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Fixing Patent Boundaries

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FIXING PATENT BOUNDARIES

Tun-Jen Chiang*

The claims of a patent are its boundaries, defining the scope of exclusion. This boundary function of claims is undermined by the fact that claims can be changed throughout the life of the patent, thereby moving the patent boundary. A boundary that can be moved at-will is one that the public cannot rely upon.

This Article explores the problems of malleable patent boundaries. If a claim can be amended to permit a patentee to capture something he did not foresee when filing the patent application, the amendment confers an unexpected windfall that did not contribute to incentives to invent before filing. If a claim is amended so that a patentee can capture something he did foresee but mistakenly failed to claim initially, the amendment allows the patentee to shift the loss of his own mistake to third parties. Either way, the amendment is inefficient.

This Article proposes that patent boundaries should be fixed upon patent issuance, and postissuance claim amendment disallowed. Because claims before issuance do not create public reliance, preissuance amendment should be retained. Nonetheless, the possibility of inefficient windfalls requires that preissuance amendment not be given retroactive priority in order to limit the ability to capture later developments.

TABLE OF CONTENTS

INTRODUCTION	524
I. THE PATENT CLAIM AS A BOUNDARY.....	527
A. <i>The Basics of Patent Claims</i>	527
B. <i>Constantly Shifting Patent Boundaries</i>	531
1. <i>Preissuance Amendment</i>	531
2. <i>Postissuance Amendment</i>	531
C. <i>Limits on Claims and the True Patent Boundary</i>	534
II. THE ECONOMICS OF CHANGING CLAIMS.....	539
A. <i>The Functions of Written Claims</i>	539
1. <i>A History of Claiming</i>	539
2. <i>The Notice Function</i>	541

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3. <i>The Definitional Function</i>	542
B. <i>The Definition Function and Patentee Incentives</i>	543
1. <i>Unequal Discounting and Patent Incentives Versus Cost</i>	545
2. <i>The Problem as Applied to Narrowing Amendments</i>	549
C. <i>Risk of Drafting Mistakes and Efficient Allocation</i>	551
1. <i>Avoidable Mistakes</i>	554
2. <i>Unavoidable Mistakes</i>	557
3. <i>Harmless Mistakes</i>	559
III. <i>SOME POLICY PROPOSALS</i>	560
A. <i>Preissuance Amendment Without Retroactive Priority Against Third-Party Insights</i>	561
B. <i>End Postissuance Claim Amendments</i>	562
IV. <i>CONSIDERING OBJECTIONS</i>	564
A. <i>The Sky Has Not Fallen</i>	564
B. <i>Maintaining Patentee Incentives</i>	566
C. <i>The Efficiencies of Delayed Adjudication</i>	567
D. <i>Less Drastic Alternatives</i>	568
1. <i>Prior User Rights</i>	568
2. <i>Intervening Rights</i>	570
3. <i>Limiting the Number of Continuations</i>	571
E. <i>Perverse Incentives and Patentee Adaptations</i>	572
1. <i>Vague Claims as Substitutes for Changeable Claims</i>	572
2. <i>Delayed Initial Filing as an Alternative to Amendment</i>	574
CONCLUSION.....	575

INTRODUCTION

Ask any patent lawyer what the most important part of a patent is, and the answer will invariably be “the claims.”¹ Claims are supposed to act as a patent’s boundaries, defining the patentee’s monopoly.² As a boundary, the claim should “inform the public during the life of the patent of the limits of the monopoly asserted, so that it may be known which features may be safely used or manufactured without a license and which may not.”³

1. See 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. CIN. L. REV. 7, 16 (1997) (“[T]he entirety of patent law centers around [the claims].”); Mark A. Lemley, *The Changing Meaning of Patent Claim Terms*, 104 MICH. L. REV. 101, 101 (2005) (“The claims of a patent are central to virtually every aspect of patent law.”).

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

3. *Permutit Co. v. Graver Corp.*, 284 U.S. 52, 60 (1931).

The normal story of patent law's boundary problems is that claim language is too vague.⁴ My goal in this Article is to discuss another—much more problematic—reason that claims fail to act as meaningful patent boundaries. Simply put, claims can be *explicitly changed* throughout the patent's lifetime, thereby moving the patent boundary. A redrawn boundary is much worse than a vague boundary. A fence that is vague and has gaps is not ideal for telling people where not to trespass, but is better than no fence at all; a fence that will be redrawn after the fact is entirely useless. The literature on clarifying claim language thus misses much of the problem: having crystal clear claim language will not provide a patent boundary if that clear language can be changed by the patentee whenever he wants.

Imagine a real property system where your neighbor is permitted to move his fence to encompass your new house. Moreover, he then sues you for trespassing and evicts you from the house. A real property system with such constantly moving fences would quickly break down, as people move fences in self-serving ways, litigate evictions, and stop building houses.

In comparison, a patentee is permitted to change his claims throughout the life of the patent, generally at-will with few substantive limits. The amended claim then retroacts upon competitors, forcing them to stop manufacturing, akin to evicting them from their factories. Similar to the prediction in real property, this lack of stable boundaries causes constant attempts to amend claims in self-serving ways, has sparked an explosion in patent litigation,⁵ and acts as a deterrent to productive investment in manufacturing, research, and innovation.⁶ A particularly successful example was Jerome Lemelson, who perfected the technique of filing vague patent applications that were kept secret until a mature industry developed a similar idea, and then extracted high tolls from that industry.⁷ Lemelson extracted billions of dollars from various industries.⁸ Other historical examples abound.⁹

4. See, e.g., Gretchen Ann Bender, *Uncertainty and Unpredictability in Patent Litigation: The Time is Ripe for a Consistent Claim Construction Methodology*, 8 J. INTELL. PROP. L. 175, 209–10 (2001); Joseph Scott Miller, *Enhancing Patent Disclosure for Faithful Claim Construction*, 9 LEWIS & CLARK L. REV. 177, 206 (2005); see also Dan L. Burk & Mark A. Lemley, *Quantum Patent Mechanics*, 9 LEWIS & CLARK L. REV. 29, 50–52 (2005) (arguing that there is no right answer because claim language exists on multiple levels of abstraction).

5. See Joseph P. Cook, *On Understanding the Increase in U.S. Patent Litigation*, 9 AM. L. & ECON. REV. 48, 48–50, 49 fig.1 (2007) (showing large increase in litigation and discussing possible reasons).

6. JAMES BESSEN & MICHAEL J. MEURER, *PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK* 130–44 (2008) (showing that in most industries litigation costs induced by the patent system exceed the research and development generated).

7. Patricia Montalvo, Comment, *How Will the New Twenty-Year Patent Term Affect You? A Look at the TRIPs Agreement and the Adoption of a Twenty-Year Patent Term*, 12 SANTA CLARA COMPUTER & HIGH TECH. L.J. 139, 157 (1996).

8. See Benjamin K. Sovacool, *Placing a Glove on the Invisible Hand: How Intellectual Property Rights May Impede Innovation in Energy Research and Development*, 18 ALB. L.J. SCI. & TECH. 381, 416 (2008).

9. Cf. ROBERT PATRICK MERGES & JOHN FITZGERALD DUFFY, *PATENT LAW AND POLICY: CASES AND MATERIALS* 612–15 (4th ed. 2007) (the case of George Seldon).

The fact that patent boundaries can be moved, at any time and within broad substantive limits, is one of the oddest and most problematic features of the patent system. Such *ex post* claiming is commonly defended on two grounds: (1) flexibility in defining the patented invention is necessary to allow patentees to benefit from later developments, unforeseen at the time of initial claim drafting;¹⁰ and (2) flexibility is necessary to permit the cure of any inadvertent mistakes by the patentee when drawing up the patent boundaries.¹¹ Neither is a compelling defense.

First, permitting patentees to change claims in order to capture unforeseen developments is, by definition, to confer a windfall upon them after the fact.¹² The ability to capture such windfalls contributes very little to the patentee's incentive when he is investing in research and development, since the windfall is *unforeseen* at that time. Conferring unforeseen windfalls upon patentees therefore creates monopoly cost without corresponding gains in incentives to invent or disclose. This contradicts the basic purpose of the patent system.

Second, the ability to amend claims allows patentees to cure any mistakes they make in drafting them. But this happens by shifting the cost of the mistake to competitors, by making these competitors pay royalties based on the amended claim. Patentees thus profiting from their own mistakes have no incentive to avoid them, and indeed have a perverse incentive to deliberately commit such mistakes. Because patentees are the least-cost avoider of claim-drafting mistakes, this shifting of loss is inefficient.

I propose in this Article that issued patents should not be amended. This fixes the boundary of a patent upon its issuance, permitting claims to create a binding and meaningful boundary. Before the issuance of a patent, amending claims to fix mistakes is useful, since before issuance such mistakes are harmless. To prevent inefficient windfalls, however, even preissuance amendment should not be permitted to capture later developments. This can be accomplished by denying amended claims retroactive priority against third-party activities.

Part I describes the basic doctrine of patent claims and procedures for changing them. Part II analyzes the functions of written claims and why claim amendment undermines these functions. Part III proposes several reforms, namely to end postissuance claim amendment and to deny retroactive

10. Stephen T. Schreiner & Patrick A. Doody, *Patent Continuation Applications: How the PTO's Proposed New Rules Undermine an Important Part of the U.S. Patent System with Hundreds of Years of History*, 88 J. PAT. & TRADEMARK OFF. SOC'Y 556, 557 (2006) (arguing that later amendments are necessary because many patentees "have no idea" which of their multiple inventions in an application will be successful).

11. *Grant v. Raymond*, 31 U.S. (6 Pet.) 218, 242 (1832) (stating that the inventor should not be penalized for "an inadvertent or innocent mistake"); Pavan K. Agarwal, *Patenting In Line with the Federal Circuit*, 12 FED. CIR. B.J. 395, 423 (2003) ("[C]ontinuation applications permit the patentee to *undo* mistakes (at least considered as such in hindsight) . . .").

12. See Gideon Parchomovsky et al., *Of Equal Wrongs and Half Rights*, 82 N.Y.U. L. REV. 738, 756–57 (2007) (defining windfalls as unforeseeable gains).

priority to preissuance amendments. Part IV considers some objections and alternatives to my proposals. A brief conclusion follows.

I. THE PATENT CLAIM AS A BOUNDARY

A. *The Basics of Patent Claims*

The process of obtaining a patent begins with filing an application in the United States Patent and Trademark Office (“PTO”). This application contains several things, but the two most important are the specification and the original claims.¹³ The specification is a detailed disclosure of the invention. For example, a specification describing a table will describe what it looks like (is it square or round); what it is made of (wood or plastic); how to make it (using nails or screws); and what it is used for (dining tables or reading desks). By contrast, the original claims—an application usually has several—are each a single sentence describing the invention in more general terms. For example, a claim over a table might read, “An apparatus comprising a flat surface and four legs.”

Each claim is then scrutinized by a PTO examiner to see if the invention claimed meets the patentability criteria of novelty, usefulness, and nonobviousness; as well as whether the claim corresponds to something disclosed by the specification.¹⁴ If the patent examiner finds the claims satisfy the statutory criteria, the patent is issued with the specification and the approved claims.¹⁵

Once issued, the claims are supposed to define the scope of infringement.¹⁶ With minor exceptions,¹⁷ the rule of patent law is that anything that is literally described by a claim, infringes; and that which is not literally described by a claim does not infringe.¹⁸ Because patent claims define infringement, they are generally regarded as the boundary of a patent,¹⁹ much as the boundaries of real property define trespass and the right of exclusion. Thus, it is commonly said in patent law that “the name of the game is the claim.”²⁰

13. Section 111 of Title 35 of the U.S. Code specifies the required contents of a patent application. 35 U.S.C. § 111 (2006).

14. For a detailed discussion of these patentability criteria, see *infra* Section I.C.

15. 35 U.S.C. §§ 151–154 (2006).

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

17. The primary exception is the doctrine of equivalents, which holds that an “insubstantial difference” between a claimed element and a feature of the accused product may not defeat infringement. See *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 29 (1997). This element-by-element comparison requires the doctrine of equivalents to operate within the strictures of the claim itself, retaining some boundary-defining role for claims even in this context.

18. *Markman*, 517 U.S. at 374.

19. See, e.g., *In re Vogel*, 422 F.2d 438, 442 (C.C.P.A. 1970).

20. *In re Hiniker Co.*, 150 F.3d 1362, 1369 (Fed. Cir. 1998) (quoting Giles S. Rich, *Extent of Protection and Interpretation of Claims—American Perspectives*, 21 INT’L REV. INDUS. PROP. & COPYRIGHT L. 497, 499 (1990)).

A simple example demonstrates how claims work. A claim over a table might be written as: "An apparatus comprising a flat surface and four legs." Written this way, a triangular table with three legs would not be covered, while a four-legged table would. Moreover, it does not matter for infringement that an infringing product has additional features, as long as it had the minimum feature set specified. For example, a table with a set of drawers attached or wheels at the bottom still infringes, as long as it also had a flat top and four legs.

The purpose of the written claim is that it (theoretically) provides a clear and reasonably simple way to determine infringement. Each claim is supposed to be a bright-line rule that makes determining the answer to whether a product is covered by the patent reasonably *easy* and *certain*. Historically, in the absence of claims, judges and juries were forced to determine the inventive aspect of a patent by looking to the entire patent specification and the whole body of prior art, a task that was extremely burdensome.²¹ And without claims, the jury determined infringement using a vague rule such as whether the two inventions are "similar," leading to uncertainty.²² By providing the requisite simplicity and certainty, patent claims are supposed to "inform the public during the life of the patent of the limits of the monopoly asserted, so that it may be known which features may be safely used or manufactured without a license and which may not."²³

As described in a voluminous literature, patent claims often fail to provide the certainty desired in boundaries. A frequently cited statistic is that the Federal Circuit (which has exclusive jurisdiction in patent appeals) reverses in 30 to 40 percent of cases involving claim interpretation.²⁴ The literature often attributes the causes of claim vagueness to reasons ranging from the inherent imperfections of language,²⁵ to the fact that patents sit on the cutting edge of new technology where a technical vocabulary is still developing,²⁶ to the lack of incentives within the patent system for patentees to

21. See *Keystone Bridge Co. v. Phoenix Iron Co.*, 95 U.S. 274, 278 (1877) (describing the statutory addition of a claims requirement as "relieving 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").

22. See *infra* Section II.A.1.

23. *Permutit Co. v. Graver Corp.*, 284 U.S. 52, 60 (1931).

24. See, e.g., 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). Notably, however, the Federal Circuit displays remarkable internal agreement on claim construction matters. Disagreement on claim construction between Federal Circuit judges is recorded in less than 5% of cases where the issue is raised. *Id.* at 243-44 (finding the figure to be approximately 3%); R. Polk Wagner & Lee Petherbridge, *Is the Federal Circuit Succeeding? An Empirical Assessment of Judicial Performance*, 152 U. PA. L. REV. 1105, 1155 (2004) (finding slightly less than 5%); cf. Jeffrey A. Lefstin, *The Measure of the Doubt: Dissent, Indeterminacy, and Interpretation at the Federal Circuit*, 58 HASTINGS L.J. 1025, 1072 & t.11 (2007) (finding 8.3%, but showing that this rate corresponds with dissent rates on other issues before the Federal Circuit).

25. DONALD S. CHISUM & MICHAEL A. JACOBS, UNDERSTANDING INTELLECTUAL PROPERTY LAW § 2F, at 2-233 to -234 (1992).

26. See Matthew Sag & Kurt Rohde, *Patent Reform and Differential Impact*, 8 MINN. J. L. SCI. & TECH. 1, 33 (2007).

write clear language.²⁷ A myriad of proposals to reform claim construction then follows.²⁸

Vague claim language is a common problem that I do not wish to minimize. The difficulty of drafting clear claim language can be illustrated by the simple example above. What is a “flat surface”? Does it have to be absolutely flat or are minor variations allowed? Does a cushioned surface count, so that a chair would infringe the patent (surely a counterintuitive result)? Even for simple technology, the translation of the intellectual idea behind the table into words is difficult.²⁹ The complications of more sophisticated technology make the task even harder for many patents. Moreover, vagueness undermines the boundary function of claims, since a vague claim is neither easy to apply nor provides certainty in the result.

But the traditional solution to the problem of crafting clear claim language early has been to give the patentees a second chance to get it right.³⁰ Indeed, patentees receive not only a second chance, but a third chance and a fourth chance—*unlimited* chances throughout the life of the patent to redraft their claims.³¹ Thus, if it emerges a year after the patent issues that it is unclear whether the claim covers chairs with four legs, the patentee can seek to reissue his patent to make clear that, yes, he does claim chairs as part of his patent on tables, since chairs stand up in the same way as a table.

The use of *ex post* claim amendment to clarify vagaries in claim language is a cure that is worse than the disease. It is far better to stick with the vague claim drafted early, than the redrafted claim that emerges *ex post*. Because while the *ex post* claim will remove the linguistic ambiguity that surfaces, it invariably does so in the most patentee-friendly manner possible, since it is the patentee who drafts the new claim in hindsight. This frustrates the public notice function of claims because, although the claim is supposed to “inform the public *during the life of the patent* of the limits of the monopoly asserted,”³² it does the public very little good to find out that chairs, cars, and all manner of other things sitting on four points are covered by the patent one year *after* the patent issues. This problem is especially acute

27. Michael Risch, *The Failure of Public Notice in Patent Prosecution*, 21 HARV. J.L. & TECH. 179, 188–89 (2007).

28. See, e.g., Timothy R. Holbrook, *Substantive versus Process-Based Formalism in Claim Construction*, 9 LEWIS & CLARK L. REV. 123 (2005); Miller, *supra* note 4; Craig Allen Nard, *A Theory of Claim Interpretation*, 14 HARV. J.L. & TECH. 1 (2000); cf. Jeffrey A. Lefstin, *Claim Construction, Appeal, and the Predictability of Interpretative Regimes*, 61 U. MIAMI L. REV. 1033, 1041–43 (2007) (arguing against the common proposal to give greater deference to district judges).

29. See Doug Lichtman, *Substitutes for the Doctrine of Equivalents: A Response to Meurer and Nard*, 93 GEO. L.J. 2013, 2016 (2005) (giving an example with claims over a pencil).

30. *In re Altenpohl*, 500 F.2d 1151, 1156–57 (C.C.P.A. 1974) (“[A] patentee should be allowed to correct an error or ambiguity in a claim [through reissue.]”); see William R. Hubbard, *Efficient Definition and Communication of Patent Rights: The Importance of Ex Post Delineation*, 25 SANTA CLARA COMPUTER & HIGH TECH. L.J. 327, 368–71 (2009) (arguing for greater use of *ex post* clarification mechanisms).

31. Mark A. Lemley & Kimberly A. Moore, *Ending Abuse of Patent Continuations*, 84 B.U. L. REV. 63, 64 (2004).

32. *Permutit Co. v. Graver Corp.*, 284 U.S. 52, 60 (1931) (emphasis added).

when (as is likely) the impetus for patentee clarification is that a competitor has already spent millions of dollars building a factory for making chairs in the belief that they did not infringe. The problem is magnified in that the patentee is permitted not only to clarify his claims, but to completely change them. A claim that expressly covered only tables with “four legs” can properly be changed later to cover something with three legs.

The effect of amending a claim is partially retroactive. While an amended claim cannot cover devices that were sold prior to the amendment, it can have retroactive effect against long-term investments. For example, a patentee changes his patent on four-legged tables to cover three-legged tables. This patentee cannot obtain royalties on the three-legged tables sold before the amendment receives patent office approval. However, the competitor who built a factory for manufacturing three-legged tables probably intended the factory to last for twenty years or more. The patentee can force his competitor to shut down the entire factory. This “hold-up” leverage allows a claim amendment to have significant retroactive bite.

The fact that claims can be so easily changed, and with retroactive effect, calls into question their function as property boundaries. Property rights generally have a degree of *stability* to facilitate investment by their owners and others.³³ A property whose boundaries are constantly shifting is a bad vehicle for investment—both for the property owner and any potential trespassers.³⁴ Imagine, for example, that the fence on your land was constantly moving in random directions. This would make it very risky for you to improve your land, such as by building a house on it, because tomorrow the fence might move inwards and take away your ownership. On the other hand, your neighbors cannot improve their land either, because your fence might move outwards and strip them of their rights. To top it off, nobody would want to buy your land precisely because its future value is so hard to determine.³⁵ Because patent claims are easily changed, they serve as poor boundaries, undermining the patent system for everyone.

In this way, claim changing is a much worse problem for boundary definition than simply vague claims, creating a cure worse than the disease. A vague claim is a fuzzy boundary, like a fence with gaps that leaves a few square feet of land ownership unclear. An amendable claim is a useless boundary, akin to a fence that is crystal clear today but which might be moved tomorrow, effectively rendering ownership of the entire tract unclear.

33. Carol M. Rose, *Crystals and Mud in Property Law*, 40 STAN. L. REV. 577, 591 (1988) (“Hard-edged rules define assets and their ownership in such a way that what is bought stays bought . . .”).

34. See generally RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* § 3.1 (7th ed. 2007).

35. Cf. Clifford G. Holderness, *A Legal Foundation for Exchange*, 14 J. LEGAL STUD. 321, 337–39 (1985) (explaining that property covenants must be certain to be upheld in the future to establish a foundation for exchange).

B. Constantly Shifting Patent Boundaries

A process to amend claims can be implemented through a variety of procedural devices, depending on the time at which amendment is sought. This section provides a brief summary of these mechanisms.

1. Preissuance Amendment

Under the statute, the original claims should reflect what the patentee “regards as his invention.”³⁶ The patentee may, however, change his mind about what his invention is. The patentee who initially wrote a claim for four-legged tables may decide that he really invented all types of tables, regardless of how many legs they have. During the period between the *filing* of the patent application and its eventual *issuance* as a patent, the patentee has broad freedom to amend claims, with no explanation necessary.³⁷ This period between filing and issuance, during which the PTO considers whether the application should be granted as a patent, averages about thirty-two months.³⁸

There is no legal limit to the number of original claims and amendments that can be filed.³⁹ One important practical limitation on both, however, is cost. The PTO charges fees for both filing claims and repeatedly amending them (the first amendment is free). If one must file multiple claims, however, filing a large number of claims through serial amendment is cheaper than filing them all as original claims.⁴⁰ The incentive to file more claims, of course, comes from the fact that every claim allows the invention to be described in a slightly different way. Thus having multiple claims allows the erecting of overlapping fences to the invention. Preissuance amendments are therefore a ubiquitous part of the current system.

2. Postissuance Amendment

Once a patent is issued, it is somewhat more procedurally complicated to change the claims. The formal language of an issued claim can be changed only with a reissuance or reexamination, both of which carry conditions. All of the practical benefits of preissuance amendment can be secured, however, with a continuation application, with none of the

36. 35 U.S.C. § 112 (2006).

37. See 37 C.F.R. § 1.121 (2008). If evidence is obtained that the patentee is being manifestly dishonest, and does not regard the new claim as being part of his invention, the new claim is invalid. *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1349 (Fed. Cir. 2002). This doctrine of “dishonest claiming” is virtually never invoked, since the standard of proof is extremely high. *Id.* (noting that “Allen admits” the claim does not reflect its invention).

38. U.S. PATENT & TRADEMARK OFFICE, PERFORMANCE AND ACCOUNTABILITY REPORT FISCAL YEAR 2008, at 16 (2008) [hereinafter PTO ANNUAL REPORT] (average pendency of 32.2 months).

39. MARTIN J. ADELMAN ET AL., CASES AND MATERIALS ON PATENT LAW 533 (2d ed. 2003).

40. See 37 C.F.R. § 1.16 (2008) (schedule of fees).

downsides, such as intervening rights. A brief summary of these vehicles is helpful.

A *reissuance* allows the holder of an issued patent to go back to the PTO and modify the claims, if there is a mistake or defect in the patent.⁴¹ “Mistake” and “defect” in this context are construed extremely generously. A patentee that obtained a patent claiming “a table with four legs” may go back and seek a patent on “a table with at least three legs”—there is no need to show that he made a typographical error or that he unconsciously put the word “four” into the claim.⁴² In fact, the patentee does not need to explain what the mistake or defect is at all.⁴³ The only thing that is not considered to be a mistake is a prior intentional disavowal: that is, the PTO specifically asked “did you invent a table with three legs,” and the patentee previously answered “no” (either expressly or by clear implication), and then later tries to claim a table with three legs.⁴⁴

A *reexamination* is similar to a reissuance in changing the claims, but is initiated differently. A reexamination is typically initiated by someone other than the patentee, because the third party discovers new prior art that raises a substantial question as to the validity of the patent.⁴⁵ In the example of a patent covering a table, someone may discover an old book describing a table before the patentee invented it, thereby potentially showing the patent is invalid. Once a reexamination is initiated, claim amendments may be made in the same way as in reissuance proceedings and preissuance amendment.⁴⁶

Patentees do not like to use reexamination and reissuance to amend claims, for two reasons. First, patentees are limited in their ability to broaden claims during these procedures, that is, changing the claims to cover *more* things. Broadening on reissuance is permitted only if requested within two years of the initial patent issuing,⁴⁷ and the patentee may not broaden claims at all in reexamination proceedings.⁴⁸ Second, reissuance and reexamination are subject to “intervening rights.” As with other methods of amendment, intervening rights exempt all the products (e.g., the individual three-legged tables) made or sold prior to the completion of a reissuance or

41. 35 U.S.C. § 251 (2006).

42. See *In re Hounsfield*, 699 F.2d 1320 (Fed. Cir. 1983) (finding no prior “intent to claim” requirement).

43. See *Shockley v. Arcan, Inc.*, 248 F.3d 1349, 1358 (Fed. Cir. 2001) (noting PTO rule change to remove the explanation requirement).

44. See *Mentor Corp. v. Coloplast, Inc.*, 998 F.2d 992, 995 (Fed. Cir. 1993) (stating the “re-capture” rule).

45. 35 U.S.C. §§ 301–03 (2006). A patentee can also request reexamination of his own patent, but this is relatively rare. In 2008, there were 680 *ex parte* reexamination requests filed. Of these, 593 were filed by third parties and 87 were filed by the patent owner. PTO ANNUAL REPORT, *supra* note 38, at 127.

46. 35 U.S.C. § 305 (2006) (“[R]eexamination will be conducted according to the procedures established for initial examination . . .”).

47. 35 U.S.C. § 251 (2006).

48. 35 U.S.C. § 305.

reexamination proceeding from damages and injunction.⁴⁹ Unique to intervening rights, however, is that courts have discretion to protect competitors who made long-term investments, such as a factory, thereby largely eliminating the retroactive effect of amendment.⁵⁰ This discretion takes shape in judicial permission for competitors to continue using a factory or machine, without having to pay a royalty.⁵¹ The possibility of such protection against retroactive effect means that patentees have less to gain from reissuance and reexamination.

A far more appealing avenue for a patentee is to seek the changes through a continuation application.⁵² Continuation applications allow the patentee to do everything that he can achieve with a reissue application, but without the limit on claim broadening, and without intervening rights accruing to competitors.

A continuation application is essentially the filing of a second, identical, patent application at a later date. The first application is known as the “original” application and the second as its “continuation.” The continuation is treated for almost all purposes as if it were filed on the date of the original application.⁵³ Thus, the patentee might file the original application on a table on January 1, 2000, and he may file a continuation application on February 1, 2003. As long as the specifications of the two applications are identical and a notation is made that the 2003 application is a continuation, it will be treated as if it were filed on January 1, 2000.

This apparently simple device is incredibly useful to a patent applicant, because there is no limit to the number of continuation applications that can be filed,⁵⁴ and there is no limit to the claim changing that can occur through a string of continuations. Moreover, the filing of a continuation does not prevent the original application from issuing.⁵⁵ Thus, suppose that you file the original application in 2000, and file the first continuation in 2001 with

49. 35 U.S.C. § 252 (2006).

50. See *supra* text accompanying notes 32–35.

51. See *Sontag Chain Stores Co. v. Nat'l Nut Co.*, 310 U.S. 281, 294–95 (1940).

52. “Continuations” refer to both a family of procedural devices in the PTO and a specific member of that family. A “continuation application” under 35 U.S.C. § 120 and 37 C.F.R. § 1.78 refers to a later application that claims priority to the originally filed application. A “divisional” application under 35 U.S.C. § 121 has the same effect but with claims directed to an ostensibly separate invention. A “request for continued examination” under 35 U.S.C. § 132 continues prosecution of the same application, effectively as if a continuation is filed but without a separate application. These are often collectively referred to as “continuations” because “their policy effects are indistinguishable.” Lemley & Moore, *supra* note 31, at 64 n.2.

53. 35 U.S.C. § 120 (2006) (“An application for patent for an invention disclosed . . . in an application previously filed in the United States . . . shall have the same effect, as to such invention, as though filed on the date of the prior application . . .”).

54. *Tafas v. Doll*, 559 F.3d 1345, 1367, *vacated pending reh'g en banc*, 91 U.S.P.Q.2d 1153 (Fed. Cir. 2009).

55. The continuation must be filed while another application is pending. Thus, the first continuation must be filed while the original application is pending; the second continuation must be filed while the first continuation is pending; and so on. This creates a “string” of continuations that persists through the life of the patent, which is twenty years from the filing of the original application. 35 U.S.C. § 154 (2006).

twenty new claims as amendments. You can then file a second continuation in 2002 with another twenty claim amendments, and a third in 2003, and so on *ad infinitum*. Because an applicant can keep filing new continuations and new claims after old claims get rejected by the PTO, “it is impossible . . . to ever finally reject a patent application.”⁵⁶

The string of continuations leads to unlimited claim changing even after the first patent (or multiple patents) has issued. Say that the original application, filed in 2000, claims “a red wooden table with four legs,” and a patent is issued in 2001. This is quite a narrow claim and a competitor can easily avoid infringing the original patent by changing the color to blue. Seeing this, the patentee can use a continuation filed in 2002 to pursue a different claim: “A table with three or more legs, of any color.” The competitor who has just finished his factory for building blue tables suddenly becomes an infringer when the 2002 continuation issues as a patent. Ostensibly, the 2002 continuation will issue as a separate patent (and thus it does not literally “change” the original patent), but its practical effect is to supersede the original patent, since it has a broader claim. This practical effect arises because anything infringing the narrow claim will necessarily infringe the broader claim (all red tables are necessarily tables), and infringing one claim is the same legally as infringing a dozen.

The fact that the later patent (issued from a continuation) effectively supersedes the original patent means that a continuation can do everything that a reissuance or reexamination can do, and more. First, there is no limit on broadening claims through a continuation—it can occur at any time and is not limited to two years.⁵⁷ Second, there are no intervening rights for a continuation.⁵⁸ The competitor who builds a factory to build blue tables must shut down the entire factory. What this means in practice is that the competitor will pay the patent owner a hefty royalty that reflects not the cost of any accused products made by the factory, but the value of the factory itself.⁵⁹ It is therefore not surprising that continuations are the method of choice for amending claims postissuance.⁶⁰

C. Limits on Claims and the True Patent Boundary

The procedures of the PTO effectively permit an unlimited quantity of amendments. This does not mean, of course, that patentees may amend to claim anything under the sun. An amended claim must satisfy the same cri-

56. Lemley & Moore, *supra* note 31, at 64.

57. See *Johnson & Johnston Assocs. Inc. v. R.E. Serv. Co.*, 285 F.3d 1046, 1055 (Fed. Cir. 2002) (en banc) (contrasting reissuance and continuations by the two-year limitation).

58. See *Tex. Instruments Inc. v. USITC*, 871 F.2d 1054, 1065 (Fed. Cir. 1989) (endorsing exclusion of competitor product by a continuation patent); Lemley & Moore, *supra* note 31, at 109 (arguing for creation of intervening rights for continuations that broaden previous claims).

59. See Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 1995–98 (2007).

60. Lemley & Moore, *supra* note 31, at 76–78 (describing use of continuations to change claims).

teria of patentability as an original claim. What it does mean, however, is that these criteria of patentability set the real boundaries of a patent right. Any other limits of patent law (such as claim language) are illusory, since a patentee can always circumvent them later through amendment. This turns an important patent-law principle—that claim language defines the patentee's right to exclude—on its head.

For most patents, the requirements of patentability boil down to having the subject matter of the claim be an advance over what was previously in the public domain (known in patent parlance as the “prior art”), and also be properly disclosed in the specification.⁶¹ As the Federal Circuit has concisely stated, a patentee “is entitled to claims as broad as the prior art *and his disclosure* will allow.”⁶² These limits exist in patent doctrine as the nonobviousness, enablement, and written description requirements.

The *novelty and nonobviousness* requirements pertain to the public domain (known in patent parlance as “the prior art”). These doctrines prevent the patentee from removing existing knowledge from the public domain.⁶³ A patentee may not claim what is already known (novelty),⁶⁴ or such an obvious variant of prior knowledge that it was effectively known (nonobviousness).⁶⁵ For example, if we already have metal doorknobs, it would require very little effort to construct clay doorknobs using the same technique, and thus neither are patentable.⁶⁶

The *enablement* requirement in theory ties the scope of patent claims to the disclosure of the patent specification. A patentee that invents a barely working incandescent lamp using carbonized paper (a horrible material for lighting) should not be able to claim a monopoly on every form of artificial lighting that might ever be developed.⁶⁷ Instead, the patentee is required to enable a person of ordinary skill to make and use “[t]he full scope of the claimed invention.”⁶⁸ The inventor may only claim what his disclosure allows other people to make and use: if he only discloses a badly working lamp using carbonized paper, then he can only claim badly working lamps using carbonized paper.⁶⁹

Similar to enablement, the *written description* requirement requires the patentee to have “possession” of the claimed invention at the time of filing,

61. Other limitations on claims include that the claim must be directed to patentable subject matter, which is broadly formulated as “anything under the sun that is made by man.” *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980). The claimed invention must also be useful, but the test is very lax. See *Juicy Whip, Inc. v. Orange Bang, Inc.*, 185 F.3d 1364 (Fed. Cir. 1999).

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

63. *Graham v. John Deere Co.*, 383 U.S. 1, 6 (1966).

64. 35 U.S.C. § 102 (2006).

65. 35 U.S.C. § 103 (2006).

66. *Hotchkiss v. Greenwood*, 52 U.S. 248 (1851).

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

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

69. *Incandescent Lamp*, 159 U.S. at 476.

as demonstrated by the disclosure of the specification.⁷⁰ This serves an identical purpose to the enablement requirement⁷¹: to prevent undue expansion of claimed monopoly scope beyond the inventor's contribution contained in the specification disclosure.⁷² Unsurprisingly, the "two requirements usually rise and fall together."⁷³

Given enough chances, a patentee can always reach (eventually) the maximum bounds permitted by the criteria of patentability. Thus, the patentee effectively has the ability to exclude anything that he "possessed" through the specification and that was not rendered obvious by the prior art:

Long-Run Coverage = Specification – Prior Art

These long-term limits on patentee rights matter far more than the literal-claim language today. A competitor who is about to invest millions of dollars building a factory making three-legged tables for twenty years cares little about whether he may sell those tables today—he cares more about whether he will be able to sell those tables for the next twenty years. And the answer to that question depends not on whether the patent claim today covers three-legged tables, but on whether the claim can be changed to cover them later.

What this means is that the boundaries that matter are the specification disclosure and the prior art. The claim language, because it can be changed at will, is irrelevant in the longrun. Notably, the PTO is already forced to conduct searches based on the scope of possible amendment, treating this as the patent boundary.⁷⁴

70. *ICU Med., Inc. v. Alaris Med. Sys., Inc.*, 558 F.3d 1368, 1377 (Fed. Cir. 2009).

71. See *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); 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, 62–63 (2000) (arguing that no court "has ever articulated a persuasive rationale for distinguishing the written description requirement from the enablement requirement"); see also *Ariad Pharms., Inc. v. Eli Lilly & Co.*, No. 2008-1248, 2009 WL 2573004 (Fed. Cir. Aug. 21, 2009) (granting en banc rehearing to determine the continued vitality of the written description requirement).

72. *E.g.*, *Reiffin v. Microsoft Corp.*, 214 F.3d 1342, 1345 (Fed. Cir. 2000). Historically, the purposes and results of the two doctrines were different. Enablement policed initial claim scope, while written description policed only expansion of claim scope through later amendment. The difference was that an original claim was not subject to the written description requirement. *In re Koller*, 613 F.2d 819, 823 (C.C.P.A. 1980). The Federal Circuit discarded this distinction in *Regents of the University of California v. Eli Lilly & Co.*, 119 F.3d 1559 (Fed. Cir. 1997).

73. *LizardTech, Inc. v. Earth Res. Mapping, Inc.*, 424 F.3d 1336, 1345 (Fed. Cir. 2005).

74. U.S. PATENT & TRADEMARK OFFICE, MANUAL OF PATENT EXAMINING PROCEDURE § 904.03 (8th ed. rev. 2008) [hereinafter MPEP] ("It is normally not enough that references be selected to meet only the terms of the claims alone [T]he search should, insofar as possible, also cover all subject matter which the examiner reasonably anticipates might be incorporated into applicant's amendment.").

The fact that the prior art and the specification really define the patentee's rights is highly problematic. As mentioned earlier,⁷⁵ claims are supposed to provide simple and certain answers to the determination of whether something will be covered by the patent so that competitors may safely sell—and the public can safely buy—a product that is not covered. But determining whether a product is part of the prior art, or (in)adequately described by the specification, is neither easy nor certain.

The prior-art limitation is highly uncertain. First, it is difficult to determine the content of prior art because the universe of prior art is extraordinarily vast.⁷⁶ Second, the legal doctrines regarding the prior-art limitation are also inherently vague. The nonobviousness doctrine was famously described by Learned Hand as “as fugitive, impalpable, wayward, and vague a phantom as exists in the whole paraphernalia of legal concepts.”⁷⁷

If obviousness is the most nebulous concept in patent law, then enablement and written description is a close second. Taken literally, the rule that the patentee can only claim what his disclosure allows other people to make and use is relatively clear and easy to apply.⁷⁸ The complication comes from the fact that every claim of necessity covers more.⁷⁹ The Wright Brothers invented the airplane, but they couldn't make and use a modern jet fighter, because aluminum frames and jet engines were not available back then. William Shockley may have invented the transistor in 1947,⁸⁰ but he couldn't make a modern transistor used in computers, which are much smaller. If I invent a table in an era before plastic, and then plastic is developed, then do I get to claim a plastic table? If I do, then I obtain a monopoly over something that my specification did not allow other people to make and use at the time it was filed, or, in other words, something that I did not enable or invent.⁸¹ If I do not, then my patent is worthless, because the core idea (of a table) can be misappropriated the minute that a new material is discovered.⁸² Enablement and written description therefore contain two directly

75. See *supra* text accompanying note 23.

76. See, e.g., *In re Hall*, 781 F.2d 897, 900 (Fed. Cir. 1986) (finding that a single thesis in a university library is prior art); *In re Wyer*, 655 F.2d 221, 227 (C.C.P.A. 1981) (finding that a patent application kept only on microfilm in the Australian patent office is prior art).

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

78. Christopher A. Cotropia, “*After-Arising*” *Technologies and Tailoring Patent Scope*, 61 N.Y.U. ANN. SURV. AM. L. 151 (2005) (arguing that literal claims are limited to technology existing at the time of the application).

79. Jeffrey A. Lefstin, *The Formal Structure of Patent Law and the Limits of Enablement*, 23 BERKELEY TECH. L.J. 1141, 1168 (2008) (pointing out that “[a]ll claims are of infinite scope”).

80. See U.S. Patent No. 2,502,488 (filed Sept. 24, 1948) (issued April 4, 1950).

81. See Lemley, *supra* note 1, at 119–21 (arguing that literal-claim scope should be fixed on the date of filing). *But see* 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 (2008) (arguing that claim language can remain fixed while its meaning grows to encompass new embodiments).

82. See generally Kevin Emerson Collins, *Enabling After-Arising Technology*, 34 J. CORP. L. 1083 (2009) (discussing the enablement problems with after-arising technology).

contradictory lines of cases.⁸³ One line holds that every claimed embodiment must be disclosed by the specification,⁸⁴ an impossible requirement that renders every patent either invalid or completely worthless. The other line holds that a single working embodiment enables everything,⁸⁵ which places no limit whatsoever on patent scope. Because the cases are irreconcilable, parties who attempt to derive boundaries from the specification can have little sense of what the enablement and written description doctrines would permit a claim to reach. And that is after they wade through the complex and technical disclosure of the specification itself, which is also a cumbersome and expensive task.

The uncertainty problem can be highlighted by considering a claim written as follows:

I claim whatever is enabled and described by the specification, and that is not made obvious by the prior art.

This is a so-called “omnibus claim,” and has long been prohibited.⁸⁶ The reasons for this prohibition are obvious. Such an omnibus claim says nothing useful.⁸⁷ A patent with an omnibus claim is not different from a patent with no claims at all, or a claim saying “I claim what the law allows me to claim.”

At the same time, an omnibus claim has advantages. An omnibus claim renders all other claims unnecessary. It automatically self-adjusts to reach the patentee’s maximum possible scope, and no more. The discovery of new prior art will automatically shrink the claim (since it claims only that which is “not made obvious by the prior art”). Allowing omnibus claims thus would make patent examination and claim construction also unnecessary. The PTO need not consider whether the patent is new, because it only claims what is new, and if there is nothing new the patent would claim nothing. Courts need not construe vague claim language, since there is no claim language of any substance to construe.⁸⁸

The sum of the situation is that if the legal requirements of novelty, nonobviousness, enablement and written description themselves provided

83. See Bernard Chao, *Rethinking Enablement in the Predictable Arts: Fully Scoping the New Rule*, 2009 STAN. TECH. L. REV. 3 (discussing the split in Federal Circuit’s enablement doctrine).

84. *ICU Med., Inc. v. Alaris Med. Sys., Inc.*, 558 F.3d 1368, 1378 (Fed. Cir. 2009); *Auto. Techs. Int’l, Inc. v. BMW of N. Am., Inc.*, 501 F.3d 1274, 1285 (Fed. Cir. 2007); *Liebel-Flarsheim Co. v. Medrad, Inc.*, 481 F.3d 1371, 1380 (Fed. Cir. 2007).

85. *Invitrogen Corp. v. Clontech Labs., Inc.*, 429 F.3d 1052, 1071 (Fed. Cir. 2005) (finding one method of making invention enough to enable); *Spectra-Physics, Inc. v. Coherent, Inc.*, 827 F.2d 1524, 1533 (Fed. Cir. 1987) (“[A] broad claim can be enabled by disclosure of a single embodiment . . .”).

86. *Intermountain Research & Eng’g Co. v. Hercules Inc.*, 163 U.S.P.Q. (BNA) 390, 393 n.2 (C.D. Cal. 1969).

87. *Ex parte Fressola*, 27 U.S.P.Q.2d (BNA) 1608, 1612 (B.P.A.I. 1993).

88. See Dan L. Burk & Mark A. Lemley, *Fence Posts or Sign Posts? Rethinking Patent Claim Construction*, 157 U. PA. L. REV. 1743, 1746 (2009) (arguing for the abandonment of modern claiming).

the requisite certainty and predictability—if both patentee and accused infringer could know, at the time of patent filing, what a claim to “what the law entitles the patentee to claim” would really entail, then there would be nothing wrong with an omnibus claim. But precisely because the legally maximum scope of a patent is extremely costly and difficult to determine, so the written claim evolved as an alternative mechanism to determine the boundary. Unlimited claim changing *ex post*, however, allows the patentee to circumvent this mechanism and achieve omnibus claim scope through the back door. This is because the scope of the patentee’s ability to change is precisely whatever is enabled and described by the specification, and that is not made obvious by the prior art.⁸⁹

The irony of the situation is that current policy achieves the worst of all possible worlds. Written claims create benefits of notice and definition in boundaries, but require significant administrative and judicial resources to examine and construe.⁹⁰ Having no claims (or omnibus claims) would create significant uncertainty, but at least would save us the trouble of examining written claims, allowing us to shut down the PTO and eliminate claim construction disputes from the judicial docket. The present situation, however, requires us to spend all the resources of examining and construing written claims, but then discards all the notice and definition benefits when the patentees can change the claim whenever the result is unfavorable. The next Part discusses the function of written claims (and how *ex post* changing undermines these functions) in more detail.

II. THE ECONOMICS OF CHANGING CLAIMS

A. *The Functions of Written Claims*

1. *A History of Claiming*

In asking what functions the patent claim serves, it is helpful to consider the counterexample of a regime where there were no claims. Such an example is easily available, because historically patents did not have claims.⁹¹ Instead, patent infringement was determined by comparing the embodiment of the patentee’s invention—such as a physical four-legged table—with the accused product, using the criterion of whether the two were “substantially, in their principles and mode of operation, like the plaintiff’s.”⁹²

This vague test of “substantial similarity” was unhelpful to everyone. For patentees, it carried the risk that juries would be misled by the superficial

89. See *supra* note 62 and accompanying text.

90. See Elizabeth D. Laporte, *Managing the Runaway Patent Case*, ASS’N OF BUS. TRIAL LAWYERS REPORT, Jan. 2008, at 1, 6 (“Many judges and practitioners believe that the average patent case consumes at least ten times the judicial resources as the typical civil case.”).

91. 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).

92. *Odiome v. Winkley*, 18 F. Cas. 581, 582 (C.C.D. Mass. 1814).

differences between two devices.⁹³ Thus insubstantial changes may allow infringers to copy the core idea while avoiding infringement. For accused infringers, it carried the risk that patentees would be rewarded with noninnovative parts of a complex device, and it would be impossible to determine ahead of time what was being patented versus what was already known.⁹⁴

An example of these problems is *Evans v. Eaton*.⁹⁵ In *Evans*, the patent described a “Hopperboy” machine with some improvements.⁹⁶ Obviously, there were no claims.⁹⁷ The problem is that it was unclear whether the “invention” was the entire machine or some subpart.⁹⁸ The Court was troubled by the fact that it was difficult to separate the supposedly inventive “improvement” from the machine as a whole, since the entire machine was described by the specification, and the patent was thus “mixing up the new and old”:

[C]an the doctrine . . . be maintained, that no specification of an improvement is necessary in the patent; and that it is sufficient if it be made out and shown at the trial, or may be established by comparing the machine specified in the patent with former machines in use? . . . How can that be a sufficient specification of an improvement in a machine, which does not distinguish what the improvement is, nor state in what it consists, nor how far the invention extends? Which . . . , mixing up the new and old, [] does not in the slightest degree explain what is the nature or limit of the improvement which the party claims as his own? . . . [W]e are of opinion that [the patentee] ought to describe what his own improvement is, and to limit his patent to such improvement.⁹⁹

From *Evans* and similar cases, the requirement of explicit claims arose,¹⁰⁰ and was included in the Patent Act of 1836.¹⁰¹ Explicit claims allowed the invention (and the scope of the patent) to be determined with more ease and certainty, for patentees and their competitors alike. Moreover, claims provided a written record of what the patentee regarded as his invention at the time he filed the patent, and which the Court suggested should be

93. 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.

94. See Karl B. Lutz, *Evolution of Claims of U.S. Patents*, 20 J. PAT. OFF. SOC'Y 134, 138–40 (1938).

95. 20 U.S. (7 Wheat.) 356 (1822).

96. *Id.* at 427–28.

97. Oliver Evans's patent was issued in 1808, before the development of modern claims. See *Evans v. Eaton*, 16 U.S. (3 Wheat.) 454, 455 (1818). It did contain a sentence stating: “I claim the exclusive right to the principles, and to all the machines above specified, and for all the uses and purposes specified . . .” *Id.* at 515 (quoting Evans's “Hopperboy patent”).

98. *Evans*, 20 U.S. at 428.

99. *Id.* at 433–35.

100. Woodward, *supra* note 91, at 759.

101. Patent Act of 1836, ch. 357, § 6, 5 Stat. 117 (requiring that a patentee “particularly specify and point out the part, improvement, or combination, which he claims as his own invention or discovery”).

binding upon the patentee.¹⁰² These advantages of claims remain relevant today, but have been undercut by the availability of claim amendment.

2. The Notice Function

The primary function attributed to modern claims is the “notice” function. By this, courts mean that claims provide a manner for potential competitors to determine what products would infringe ahead of time.¹⁰³ Since competitors have access to issued claims, they can create products that fall outside those claims and thereby not infringe patents.

Although it is frequently emphasized that the claims provide public notice of the limits of the patentee’s monopoly, it is important to note that public *access* is not the heart of the notice function of claims. To be sure, issued claims are publicly accessible,¹⁰⁴ and without such access claims would serve no notice function at all. But the public could also discern the permissible scope of a patentee’s invention during the preclaiming era. As the patentee in *Evans* pointed out, all that a potential competitor needed to do was take the machine described by the patent specification, and “compar[e] the machine specified in the patent with former machines in use.”¹⁰⁵ In other words, a competitor could read the patent specification, figure out what is enabled and described, and then subtract from that everything already in the prior art, and be left with the patent’s limits—the broadest potential coverage of the patent. Both the patent specification and the prior art are publicly accessible to potential competitors.¹⁰⁶

The true advantage of claims in providing public notice is that they achieve this notice of patent limits more cheaply and with better certainty than the specification-minus-prior-art method.¹⁰⁷ Although the prior art is publicly available, it is very difficult and expensive for a competitor to exhaustively search all prior art;¹⁰⁸ while a claim can be cheaply accessed on the PTO website or on paper. Although the specification can be analyzed by a competitor, it is inherently uncertain because it mixes the old with the new, is full of complex jargon and disclosures, and is very long; while each claim

102. *Evans*, 20 U.S. at 435 (“[H]e ought to describe what his own improvement is, and to limit his patent to such improvement.”).

103. *PSC Computer Prods., Inc. v. Foxconn Int’l, Inc.*, 355 F.3d 1353, 1359 (Fed. Cir. 2004) (“[C]laims serve the important notice function of informing the public that anyone who makes, uses, or sells the claimed invention infringes the patent.”).

104. 35 U.S.C. § 10 (2006) (publication of patents).

105. *Evans*, 20 U.S. at 433.

106. Prior art generally must be public. *Pennock v. Dialogue*, 27 U.S. (2 Pet.) 1, 19 (1829). Only limited exceptions to this requirement exist. See 35 U.S.C. § 102(e), (g)(2) (2006).

107. See Paul J. Heald, *A Transaction Costs Theory of Patent Law*, 66 OHIO ST. L.J. 473, 509 (2005) (arguing for “cheap, useful, and clear delineation of property rights”).

108. See *Keystone Bridge Co. v. Phoenix Iron Co.*, 95 U.S. 274, 278 (1877) (“[Claims] relief[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.”).

is supposed to be a crisp, single sentence.¹⁰⁹ And analyzing the specification and prior art using the legal doctrines of enablement, written description and obviousness causes great uncertainty because the legal doctrines are amorphous standards; while each claim is supposed to be a bright-line rule.

The cost and certainty advantages of claims (versus a detailed analysis of the specification and prior art) only hold, however, if claims impose meaningful limitations on patentees and truly protect competitors. Claims that are easily changed with retroactive effect provide no such protection: a competitor who relies on claims falls squarely into a trap when the amended claim issues and covers his product, forcing him to abandon his newly built factory. The wily competitor should either spend the money to analyze the specification and prior art; or simply give up and treat patent infringement as a cost of doing business. Overwhelmingly, it appears that competitors in practice choose the latter option and ignore patents until sued, in the belief that paying infringement damages *ex post* is cheaper than analyzing patents *ex ante*.¹¹⁰ Neither option, of course, is a desirable outcome.

3. *The Definitional Function*

A second function served by claims is known as the “definitional” function. Primarily, this refers simply to the doctrine that claims are supposed to define the boundaries of the patent,¹¹¹ which makes this function almost indistinguishable from the notice function. Claims offer definition, however, in that they require the patentee to detail *his own* invention.¹¹² As the Supreme Court said in the famous case of *Merrill v. Yeomans*,¹¹³ “nothing can be more just and fair, both to the patentee and to the public, than that the former should understand, and correctly describe, just what he has invented.”¹¹⁴

The fact that claims cover his own invention gives the patentee an informational advantage.¹¹⁵ Better than anyone else, the patentee should know what he actually invented, at the time he filed the patent application:

[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. This is true, even though subsequent students may perceive . . . that he disclosed methods, means, or processes having capabilities surpassing the

109. MPEP, *supra* note 74, § 608.01(m).

110. Mark A. Lemley, *Ignoring Patents*, 2008 MICH. ST. L. REV. 19, 21–22.

111. Christopher A. Cotropia, *Patent Claim Interpretation Methodologies and Their Claim Scope Paradigms*, 47 WM. & MARY L. REV. 49, 65 (2005).

112. *Evans v. Eaton*, 20 U.S. (7 Wheat.) 356, 435 (1822).

113. 94 U.S. 568 (1877).

114. *Merrill*, 94 U.S. at 573–74.

115. Clarisa Long, *Information Costs in Patent and Copyright*, 90 VA. L. REV. 465, 496–97 (2004) (“In almost all cases, owners will know more about their intellectual goods than observers will.”).

inventor's dreams at the time attempt was made to put achievements into words.¹¹⁶

Claims therefore act as an "information forcing" mechanism,¹¹⁷ to encourage patentees to disclose their own understanding of the invention, early on at the time of filing. Original claims are more "honest" than later claims in describing what the patentee really invented, in the same way that early testimony is usually regarded as more honest than later contradictory testimony from the same witness.¹¹⁸ Allowing later amendments to control, however, discards the valuable information elicited through original claims.

B. *The Definition Function and Patentee Incentives*

One important motivation for patentees to amend claims is to incorporate later-discovered information. Precisely because original claims reflect the patentee's honest assessment of what they invented, the original claims often prove to be quite disadvantageous to patentees in hindsight, as new circumstances challenge old assumptions. What the patentee thought would become valuable turns out to be worthless; what the patentee thought would be worthless in his specification turns out to be very valuable.

A good example is *Crown Cork & Seal Co. v. Ferdinand Gutmann Co.*¹¹⁹ In *Crown Cork*, the patentee Warth filed an initial patent application on a process for making bottle caps. The patentee emphasized and claimed the benefit of using simultaneous heat and pressure to seal the cap.¹²⁰ As an aside, the patent noted that it may be desirable to "preheat" the assembled crown. Warth initially thought that preheating was not worth protecting—he cancelled claims that would have covered it.¹²¹ Subsequently, however, a competitor Johnson obtained a patent on preheated caps.¹²² As a lower court noted, "had it not been for this competitor, Warth might never have considered the subject [of preheating] worth claiming as an invention."¹²³

The fact that a competitor made preheating bottle caps commercially valuable induced Warth to resurrect his claims on preheating through a continuation. Warth amended his claims to become exact copies of Johnson's.¹²⁴

116. *Kintner v. Atl. Comm'n Co.*, 240 F. 716, 717 (2d Cir. 1917).

117. See Ian Ayres & Robert Gertner, *Filling Gaps in Incomplete Contracts: An Economic Theory of Default Rules*, 99 *YALE L.J.* 87, 98 (1989) ("[W]hen the rationale is to inform the relatively uninformed contracting party, the penalty default should be against the relatively informed party."); see also Robert E. Scott, *A Relational Theory of Default Rules for Commercial Contracts*, 19 *J. LEGAL STUD.* 597, 609–11 (1990) (discussing information-forcing rules).

118. *Mack v. United States*, 814 F.2d 120, 124 (2d Cir. 1987) ("[A] party's affidavit which contradicts his own prior deposition testimony should be disregarded . . .").

119. 304 U.S. 159 (1938).

120. *Crown Cork & Seal Co.*, 304 U.S. at 162.

121. *Id.* at 163.

122. *Id.* at 164.

123. *Id.* (internal quotation marks omitted).

124. *Id.*

Thus a priority dispute evolved between Warth, who first thought of the feature but attached no importance to it, and Johnson, who was later in time, but appreciated the value of preheating. In this contest between inventors, the Supreme Court awarded the patent to Warth.¹²⁵ Johnson therefore received nothing from the patent system for his efforts; instead he became an infringer.¹²⁶

Amending claims *ex post* to capture inventions whose commercial value becomes apparent later through the efforts of others is widely seen as unfair.¹²⁷ Robert Merges has dubbed this practice “misappropriation by amendment.”¹²⁸ The essential defect is that, although the patentee must disclose the later-claimed invention in some form to sustain the amendment, the written description requirement allows this initial disclosure to be vague, cursory, and buried within a laundry list.¹²⁹ It is Johnson who really contributed the idea of using preheating to society, since without Johnson it is highly unlikely that anyone (least of all Warth) would have bothered to notice a stray line buried in a patent specification sitting among millions of issued patents. Given retroactive claim amendments, however, it is Warth who received all the reward, and Johnson who paid the penalty.

To say that the result is “unfair,” however, lacks rigor. Patent holders have a different view of the equities. After all, the patentee was the first person to write the feature down on paper—they were the first “inventor” of the later claimed feature in some sense. Patentees often have no idea whether they invented anything valuable when filing for patents,¹³⁰ and thus a wait-and-see position in refining claims to match market developments helps patentees focus resources on the most valuable inventions. A court sympathetic to patentees can easily see omissions in original claims as standard patent-prosecution practice,¹³¹ while regarding competitors who rely on such omissions as brazen pirates who deserve no sympathy (though it is by no means clear that Johnson or many other infringers actually copied the invention by examining the patent).¹³² Because unfairness is

125. *Id.* at 165.

126. *Id.* at 161.

127. *See, e.g.,* Lemley & Moore, *supra* note 31, at 111 (opining that allowing patentees to obtain claims covering “a competitor’s product where the patentee had not contemplated the embodiment prior to seeing the competitor’s device [is] a particularly offensive practice”).

128. Robert P. Merges, *Software and Patent Scope: A Report from the Middle Innings*, 85 *TEX. L. REV.* 1627, 1653 (2007).

129. *See, e.g.,* Vas-Cath, Inc. v. Mahurkar, 935 F.2d 1555 (Fed. Cir. 1991) (holding that drawings with no description were sufficient to meet disclosure requirements); Snitzer v. Etzel, 465 F.2d 899, 902 (C.C.P.A. 1972) (holding that one ion selected *ex post* from eighty-seven billion disclosed variants was properly claimed).

130. *See* Schreiner & Doody, *supra* note 10, at 557.

131. *See In re Wilder*, 736 F.2d 1516, 1519 (Fed. Cir. 1984) (“[F]ailure to appreciate the full scope of the invention is one of the most common sources of defects in patents.”).

132. *Grant v. Raymond*, 31 U.S. (6 Pet.) 218, 243 (1832) (stating that defects in a patent are unlikely “to be perceived by any but those who examine it for the purpose of pirating the invention”).

in the eyes of the beholder, and following the spirit of *Crown Cork*, the Federal Circuit has strongly endorsed the practice of using retroactive amendment to capture new information:

[T]here is nothing improper, illegal or inequitable in filing a patent application for the purpose of obtaining a right to exclude a known competitor's product from the market; *nor is it in any manner improper to amend or insert claims intended to cover a competitor's product the applicant's attorney has learned about during the prosecution of a patent application.* Any such amendment or insertion must comply with all statutes and regulations, of course, but, if it does, its genesis in the marketplace is simply irrelevant¹³³

A more concrete way of approaching the problem, besides the simple appeal to fairness, is from patent law's economic purpose. Patents exist to "promote the Progress of . . . useful Arts,"¹³⁴ a mandate that has made this area of law particularly well suited to economic and utilitarian analysis.¹³⁵ The question, then, is whether allowing claim amendments that capture later insights promotes the incentive of patentees to invent and disclose their discoveries, as compared to the cost of that incentive on society.

Allowing patentees to capture new insights by competitors through ex post claiming increases their return on the patent. All else being equal, this should increase the incentive to invent and disclose. The question is by how much, and the answer is very little. The unpredictability of later windfalls means that practically no one would make investments in reliance upon them. On the other hand, increasing the patentee's return on a patent also increases the monopoly cost on society and reduces the reward to legitimate competitors. As mentioned before, Johnson received nothing in return for making preheating well known and valuable—instead he had to pay Warth—and this surely discourages others from following in Johnson's footsteps. The costs of claim amendments and captured insights, therefore, can be very great. As discussed below, the benefits and costs of claim amendments accrue in different ways, resulting in a disparity between them.

1. *Unequal Discounting and Patent Incentives Versus Cost*

The standard economic model of patents holds that patents provide an incentive to invent and disclose some useful product or process by providing a time-limited monopoly over the same invention.¹³⁶ The monopoly thus creates both a benefit and corresponding cost. A very lucrative monopoly

133. *Kingsdown Med. Consultants, Ltd. v. Hollister, Inc.*, 863 F.2d 867, 874 (Fed. Cir. 1988) (en banc) (emphasis added).

134. U.S. CONST. art. I, § 8, cl. 8.

135. 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.").

136. *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 150–51 (1989).

(e.g., Edison's monopoly over the incandescent lamp) confers strong incentive benefits, and imposes large societal costs, since everyone must pay inflated prices to the patentee.¹³⁷

The benefits and costs of the patent monopoly usually go hand-in-hand.¹³⁸ A \$100 monopoly profit paid to the patentee creates the incentive, but comes out of consumer pockets with a resulting deadweight loss.¹³⁹ But there are two important features that affect this link between benefit and cost. First, the incentives are directed to *private* individuals, in that they affect individual patentees, but the costs are *social*, in that they are borne by the entire society in paying inflated prices. Second, the incentive effect occurs at distinct points in time. The patentee must make an upfront investment in research and development early, and reaps the monopoly profits only later. The process is affected by uncertainty, and the patentee must make research investments based on expected monopoly profits. In economic terms, he must *discount* the future revenue stream by an appropriate adjustment for risk.

Thus, suppose in the year 2019, a patent on an invention is expected to yield a \$100 monopoly profit. A putative inventor, however, has to make a decision whether to pursue the invention in 2009. To the inventor in 2009, the prospect of \$100 in ten years is worth much less than \$100 today. In addition to the time value of money, there is the possibility that the expected \$100 might never materialize at all. The research and development efforts may fail, or the invention may not be as successful as one initially thought.¹⁴⁰ Because people are assumed to be risk averse,¹⁴¹ the inventor today will not spend \$100 in research and development. At a 10 percent risk discount rate,¹⁴² he will spend only \$38.56.

137. Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 885–88 (1990) (discussing the costs of patent monopoly on the early electric lighting industry).

138. See Giles S. Rich, *Infringement Under Section 271 of the Patent Act of 1952*, 35 J. PAT. OFF. SOC'Y 476, 479 (1953) (“[A] patent is a monopoly because its only value as an incentive depends upon securing to its owner monopoly power . . .”).

139. DONALD S. CHISUM ET AL., *PRINCIPLES OF PATENT LAW: CASES AND MATERIALS* 61 (3d ed. 2004).

140. Or it may perform unexpectedly better and be more valuable than initially expected. The aversion to variance, not simple downside loss, is the economic concept of risk aversion. See Michael Rothschild & Joseph E. Stiglitz, *Increasing Risk: I. A Definition*, 2 J. ECON. THEORY 225, 226 (1970).

141. See Gideon Parchomovsky & R. Polk Wagner, *Patent Portfolios*, 154 U. PA. L. REV. 1, 25 (2005) (explaining that risk aversion is the standard assumption in patent law). But see F.M. Scherer, *The Innovation Lottery*, in *EXPANDING THE BOUNDARIES OF INTELLECTUAL PROPERTY: INNOVATION POLICY FOR THE KNOWLEDGE SOCIETY* 3, 15–19 (Rochelle Cooper Dreyfuss et al. eds., 2001) (arguing that some patentees are not risk averse); Dennis D. Crouch, *The Patent Lottery: Exploiting Behavioral Economics for the Common Good*, 16 GEO. MASON L. REV. 141, 161 (2008) (arguing that individuals are more sensitive to the size of the maximum reward than the probability of attaining it).

142. See WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 296 n.2 (2003) (noting that a 10 percent discount seems “appropriate in light of the uncertainty associated with income from intellectual property”).

Although the patentee receives his reward only after issuance, he must assess the value of this reward much earlier, when he is making decisions. The decision to research a patentable invention necessarily occurs before filing a patent on it, and the decision to disclose that invention is made by filing.¹⁴³ Thus, the relevant time point for assessing the incentive benefit of a patent is, at the latest, the time of filing. A risk discount must be applied throughout the period between original filing and the later receipt of the reward.

The fact that benefits must be reduced by a risk discount, itself, cannot be a strong objection to patentee appropriation of later competitor innovations and insights. All patent outcomes are subject to some level of uncertainty,¹⁴⁴ as are other property rights.¹⁴⁵ If the discounting of incentive benefits is a problem, it is a problem that occurs throughout all of intellectual property law.

The problem is not that the patentee's rewards from capturing future competitor insights must be discounted for risk, but that the discount is particularly high. The more uncertain a particular outcome at the relevant decision point, the higher the risk discount rate.¹⁴⁶ At the time of patent filing, future insights such as the commercial success of a feature are by definition unknown to the patentee.¹⁴⁷ To the extent that the patentee already believes a feature will become commercially successful, or that the patentee intends to exploit the feature himself, he will include it in an original claim. Thus, the developments subject to claim amendment are necessarily those that are unforeseen and uncertain.

The lure of permitting amended claims to an inventor at the point of filing thus reduces to this vague promise: “[i]f someone else comes up with anything good, and if it vaguely resembles what is in your patent specification, we will give you a chance to change your claim to cover it.”¹⁴⁸ Whether competitors will have *any* insights, and whether those insights will prove to

143. *Alexander Milburn Co. v. Davis-Bourmonville Co.*, 270 U.S. 390, 401 (1926) (commenting that, upon filing, the patentee had “done all that he could do to make his description public”).

144. Mark A. Lemley & Carl Shapiro, *Probabilistic Patents*, 19 J. ECON. PERSP. 75, 95 (2005); see also Russell F.R. Denton & Paul J. Heald, *Random Walks, Non-Cooperative Games, and the Complex Mathematics of Patent Pricing*, 55 RUTGERS L. REV. 1175 (2003) (discussing the problems of valuing patent rights and proposing an option-based model).

145. Stewart E. Sterk, *Property Rules, Liability Rules, and Uncertainty About Property Rights*, 106 MICH. L. REV. 1285, 1295–99 (2008) (discussing limits on the ex ante certainty of scope for all property).

146. See HARRY MARKOWITZ, *PORTFOLIO SELECTION: EFFICIENT DIVERSIFICATION OF INVESTMENTS* 129 (rev. ed. 1991).

147. See Michael J. Meurer & Craig Allen Nard, *Invention, Refinement and Patent Claim Scope: A New Perspective on the Doctrine of Equivalents*, 93 GEO. L.J. 1947, 1993 (2005) (“Since entry [of an unclaimed competitor product] is unforeseen and does not occur until the second period, the effect on the incentive to invent is muted.”).

148. An important assumption underlying this analysis is that inventors regard a monopoly with a *defined* scope as more predictable than one with an *undefined* scope. Of course, even a defined monopoly over a particular set of embodiments (e.g., all tables) has considerable commercial uncertainty (i.e., it is unknown whether tables will sell), so the patentee's monetary return is always uncertain. The analysis holds, however, so long as the uncertainty is reduced.

be very valuable or virtually worthless, is subject to tremendous uncertainty at the time of patent filing, due to its inherent unpredictability as a future event.¹⁴⁹

To be sure, even a vague and speculative promise of future benefit will have some pre-filing incentive effects.¹⁵⁰ But this incentive is very small after risk discounting and is entirely disproportionate to the monopoly cost incurred.¹⁵¹ Society gets very little pre-filing incentive bang for the later monopoly cost buck.

For a fair comparison, the relevant cost must be discounted too. The fact that the patentee can expect a \$100 monopoly profit in 2019 requires that the same profit be paid by consumers.¹⁵² Even a certain cost of \$100 in ten years is not worth that amount today—we can invest \$61.39 in a bank at 5 percent interest for ten years, and be virtually guaranteed to have \$100 to pay the cost when it arises.

The difference—\$38.56 in benefit versus \$61.39 in cost—is created by different rates of discounting. The lower discounting of costs arises because the costs of the patent system are borne *socially*—reducing consumer welfare for society as a whole. For society as a whole, there are large numbers of patentees, large numbers of competitors, and large numbers of consumers; the law of large numbers allows us to consider this average cost of the patent system to be a virtual certainty. This cost includes the cost of permitting claim amendments that misappropriate future competitor insights, since *some* competitors of *some* patentees will surely have insights to appropriate (for each individual patentee, the uncertainty is whether *his* particular competitors will have insights, which is much less certain). The monopoly costs of amending claims, as a feature of the patent *system*, are therefore subject to the low social discount rate, usually considered to be the risk-free rate.¹⁵³

To illustrate the difference between public and private discounting, suppose that we have a society with 100 patentees each holding one patent, and 100 consumers. Of the 100 patents, one single patent will strike the jackpot through an amendment, resulting in a \$100 monopoly profit, and each con-

149. See Robin Feldman, *Rethinking Rights in Biospace*, 79 S. CAL. L. REV. 1, 40 (2005) (granting rights “projects an enormous shadow across the future, one whose size cannot even be contemplated at the time of the invention”).

150. See *Eldred v. Ashcroft*, 537 U.S. 186, 214–15 (2003) (finding ex ante incentive from the expectation of future lengthening of copyright).

151. See *id.* at 255 (Breyer, J., dissenting) (noting that “a 1% likelihood of earning \$100 annually for 20 years, starting 75 years into the future, is worth less than seven cents today”). Justice Breyer’s calculation was made with a 7 percent discount rate. *Id.* at 268. Given the degree of uncertainty involved, the discount rate for ex post claiming is likely to be a great deal higher. Cf. William M. Landes & Richard A. Posner, *Indefinitely Renewable Copyright*, 70 U. CHI. L. REV. 471, 481 n.22 (2003) (noting that incentive benefits and monopoly costs might be discounted at different rates).

152. The economic harm of the \$100 monopoly profit is the deadweight loss created by reducing output. This deadweight loss is generally proportionate to, but not the same as, the monopoly profit. See CHISUM ET AL., *supra* note 139, at 61 (illustrating relationship between monopoly profit and deadweight loss). The example is a simplification.

153. See generally K. J. Arrow & R. C. Lind, *Uncertainty and the Evaluation of Public Investment Decisions*, 60 AM. ECON. REV. 364 (1970).

sumer will pay \$1 to that lucky patentee. For each patentee, the average value of the jackpot is \$1 ($\$100 \cdot 1\%$); but the risk-adjusted value is less than \$1 due to patentee risk aversion. For each consumer, the cost is a certain \$1, and no risk discounting applies because the eventuality is certain (the uncertainty is *to whom* the \$1 will be paid, about which consumers do not care). The difference in private and social risk discounting thus creates a disparity between the discount rates applied to incentive benefit and cost.

The problem of appropriating later-developed competitor insights is that the inherent uncertainty of postfiling events magnifies this discount rate differential. For each individual patentee, the prefiling anticipated benefit of appropriating competitor innovation is minimal, since it is grossly uncertain whether his competitors will have any insights worth taking. For society as a whole, however, it is almost certain that *some* competitor to *some* patentee will have insights that are later going to be misappropriated, and the average cost of amending a claim is therefore subject to discounting at a much lower rate.

2. The Problem as Applied to Narrowing Amendments

The problem of claim amendments that expand scope into unforeseen developments is most easily understood when claims are (1) broadened and (2) to capture new competitor products. This is the phenomenon that has attracted the most criticism in past literature.¹⁵⁴ And the limitation on broadening but not narrowing amendments during reissuance and reexamination proceedings reflects this common view: that amending claims to nominally cover more things is more harmful than a claim amendment to cover fewer things.¹⁵⁵ But neither distinction makes much sense. Instead, the disparity between benefit and cost arises equally in every instance of amendments to capture unforeseeable developments or, in other words, patentee windfalls.¹⁵⁶

Unforeseeable developments that create high discount rates are not limited to competitor insights or competitor products, at least under a strict view of who the patentee's competitors are. New technological contexts and unforeseen commercial value are common with the passage of time. A recent example is the development of the internet giving unforeseen windfalls to many patents on old networking technology.¹⁵⁷ The very fact that a claim is amended tends to suggest that the amendment is reacting to something unforeseen. After all, if the patentee had foreseen a particular development, he would have attempted to account for it through an original claim—at

154. Lemley & Moore, *supra* note 31, at 111; Merges, *supra* note 128, at 1653–54.

155. See *supra* text accompanying notes 47–48.

156. See Parchomovsky et al., *supra* note 12, at 756–57, for a definition of windfalls.

157. E.g., U.S. Patent No. 5,845,265 (filed Nov. 7, 1995) (the patent at issue in *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388 (2006), covering electronic trading); cf. *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299 (Fed. Cir. 2008) (rejecting attempt to expand patent on vending machines to cover T-Mobile's "Wi-Fi hotspots" found in places such as Starbucks and airports).

least if the expected value of the future development was worth more than the small cost of adding a marginal claim. And the fact of unforeseeability means that the patentee's incentive at filing for capturing unexpected later developments is small, while the social costs remain large.¹⁵⁸

Nor does capturing unforeseeable information always result in broadening of claim language. One common category of claim amendments, probably the most common and important, are *narrowing* amendments to avoid unknown prior art that is discovered after filing.¹⁵⁹ This category raises the same problem of giving patentees undue windfalls, just as when they appropriate later-developed competitor insights. The key understanding is that although prior art necessarily exists before filing (since it is *prior* art), the patentee's knowledge of it almost always occurs after filing. Thus, the discovery of unforeseen prior art is postfiling information that does not meaningfully contribute to pre-filing incentives.

The universe of prior art is vast, and a patentee cannot realistically know that his claims are patentable over all prior art at the time of filing. Although the patentee can certainly believe *some* features of his specification disclosure to be novel over the prior art, those will be the features in his original claims. The features emphasized by a claim amendment are likely to be those features that were originally thought to matter little, but acquire new significance after the unexpected discovery of new prior art. For example, the patentee may have initially claimed to have invented the computer mouse. Upon discovering that a one-button computer mouse already exists, however, the patentee may change his claim, to now claim that he invented a *two-button* computer mouse. This newfound emphasis on "two-button" mice raises the same windfall concerns.

The twist that makes the incentive problem less intuitive in cases of unforeseen prior art is that a patentee seeking to avoid prior art will usually seek to *narrow* an existing claim (i.e. to cover fewer things). In particular, the narrowing amendment will omit the particular prior-art device, such as a change from covering *all* mice to covering just *two-button* mice in order to exclude a one-button mouse. This is in contrast to amendments trying to cover competitor insights, which usually seek to broaden the existing claim to cover more things. But whether an amendment is broadening or narrowing, the effect is to expand the patent monopoly and its costs. The key is to understand the difference between nominal claim language (what the claim purports to cover) and legal claim scope. A nominally broad claim that is

158. Meurer & Nard, *supra* note 147, at 1998 ("[A]n inventor's incentive is not harmed much when, ex post, she is denied patent scope over technology that she did not foresee ex ante."); see also Shyamkrishna Balganesh, *Foreseeability and Copyright Incentives*, 122 HARV. L. REV. 1569 (2009) (applying similar analysis to copyright law).

159. See Donald S. Chisum, *Patent Law Developments in the United States Court of Appeals for the Federal Circuit During 1991*, 41 AM. U. L. REV. 869, 885 (1992) ("The temptation is great to amend claims after the original filing to avoid newly discovered prior art and yet encompass post-filing date evolving technology, as well as provide broad coverage of embodiments that turn out to be commercially important.").

invalid has *no legal scope*,¹⁶⁰ while a narrow claim that is valid has legal scope corresponding to its language.

A nominally narrowing amendment to avoid prior art thus *broadens* the legal scope of the claim, and increases its monopoly cost, because the amendment transforms legal scope from zero to something greater. Moreover, about the only reason to ever file a narrowing claim amendment is to avoid rejection or invalidity of the patent.¹⁶¹ A narrowing amendment is thus indistinguishable from a broadening amendment. Both increase patent scope and monopoly cost. When done in response to unforeseen developments, all amendments to claims postfiling create the same disparity between incentive benefits (very low) and monopoly costs (not low), resulting in later windfalls to patent owners.

C. Risk of Drafting Mistakes and Efficient Allocation

A key assumption underlying my analysis in the previous Section is that if a patentee had foreseen a particular development at the time of filing, he would have incorporated that development into an original claim, at least if the development were perceived as minimally valuable. One obvious response is that the patentee may very well have attempted to do so—the original claim was simply badly drafted. After all, drafting good claim language is notoriously difficult: changing a single word can drastically affect the scope of any particular claim.¹⁶² Therefore, the reasoning goes, claim amendments should be liberally permitted to allow rectifying mistakes in articulating what the patentee foresaw.

There seems little doubt that claim-drafting mistakes do happen. By claim-drafting “mistake” in this Section, I mean the failure to cover what the patentee had foreseen at filing, not a failed attempt to capture the unforeseen. A good example of likely mistake is *Winans v. Adam*.¹⁶³ In *Winans*, the patentee invented coal cars that, by virtue of a circular shape, evenly distributed weight across the whole of the body of the car.¹⁶⁴ The patentee drafted a claim that stated:

What I claim as my invention, and desire to secure by letters-patent, is making the body of a car for the transportation of coal, &c., in the form of a frustum of a cone, substantially as herein described, whereby the force exerted by the weight of the load presses equally in all directions, and does

160. *Richdel, Inc. v. Sunspool Corp.*, 714 F.2d 1573, 1579 (Fed. Cir. 1983) (“An invalid patent cannot be infringed.”).

161. *See Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 723 (2002) (noting that amendment is taken as a concession of invalidity of prior claim).

162. *Lichtman*, *supra* note 29, at 2016; *see Topliff v. Topliff*, 145 U.S. 156, 171 (1892).

163. 56 U.S. (15 How.) 330 (1853).

164. *Winans*, 56 U.S. at 339.

not tend to change the form thereof, so that every part resists its equal proportion¹⁶⁵

As the context of the claim makes clear, the emphasis of the invention was on the principle of even distribution of weight. The patentee, however, chose to use the word “cone” to describe the shape of his car. A later infringer then copied the design, but used an octagonal coal car instead of a perfectly circular one.¹⁶⁶ Based on any fair reading of the patentee’s original claim, we can safely say that the intent was to claim any shape that utilized the principle of even weight distribution, including a variation that utilized octagons instead of perfect circles. The inclusion of the word “cone” was a mistake.

The issue is whether the ease of making claim-drafting mistakes should necessarily mean that they be rectified through a claim amendment. Here, there are competing fairness paradigms. The fact that the patentee makes a claim-drafting mistake, and a competitor creates a product that falls just outside the literal claim due to the mistake (e.g., creates an octagon instead of a circle), is quite common. Two schools of thought have developed. According to one view, the accused infringer in such cases is simply a pirate who exploits a minor error and claim amendments should be liberally permitted. The Supreme Court’s decision in *Grant v. Raymond*¹⁶⁷ aptly illustrates this “antipirate” view:

An objection [to later amendment] much relied on is, that after the invention has been brought into general use, those skilled in the art or science with which it is connected, perceiving the variance between the [claim] and the [accused] machine, and availing themselves of it, may have constructed, sold and used the machine without infringing the legal rights of the patentee, or incurring the penalties of the law. The new patent would retro-act on them, and expose them to penalties to which they were not liable when the act was committed.

This objection is more formidable in appearance than in reality. It is not probable that the defect in the [original claim] can be so apparent as to be perceived by any but those who examine it for the purpose of pirating the invention. They are not entitled to much favour.¹⁶⁸

Another view of the equities, however, holds that competitors are doing precisely what we would hope. The accused infringer has read the patent, understood its claims, and made a product that does not infringe the claim. It is the same thing, only stated in different ways, to say that the competitor is “exploiting a minor loophole” versus “relying on the notice function of

165. *Id.* at 342 (emphasis added).

166. *Id.* at 345.

167. 31 U.S. (6 Pet.) 218 (1832).

168. *Grant*, 31 U.S. (6 Pet.) at 243.

the claim.” The Supreme Court’s decision in *Sontag Chain Stores Co. v. National Nut Co.*¹⁶⁹ is a concise statement of the “procompetition” view:

[T]he claims of the original patent were limited as to the form of conveyor [E]xpressly appreciating its limited character, indeed, being governed therein by the advice of patent counsel, the defendant built a noninfringing brick machine . . . at a substantial expense, and put them into commercial use on a large scale by extensively selling their product¹⁷⁰

The two lines of cases are fundamentally irreconcilable in spirit. In *Winans*, the original claim is limited as to the form of the car—as a cone—and the competitor exploits this limitation by constructing a noninfringing car. The Court condemns the competitor as a pirate.¹⁷¹ In *Sontag*, the Court considers an original claim limited as to the form of a conveyor, and a competitor who exploited this limitation by constructing a noninfringing brick machine.¹⁷² The Court applauds this reliance on claims and holds that the competitor should not only be shielded from preexisting liability, but should have a continuing right to use the brick machine to make more bricks.¹⁷³

Nor is it useful to distinguish the cases based on the “substantiality” of the difference between a patentee’s claim and the competitor’s device.¹⁷⁴ The competitor’s device is always substantially different in the only way that matters—it does not meet an element of the claim language. As the courts have repeatedly emphasized, “there is no legally recognizable or protected ‘essential’ element, gist or ‘heart’ of” a claim.¹⁷⁵ Every word in a claim is deemed to matter, and to label a particular element to be a “minor mistake” instead of a significant one is just that: a conclusory label. Analytically, it is almost impossible to discern the substantiality of a claim-drafting mistake.

The core dilemma boils down to this: Claim-drafting mistakes will be made, and they will cause a loss. This loss is of the patentee’s foreseen monopoly profits, which comes from excluding competitors, and either the patentee or competitor must be made to bear this loss. If the patentee is permitted to amend his claim to fix the mistake, then the competitor who relied on the patent claim will be made to bear the loss by paying royalties, reducing competitor incentive to rely on claims and create noninfringing designs. If the patentee is not permitted to amend his claim, then the

169. 310 U.S. 281 (1940).

170. *Sontag*, 310 U.S. at 294 (quoting *Ashland Fire Brick Co. v. Gen. Refractories Co.*, 27 F.2d 744, 746 (6th Cir. 1928)).

171. *Winans*, 56 U.S. at 344.

172. *Sontag*, 310 U.S. at 294–95 (endorsing the decision in *Ashland Fire*, 27 F.2d at 745–46).

173. *Id.*

174. See *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 36 (1997) (“[O]ne wonders how ever to distinguish between the intentional copyist making minor changes . . . and the incremental innovator designing around the claims . . .”).

175. *Allen Eng’g Corp. v. Bartell Indus.*, 299 F.3d 1336, 1345 (Fed. Cir. 2002) (internal quotation marks omitted) (quoting *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 345 (1961)).

patentee will bear the loss by having his legitimately expected monopoly dissipated, with reduced incentives to invent. Both the patentee and the competitor have self-serving appeals to fairness in why they should not bear the loss. A more solid foundation to analyze the problem, aside from competing appeals to fairness, once again appears in patent law's utilitarian purpose and economic analysis.

The economic analysis of law already has a well-established framework for the allocation of losses that result from mistakes: the economic analysis of the tort system. The principles from tort law are fully applicable here because, reduced to their essentials, claim-drafting mistakes are just another category of human error that cause later loss. The loss can be allocated to one of two different parties, each of whom will respond to the loss allocation in different ways. As is usual in such cases, transaction costs preclude an *ex ante* bargain that will make the allocation rule irrelevant under the Coase theorem;¹⁷⁶ no competitor can pay putative patentees in advance to not make claim-drafting mistakes, especially given that patent applications are prosecuted in secret.

The economic rules regarding efficient allocation of loss from mistakes are well established. If the mistake can be reasonably avoided, the loss should be allocated to the party best able to avoid the mistake (i.e., the least-cost avoider), creating a negligence rule.¹⁷⁷ If the mistake cannot be reasonably avoided, the shifting of loss to a faultless party—a strict liability system—only occurs when there is a compelling justification.¹⁷⁸

Which of these regimes best describes claim-drafting mistakes by patentees would seem to vary by case. Some claim-drafting mistakes are surely avoidable, and a negligence rule is appropriate for such cases. Other claim-drafting mistakes, however, are not reasonably avoidable. The allocation of loss between patentee and accused infringer is much harder in such cases, though, as detailed below, I believe they should still remain on the patentee.

1. Avoidable Mistakes

In cases of avoidable mistakes causing loss, the optimal incentive is to place the loss on the party best able to avoid the loss.¹⁷⁹ If I can best avoid an accident by driving more carefully, I should bear the loss of failing to do so. Similarly, if I can best avoid the future dissipation of monopoly profits through better *ex ante* claim drafting, I should bear the loss for failing to do so. This incentive structure is efficient for two reasons. First, the fact that the negligent party bears the loss means that they will take precautions, such as

176. See R. H. Coase, *The Problem of Social Cost*, 3 J.L. ECON 1, 8 (1960).

177. GUIDO CALABRESI, *THE COST OF ACCIDENTS: A LEGAL AND ECONOMIC ANALYSIS* 135 (1970).

178. See James A. Henderson, Jr., *Why Negligence Dominates Tort*, 50 UCLA L. REV. 377, 390–94 (2002).

179. CALABRESI, *supra* note 177, at 135–40.

driving more carefully or drafting better claims.¹⁸⁰ Second, the opposite regime (i.e., placing the loss on the *nonnegligent* party) will create perverse incentives and moral hazards.¹⁸¹ If my negligent driving results in my *victim* paying me for the damage to my car, I will tend to drive very recklessly. If my negligent claim-drafting results in my competitor paying me royalties, I will tend to draft very bad claims.

The loss here should be defined with some precision. The loss from a claim-drafting mistake is the inadvertent omission of a foreseen product from the claim, but the loss has no monetary value until a competitor *makes* the inadvertently omitted product.¹⁸² It takes two (patentee and at least one competitor) to dissipate a monopoly and its profits.¹⁸³ Which party—patentee or competitor—is better able to avoid this loss?

In most cases, the patentee will be in a better position to avoid the loss, due to several advantages in information.¹⁸⁴ The patentee drafts his patent, and is trying to delineate the scope of his *own* invention—the scope of what *he* foresaw as the monopoly when determining incentives at filing.¹⁸⁵ Any competitors, by contrast, will be attempting to discern a deviance from this patentee-subjective scope solely from reading the public record, comprised of the patent and its prosecution history; and it is the patentee that creates the record in the first place. If a mistake causes the claim to encompass less than the patentee foresaw, the patentee has the best opportunity to avoid it. In cases where the mistake is reasonably avoidable, therefore, the patentee should generally bear the loss and be denied amendment to cure it.¹⁸⁶

What about the situation where the negligent mistake is obvious to everyone, patentee and competitor alike, and therefore the competitor is also at fault for designing a product that encroaches upon the inadvertently omitted domain? A good example of this is *Lemelson v. General Mills, Inc.*¹⁸⁷ In that case, the patentee, Lemelson, claimed a “trackway” instead of a “toy trackway,” even though the entire patent specification was directed to a toy and

180. *Id.* at 135–38.

181. See ROBERT COOTER & THOMAS ULEN, *LAW & ECONOMICS* 342–44 (5th ed. 2008).

182. The dissipation of the monopoly is a social loss because it reduces patent incentives, assuming that the patent system induces more innovation benefit than it costs. Rich, *supra* note 138, at 479.

183. Cf. Coase, *supra* note 176, at 2 (noting that social costs are reciprocal).

184. F. Scott Kieff, *The Case for Registering Patents and the Law and Economics of Present Patent-Obtaining Rules*, 45 B.C. L. REV. 55, 99 (2003) (“[T]he patentee, as the drafter, is the least-cost avoider of such ambiguities.”).

185. See *supra* Part II.

186. One area where this negligence principle already operates is prosecution history estoppel, admittedly a narrow doctrine applied only when the claim language does not literally cover the accused product and the claim language was amended in prosecution. Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17, 40–41 (1997). Patentees seeking to show that an alleged feature is insubstantially different from an amended claim (and thus infringing) must show that they “could not reasonably be expected to have drafted” a better claim. Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722, 741 (2002). Previous literature has advocated expanding the principle of claim refinement as reflected in this doctrine. See Meurer & Nard, *supra* note 147, at 1989–91.

187. 968 F.2d 1202 (Fed. Cir. 1992).

not a real trackway.¹⁸⁸ The defendant, Mattel, made a toy trackway.¹⁸⁹ The mistake was easily avoidable with even minimal claim-drafting care; but it was also surely the case that any competitor would understand the patent to really be directed at toys. If the patentee made a clear mistake, does the accused infringer have a special obligation to avoid exploiting the mistake?

In tort parlance, this is the problem of contributory negligence, where both parties have some ability to avoid the loss, and it is necessary to incentivize both parties.¹⁹⁰ In patent law, however, true cases of optimal mutual avoidance are rare, and judicial correction is available in such extraordinary cases, as the court demonstrated in *Lemelson*.¹⁹¹ It is by no means clear that shifting the loss to accused infringers is optimal even in cases of mutual avoidance, since the rule of contributory negligence left the loss where it originally lay—with the patentee—to save administrative costs.¹⁹² But in any case, the choice between contributory and comparative negligence is all but irrelevant for patent law, because a genuine case of contributory negligence like *Lemelson* is extremely rare. To have a comparative advantage in avoiding dissipation of a foreseen monopoly, the accused infringer must know two things (which were present in *Lemelson*): (1) the patentee omitted something from the claim; and (2) the omitted thing was properly foreseen and a legitimate part of the patentee's monopoly. Such a combination practically never exists in patent law.

The reason that contributory negligence rarely occurs is twofold: First, an accused infringer usually cannot determine what a patentee omitted from his maximum potential claim scope without an exhaustive search of prior art and a detailed analysis of the specification.¹⁹³ More importantly, even after such a detailed analysis of maximum potential scope, the accused infringer cannot know *why* the patentee failed to claim all the way to that theoretical boundary. The patentee may claim less than the theoretical maximum because he: (1) did not foresee everything as being commercially worthwhile to claim; (2) has knowledge of secret prior art that the accused infringer lacks;¹⁹⁴ (3) simply dedicates some subject matter to the public; or (4) made a mistake in claim drafting. Requiring the accused infringer to take steps to avoid unclaimed-but-claimable subject matter assumes that the only reason patentees fail to claim the full scope of their disclosure is by mistake, which

188. *Lemelson*, 968 F.2d at 1203 & n.3.

189. *Id.* at 1204.

190. See Mark F. Grady, *Common Law Control of Strategic Behavior: Railroad Sparks and the Farmer*, 17 J. LEGAL STUD. 15, 16 (1988).

191. *Lemelson*, 968 F.2d at 1203 n.3 (“The deletion of ‘toy’ appears from the record of the proceedings before the PTO to have been an inadvertent error . . .”); see also *Group One, Ltd. v. Hallmark Cards, Inc.*, 407 F.3d 1297, 1303 (Fed. Cir. 2005) (allowing correction of errors “evident from the face of the patent”).

192. POSNER, *supra* note 34, at § 6.4

193. See *supra* text accompanying note 186.

194. Although most prior art is public, the patentee has special access to secret prior art created by himself. *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55 (1998) (describing secret prior sales by patentee).

is not true when “mistake” is defined to encompass only loss of *foreseen* scope. (Courts, of course, have frequently given patentees the benefits of their “mistakes” in failing to claim unforeseen developments.¹⁹⁵) Rather, given the information advantages possessed by the patentee, the efficient allocation seems to be to place responsibility to avoid losses on patentees. This is particularly the case when considering that *one* patentee can avoid the loss by claim-drafting improvement, whereas each of *multiple* competitors must work to avoid it.

The current policy of liberal amendment creates precisely the opposite regime in that it grants patentees the ability to cure their mistakes, and transfers the loss to competitors by making them pay royalties. Not surprisingly, the strict transfer of loss to the nonnegligent party—competitors who relied on claim language—creates perverse incentives and moral hazards to draft bad claims. When patentees *profit* from drafting misleading claims that can be amended to ensnare competitors, they will *intentionally* do so.¹⁹⁶ When patentees are *not punished* for drafting bad claims that are amended to ensnare competitors, they will *recklessly* do so. Either way, patentees have little incentive to draft good claims in the first place, resulting in vague-issued claims being a common problem.¹⁹⁷ The incentives are so perverse that patent attorneys dislike having an original claim granted without amendment, and such immediate allowances will usually trigger a continuation application to amend claims.¹⁹⁸

2. Unavoidable Mistakes

A more difficult question is presented when the claim-drafting mistake is *not* reasonably avoidable, i.e., no one has acted negligently.

Initially, the scope of this problem must be defined. A patentee is not entitled to capture by amendment a product that he did not foresee. This leaves only the category of products that were foreseen but not claimed, and the failure to claim something that was foreseen sounds almost like the very definition of negligence. After all, why fail to claim something if you had already foreseen it?¹⁹⁹ Under this analysis, the category of unavoidable mistakes is basically a null set.²⁰⁰ The purported mistake would either not be a

195. See, e.g., *In re Wilder*, 736 F.2d 1516, 1519 (Fed. Cir. 1984) (“[F]ailure to appreciate the full scope of the invention is one of the most common sources of defects in patents.”).

196. Cf. *Rambus Inc. v. FTC*, 522 F.3d 456, 460–61 (D.C. Cir. 2008).

197. See *supra* text accompanying notes 23–24.

198. See KINNEY & LANGE, P.A., *INTELLECTUAL PROPERTY LAW FOR BUSINESS LAWYERS* § 3.8, at 63 (2008) (“Patent attorneys generally do not like to have applications allowed when they are first submitted.”).

199. See *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 344 F.3d 1359, 1370 (Fed. Cir. 2003) (en banc) (“[T]here can be no other reason the patentee could not have described the substitute in question.” (internal quotation marks omitted)).

200. *Meurer & Nard*, *supra* note 147, at 1987–91 (advocating greater claim refinement as a solution to mistakes in drafting).

mistake at all, but rather an attempt to capture an unforeseen product, or a mistake would be a negligent failure to capture a foreseen product.

As simple as the analysis is, it demands an understanding of reasonable behavior that is somewhat unrealistic. The nature of the problem comes from so-called “compliance costs.”²⁰¹ For example, a reasonable person should use turn signals when driving; and it is easy to foresee that failure to do so might result in an accident. But it is hard to ensure that one uses turn signals *every time* when turning and changing lanes—virtually nobody does so.²⁰² Similarly, it is easy to say that a reasonable person should be able to type an individual word without a typographical mistake, especially when typing an important contract; but it is almost impossible to ensure that a 1000-page contract is completely free from typographical error. The cumulative difficulty of perfect compliance (when each individual instance seems easy) leads to the almost oxymoronic phenomenon of reasonably negligent behavior.

Patent drafting mistakes are sometimes unavoidable due to compliance costs. It is difficult to ensure that a good claim leaves nothing foreseen out of its scope,²⁰³ just as it is difficult to ensure that a good contract has no typos. At the same time, deterring negligent behavior necessarily requires disregarding compliance costs, because it is impossible to tell ordinary negligence apart from inevitable compliance error.²⁰⁴ If saying that the accident occurred during that rare and unavoidable instance when you failed to use the turn signal were a defense to negligent driving, then every driver who failed to use the turn signal would argue it.

Ignoring compliance costs does have the effect of holding parties strictly liable for some unavoidable mistakes, as tort scholars have long recognized.²⁰⁵ But this is not a bad rule for patent drafting. First, there is no middle ground: either patentees can have amendments or they cannot. It is impossible to have a compromise position where patentees can amend if they show that the error was a result of unavoidable compliance-cost-induced mistakes—because nobody can tell whether the mistake was compliance cost induced.

Second, in the absence of a compelling justification, the law *shifts* loss only through a showing of negligence, and otherwise leaves the loss where it lies.²⁰⁶ The loss of monopoly profits initially falls upon the patentee, who must seek both PTO intervention (filing a continuation or reissuance) *and*

201. WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF TORT LAW* 72 (1987).

202. See Mark F. Grady, *Why are People Negligent? Technology, Nondurable Precautions, and the Medical Malpractice Explosion*, 82 NW. U. L. REV. 293, 306 (1988).

203. See Lichtman, *supra* note 29, at 2017 (“[I]t is hard to fault Tessera’s attorneys, who surely had their hands full perfecting the rest of that unwieldy 104-word descriptive articulation.”).

204. Grady, *supra* note 202, at 306.

205. *Id.* at 307 (“When courts exclude compliance costs, they effectively create a pocket of strict liability at the heart of the negligence rule.”).

206. See Henderson, *supra* note 178, at 390–94.

judicial intervention (adjudicating an infringement suit). The administrative cost counsels against such intervention. And patentees do not have a compelling justification to shift the loss from their mistakes to their competitors, even if the mistakes were unavoidable. The fact that a patentee unavoidably—and thus blamelessly—messed up his claim is hardly a reason that other blameless people (competitors and consumers) must now pay him for his unavoidable mistake.

Third, the major defect of a strict liability regime is that it induces perverse incentives and moral hazards.²⁰⁷ If drivers are held strictly liable for all accidents, then pedestrians have less incentive to look both ways before crossing the street; while holding pedestrians strictly liable induces drivers to drive recklessly. This is a problem when each party has some ability to avoid the loss. But, as discussed above, such ability by accused infringers is very rare in patent law.²⁰⁸ Not only is the analysis of potential patentee coverage very difficult for an accused infringer to conduct, but the accused infringer also has no idea why the patentee failed to claim something in the specification, with unavoidable mistake hardly being the only explanation. In the one area where the accused infringer does have an advantage—comparing the unamended claim to his particular product—he has an undiminished incentive to take all reasonable care. The moral hazard of reduced care by accused infringers is practically nonexistent even if strict liability for claim drafting is placed on patentees.

Finally, the problem of disregarding compliance cost is mitigated significantly by a causation requirement.²⁰⁹ Although it is inevitable that all of us will occasionally drive negligently, it rarely matters because we are lucky and our negligence causes no accidents. For patentees, not every claim-drafting mistake will cause a competitor to intrude upon the expected monopoly. The notice function of claims is a legitimate limit on claim amendments only when there is reliance, as the next section discusses.

3. Harmless Mistakes

The analysis up to now has emphasized the comparative advantage of patentees versus their competitors in avoiding losses from claim-drafting mistakes. Not all claim-drafting mistakes *cause* losses. First, if no competitors produce an infringing product even under the originally intended claim, no loss arises. Suppose the patentee mistakenly writes “cone” instead of “octagon” and therefore fails to claim octagonal coal cars, the mistake is harmless if no one produces octagonal coal cars. But even if a competitor did produce an octagonal coal car, the mistake is still harmless if the competitor would have chosen to produce octagonal coal cars no matter

207. See generally John Prather Brown, *Toward an Economic Theory of Liability*, 2 J. LEGAL STUD. 323 (1973) (concluding, after applying and analyzing economic models of a number of liability regimes, that strict liability is inefficient because it provides perverse incentives).

208. See *supra* text accompanying notes 190–194.

209. See LANDES & POSNER, *supra* note 201, at 230–33.

what—even at the risk of infringement damages, because in such a case it does not matter what the patentee writes in his claim. A claim-drafting mistake is only harmful if the competitor *relies* on the claim language.²¹⁰

Furthermore, it is important not to overdeter claim-drafting mistakes by punishing harmless mistakes.²¹¹ It is an inefficient use of social resources for patentees to spend money avoiding harmless mistakes.²¹² This applies regardless of whether the regime is governed by negligence or strict liability,²¹³ since without harm there is nothing to allocate.

Patents are public instruments, and reliance on issued claims is normally presumed.²¹⁴ But such reliance can only extend to issued patents, and indeed before issuance many patent applications are kept secret (giving competitors nothing upon which to rely).²¹⁵ Therefore, the possibility of competitor reliance does not serve as a rationale to limit claim amendments before issuance, because preissuance drafting mistakes cause no reliance harm. In other words, the notice function of claims is not undermined by preissuance amendment. In contrast, the definitional function and the possibility of misappropriating third-party insights applies any time after filing, and is not triggered by issuance.²¹⁶ The difference between the notice and definitional functions, separated by the issuance threshold, leads to different policy implications in Part III. Postissuance amendments should never be allowed, while preissuance amendment should be permitted in some circumstances.

III. SOME POLICY PROPOSALS

If written claims are to be meaningful, they cannot be changed at-will. But not all changes to claims are equally harmful. As described in the previous section, claims serve two functions. The first function is to force the patentee to *define* what he invented at the time of filing and prevent later

210. Jonathan A. Platt, Note, *Protecting Reliance on the Patent System: The Economics and Equities of Intervening Rights*, 47 CASE W. RES. L. REV. 1031, 1055 (1997) (arguing for a reliance requirement on intervening rights).

211. See Thomas C. Galligan, Jr., *Augmented Awards: The Efficient Evolution of Punitive Damages*, 51 LA. L. REV. 3, 49 (1990) (arguing that overdeterrence leads to inefficient overinvestment in safety).

212. Internalizing the *expected* harm ex ante is achieved by compensating the *actual* harm ex post. See POSNER, *supra* note 34, § 6.7, at 187–88 (noting that tort law fully compensates the actual harm to the “eggshell skull” victim to offset the lack of harm in the “rock skull” case).

213. See 63 AM. JUR. 2D *Products Liability* § 627 (1996) (describing proximate causation for strict products liability).

214. See *Boyden v. Burke*, 55 U.S. (14 How.) 575, 582 (1852) (“Patents are public records. All persons are bound to take notice of their contents . . .”). This presumption makes sense even when few people actually rely on patents in reality. Douglas Baird & Thomas Jackson, *Information, Uncertainty, and the Transfer of Property*, 13 J. LEGAL STUD. 299, 318–20 (1984). For one thing, under current law issued claims do not really bind patentees, while reading them increases the liability of potential infringers. Mark A. Lemley & Ragesh K. Tangri, *Ending Patent Law’s Willfulness Game*, 18 BERKELEY TECH. L.J. 1085, 1100–01 (2003). If claims actually provided meaningful notice, reliance may well increase.

215. 35 U.S.C. § 122 (2006).

216. See *supra* Section II.B.

incorporation of new insights that did not contribute to the patentee's original incentive. This definitional function applies any time after the patent is filed, since the patentee should be made to state his invention at the earliest opportunity after filing, much as a witness's testimony should be taken as soon as possible after the relevant event. By contrast, the *notice* function of claims and the allocation of loss from claim-drafting mistakes become relevant only after the claims are issued, when the public can rely on such notice. Because the definitional and notice rationales apply at different time periods, the policy implications are somewhat different. Specifically, I propose that amendments should be permitted in limited form before issuance, but should never be permitted after issuance.

A. *Preissuance Amendment Without Retroactive
Priority Against Third-Party Insights*

The first problem of allowing claim amendments is that patentees have a strong incentive to misappropriate later-arising insights through amendment, thereby expanding their monopoly. The reason this is problematic—aside from simple unfairness toward whichever party the insight is appropriated from—is that an expanded monopoly of this type creates social cost with very little incentive benefit in return. Because the later-arising insight was unforeseeable at the time of filing, the patentee derives little *ex ante* incentive from capturing it. However, the social cost remains the same.

Patentees should therefore not be permitted to capture later-arising insights that were unforeseen at the time of filing. The problem of undue windfalls by later amendment, however, need not result in the elimination of all claim amendments. Not all claim amendments, after all, are directed toward newly arising insights; some are simply attempting to fix mistakes. Although we would expect patentees to claim everything they foresee in an original claim, some claim-drafting mistakes are inevitable due to compliance costs. In the absence of competitor reliance (which occurs only postissuance), the possibility of abusing amendment to capture undue windfalls does not itself justify eliminating all claim amendments if there is a narrower solution.

The narrower solution is to deny claim amendments retroactive priority. Retroactive *priority* is very different conceptually from the retroactive *effect* of amended claims on a competitor's factory. A claim has retroactive effect when it makes a previously noninfringing activity infringing *ex post*—the factory that was built as a noninfringing factory must now be shut down. Retroactive priority of a claim, however, simply means that amended claims are treated as if filed on the date of the initial application and the patentee receives an unjustified windfall—it does not require any determination of infringement.²¹⁷ Take the following example:

217. Another way of understanding the distinction is that the harm of claims having retroactive effect is concentrated on the specific competitor who owns the factory that must be shut down. The harm of retroactive priority is more diffuse. The patentee gains an unjustified windfall in

January 1, 2000 Patentee files application.
January 1, 2001 Competitor comes up with insight.
January 1, 2002 Patentee files amendment claiming insight.

Under the current system, where the amended claim is treated for almost all purposes as filed on January 1, 2000, the patentee can gain an unjustified windfall from the value of new developments in the intervening period between 2000 and 2002. All that is necessary to prevent the system of amendment from being abused to capture this unforeseen value is to deny the amendment this retroactive priority and consider it as claiming an invention on January 1, 2002. The amended claim then becomes unpatentable, because the competitor's insight becomes prior art once the amended claim is given the later priority date.²¹⁸

The denial of retroactive priority effectively precludes appropriation of later developments through amendment.²¹⁹ This preserves claim amendments during the patent prosecution process for legitimate uses—to fix claim-drafting mistakes during a period when such mistakes are largely harmless. The harmless mistake rationale, however, does not hold after the patent issues. Once the patent issues, there is no compelling justification for amending its boundaries.

B. *End Postissuance Claim Amendments*

The two problems of claim amendments—windfalls to patentees through capturing later information and frustrating public reliance on claim language—become more problematic over time. At the time of patent filing, there are usually no later insights to capture. Before the patent issues, competitors and the public have little upon which to rely.²²⁰ Thus, while some limit on preissuance claim amendments is necessary to prevent the patentee from capturing unanticipated windfalls, the protection of competitors and public notice is not a compelling rationale until after the issue of the patent.

The flip side of the coin is that, once a patent issues and becomes potentially subject to competitor reliance, the increased risks of later insights being retroactively captured and competitor harm strongly counsel against permitting further claim amendments. There are now more insights to capture because of the passage of time, and because competitors have an

capturing later insights. This harms not only the competitor whose insight was misappropriated, but also everybody else, since the cost of a broadened patent is social. The social harm of a broadened monopoly is why prior user rights (which alleviate the harm to a specific competitor) are not an adequate solution for amendments that capture unforeseen developments. *See infra* text accompanying notes 260–262.

218. *Peters v. Active Mfg. Co.*, 129 U.S. 530, 537 (1889) (“That which infringes, if later, would anticipate, if earlier.”).

219. The priority is only important against third-party activity. The patentee's own activities should not create a statutory bar against amendment.

220. *See supra* text accompanying notes 214–216.

incentive to improve upon patent disclosures.²²¹ These improvers (or pirates, depending on perspective) are also more likely to find unexpected prior art than patent examiners who rely on applicants to disclose prior art in ex parte examination proceedings.²²² The very fact of issuance and attendant publicity leads to the creation of more insights. Thus, while the problem of capturing new insights is not unique to postissuance conditions, it becomes a greater concern in the postissuance era.

Patent issuance also gives competitors and the public a legitimate reason to expect that the claims fully define the invention. The issued claims are supposed to “inform the public during the life of the patent of the limits of the monopoly asserted, so that it may be known which features may be safely used or manufactured without a license and which may not.”²²³ Claims that may be changed later simply do not inform anybody of what can be “safely used or manufactured without a license,” and certainly do not do so through “the life of the patent.”

As compared to the great harms of permitting postissuance claim amendment, the risk of penalizing harmless claim mistakes is diminished by the time of issuance. An original patent application takes, on average, about two years to issue.²²⁴ If the patentee cannot discover and correct an innocent mistake within that time, the chance is minimal that he will: (1) discover the mistake after issuance; (2) before the mistake causes harm to competitors, and (3) not have that discovery spurred by competitor insights. A bright-line rule forbidding postissuance claim amendments thus fixes a stable patent boundary, promotes notice, secures competitor reliance, discourages the retroactive claiming of unforeseen insights, and is unlikely to impose disproportionate costs on the incentive to invent.²²⁵

Postissuance claim amendments are currently permitted during reissuance and reexamination proceedings, and through continuations. None of these devices need be completely abolished. Because patentees can file multiple original claims, a single overbroad claim can be canceled using reissuance or reexamination, with the narrower claims being rewritten for

221. *State Indus. v. A.O. Smith Corp.*, 751 F.2d 1226, 1236 (Fed. Cir. 1985). The incentive to improve was traditionally protected by the experimental use defense. *See Chesterfield v. United States*, 159 F. Supp. 371, 376 (Ct. Cl. 1958); *Sawin v. Guild*, 21 F. Cas. 554, 555 (C.C.D. Mass. 1813) (No. 12,391). The experimental use defense is now effectively dead. *Madey v. Duke Univ.*, 307 F.3d 1351 (Fed. Cir. 2002).

222. *See* 37 C.F.R. § 1.56 (2008) (applicants' duty to disclose prior art to the PTO); Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 Nw. U. L. Rev. 1495, 1528 (2001) (“Examiners do not in fact spend long hours poring over a patent application or the prior art. They spend very little time, and far less than either the lawyers or the triers of fact in infringement cases.”).

223. *Permutit Co. v. Graver Corp.*, 284 U.S. 52, 60 (1931).

224. Lemley & Moore, *supra* note 31, at 71–73. Average pendency for all patents (including continuations) is about thirty-two months. PTO ANNUAL REPORT, *supra* note 38, at 16.

225. If the rule is considered overly harsh, we can achieve almost as good a result by demanding a very high standard of proof for postissuance amendments. One example is the standard for postissuance judicial correction, which requires that the mistake be shown to be (1) harmless, (2) not subject to reasonable debate, and (3) apparent from the face of the patent. *See Hoffer v. Microsoft Corp.*, 405 F.3d 1326, 1331 (Fed. Cir. 2005).

stylistic purposes (without substantive amendment), a common practice known as “rewriting into independent form.”²²⁶ Continuation applications also have legitimate uses that do not involve misappropriating later insights or undoing competitor reliance; namely that continuations are useful to continue prosecution of original claims when there is reasonable disagreement about their patentability between applicant and examiner, which need not always involve an appeal.²²⁷ Thus, I am not proposing to end any of these devices, only to end their use in facilitating postissuance claim amendments.

IV. CONSIDERING OBJECTIONS

A. *The Sky Has Not Fallen*

One simple objection to my analysis might be that, even if freely amending claims might create problems in theory, it is a longstanding feature of the U.S. patent system that has not caused significant problems in practice.²²⁸ Although anecdotal accounts of claim amendment abuse are common,²²⁹ the plural of anecdote is not data. Moreover, while the worst possible abuses are made possible by postissuance amendment, empirically continuations account for only 23 percent of issued patents,²³⁰ and reissuance and reexamination are even rarer. If laying traps for unwary competitors is so profitable, why don't patentees do it all the time?

This rosy view of the current system needs some qualification. First, there is good evidence that uncertain boundaries do cause problems for the patent system, given that the patent system appears to induce more litigation costs than research and development expenditure.²³¹ Frequent litigation is a good proxy for failing boundaries and inadequate notice because the purpose of clear boundaries is to allow private ordering without litigation.²³² Second, continuations and other amendment devices contribute disproportionately to litigation and thus the notice failure of the patent system.

226. See generally *Honeywell Int'l, Inc. v. Hamilton Sundstrand Corp.*, 370 F.3d 1131, 1141–43 (Fed. Cir. 2004) (en banc).

227. Lemley & Moore, *supra* note 31, at 96–97. Of course, there is a point at which reasonable disagreement becomes an unreasonable effort to wear down the examiner's patience by repetitive filing. *Id.* at 74–76. There is no good reason for filing a large number of repetitive continuations. See Lichtman, *supra* note 29, at 2018 (describing one such effort by GemStar-TV Guide International).

228. See Schreiner & Doody, *supra* note 10, at 559–60.

229. See, e.g., *Rambus Inc. v. FTC*, 522 F.3d 456, 460–61 (D.C. Cir. 2008) (using amendment to capture later-developed industry standard); *Symbol Techs., Inc. v. Lemelson Med., Educ. & Research Found.*, 422 F.3d 1378, 1380 (Fed. Cir. 2005) (describing a chain of seventeen continuations).

230. Lemley & Moore, *supra* note 31, at 69.

231. BESSEN & MEURER, *supra* note 6, at 130–44.

232. Kimberly A. Moore, *Forum Shopping in Patent Cases: Does Geographic Choice Affect Innovation?*, 79 N.C. L. REV. 889, 928 (2001) (“Unpredictability or uncertainty in the boundaries of the patent holder's property right . . . will divert resources from innovative efforts (research and development) to enforcement (transaction or litigation costs) . . .”); Rich, *supra* note 20, at 501.

Although continuations account for only 23 percent of issued patents, they account for 52 percent of litigated patents.²³³ Therefore, remedying the uncertainty problem is worthwhile and claim amendments that makes patent boundaries constantly movable is a significant factor in this uncertainty.

As for the fact that not every patentee files multiple claim amendments, a likely explanation is the cost of continuations (which are by far the most important procedural device for amendment). Although one could theoretically keep a chain of continuations running for all twenty years of the patent lifespan and thereby achieve continuous amendment, doing so is expensive because each continuation requires a fee and an attorney to prosecute it,²³⁴ and each continuation only lasts for a few years before a new one must be filed.²³⁵ In this way, the expense of continuing patent prosecution acts as a “costly screen.”²³⁶ Another way of implementing a bar to postissuance claim amendments, or of reducing the number of preissuance amendments, would be to charge a prohibitive fee for the privilege.

Despite already substantial PTO fees, however, it appears that applicants are filing more claim amendments than ever.²³⁷ Nor can PTO fees be raised much further, since they are either statutorily mandated or can only be raised to recover the costs of the PTO,²³⁸ not for broad social policy purposes such as protecting the notice and definition functions of written claims.²³⁹ Thus, while PTO fees have been a useful procedural limit on abuse of claim amendment—a way of limiting the damage—more direct substantive limits should be considered.

233. Lemley & Moore, *supra* note 31, at 70; *see also* John R. Allison et al., *Valuable Patents*, 92 GEO. L.J. 435, 457 (2004) (“[E]ach litigated patent resulted from an average of 2.57 different applications . . .”).

234. The exact math depends on how the continuation “chain” is implemented. Filing a formal continuation application (necessary for the original patent to issue) incurs a fee of \$1090 (the sum of the filing, search, and examination fees). 37 C.F.R. § 1.16 (2008). Filing a request for continued examination incurs a fee of \$810. 37 C.F.R. § 1.17(e) (2008). These are *per application* amounts and quickly add up.

235. Lichtman, *supra* note 29, at 2018.

236. *See* Jonathan S. Masur, *Costly Screens and Valuation Asymmetries* (Univ. of Chi., Pub. Law Working Paper No. 205, 2008), *available at* <http://ssrn.com/abstract=1105184> (arguing that PTO costs have the more general effect of screening out low value patents).

237. Allison et al., *supra* note 233, at 458 (“[A]pplicants are increasingly securing their ability to file additional claims through an extensive continuation practice.”); Lemley & Moore, *supra* note 31, at 69 (“[T]he trend has been a steady increase.”).

238. *See* 35 U.S.C. § 41(d) (2006).

239. Arti K. Rai, *Growing Pains in the Administrative State: The Patent Office’s Troubled Quest for Managerial Control*, 157 U. PA. L. REV. 2051 (2009) (describing the political difficulties of raising PTO fees and the current incentive to grant more patents to generate more fees).

B. Maintaining Patentee Incentives

A major concern with limiting the ability of patentees to amend claims is that it will reduce incentives to invent and disclose inventions.²⁴⁰ The patent system involves a trade-off between these incentives and the cost of monopoly.²⁴¹ Reducing patentee options ex post will inevitably work to reduce ex ante incentives to some extent.

Of course, if no reduction in patentee incentives were to be permitted, then we would have patents of unlimited scope and infinite duration, which would harm innovation as inventors are almost always both patentees and users of inventions patented by others. The point of the patent system is to balance incentives and cost.²⁴² My point in this Article is to propose improvements that, overall, will save society more in monopoly cost than the reduction in patentee incentives. The fact that patentee incentives may be reduced to some extent is not a persuasive barrier if those reduced incentives are offset by other social benefits.

Limiting the ability of patentees to engage in misappropriation of later insights by amendment serves this purpose because of the unequal discounting differential, as described in Section II.B. The inability to capture unforeseen developments does little to reduce prefiling incentives—the logical corollary of the fact that unforeseen windfalls do little to increase prefiling incentives. Once the significant monopoly cost incurred in conferring the windfall is considered, the balance points to limiting the use of amendments to capture unforeseen developments.

Similarly, although patentees may feel reduced incentives from being forced to bear the loss of their mistakes, this is offset by the gains in incentives from competitors in being able to rely on written claims and increase competition in legitimate products. To take the driving analogy once more, if I can drive recklessly and make the pedestrians I hit pay for the damage, I will have tremendous incentives to drive more often, with the benefit that I will get to places I need to go faster. However, this incentive is not worth the cost, the cost being that pedestrians will stop walking when I am in the area. Likewise, the fact that patentees can intentionally draft misleading claims and redefine their inventions later traps competitors into infringement.²⁴³ Since competitors thus trapped cannot rely on claims to avoid future infringement and have no other cost-effective means of ascertaining patent boundaries (exhaustively analyzing every patent specification and the entire

240. See Jeanne C. Fromer, *Claiming Intellectual Property*, 76 U. CHI. L. REV. 719, 772–81 (2009) (analyzing the costs and benefits of claiming practice from a rules-versus-standards perspective).

241. See *supra* text accompanying notes 136–139.

242. *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 150–51 (1989).

243. The most infamous example may be Rambus Inc., which participated in a standards-setting organization, denied it had patents covering the proposed standard, and then changed its claims to cover the issued standard after it had been adopted by an entire industry. See *Rambus Inc. v. FTC*, 522 F.3d 456 (D.C. Cir. 2008) (ruling in favor of Rambus); *Rambus Inc. v. Infineon Techs. AG*, 318 F.3d 1081 (Fed. Cir. 2003) (same).

prior art being cost-prohibitive), they must treat occasional patent infringement as an unavoidable cost of doing business, raising prices and reducing quantity on *all* goods (whether or not eventually found to be infringing).²⁴⁴ Consumers are thus made worse off as a result.

C. *The Efficiencies of Delayed Adjudication*

Another argument for allowing postissuance amendment is that it saves the bulk of administrative and judicial resources for the patents that really matter: those that are involved in litigation or at least licensed.²⁴⁵ Under this theory, ex ante claim drafting and examination is largely an inefficient use of social resources, because only 5% of patents will eventually be litigated or licensed.²⁴⁶ The ex ante resources spent on prosecuting and examining the remaining 95% of patents turn out to be wasteful, since those patents do not matter.

As applied to PTO *examination*, I have no disagreement with this argument.²⁴⁷ If a patent covers an invention that nobody wants and nobody infringes (e.g. a Rube Goldberg machine), then we never have to consider its validity, because nobody cares. In such cases, the resources spent on ex ante examination truly are wasted.

But the lack of litigation and licensing does not indicate that the resources spent on ex ante claim drafting are wasted. First, how do we figure out if a patent covers only a worthless invention, so as to not bother to litigate or license it? By looking at the claims. Second, the worthlessness of an invention is not the only reason not to license or litigate its patent. Rather, a patentee who is practicing a very valuable patent can also avoid litigation, if the scope and validity of that patent is clear. Thus, clarifying scope early permits a fast and certain determination by all potential players without requiring litigation,²⁴⁸ which is the whole point of having claims. The fact that 95% of patents are quickly determined to be worthless and never litigated is a *success*, not a failure.²⁴⁹ Indeed, if the rate of patent litigation even approaches 5%, this would show systemic failure in comparison to other property systems.²⁵⁰ Imagine the chaos that would result if even 1% of all real property deeds were so ambiguous that parties had to go to court to

244. See Lemley, *supra* note 110, at 21–22.

245. Hubbard, *supra* note 30, at 359–62.

246. Lemley, *supra* note 222, at 1507.

247. Tun-Jen Chiang, *A Cost-Benefit Approach to Patent Obviousness*, 82 ST. JOHN'S L. REV. 39, 77–78 (2008).

248. Rich, *supra* note 20, at 501.

249. See generally George L. Priest & Benjamin Klein, *The Selection of Disputes for Litigation*, 13 J. LEGAL STUD. 1 (1984) (noting that litigation is caused by uncertainty in outcome).

250. The actual rate of litigated patents is very hard to determine. Jean Lanjouw and Mark Schankerman found an overall rate of nineteen case filings for every 1000 patents, which would translate to a rate of about 1.9 percent; but each case may involve more than one patent, and a patent may be litigated in more than one case. See Jean O. Lanjouw & Mark Schankerman, *Protecting Intellectual Property Rights: Are Small Firms Handicapped?*, 47 J.L. & ECON. 45, 55 (2004).

resolve their boundaries: given the hundreds of millions of homes and other properties across the United States, the court system would quickly become overwhelmed.

To be sure, it is possible to imagine a world where *ex ante* claim drafting is extremely costly, and *ex post* determination without claims is extremely cheap,²⁵¹ such that the efficient mechanism is *ex post* delineation of scope. Some patents are clearly worthless even without looking at the claims—e.g., fanciful inventions such as perpetual-motion machines. If the number of facially worthless patents is sufficiently high (thus the cost of *ex post* determination sufficiently low), and the cost of claim drafting is also high, then *ex ante* claim drafting becomes inefficient. Such a hypothetical world, however, is not one that we live in, if history is any guide.²⁵² And if such a world ever came into being, the efficient solution would be to abolish *ex ante* claim drafting and permit omnibus claims—not to require detailed claims that are costly to draft and also permit them to be changed later.

D. *Less Drastic Alternatives*

1. *Prior User Rights*

In a report addressing the problems of the patent system, the Federal Trade Commission identified the phenomenon of misappropriation by amendment as a problem and proposed “prior user rights” as a solution.²⁵³ A prior user right is a personal right to continue a prior course of business, even though an intervening patent now makes the course of business infringing.²⁵⁴ For example, if I build a factory to make tables, and a patent on tables then issues to a competitor, I would normally be required to stop using the factory. A prior user right would permit me to keep using the factory to make more tables, despite the newly issued patent.

The timing mechanics of prior user rights function similarly to my proposal of denying priority to claim amendments. In each case, the time sequence is identical: the patentee files the application, then a competitor develops a new product, after which the original patentee amends his claim to capture the competitor’s later-developed insight. The difference between a prior user right and my proposal is that a prior user right gives the third

251. See MERGES & DUFFY, *supra* note 9, at 211 (suggesting that the lax utility requirement allows the screening out of clearly inoperable inventions at low cost, and leaves the market to winnow out the rest).

252. See *Keystone Bridge Co. v. Phoenix Iron Co.*, 95 U.S. 274, 278 (1877) (describing determining infringement without claims as “inference and conjecture”); *Merrill v. Yeomans*, 94 U.S. 568, 573 (1877) (citing the “growth of the patent system” as requiring greater clarity in language to keep the system functioning).

253. FED. TRADE COMM’N, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY 16 (2003) [hereinafter FTC REPORT], available at <http://www.ftc.gov/os/2003/10/innovationrpt.pdf>.

254. See, e.g., 35 U.S.C. § 273 (2006) (describing prior user rights for business method patents).

party a personal right to use the product with the patentee, creating a *duopoly*.²⁵⁵ My proposal invalidates the amended claim outright, creating *competition*.²⁵⁶ Which of these effects is better?

One quick response might be that we always prefer competition to duopoly to monopoly, but this is an overstatement. The monopoly profits of a patent are inseparable from the incentive to invent.²⁵⁷ In some circumstances, if we were attempting to incentivize the patentee while protecting the incentives of one particular third-party competitor, creating a duopoly between them that splits the profits between these parties may be a good compromise.²⁵⁸ Indeed, where patent incentives are necessary for both a pioneer and subsequent improver, patent law creates such a duopoly by granting overlapping patents.²⁵⁹

In the context of capturing unforeseen later developments, however, we are neither attempting to incentivize the patentee nor are we protecting the interest of any single competitor. The cost of broadening a patentee's monopoly is social—everyone pays higher prices for the monopoly—and this social cost is not usually borne by any single competitor.²⁶⁰ Moreover, the incentive to the patentee is simply not present, because the windfall gain was unforeseen at the time of filing.²⁶¹ Paying monopoly profits to a patentee for no incentive gain is a bad deal. Paying duopoly profits for no incentive gain is marginally better, since duopoly profits are lower,²⁶² but it is still a bad deal.

While the unfairness intuition points to protecting the particular competitor whose insight is captured by the patentee (in which case a personal right to that competitor might suffice), the economic rationale of balancing monopoly cost with incentive benefit suggests that prior user rights are insufficient to protect society. Allowing prior user rights still permits patentees

255. Carl Shapiro, *Prior User Rights*, AM. ECON. REV., May 2006, at 92, 92.

256. I am assuming that the competitor cannot obtain his own patent on the new insight (a "blocking patent"). If the competitor's insight is so significant that he can obtain a blocking patent, then the difference is not between competition and duopoly but how the single monopoly profit will be split. Even in this context, the misallocation is harmful because a patentee who reaps windfall profits inefficiently reduces the share to later improvers, reducing the reward in the race for improvement patents. See Merges & Duffy, *supra* note 9, at 892–93.

257. Rich, *supra* note 138, at 479.

258. See Samson Vermont, *Independent Invention as a Defense to Patent Infringement*, 105 MICH. L. REV. 475, 498 (2006) (arguing that an independent-invention defense that creates a duopoly between patentee and later independent inventor provides efficient incentives for both).

259. See Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 TEX. L. REV. 989, 1000–11 (1997) (describing the differential treatment for minor improvements that receive no patent, and significant improvements that receive their own blocking patent); Robert Merges, *Intellectual Property Rights and Bargaining Breakdown: The Case of Blocking Patents*, 62 TENN. L. REV. 75 (1994) (same).

260. The social cost may be privatized if there is only one competitor, either due to market dynamics or because the competitor holds a blocking patent.

261. See *supra* Section II.B.

262. DENNIS W. CARLTON & JEFFREY M. PERLOFF, *MODERN INDUSTRIAL ORGANIZATION* 161–70 (4th ed. 2005) (describing Cournot duopoly); Vermont, *supra* note 258, at 498 (same).

to retain a significant windfall. To prevent undue windfalls, patentees should not be permitted to capture unforeseen insights at all.

2. Intervening Rights

Separate from the problem of undue windfalls, there is the problem of competitor reliance on issued claims. The traditional method of protecting competitor reliance has been intervening rights,²⁶³ which exempt competitors from damages prior to the completion of a reissuance or reexamination proceeding, if claims are amended during those proceedings.²⁶⁴ A court may also permit (in its discretion) a personal right to continue infringement.²⁶⁵ A competitor that builds a factory to make three-legged tables may be permitted to continue using the factory, even if a reissued claim now makes the three-legged tables infringing. In this way, intervening rights function quite similarly to prior user rights.

A robust application of intervening rights—and extending them to cover all postissuance amendments, including those made through continuations—can mitigate many of the notice harms I have described.²⁶⁶ At the same time, intervening rights are a second-best substitute for ending postissuance claim amendment altogether.

First, intervening rights cannot address the definition problem—patentees using amendment to capture later insights as windfalls—since intervening rights also create a duopoly. The problem of unanticipated windfalls becomes more significant during the postissuance era because the simple passage of time increases the risk of unanticipated windfalls occurring and because issuance creates an incentive to design around and make improvements.²⁶⁷ Indeed, the most common situation where intervening rights arise today—reexamination to overcome newly discovered prior art—is a situation where patentees amend claims in response to unforeseen developments (in this case, previously unknown prior art).²⁶⁸

Second, courts have not been particularly robust in applying intervening rights to protect competitors. While courts do have discretion to permit continuing use, this discretion is exercised sparingly and usually with stringent limits.²⁶⁹

263. See *supra* text accompanying notes 49–51.

264. See Section II.B.

265. See *BIC Leisure Prods., Inc., v. Windsurfing Int'l, Inc.*, 1 F.3d 1214, 1220 (Fed. Cir. 1993) (describing intervening rights).

266. Lemley & Moore, *supra* note 31, at 109–11 (advocating intervening rights as a solution to the problems created by continuations).

267. See *supra* text accompanying notes 221–222.

268. See 35 U.S.C. § 303 (2006) (requiring a “substantial new question of patentability” to commence reexamination).

269. See, e.g., *Seattle Box Co. v. Indus. Crating & Packing Inc.*, 756 F.2d 1574, 1581 (Fed. Cir. 1985) (permitting infringer to dispose of existing inventory, but nothing more); *Plastic Container Corp. v. Cont'l Plastics, Inc.*, 607 F.2d 885, 902–03 (10th Cir. 1979) (holding that there is no right to continue infringement when infringer had already made substantial profits); *Halliburton Co.*

Third, under *Shockley v. Arcan, Inc.*,²⁷⁰ willful infringement of a reissued patent creates unclean hands against continuing use.²⁷¹ However, since the failure to immediately *cease* clear infringement is considered willful,²⁷² this creates an almost perfect Catch-22: a defendant seeking equitable intervening rights is seeking to continue infringement, but continuing infringement creates unclean hands and bars equitable intervening rights (the “equitable” aspect is what allows continuing infringement).²⁷³ To be sure, an infringer could cease his activity upon being notified of the reissued patent, file a declaratory judgment lawsuit, and *then* ask for permission to restart infringement after the case has been adjudicated. But this is hardly a practical option, since the sunk cost of investment and the hardship of changing course is precisely the problem that equitable intervening rights is designed to address. The competitor who can afford to cease infringement for the pendency of a multiyear patent lawsuit is not the one that most needs equitable intervening rights.

3. Limiting the Number of Continuations

The problem of unlimited claim amendments has also been noticed by the PTO. The PTO attempted to address this problem in 2007 by enacting regulations that would have limited the number of continuations to three, with additional continuations requiring good cause.²⁷⁴ These regulations were enjoined by a district court.²⁷⁵ After a change of administration, the PTO then rescinded the regulation.

Given the problems caused by unlimited claim amendment, limiting the number of continuations (the worst method of claim amendment) to three would have been a good start. At the same time, three continuations still provide a total of seven rounds of claim amendment, six of those potentially after the issuance of a first patent.²⁷⁶ Therefore, even under the PTO’s

v. Western Co., 10 U.S.P.Q.2d 1973, 1983 (W.D. Okla.), *aff’d*, 883 F.2d 1027 (Fed. Cir. 1989) (holding that there is no right to continue infringement when investment made prior to original patent issuance).

270. 248 F.3d 1349 (Fed. Cir. 2001).

271. *Shockley*, 248 F.3d at 1361.

272. *Golight, Inc. v. Wal-Mart Stores, Inc.*, 355 F.3d 1327, 1339 (Fed. Cir. 2004).

273. The Federal Circuit recently made it harder to prove willful infringement by requiring that the infringement be very clear by the time of the ultimate judgment. *In re Seagate Tech., LLC*, 497 F.3d 1360, 1370–71 (Fed. Cir. 2007) (en banc). Because many patents have vague language that allow plausible noninfringement arguments, *Seagate* makes willful infringement hard to prove in most cases. One likely exception is a reissued patent designed to capture a new competitor product, where the claim language has been retroactively polished so that infringement will be very clear.

274. Patent and Trademark Office, Changes To Practice for Continued Examination Filings, 72 Fed. Reg. 46716, 46837–41 (Aug. 21, 2007). The precise formulation was two formal continuation applications and one request for continued examination. *Id.*

275. *Tafas v. Dudas*, 541 F. Supp. 2d 805 (E.D. Va. 2008), *appeal pending*, No. 2008-1352 (Fed. Cir.).

276. Each continuation provides two rounds of claim amendment. 37 C.F.R. § 1.113 (2008). The original application receives one round of claim amendment as-of-right. 37 C.F.R.

proposal, claim changing through multiple continuations would have persisted for years after a patent first issued, resulting in meaningless and uncertain boundaries for that entire duration until the third continuation was exhausted.

Numerical limits on continuations also have the potential to be overly restrictive. Not all continuation applications are bad. Some are used to keep pursuing original claims while avoiding the expense of an appeal, and continuations can also be used to fix mistakes *prior* to issuance of any patent.²⁷⁷ Although I am inclined to think that three continuations should be more than enough for these legitimate purposes (and patentees could have petitioned for more under the PTO rules if they have good cause), the focus should remain on the substantive harm of claim amendment rather than the particular procedural vehicle by which such amendments are pursued.

E. *Perverse Incentives and Patentee Adaptations*

Finally, it bears consideration whether my proposal might generate perverse incentives or be easily circumvented through patentee adaptations. Two such adaptations come to mind: writing very vague claims that replicate omnibus claims, and filing patent applications later. While both present some problems, these adaptations are still less problematic than the present system of unlimited amendment.

1. *Vague Claims as Substitutes for Changeable Claims*

It is often argued that, if patentees were strictly constrained by the literal text of claims, then they would simply draft very vague claims.²⁷⁸ This argument has some force. An omnibus claim, after all, is a very vague claim. But the problem is much more limited than it appears at first glance.

An important conceptual distinction must be made between *broad* patent claims and *vague* patent claims. A broad patent claim is one that covers many things. A vague patent claim is one that might cover many things, but also might cover very few things—the vagueness comes from the indeterminacy regarding what the claim covers.²⁷⁹ A claim can be broad without being vague: “I claim the entire universe” is a broad but very clear claim.²⁸⁰ On the other hand, a truly vague claim is always *potentially* quite broad, but it can be centered on a core that is quite narrow.

§§ 1.111–112 (2008). Thus an original application plus three continuations result in seven rounds of amendment.

277. See *supra* text accompanying note 206.

278. Samson Vermont, *Taming the Doctrine of Equivalents in Light of Patent Failure*, 16 J. INTELL. PROP. L. 83, 92 (2008).

279. TIMOTHY A.O. ENDICOTT, *VAGUENESS IN LAW* 1 (2000) (defining vagueness as indeterminacy).

280. See *O'Reilly v. Morse*, 56 U.S. (15 How.) 62, 112–13 (1854) (finding it “impossible to misunderstand the extent” of Morse’s claim, and that it was “too broad”).

Assuming that the claims are all valid, a patentee will prefer a clearly broad claim over a vague claim, and a vague claim over a clearly narrow claim. But the relevant question is not whether the patentee will prefer a vague claim to a clearly narrow claim, but rather whether the patentee will prefer a vague claim with a particular expected average or a certain claim with that same average. That is, assuming a definite claim that will cover five types of widgets, does the patentee prefer a more vague claim, which might ultimately cover ten types of widgets, or nothing at all, depending on how a court construes it?

If the construction by a court later is unbiased, and the patentee is risk averse, then he will prefer the more certain claim, since the vague claim is by definition more risky.²⁸¹ And the requirement of unbiased claim construction is where the problem lies. For an omnibus claim, the claim construction is biased because it grants the patentee the broadest scope the law allows, *incorporating all later information* (such as newly discovered prior art). The retroactivity of omnibus claim construction—by *ex post* giving the patentee the benefit of all subsequent insights and discoveries of prior art—is why patentees prefer omnibus claims. The same is true to some extent of other claims. Courts allow hindsight bias to creep into claim construction so that vague claims are construed to avoid invalidity,²⁸² to give “pioneering” patents greater scope,²⁸³ and to allow greater scope for infringement than invalidity.²⁸⁴ These claim construction doctrines give the patentee the benefit of later information, which creates a patentee preference for vagueness. This is akin to coin-tossing with a biased coin, leading to a natural preference to bet because the odds of winning are better than 50 percent.

The fact that claim construction doctrine biases vague language in favor of the patentee, however, is an argument for reforming claim construction doctrine,²⁸⁵ not for maintaining changeable claims as an alternative. Moreover, the hindsight bias is one that courts have addressed to some extent, with a recent emphasis on giving claims their original meaning at the time those claims were written.²⁸⁶ If claims were consistently construed to remove the hindsight advantage, then patentees would have no incentive to create greater uncertainty for their own rights with very vague claims. Indeed, history shows that patentees, like all other people, prefer certainty over vagueness: it was patentees who developed written claims to create greater

281. For the definition of risk, see *supra* note 140.

282. *Klein v. Russell*, 86 U.S. (19 Wall.) 433, 466 (1874); *Turrill v. Mich. S. R.R. Co.*, 68 U.S. (1 Wall.) 491, 510 (1864) (construing claim narrowly to avoid newly presented prior art).

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

284. *Tate Access Floors, Inc. v. Interface Architectural Res., Inc.*, 279 F.3d 1357, 1367 (Fed. Cir. 2002) (requiring higher standard to prove invalidity). *But see Peters v. Active Mfg. Co.*, 129 U.S. 530, 537 (1889) (“That which infringes, if later, would anticipate, if earlier.” (internal quotation marks omitted)).

285. Lemley, *supra* note 1, at 105 (arguing for fixed meaning).

286. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc); see *Nazomi Commc’n, Inc. v. ARM Holdings, PLC*, 403 F.3d 1364, 1368–69 (Fed. Cir. 2005) (cautioning against putting “the validity cart before the claim construction horse”).

certainty in their rights, over the extremely vague “substantial similarity” standard.²⁸⁷

2. *Delayed Initial Filing as an Alternative to Amendment*

One other alternative that patentees may engage in is to delay the filing of their original patent applications. Since the original claims are not fixed until the patent application is filed, delaying the filing of the application allows the original claims to themselves be updated in light of new developments.

The reason this works is because the original application (and the original claims) can receive retroactive priority to an even earlier time: the time of “invention” under 35 U.S.C. § 102(g).²⁸⁸ The mechanics of this delay tactic become exactly the same as retroactive priority for amendment.²⁸⁹ This is a consequence of the unique “first to invent” system of priority in the United States, where (given adequate proof) the priority of an application can be retroactive to the date that the patentee conceived the invention in his mind, rather than when he files the application in the PTO.

Given the exact same mechanics at play, one simple solution is to abolish retroactive priority for original claims and simply accord them the priority date of their filing. Indeed, pending legislation is well on track to move the United States to a “first to file” system that will do precisely this.

Although there is much to be said for the solution of removing retroactive priority for original claims, one countervailing consideration is in order: the early filing of an application has consequences not only for priority, but also for the patent term, which is keyed to the date of filing (not invention).²⁹⁰ Moreover, this is deliberate, so that a patentee can secure twenty-one years of effective monopoly through the first-to-invent system.²⁹¹ The sum is that changing priority rules for the original filing (as opposed to amendments) involves many more moving parts that are liable to cause unanticipated consequences, bespeaking caution in the process.

Moreover, although patentees may theoretically be able to delay their filing and then claim retroactive priority under section 102(g), in practice this is very hard to do.²⁹² And retroactive priority extends, at most, to one year.²⁹³ Thus, while a few patentees may attempt to delay their original applications in order to incorporate later developments, the high cost of delaying an

287. Duffy, *supra* note 93, at 309–10.

288. For a summary of the 102(g) rules, see MERGES & DUFFY, *supra* note 9, at 440–41.

289. See *supra* text accompanying notes 217–218.

290. 35 U.S.C. § 154 (2006).

291. See MERGES & DUFFY, *supra* note 9, at 59–60.

292. Edward G. Fiorito, *Highlights of Selected Recommendations of the Advisory Commission on Patent Law Reform*, 1 TEX. INTELL. PROP. L.J. 11, 16 (1992) (noting that far less than 1 percent of applications enter the 102(g) interference process, and the senior party (first-to-file) usually wins).

293. 35 U.S.C. § 102(b) (2006).

original application²⁹⁴ means such abuse is likely to be significantly less worrisome than the present system when such delay is much more pervasive and long-lasting.

CONCLUSION

Because patentees have broad freedom to file multiple original claims, resort to claim amendment after filing occurs for only two reasons: (1) to react to unforeseen developments discovered after filing, or (2) to correct a mistake in articulating what the patentee foresaw at the time of filing. Both of these motivations pose significant problems. Permitting a patentee to capture unforeseen developments confers an inefficient windfall upon him. Permitting the patentee to correct his own drafting mistakes shifts the loss of those mistakes onto competitors, reducing the patentee's incentives to take reasonable care.

To eliminate these perverse incentives, I propose eliminating postissuance amendment. This preserves competitor reliance on issued claims, fixes a meaningful patent boundary, and gives patentees efficient incentives to take proper care in drafting claims. Because competitor reliance is much diminished before issuance, and because harmless mistakes in claim drafting will occur and can be efficiently remedied during prosecution, preissuance amendments should be permitted. Such preissuance amendments, however, should not be permitted to capture later third-party insights, and denial of retroactive priority to preissuance amendment permits their use in curing of mistakes while preventing the possibility of retroactive capture.

Beyond such a technical analysis, the problems of unlimited claim amendment are really quite intuitive. A claim subject to unlimited post hoc amendment is useless as a boundary, since it neither defines the patentee's real ability to exclude nor provides meaningful notice to competitors. A fence that could be moved tomorrow is not a fence that anyone should rely on to determine where to build a house. The very purposes of having a written claim—definition and notice—require that the written claim be meaningful and binding. A binding claim, of course, cannot be one that is changeable at will.

294. See George E. Frost, *The 1967 Patent Law Debate—First-to-Invent vs. First-to-File*, 1967 DUKE L.J. 923, 938–39 (discussing advantages of early filing).

