

THE LEVELS OF ABSTRACTION PROBLEM IN PATENT LAW

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INTRODUCTION

No concept is more important in patent law than that of the “invention.” In theory, the “invention” is what entitles an inventor to a patent and correspondingly defines the scope of his monopoly.¹ The problem is that the meaning of “invention” differs depending on context. It refers either to the specific working embodiment that the inventor created or to the broader

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¹ See *Universal Oil Prods. Co. v. Globe Oil & Refining Co.*, 322 U.S. 471, 484 (1944) (“As a reward for inventions and to encourage their disclosure, the United States offers a seventeen-year monopoly to an inventor who refrains from keeping his invention a trade secret.”).

idea that is the subject of the patent monopoly. The failure to distinguish between these two meanings of “invention” causes much confusion.

In the first sense of the word, an “invention” refers to a tangible and working apparatus or process.² A person becomes entitled to a patent by creating a “new and useful process, machine, manufacture, or composition of matter.”³ Unlike these tangible creations, a disembodied idea is not patentable subject matter.⁴ In this paradigm, Thomas Edison’s invention was a single incandescent lamp using carbonized bamboo filament,⁵ and the Wright brothers invented a single wooden glider that could barely fly.⁶

In the other contexts of patent law, however, the term “invention” refers to an *idea*, not the specific embodiment that the patentee creates.⁷ This occurs primarily in the determination of patent scope and infringement of the patent right. It is well settled that, in the infringement context, patents protect the “principle” of the invention, not the particular form in which the patentee has embodied it. Otherwise, an unscrupulous pirate can copy the idea while changing the form.⁸ In this paradigm, Edison’s invention was the idea of an incandescent lamp, which is manifested in both his original lamp and modern variants such as light bulbs using tungsten filaments, and the Wright brothers’ invention was the idea of an airplane, which is reflected in both their original glider and modern F-117 jets.

The difference between ideas and embodiments is important. An embodiment contains many ideas at multiple levels of abstraction, and each individual idea can also be embodied in various alternative forms.⁹ Despite

² See *In re Nuijten*, 500 F.3d 1346, 1356 (Fed. Cir. 2007) (holding that patentable products must be tangible).

³ 35 U.S.C. § 101 (2006).

⁴ *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. (20 Wall.) 498, 507 (1874) (“An idea of itself is not patentable, but a new device by which it may be made practically useful is.”).

⁵ See U.S. Patent No. 223,898 (filed Nov. 4, 1879) (Edison’s electric lamp patent). In fact, Edison’s original lamp used carbon wire, and carbonized bamboo was itself a later improvement. See U.S. Patent No. 251,540 (filed Aug. 6, 1880).

⁶ See U.S. Patent No. 821,393, at col. 1 ll. 103–04 (filed Mar. 23, 1903) (“[S]pars, bows, and ribs are preferably constructed of wood . . .”).

⁷ *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 60 (1998) (“The primary meaning of the word ‘invention’ in the Patent Act unquestionably refers to the inventor’s conception rather than to a physical embodiment of that idea.”).

⁸ See, e.g., *Cont’l Paper Bag Co. v. E. Paper Bag Co.*, 210 U.S. 405, 418–19 (1908) (“The principle of the invention is a unit, and invariably the modes of its embodiment in a concrete invention may be numerous and in appearance very different from each other.” (quoting 2 WILLIAM C. ROBINSON, *THE LAW OF PATENTS FOR USEFUL INVENTIONS* § 485, at 75 (Bos., Little, Brown & Co. 1890))); *Winans v. Denmead*, 56 U.S. (15 How.) 330, 343 (1853) (“[I]t is the duty of courts and juries to look through the form for the substance of the invention—for that which . . . the patent was designed to secure . . .”); see also *Mazer v. Stein*, 347 U.S. 201, 217 (1954) (noting that copyrights protect only expression whereas patents protect the idea itself).

⁹ See Robin C. Feldman, *The Inventor’s Contribution*, 2005 UCLA J.L. & TECH. 6, 24, http://www.lawtechjournal.com/articles/2005/06_051223_Feldman.pdf (“A patent holder need only identify a single

the conceptual difference, patent law holds that the “invention” (meaning the embodiment) that creates the patent entitlement is the same as the “invention” (meaning the idea) that defines patent scope for infringement.¹⁰ This artificial conflation of idea and embodiment means that courts have tied themselves into knots trying to define a single idea as the “invention” when the described embodiment contains an infinite number of ideas.¹¹ To take a concrete example, suppose an inventor produced a method of curing AIDS using radiation therapy, specifically using X-radiation, and then built a radiation machine that implemented the method. This would be a working embodiment. The ideas that underlie this cure can be broken into many different levels of abstraction, each progressively more specific and narrower in the resulting patent’s scope:

1. The idea of curing AIDS, covering all cures that might ever be devised.
2. The idea of curing AIDS by using radiation therapy, covering all cures using any type of radiation but not other methods.
3. The idea of curing AIDS by using radiation therapy specifically by using X-radiation, thereby excluding methods not using X-radiation.
4. The idea of curing AIDS using radiation therapy specifically by using X-radiation and more specifically by using the exact make and model of the patentee’s radiation machine.

As can be seen from this example, each idea at a different level of abstraction can be accurately described as the “invention.” A patentee choosing to claim his invention as “the cure for AIDS” would not appear to be wrong. By the same token, an accused infringer arguing that the patentee invented only one specific machine to cure AIDS and using only X-radiation would appear equally right. Courts left to choose between these positions have no principled basis for doing so.

How this choice is exercised, however, has tremendous consequences for both the incentives of inventors and the rights of subsequent improvers and users. A patent covering the broad idea of curing AIDS would entitle the patentee to *all* cures for AIDS, even a later cure that used a pill instead of radiation. This would provide a great incentive to obtain the patent, but it would also create a monopoly scope disproportionate to the inventor’s contribution. After all, the patentee did not devise a cure with a pill; a later inventor who invents a cure with a pill would have his research hampered by such a broad patent, and some AIDS patients would be priced out of re-

use and a single embodiment for the product to receive rights to a wide range of embodiments and all uses.”).

¹⁰ See *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 . . .”).

¹¹ See PETER D. ROSENBERG, *PATENT LAW FUNDAMENTALS* 39 (1975) (“A claim is an abstraction and generalization of an indefinitely large number of concrete, physical objects.”).

ceiving the improved cure by the monopoly prices.¹² But that reasoning works just as well if the patentee receives only the narrower idea of a radiation cure because a later innovator who finds a new cure with gamma radiation instead of X-radiation would infringe the patent. But again, our patentee did not invent curing AIDS with gamma radiation. Granting the radiation patent will deter research into new cures for AIDS using different types of radiation as well as price some patients out of the improved cure. Indeed, this reasoning works all the way down the slippery slope until the patent covers only the specific radiation machine down to the last nut and bolt and paint color, at which point the patent becomes essentially worthless because even a pure pirate who does no research can avoid infringement by changing the paint color.¹³

This task of defining patent scope—translating an embodiment into a protected idea—is a classic levels of abstraction problem.¹⁴ The choice between levels of abstraction as a means of expressing some idea or principle presents problems of arbitrariness, a difficulty well known in many areas of law.¹⁵ The problem is worse in patent law, however, because courts have not even acknowledged the nature of the problem. Instead, courts routinely treat the idea and embodiment in a patent as the same thing so that the correct level of abstraction to express the idea is made to seem self-evident.¹⁶ This only makes the task of ascertaining patent scope more difficult by obscuring the process by which one level of abstraction is chosen from the many available. The net result is that courts perform this choice implicitly and on an ad hoc basis, and the Federal Circuit devotes a sizable portion of its docket to determining the scope of individual patents during “claim con-

¹² See Robert P. Merges & Richard R. Nelson, *Market Structure and Technical Advance: The Role of Patent Scope Decisions*, in ANTITRUST, INNOVATION AND COMPETITIVENESS 185, 198–99 (Thomas M. Jorde & David J. Teece eds., 1992) (“Wide patent scope that exceeds the enablement of the disclosure makes anyone who attempts to invent in that area beholden to the patent owner.”).

¹³ See MARTIN J. ADELMAN ET AL., *CASES AND MATERIALS ON PATENT LAW* 459 (2d ed. 2003) (“If courts strictly limit the scope of patent protection to the specific examples disclosed in the specification, competitors could readily circumvent the patent through minor changes in design.”).

¹⁴ See Dan L. Burk & Mark A. Lemley, *Quantum Patent Mechanics*, 9 LEWIS & CLARK L. REV. 29, 51 (2005) (arguing that there is no right level of abstraction in defining claims vis-à-vis accused products).

¹⁵ See, e.g., *Nichols v. Universal Pictures Corp.*, 45 F.2d 119, 121 (2d Cir. 1930) (Hand, J.) (describing the levels of abstraction problem in copyright law); Herman Oliphant, *A Return to Stare Decisis*, 14 A.B.A. J. 71 (1928) (discussing the levels of abstraction at which a case’s holding can be characterized); Laurence H. Tribe & Michael C. Dorf, *Levels of Generality in the Definition of Rights*, 57 U. CHI. L. REV. 1057, 1065–71 (1990) (discussing the problem of abstraction in defining rights).

¹⁶ 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.”); *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1564 (Fed. Cir. 1991) (“The invention is, for purposes of the ‘written description’ inquiry, whatever is now claimed.” (emphasis omitted)).

struction” or *Markman* proceedings.¹⁷ The murky process and its seemingly arbitrary results mean that patent rights are subject to tremendous uncertainty.¹⁸

The facts that every invention exists on multiple levels of abstraction, and that a choice is necessary, shed light on many of the apparently irresolvable problems in modern patent law. For example, a large body of scholarship discussing the Federal Circuit’s doctrinal conflict and high reversal rate in cases involving patent claim interpretation often characterizes the dispute as one over textual meaning.¹⁹ But because the text of a claim seeks to define the invention, many such claim interpretation cases are really disputes about the proper level of abstraction, which implicates substantive policy rather than textual analysis. Similarly, patent law’s doctrines of enablement and written description seek to define monopoly scope by equating such scope to the “invention” contributed. The confused state of these doctrines has been noted elsewhere.²⁰ Again, the ultimate problem underlying these doctrines is that the contributed invention can be expressed at multiple levels of abstraction, but judges must choose only one. The levels of abstraction framework thus demonstrates that a central tenet of the patent system—automatic calibration of reward to contribution—is an illusion.²¹

My goal in this Article is not to articulate any bright-line rule to select one level of abstraction. Rather, my aim is simply to demonstrate that the problem exists and that current doctrine fails to acknowledge it. By demonstrating that the levels of abstraction problem exists and that courts select among multiple possible levels of abstraction arbitrarily and silently, I provide the foundation for a more transparent analysis of the problem, in which

¹⁷ See *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 372 (1996) (holding that the patent scope defined by claims is a legal question); see also Jeffrey A. Lefstin, *The Measure of the Doubt: Dissent, Indeterminacy, and Interpretation at the Federal Circuit*, 58 HASTINGS L.J. 1025, 1071 tbl.X (2007) (finding that claim construction was addressed in 51% of Federal Circuit opinions relating to patents between 1998 and 2005).

¹⁸ See, e.g., JAMES BESSEN & MICHAEL J. MEURER, *PATENT FAILURE* 46–72 (2008); Gretchen Ann Bender, *Uncertainty and Unpredictability in Patent Litigation: The Time Is Ripe for a Consistent Claim Construction Methodology*, 8 J. INTEL. PROP. L. 175, 202–17 (2001).

¹⁹ See, e.g., Craig Allen Nard, *A Theory of Claim Interpretation*, 14 HARV. J.L. & TECH. 1, 4 (2000) (characterizing the two schools of scholarship as “hypertextualism” and “pragmatic textualism”); Kristen Osenga, *Linguistics and Patent Claim Construction*, 38 RUTGERS L.J. 61, 84 (2006).

²⁰ See, e.g., *Lizardtech, Inc. v. Earth Res. Mapping, Inc.*, 433 F.3d 1373, 1376 (Fed. Cir. 2006) (Rader, J., dissenting from denial of rehearing en banc) (“This court’s written description jurisprudence has become opaque to the point of obscuring other areas of this court’s law.”); Bernard Chao, *Rethinking Enablement in the Predictable Arts: Fully Scoping the New Rule*, 2009 STAN. TECH. L. REV. 3, ¶¶ 50–52, <http://stlr.stanford.edu/pdf/chao-rethinking-enablement.pdf> (discussing conflicts in doctrine).

²¹ See Giles S. Rich, *Principles of Patentability*, 28 GEO. WASH. L. REV. 393, 402 (1960) (“That is one of the beauties of the patent system. The reward is measured automatically by the popularity of the contribution.”).

relevant economic information can be collected and considered in determining the appropriate level of abstraction for patent rewards. Part I of this Article describes the doctrines of scope—i.e., claim construction and enablement—and demonstrates that each doctrine of patent scope contains inherent contradictions that create indeterminacy. Part II explores how the indeterminacy problems can be understood as a fundamental policy debate about the proper level of abstraction at which to characterize an invention. Part III then provides a more pragmatic framework within which to consider the policy issues inherent in patent scope.

I. THE UNITARY INVENTION FRAMEWORK AND ITS PROBLEMS

A fundamental premise of patent law is what I call the “unitary invention principle,” which is that the two major components of a patent—the specification and the claims—both describe the same “invention.”²² Many of the doctrinal problems of patent law stem from the fact that this unitary invention principle is not true. This Part first provides a background on the unitary invention principle and then describes the doctrinal problems that arise from reliance on this false premise.

A. *Background: The Specification and the Claims*

A United States patent is a complex document, but its two most important components are the written description of the invention (often called the specification) and the claims.²³ Both the specification and the claims are drafted by the patentee.²⁴

The specification describes the invention created by the patentee so that others can make and use it.²⁵ This requires considerable detail: enough that the invention can be built from the ground up. For example, a specification describing a table should describe its specific shape (square or round); material (wood or plastic); manner of manufacture (using nails or screws); and what it is used for (dining tables or reading desks). A useful way to think about the specification description is that it figuratively deposits a physical embodiment of the patentee’s creation into the Patent Office—and thus into the public domain—using words. Indeed, when words

²² See *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”); *Bates v. Coe*, 98 U.S. 31, 38 (1878).

²³ Strictly speaking, the specification includes both the written description *and* the claims. In common parlance, however, the specification is used to refer only to the written description component of a patent, and I do so in this Article. See CRAIG ALLEN NARD, *THE LAW OF PATENTS* 39 (2008).

²⁴ *Id.*

²⁵ See 35 U.S.C. § 112 (2006).

fail, as they often do in biotechnology, a physical deposit may be used instead.²⁶

In contrast, a claim describes only the key inventive features of the invention—those that form the essence of the patentee’s idea.²⁷ For example, a claim to a table might read “an apparatus with a flat surface and four legs.” Because claims recite only these fundamental features, claim language is inherently generalized compared to the specification. Whereas a specification description represents just *one* physical table, or a very limited number of tables, a claim to “an apparatus with a flat surface and four legs” will accurately describe *many* tables of all different sizes, colors, and materials.

The generality of the claim corresponds to the scope of the patent. With minor exceptions,²⁸ the rule in patent law is that anything that is literally described by a claim infringes, but anything not described by the claim does not infringe.²⁹ One implication of this rule is that added elements do not defeat infringement once the minimum feature set is met.³⁰ For example, a four-legged table with a set of drawers and made of futuristic material is still “an apparatus with a flat surface and four legs,” and so it infringes. In this way, the scope of a patent is a class of embodiments sharing an idea captured by the claim whereas the specification describes only one particular embodiment within that class.

Procedurally, obtaining a patent requires the patentee to first create the specification embodiment³¹ and then to write claims for it.³² There are essentially two limits on writing a claim. The first limitation is that the claim cannot cover anything previously in the public domain, which patent lawyers call the “prior art.”³³

²⁶ *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).

²⁷ See ROBERT C. FABER, *FABER ON MECHANICS OF PATENT CLAIM DRAFTING* § 10:1.1 (6th ed. 2010) (“The claims should cover the inventor’s concept.”).

²⁸ The primary exception is the doctrine of equivalents, which holds that an “insubstantial difference” between a feature of an accused product and the claim language does not defeat infringement. See *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 29, 40 (1997). This element-by-element comparison still requires the doctrine of equivalents to operate within the strictures of the claim language. *Id.* at 29–30.

²⁹ See *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 374 (1996).

³⁰ See ROBERT P. MERGES & JOHN F. DUFFY, *PATENT LAW AND POLICY: CASES AND MATERIALS* 28 (4th ed. 2007) (describing “open” claims).

³¹ The patentee can create the embodiment actually or constructively. Constructive reduction to practice entails describing the embodiment in detail in the specification. Actually building a physical model is not required. See *Cooper v. Goldfarb*, 154 F.3d 1321, 1327 (Fed. Cir. 1998).

³² See MERGES & DUFFY, *supra* note 30, at 26 (noting that claims are “often modified extensively” after the patent application is filed).

³³ *Id.* at 27; see 35 U.S.C. §§ 102–103 (2006).

Once the claim meets this novelty requirement, the second limitation is the unitary invention principle, which establishes that patent scope in the claim must cover the same invention as described in the specification.³⁴ The unitary invention principle reflects the fundamental idea of *quid pro quo*: the patentee receives as a monopoly only those things that he first created and nothing more.³⁵ It also underlies the practical operation of the patent system, in which U.S. Patent and Trademark Office (PTO) examiners must make decisions on which patent claims to allow or deny. Patent law regards it as extremely important that such decisions are purely ministerial—that PTO bureaucrats simply allow or reject claims to monopoly rewards based on fixed statutory criteria, and judges reviewing the decisions do likewise.³⁶ The idea is that it would be intolerable for research companies who invest millions of dollars toward new inventions (e.g., cures for AIDS) to have the scope of their patents—and thus the level of reward—become a matter of judicial or bureaucratic whim.³⁷ Rather, the scope of a patent and its reward should be calibrated by the patentee’s contribution.³⁸ Thus, the PTO *must* issue deserving patents and *must* reject undeserving ones: it has no substantive policy discretion.³⁹ A patentee “is *entitled* to claims as broad as the prior art and his disclosure will allow.”⁴⁰

In addition to governing the scope of allowable claims and removing discretion, the unitary invention principle also helps the judicial administration of the patent system. The precondition to determining infringement is that one must first understand what the claim language means.⁴¹ Assuming

³⁴ See Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 844–45 & nn.21–22 (1990) (“This fundamental principle—that legal protection is premised on an adequate disclosure of the invention—is built deep into the history of patent law.”).

³⁵ *O’Reilly v. Morse*, 56 U.S. (15 How.) 62, 119–20 (1853) (“The specification of this patentee describes his invention or discovery, and the manner and process of constructing and using it; and his patent . . . covers nothing more.”); see *Sitrick v. Dreamworks, LLC*, 516 F.3d 993, 999 (Fed. Cir. 2008).

³⁶ See *United States v. Dubilier Condenser Corp.*, 289 U.S. 178, 189 (1933) (“The grant of letters patent is not, as in England, a matter of grace or favor, so that conditions may be annexed at the pleasure of the executive. To the laws passed by the Congress, and to them alone, may we look for guidance”); see also *Animal Legal Def. Fund v. Quigg*, 932 F.2d 920, 930 (Fed. Cir. 1991) (noting that the PTO lacks authority over substantive patent law).

³⁷ See Rich, *supra* note 21, at 402 (“That is one of the beauties of the patent system. The reward is measured automatically by the popularity of the contribution.”).

³⁸ See *id.*

³⁹ See 35 U.S.C. § 131 (2006) (stating that “if on such examination it appears that the applicant is entitled to a patent under the law, the Director *shall* issue a patent therefor” (emphasis added)); *Koninklijke Philips Elecs. N.V. v. Cardiac Sci. Operating Co.*, 590 F.3d 1326, 1336 (Fed. Cir. 2010) (“The PTO lacks substantive rulemaking authority.”).

⁴⁰ *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473, 1480 (Fed. Cir. 1998) (emphasis added and emphasis omitted) (quoting *In re Rasmussen*, 650 F.2d 1212, 1214 (C.C.P.A. 1981)).

⁴¹ See *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1454 (Fed. Cir. 1998) (en banc) (“An infringement analysis involves two steps. First, the court determines the scope and meaning of the patent claims asserted”).

that the claim and the specification describe the same thing, just in different ways,⁴² makes claim interpretation easier. The specification is always more detailed than the claim, and a drawing in the specification is worth a thousand words.⁴³ Everyone can see how a physical radiation machine works, whereas claim language on paper is never quite as good.⁴⁴ Looking to a concrete and detailed embodiment that represents the same invention as the one claimed can help clarify claim language. The unitary invention principle thus underlies the entire doctrine of patent scope, both determining what degree of scope is requested (claim construction) and whether it should be permitted (enablement and written description). Vague claim language should be clarified by looking to the specification,⁴⁵ and the claimed monopoly should be allowed to cover only those things that the specification teaches.⁴⁶

The problem is that the unitary invention principle is not true. The specification and the claims do not describe the same thing in different ways. Rather, they describe entirely different concepts. The specification describes a single embodiment (or a very limited number of embodiments). The claim describes an idea. To be sure, the specification embodiment embodies the claimed idea, but the claimed idea may be reflected in countless other embodiments; conversely, the specification embodiment also embodies countless other ideas in addition to what is claimed. The following sections describe the doctrinal confusion that has arisen from the mistaken conflation of these distinct concepts.

B. Claim Construction

In most patent cases, claim construction is the most important determinant of the outcome.⁴⁷ As mentioned earlier, claims (if they are valid) define the scope of the patent by specifying the features that must be present in an infringing product.⁴⁸ A product infringes when it contains all the

⁴² See *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1561 (Fed. Cir. 1991) (“[T]he two standards, while complementary, approach a similar problem from different directions.” (quoting *Rengo Co. v. Molins Mach. Co.*, 657 F.2d 535, 551 (3d Cir. 1981))).

⁴³ See *id.* at 1565 (finding the claimed “invention is what the ’081 drawings show”).

⁴⁴ Even if no physical embodiment is built, and the specification is also just a paper description, the specification description will always be considerably more detailed and concrete than the claim language.

⁴⁵ *Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005) (en banc).

⁴⁶ See *Sitrick v. Dreamworks, LLC*, 516 F.3d 993, 999 (Fed. Cir. 2008).

⁴⁷ David L. Schwartz, *Courting Specialization: An Empirical Study of Claim Construction Comparing Patent Litigation Before Federal District Courts and the International Trade Commission*, 50 WM. & MARY L. REV. 1699, 1708 (2009).

⁴⁸ A claim may also describe a process with one or more required steps. See 35 U.S.C. §§ 100–101 (2006) (defining patentable inventions to include processes). The infringement inquiry with process claims is not materially different.

claimed features, but an accused product that omits one or more required features does not infringe. The recited features are known as the “elements” or “limitations” of a claim.⁴⁹

The problem addressed by claim construction, at least according to courts, is that claim language is often vague and difficult to apply.⁵⁰ Claim construction is the process of taking the language of a claim and translating it concretely into a set of required features in the physical world,⁵¹ which are then either present or absent in an accused product. This process has special importance because, in most cases, there is no dispute about the accused product’s features. A product accused of infringement is usually publicly sold or used—because it is the publicity that usually brings it to the notice of the patentee in the first place—and in any case an accused product can be brought into a courtroom for all to see.⁵² The only dispute is over whether the features of the accused product are described by the language of a claim.⁵³ Once a judge construes the elements of a claim, most cases “either settle or are resolved on summary judgment.”⁵⁴

Like the formalism of the unitary invention principle, claim construction is supposed to be a textual exercise that permits no policy discretion.⁵⁵ In this view, courts are supposed to interpret a claim according to its lan-

⁴⁹ See *TIP Sys., LLC v. Phillips & Brooks/Gladwin, Inc.*, 529 F.3d 1364, 1379 (Fed. Cir. 2008) (“Under the ‘all elements’ rule, to find infringement, the accused device must contain ‘each limitation of the claim, either literally or by an equivalent.’” (quoting *Freedman Seating Co. v. Am. Seating Co.*, 420 F.3d 1350, 1358 (Fed. Cir. 2005))).

⁵⁰ Dan L. Burk & Mark A. Lemley, *Fence Posts or Sign Posts? Rethinking Patent Claim Construction*, 157 U. PA. L. REV. 1743, 1760 (2009) (“The process of claim construction itself presumes that the words of the claims are insufficiently precise to delineate those boundaries. The solution that claim construction offers is to substitute theoretically clearer words for the unclear words of the patent claim.”); see *Scripps Clinic & Research Found. v. Genentech, Inc.*, 927 F.2d 1565, 1580 (Fed. Cir. 1991) (“[T]he construction of claims is simply a way of elaborating the normally terse claim language: in order to understand and explain, but not to change, the scope of the claims.”).

⁵¹ Burk & Lemley, *supra* note 14, at 50.

⁵² See, e.g., *Gen. Mills v. Hunt-Wesson, Inc.*, 917 F. Supp. 663, 667 (D. Minn. 1996) (noting that “proper construction of a claim can make short work of the question of infringement” because a feature of the accused product was undisputed).

⁵³ See *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 989 (Fed. Cir. 1995) (en banc) (Mayer, J., concurring) (“[T]o decide what the claims mean is nearly always to decide the case.”).

⁵⁴ Mark A. Lemley, *The Limits of Claim Differentiation*, 22 BERKELEY TECH. L.J. 1389, 1390 (2007).

⁵⁵ *Autogiro Co. of Am. v. United States*, 384 F.2d 391, 396 (Ct. Cl. 1967) (“Courts can neither broaden nor narrow the claims to give the patentee something different than what he has set forth. No matter how great the temptations of fairness or policy making, courts do not rework claims.” (footnote omitted)); see *Abtox, Inc. v. Exitron Corp.* 122 F.3d 1019, 1023 (Fed. Cir. 1997) (“Claim interpretation is the process of giving proper meaning to the claim language. . . . Therefore, the language of the claim frames and ultimately resolves all issues of claim interpretation.”).

guage,⁵⁶ using only the standard tools of textual interpretation.⁵⁷ This formalistic framework is necessary, according to the Federal Circuit, because the alternative of allowing policy discretion to enter the claim construction inquiry “would make infringement a matter of judicial whim.”⁵⁸ In other words, formalism in claim interpretation is predicated on an artificial dichotomy under which judicial discretion is deemed to be equivalent to judicial whim and the only perceived alternative is text-based mechanical jurisprudence. Not only is this equation of discretion to whim untrue,⁵⁹ the rhetorical emphasis on text in claim construction has not eliminated judicial discretion in this area. Instead, the two most important canons of claim interpretation are so self-contradictory that judges can reach almost any desired result by selecting one rule or the other.⁶⁰

The first fundamental canon of claim construction is that claims should always be interpreted “in the light of [their] specifications.”⁶¹ This follows from the unitary invention principle. Because the embodiment in the specification is the “invention” as much as the claim language, the two should be compared for context.⁶² The specification is much more detailed and often supplies details that abstract claims lack.

Kinetic Concepts, Inc. v. Blue Sky Medical Group, Inc. aptly demonstrates the application of this rule.⁶³ In *Kinetic Concepts*, the patentee claimed a treatment for a “wound.” The word “wound” is a commonly understood and generic concept, which usually includes any injury to body tissue.⁶⁴ The specification of the patent, however, described only one type of wound: skin wounds.⁶⁵ The Federal Circuit narrowed the broad claim language to the categories disclosed in the specification: “All of the exam-

⁵⁶ *Thermalloy, Inc. v. Aavid Eng’g, Inc.*, 121 F.3d 691, 693 (Fed. Cir. 1997) (“[T]hroughout the interpretation process, the focus remains on the meaning of claim language.”).

⁵⁷ *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 388–89 (1996) (characterizing claim construction as another instance of “construction of written instruments”); see *Cimiotti Unhairing Co. v. Am. Fur Ref. Co.*, 198 U.S. 399, 410 (1905) (holding that courts “may not add to or detract from the claim”).

⁵⁸ *SRI Int’l v. Matsushita Elec. Corp. of Am.*, 775 F.2d 1107, 1118 (Fed. Cir. 1985) (en banc) (identifying consideration of the accused product as outside the scope of permissible claim construction).

⁵⁹ See *infra* text accompanying note 253.

⁶⁰ 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.”); Duncan Kennedy, *Form and Substance in Private Law Adjudication*, 89 HARV. L. REV. 1685, 1700 (1976).

⁶¹ *Schriber-Schroth Co. v. Cleveland Trust Co.*, 311 U.S. 211, 217 (1940).

⁶² See, e.g., *Network, LLC v. Centraal Corp.*, 242 F.3d 1347, 1352 (Fed. Cir. 2001) (“The claims are directed to the invention that is described in the specification; they do not have meaning removed from the context from which they arose.”).

⁶³ 554 F.3d 1010 (Fed. Cir. 2009).

⁶⁴ See *id.* at 1018 (quoting *STEDMAN’S MEDICAL DICTIONARY* 1964 (26th ed. 1995)).

⁶⁵ *Id.* at 1018–19.

ples described in the specification involve skin wounds. . . . To construe ‘wound’ to include fistulae and ‘pus pockets’ would thus expand the scope of the claims far beyond anything described in the specification.”⁶⁶ In short, because the claim and the specification described a single “invention,” the specification clarified that the generic word “wound” really translated to only one type of wound (skin wounds) in the real world.

The problem with such an approach to claim construction, however, is that reducing abstractness (i.e., generality) through reference to the specification embodiment has no limits.⁶⁷ Just as a “wound” can be limited to “skin wounds” because those were the only type of wounds in the specification embodiment, so too might “skin wounds” be further limited to, say, “skin wounds on the arm” if that were the only type of skin wound described in the specification embodiment and so on. The end of this slippery slope would be a patent that covered only the precise embodiment described in the specification, and changing just the paint color or body part would avoid infringement. This would be bad for patent incentives because even an unsophisticated pirate would know how to change the paint color or take the *Kinetic Concepts* treatment method and use it on the leg.

For this reason, the second fundamental canon of claim construction holds that courts must never “import[] limitations from the specification into the claim.”⁶⁸ Instead, the claim language alone “measures the grant” of a patent.⁶⁹ But a claim is only a list of limitations,⁷⁰ so the effect of interpreting a claim by reference to the specification must be to add limitations that a court otherwise would not read into the claim.⁷¹ In other words, if courts reach exactly the same interpretation whether or not they consider the specification, then the first rule of claim interpretation is meaningless. But a court reaching a different interpretation *because* it considered the specification thereby imports a limitation from it in violation of the second rule. The two rules thus flatly contradict each other, as many commentators have noted,⁷² and as even courts themselves have seemingly acknowledged.⁷³ In-

⁶⁶ *Id.* at 1019.

⁶⁷ See *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.”).

⁶⁸ *Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005).

⁶⁹ *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 336 U.S. 271, 277 (1949).

⁷⁰ See *supra* text accompanying note 49.

⁷¹ See *Watts v. XL Sys., Inc.*, 232 F.3d 877, 882 (Fed. Cir. 2000) (“One purpose for examining the specification is to determine if the patentee has limited the scope of the claims.”).

⁷² E.g., Robert Unikel & Douglas Eveleigh, *Protecting Inventors, Not Fortune Tellers: The Available Patent Protection for After-Developed Technologies*, 34 *AIPLA Q.J.* 81, 88 n.9 (2006) (“How one can read claims ‘in light of the specification’ but yet avoid importing limitations from the specification has never been adequately explained, perhaps because these ostensibly contradictory tenets of claim construction cannot be reconciled.”); see, e.g., MERGES & DUFFY, *supra* note 30, at 803.

determinacy in claim construction law thus arises not (as is commonly supposed) because the text is linguistically vague but because of contradictory doctrine.

Contradictory doctrine makes claim construction outcomes difficult to predict without litigation, and judicial disagreement frequently arises when such issues are litigated.⁷⁴ Courts sometimes grant the broad scope reflected by the plain language of a claim and sometimes limit the claim to a precise embodiment in the specification. Most often, though, courts reach some middle position in which the claim is not as abstract as the language reflects but still encompasses more than the specification embodiment. Although litigated outcomes may thus often be sensible from a substantive standpoint, the murky process by which such outcomes are reached creates uncertainty that harms every participant in the patent system because it increases risk, encourages litigation, and disrupts business planning.⁷⁵ The fact that real patent scope is determined *ex post* by judicial interpretation also frustrates PTO decisionmaking.⁷⁶ Since the PTO cannot predict what eventual scope a court will give a claim, it may inadvertently issue undeserved claims or erroneously reject meritorious claims.⁷⁷

Far from creating a determinate and predictable system that secures patentee rights against the arbitrary whims of judges and PTO bureaucrats,⁷⁸ current claim construction doctrine—based on the formalistic unitary invention framework—creates precisely the indeterminate free-for-all that formalism seeks to avoid. An enormous degree of real judicial discretion is coupled with a lack of transparency on how that discretion is exercised.

⁷³ See, e.g., *Comark Commc'ns, Inc. v. Harris Corp.*, 156 F.3d 1182, 1186–87 (Fed. Cir. 1998) (“[T]here is sometimes a fine line between reading a claim in light of the specification, and reading a limitation into the claim from the specification.”).

⁷⁴ Russell B. Hill & Frank P. Cote, *Ending the Federal Circuit Crapshoot: Emphasizing Plain Meaning in Patent Claim Interpretation*, 42 IDEA 1, 2 (2002) (describing judicial uncertainty); Kimberly A. Moore, *Markman Eight Years Later: Is Claim Construction More Predictable?*, 9 LEWIS & CLARK L. REV. 231, 233, 239 (2005) (reporting a 34.5% reversal rate for claim construction). Another sign that claim construction is particularly unpredictable is that experienced district court judges appear to do no better in avoiding reversal. David L. Schwartz, *Practice Makes Perfect? An Empirical Study of Claim Construction Reversal Rates in Patent Cases*, 107 MICH. L. REV. 223 (2008).

⁷⁵ See, e.g., Bessen & Meurer, *supra* note 18, at 130–44 (showing that many patents are a net disincentive for innovation due to unpredictability and litigation costs); Jeffrey A. Lefstin, *Claim Construction, Appeal, and the Predictability of Interpretive Regimes*, 61 U. MIAMI L. REV. 1033, 1041–42 (2007) (“[P]redictability is paramount . . . when participants in the patent system decide whether to invest resources in developing inventions, whether to pursue patent protection, whether to embark upon potentially infringing business ventures, or whether to initiate infringement litigation.”).

⁷⁶ See Tun-Jen Chiang, *Fixing Patent Boundaries*, 108 MICH. L. REV. 523, 536 (2010) (arguing that *ex post* determination allows patentees to game claim construction to their advantage).

⁷⁷ See *SRAM Corp. v. AD-II Eng'g, Inc.*, 465 F.3d 1351, 1359 (Fed. Cir. 2006) (holding that a court may interpret claims more broadly than the PTO).

⁷⁸ See *SRI Int'l v. Matsushita Elec. Corp. of Am.*, 775 F.2d 1107, 1118 (Fed. Cir. 1985).

C. Enablement and Written Description

If claim construction were the only link between the specification and the claims, then the unpredictability of the doctrine would be of little long-term consequence. This is because patentees control claim language and, indeed, have unlimited chances to amend claims after the fact.⁷⁹ Thus, if a court construes a claim in a way that the patentee does not like, such as by limiting claim scope to the specification embodiment, the patentee can simply return to the PTO and amend the claim language to clarify his intent.⁸⁰ This is similar to the oft-made point that judicial mistakes in construing statutes are less consequential than mistakes in construing the Constitution because Congress can amend the statute to fix the mistake.⁸¹ And the burden for patentees to amend their patent is much lower than the burden for Congress to amend a statute.⁸²

Patentees can often also preemptively resist the importing of limitations from the specification by including very insistent language when initially drafting the claim.⁸³ A good historical example of such preemptive resistance is the eighth claim of Samuel Morse's patent on the telegraph:

Eighth. *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 making or printing intelligible characters, letters, or signs at any distances . . .*⁸⁴

As the Supreme Court noted when examining this claim, “[i]t is impossible to misunderstand the extent of this claim,” and no court could narrow the claim down to a specific machine embodiment without appearing flatly unreasonable.⁸⁵ Thus, instead of using claim construction to narrow the claim,

⁷⁹ See Chiang, *supra* note 76, at 531–34; Mark A. Lemley & Kimberly A. Moore, *Ending Abuse of Patent Continuations*, 84 B.U. L. REV. 63, 64 (2004).

⁸⁰ See generally Chiang, *supra* note 76, at 531–34 (explaining the basic mechanisms for amending patent claims). To quickly summarize, the three basic mechanisms to do this are: reissuance, 35 U.S.C. § 251 (2006); reexamination, §§ 301–303; and continuation applications, § 120.

⁸¹ E.g., *Patterson v. McLean Credit Union*, 491 U.S. 164, 172–73 (1989).

⁸² Cf. William N. Eskridge, Jr., *Interpreting Legislative Inaction*, 87 MICH. L. REV. 67, 98–100 (1988) (describing the structural tendency towards legislative inaction); Trevor W. Morrison, *Stare Decisis in the Office of Legal Counsel*, 110 COLUM. L. REV. 1448, 1481 n.134 (2010) (“[T]he fact that Congress can in theory correct the Court’s statutory errors does not mean it is easy to do so as a practical matter.”).

⁸³ See Friedemann Horn, *Preparing a Patent Specification for Filing with the U.S. Patent and Trademark Office*, JAT BULLETIN (Japan Ass’n of Translators) (Jan. 2000), <http://old.jat.org/jtt/bulletin/0001/07.html> (“For U.S. specifications, it is customary to end the [specification] with a disclaimer, in which the applicant states that the preceding examples are only examples, and that there are other ways to work the invention.”).

⁸⁴ See *O’Reilly v. Morse*, 56 U.S. (15 How.) 62, 86 (1853) (emphasis added).

⁸⁵ See *id.* at 112–13.

the Court invalidated Morse's claim entirely.⁸⁶ Invalidity thus serves as a "hard" limit on broad claims when the "soft" limit of narrow claim construction is circumvented.

Although the *Morse* Court did not give a clear doctrinal basis for invalidating the claim,⁸⁷ modern patent law would invalidate the claim under the enablement doctrine.⁸⁸ The enablement doctrine requires a specification to teach an ordinary person of skill in the field "how to make and use the *full scope* of the claimed invention."⁸⁹ As the Court noted, Morse's patent could not possibly have taught *every* mode of using electromagnetism to communicate characters at a distance:

For aught that we now know some future inventor, in the onward march of science, may discover a mode of writing or printing at a distance by means of the electric or galvanic current, without using any part of the process or combination set forth in the plaintiff's specification. His invention may be less complicated—less liable to get out of order—less expensive in construction, and in its operation. But yet if it is covered by this patent the inventor could not use it, nor the public have the benefit of it, without the permission of this patentee. . . . In fine [Morse] claims an exclusive right to use a manner and process which he has not described and indeed had not invented, and therefore could not describe when he obtained his patent.⁹⁰

Under this reasoning, the proper scope of a claim is only what Morse had described in the patent. A claim that is any broader would improperly encroach upon the contributions of future inventors.

Viewed within the unitary invention framework, this application of the enablement requirement makes perfect sense. The invention contributed by the patentee is only what the specification describes, and describing only one telegraph machine should not permit Morse to claim every future machine that might ever be developed. Enablement is lacking when the specification teaches "only one or a few embodiments and do[es] not demonstrate with reasonable specificity how to make and use other potential embodiments across the full scope of the claim."⁹¹ A specification does not need to explicitly teach every variation in material and color that a tele-

⁸⁶ *Id.* at 113.

⁸⁷ Dana Remus Irwin, *Paradise Lost in the Patent Law? Changing Visions of Technology in the Subject Matter Inquiry*, 60 FLA. L. REV. 775, 792–93 & n.107 (2008) (noting the difficulty in categorizing *Morse*); see Vincent Chiappetta, *Defining the Proper Scope of Internet Patents: If We Don't Know Where We Want to Go, We're Unlikely to Get There*, 7 MICH. TELECOMM. & TECH. L. REV. 289, 317 n.147 (2001).

⁸⁸ See A. Samuel Oddi, *Regeneration in American Patent Law: Statutory Subject Matter*, 46 IDEA 491, 514 (2006) (arguing that, in modern theory, *Morse* would be more appropriately categorized as an enablement issue).

⁸⁹ *In re Wright*, 999 F.2d 1557, 1561 (Fed. Cir. 1993) (emphasis added).

⁹⁰ *Morse*, 56 U.S. (15 How.) at 113.

⁹¹ *PPG Indus., Inc. v. Guardian Indus. Corp.*, 75 F.3d 1558, 1564 (Fed. Cir. 1996).

graph machine might have: rather, the reasonable skill of an ordinary artisan will allow such minor variations to be considered taught even if not explicitly mentioned.⁹² Of course, such ordinary skill cannot encompass technology developed after the filing date.⁹³ The basic and intuitive point is that the idea of *quid pro quo* limits the patentee to what he or she contributed at the time of patent filing.⁹⁴

The Supreme Court elaborated on the enablement requirement in *The Incandescent Lamp Patent* case.⁹⁵ Two inventors, William Sawyer and Albon Man, produced an incandescent lamp with a filament of carbonized paper.⁹⁶ The lamp was a commercial failure,⁹⁷ but nonetheless it worked. Like all patentees, Sawyer and Man were not content with exclusive rights covering only carbonized paper filaments, which would have been very narrow and easily avoided.⁹⁸ Instead, Sawyer and Man abstracted out their invention, stating that it was an incandescent lamp using a “carbonized fibrous or textile material” as filament.⁹⁹ Note here a rhetorical trick: although it is true enough that Sawyer and Man had invented *an* incandescent lamp using *a* carbonized fibrous or textile material, the legal effect of the claim was to cover *every* incandescent lamp using *any* carbonized fibrous or textile material.

The Supreme Court invalidated Sawyer and Man’s patent.¹⁰⁰ The problem was that the inventors had “made a broad claim for every fibrous or textile material, when in fact an examination of over six thousand vegetable growths showed that none of them possessed the peculiar qualities that fitted them” for the purpose of being used as filament.¹⁰¹ Thus, a person taking Sawyer and Man’s disclosure would not be able to make an incandescent lamp made of every fibrous or textile material without “pains-taking” (i.e., undue) experimentation;¹⁰² rather, that person would only be able to make an incandescent lamp made of carbonized paper. The narrow scope of Sawyer and Man’s contribution—an incandescent lamp made of carbonized paper—did not match the scope of their broad claim.

The logical conclusion of this framework, what I shall call the “full scope” rule, is that the patent’s specification must teach others how to make

⁹² See *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384 (Fed. Cir. 1986).

⁹³ *Chiron Corp. v. Genentech, Inc.*, 363 F.3d 1247, 1254 (Fed. Cir. 2004).

⁹⁴ See *Liebel–Flarsheim Co. v. Medrad, Inc.*, 481 F.3d 1371, 1380 (Fed. Cir. 2007).

⁹⁵ *The Incandescent Lamp Patent*, 159 U.S. 465 (1895).

⁹⁶ *Id.* at 468; U.S. Patent No. 317,676 (filed Jan. 9, 1880).

⁹⁷ *Incandescent Lamp*, 159 U.S. at 471.

⁹⁸ In fact, they also filed a claim limited to incandescent lamps using carbonized paper, which was not infringed. *Id.* at 472.

⁹⁹ *Id.* at 468.

¹⁰⁰ *Id.* at 477.

¹⁰¹ *Id.* at 472.

¹⁰² *Id.* at 475.

and use every embodiment that is covered by a claim.¹⁰³ Again, the teaching need not be explicit because scientific principles known at time of patent filing will allow a person of ordinary skill to understand minor changes. But, nonetheless, the specification must contain enough detail that the full scope of the claim can be built at the time of its filing using only the conventional skill of someone versed in the relevant art.¹⁰⁴

The full scope rule is also reflected in the “written description” requirement, which requires the specification to describe the invention in such a way that an ordinary reader can discern “possession” of the claim at the time of filing.¹⁰⁵ Although phrased as two separate requirements,¹⁰⁶ in practice the enablement and written description requirements are basically coextensive.¹⁰⁷ Filing a specification proves possession of what is taught within; teaching how to make and use something shows possession of it.¹⁰⁸ Like enablement, therefore, the written description doctrine is based on the unitary invention principle and the idea of *quid pro quo*.¹⁰⁹ The patentee may only claim those embodiments to which he shows possession at the time of filing the patent because they represent his “invention” and social contribution.¹¹⁰

¹⁰³ *Merges & Nelson*, *supra* note 34, 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.”).

¹⁰⁴ *Liebel-Flarsheim Co. v. Medrad, Inc.*, 481 F.3d 1371, 1378–79 (Fed. Cir. 2007).

¹⁰⁵ *See ICU Med., Inc. v. Alaris Med. Sys., Inc.*, 558 F.3d 1368, 1376–77 (Fed. Cir. 2009).

¹⁰⁶ *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1340 (Fed. Cir. 2010) (en banc).

¹⁰⁷ *See LizardTech, Inc. v. Earth Res. Mapping, Inc.*, 424 F.3d 1336, 1345 (Fed. Cir. 2005) (noting that the two requirements usually “rise and fall together”). I should make clear here that they are coextensive only as to the function of policing the reach of claims beyond the specification embodiment. *See infra* text accompanying notes 306–13. Obviously, it is possible to describe a specification embodiment that does not work, such as a perpetual motion machine, which would fail only the aspect of enablement that requires at least one working embodiment, and not written description.

¹⁰⁸ *Moba, B.V. v. Diamond Automation, Inc.*, 325 F.3d 1306, 1326 (Fed. Cir. 2003) (Rader, J., concurring) (“[T]o enable is to show possession, and to show possession is to enable.”); Timothy R. Holbrook, *Possession in Patent Law*, 59 SMU L. REV. 123, 146–47 (2006) (arguing that enablement should be conceptualized as possession); *see* Mark D. Janis, *On Courts Herding Cats: Contending with the “Written Description” Requirement (and Other Unruly Patent Disclosure Doctrines)*, 2 WASH. U. J.L. & POL’Y 55, 62–64 (2000) (arguing that no court “has ever articulated a persuasive rationale for distinguishing the written description requirement from the enablement requirement”).

¹⁰⁹ *See Enzo Biochem, Inc. v. Gen-Probe Inc.*, 323 F.3d 956, 970 (Fed. Cir. 2002).

¹¹⁰ *See, e.g., PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1306–07 (Fed. Cir. 2008) (holding that a specification describing one type of “customer interface”—vending machines—did not show possession of other types of interface, such as remote laptop computers); *Univ. of Rochester v. G.D. Searle & Co.*, 358 F.3d 916, 920 (Fed. Cir. 2004) (“[T]he purpose of the written description requirement is to ensure that the scope of the right to exclude, as set forth in the claims, does not overreach the scope of the inventor’s contribution to the field of art as described in the patent specification.” (quoting *Reiffin v. Microsoft Corp.*, 214 F.3d 1342, 1345 (Fed. Cir. 2000)) (internal quotation marks omitted)).

All of this reasoning makes apparent sense, except that a literal application of the full scope rule would invalidate every patent in existence. This is because, as Jeffrey Lefstin has pointed out, every patent claim covers an infinite array of embodiments, which cannot all be taught by the specification.¹¹¹ A claim by default covers every material, size, and added part, unless such variations are expressly disclaimed.¹¹² For example, the claims of the Wright brothers' patent on the airplane recited the basic structure of an airplane without specifying its material, size, or power source.¹¹³ By default, therefore, the claim covered every type of material, every size of airplane, and every added part such as later-developed engines. In March 1903, when the patent was filed, however, the Wright brothers had only wood for construction, and they did not have any engine at all.¹¹⁴ The claim thus covers a large number of later-developed embodiments—aluminum planes, propeller planes, jet planes—that the Wright brothers did not and could not teach in their specification at the time it was filed.¹¹⁵

Not only is it impossible for a specification to teach how to build every embodiment covered by a claim,¹¹⁶ almost everybody would agree that

¹¹¹ Jeffrey A. Lefstin, *The Formal Structure of Patent Law and the Limits of Enablement*, 23 BERKELEY TECH. L.J. 1141, 1168 (2008).

¹¹² A.B. Dick Co. v. Burroughs Corp., 713 F.2d 700, 703 (Fed. Cir. 1983) (“It is fundamental that one cannot avoid infringement merely by adding elements”); see *supra* text accompanying note 30.

¹¹³ U.S. Patent No. 821,393 (filed Mar. 23, 1903). The key claim recited:

In a flying-machine, the combination, with an aeroplane, and means for simultaneously moving the lateral portions thereof into different angular relations to the normal plane of the body of the aeroplane and to each other, so as to present to the atmosphere different angles of incidence, of a vertical rudder, and means whereby said rudder is caused to present to the wind that side thereof nearest the side of the aeroplane having the smaller angle of incidence and offering the least resistance to the atmosphere, substantially as described.

Id. at col. 6 ll. 62–74.

¹¹⁴ See John F. Haneski, *The Airplane as an Economic Variable: Aspects of Technological Change in Aeronautics, 1903–1955*, 14 TECH. & CULTURE 535, 543–44 (1973) (noting that the Wright brothers' twelve-horsepower engine was first used in flight in December 1903).

¹¹⁵ See *id.* at 544 (“The following thirty-five years saw the aircraft engine increase dramatically in its power.”); see also Kevin Emerson Collins, *The Reach of Literal Claim Scope into After-Arising Technology: On Thing Construction and the Meaning of Meaning*, 41 CONN. L. REV. 493, 516–20 (2008) (describing the coverage of open claims over after-arising technology); Lefstin, *supra* note 111, at 1170 (giving example of a standard claim to a chair that, by its openness, covers futuristic chairs made of neutronium).

¹¹⁶ One might suggest that enablement of an accused product should be assessed instead at the time of infringement. Timothy R. Holbrook, *Equivalency and Patent Law's Possession Paradox*, 23 HARV. J.L. & TECH. 1 (2009); see Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17, 37 (1997) (holding that equivalency is assessed at time of infringement). But this would be a useless test: the person of skill in the art is deemed to have perfect knowledge of everything public, *In re Winslow*, 365 F.2d 1017, 1020 (C.C.P.A. 1966), which would include the accused product if assessed at the time of infringement. Even without this imputed knowledge, the accused infringer would presumably be a person of ordinary skill in the art, and thus the very fact of infringement would show that creating the accused product was within the skill of an ordinary person in the art. Assessing enablement at the time of infringement would mean that an accused product was always enabled.

claim coverage *should* reach some of the variations that the specification cannot teach.¹¹⁷ The Wright brothers in 1903 could not have built even World War I fighter planes, which stayed in the air much longer than their unpowered wooden glider,¹¹⁸ let alone a modern jet. Yet we are still even today relying on the flight control principles that they devised,¹¹⁹ so their tremendous social contribution calls for a large reward.¹²⁰ More generally, incremental changes in technology will quickly create improved embodiments that the original inventor could not possibly have built but which still rely on many of the same ideas and principles of operation.¹²¹ If patent scope is limited to those embodiments that the patentee could build at the time of filing (and thus teach in the specification), then every patent becomes worthless practically from the moment it is issued. A functioning patent system requires a different approach, one that allows some degree of coverage for later-developed technologies that are not fully enabled by the patentee's specification.

Acknowledging this reality, a second line of cases holds that teaching a single working embodiment satisfies the enablement and written description requirements.¹²² I shall call this the “one-embodiment-enables-everything” rule. For example, in *Invitrogen Corp. v. Clontech Laboratories, Inc.*,¹²³ the Federal Circuit held that “[t]he enablement requirement is met if the de-

¹¹⁷ Note that the two formulations are equivalent. To require that the specification teach all claimed embodiments is to limit claims to the embodiments taught by the specification. The full scope rule can be described as “claim coverage equals specification teaching” or vice versa.

¹¹⁸ See G.D. Padfield & B. Lawrence, *The Birth of Flight Control: An Engineering Analysis of the Wright Brothers' 1902 Glider*, 107 AERONAUTICAL J. 697, 717 (2003) (“[A]fter 1908 the rate of progress in aviation was quite startling; progress which, in many ways, would leave the Wright brothers behind . . .”).

¹¹⁹ DAVID B. THURSTON, *THE WORLD'S MOST SIGNIFICANT AND MAGNIFICENT AIRCRAFT* 23 (2000) (“We use the rudder in similar fashion today [as the Wright brothers].”).

¹²⁰ See Padfield & Lawrence, *supra* note 118, at 698 (“[T]heir solution to three-axis control, linking roll and yaw control to mitigate the powerful adverse yaw effects, was one of ‘the’ critical breakthroughs in the history of aviation and aeronautical engineering.”).

¹²¹ See Hanieski, *supra* note 114, at 538 (noting that “Louis Bleriot retained the Wright system of control but abandoned their [airplane] design” for his crossing of the English Channel in 1909); see also *Morley Sewing Mach. Co. v. Lancaster*, 129 U.S. 263, 273 (1889) (“[A]ll subsequent machines which employ substantially the same means to accomplish the same result are infringements, although the subsequent machine may contain improvements . . .”).

¹²² *Tilghman v. Proctor*, 102 U.S. 707, 728 (1880) (requiring “a description of the process and of one practical mode in which it may be applied”); see *Spectra-Physics, Inc. v. Coherent, Inc.*, 827 F.2d 1524, 1533 (Fed. Cir. 1987) (holding that a claim is not invalid even if it “reads on another embodiment of the invention which is inadequately disclosed”); see also *Laryngeal Mask Co. v. Ambu A/S*, 618 F.3d 1367, 1374–75 (Fed. Cir. 2010) (reversing grant of summary judgment that claim lacked written description when specification did not describe accused product).

¹²³ 429 F.3d 1052 (Fed. Cir. 2005).

scription enables any mode of making and using the invention.”¹²⁴ It further explained:

Enablement 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.¹²⁵

Moreover, the Federal Circuit has specifically held that a competitor’s product can be infringing without being enabled by the patentee’s specification.¹²⁶ This conclusion follows from the doctrine that patentees should be able to cover new variants and improvements.¹²⁷ But it poses a contradiction for the quid pro quo theory of patents and the unitary invention principle. After all, if the patent specification should enable the full scope of the claim and a product must fall within the claim to infringe, then a logical application of the unitary invention framework would require enabling every infringing product. The fact that this is not required exposes the unacceptable policy consequences of strictly following the full scope rule in all cases.

One way that courts have attempted to reconcile these two lines of cases is to hold that later-developed technology need not be enabled,¹²⁸ but all other claimed embodiments must be.¹²⁹ This, however, is simply a restatement of the “one-embodiment-enables-everything” rule in disguise. To see why, consider that everything in the universe fits into one of three temporal categories: (1) preexisting technology or prior art, (2) the embodiments taught by the patentee at filing, or (3) later-developed technology.¹³⁰ Category 1 is unpatentable anyway on novelty grounds.¹³¹ Category 2 is by definition what has been enabled by the patentee. If category 3 need not be

¹²⁴ *Id.* at 1071 (quoting *Johns Hopkins Univ. v. CellPro, Inc.*, 152 F.3d 1342, 1361 (Fed. Cir. 1998)) (internal quotation marks omitted).

¹²⁵ *Id.*

¹²⁶ *Durel Corp. v. Osram Sylvania Inc.*, 256 F.3d 1298, 1306 (Fed. Cir. 2001) (“The dispositive question of enablement does not turn on whether the accused product is enabled.”).

¹²⁷ *Morley Sewing Mach. Co. v. Lancaster*, 129 U.S. 263, 273 (1889).

¹²⁸ *Chiron Corp. v. Genentech, Inc.*, 363 F.3d 1247, 1254 (Fed. Cir. 2004) (“The law does not expect an applicant to disclose knowledge invented or developed after the filing date.”); *In re Hogan*, 559 F.2d 595, 605–06 (C.C.P.A. 1977).

¹²⁹ *See Chiron*, 363 F.3d at 1254 (holding that nascent technology must be enabled with specific disclosure).

¹³⁰ *See* Kevin Emerson Collins, *Enabling After-Arising Technology*, 34 J. CORP. L. 1083, 1086 (2009) (distinguishing prior art doctrines that scope over pre-filing knowledge from enablement and written description, which limit scope “prospectively”).

¹³¹ 35 U.S.C. § 102 (2006).

taught but can still be claimed,¹³² then all that is required for a valid claim is for *something* to fall within category 2. Therefore, one working embodiment would allow for unlimited claiming. Unsurprisingly, given that this doctrine simply restates the one-embodiment-enables-everything rule in different words, it is contradicted by numerous other cases requiring the full claim scope—including later-developed technology—to be taught.¹³³

This analysis reveals two problems. First, the cases are irreconcilable.¹³⁴ The full-scope line of cases requires every claimed embodiment to be taught, and the one-embodiment-enables-everything line of cases requires only one claimed embodiment to be taught. A citation to one or the other can justify any outcome.¹³⁵ Litigants are left to wonder whether a patent that discloses one or a few working embodiments and claims many others—that is, practically every patent—is valid.¹³⁶ Second, each line of cases has serious defects that are responsible for the contrary line.

Teaching every claimed embodiment is impossible, and such a requirement would invalidate every patent. At the very least, it would restrict patent scope to slavish replication of disclosed embodiments and thereby cripple patent incentives since pirates could then escape infringement by simply making insignificant changes using post-filing technology. On the other hand, to say that teaching one working embodiment satisfies the enablement requirement leaves no limit on patent scope. After creating one working embodiment, a patentee could then claim “everything new and nonobvious in the universe,” without an obvious doctrine to strike that claim down.¹³⁷ A less extreme version of this tactic, though one with the same sense of unfairness, is precisely what Samuel Morse and Sawyer and Man tried—claiming very general categories, such as all uses of electro-

¹³² See *Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363, 1371–72 (Fed. Cir. 2008) (“Our case law allows for after-arising technology to be captured within the literal scope of valid claims that are drafted broadly enough.”).

¹³³ See, e.g., *The Incandescent Lamp Patent*, 159 U.S. 465, 472–74 (1895) (finding Sawyer and Man’s patent invalid due to its failure to teach Edison’s later-developed bamboo filament); *Auto. Techs. Int’l, Inc. v. BMW of N. Am., Inc.*, 501 F.3d 1274, 1284 (Fed. Cir. 2007) (finding invalidity due to failure to teach later-developed electronic sensor).

¹³⁴ See generally Chao, *supra* note 20, ¶¶ 50–52 (discussing the Federal Circuit split).

¹³⁵ Of course, if *no* working embodiment is disclosed, everyone can agree that the patent is invalid because it has no utility. See *Brenner v. Manson*, 383 U.S. 519, 535 (1966).

¹³⁶ See *Lizardtech, Inc. v. Earth Res. Mapping, Inc.*, 433 F.3d 1373, 1376 (Fed. Cir. 2006) (Rader, J., dissenting from denial of rehearing en banc) (“[A]n issue common to many patent disputes [is] claims that are broader than the disclosed embodiments.”).

¹³⁷ Such a claim would fail the PTO’s procedural requirements for claim form. *Ex parte Fressola*, 27 U.S.P.Q.2d 1608, 1612 (B.P.A.I. 1993). However, these procedural requirements have never been judicially endorsed. See *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 27 n.4 (1997) (stating that the PTO’s modern claiming practice “is not of statutory origin” and abandonment of prior forms “may be overstated”).

magnetism or all fibrous and textile materials.¹³⁸ Thus, under current doctrine, there is neither a predictable rule for determining patent scope nor even a theoretical framework for how such a rule might be devised. The rules that we do have ultimately create more confusion than clarity because they directly contradict each other.

II. INVENTION IN MULTIPLE LEVELS OF ABSTRACTION

A better way to understand the patent scope problem is to consider the specification and the claim separately by discarding the idea that these two distinct concepts describe a unitary invention.¹³⁹ The specification describes an *embodiment*, and the claim captures an *idea*. Rather than thinking of these two components of a patent as different paths to the same conclusion,¹⁴⁰ it is better to understand that they represent fundamentally different concepts.

A. Differentiating the Concepts of Invention

1. *Invention as a Specification Embodiment.*—Section 112 of the patent statute states that the “specification shall 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.”¹⁴¹ Here, when the statute uses the word “invention,” it requires a tangible and working embodiment, such as a physical process or a machine. It is not possible to “make” intangible ideas, only embodiments.¹⁴² Thus, an invention in the specification must be “embodied . . . in some distinct form.”¹⁴³ This is also consistent with § 101’s requirement that patentable inventions be a tangible “process, machine, manufacture, or composition of matter.”¹⁴⁴

¹³⁸ See *supra* text accompanying notes 95–102.

¹³⁹ EMERSON STRINGHAM, DOUBLE PATENTING 209 (1933) (“This primitive confusion of ‘invention’ in the sense of physical embodiment with ‘invention’ in the sense of definition of the patentable . . . survives to the present day, not only in the courts, but among some examiners in the Patent Office.”).

¹⁴⁰ See, e.g., *Univ. of Rochester v. G.D. Searle & Co.*, 358 F.3d 916, 922, n.5 (Fed. Cir. 2004) (“[W]hile the role of the claims is to give public notice of the subject matter that is protected, the role of the specification is to teach, both what the invention is (written description) and how to make and use it (enablement).”); *SRI Int’l v. Matsushita Elec. Corp. of Am.*, 775 F.2d 1107, 1121, n.14 (Fed. Cir. 1985) (en banc) (“Specifications teach. Claims claim.”).

¹⁴¹ 35 U.S.C. § 112 (2006).

¹⁴² Howard T. Markey, *Why Not the Statute?*, 65 J. PAT. OFF. SOC’Y 331, 333 (1983) (“Ideas are never patentable. Only an embodiment of an idea, i.e., an invention, may be patented.”).

¹⁴³ *Seymour v. Osborne*, 78 U.S. (11 Wall.) 516, 552 (1870).

¹⁴⁴ See *In re Comiskey*, 554 F.3d 967, 978 (Fed. Cir. 2009) (holding that a process is only patentable if it “is embodied in, operates on, transforms, or otherwise involves” a product); *In re Nuijten*, 500 F.3d 1346, 1356 (Fed. Cir. 2007) (holding that tangibility is required for products to be patentable).

2. *Invention as a Claimed Idea.*—Although the law requires the invention in the specification to be embodied in distinct form, it equally recognizes that substance, not form, defines patent protection.¹⁴⁵ In ascertaining patent scope, the claim should articulate the “principle” of the underlying the patent.¹⁴⁶ In other words, claims define an *idea*, and the claimed idea defines the scope of a patent. In this second sense, “invention” refers to an intangible idea.¹⁴⁷

Although I refer to this sense of invention as an idea, it is important to clarify the meaning of “idea” that is intended. I am not referring to ideas in the sense of philosophical thought—in all cases a physical embodiment is required for infringement.¹⁴⁸ Instead, the point is that patent coverage is more abstract than any single embodiment, covering a class of embodiments that share only some operating principle or functional idea. For example, the original transistor embodiment created by Bell Laboratories was an “ungainly table-top experiment,” bearing little physical resemblance to modern micro-transistor embodiments that are mere nanometers across.¹⁴⁹ But both the table-top transistor and the micro-transistor share the operating principles inherent to all transistors in using semiconductor material to amplify and switch electronic signals. At an even higher level of abstraction, a modern transistor bears even less physical resemblance to a vacuum tube, but the two embodiments still share the principle of functioning as electrical switches. A claim directed to “all electrical switches” is not directed to one particular tangible thing but is instead directed to an abstraction, and this claimed idea is reflected in an infinitely large (and continually growing)

But cf. *Bilski v. Kappos*, 130 S. Ct. 3218, 3227 (2010) (plurality opinion) (“The machine-or-transformation test may well provide a sufficient basis for evaluating . . . inventions grounded in a physical or other tangible form. But there are reasons to doubt whether the test should be the sole criterion for determining the patentability of inventions in the Information Age.”).

¹⁴⁵ See, e.g., *Winans v. Denmead*, 56 U.S. (15 How.) 330, 343 (1853) (“[I]t is the duty of courts and juries to *look through the form for the substance of the invention*—for that which entitled the inventor to his patent, and which the patent was designed to secure . . .” (emphasis added)).

¹⁴⁶ See *MERGES & DUFFY*, *supra* note 30, at 27 (“For purposes of the patent law, an invention is only the concept or principle that is articulated in the patent claim.”).

¹⁴⁷ *Gill v. United States*, 160 U.S. 426, 434 (1896) (“In every case the idea conceived is the invention.”); see *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 60 (1998) (“The primary meaning of the word ‘invention’ in the Patent Act unquestionably refers to the inventor’s conception rather than to a physical embodiment of that idea.”); see also *Mazer v. Stein*, 347 U.S. 201, 217 (1954) (“Unlike a patent, a copyright gives no exclusive right to the art disclosed; protection is given only to the expression of the idea—not the idea itself.”).

¹⁴⁸ See *In re Comiskey*, 554 F.3d at 979 (holding that a pure mental process is not patentable); *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1354 (Fed. Cir. 2005) (holding that a claim to an “aesthetically pleasing” appearance was invalid because it was impossible to objectively determine infringement); see also Kevin Emerson Collins, *Constructive Nonvolition in Patent Law and the Problem of Insufficient Thought Control*, 2007 WIS. L. REV. 759, 799 (arguing for a “constructive nonvolition” defense to infringement by mental processes).

¹⁴⁹ *MERGES & DUFFY*, *supra* note 30, at 27.

class of tangible things that otherwise often bear little resemblance to each other.

3. *Differences in Concept, Not Just in Approach.*—Although the differences between an idea and embodiment are well known, courts and commentators have elided the differences between them using the rhetoric of a unitary “invention,” in which the specification and claim are supposed to be describing different facets of the same thing.¹⁵⁰ When forced to clarify what an “invention” really is, however, leading authorities take directly contradictory approaches.

Chief Judge Howard Markey of the Federal Circuit, one of the preeminent judges of patent law, has characterized an “invention” as the embodiment described by a specification. According to Chief Judge Markey, “Ideas are never patentable. Only an embodiment of an idea, i.e., an invention, may be patented.”¹⁵¹ Moreover, “‘idea’” is a “mud word” that “appears nowhere in the statute, which speaks only of ‘invention.’”¹⁵² Some Supreme Court precedent supports the view of invention as embodiment,¹⁵³ as does the statute that defines patentable inventions as tangible machines, products, and processes¹⁵⁴ that can be made and used.¹⁵⁵

On the other side, Judge Giles Rich of the Federal Circuit, another eminent judge who wrote much of the 1952 Patent Act, has opined that an “invention” is an abstract idea. According to Judge Rich, an invention is “an incorporeal, intangible abstraction in the nature of a product of the mind.”¹⁵⁶ An embodiment is “[p]opularly but inaccurately called ‘invention.’”¹⁵⁷ This view, too, has support in Supreme Court precedent, which states that “[t]he primary meaning of the word ‘invention’ in the Patent Act unquestionably refers to the inventor’s conception rather than to a physical embodiment of that idea.”¹⁵⁸

Taken to their extreme, the two definitions for “invention” are irreconcilable. An invention cannot be both an intangible idea and a tangible thing

¹⁵⁰ *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 . . .”).

¹⁵¹ Markey, *supra* note 142, at 333.

¹⁵² *Id.*

¹⁵³ *Seymour v. Osborne*, 78 U.S. (11 Wall.) 516, 552 (1870).

¹⁵⁴ 35 U.S.C. § 101 (2006).

¹⁵⁵ 35 U.S.C. § 112.

¹⁵⁶ Giles S. Rich, *The Relation Between Patent Practices and the Anti-Monopoly Laws—Part II*, 24 J. PAT. OFF. SOC’Y 159, 171 (1942).

¹⁵⁷ *Id.* at 172.

¹⁵⁸ *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 60 (1998); see *Gill v. United States*, 160 U.S. 426, 434 (1896) (“In every case the idea conceived is the invention.”).

at the same time.¹⁵⁹ But “invention” can mean different things in different contexts. When speaking about the specification disclosure, the statute uses “invention” to denote the patentee’s tangible creation, which must be novel and useful and must be precisely described so that it can be built. When speaking about claims and infringement, the statute uses “invention” to denote an idea that others may not utilize, and a third party infringes the patent by using the same idea even if it is embodied in a different form than the specification embodiment.

One counterargument to this need for conceptual differentiation is that the invention being described by a specification can also be considered an idea because patentees will often include a statement of the operating principles and inventive ideas in the specification as well as in the claim. But whether patentees perform this exercise in redundancy is irrelevant; I am not resting my assertion that the specification describes an embodiment on whether a particular patent specification explicitly describes the inventive idea. Rather, the premise of my argument is that the *patent statute* itself conceptualizes the invention of the specification as an embodiment when it states that the specification must describe a “process, machine, manufacture, or composition of matter”¹⁶⁰ in sufficient detail that it can be “ma[de] and use[d].”¹⁶¹ Even when a patentee explicitly describes ideas in the specification description in addition to an embodiment, they cannot supersede the statutory definition of what the specification invention is. Because the specification invention is defined to be an embodiment, two options remain: either the claimed invention is also conceptualized as an embodiment, which would produce unacceptable policy results,¹⁶² or we must accept that the specification and claims reflect different conceptions of what an invention is.

So far, all I have provided is a simple description of the reality of patent practice, which every practitioner at some level intuitively understands.¹⁶³ But if “invention” means different things in different contexts—if idea and embodiment are not the same thing described in different ways—then the unitary invention framework is invalid. This is because every embodiment contains many ideas at different levels of abstraction. There is no automatic correlation between embodiment (i.e., contribution) and idea (i.e., monopoly scope). Defining the idea-invention by conflating it with

¹⁵⁹ See John F. Duffy, *Rules and Standards on the Forefront of Patentability*, 51 WM. & MARY L. REV. 609, 645 (2009) (arguing that “abstraction is the very antithesis of the precision required by the disclosure provisions of the Patent Act”).

¹⁶⁰ 35 U.S.C. § 101.

¹⁶¹ 35 U.S.C. § 112.

¹⁶² See *supra* text accompanying notes 117–21.

¹⁶³ See generally RONALD D. SLUSKY, *INVENTION ANALYSIS AND CLAIMING: A PATENT LAWYER’S GUIDE* 5 (2007) (“[A]n invention is an abstraction.”).

the embodiment-invention is a comparison of apples to oranges, more misleading than helpful.¹⁶⁴

B. Claiming Ideas at Multiple Levels of Abstraction

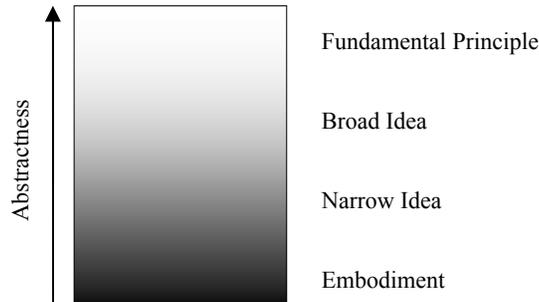
The two differing concepts of “invention” create a problem for defining patent scope. For any specification embodiment, an infinite array of ideas are equally apt for a claim. To return to an earlier example, consider the invention of a radiation machine that cures AIDS.¹⁶⁵ The invention can be claimed as any of the following:

1. “A cure for AIDS,” covering all cures that might ever be devised.
2. “A cure for AIDS using radiation,” covering all cures using any type of radiation but not other methods.
3. “A cure for AIDS using X-radiation,” thereby excluding methods using other types of radiation.
4. “A cure for AIDS using X-radiation specifically by using the exact make and model of the radiation machine in the specification.”

Every level of abstraction describes something that is new, useful, and non-obvious. Thus, the standard criteria of patentability provide no guidance regarding which level of abstraction is proper for patent protection.¹⁶⁶ But a patent covering all cures for AIDS is obviously different from a patent covering only one particular radiation machine.

The level of abstraction corresponds directly to the scope of a claim. The more abstract a claimed idea, the broader the resulting patent coverage. In this sense, protecting a single concrete embodiment is just the narrowest, most extreme point on a spectrum of possible levels of abstraction.

FIGURE 1: SPECTRUM OF LEVELS OF ABSTRACTION



¹⁶⁴ STRINGHAM, *supra* note 139, at 209 (“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.”).

¹⁶⁵ See *supra* Introduction.

¹⁶⁶ See 35 U.S.C. §§ 101–103 (requiring novelty, usefulness, and nonobviousness).

Within the spectrum of abstractions, each description is as equally accurate as any other. As a matter of formalist principle, there is almost no limit on how far one can move up or down the abstractions ladder.¹⁶⁷ Between claiming every last detail of the specification embodiment and omitting all details and claiming a fundamental principle, there is no legally principled limit. The criteria of novelty, usefulness, and nonobviousness provide no definitive answer. Nor do enablement and written description provide an answer: these two related doctrines are both internally contradictory and thus provide no coherent principle at all.¹⁶⁸

Nonetheless, courts must and do draw lines on the permissible level of abstraction. The lines, however, are drawn silently, without informing the public and litigants of any coherent principle. Because courts have not openly appreciated the abstractions problem or recognized this inherent line-drawing choice, the formal doctrine does nothing to answer how the choice is made.

One obvious response to this analysis is that courts usually reach sensible results anyway. For example, even though the one-embodiment-enables-them-all line of cases would allow it, a court almost certainly will not permit a patent that covers all cures for AIDS. Nor would a court narrowly reward the creator of a radiation machine that cures AIDS with only the precise machine down to the last nut, bolt, or paint color even though that is the logical conclusion of the full-scope line of cases. The mere fact that a doctrine permits logical absurdities does not mean that courts will actually reach absurd results.¹⁶⁹ Rather, courts will usually manipulate the conflicting case law to reach sensible outcomes.¹⁷⁰

The fact that litigated outcomes are usually sensible, however, does not diminish the importance of accurately recognizing the means used to reach them. A patent system that promises inventors a sensible reward based on plenary judicial discretion is one that is radically different in conception than what our current system purports to be. This analysis highlights the irony that patent law, once stripped of its formalist gloss, actually operates on almost plenary judicial discretion.

Moreover, it is important to point out that outcomes are largely sensible precisely *because* there is judicial discretion. Following either absolutist rule—allowing one embodiment to enable everything or requiring every

¹⁶⁷ See Burk & Lemley, *supra* note 14 (arguing that there is no right level of abstraction when construing claim limitations).

¹⁶⁸ See *supra* Part I.C.

¹⁶⁹ Cf. Karl N. Llewellyn, *Remarks on the Theory of Appellate Decision and the Rules or Canons About How Statutes Are to Be Construed*, 3 VAND. L. REV. 395, 401–06 (1950) (arguing that, because the canons of statutory construction contradict each other, decisions are made according to “[t]he good sense of the situation”).

¹⁷⁰ Kennedy, *supra* note 60, at 1700.

claimed embodiment to be enabled—would lead to absurd results. Thus, judges are required to engage in the delicate and policy-laden line-drawing task of finding the “right” level of abstraction for a particular patent. If mechanical decisionmaking truly reigned in patent law, then absurd results would abound.

The fact that courts pick and choose among conflicting case law to reach sensible outcomes would be much less problematic if judges articulated the real bases for reaching these decisions. But this is hardly possible while patent law continues to be dominated by the fiction that patent rewards should be rigidly and automatically matched to the “invention” and by rhetoric disparaging the exercise of judicial discretion as tantamount to decisionmaking by whim.¹⁷¹ Indeed, the rhetoric of mechanical formalism holds such sway over patent jurisprudence that the Federal Circuit has not even acknowledged the conflict between the full-scope and the one-embodiment-enables-them-all lines of cases.¹⁷² By remaining entirely silent about how the choice among conflicting cases is made—i.e., by remaining silent about the real decisionmaking process—courts create confusion and unpredictability for everyone.¹⁷³ Even if courts ultimately reach the right results most of the time, masking the true decisionmaking process behind formalist rhetoric makes it more difficult to resolve the many cases that are never litigated. This uncertainty ultimately causes additional litigation and expense. The levels of abstraction problem illuminates the reality of patent scope determinations and reveals the necessity of judicial line-drawing. This analysis sheds much light on the current confusion surrounding issues of patent scope.

C. *Understanding the Claim Construction Debate*

Once we understand that claimed ideas exist on multiple levels of abstraction, the conflicts in claim construction are more accurately viewed as disagreements over *policy*, not over textual methods.

1. *Debunking the Linguistic Vagueness Rationale.*—Claim construction is commonly framed as a debate between two interpretative schools: textualists, who look primarily to dictionaries for the meaning of claim language, and contextualists, who look primarily to the specification embodi-

¹⁷¹ See *supra* text accompanying note 58.

¹⁷² See *Auto. Techs. Int'l, Inc. v. BMW of N. Am., Inc.*, 501 F.3d 1274, 1281 (Fed. Cir. 2007) (rejecting argument that there is a “dichotomy in our case law”).

¹⁷³ See Bender, *supra* note 18, at 202–17; William F. Lee & Anita K. Krug, *Still Adjusting to Markman: A Prescription for the Timing of Claim Construction Hearings*, 13 HARV. J.L. & TECH. 55, 67 (1999); Moore, *supra* note 74, at 231 (noting a concern among “the bench and bar” that “de novo review of district court claim construction decisions and lack of guidance have caused considerable unpredictability” (footnote omitted)).

ment for context.¹⁷⁴ Thus, textualists give greater weight to the canon against importing limitations from the specification whereas contextualists give greater weight to the canon that claims must be interpreted in light of the specification. Common to both schools, however, is a core framework: both agree that claim construction is a *formalist* interpretive exercise whose goal is to *neutrally* ascertain the meaning of claim language.¹⁷⁵ The nominal enemy of both schools remains the judge who twists text to reach a particular outcome.¹⁷⁶

The formalist framework characterizes the claim construction problem as one of linguistic vagueness.¹⁷⁷ Although the point is somewhat too obvious to be frequently stated, the very fact that the court believes that a dispute falls within the rubric of claim construction implies that the court regards the claim language as unclear and that this lack of linguistic clarity is the source of the legal dispute.¹⁷⁸ When the court in *Kinetic Concepts* treated the dispute—the patentee claiming “wound” treatments generically but the specification disclosing only skin wounds—as one of claim construction, it implicitly asserted that the problem was that the claim was linguistically vague. Similarly, in *Phillips v. AWH Corp.*,¹⁷⁹ when the en banc Federal Circuit struggled with whether to narrow down a generic-sounding claim to all “internal steel baffles”¹⁸⁰ to cover only steel plates that lie within the specific range of angles that were disclosed in the specification, the implicit predicate assertion was that the claim language was unclear. To regard such common nontechnical terms such as “wound” and “baffle” as linguistically uncertain is in many ways strange to the layperson, yet it is so common in patent law that this strangeness is no longer noted. The reason for this curious conception of vagueness is the unitary invention theory. If we understand the specification and the claim as directed to a single invention, then the linguistic uncertainty makes sense: although the specification

¹⁷⁴ See Nard, *supra* note 19, at 4 (characterizing the two schools as “hypertextualism” and “pragmatic textualism”); R. Polk Wagner & Lee Petherbridge, *Is the Federal Circuit Succeeding? An Empirical Assessment of Judicial Performance*, 152 U. PA. L. REV. 1105, 1111 (2004) (describing the two schools as “procedural” versus “holistic”).

¹⁷⁵ *Scripps Clinic & Research Found. v. Genentech, Inc.*, 927 F.2d 1565, 1580 (Fed. Cir. 1991) (“[T]he construction of claims is simply a way of elaborating the normally terse claim language: in order to understand and explain, but not to change, the scope of the claims.”).

¹⁷⁶ *SRI Int'l v. Matsushita Elec. Corp. of Am.*, 775 F.2d 1107, 1118 (Fed. Cir. 1985) (en banc).

¹⁷⁷ See, e.g., Osenga, *supra* note 19, at 84 (arguing for greater use of linguistic techniques in claim construction).

¹⁷⁸ *Burk & Lemley*, *supra* note 50, at 1760 (“The process of claim construction itself presumes that the words of the claims are insufficiently precise to delineate those boundaries.”); see *U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997) (“Claim construction is a matter of resolution of disputed meanings and technical scope . . .”).

¹⁷⁹ 415 F.3d 1303 (Fed. Cir. 2005) (en banc).

¹⁸⁰ *Id.* at 1324. An “internal steel baffle” in this context is an internal steel plate. The patent pertains to prison walls where the primary purpose of internal steel plates is to deflect bullets. *Id.* at 1310.

and the claim are supposed to describe the same thing, one describes a general category of all wounds, all baffles, all airplanes, or all cures for AIDS, and the other describes only a single embodiment of those things. The patent document thus appears to be contradicting itself. On this understanding of the patent document and the nature of an invention, *every* patent is linguistically unclear.

The levels of abstraction framework brings clarity to what is really going on in the current claim construction debate. First, the real problem is rarely linguistic ambiguity or vagueness. As the drafter of patent claim language, *of course* the patentee prefers to cover all wounds, baffles of all angles, and as many embodiments and variants as the law will allow.¹⁸¹ There is nothing ambiguous, vague, incoherent, or even surprising about the patentee trying to move up the abstraction ladder to gain more scope for the claim even though the specification has only one embodiment. The only reason that courts would think so is because of the unitary invention principle treating the claim and the specification as a single “invention.” In other words, the root of the problem that courts are perceiving is not that the patent document is linguistically uncertain but rather that the unitary invention theory is not true and thus the specification and claims are not describing the same thing. Courts that forcibly mesh the two together will obviously become confused, but the confusion is not a result of uncertainty in the claim language or textual defects of the patent document. A court that attempts to deem oranges and apples as the same thing will also become confused when it discovers they are not.

Second, courts that treat the claim construction problem as one of linguistic vagueness often confuse vagueness with abstraction, as do many commentators.¹⁸² What courts then do with the supposedly “vague” claim is to interpret it by reference to the specification embodiment and make the claim narrower.¹⁸³ But this relies on a mistaken diagnosis of the problem.

¹⁸¹ Faber, *supra* note 27, § 10:1.1 (“[C]overage should be as broad as possible.”). The qualification of “as the law will allow” is important. A patentee would prefer a narrow claim construction if the broad construction would invalidate the patent, and patentees often change their tune when later-discovered information creates such a threat. See Mark A. Lemley, *The Changing Meaning of Patent Claim Terms*, 104 MICH. L. REV. 101, 117 (2005). But ex post shifts in patentee claim interpretation preference are obviously disingenuous. See Chiang, *supra* note 76, at 549–51 (discussing incentive problems created by modifying scope in response to post-filing information).

¹⁸² See, e.g., Bessen & Meurer, *supra* note 18, at 199–200 (attributing the problem of uncertainty to abstract claims); Jay Dratler, Jr., *Fixing Our Broken Patent System*, 14 MARQ. INTELL. PROP. L. REV. 47, 56 (2010) (arguing “because abstractions are inherently fuzzier than real things, their uncertain definition complicates every aspect of our patent system”).

¹⁸³ See, e.g., *Edward Lifesciences LLC v. Cook Inc.*, 582 F.3d 1322, 1331–35 (Fed. Cir. 2009) (construing the claim term “graft,” in a surgical device, to require wires and also that the wires be malleable because these were features of the specification embodiment).

Narrowing scope directly reduces abstraction,¹⁸⁴ but it does not predictably reduce vagueness.

Examples will help clarify the distinction between vagueness and abstraction. An idea is *vague* if its own boundaries are fuzzy,¹⁸⁵ creating a high number of borderline cases. On the other hand, an idea is *abstract* if it lacks specific context.¹⁸⁶ The question, “Is Mr. Smith tall?” is vague, but it is not abstract. Whether Mr. Smith is “tall” is difficult to answer, even if we know Mr. Smith is 5’11”, because there is no bright-line height cut-off for what is considered tall, and 5’11” is a borderline case. But the question is not abstract because it refers to one specific person and the specific attribute of his height.

In contrast, the idea of a prime number (a number divisible only by itself and one) is abstract but not vague. The idea is abstract because prime numbers can be used in many contexts.¹⁸⁷ Its abstractness comes from specifying no particular application. But it is extremely straightforward to determine whether a number is a prime number, and thus the idea is not vague.

When courts find broad claims “vague,” they are often mistaking vagueness for abstraction. A classic example of this mistake is the *Phillips* case.¹⁸⁸ The question in *Phillips* was whether the term “baffle” (used in prison walls) meant “baffles at any angle” or “baffles at angles *other than 90 degrees*.” The Federal Circuit obviously considered the term vague since it took the case en banc and three judges dissented.¹⁸⁹ But in truth, although “baffles at any angle” is more *abstract* than “baffles at angles other than 90 degrees,” both are equally *vague*. It is as easy to determine whether something is a baffle at any angle as it is to determine whether something is a baffle at an angle other than 90 degrees. It is simply that “baffles at any angle” does not specify any *particular* angle or range of angles and is thus more abstract. Indeed, it is slightly easier to determine whether something

¹⁸⁴ See *supra* Part II.B.

¹⁸⁵ See ISRAEL SCHEFFLER, BEYOND THE LETTER: A PHILOSOPHICAL INQUIRY INTO AMBIGUITY, VAGUENESS AND METAPHOR IN LANGUAGE 40–43 (1979) (comparing the concepts of vagueness and generality).

¹⁸⁶ See *id.*

¹⁸⁷ Prime numbers are used in numerous contexts such as encryption technology. See, e.g., ALFRED J. MENEZES, PAUL C. VAN OORSCHOT & SCOTT A. VANSTONE, HANDBOOK OF APPLIED CRYPTOGRAPHY 286 (1997). Under a doctrine that is distinct from claim construction and enablement, extremely abstract claims such as those on prime numbers are not allowed. See *Gottschalk v. Benson*, 409 U.S. 63 (1972) (claim on converting binary numbers not permitted).

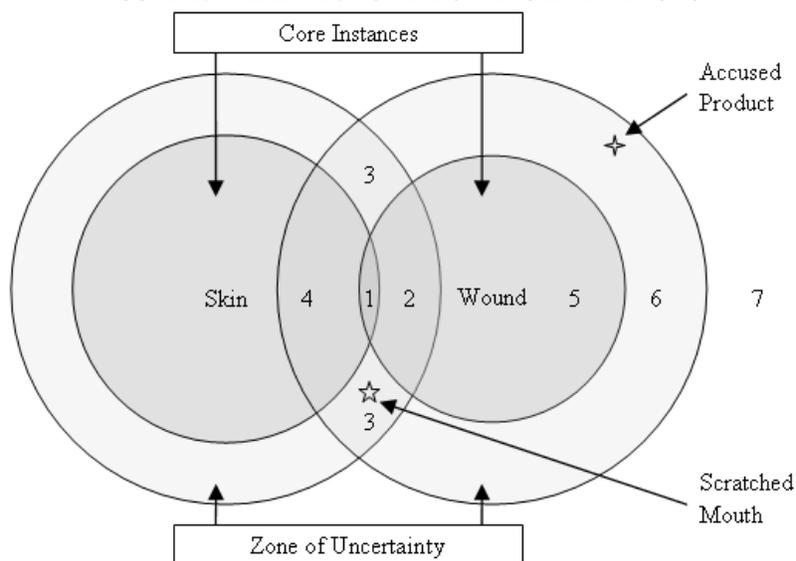
¹⁸⁸ *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc).

¹⁸⁹ *Id.* at 1328–35 (dissents of Judges Newman, Mayer, and Lourie).

is a baffle at any angle, since we avoid disputes about whether 89.99999 degrees is close enough.¹⁹⁰

This mistake also arose in *Kinetic Concepts*, which dealt with whether the term “wound” really meant “skin wound.”¹⁹¹ There is no extraordinary vagueness problem in the word “wound” that is clarified by specifying that the wound must occur on the skin. It is as easy to determine whether something is a wound anywhere as it is to determine whether something is a wound on the skin. As with the baffle example, the primary effect of importing the limitation of skin is not to reduce uncertainty but rather to reduce coverage. Indeed, there may be an increase in the relative degree of uncertainty because, in addition to questions about what constitutes a wound, we must now also consider questions about whether something constitutes skin (such as the membranes on the inside of the mouth), as well as cases where it is uncertain whether something is a wound and uncertain whether it is on the skin (e.g., a scratch inside the mouth). The following diagram illustrates the effect:

FIGURE 2: THE EFFECT OF IMPORTING LIMITATIONS



¹⁹⁰ These “construction of the construction” disputes are common. See, e.g., *SafeTCare Mfg., Inc. v. Tele-Made, Inc.*, 497 F.3d 1262 (Fed. Cir. 2007); *Leapfrog Enters. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1159–60 (Fed. Cir. 2007).

¹⁹¹ *Kinetic Concepts, Inc. v. Blue Sky Med. Grp., Inc.*, 554 F.3d 1010, 1018–19 (Fed. Cir. 2009); see also *Retractable Techs., Inc. v. Becton, Dickinson & Co.*, 653 F.3d 1296, 1305 (Fed. Cir. 2011) (interpreting the “body” of a syringe to require a one-piece structure).

In Figure 2, without the added limitation of skin, the zone of certain infringement would be represented by the union of areas 1, 2, and 5. The zone of uncertain potential infringement would be represented by the union of zones 3, 4, and 6. Finally, the zone of certain noninfringement would be represented by zone 7.

The primary effect of importing the limitation of skin is to reduce the abstractness of the claim and thus the scope of coverage. This can be seen by the fact that the zone of certain infringement has been reduced dramatically to only zone 1 whereas the zone of certain noninfringement has been expanded dramatically to the union of zones 5, 6, and 7. Thus, the accused product that fell within the zone of uncertain potential infringement before now falls in the zone of definite noninfringement. The claim has been made superficially more determinate for a single case and a single product, which may explain why judges believe that narrowing scope reduces vagueness. But, of course, the ease of resolving one single case is not something that the legal system as a whole is particularly concerned about when devising rules of general application.¹⁹²

What happens to the zone of uncertainty more generally? The zone of uncertainty changes from the union of zones 3, 4, and 6 to the union of zones 2, 3, and 4. Whether the absolute number of uncertain cases increases or decreases depends on whether zone 2 or zone 6 was larger. In Figure 2, zone 6 is larger than zone 2, so the absolute number of borderline cases has decreased, but the diagram could easily be changed to produce the opposite outcome. Also, note that the inquiry for cases falling within zone 3 has become more difficult because now there is uncertainty with respect to the meanings of both “wound” and “skin.” Finally, note that the number of uncertain cases has dramatically increased relative to the number of potential and definite infringements. This relativistic measure of uncertainty is usually how vagueness is conceived. Saying someone is tall or short would be considered vague because there are many borderline cases when considered relative to the known ranges of human height. But if considered from an absolute perspective—that is, considering every height from zero to infinity—then all human heights are within a very narrow band.

The bottom line is that, whether considered from an absolute or relativistic perspective, the scope of a claim has no logical connection to its linguistic vagueness. Although it is true enough that, at the extreme, a claim with no scope also has no vagueness and reducing abstraction enough will eventually reduce the absolute number of borderline cases, this logical

¹⁹² See Lefstin, *supra* note 75, at 1040–42 (arguing that predictability before litigation is more important than predictability after a district court trial).

sleight of hand does little to further the analysis.¹⁹³ An infinitely abstract claim with infinite scope has no borderline cases, either, because it would cover everything. But no one thinks of increasing scope as a method of reducing vagueness. Reducing scope to solve a supposed vagueness problem is not any more logical, and thus courts that narrow patent scope to cure “vagueness” are fundamentally misdiagnosing the problem.

The confusion of abstraction for vagueness explains why courts keep attempting to resolve claim construction disputes using formal textual methods and yet keep discovering that such textual methods do not work. Problems of vagueness can be resolved by formalist textual methods because vagueness has no normative dimension: all else being equal, clearer is better when it comes to property boundaries like claims.¹⁹⁴ In contrast, abstraction, which directly translates into scope, has a normative dimension that formalist textual methods will never answer—namely, how much scope is desirable. As the *Kinetic Concepts* court frankly acknowledged, the claim at issue had to be narrowed because it would otherwise “expand the scope of the claims far beyond anything described in the specification.”¹⁹⁵ No amount of textual interpretation will tell us how much broader the claim *should* be compared to the specification embodiment or how far claiming beyond the specification is “too far” and thereby triggers the need to narrow the claim. Textual interpretation can only tell us how much broader the claim *is*; it does not answer the current claim construction inquiry with its (largely unnoticed) policy focus.

2. *Claim Construction as an Abstraction-Oriented Inquiry.*—Rather than linguistic vagueness, the disagreement between the two claim construction camps is over the permitted level of abstraction. Interpreting claims in light of the specification—that is, importing limitations from the specification—has the effect of reducing the abstractness of a claim and its corresponding scope. A physical embodiment is the least abstract rung of the abstraction ladder: it is specific down to the last atom. A specification description is slightly more abstract than a physical embodiment because the written description of an embodiment usually omits very minor details such as the precise paint color. But the specification description is still

¹⁹³ Cf. Kenneth W. Dam, *The Economic Underpinnings of Patent Law*, 23 J. LEGAL STUD. 247, 261 (1974) (stating that to classify the denial of a patent as an extreme form of scope reduction would be a “semantic trick”).

¹⁹⁴ See *Merrill v. Yeomans*, 94 U.S. 568, 573 (1876) (reasoning that there is “no excuse for ambiguous language or vague descriptions”); *In re Zletz*, 893 F.2d 319, 322 (Fed. Cir. 1989) (“An essential purpose of patent examination is to fashion claims that are precise, clear, correct, and unambiguous. Only in this way can uncertainties of claim scope be removed, as much as possible . . .”). Of course, all else is not always equal, and perfect clarity might entail excessive transaction costs. Doug Lichtman, *Substitutes for the Doctrine of Equivalents: A Response to Meurer and Nard*, 93 GEO. L.J. 2013, 2016 (2005) (arguing that drafting perfect claims is too difficult).

¹⁹⁵ *Kinetic Concepts*, 554 F.3d at 1019.

more specific than even the narrowest claim. Thus, the contextualist school predictably narrows patent scope because it hews more closely to the specification description.¹⁹⁶

On the other hand, because patentees draft claim language, they naturally draft very general (and hence broad) claims. A court that gives effect to this broad text—drafted by the patentee—gives broader patent scope than one that limits claims using the specification embodiment.¹⁹⁷

The levels of abstraction framework makes clear that, contrary to the conventional assumption, the real disagreement is not about interpretative methodology.¹⁹⁸ Rather, the conflict is over substantive scope: whether and to what extent claims cover more embodiments than disclosed by the specification. As *Kinetic Concepts* candidly acknowledged, creative “interpretation” (i.e., the importation of limitations) is triggered by a claim going too far beyond the specification embodiment. But how far is too far? The degree to which claim breadth should extend beyond a specification embodiment is, like the proper length of patent’s term, a matter of policy.¹⁹⁹ The core problem of current claim construction doctrine is that no one knows where the claim lines lie because the judges themselves disagree on where that normative line lies.

D. Enablement, Scope, and Undue Experimentation

The levels of abstraction framework also illuminates the problems of the enablement standard. The enablement inquiry, which asks whether the specification permits a person of ordinary skill in the art to make the full scope of the claim,²⁰⁰ poses a question that is almost nonsensical once the real nature of a claim is understood. Because the claim reflects an abstraction—an idea—it is impossible to “make” anything so intangible.²⁰¹ Nor is it ever possible to explicitly teach someone to make every embodiment that encompasses the idea because even minor technological advances will quickly permit new embodiments to incorporate the idea and render even

¹⁹⁶ See Christopher A. Cotropia, *Patent Claim Interpretation Methodologies and Their Claim Scope Paradigms*, 47 WM. & MARY L. REV. 49, 105–09 (2005) (discussing the scope effect of using the specification to interpret claims).

¹⁹⁷ See Wagner & Petherbridge, *supra* note 174, at 1142 (predicting that a procedural (textualist) approach will yield broader constructions than a holistic (contextualist) approach).

¹⁹⁸ Cf. *Phillips v. AWH Corp.*, 376 F.3d 1382, 1383 (Fed. Cir. 2004) (en banc) (order granting rehearing en banc to determine whether “the public notice function of patent claims [is] better served by referencing primarily to technical and general purpose dictionaries and similar sources to interpret a claim term or by looking primarily to the patentee’s use of the term in the specification”).

¹⁹⁹ *Merges & Nelson*, *supra* note 34, at 842 (discussing economic effects of varying patent scope).

²⁰⁰ *Liebel-Flarsheim Co. v. Medrad, Inc.*, 481 F.3d 1371, 1378–80 (Fed. Cir. 2007); *Merges & Nelson*, *supra* note 34, at 845.

²⁰¹ See *supra* Part II.A.

the most detailed specification outdated.²⁰² Even the concept of implicit teaching and allowance for ordinary skill in the field cannot save the enablement standard because future improvements—even very minor ones—are by definition excluded from the skill of the field at the time of filing.²⁰³

This is not to say that the concept of making the invention without undue experimentation by a person of ordinary skill has no relevance. But it pertains only to *embodiments*—the “invention” of the specification. In other words, current enablement doctrine is attempting to capture two distinct functions. The first, ensuring that the specification contains a working embodiment, fits coherently into the “make without undue experimentation” test.²⁰⁴ The second, ensuring that the idea claimed is adequately disclosed in the specification, does not. Merging these distinct purposes into a single test means that the second function—claiming ideas and determining scope—has been ill-served. Taking this second function out of the enablement doctrine will let the doctrine serve its first function more coherently and allow some another doctrine to better effectuate the second function as well.

The first function of ensuring the specification teaches at least one working embodiment is important because the working embodiment is the basis of the patentee’s contribution. When applying this intuition, it also makes sense to remember that no embodiment works unfailingly: drugs rarely achieve 100% effectiveness, computers crash, and light bulbs burn out. Some degree of experimentation and some tolerance for failure are required. Thus, in asking what embodiments the patentee has disclosed, the current test of whether the specification teaches a person having ordinary skill in the art how “to make and use the invention without undue experimentation”²⁰⁵ makes sense as long as the invention is understood to refer to a working specification embodiment. The test tells us how many embodiments the patentee has given society through the patent, including whether the patentee passes the minimum threshold of at least one working embodiment.

The problems of the current enablement test arise because it is also used to police patent scope and thus intrudes into the policy question posed by the levels of abstraction framework. Above the minimum floor of protecting against literal replication of those embodiments the patentee has

²⁰² See *supra* text accompanying notes 111–21.

²⁰³ See *supra* note 116 and accompanying text.

²⁰⁴ *In re Wands*, 858 F.2d 731, 736–37 (Fed. Cir. 1988) (holding that a specification must teach how to “make and use the invention without undue experimentation”).

²⁰⁵ *Id.* at 737.

taught,²⁰⁶ patent scope becomes a policy question: given the working embodiments taught today, how many other embodiments should the patentee get for the next twenty years?²⁰⁷ In return for one or a few working cures for AIDS today, how many future variants of the cure for AIDS—which are unknown today and may be better, faster, or cheaper—are we willing to give up over twenty years?²⁰⁸ This ultimately translates into a larger normative question: how broad an idea should patent law protect?

Under the full scope rule, the formalist answer is that no future embodiments, and hence no “idea,” can be claimed.²⁰⁹ Only replication of the embodiments that are actually or constructively enabled at the time of filing can be covered by a patent. But this is unlikely to be the right answer, or even the answer that courts would give in a case like the cure for AIDS.²¹⁰ Given the pressing nature of the AIDS crisis and the need to solve it quickly, one cure under monopoly today is better than two cures under free competition many years down the road. Thus, the true patent bargain is not disclosure in exchange for twenty years of monopoly on the thing disclosed. The true patent bargain is this: one working embodiment today in exchange for a broader monopoly lasting twenty years²¹¹ that covers some range of future improvements and variants otherwise known as after-arising technology.²¹² The bargain is often worthwhile because the pressing concern of the moment often outweighs the later consequences of monopoly. But determining *how much broader* is an unavoidable policy question for which

²⁰⁶ Of course, even under the narrowest formulation of patent scope, the patentee would receive protection against literal replication of the embodiments taught, including the embodiments taught constructively. But because this would exclude even the most minor variant based on later-arising technology, it is clearly too narrow.

²⁰⁷ See JANICE M. MUELLER, *PATENT LAW* 108 (3d ed. 2009) (“Deceptively simple on its face, the task of awarding the ‘right’ claim scope for a particular disclosure . . . actually involves a delicate balancing of policy concerns.”).

²⁰⁸ See generally Lefstin, *supra* note 111 (discussing the problems of the enablement doctrine).

²⁰⁹ *Nat’l Recovery Techs., Inc. v. Magnetic Separation Sys., Inc.*, 166 F.3d 1190, 1196 (Fed. Cir. 1999) (“The scope of enablement . . . is that which is disclosed in the specification plus the scope of what would be known to one of ordinary skill in the art without undue experimentation.”).

²¹⁰ Collins, *supra* note 115, at 558 (“Although patent doctrine requires courts to stabilize the literal scope of a claim at the time of filing, courts routinely allow claims to grow and encompass [after-arising technology].”); Robert P. Merges, *Rent Control in the Patent District: Observations on the Grady-Alexander Thesis*, 78 VA. L. REV. 359, 379 n.73 (1992) (arguing that courts treat scope differently for enablement and infringement).

²¹¹ The patent expires twenty years from filing. 35 U.S.C. § 154(a)(2) (2006).

²¹² It is worth repeating that everything that is not taught by the patentee constitutes either prior art or after-arising technology. See *supra* text accompanying notes 128–33. Everyone agrees that patents protect against literal replication of embodiments taught by the patentee, and everyone agrees that patents should never cover the prior art. Thus, the debate over patent scope can be viewed as one about whether, and to what extent, patents can encompass after-arising technology.

formalistic enablement tests provide either no answer or an answer (i.e., zero) that is simply unacceptable.²¹³

III. A LEGAL REALIST APPROACH TO PATENT SCOPE

A. *The Unavoidable Policy Question*

Copyright scholars will have noticed the similarity of this analysis to the famous Learned Hand “abstractions test” in copyright law. Judge Hand observed that in determining whether two nonidentical stories were nonetheless “substantially similar,” thus making one an illegal copy of the other,²¹⁴ much depended on how abstractly the original story is characterized by the court and the level of generality at which similarity is compared.²¹⁵ According to Judge Hand:

It is of course essential to any protection of literary property . . . that the right cannot be limited literally to the text, else a plagiarist would escape by immaterial variations. That has never been the law, but, as soon as literal appropriation ceases to be the test, the whole matter is necessarily at large Upon any work, and especially upon a play, a great number of patterns of increasing generality will fit equally well, as more and more of the incident is left out. The last may perhaps be no more than the most general statement of what the play is about, and at times might consist only of its title; but there is a point in this series of abstractions where they are no longer protected Nobody has ever been able to fix that boundary, and nobody ever can.²¹⁶

Because no logical principle can determine the proper degree of abstraction, the question is necessarily “at large”—a matter of policy. And while nobody has been able fix the boundary using formalist methods of logic, text, and precedent, it must be noted that judges “fix” the boundary in some sense every time they decide a patent or copyright case. By determining whether a product is or is not infringing, they determine whether it falls within or without the boundary. Hand’s insight into the levels of abstraction problem in copyright translates directly into patent law.

To illustrate with a copyright example, *Snow White* can be described as a story of a princess living with seven dwarves, who eats a poisoned apple from her evil stepmother and then meets a handsome prince.²¹⁷ Insisting on

²¹³ See Collins, *supra* note 130, at 1088–89 (arguing that the Federal Circuit in practice applies a “reasonableness” test that is a “fact-intensive, fuzzy, and unclear standard”).

²¹⁴ A prima facie case of copyright infringement is met by proving both access to the copyrighted work and substantial similarities between the copyrighted work and the accused work. See *Folio Impressions, Inc. v. Byer Cal.*, 937 F.2d 759, 765 (2d Cir. 1991).

²¹⁵ *Nichols v. Universal Pictures Corp.*, 45 F.2d 119, 121 (2d Cir. 1930).

²¹⁶ *Id.*

²¹⁷ Jacob Grimm & Wilhelm Grimm, *Schneewittchen (Snow White)*, in *THE GRIMMS’ GERMAN FOLK TALES* 192 (Francis P. Magoun, Jr. & Alexander H. Krappe trans., 1960).

this relatively specific characterization of the story and requiring every element of the story to be copied for copyright infringement would allow a pirate to write an almost identical story, changing only the evil stepmother into an evil aunt. But once we start dropping elements, so that the apple can come from anybody, then we are simply moving up the abstraction ladder, “as more and more of the incident is left out.”²¹⁸ If the apple does not need to come from an evil stepmother for a subsequent work to plagiarize, then why does there need to be a poisoned apple at all? Any story with seven dwarves and a princess meeting a handsome prince still sounds a lot like *Snow White*. But at the end of this slippery slope, *Snow White* becomes described very abstractly as a story of “boy meets girl,” at which point practically every novel in existence is a “copy.”

The process is identical in patent law.²¹⁹ From the patentee’s original machine that cures AIDS using X-radiation, “a great number of patterns of increasing generality will fit equally well.”²²⁰ To insist upon confining the invention to the specification’s exact embodiment would allow “the unscrupulous copyist” to escape infringement by making “unimportant and insubstantial changes.”²²¹ But once we start dropping elements, saying that the precise nuts and bolts in the specification are not required and that any method of assembly will do, there is no natural stopping point as to what incidents may be left out. If the particular nuts and bolts do not matter, then why does using X-radiation in particular matter?²²² The end of the slippery slope is that the invention does not even need to be a machine, at which point the patent covers anything that cures AIDS, including a later-invented pill that bears no resemblance to a radiation machine.²²³

Judge Hand’s abstractions test has spawned an enormous literature in copyright law, but no one has yet fixed a rule that distinguishes the level of

²¹⁸ *Nichols*, 45 F.2d at 121.

²¹⁹ See Burk & Lemley, *supra* note 14, at 35; Joshua D. Sarnoff, *Abolishing the Doctrine of Equivalents and Claiming the Future After Festo*, 19 BERKELEY TECH. L.J. 1157, 1160 (2004); 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, 110 (1999).

²²⁰ *Nichols*, 45 F.2d at 121; see also Peter Lee, *The Evolution of Intellectual Infrastructure*, 83 WASH. L. REV. 39, 68 n.155 (2008) (“[A]n invention, if subjected to a ‘great number of patterns of increasing generality,’ could be conceptualized as a combination of scientific principles and mechanical forces.” (quoting *Nichols*, 45 F.2d at 121)).

²²¹ *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 607 (1950).

²²² One response might be that X-radiation is what is novel about the machine. The point is that beyond the requirements of novelty, usefulness, and nonobviousness, there remains an infinite spectrum of abstractions. A machine that cures AIDS using any other type of radiation would still be new, useful, and nonobvious.

²²³ See *Royal Typewriter Co. v. Remington Rand, Inc.*, 168 F.2d 691, 693–94 (2d Cir. 1948) (Hand, J.) (applying a similar analysis in a patent case and concluding that permissible abstraction is “always a question of degree, and courts have differed, and always will differ, as to the allowable latitude in a given instance”).

abstraction that copyright protects from what it does not.²²⁴ There is no legally “correct” answer to the level of abstraction inquiry.²²⁵ At least, the answer will not come from traditional legal sources of statutory text and judicial precedent. Rather, in copyright law, the legal conclusion of whether something is an unprotected idea is “prompted by notions—often unarticulated and unproven—of appropriate competition.”²²⁶ As the Ninth Circuit candidly put it, “The guiding consideration in drawing the line is the preservation of the balance between competition and protection reflected in the patent and copyright laws.”²²⁷ In short, the selection of the level of abstraction is a matter of judge-crafted economic policy.²²⁸

In contrast to the acceptance of flexible scope in copyright law, patent law attempts to remove bureaucratic and judicial discretion. The creator of a new, useful, and nonobvious invention is “entitled” to his patent.²²⁹ The notion that judges have tremendous discretionary control over the practical value of that patent—by defining the “invention” at different levels of abstraction—brings tremendous unease to patent lawyers because the consequence appears to be that the reward for innovation becomes a matter of judicial whim.²³⁰ Courts therefore adopt an ostrich-in-the-sand posture of denying they possess any discretion at all.²³¹

To this ostrich-in-the-sand avoidance, there are three responses. First, pragmatic use of judicial discretion to determine patent scope is how the current system actually works, and pretending otherwise is deceptive and unhelpful. Every invention lies on a spectrum of abstractions, and the rules that determine which level of abstraction deserves protection are so self-

²²⁴ *Peter Pan Fabrics, Inc. v. Martin Weiner Corp.*, 274 F.2d 487, 489 (2d Cir. 1960) (“Obviously, no principle can be stated as to when an imitator has gone beyond copying the ‘idea,’ and has borrowed its ‘expression.’ Decisions must therefore inevitably be *ad hoc*.”). See generally Amy B. Cohen, *Copyright Law and the Myth of Objectivity: The Idea-Expression Dichotomy and the Inevitability of Artistic Value Judgments*, 66 IND. L.J. 175 (1990) (arguing that copyright law lacks any objective basis to determine the proper level of abstraction and that artistic value judgments are inevitable).

²²⁵ See Burk & Lemley, *supra* note 14, at 52–54; see also Alfred C. Yen, *A First Amendment Perspective on the Idea/Expression Dichotomy and Copyright in a Work’s “Total Concept and Feel,”* 38 EMORY L.J. 393, 405 (1989) (contending that “the *Nichols* opinion never stated any principle which tells the court where to draw the line between idea and expression”).

²²⁶ Jane C. Ginsburg, *No “Sweat”? Copyright and Other Protection of Works of Information After Feist v. Rural Telephone*, 92 COLUM. L. REV. 338, 346 (1992).

²²⁷ *Herbert Rosenthal Jewelry Corp. v. Kalpakian*, 446 F.2d 738, 742 (9th Cir. 1971); see also *Computer Assocs. Int’l, Inc. v. Altai, Inc.*, 982 F.2d 693, 696 (2d Cir. 1992) (creating an “abstraction-filtration-comparison” approach based on “the necessary balance between creative incentive and industrial competition”).

²²⁸ Alan L. Durham, *Copyright and Information Theory: Toward an Alternative Model of “Authorship,”* 2004 B.Y.U. L. REV. 69, 96–97.

²²⁹ 35 U.S.C. § 131 (2006).

²³⁰ See *SRI Int’l v. Matsushita Elec. Corp. of Am.*, 775 F.2d 1107, 1118 (Fed. Cir. 1985) (en banc).

²³¹ See *id.*; see also *Auto. Techs. Int’l, Inc. v. BMW of N. Am., Inc.*, 501 F.3d 1274, 1281 (Fed. Cir. 2007) (rejecting the argument that there is a “dichotomy in our case law”).

contradictory that they are practically nonexistent, resulting in wide discretion to judges.²³² Even if this state of affairs were normatively undesirable, an accurate recognition of the present is a prerequisite for future reform.

Second, as a normative matter, it is not clear that judicial discretion in this area is a bad thing. After all, the levels of abstraction problem has existed for the entire history of the patent system in the United States and elsewhere. Thus, broad judicial discretion over patent scope is compatible with a functioning patent system and with providing adequate incentives for innovation.

Finally, there is no clearly superior alternative. Taking discretion over patent scope away from judges necessarily places the decision in the hands of some other government entity to limit patentee demands, or the result would be patents of unlimited scope. The obvious candidates are Congress and the PTO. Both must determine patent scope *ex ante* and, in the case of Congress, a great deal *ex ante* through the use of blunt legislative rules. This poses a problem given that judges determine scope through *ex post* adjudication, when more information is available.²³³ If, as is almost certainly the case, judges have a difficult time determining optimal scope *ex post* because of the complexity of the inquiry, then it is almost impossible to imagine how Congress or the PTO will have the capability to determine a method of computing optimal (or at least better) scope *ex ante* when less information is available.²³⁴

B. Considerations in the Policy Balance

Once we acknowledge that judges currently have (and will likely always have) substantial discretion in determining patent scope, the question becomes how such discretion should be exercised. The difficulty here is that patent scope presents a core conflict²³⁵: broader patent scope favors an initial invention but hampers subsequent improvement and use;²³⁶ narrower patent scope favors subsequent improvers and users, but without an initial

²³² See Merges & Nelson, *supra* note 34, at 841 (arguing that there is considerable discretion over scope, and economic policy should inform how discretion is exercised).

²³³ Cf. Louis Kaplow, *Rules Versus Standards: An Economic Analysis*, 42 DUKE L.J. 557, 577 (1992) (noting the comparative advantages of governing *ex post* through standards versus governing *ex ante* through rules).

²³⁴ *Nash v. CBS, Inc.*, 899 F.2d 1537, 1541 (7th Cir. 1990) (“Neither Congress nor the courts has the information that would allow it to determine [optimal copyright scope]. Both institutions must muddle through . . .”).

²³⁵ *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 152 (1989) (“The tension between the desire to freely exploit the full potential of our inventive resources and the need to create an incentive to deploy those resources is constant.”).

²³⁶ See Merges & Nelson, *supra* note 34, at 843. *But see* Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265 (1977) (arguing that patents encourage subsequent invention by allowing the first inventor to control later development).

pioneer, there would be nothing upon which to improve and nothing to use. Courts that have policy discretion to select one of many levels of abstraction should refrain from adopting absolutist rules that reach “either extreme of the continuum of generality.”²³⁷

Thus, if we promise the first inventor of a cure for AIDS that he or she will control all variants of anything that cures AIDS (e.g., whether a radiation machine, a pill, or anything else), the incentive to create that first working embodiment will be very large. But once the first working embodiment is achieved, later improvements are hampered by the monopoly. This can be tremendously costly because those later variants may be cheaper or more effective. If the first working embodiment cures AIDS 50% of the time, do we really want the monopoly to cover, and thus preclude, a later cure that works 90% of the time? In limiting the scope of Morse’s patent on the telegraph, the Supreme Court relied on precisely this concern: “For aught that we now know some future inventor” may create a better telegraph than what Morse taught, “[b]ut yet if it is covered by this patent the inventor could not use it, nor the public have the benefit of it without the permission of this patentee.”²³⁸

On the other hand, some degree of control beyond the precise embodiment is necessary for patent incentives to work. If the patent’s scope is confined to precise replication of the first working embodiment, then pirates would quickly learn to copy the principle or the heart of the patent without replicating the precise embodiment. With very few exceptions,²³⁹ protection limited to literal reproduction is worthless and easily circumvented. A good historical example is Eli Whitney’s invention of the cotton gin, one of the most important discoveries in American history.²⁴⁰ Because of the narrow scope of patent protection at the time, Whitney received almost no reward for this revolutionary invention because farmers simply created nearly (but not completely) identical apparatuses.²⁴¹ Courts granting broad protection

²³⁷ *Nash*, 899 F.2d at 1540.

²³⁸ *O’Reilly v. Morse*, 56 U.S. (15 How.) 62, 113 (1853).

²³⁹ One exception that comes to mind is a novel chemical element, where protecting only the specified embodiment may still confer significant value. *See, e.g., In re Seaborg*, 328 F.2d 996 (C.C.P.A. 1964) (patent on chemical element 95, Americium). But even here, this is a matter of abstraction, for a chemical element will have numerous isotopes. Does the first creator of one isotope get to control every later isotope?

²⁴⁰ Of course, like almost every other famous inventor, Whitney did not really “create” the cotton gin. He only *improved* earlier gins. *See* ANGELA LAKWETE, *INVENTING THE COTTON GIN: MACHINE AND MYTH IN ANTEBELLUM AMERICA*, at viii (2003) (arguing that “Eli Whitney patented not the first but a new type of gin”). In this way, every inventor relies on the prior contributions of others.

²⁴¹ Paul Klempner, *How Broad Should the Scope of Patent Protection Be?*, 21 *RAND J. ECON.* 113, 113–14 (1990).

thus frequently cite the necessity of providing sufficient reward to create incentives.²⁴²

Moreover, not only is protection beyond literal reproduction of the patentee's creation necessary for the patent incentive to work, it can also be socially beneficial. The key here is a difference in timing: society gets the first working embodiment immediately, but the improvements that are hampered occur only in the future. And without the first working embodiment as a guide, the improvements might never even exist at all, or at least would be delayed even further absent the patentee's pioneering efforts. Allowing the Wright brothers' barely working glider to morph into a monopoly covering the F-117 jet would not be bad if, without the Wright brothers' glider, no one would have ever developed the F-117 jet. Allowing the first person who develops a 50%-effective cure for a raging pandemic to obtain a monopoly that covers a later 90%-effective cure is not bad if, without the 50% cure, the human race would be extinct before the 90%-effective cure is discovered. Under such assumptions, the only thing "'monopolized' and sold at too low quantities is a product that would be sold in even lower quantity—zero—if there were no 'monopoly'" in the first place.²⁴³

Between these two competing goals of providing initial incentives and permitting subsequent improvement and use, there is an optimal point of abstraction and scope that maximizes economic welfare. Of course, this optimal point is very difficult to discern and will likely vary by industry or even individual patent.²⁴⁴ My goal in this Article is not to articulate a rule that reaches the right answer. Rather, my aim is to note that courts are likely to get closer to the right answer if they confront the question openly and allow litigants to supply them with information that addresses the actual question. The current debate over textual meaning and specification disclosures does not address the question of how far scope should extend beyond the embodiments taught by the specification in order to maximize social welfare. Neither dictionaries nor specifications will help answer that normative question. What *will* help provide an answer is an assessment of the social benefits of the pioneer's work, the incentives necessary to achieve this breakthrough, the cost of monopoly in terms of what later research has been or will be hampered, and the extent to which subsequent research is derived from the pioneer's work.

²⁴² See, e.g., *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 607 (1950) (“[C]ourts have also recognized that to permit imitation of a patented invention which does not copy every literal detail would be to convert the protection of the patent grant into a hollow and useless thing.”); *Invitrogen Corp. v. Clontech Labs., Inc.*, 429 F.3d 1052, 1071 (Fed. Cir. 2005).

²⁴³ JOHN W. SCHLICHER, *PATENT LAW: LEGAL AND ECONOMIC PRINCIPLES* § 5:36 (2d ed. 2006).

²⁴⁴ See Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1615 (2003) (arguing that optimal rules will vary by industry).

Instead of looking to dictionaries and specifications, courts would do better to consider the real-world economic facts and the enormous economic literature on how to determine optimal patent scope.²⁴⁵ Such a policy-oriented inquiry has been done in the copyright arena since Learned Hand articulated the problem in 1930.²⁴⁶ There remains no bright-line rule on the level of abstraction that copyright law will protect. But the abstractions test provides an enormously useful framework, which reminds judges of “the difficulties that require courts to avoid either extreme of the continuum of generality.”²⁴⁷ Every copyright court understands that scope lies on a spectrum of abstractions and the problems created by going to either extreme—either destroying incentives or crippling improvement. As a result, copyright law has refrained from absolutist rules such as confining scope to literal reproduction of the intellectual property owner’s creation (as the full scope rule effectively does)²⁴⁸ or the opposite extreme of permitting unlimited abstraction (as the one-embodiment-enables-everything rule does).²⁴⁹ And although copyright courts still do not have sufficient information to compute optimal scope,²⁵⁰ their awareness of the problem at least opens the door to making the inquiry.²⁵¹

Finally, it is important to point out that the implementation of standards is less prone to arbitrariness in intellectual property law than other areas²⁵² because widespread consensus exists on the normative framework—economic utilitarianism.²⁵³ This means that disagreement about pa-

²⁴⁵ See Richard Gilbert & Carl Shapiro, *Optimal Patent Length and Breadth*, 21 RAND J. ECON. 106, 108–11 (1990); Kitch, *supra* note 236, at 285–86 (arguing for broader patents to pioneers that allow them to direct subsequent development in an orderly manner); Klemperer, *supra* note 241, at 116–19; Merces & Nelson, *supra* note 12, at 198–99 (arguing for narrower scope since “[w]ide patent scope that exceeds the enablement of the disclosure makes anyone who attempts to invent in that area beholden to the patent owner”).

²⁴⁶ *Herbert Rosenthal Jewelry Corp. v. Kalpakian*, 446 F.2d 738, 742 (9th Cir. 1971).

²⁴⁷ *Nash v. CBS, Inc.*, 899 F.2d 1537, 1540 (7th Cir. 1990); see also *Apple Computer, Inc. v. Franklin Computer Corp.*, 714 F.2d 1240, 1253 (3d Cir. 1983) (“[T]he line must be a pragmatic one.”).

²⁴⁸ See *supra* text accompanying notes 103–10.

²⁴⁹ See *supra* text accompanying notes 122–25.

²⁵⁰ *Nash*, 899 F.2d at 1541.

²⁵¹ See generally Justin Kruger & David Dunning, *Unskilled and Unaware of It: How Difficulties in Recognizing One’s Own Incompetence Lead to Inflated Self-Assessments*, 77 J. PERSONALITY & SOC. PSYCHOL. 1121 (1999). As Socrates observed, the wise know what they do not know. See PLATO, THE APOLOGY OF SOCRATES 39–40 (D.F. Nevill trans., 1901) (c. 399 B.C.E.).

²⁵² For example, one persistent problem in criminal law is disagreement about the underlying normative goals: is the goal of criminal law to deter, to punish, or to rehabilitate? Even with perfect information, judges will disagree about the optimal criminal sentence because they are seeking to achieve different normative ends. See George P. Fletcher, *The Nature and Function of Criminal Theory*, 88 CALIF. L. REV. 687, 689 (2000) (“The field of criminal theory should be thought of more as a humanist inquiry than as a social science. The questions that concern us are not empirical.”).

²⁵³ Yochai Benkler, *Siren Songs and Amish Children: Autonomy, Information, and Law*, 76 N.Y.U. L. REV. 23, 59 (2001); F. Scott Kieff, *Property Rights and Property Rules for Commercializing Inven-*

tent outcomes is largely empirical. Although these empirical disagreements are very hard to resolve due to the paucity of information, there is at least an objectively “right” answer that everybody agrees the courts should be looking for. This provides a rebuttal to the charge that allowing judicial discretion over patent scope is tantamount to allowing judges to indulge in subjective whim.

Of course, collecting the necessary economic information to make individualized determinations about optimal scope would be very costly, and expending large amounts of administrative resources cannot be justified for the great majority of patents that eventually proves to be worthless.²⁵⁴ Thus, I do not mean to suggest that conducting an individualized economic analysis for every patent is the right solution. Rather than a perfectionist inquiry, rule-like safe harbors and presumptions may be necessary to achieve administrative workability in the usual case,²⁵⁵ while reserving detailed individualized analysis for only the most important patents.²⁵⁶ A definitive answer to the rules versus standards trade-off is beyond the scope of this Article.²⁵⁷ My simple suggestion is that the current set of self-contradictory rules achieves the worst of both worlds. Contradictory rules provide no real determinacy because any outcome can be justified by invoking whichever rule favors the outcome the appellate judge prefers. Yet the presence of those rules deceives litigants into making arguments focused on contradictory case law, deprives the courts of information relevant to the real underlying normative issue, confuses district judges by forcing them to reconcile precedent that is simply irreconcilable, frustrates nonlitigation licensing between patentees and their competitors because outcomes are difficult to predict without litigation, and reduces public accountability for courts as the real motives for a decision—the unspoken intuitions and hidden principles used to pick among the rules—are shielded from public scrutiny.

tions, 85 MINN. L. REV. 697, 697–98 (2001); see *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 480–81 (1974) (“The stated objective of the Constitution . . . is to ‘promote the Progress of Science and useful Arts.’ The patent laws . . . have a positive effect on society . . . by way of increased employment and better lives for our citizens.”); *Graham v. John Deere Co.*, 383 U.S. 1, 5–6 (1966) (“Congress in the exercise of the patent power may not . . . enlarge the patent monopoly without regard to the innovation, advancement or social benefit gained thereby.”).

²⁵⁴ Dennis Crouch, *The Patent Lottery: Exploiting Behavioral Economics for the Common Good*, 16 GEO. MASON L. REV. 141, 149–50 (2008).

²⁵⁵ See Kaplow, *supra* note 233, at 577 (“Rules cost more to promulgate; standards cost more to enforce.”).

²⁵⁶ See Tun-Jen Chiang, *The Rules and Standards of Patentable Subject Matter*, 2010 WIS. L. REV. 1353 (arguing that patent law has, and should have, this type of layered analysis).

²⁵⁷ See generally Isaac Ehrlich & Richard A. Posner, *An Economic Analysis of Legal Rulemaking*, 3 J. LEGAL STUD. 257, 257–58 (1974) (“discuss[ing] the conditions under which greater specificity or greater generality is the efficient choice” in legal rulemaking); Duncan Kennedy, *Form and Substance in Private Law Adjudication*, 89 HARV. L. REV. 1685 (1976); Pierre Schlag, *Rules and Standards*, 33 UCLA L. REV. 379 (1985).

The problem is not with the rules per se but with their contradictory absolutism. A properly formulated set of rules to determine patent scope should both serve a coherent and consistent purpose and reasonably correlate to the patent law's underlying economic policy of balancing incentives with monopoly cost.

For example, one rule-like presumption could be that derivative works (as distinct from independently developed products) should be presumed to be infringing even if they incorporate alterations and improvements.²⁵⁸ This follows from the rationale that if a defendant actively relied on the patent disclosure, then the accused product would not likely exist absent the patent.²⁵⁹ Similarly, Mark Lemley has suggested economics-based rules that consider infringer intent and prior secret use.²⁶⁰ We see that economics-based rules can be formulated and, even if such rules are necessarily imperfect, they will at least consider and bear a correlation to the underlying economic goal of balancing benefits and costs. Whether done through rules or standards, or a mix of both, a more transparent scope analysis that selects among levels of abstraction using coherent economic principles will provide better normative results and greater predictability than current doctrine.

C. *Choosing a Doctrinal Vehicle*

The economic factors that inform the selection of a proper level of abstraction can easily be incorporated into the current framework of patent law. Judges already inherently select the level of abstraction when they determine whether some accused product falls within a patent's scope.²⁶¹ But they exercise this discretion silently. The reform suggested here involves articulating and then properly analyzing an already-existing judicial role: one in which judges are guided in their preexisting discretion by consideration of the policy effects of granting broader or narrower scope.²⁶²

²⁵⁸ Oskar Liivak, *Rethinking the Concept of Exclusion in Patent Law*, 98 GEO. L.J. 1643 (2010) (suggesting that patents be limited to copying); Samson Vermont, *Independent Invention as a Defense to Patent Infringement*, 105 MICH. L. REV. 475 (2006) (arguing that patent scope should be limited to copies and derivative works).

²⁵⁹ See Jeanne C. Fromer, *The Layers of Obviousness in Patent Law*, 22 HARV. J.L. & TECH. 75, 77 (2008) (arguing that the patent system aims to "offer an incentive to create those inventions deemed to be beneficial to society that otherwise would not exist").

²⁶⁰ Mark A. Lemley, *Should Patent Infringement Require Proof of Copying?*, 105 MICH. L. REV. 1525, 1532-35 (2007) (suggesting a modified willfulness test and prior user rights).

²⁶¹ See Burk & Lemley, *supra* note 14, at 50.

²⁶² The discretion is currently vested in the courts rather than the PTO, as the determination of patent scope is largely a legal question. See *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 388-91 (1996) (holding that claim construction is a legal issue for judges); *In re Vaeck*, 947 F.2d 488, 495 (Fed. Cir. 1991) ("Enablement, like obviousness, is a question of law which we independently review . . .").

The question that follows is what precise doctrinal “hook” should be used to implement these policy decisions if the underlying economic considerations are to be weighed openly. Four primary doctrinal mechanisms are either in use today or have been used historically: claim construction, freestanding judicial scope determination without deference to patentee-drafted claims, enablement based on § 112, and a common law “undue breadth” doctrine. I shall discuss each possibility in turn, ultimately suggesting that an independent undue breadth doctrine is the best option.

1. Claim Construction.—As a practical matter, the current law determines scope during claim construction.²⁶³ After the claims are construed, most cases settle or are resolved on summary judgment.²⁶⁴ Descriptively speaking, current claim construction doctrine is often manipulated to achieve the court’s desired scope.²⁶⁵ But is this kind of results-oriented claim construction normatively desirable?²⁶⁶

One benefit of using claim construction as a doctrinal vehicle for policy analysis is that it has support in case law. Although the modern Federal Circuit strongly condemns result-oriented claim construction (in rhetoric if not in practice),²⁶⁷ the Supreme Court has historically shown this approach much greater favor. Chief Justice Taft’s opinion in *Eibel Process Co. v. Minnesota & Ontario Paper Co.* is illustrative:

In administering the patent law, the court first looks into the art to find what the real merit of the alleged discovery or invention is and whether it has advanced the art substantially. If it has done so, then the court is liberal in its construction of the patent to secure to the inventor the reward he deserves. If what he has done works only a slight step forward and that which he says is a discovery is on the border line between mere mechanical change and real invention, then his patent, if sustained, will be given a narrow scope and infringement will be found only in approximate copies of the new device.²⁶⁸

²⁶³ See Matthew D. Henry & John L. Turner, *The Court of Appeals for the Federal Circuit’s Impact on Patent Litigation*, 35 J. LEGAL. STUD. 85, 113 (2006) (arguing that a stronger presumption of validity caused more focus to be placed on the infringement inquiry).

²⁶⁴ Lemley, *supra* note 181, at 102; see *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 989 (Fed. Cir. 1995) (en banc) (Mayer, J., concurring) (“[T]o decide what the claims mean is nearly always to decide the case.”).

²⁶⁵ See *supra* text accompanying notes 198–99.

²⁶⁶ See Cotropia, *supra* note 196, at 127–33 (arguing that claim construction is an effective policy lever).

²⁶⁷ See *supra* text accompanying note 176; see also MERGES & DUFFY, *supra* note 30, at 802–03.

²⁶⁸ 261 U.S. 45, 63 (1923).

The problem with this approach is that, at the end of the day, claim *construction* must be anchored by claim language as a practical matter.²⁶⁹ If the patentee has written an overly narrow claim (however rarely this happens), there is only so much the court can do to expand it without appearing ridiculous, no matter what formal doctrine may allow.²⁷⁰ Similarly, a patentee who mimics Samuel Morse and writes insistent language into a broad claim—e.g., “I do not propose to limit myself to the specific machinery or parts”—will make it difficult for a court to narrow the claim down through interpretation.²⁷¹ As the Court in *Morse* discovered, courts frequently need a hard limit on claim scope separate from the claim language drafted by the patentee.

Of course, a court could construe claims by importing limitations from the specification embodiment even when the patentee is quite explicit in specifying otherwise.²⁷² Again, current claim construction doctrine imposes no real constraints on judicial action.²⁷³ The constraints arise instead from common sense. Courts cannot adopt wildly implausible constructions without looking ridiculous, even if not constrained by precedent. In other words, a court that simply imposes claim scope by fiat, notwithstanding whatever the claim language says, ceases to do anything reasonably called “construction.” Instead, such an approach essentially becomes a freestanding scope doctrine in which judges determine scope independently. This is undesirable because, as the next section discusses, claim language serves important notice and definition functions,²⁷⁴ and if claim language is not given any effect, then patentees would have no incentive to draft good claims. Because giving effect to formal claim language is important, claim construction is not a suitable vehicle for implementing policy.²⁷⁵

2. *Freestanding Scope Determination.*—An alternative to anchoring claim construction and scope determination in formal claim language is to simply disregard that language. Courts could simply determine patent scope in the first instance according to the dictates of economic policy.

²⁶⁹ See *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1248 (Fed. Cir. 1998) (“Without any claim term that is susceptible of clarification by the written description, there is no legitimate way to narrow the property right.”).

²⁷⁰ Cf. *Miller v. Bridgeport Brass Co.*, 104 U.S. 350, 354 (1881) (“It was probably supposed that the patentee would never err in claiming too little.”).

²⁷¹ See *supra* text accompanying notes 83–85.

²⁷² E.g., *Martek Biosciences Corp. v. Nutrinova, Inc.*, 579 F.3d 1363, 1383 (Fed. Cir. 2009) (Lourie, J., dissenting) (arguing that, although the patentee had an explicit definition, the definition should be ignored because it was “totally negated by the remainder of the text of the patent”).

²⁷³ See *supra* Part I.B; cf. Felix Frankfurter, *Some Reflections on the Reading of Statutes*, 47 COLUM. L. REV. 527, 529 (1947) (describing how “external circumstances may be allowed to infiltrate the text on the theory that they were part of it, written in ink discernible to the judicial eye”).

²⁷⁴ See *infra* text accompanying notes 286–95.

²⁷⁵ See *infra* text accompanying notes 294–98.

This means courts would simply pronounce the scope of a patent without invalidating claims but also without giving their language any effect. Under this approach, claims are basically irrelevant.²⁷⁶

A regime of overtly disregarding claims and their language is almost inconceivable in modern patent law, in which the importance of written claims is routinely emphasized.²⁷⁷ It is, however, not as radical as one might think. Such a regime describes copyright law, in which courts determine the scope of a copyright through the Hand abstraction framework without anything resembling claims. And it describes American patent law prior to 1809, when patents were not accompanied by meaningful claims.²⁷⁸

Before claims existed, courts determined patent infringement by comparing the specification embodiment to the accused product and asking whether the two were “substantially, in their principles and mode of operation, [a]like.”²⁷⁹ This analysis likewise turned entirely on the level of abstraction at which the court considered the product’s “principle.”²⁸⁰ Virtually everything shares a “principle” or “idea” at some level of abstraction: everything is made of atoms and operates under the principles of physics. By determining the governing principle of a patent, courts determined the level of abstraction and patent scope.²⁸¹ Early American patent law shows that it is more than possible for courts to pronounce patent scope without reference to patentee-drafted claims. Indeed, modern patent law still technically allows courts to make such freestanding determinations of scope through the doctrine of equivalents (which allows courts to grant broader scope than the claim language)²⁸² and the reverse doctrine of equivalents (which allows courts to narrow scope notwithstanding any literal

²⁷⁶ See Burk & Lemley, *supra* note 50, at 1746–47 (arguing for the abandonment of peripheral claims).

²⁷⁷ *In re Hiniker Co.*, 150 F.3d 1362, 1369 (Fed. Cir. 1998) (“[T]he name of the game is the claim.” (citing Giles Sutherland Rich, *Extent of Protection and Interpretation of Claims—American Perspectives*, 21 INT’L REV. INDUS. PROP. & COPYRIGHT L. 497, 499 (1990))); John F. Duffy, *On Improving the Legal Process of Claim Interpretation: Administrative Alternatives*, 2 WASH. U. J.L. & POL’Y 109, 109 (2000) (“Claims are the most important part of the modern patent document.”); Paul M. Janicke, *When Patents Are Broadened Midstream: A Compromise Solution to Protect Competitors and Existing Users*, 66 U. CINN. L. REV. 7, 16 (1997) (noting that the “entirety of patent law centers around” claims).

²⁷⁸ See William Redin Woodward, *Definiteness and Particularity in Patent Claims*, 46 MICH. L. REV. 755, 758 (1948) (tracing the first patent claims to Robert Fulton’s patent on the steamboat).

²⁷⁹ *Odiorne v. Winkley*, 18 F. Cas. 581, 582 (C.C.D. Mass. 1814) (No. 10,432).

²⁸⁰ See *supra* text accompanying notes 215–21.

²⁸¹ See Jeanne C. Fromer, *Claiming Intellectual Property*, 76 U. CHI. L. REV. 719, 731–35 (2009) (describing the history of claiming).

²⁸² This freestanding discretion has been cabined somewhat after *Warner-Jenkinson Co. v. Hilton Davis Chemical Co.*, which required analysis of substantial similarity to follow the *structure* of a claim even if not its literal language. 520 U.S. 17, 29 (1997).

claim language).²⁸³ The essential question in the equivalence inquiry remains whether the elements of two products have “insubstantial differences,”²⁸⁴ and the answer largely depends on the level of abstraction at which the similarities and differences are compared.²⁸⁵

However, as much as history and experience show that a regime of freestanding scope pronouncement without claims is possible, they also show that such a regime is unwise.²⁸⁶ Claims predominate today because of our experience with this history,²⁸⁷ and both the doctrine of equivalents and the reverse doctrine of equivalents are now largely moribund.²⁸⁸ One frequently cited benefit of defining scope through claims is the vagueness and unpredictability of the “substantial similarity” test,²⁸⁹ though this benefit is questionable given the uncertainty of claim construction doctrine.²⁹⁰ A far more important reason for requiring claims is the patentee’s comparative information advantage at the time of patent filing.²⁹¹ A patentee, more than any other participant in the patent system, is likely to know which features of his embodiment are novel and which are not, and what he regarded as important to his own incentives when filing for the patent.²⁹² Thus, even if claims are drafted at a very high level of generality, they at least force the

²⁸³ *Westinghouse v. Boyden Power Brake Co.*, 170 U.S. 537, 569 (1898) (describing the reverse doctrine of equivalents).

²⁸⁴ *Warner-Jenkinson*, 520 U.S. at 39–40.

²⁸⁵ See ADELMAN ET AL., *supra* note 13, at 806 (using an example of two forks, with equivalence depending on whether you compare them at the level of individual tines or as generic forks).

²⁸⁶ See generally John F. Duffy, *The Festo Decision and the Return of the Supreme Court to the Bar of Patents*, 2002 SUP. CT. REV. 273, 309–10 (describing the emergence of claims to address problems created by the substantial similarity test).

²⁸⁷ *Merrill v. Yeomans*, 94 U.S. 568, 570 (1876) (noting that formal claims are “of primary importance, in the effort to ascertain precisely what it is that is patented”).

²⁸⁸ *Roche Palo Alto LLC v. Apotex, Inc.*, 531 F.3d 1372, 1378 (Fed. Cir. 2008) (“The reverse doctrine of equivalents is rarely applied, and this court has never affirmed a finding of non-infringement under the reverse doctrine of equivalents.”); John R. Allison & Mark A. Lemley, *The (Unnoticed) Demise of the Doctrine of Equivalents*, 59 STAN. L. REV. 955, 958 (2007) (arguing that, as a practical matter, the doctrine of equivalents is largely dead). Neither doctrine, though, is completely dead, and the statement in *Roche Palo Alto* is artfully worded: the Federal Circuit has itself applied the reverse doctrine of equivalents, e.g., *Scripps Clinic & Research Found. v. Genentech, Inc.*, 927 F.2d 1565, 1581 (Fed. Cir. 1991) (reversing a finding of infringement), but it has never affirmed a lower court that did so.

²⁸⁹ See Sarnoff, *supra* note 219, at 1198 (arguing that the doctrine of equivalents causes uncertainty and additional litigation costs).

²⁹⁰ See *supra* Part I.B; see also Burk & Lemley, *supra* note 50, at 1791–92 (“The simple answer to those who worry about the failure of public notice under central claiming is that peripheral claiming has already failed in that function, and in fact has failed catastrophically.”).

²⁹¹ Chiang, *supra* note 76, at 542–43.

²⁹² *Kintner v. Atl. Commc’n Co.*, 240 F. 716, 717 (2d Cir. 1917) (“[T]he patentee is conclusively presumed to have known what he invented or discovered, better than did any one else, at the time he applied for a patent.”).

patentee to disclose this knowledge to some extent.²⁹³ Patentee-drafted claims thus have an information-forcing function, and this benefit is lost in a freestanding abstraction doctrine. Patentees would not have any incentive to draft precise claims if courts simply ignored them. Thus, the information advantages of having formal claims suggest that we should seek some other vehicle for determining the proper level of abstraction, one that does not require completely ignoring claim language.

3. *Enablement and Written Description Under § 112.*—If, as the above analysis indicates, having patentee-drafted claims is a good thing, then claims must be given a certain measure of effect. The implication is that courts should formalistically construe claims without subtly undermining claim language through creative interpretations that seek to achieve policy goals.²⁹⁴ This does not mean that courts will never consider policy. Rather, the time to do so is after the claim has been formalistically construed. By formalistically following patentee intent during claim construction—determining exactly what monopoly the patentee seeks—no matter how broad, courts can then use invalidity or rejection to control whether the patentee should get the claimed monopoly as a policy matter. The hard limit of invalidity, which has no patentee-set anchor like claim language, is a much better vehicle for implementing judicial policy than claim construction doctrine.²⁹⁵ The added bonus is that this mechanism allows claim language to be given some effect because anything not claimed would be forfeited by the patentee,²⁹⁶ thereby preserving the incentive for patentees to draft good claims and in the process disclose their private information.

At least sometimes, the Federal Circuit already follows this pattern of formalistically construing the claim and then afterwards applying invalidity doctrine to police scope, and the enablement doctrine serves as the doctrinal vehicle. A good example of this is *Liebel-Flarsheim Co. v. Medrad, Inc.*, in which the Federal Circuit initially rejected the accused infringer’s plea to creatively interpret a claim to the “opening” of a syringe, where the accused infringer argued that the claim should be limited to syringes that had pressure jackets to protect the syringe from breaking under pressure because

²⁹³ *Keystone Bridge Co. v. Phoenix Iron Co.*, 95 U.S. 274, 278 (1877) (holding that claims “reliev[ed] the courts from the duty of ascertaining the exact invention of the patentee by inference and conjecture, derived from a laborious examination of previous inventions, and a comparison thereof with that claimed by him”); *Evans v. Eaton*, 20 U.S. (7 Wheat.) 356, 435 (1822) (noting that patentee ought to “describe what his own improvement is, and to limit his patent to such improvement”).

²⁹⁴ See *supra* text accompanying notes 198–99.

²⁹⁵ One complication is that invalidity analysis is currently distorted by a presumption of validity that biases courts against invalidating claims. See Douglas Lichtman & Mark A. Lemley, *Rethinking Patent Law’s Presumption of Validity*, 60 STAN. L. REV. 45, 51 (2007); see also *Microsoft Corp. v. i4i Ltd. P’ship*, 131 S. Ct. 2238, 2246 (2011) (reaffirming heightened burden of proof).

²⁹⁶ *Johnson & Johnston Assocs. v. R.E. Serv. Co.*, 285 F.3d 1046, 1054 (Fed. Cir. 2002) (en banc) (holding that unclaimed subject matter is dedicated to the public).

that was how the specification embodiment was set up.²⁹⁷ The court held that there was “no ambiguity in the term ‘opening’ and no reason to resolve the purported ambiguity by reading that term restrictively.”²⁹⁸ Subsequently, however, the court invalidated the claim for lack of enablement because the specification did not enable a person of skill in the art to make and use syringe openings without pressure jackets.²⁹⁹

As shown by *Liebel-Flarsheim*, the enablement doctrine has sufficient flexibility to allow a court to implement policy decisions through its rubric.³⁰⁰ So too does enablement’s close cousin, the written description doctrine.³⁰¹ Once a court decides that the scope of a patentee’s claim is overbroad under an economic policy-based abstraction analysis, the precise label used to strike the claim down matters little if everyone understands the real test being applied is an economics-based policy balancing. The rejection may be classified under doctrines of enablement,³⁰² written description,³⁰³ patent eligibility,³⁰⁴ or proper claiming.³⁰⁵ If the analysis is transparent to everyone involved, then its labeling becomes largely an inconsequential matter of semantics.

One problem, however, is that enablement does not serve solely as a vehicle for economic balancing. Although it is often invoked for this purpose under current practice, it also serves a distinct and essential function of determining what embodiments the patentee has taught³⁰⁶ and ensuring that at least one working embodiment is among them. This “one working embodiment” aspect of enablement doctrine does not depend on abstraction or economic balancing, and it is not plagued by conflicting case law. In fact, it works quite well.³⁰⁷ In contrast, the economics-based abstraction inquiry examines how far beyond the taught embodiments patent protection should extend, and the “undue experimentation” test does not answer this in-

²⁹⁷ 358 F.3d 898, 905 (Fed. Cir. 2004).

²⁹⁸ *Id.*

²⁹⁹ *Liebel-Flarsheim Co. v. Medrad, Inc.*, 481 F.3d 1371, 1380 (Fed. Cir. 2007).

³⁰⁰ *Id.*; see also *supra* Part II.D.

³⁰¹ See *supra* text accompanying notes 105–10.

³⁰² *E.g.*, *In re Hyatt*, 708 F.2d 712, 714 (Fed. Cir. 1983).

³⁰³ *E.g.*, *LizardTech, Inc. v. Earth Res. Mapping, Inc.*, 424 F.3d 1336, 1344–45 (Fed. Cir. 2005).

³⁰⁴ See, e.g., *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972); *Burr v. Duryee*, 68 U.S. (1 Wall.) 531, 570 (1863).

³⁰⁵ *E.g.*, *Allen Eng’g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1349 (Fed. Cir. 2002) (setting forth an honest claiming requirement); *Intervet Am., Inc. v. Kee-Vet Labs., Inc.*, 887 F.2d 1050, 1053 (Fed. Cir. 1989) (“Ambiguity, undue breadth, vagueness, and triviality are matters which go to claim *validity* for failure to comply with 35 U.S.C. § 112-¶ 2 . . .”).

³⁰⁶ Again, what the patentee has taught includes both the embodiments taught explicitly and those constructively disclosed by supplementing the specification with ordinary skill known at filing.

³⁰⁷ See *supra* text accompanying note 205.

quiry.³⁰⁸ Framing both inquiries under the rubric of “enablement” is prone to causing confusion. The danger is that courts will mesh the two purposes together and develop a single absolutist test, repeating the error of the unitary invention principle.

Likewise, the written description doctrine has an important timing function in addition to its function of policing scope.³⁰⁹ The timing function helps ensure that the currently claimed scope was intended by the patentee at the time of filing—a necessity because patentees can amend claims *ex post*.³¹⁰ In other words, the written description requirement ensures that patentees do not retroactively expand the scope of their patent. Regardless of whether that expanded scope is justified by the calculation of incentives versus monopoly cost, its retroactivity causes independent problems of notice.³¹¹ The possible confusion of these two distinct purposes and modes of analysis (preventing retroactivity versus preventing excessive monopoly scope) must be avoided.

Thus, the drawback of using either enablement or written description doctrine as the vehicle for implementing economic policy balancing is that there is a risk of undermining the other functions served by these doctrines. This drawback is minor, though, because we can avoid the problem simply by constantly reminding courts of the difference in function while still using the label of “enablement” or “written description.” Using the same label for what are really distinct doctrinal tools and concerns is common in the law, such as using the single label of “causation” to cover the distinct concepts of factual and proximate causation.³¹² Nonetheless, shared labels do in fact prove confusing and should be avoided if there is a simpler alternative.³¹³

4. *Resurrecting the “Undue Breadth” Doctrine.*—The preferred course would be to avoid shoehorning the problem of undue breadth into any of the established headings of invalidity (i.e., enablement, written description, unpatentable subject matter, and failure to claim) because of their

³⁰⁸ See *supra* text accompanying notes 209–14.

³⁰⁹ Janice M. Mueller, *The Evolving Application of the Written Description Requirement to Biotechnological Inventions*, 13 BERKELEY TECH. L.J. 615, 620–23 (1998) (describing the operation of written description to prevent retroactive changes).

³¹⁰ *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1560 (Fed. Cir. 1991) (“[T]he ‘written description’ requirement most often comes into play where claims not presented in the application when filed are presented thereafter.”).

³¹¹ Chiang, *supra* note 76, at 525; Robert P. Merges, *Software and Patent Scope: A Report from the Middle Innings*, 85 TEX. L. REV. 1627, 1653–54 (2007) (describing the problem of “misappropriation by amendment”).

³¹² RESTATEMENT (SECOND) OF TORTS § 431 (1965).

³¹³ See, e.g., RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL INJURY §§ 26–36 (2005) (Proposed Final Draft No. 1) (distinguishing between “factual cause” and “scope of liability (proximate cause)”).

preexisting doctrinal baggage.³¹⁴ Rather, undue abstraction may be identified as its own ground of invalidity with an economically oriented analysis that is distinct from current doctrine. In many ways, this is simply restoring the historical approach of the PTO, which until 1970 rejected overly-abstract claims for “undue breadth” instead of lack of enablement.³¹⁵ The turn towards insisting that the analysis be conducted under the rubric of enablement or written description,³¹⁶ which came about partly as a result of the Court of Customs and Patent Appeals’ penchant for formalist rhetoric,³¹⁷ has only confused an already difficult analysis and distorted the enablement and written description doctrines.

This is not to say that the considerations that inform the current doctrines of enablement and written description are utterly irrelevant to the undue breadth analysis. Rather, a separate doctrine is desirable precisely because the enablement test somewhat captures the problem but misses many critical distinctions. For example, the current enablement test relies heavily on the concept of “undue experimentation,” and it applies this concept identically to the inquiry of what the patentee has taught and the abstraction-oriented inquiry of what additional scope should be afforded.³¹⁸ This is a mistake because, although the degree of necessary experimentation is relevant to both inquiries, it affects the analysis in different ways.

In determining what embodiments have been taught by the patentee in the specification, predictability is relevant because all predictable variants at the time of filing are considered constructively taught by the specification. In this context, predictability provides a straightforward lodestar: if a variant is predictable at the time of filing, it is constructively disclosed, with

³¹⁴ In addition to the problems with the enablement and written description doctrines, the other doctrines suffer from their own shortcomings. Patentable subject matter tests exclude products of nature and other prohibited categories, regardless of abstraction. *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130 (1948). Thus, a single moon rock specified down to its last atom is not patentable even though it is not abstract. Failure to claim under 35 U.S.C. § 112 paragraph 2 is primarily directed to insolubly vague claims like claims to “aesthetically pleasing” objects. *See Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1345–46 (Fed. Cir. 2005). Vagueness and undue abstraction are distinct problems and should not be confused. *See supra* text accompanying note 185.

³¹⁵ *See In re Mayhew*, 527 F.2d 1229, 1235 (C.C.P.A. 1976) (Baldwin, J., concurring) (“Beginning in 1970, we departed from a vast line of authority which permitted the PTO to reject claims . . . for ‘undue breadth.’ Up to that time, examiners quite frequently determined what they felt the invention was and rejected all claims which were broader than their conception of the invention . . .”).

³¹⁶ *In re Hyatt*, 708 F.2d 712, 714 (Fed. Cir. 1983); *In re Borkowski*, 422 F.2d 904, 908–10 (C.C.P.A. 1970).

³¹⁷ Jeffrey A. Lefstin, *The Constitution of Patent Law: The Court of Customs and Patent Appeals and the Shape of the Federal Circuit’s Jurisprudence*, 43 LOY. L.A. L. REV. 843, 858 (2010). Notwithstanding their formalist rhetoric, the CCPA judges could be very pragmatic when they perceived important policy issues at stake. *Id.* (“[CCPA Judge Giles Rich] was enough of a pragmatist to rely on common law development when he sought to implement a particular policy, notwithstanding the lack of a foundation in the statutory text.”).

³¹⁸ *In re Wands*, 858 F.2d 731, 736–37 (Fed. Cir. 1988).

the implication that the more predictable a technical field is, the more variants are constructively disclosed.³¹⁹

The amount of experimentation required is also relevant to the economics-based abstraction analysis but in a very different way. Predictability is relevant to economic balancing because the investment incentives of pioneers and subsequent improvers are both affected by the predictability of a field. Given an innovative table, it is easy to quickly create a large range of improved tables because the principles of physics in this area are well-established. Given a pioneering cure for AIDS, though, it is difficult to create a large range of improved cures because the principles of medicine are complex. The improver of an innovative table design has made only a small contribution over the pioneer; the improver of a cure for AIDS has made a large one. Thus, predictability is a relevant consideration in determining both what the specification has constructively enabled and what additional nonenabled embodiments should be covered by the patent.

Just as the example demonstrates that predictability is relevant to the economic balancing test, however, it also illustrates critical distinctions that are prone to becoming lost in the rhetoric of a single enablement doctrine. In contrast to the straightforward lodestar that predictability provides in the context of determining what embodiments have been taught, where more predictability is always better for the patentee, predictability often cuts both ways in the context of economic balancing. Medicine and biotechnology are generally less predictable than mechanical fields where the technology is more mature.³²⁰ This characteristic suggests that the scope of pioneering patents should be narrower in medicine and biotechnology where the contribution of later improvements is greater.³²¹ But the lack of predictability in medicine and biotechnology also means that pioneers need greater patent incentives. It takes more investment to create a first cure for AIDS than it does to create a pioneering modern table.³²² Thus, lack of predictability can be invoked to support greater or narrower scope depending on the circumstances.

A separate doctrine of undue abstraction or undue breadth, divorced from enablement, would clarify how economic factors should affect patent scope and would force courts to more directly confront the levels of abstraction problem. Forthrightly admitting that this economics-based analy-

³¹⁹ See *In re Cook*, 439 F.2d 730, 734 (C.C.P.A. 1971) (creating “a dichotomy between predictable and unpredictable factors in any art” when analyzing enablement).

³²⁰ See Sean B. Seymore, *Heightened Enablement in the Unpredictable Arts*, 56 UCLA L. REV. 127, 136–38 (2008) (contrasting “the predictable arts” of the applied sciences with the “the unpredictable arts” of the experimental sciences).

³²¹ See *id.* at 155–56 (arguing for a higher enablement requirement and thus narrower patents in unpredictable fields).

³²² I concede that this is an imprecise statement because we can, of course, imagine a truly revolutionary table that would require huge investments to design.

sis must take place would encourage litigants and judges to consider relevant economic information instead of making seemingly arbitrary decisions based on contradictory rules of textual interpretation or some illusory doctrine that depicts patents as covering a mythical unitary invention.

CONCLUSION

The “invention” is the fundamental concept of patent law, but it actually comprises two distinct concepts. On the one hand, the “invention” refers to an embodiment created by the patentee—a new, useful, and nonobvious embodiment is required for patentability. On the other hand, the “invention” refers to an idea that exists within the embodiment (and the patent monopoly extends to the full scope of that idea) even when embodied in other machines or processes.

The duality in the concept of invention requires extracting an idea from an embodiment when defining patent scope. Because each embodiment contains many ideas, there is no inherently correct level of abstraction at which to define the idea that should be covered by the patent. Thus, nearly every patent case involves a tug-of-war between a patentee’s claim to a higher level of abstraction, which promotes pioneer incentives, and the accused product’s claim to limit the patentee to the specific embodiment that he created, which reduces the monopoly cost of a patent. Because the specific embodiment is considered to be the invention as much as the claimed idea, this tug-of-war has no intuitive resolution. Instead, what has developed is contradictory doctrine that simultaneously requires the invention to be defined as the specification embodiment and absolutely forbids such importation of limitations from the specification.

Once we understand that every invention can be characterized as multiple ideas on many levels of abstraction, it becomes clear that a selection among them must be made. The levels of abstraction problem is inherent to patent law; the only issue is the manner in which the level of abstraction should be selected. Selection can be done either by the transparent balancing of competing interests or by the invocation of absolutist yet contradictory rules that yield no coherent principle. Of course, one final option is rigidly enforcing only one absolutist rule, but such a course would create unacceptable consequences. Rather, the best way to achieve accuracy and predictability in selecting a level of abstraction for patent scope is to make the process more transparent, increase the amount of available information, and strive to grant the degree of scope that achieves balance between incentive benefits and monopoly costs. Although the limitations of administrative cost mean that perfection in economic balancing cannot be achieved, greater transparency in striving toward a generally shared normative goal will yield greater predictability and substantively more desirable results than the current regime of pretending to abide by a system of self-contradictory rules.