of Section 103*, 5 APLA Q.J. 87, 97 n.5 (1977).

worth giving a monopoly over.⁵⁸ The claim identifies this new and non-obvious part or feature, and it then defines the boundary of the patent right.⁵⁹ 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.⁶⁰ Yet it creates something of a paradox.⁶¹

The paradox is that the practical coverage of a claim encompasses far more than the embodiment that is disclosed in the specification.⁶² 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,⁶³ at the same time every patent in practical terms covers an idea of some sort. This paradox has long been recognized,⁶⁴ but it has never been resolved.

⁵⁸ *Graham v. John Deere Co.*, 383 U.S. 1, 9 (1966).

⁵⁹ *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.”).

⁶⁰ *Merges & Duffy*, *supra* note 5, at 28.

⁶¹ Timothy R. Holbrook, *Equivalency and Patent Law's Possession Paradox*, 23 *Harv. J. L. & Tech.* 1, 6 (2009).

⁶² *Id.*; see 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.”).

⁶³ *Gottschalk v. Benson*, 409 U.S. 63, 71 (1972).

⁶⁴ 1 William C. Robinson, *The Law of Patents* § 134 (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.”).

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.⁶⁵ 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.⁶⁶ Thus, from an economic perspective, patents must allow some degree of abstraction, to say that 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.⁶⁷ 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.

This creates a real tension in patent law's fundamental *quid pro quo*, which is the basis of disclosure theory.⁶⁸ 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, where 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

⁶⁵ See *In re Comiskey*, 554 F.3d 967, 979 (Fed. Cir. 2009) (holding that a pure mental process is not patentable).

⁶⁶ See *Royal Typewriter Co. v. Remington Rand, Inc.*, 168 F.2d 691, 693–94 (2d Cir. 1948) (Hand, J.) ("it is always, or almost always, possible to change the form . . . and yet cull the full advantage of the discovery").

⁶⁷ 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.").

⁶⁸ 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").

of 10 rads of X radiation.⁶⁹ 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 principled limit on permissible abstraction. Our 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.

Each level of abstraction seems equally accurate in describing the invention.⁷⁰ 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.⁷¹ 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.⁷² These 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. Our scientist can argue that “a cure for AIDS” is new, because nobody has

⁶⁹ See, e.g., *O’Reilly v. Morse*, 56 U.S. (15 How.) 62, 119 (1853) (hereinafter *Morse*) (“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.”).

⁷⁰ See Dan L. Burk & Mark A. Lemley, *Quantum Patent Mechanics*, 9 *Lewis & Clark L. Rev.* 29, 51 (2005) (discussing a similar levels of abstraction problem in claim interpretation).

⁷¹ I focus on courts because they have the final say. See 35 U.S.C. §§ 141 & 282 (providing for direct and collateral review of patent office decisions).

⁷² 35 U.S.C. §§ 102-103.

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.⁷³

A. *Disclosure Theory in Doctrine*

The two primary doctrines that limit permissible abstraction are the disclosure doctrine of § 112, and the abstract idea doctrine. 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 section 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.⁷⁴ 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.⁷⁵

As a textual matter, the most plausible reading of § 112 is that it defines the invention as an embodiment 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 § 112.⁷⁶ 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

⁷³ See *Gentry Gallery 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*” (emphasis added)).

⁷⁴ 35 U.S.C. § 112 (2006).

⁷⁵ 35 U.S.C. § 282(3) (2006).

⁷⁶ *Merges & Nelson*, *supra* note 13, 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.”).

field.⁷⁷ But an implicitly taught embodiment is still taught, so the amount of stretching is minor.⁷⁸ Thus, in *Automotive Technologies International, Inc. v. BMW*,⁷⁹ 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.⁸⁰

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.⁸¹ 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 to paint color, it cannot even bridge the small gap between a mechanical sensor and an electronic sensor of the same design.⁸² Moreover, the relevant time for ascertaining what the specification teaches is the when the patent is *filed*,⁸³ and supplemental background knowledge is thus likewise frozen at this time.⁸⁴ But technology often evolves very quickly, so the frozen background knowledge becomes outdated in short order.⁸⁵

Thus, a contrary line of cases holds that patentees may claim undisclosed future improvements.⁸⁶ This line of cases criticizes the economic effect of limiting patentees to the specification embodiments:

⁷⁷ *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384 (Fed. Cir. 1986).

⁷⁸ *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”).

⁷⁹ 501 F.3d 1274 (Fed. Cir. 2007).

⁸⁰ *Id.* at 1284.

⁸¹ *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 608 (1950).

⁸² *Auto. Techs.*, 501 F.3d at 1284.

⁸³ *Chiron Corp. v. Genentech, Inc.*, 363 F.3d 1247, 1254 (Fed. Cir. 2004).

⁸⁴ *Id.* (“a patentee preferably omits from the disclosure any routine technology that is well known *at the time of application*” (emphasis added)).

⁸⁵ 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 19, at 717 (“after 1908 the rate of progress in aviation was quite startling; progress which, in many ways, would leave the Wright brothers behind”).

⁸⁶ *See, e.g., Spectra-Physics, Inc. v. Coherent, Inc.*, 827 F.2d 1524, 1533 (Fed. Cir. 1987) (“a broad claim . . . is not invalid for lack of enablement

[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.⁸⁷

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.”⁸⁸ 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,⁸⁹ 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.⁹⁰

This can most easily be seen by comparing and contrasting two famous Supreme Court cases that are classified under the abstract idea doctrine:⁹¹ Samuel Morse’s invention of the telegraph and

simply because it reads on another embodiment of the invention which is inadequately disclosed” (internal citation omitted)).

⁸⁷ *Invitrogen Corp. v. Clontech Labs., Inc.*, 429 F.3d 1052, 1071 (Fed. Cir. 2005).

⁸⁸ *Lizardtech, Inc. v. Earth Resource Mapping, Inc.*, 433 F.3d 1373, 1376 (Fed. Cir. 2006) (Rader, J., dissenting from denial of rehearing *en banc*).

⁸⁹ *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. 498, 507 (1874).

⁹⁰ 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).

⁹¹ 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).

Alexander Graham Bell's invention of the telephone. On their face, these inventions would seem closely analogous: both represented a long-sought and revolutionary telecommunications 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.⁹²

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.⁹³

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.”⁹⁴ Thus, under this interpretation, it would cover modern fax machines and email.⁹⁵

The Supreme Court held that the claim was “too broad” and thus invalid.⁹⁶ The Court's reasoning in support of this holding is somewhat murky,⁹⁷ but it expressed two basic concerns. First, as a legal matter, the Court cited the then-recent case of *Le Roy v. Tatham*,⁹⁸ which had stated in dicta that “a principle is not patentable.”⁹⁹ The Court then held that the use of electromagnetic force to transmit characters was

⁹² 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).

⁹³ O'Reilly v. Morse, 56 U.S. (15 How.) 62, 112 (1853) (hereinafter *Morse*).

⁹⁴ *Id.* at 113.

⁹⁵ 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).

⁹⁶ *Morse*, 56 U.S. at 113.

⁹⁷ 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”).

⁹⁸ 55 U.S. (14 How.) 156 (1852).

⁹⁹ *Id.* at 175.

an unpatentable principle.¹⁰⁰ 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 progress.¹⁰¹ 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.*¹⁰²

From this reasoning, we 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 § 112.¹⁰³

But this rule is directly contradicted by the Court's subsequent decision in the *Dolbar v. American Bell Telephone Co.*¹⁰⁴ 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.¹⁰⁵

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.¹⁰⁶ Obviously,

¹⁰⁰ *Morse*, 56 U.S. at 117.

¹⁰¹ *Id* at 113.

¹⁰² *Id* at 119 (emphasis added).

¹⁰³ See Duffy, *supra* note 34, at 625 (“abstraction is the very antithesis of the precision required by the disclosure provisions of the Patent Act”).

¹⁰⁴ 126 U.S. 1 (1888) (hereinafter *Bell*).

¹⁰⁵ *Id* at 13-14.

¹⁰⁶ 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.”).

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.¹⁰⁷ The Court's technical 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.¹⁰⁸ This technical 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.

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 that, “[s]urely, 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.”¹⁰⁹ 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.”¹¹⁰ Even taking the factual distinction concerning closed circuits at face value, the legal rules being stated still directly contradict each other.¹¹¹

What this means is that “no one can figure out what constitutes abstract ideas.”¹¹² Rather than meaningful legal doctrine guiding courts to outcomes, commentators have long suspected that outcomes in this area are being determined by extra-legal considerations.¹¹³ This, too, is a lot like § 112.¹¹⁴

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 the exact same levels of abstraction problem as patent law: limiting copyright scope to verbatim reproduction of the literal text would allow “a plagiarist

¹⁰⁷ *Id* at 535.

¹⁰⁸ *Id* at 534–35.

¹⁰⁹ *Bell*, 126 U.S. at 539.

¹¹⁰ *Morse*, 56 U.S. at 119.

¹¹¹ See Hanoch Dagan, *The Realist Conception of Law*, 57 U. Toronto L.J. 607, 613 (2007) (“The indeterminacy of legal doctrine derives first and foremost from the available leeway in choosing the applicable rule rather than from the ambiguity of that rule once chosen.”).

¹¹² Michael Risch, *Forward to the Past*, 2010 Cato Sup. Ct. Rev. 333, 336.

¹¹³ See, e.g., 1 Donald S. Chisum, *Chisum on Patents* § 1.03[2][d] (“The holding of the Telephone Case was undoubtedly influenced by the desire to secure recognition and reward for Alexander Graham Bell.”).

¹¹⁴ See Chiang, *supra* note 6, at 46 (arguing that the incoherence of § 112 doctrine means that courts resort to economic considerations).

would escape by immaterial variations,”¹¹⁵ but once we allow more, there is no principled limit on how much abstraction should be allowed.¹¹⁶ 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 rather more transparently. Copyright courts acknowledge that the levels of abstraction problem exists and that doctrine cannot resolve it,¹¹⁷ and some courts go so far as to acknowledge that decisions about copyright scope in fact depend on extra-legal economic balancing.¹¹⁸ Patent courts acknowledge none of these things.¹¹⁹ 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 these *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.¹²⁰ Judges would thus first attempt to calculate the optimal patent scope, and then manipulate doctrine to reach these predetermined results; and like 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.¹²¹ 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.¹²² This

¹¹⁵ See *Nichols v. Universal Pictures Corp.*, 45 F.2d 119, 121 (2d Cir. 1930).

¹¹⁶ *Id.* (“Nobody has ever been able to fix that boundary.”).

¹¹⁷ *Id.*

¹¹⁸ *Herbert Rosenthal Jewelry Corp. v. Kalpakian*, 446 F.2d 738, 742 (9th Cir. 1971).

¹¹⁹ *Automotive Techs.*, 501 F.3d at 1281.

¹²⁰ Chiang, *supra* note 6, at 43–44; Merges & Nelson, *supra* note 13, at 868-71

¹²¹ See Mathilde Cohen, *Sincerity and Reason-Giving: When May Legal Decision Makers Lie?*, 59 DePaul L. Rev. 1091, 1091 (2010).

¹²² Kaplow, *supra* note 25, 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.”).

is an acknowledged problem in copyright law.¹²³ Patent courts are unlikely to do any better.¹²⁴

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.¹²⁵ But even with such help, collecting complete and accurate economic information is still a frightfully expensive exercise.

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.”¹²⁶ The result is that antitrust cases depend on enormous amounts of economic data collection and battles of experts.¹²⁷ While most commentators applaud the modern economics-focused approach of antitrust law over the prior approach of relying primarily on legalistic *per se* rules,¹²⁸ there is little doubt that the modern approach results in very costly litigation.¹²⁹ 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).¹³⁰

Such a costly information-gathering process cannot be justified for the overwhelming majority of patents or copyrights, because the

¹²³ *Nash v. CBS, Inc.*, 899 F.2d 1537, 1541 (7th Cir. 1990).

¹²⁴ See Keith E. Maskus, *Lessons from Studying the International Economics of Intellectual Property Rights*, 53 Vand. L. Rev. 2219 (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”).

¹²⁵ Chiang, *supra* note 6, at 44.

¹²⁶ *Continental T.V., Inc. v. GTE Sylvania Inc.*, 433 U.S. 36, 49 (1977).

¹²⁷ 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).

¹²⁸ See, e.g., Christina Bohannon & Herbert Hovenkamp, *IP and Antitrust: Reformation and Harm*, 51 B.C. L. Rev. 905, 908–13 (2010).

¹²⁹ See *Bell Atlantic Corp. v. Twombly*, 550 U.S. 544, 558 (2007) (discussing the “unusually high cost of discovery in antitrust cases” (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, 1898–1899 (2003))); see, 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).

¹³⁰ Geoffrey A. Manne & Joshua D. Wright, *Innovation and the Limits of Antitrust*, 6 J. Competition L. & Econ. 153, 195–96 (2010).

overwhelming majority of patented inventions and copyrighted works eventually prove to be worthless in the market—they are books nobody wants to read and gadgets nobody wants to use.¹³¹ 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 should be issued in the first place.¹³² Unlike antitrust trials that occur only rarely, the patent office processes over 500,000 patent applications every year.¹³³ 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.¹³⁴ 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.¹³⁵ Because patentees and their competitors are all risk-averse, an increase in the uncertainty of the patent system harms everyone.¹³⁶ As James Bessen and Michael Meurer have shown, in many areas the cost of patent litigation is

¹³¹ Dennis Crouch, *The Patent Lottery: Exploiting Behavioral Economics for the Common Good*, 16 Geo. Mason L. Rev. 141, 150 (2008).

¹³² Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 Nw. U. L. Rev. 1495, 1497 (2001).

¹³³ U.S. PATENT & TRADEMARK OFFICE, PERFORMANCE AND ACCOUNTABILITY REPORT FISCAL YEAR 2010, at 125 (2010) (showing 553,549 applications processed).

¹³⁴ *Nash v. CBS, Inc.*, 899 F.2d 1537, 1541 (7th Cir. 1990) (stating that courts “muddle through”).

¹³⁵ *See, e.g., Valley Drug Co. v. Geneva Pharmaceuticals, Inc.*, 344 F.3d 1294, 1308 (11th Cir. 2003) (“Patent litigation is too complex and the results too uncertain for parties to accurately forecast.”).

¹³⁶ *See Kelly Casey Mullally, Legal (Un)certainty, Legal Process, and Patent Law*, 43 Loy. L.A. L. Rev. 1109, 1140 (2010) (arguing 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).

exceeding the research and development investments that the patent system is supposed to be incentivizing in the first place.¹³⁷

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.¹³⁸ This is the case regardless of whether judges achieve good economic results through such extra-legal use of discretion. The promise of the patent system is an automatic monopoly covering the same invention as the patentee contributes,¹³⁹ 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.¹⁴⁰ The failure of reality to match the rhetoric is itself a harm.¹⁴¹ This legitimacy cost is difficult to measure,¹⁴² but it surely exists.

D. *The Proposals in Existing Literature*

Proposals in the 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 “legalistic” approach and the “economic” approach. The legalistic approach attempts to create doctrinal solutions to the problem, usually by polishing and

¹³⁷ JAMES BESSEN & MICHAEL J. MEURER, *PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK* 153 (2008).

¹³⁸ See Or Bassok, *The Sociological-Legitimacy Difficulty*, 26 J.L. & Politics 239, 264–65 (2011) (arguing that courts perceive a need to rely on formal discretion-constraining rules to maintain their legitimacy).

¹³⁹ See Giles S. Rich, *Principles of Patentability*, 28 Geo. Wash. L. Rev. 393, 402 (1960) (“one of the beauties of the patent system [is that the] reward is measured automatically by the popularity of the contribution”).

¹⁴⁰ See, e.g., *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 484 (1974).

¹⁴¹ 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” due to transparency reasons); *but see* Michael L. Wells, “Sociological Legitimacy” in Supreme Court Opinions, 64 Wash. & Lee L. Rev. 1011, 1014 (2007) (arguing “the Court’s opinions may serve worthy goals and earn our respect even if other reasons account for outcomes”).

¹⁴² 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.”).

reforming the disclosure doctrine of § 112.¹⁴³ 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 such that they are capable of being reduced to practice,”¹⁴⁴ 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 time of the patentee’s initial conception, but at least some such later improvements (e.g. substituting plastic for wood) should be covered.

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).¹⁴⁵ 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 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 infringer is somehow “extraordinarily skilled” so that they do not count, a standard that seems clearly too generous to patentees. 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 which 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

¹⁴³ See, e.g., Holbrook, *supra* note 61, at 40 (purporting to solve the “possession paradox”—another way of stating the levels of abstraction problem—by tying patent scope to disclosure).

¹⁴⁴ Oskar Liivak, *Rescuing the Invention from the Cult of the Claim*, available online at <http://ssrn.com/abstract=1769270> (manuscript at 20).

¹⁴⁵ Holbrook, *supra* note 61, at 40. 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, this result is ultimately that the more generous standard governs patent scope.

“defines” as the invention.¹⁴⁶ A specification would define a genus, in turn, by distinguishing a particular genus from higher and lower and levels of abstraction.¹⁴⁷ 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.¹⁴⁸ 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.¹⁴⁹

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,¹⁵⁰ 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 on how to calculate this optimal balance.¹⁵¹ 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.¹⁵²

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

¹⁴⁶ Lefstin, *supra* note 12, at 1211.

¹⁴⁷ *Id.*

¹⁴⁸ A point that, ironically, nobody has made better than Lefstin himself. *Id.* at 1168–69 (“essentially all patent claims . . . are genus claims”). See also 35 U.S.C. § 112 ¶ 2 (requiring claims to “*particularly* point[] out and *distinctly* claim[]” the subject-matter being patented (emphasis added)).

¹⁴⁹ 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.

¹⁵⁰ See, e.g., Chiang, *supra* note 6; Merges & Nelson, *supra* note 13; Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 Tex. L. Rev. 989 (1997).

¹⁵¹ 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)

¹⁵² Kaplow, *supra* note 25, at 1844; see *supra* Part II.B.

approach can still be considered doctrinal rather than economic, but it differs from the existing doctrinal literature that generally focuses on the disclosure, in the sense of the number or quality of the embodiments taught by 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 at all; but the *amount* of disclosure 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 contribution. A more detailed explanation follows.

A starting point is to note, as in Part **Error! Reference source not found.**, 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.¹⁵³ In the downstream context, patent law defines the invention as an idea.¹⁵⁴

This inconsistency can be explored more deeply. The moral—not strictly economic—justification for allowing patentees to cover later improvements is that we assume that a later improver copies ideas from the patentee,¹⁵⁵ and that these copied ideas have value.¹⁵⁶ For

¹⁵³ See *supra* Part I.A.

¹⁵⁴ See *supra* Part I.B.

¹⁵⁵ Mark Lemley and Chris Cotropia 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 rhetoric 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.

example, 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.¹⁵⁷

No so in the upstream context. As already described, in the upstream context patent law defines the invention as an embodiment, not an idea.¹⁵⁸ 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 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*, and it is not an anticipation.¹⁵⁹

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 in fact not originate with the patentee at

¹⁵⁶ 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.

¹⁵⁷ 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 well within his contribution, since the improvement was made possible by his work.” *Id* at 839.

¹⁵⁸ See *supra* Part I.A.

¹⁵⁹ *Dewey & Almy Chem. Co. v. Mimex Co.*, 124 F.2d 986, 989 (2d Cir. 1942) (emphasis added).

all, but in fact originates from 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. 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.¹⁶⁰
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.¹⁶¹
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 first person to think of curing AIDS is unlikely to find a cure. The first person to think of using radiation is unlikely to find the right type of radiation. These earlier inventors will receive no credit from the patent system. The patentee who eventually creates the working embodiment should

¹⁶⁰ 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).

¹⁶¹ 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>.

not be able to claim sole credit for all of the prior ideas.¹⁶² 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 from 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 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 it artificially deems every patentee (who by definition creates the first working embodiment) to be a *sui generis* pioneer. Because all prior ideas by other inventors is 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 can be seen. 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*.

How this proposal operates can be made clearer by reference to the AIDS example. 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

¹⁶² See Mark A. Lemley, *The Myth of the Sole Inventor*, available at <http://ssrn.com/abstract=1856610> (manuscript at 2) (arguing that innovation is cumulative and “[t]he canonical story of the lone genius inventor is largely a myth”).

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 would be entitled to his own insight: the highest level of abstraction reflected in his specification 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.¹⁶³ 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 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*.¹⁶⁴ 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 idea is incorporated into future cures—e.g. if the idea is using radiation to cure AIDS and future cures use radiation—then he would be compensated *to that same extent*.

¹⁶³ 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.

¹⁶⁴ The first and second points thus address the two opposing concerns. The first concern is with too much patent scope; and the second concern is with too little.

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. 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.

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.¹⁶⁵ 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.¹⁶⁶ This standard rationale has two implications. The first is that the fact that patent law protects *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 (section 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

¹⁶⁵ Kieff, *supra* note 22, at 697.

¹⁶⁶ Gideon Parchomovsky & R. Polk Wagner, *Patent Portfolios*, 154 U. Pa. L. Rev. 1, 12–14 (2005); *see* Landes & Posner, *supra* note 23, 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.”).

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,¹⁶⁷ some further justification for the change is necessary.

As an initial matter, we can note that the enablement requirement for prior art has no textual support in the statute.¹⁶⁸ 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, requiring instead that the invention not be previously "known" by others without elaborating on what this means.¹⁶⁹ 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."¹⁷⁰ 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 fails to recognize, thus, is that innovation is a cumulative process.¹⁷¹ Patentees necessarily build on

¹⁶⁷ *Elan Pharmaceuticals, 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).

¹⁶⁸ Matt Lincicum, *A Knot in the Eternal Golden Braid: Searching for Coherence in the Relationship Between Enablement, Anticipation, and Obviousness*, 23 Harv. J.L. & Tech. 589, 608 (2010).

¹⁶⁹ 35 U.S.C. § 102(a) (2006).

¹⁷⁰ *Dewey*, 124 F.2d at 989; see also Seymore, *supra* note 55, at 959–61.

¹⁷¹ See Christopher R. Leslie, *Antitrust and Patent Law as Component Parts of Innovation Policy*, 34 J. Corp. L. 1259, 1261 (2009) ("Innovation is a

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 (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.¹⁷²

Ultimately, not even current law embraces this fairness and symmetry rationale, as the court made clear in *In re Hafner*:¹⁷³

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

cumulative process in which today's inventors build on the ideas of yesterday's creators.”).

¹⁷² 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).

¹⁷³ 410 F.2d 1403 (C.C.P.A. 1969).

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.¹⁷⁴

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,¹⁷⁵ 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 the patentee can capture the preexisting idea—*all* telegraphs, *all* telephones, and *all* airplanes—the patentee would 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,¹⁷⁶ as well as Morse Code;¹⁷⁷ in the case of Bell, the insight was continuous electric current that mimicked sound waves;¹⁷⁸ and in the case of the Wright brothers the insight was using a rudder for flight control.¹⁷⁹ In each of these historical cases the patentee ultimately received protection closely corresponding to their actual insight,¹⁸⁰ and in each case they were well-remunerated. The next sub-

¹⁷⁴ *Id.* at 1405.

¹⁷⁵ *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”).

¹⁷⁶ See VLADIMIR GUREVICH, *ELECTRIC RELAYS: PRINCIPLES AND APPLICATIONS* 11–13 (2006) (describing history and how Morse arguably derived the idea from Joseph Henry).

¹⁷⁷ *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”).

¹⁷⁸ See *infra* text accompanying notes 189–196.

¹⁷⁹ Padfield & Lawrence, *supra* note 19, at 698.

¹⁸⁰ *Morse*, 56 U.S. at 112 (upholding Morse’s first seven claims, including the fourth claim to relays, and fifth claim to Morse Code); *Bell*, 126 U.S. at 544 (construing Bell claim to be limited to continuous electric current); *Wright Co. v. Paulhan*, 177 F. 261, 264 (S.D.N.Y. 1910), *rev’d on other*

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 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 an embodiment 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.¹⁸¹ Current claiming technique purports to describe an embodiment, but really covers an idea through the process of abstraction. Courts that both acknowledge¹⁸² and deny¹⁸³ 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

grounds, 180 F. 112 (2d Cir.) (interpreting claim to cover any means where a rudder, which controls yaw, is linked to roll).

¹⁸¹ See 35 U.S.C. § 271(a) (defining infringement as making, using, and selling the invention).

¹⁸² *Gill v. United States*, 160 U.S. 426, 434 (1896) (“In every case the idea conceived is the invention.”).

¹⁸³ *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. 498, 507 (1874) (“An idea of itself is not patentable.”).

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.¹⁸⁴ 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, “very soon after the discovery [of electromagnetism] by Oersted [in 1920], it was believed by men of science that this newly discovered power might be used to communicate intelligence to distant places.”¹⁸⁵ 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.”¹⁸⁶ In the 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 take knowledge out of the public domain.¹⁸⁷

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*.¹⁸⁸ 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.¹⁸⁹

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.¹⁹⁰ 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

¹⁸⁴ *Morse*, 56 U.S. at 112.

¹⁸⁵ *Id.* at 107.

¹⁸⁶ *Id.*

¹⁸⁷ *Cf.* *Graham v. John Deere Co.*, 383 U.S. 1, 9 (1966) (“Congress may not authorize the issuance of patents whose effects are to remove existent knowledge from the public domain.”).

¹⁸⁸ *Bell*, 126 U.S. at 536.

¹⁸⁹ *See* Merges & Duffy, *supra* note 5, at 95 (“unlike Morse, Bell limited even his broad fifth claim in a way that corresponded to his specific contribution to the technology”).

¹⁹⁰ *Id.* at 96.

was due “to the imperfect mechanism of the apparatus used, rather than to any fault in the principle.”¹⁹¹

Bell’s major conceptual breakthrough was understanding that Reis’s “failure was due not to workmanship, but to the principle.”¹⁹² 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.”¹⁹³ Bell’s insight was to then operate the current *continuously* while varying its intensity, which he called “undulatory current.”¹⁹⁴ Unlike Morse who did not invent the idea of electromagnetism for telegraphs, Bell *did* invent the idea of using “electric 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 “electric undulations” meant that the patent covered only telephones using continuous electric current.¹⁹⁵ As the 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.”¹⁹⁶ 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. 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 invalidate the claim to electromagnetic transmission in the very same case, the Court summarily upheld the claim to Morse Code.¹⁹⁷

¹⁹¹ *Bell*, 126 U.S. at 544.

¹⁹² *Id.*

¹⁹³ *Id.*

¹⁹⁴ *Id.*

¹⁹⁵ *Id.*

¹⁹⁶ *Id.* at 545.

¹⁹⁷ *Morse*, 56 U.S. at 86 (Morse’s fifth claim to “the system of signs, consisting of dots and spaces, and of dots, spaces, and horizontal lines, for

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;¹⁹⁸ 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 eventually.¹⁹⁹ The *Bell* Court notes that Reis had never thought of continuous electric current.²⁰⁰ Yet under the formal doctrine that emanates from these cases, *none* of these recited facts would 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 is intuitively grasping 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 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.²⁰¹ 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

numerals, letters, words, or sentences, substantially as herein set forth and illustrated”).

¹⁹⁸ *Lizardtech, Inc. v. Earth Resource 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.”).

¹⁹⁹ *Morse*, 56 U.S. at 107.

²⁰⁰ *Bell*, 126 U.S. at 544.

²⁰¹ See *supra* text accompanying notes 165–166.

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.²⁰² This is most aptly demonstrated by the Supreme Court's statement that disclosure is the "quid pro quo" of the right to exclude.²⁰³ In the conventional view, more disclosure of more embodiments means more exclusion.²⁰⁴

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 **Error! Reference source not found.**, 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 10 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 10 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,²⁰⁵ and from this single embodiment the patentee

²⁰² Merges & Nelson, *supra* note 76, at 844–45 (quid pro quo is "built deep into the history of patent law.").

²⁰³ *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.").

²⁰⁴ *See, e.g., In re Vaeck*, 947 F.2d 488, 495 (Fed. Cir. 1991) (disclosure of nine genera of cyanobacteria not enough).

²⁰⁵ 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

can the broadest novel idea contained within. 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.²⁰⁶ 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*.

4. The role of non-obviousness.

An idea has to be more than technically “new” to be patentable; it must also be non-obvious.²⁰⁷ It is important to understand in this context that when patent law speaks of something as “new,” it means that it has not be *literally* disclosed verbatim.²⁰⁸ 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.²⁰⁹ 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.²¹⁰

working as opposed to inoperative. *In re Swartz*, 232 F.3d 862, 863 (Fed. Cir. 2000). My proposal would not affect those requirements.

²⁰⁶ See, e.g., Merges & Nelson, *supra* note 13, 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.”).

²⁰⁷ See 35 U.S.C. § 103 (2006) (defining obviousness).

²⁰⁸ *Old Reliable Wholesale, Inc. v. Cornell Corp.*, 635 F.3d 539, 544 (Fed. Cir. 2011) (reiterating the “every element” rule).

²⁰⁹ *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1259 (Fed. Cir. 2007) (“obvious variants of prior art references are themselves part of the public domain”).

²¹⁰ 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

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;²¹¹ and (2) asking whether the prior art teaches how to *make* a five-legged table.²¹² My proposal keeps the first step unchanged, and abolishes the second step.

A familiar problem with the non-obviousness standard is its fuzzy boundaries.²¹³ Giving more precision to the obviousness doctrine, however, is not the task of this paper. I have elsewhere suggested ways to give obviousness doctrine more conceptual and practical coherence.²¹⁴ 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.

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 my solution to the abstraction problem does not readily carry over to addressing the problems in obviousness doctrine.

²¹¹ See 35 U.S.C. § 103 (2006) (“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 . . .”).

²¹² 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.”).

²¹³ *Harries v. Air King Prods.*, 183 F.2d 158, 162 (2d. Cir. 1950).

²¹⁴ Tun-Jen Chiang, *A Cost-Benefit Approach to Patent Obviousness*, 82 St. John’s L. Rev. 39 (2007).

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.²¹⁵

As described in Part III.C.1., the response to this objection is that it rests on a false dichotomy.²¹⁶ The implicit assumption is that the only alternative to awarding *no* patent to the first builder of a hyperdrive (a conceded 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 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.²¹⁷

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 was 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

²¹⁵ See *supra* text accompanying note 55; see generally Mueller & Chisum, *supra* note 224, at 1134–37 (providing a history of the development of the enablement requirement for prior art).

²¹⁶ See *supra* text accompanying notes 176–180.

²¹⁷ The paradox, of course, 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.

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.²¹⁸ 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.²¹⁹ 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.²²⁰ Even under the enablement requirement for prior art, science fiction has invalidated patents when they provided sufficient detail to act as this kind of blueprint.²²¹ 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.²²² And the Supreme Court has held in *Brenner v. Manson* that the usefulness requirement of § 101 also

²¹⁸ See *supra* text accompanying note 164.

²¹⁹ 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”).

²²⁰ See *Hotchkiss v. Greenwood*, 52 U.S. (11 How.) 248, 267 (1851) (requiring more skill than “possessed by an ordinary mechanic acquainted with the business” to obtain a patent).

²²¹ 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).

²²² 35 U.S.C. § 112 (2006).

requires a working embodiment.²²³ Thus while the requirement for prior art to create a working embodiment has no statutory basis,²²⁴ 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.²²⁵ 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.²²⁶ 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. 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 leads to a working airplane, and it is these lower-level ideas that I would protect.²²⁷

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

²²³ 383 U.S. 519, 534–35 (1966).

²²⁴ Janice M. Mueller & Donald S. Chisum, *Enabling Patent Law's Inherent Anticipation Doctrine*, 45 Hous. L. Rev. 1101, 1137 (2008) (“Unlike § 112 of the Patent Act, . . . § 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.”).

²²⁵ Devlin & Sukhatme, *supra* note 172, at 917–18.

²²⁶ 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 214, at 57–72.

²²⁷ See National Aeronautics and Space Administration, *Overview of the Wright Brothers Invention Process*, available online at <http://wright.nasa.gov/overview.htm> (visited June 1, 2011) (“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.”).

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. 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 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.²²⁸ Clear boundaries for property rights like patents, of course, are generally considered desirable.²²⁹ But allowing patents to cover the inventor's insight is not in tension with this goal.

The simple reason is that all claims *already* cover ideas; they are just not called such.²³⁰ Unless a patent is limited to exact replication of the specification embodiment down to the last nut, bolt, and paint color, then the claim covers an abstraction, and an abstraction is just another word for an idea. 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. To the extent that claims are tolerably clear today, they will continue to be under my proposal (and to the extent that they are

²²⁸ Bessen & Meurer, *supra* note 137, at 200 (attributing the problem of uncertainty to abstract claims);

²²⁹ Chiang, *supra* note 149, at 525.

²³⁰ See *supra* Part I.B.

not,²³¹ 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.²³² The judges then “interpret” the claim that on-its-face would cover all tables to *really* cover only wooden tables with four legs.²³³ Other judges then protest that the claim plainly covers every table.²³⁴

It should be obvious that this extremely frequent fact pattern²³⁵ 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

²³¹ See, e.g., Burk & Lemley, *supra* note 92, at 1748–65 (arguing claims are insolubly vague).

²³² 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.”).

²³³ See, e.g., *Kinetic Concepts, Inc. v. Blue Sky Med. Group, Inc.*, 554 F.3d 1010 (Fed. Cir. 2009) (interpreting the word “wound” to really cover only *skin* wounds, because the specification described only skin wounds and not other types of wounds).

²³⁴ *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”).

²³⁵ See *Lizardtech, Inc. v. Earth Resource 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 also *Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005) (*en banc*) (whether claim to “steel baffles” really means steel baffles aligned at the angles described in the specification); see generally Craig Allen Nard, *A Theory of Claim Interpretation*, 14 Harv. J.L. & Tech. 1, 5 (2001) (characterizing the two schools as “hypertextualism” and “pragmatic textualism”).

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.²³⁶ The legal indeterminacy arises from the same levels of abstraction problem as described in Part **Error! Reference source not found.** By providing a predictable rule on permissible 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.²³⁷

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.²³⁸ 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,

²³⁶ *SuperGuide Corp. v. DirectTV 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”).

²³⁷ See, e.g., Burk & Lemley, *supra* note 92, at 1748–65; Kimberly A. Moore, Markman *Eight Years Later: Is Claim Construction More Predictable?*, 9 Lewis & Clark L. Rev. 231, 233, 239 (2005); Russell B. Hill & Frank P. Cote, *Ending the Federal Circuit Crapshoot: Emphasizing Plain Meaning in Claim Construction*, 42 IDEA 1, 2 (2002); 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)

²³⁸ 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.’”).

since otherwise it would be better to abolish the patent system and award cash prizes instead.²³⁹ 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.²⁴⁰

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.²⁴¹ 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,²⁴² 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,²⁴³ or a free-for-all regime where judges simply engaged in economic balancing. As described in Part II, neither alternative is satisfactory.

²³⁹ Michael Kremer, *Patent Buyouts: A Mechanism for Encouraging Innovation*, 113 Q.J. Econ. 1137, 1140 (1998) (“financing research with monopoly profits . . . is generally less efficient than financing research with 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).

²⁴⁰ Kaplow, *supra* note 25, at 1844.

²⁴¹ See Kathleen M. Sullivan, *The Supreme Court, 1991 Term—Foreword: The Justices of Rules and Standards*, 106 Harv. L. Rev. 22, 62–69 (1992) (describing trade-offs between rules and standards).

²⁴² See Harold Demsetz, *Information and Efficiency: Another Viewpoint*, 12 J.L. & Econ. 1, 1 (1969) (Criticizing the “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.

²⁴³ See *supra* text accompanying notes 76–80.

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 computer list of all of these potential candidates. 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 computer 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. 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.²⁴⁴ 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.²⁴⁵ 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

²⁴⁴ 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 Pharmaceuticals, Inc. v. Mylan Labs., Inc.*, 520 F.3d 1358, 1364 (Fed. Cir. 2008) (requiring 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.

²⁴⁵ See, e.g., *In re Samour*, 571 F.2d 559 (C.C.P.A. 1978) (finding prior disclosure of the compound invalidated patent).

formula.²⁴⁶ 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.²⁴⁷ Keeping current law would thus not solve this problem.²⁴⁸ 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,²⁴⁹ 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.²⁵⁰ 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—such as testing, marketing, and commercial manufacturing—are easy.²⁵¹ 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 paper.²⁵² It suffices to note that because this assumption is independent of the issue I am trying to address, the

²⁴⁶ Seymore, *supra* note 55, at 958-59 (“X's mere appearance in a document often places it on the fast track to anticipation.”).

²⁴⁷ *In re Hafner*, 410 F.2d 1403, 1405 (C.C.P.A. 1969).

²⁴⁸ 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).

²⁴⁹ *But see id* at 1010 (creating one such list as a “proof of concept”).

²⁵⁰ *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”).

²⁵¹ 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.”).

²⁵² Sichelman proposes a new type of property right to incentivize the post-conception commercialization steps. *Id* at 345.

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,²⁵³ 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 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.²⁵⁴ 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

²⁵³ 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 132, at 1510 (arguing for devoting fewer administrative resources to patent examination and more to patent litigation).

²⁵⁴ 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.

the approach, however, has been much greater complexity and higher litigation costs.²⁵⁵ 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 to choose.

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 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.

The solution I propose in this Article is to recognize 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 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

²⁵⁵ See *supra* text accompanying notes 127–130.

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 in 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 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 my rule will produce optimal economic outcomes every time, but only that it produces reasonable outcomes, and 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 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 in determining the proper standard of proof, and also whether the higher administrative costs of such a system are justified to achieve the improvement in precision in individual cases.