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The Reciprocity of Search

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INTRODUCTION

The discussion of search in patent law always focuses on one particular model of search: producers of commercial products are supposed to identify the patents that their products might infringe and then negotiate a license from the owners of those patents. This one-sided view of search responsibility is most evident in doctrine. As a doctrinal matter, patent law imposes an absolute duty on the producer of a commercial product to find all relevant patents and obtain licenses from each of the owners before commencing

manufacture. Failure to meet this duty is punished by liability for infringement, where ignorance of the patent is no excuse.[1]

The one-sided view of search, however, is treated as far more than simply a matter of doctrine. Numerous prominent commentators have sharply criticized the current doctrine.[2] In what has become known as the "patent thicket" literature, these critics argue that producers face excessively high search costs because a commercial product is often covered by thousands of overlapping patents and finding every last patent is impossible. The irony of this critique is that these critics still adopt a one-sided view of search, in that they only ever examine the costs and difficulties of producers finding patentees. Once the critics conclude that this one particular type of search is too expensive, they immediately conclude that *all* searching is impossible.[3]

The point of this Article is that search is reciprocal. In designing a patent system, we can require producers to look for patentees, or we can require patentees to look for producers. Either will achieve the goal of an ex ante licensing negotiation that patent search is designed to facilitate. There is no intrinsic reason that patent law must prefer to place the search obligation on one side or the other. The choice is a matter of system design.

Once we appreciate this reciprocity point, it becomes clear that the existing patent search literature has missed half of the equation. There is extensive literature on whether it is feasible, sensible, and efficient to require producers to look for patentees. There is almost no literature on whether it is feasible, sensible, or efficient to make

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1. *In re* Seagate Tech., LLC, 497 F.3d 1360, 1368 (Fed. Cir. 2007) (en banc) (stating that patent infringement is a strict liability offense).

2. *See, e.g.*, JAMES BESSEN & MICHAEL J. MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK 71–72 (2008) (arguing that the current patent system suffers from a problem of "[h]igh search costs"); MICHAEL A. HELLER, THE GRIDLOCK ECONOMY 53 (2008); Mark A. Lemley & Philip J. Weiser, *Should Property or Liability Rules Govern Information?*, 85 TEX. L. REV 783, 797 (2007); Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, *in* 1 INNOVATION POLICY AND THE ECONOMY 119 (2000); *see also* FED. TRADE COMM'N, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW POLICY 6 (2003), *available at* http://www.ftc.gov/os/2003/10/innovationrpt.pdf (stating that in certain industries such as computer hardware and software, a company must "hack" its way through a dense web of overlapping intellectual property rights in order to successfully commercialize a new product).

3. As a consequence, they argue for a liability rule regime that does not require search. *See, e.g.*, Peter Lee, *The Accession Insight and Patent Infringement Remedies*, 110 MICH. L. REV. 175 (2011) (arguing for judicially imposed compulsory licenses); Lemley & Weiser, *supra* note 2, at 799–800.

patentees look for producers.[4] But unless one considers patentee search costs as well as producer search costs, it is altogether premature to conclude that *all* search is hopeless, as the current literature is wont to do. The first contribution of this Article is to argue that discussions of patent search should consider both sides of the equation.

A close analogy to this point is Ronald Coase's famous insight in tort law.[5] Prior to Coase, the intuitive belief was that causation was one sided.[6] That is, when a driver crashes into a pedestrian, people intuitively blame the driver for causing the accident and therefore focus on measures to adjust the driver's behavior (e.g., by imposing penalties for bad driving). In *The Problem of Social Cost*, Coase observed that causation is reciprocal: both drivers and pedestrians can take measures to avoid accidents.[7] Drivers can drive more slowly, and pedestrians can walk more carefully. There is no intrinsic reason for the law to consider *only* measures that would affect driver behavior.

The corollary to the reciprocity insight is that law should place the duty on the party with the lower cost. In tort law, this was Guido Calabresi's famous follow-up to Coase.[8] Once we appreciate that both drivers and pedestrians can take measures to avoid accidents, Calabresi argued that the duty to take precautions should be allocated to the *least cost avoider*.[9] At a doctrinal level, tort law had already implemented this insight through the doctrine of contributory negligence, which imposes a duty on victims to take precautions when

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4. Jonathan Masur comes close with his recent article, *Patent Liability Rules as Search Rules*, 78 U. CHI. L. REV. 187 (2011). The difference is that Masur focuses his discussion on patentees searching for infringers after infringement has already occurred, while my focus is on ex ante searches for producers before they begin infringing. As I discuss in Part III.A *infra*, this ex ante/ex post difference is crucial, because it is often too late for efficient negotiation if infringement has already occurred.

5. R.H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960).

6. *See* Guido Calabresi, *Neologisms Revisited*, 64 MD. L. REV. 736, 738 (2005) (recounting how the reciprocity point was so counter-intuitive at the time that a professor told him it was wrong and made him remove the argument from an article); *see also* Todd S. Aagaard, *Environmental Harms, Use Conflicts, and Neutral Baselines in Environmental Law*, 60 DUKE L.J. 1505, 1558 (2011) ("Coase's observation of the reciprocity of causation in land-use conflicts is simple, but it differs dramatically from the traditional and intuitive conceptualization of such conflicts . . . .").

7. Coase, *supra* note 5, at 13 (making the point in the context of a rancher's cattle trampling a farmer's crops).

8. GUIDO CALABRESI, THE COSTS OF ACCIDENTS: A LEGAL AND ECONOMIC ANALYSIS 135–40 (1970).

9. *Id.* (creating the concept of the "cheapest cost avoider").

they can do so at the lower cost.[10] Calabresi provided the theoretical foundation for explaining the economic function of this doctrine.

In similar vein, the second novel contribution of this Article is the argument that we should allocate the duty of search to the lower-cost searcher, and patentees will at least sometimes—indeed, likely very often—be the lower-cost searchers. As the existing literature has shown, producers often face extraordinary difficulties finding patentees because there are often thousands of relevant patents covering a single product and these thousands of patents are hidden in a thicket of two million issued and unexpired patents.[11] At a first approximation, if there are a small number of well-known producers (e.g., a few large companies dominate an industry) but thousands of small and unknown patentees, then it would be more efficient to have patentees look for producers than to have producers look for patentees.

If we followed the script of the tort analogy, the doctrinal response would then be to impose a "contributory search" defense. I outline how such a defense would work in Part III. Importantly, an efficient search regime does *not* require knowing ahead of time who the lower-cost searcher is, just as nobody knows ahead of time whether a driver or a pedestrian is the lower-cost avoider of an accident. By imposing the duty on the least cost searcher as determined ex post, the law creates the incentive among parties to each perform efficient searches ex ante as a precaution against potential liability, in the same way that imposing negligence liability ex post encourages efficient precautions ex ante in tort law.

Although a contributory search defense creates the most elegant incentives from a theoretical standpoint, it lacks statutory support and requires highly individualized case-by-case adjudication. Thus, in Part IV I also provide a more practical, though less theoretically perfect, mechanism for reallocating the search burden through 35 U.S.C. § 287. The point is that § 287 on its face requires

10. *See* RESTATEMENT (FIRST) OF TORTS § 467 (1934) (describing how, with certain exceptions, a plaintiff's own negligence bars recovery against a negligent defendant who otherwise would have been liable).

11. Mark A. Lemley & Ragesh K. Tangri, *Ending Patent Law's Willfulness Game*, 18 BERKELEY TECH. L.J. 1085, 1117 & n.99 (2003); *see also* Jay P. Kesan et al., *Paving the Path to Accurately Predicting Legal Outcomes: A Comment on Professor Chien's Predicting Patent Litigation*, 90 TEX. L. REV. SEE ALSO 97, 101 (2012) (noting there are approximately two million patents in effect).

patentees to give notice to producers,[12] but courts have interpreted this provision narrowly because it lies in tension with the dominant assumption that producers must find patentees. Giving § 287 a more robust application would thus partially reallocate the search duty from producers to patentees, though not with the same theoretical elegance as a contributory search defense.

This Article proceeds in five Parts. In Part I, I explain how the existing literature and case law reflect a one-sided view of search. In Part II, I point out that search is in fact reciprocal, with the corollary that we should allocate the search duty to the lower-cost searcher. In Part III, I describe how this can be implemented through a contributory search defense, akin to how the contributory negligence defense achieves this function in tort law. Because the contributory search defense lacks statutory support, however, Part IV provides an alternative doctrinal mechanism to implement the reciprocity insight, through the existing provisions of 35 U.S.C. § 287. In Part V, I consider how the reciprocity insight might have application outside of patent law, most importantly in the analogous domain of copyrights. A brief conclusion follows.

I. THE ONE-SIDED VIEW OF SEARCH

A. The Role of Search

In order to see why the fallacy of one-sided producer search matters, it is helpful to see first why search matters. It is usually taken for granted that having low patent search costs is important and desirable. It is rarely elaborated as to why. The reason goes to the fundamental nature of patents as property rights. A brief discussion of the dichotomy of property rules versus liability rules is therefore required.

As Guido Calabresi and Douglas Melamed explained, property rules and liability rules are alternative ways for the legal system to determine the value of social resources such as land or inventions.[13] A property rule determines the value of a social resource by forcing the parties to negotiate.[14] In practical terms, this is usually achieved by

12. *See* SEB S.A. v. Montgomery Ward & Co., 594 F.3d 1360, 1378 (Fed. Cir. 2010) ("Under § 287(a) a patentee that sells its patented product within the United States must provide actual or constructive notice of the patent to the accused infringer to qualify for damages.").

13. Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089 (1972).

14. *Id.* at 1092.

conferring a right to injunctive relief.[15] By giving the owner of Blackacre an absolute right to Blackacre (backed by an injunction against unconsented takings), the law forces anyone who wishes to use Blackacre to negotiate with the owner and pay a mutually agreed price. The market mechanism therefore determines the value of Blackacre.

Search plays an essential role in a property-rule regime because, in order for the parties to negotiate, they must find each other first.[16] And it is important to note that property rules require the negotiation to occur *before* the buyer takes the property: if I want to use Blackacre, the expectation is that I would purchase it first, before moving in.[17] This ex ante point applies equally to patent law. What patent law seeks to achieve is not a negotiation that occurs *after* the producer has independently developed a product and started infringing—that result is wasteful and inefficient. Rather, the point of patent law is to incentivize a negotiation beforehand, so that an inventor who has a brilliant idea but no capital can team together with a producer who has a comparative advantage in manufacturing and marketing, in order to bring the idea to market and allow both the inventor and the producer to share the profit.[18] Thus, when I refer to "search" in this Article, I mean *ex ante* searches.

Another way to understand the importance of ex ante negotiation in a property-rule system is to consider what happens if the negotiation occurs ex post, after the property rule has already been violated. If I build a house on Blackacre without purchasing it beforehand and *then* approach the owner to negotiate, a phenomenon known as "holdup" occurs. Stated simply, holdup is the increased leverage that comes from the fact that the property has been improved

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15. *Id.* at 1127 (noting that property rules are usually supported by injunctions and/or criminal penalties for violation).

16. *See id.* (pointing out that we use liability rules for car accidents because drivers and pedestrians cannot find each other ahead of time to negotiate); *see also* Carol M. Rose, *The Shadow of the Cathedral*, 106 YALE L.J. 2175, 2184 (1997) (calling this difficulty of "having to find and assemble numerous or indistinctly defined interested parties" a "Type I" transaction cost).

17. *See* Calabresi & Melamed, *supra* note 13, at 1108 (noting that a property entitlement against accidental injuries would require purchase of the right to injure *before* the accident occurred).

18. *See* Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources for Invention*, *in* NAT'L BUREAU OF ECON. RESEARCH, THE RATE AND DIRECTION OF INVENTIVE ACTIVITY: ECONOMIC AND SOCIAL FACTORS 609, 614–16 (1962) (noting the disclosure paradox that would occur without patent protection, where a manufacturer would not agree to license an idea without knowing what it was buying, but once the idea was disclosed the manufacturer would lose the incentive to pay for it).

and that this improvement cannot be undone.[19] *After* I have already built the house, the price that the owner will demand for Blackacre increases because the land now has a brand new house on it and the house cannot be moved.[20] This ex post value exceeds the ex ante "true" value of Blackacre (i.e., the value of the land and not the house) that a property rule is designed to measure. Similarly, once a producer has made fixed investments in an invention, such as building a factory to commercialize it, the ex post value of a license will reflect the value of the factory, not the inventive idea by itself.[21]

Holdup is usually considered deeply unfair.[22] A more economically oriented way of expressing this unfairness is that it deters productive improvement of property.[23] If I must effectively pay for the house (or the factory) twice—once to build it, and a second time to buy it back from the owner of Blackacre (or the patentee)—I am less likely to build the house (or commercialize the invention), which is a productive use of Blackacre (or the inventive idea).[24] Of course, one response is that I should buy Blackacre *before* building a house on it, but it is important to see that this intuitive response requires an embedded assumption that the owner and I can find each other ahead of time to negotiate.[25] The smooth functioning of a property rule is thus extremely dependent on this type of ex ante search being feasible or, in economic terms, cheap.

An alternative way of determining the value of property is not to negotiate for it, but simply to have a judge order the transfer at a judicially determined price.[26] This alternative turns the notion of "property" on its head, but it is what happens in an eminent domain proceeding.[27] The government first unilaterally takes the land and puts a government building on it, and *then* has a judge determine the

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19. Benjamin Klein, *Transaction Cost Determinants of "Unfair" Contractual Arrangements*, 70 AM. ECON. REV. 356, 356–57 (1980) (emphasizing the requirement of "highly firm-specific investments").

20. This is not because of the "sunk cost fallacy," but because the land has been improved.

21. Shapiro, *supra* note 2, at 125 (describing the holdup problem).

22. *See* eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 396 (2006) (Kennedy, J., concurring) (arguing that holdup gives patentees "undue leverage in negotiations" that allow them to "charge exorbitant fees").

23. Klein, *supra* note 19, at 357 ("For example, one would not build a house on land rented for a short term. After the rental agreement expires, the landowner could raise the rental price to reflect the costs of moving the house to another lot.").

24. *Id.*

25. *See* Calabresi & Melamed, *supra* note 13, at 1127 (noting transaction costs, and in particular search costs, as the determinant between property rules and liability rules).

26. *Id.* at 1092 (defining liability rules).

27. *Id.* at 1106–07 (giving eminent domain as an example of a liability rule).

"just compensation" that must be paid to the original owners.[28] This is what Calabresi and Melamed define as a "liability rule" regime.[29]

A liability rule does not require search because it does not require ex ante negotiation. A judge can determine the true value (i.e., the value of Blackacre without the building) in an ex post setting. In this way, liability rules are more efficient in situations where ex ante search costs are very high.[30] But liability rules also have a downside, which is that they require judges to determine the value of property.[31] Courts are not institutionally well equipped to perform this task, so a judge trying to determine the value of Blackacre, or the value of an invention, will often get it wrong.[32] Indeed, the entire premise of the patent system is that judges cannot accurately measure the value of inventions; if they could, it would be more efficient to abolish patents completely and award taxpayer-funded cash prizes instead.[33] For this reason, patent law has always used a property-rule system (backed by a strong right to injunctions) that forces the parties to engage in ex ante negotiations to determine value.[34] Therefore, search matters to patent law because it is essential to the smooth functioning of any property-rule system.

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28. *See* U.S. CONST. amend. V.

29. Calabresi & Melamed, *supra* note 13, at 1106–07.

30. *Id.* at 1127; *see also* Richard R.W. Brooks, *The Relative Burden of Determining Property Rules and Liability Rules: Broken Elevators in the Cathedral*, 97 NW. U. L. REV. 267, 274 (2002) (arguing that although transaction costs are often stated to be the determinant, this requires an implicit assumption about judicial assessment costs).

31. James E. Krier & Stewart J. Schwab, *Property Rules and Liability Rules: The Cathedral in Another Light*, 70 N.Y.U. L. REV. 440, 453–55 (1995) (discussing judicial "assessment costs").

32. Richard A. Epstein, *A Clear View of the Cathedral: The Dominance of Property Rules*, 106 YALE L.J. 2091, 2092–94 (1998) (arguing that "liability rules . . . require[] some level of state intervention in *each and every* transaction to set the appropriate value for the parties" and the "risk of undercompensation in such situations is pervasive"); *see also* THOMAS J. MICELI, THE ECONOMIC APPROACH TO LAW 157 (2009) (costs of liability rules include "litigation costs and the possibility of court error in setting damages").

33. Louis Kaplow, *The Patent-Antitrust Intersection: A Reappraisal*, 97 HARV. L. REV. 1813, 1844 (1984) ("In theory, direct reward systems are preferable . . . . A central reason for reliance on a patent system is that it is thought to be too difficult to determine the appropriate level of reward fairly and accurately on a case-by-case basis."); *see also* Michael Kremer, *Patent Buyouts: A Mechanism for Encouraging Innovation*, 113 Q.J. ECON. 1137, 1140 (1998) ("[F]inancing research with monopoly profits . . . is generically less efficient than financing research through tax revenue.").

34. *See In re* Mahurkar Double Lumen Hemodialysis Catheter Patent Litig., 831 F. Supp. 1354, 1397 (N.D. Ill. 1993) (Easterbrook, J.) ("The injunction creates a property right and leads to negotiations between the parties. A private outcome of these negotiations . . . is much preferable to a judicial guesstimate about what a royalty should be.").

B. The Conventional One-Sided View

In Calabresi and Melamed's original formulation of a property rule, they did not specify which party had to conduct a search. According to Calabresi and Melamed: "If we were to give victims a property entitlement not to be accidentally injured we would have to require all who engage in activities that may injure them *to negotiate* with them before an accident."[35] Thus, while Calabresi and Melamed envisioned a duty on defendants to negotiate, they did not explicitly say that it was defendants who must find plaintiffs to initiate that negotiation.

Subsequent authors, however, have always reflexively assumed that, because the defendant must negotiate with a plaintiff under a property rule, the defendant also bears the burden of search.[36] As the remainder of this Section will discuss, this assumption is built so deeply into the fabric of patent law that not only does the doctrine reflect this assumption, but the *critics* of the doctrine subscribe to it as well.

1. The Doctrine that *Requires* Producers to Search

The standard doctrine imposes a duty on producers to search for patentees. This comes from the fact that patent infringement is a strict liability offense.[37] That is, anyone who makes, uses, or sells something that is covered by a patent will infringe, *even if he is unaware of the patent*.[38] Because patent law uses infringement liability to punish a producer who fails to find the patentee (and obtain a license), it effectively imposes the duty of search on producers.[39]

On the other side, patent law imposes no duty of search on patentees. Indeed, patentees are free to do nothing without jeopardizing their legal rights.[40] Of course, some patentees will

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35. Calabresi & Melamed, *supra* note 13, at 1108 (emphasis added).

36. *See, e.g.*, MICELI, *supra* note 32, at 157 (arguing that a property right against being injured by railways would necessarily imply that railroad companies must "*identify and* negotiate with all potential accident victims" (emphasis added)).

37. *In re* Seagate Tech., LLC, 497 F.3d 1360, 1368 (Fed. Cir. 2007) (en banc).

38. *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.").

39. *See* Masur, *supra* note 4, at 187 (noting that patent law's substantive liability rules also function as search rules, in that they allocate search duties and costs).

40. Cont'l Paper Bag Co. v. E. Paper Bag. Co., 210 U.S. 405, 424 (1908) (" 'The inventor is one who has discovered something of value. *It is his absolute property*. He may withhold the

voluntarily search for and approach potential producers to offer them licenses,[41] but there is no law that requires it.[42] The vision of search is therefore one sided: the law requires producers to search, but it does not require patentees to do so.

This one-sided view of search is further reinforced by the fact that the law *does* require patentees to help producers find them. That is, the law requires patentees to make the patent document clear and understandable,[43] and to record their contact information[44] so that the owner of a patent can be easily found. But this still reflects a one-sided view of search. Producers are required to actively look for patentees, akin to the tradition of men asking women to dance, while patentees are shy wallflowers who passively wait to be asked (and have to dress in a way as to get noticed). Nothing requires patentees to search in an active way—judges do not even imagine the possibility—just as no Victorian could imagine women asking men to dance.

Patent law maintains this configuration of duties (producers to search, patentees to passively wait) even when it is far easier for patentees to find producers and initiate negotiations than vice versa. The most extreme example is *Rambus Inc. v. Infineon Technologies AG*.[45] In *Rambus*, the patentee (Rambus Inc.) had a patent application covering a type of memory technology called SDRAM.[46] At the same time, the computer industry had a joint committee, known as JEDEC, that was developing standards for memory technology.[47] Rambus was a member of this committee, but it did not tell anyone that it had a patent related to this area.[48] The committee eventually settled on

knowledge of it from the public, and he may insist upon all the advantages and benefits which the statute promises to him.' " (quoting United States v. Am. Bell Tel. Co., 167 U.S. 224, 249 (1897)) (emphasis added)).

41. F. Scott Kieff, *Coordination, Property, and Intellectual Property: An Unconventional Approach to Anticompetitive Effects and Downstream Access*, 56 EMORY L.J. 327, 396 (2006) (pointing out that "patents are wasting assets" and, therefore, patentees have some economic incentive to find potential licensees).

42. To elaborate: Saying that patentees have an inbuilt incentive to search is like saying that pedestrians have an inbuilt incentive to walk carefully. The problem is not that there are no inbuilt incentives at all, but that the inbuilt incentives are *not enough*. The fact that pedestrians have some inbuilt incentive to walk carefully does not mean that imposing absolute liability on drivers is efficient.

43. Merrill v. Yeomans, 94 U.S. 568, 573 (1876) (stating there is "no excuse for ambiguous language or vague descriptions" in patents).

44. 37 C.F.R. § 1.63(c)(1) (2012) (requiring a patent applicant to record his address).

45. Rambus Inc. v. Infineon Techs. AG (*Rambus I*), 318 F.3d 1081 (Fed. Cir. 2003).

46. *Id.* at 1084–85.

47. *Id.* at 1085.

48. *Id.* ("Rambus did not disclose any patent applications to JEDEC.").

SDRAM as the standard, and thus everyone in the industry started making irreversible fixed investments (e.g., building factories) on a technology that infringed Rambus's patent.[49]

Once the other members had made irreversible investments, Rambus sued everyone for infringement and obtained hefty royalties.[50] This is a classic holdup strategy: *after* an unknowing producer has made irreversible fixed investments in the property (here the patented technology), the patent owner can obtain more in royalties than it could in an ex ante negotiation.[51] The Court of Appeals for the Federal Circuit ruled for Rambus.[52] Later, in a separate proceeding brought by the Federal Trade Commission, the D.C. Circuit also ruled for Rambus.[53]

Rambus illustrates how far the law insists on its configuration of duties, where producers have a duty to search and patentees have none, even when the relative burdens of compliance are mismatched. For producers like the defendant, Infineon, it was literally impossible to find Rambus's patent application, because an *unissued* patent application (which Rambus had) is confidential by law.[54] But once the computer industry made irreversible fixed investments, Rambus then allowed its patent to issue,[55] and at this point the industry was made to pay for its ignorance. Conversely, for the patentee Rambus, finding the producers and initiating negotiations would have cost almost nothing at all since Rambus was already a member of the committee. All it would have had to do is tell the committee about its pending patent application (the statute bars the patent office but not the patentee from disclosing a pending application). Rambus did not do so, however, because it was not legally required to do so,[56] and because it

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49. *See* Hynix Semiconductor Inc. v. Rambus Inc., 609 F. Supp. 2d 951, 955 (N.D. Cal. 2009) (finding infringement).

50. *See* Tony Smith, *Rambus' "Very High" DDR Royalty Revealed*, REGISTER (May 3, 2001), http://www.theregister.co.uk/2001/05/03/rambus_very_high_ddr_royalty/ (discussing that Rambus charged a royalty of 3.5% for patents covering the standard, but only 0.75% for other patents).

51. *Id.; see also supra* text accompanying notes 19–23.

52. *Rambus I*, 318 F.3d at 1106–07 (ruling for Rambus on infringement and fraud issues).

53. Rambus Inc. v. FTC, 522 F.3d 456, 459 (D.C. Cir. 2008).

54. 35 U.S.C. § 122 (2006). The statute does require the publication of an unissued application after eighteen months, but only if the patent applicant files the application internationally. *Id.*

55. Through a variety of procedural mechanisms, most particularly the "continuation" application, patentees have tremendous control over the timing of when their patent will issue. *See generally* Mark A. Lemley & Kimberly A. Moore, *Ending Abuse of Patent Continuations*, 84 B.U. L. REV. 63 (2004) (discussing the continuation application process).

56. *Rambus I*, 318 F.3d at 1100–02 (finding Rambus had no duty to disclose its claims).

was more profitable for Rambus to wait until the industry had made irreversible fixed investments before disclosing its patent.

Similar, if less extreme, examples of well-known producers being held up by previously unknown patentees abound.[57] The most famous is probably *NTP, Inc. v. Research in Motion, Ltd.*,[58] where the maker of the Blackberry device was sued by a previously unknown entity named NTP, Inc.[59] Because Research in Motion ("RIM") had made irreversible investments in the Blackberry while ignorant of the NTP patent,[60] NTP could threaten to shut down the entire Blackberry business with an injunction.[61] RIM was forced to pay $612.5 million to avoid a shutdown of its business.[62] Once again, the doctrine effectively requires producers to find every patentee ahead of time, even if producer search is impossibly difficult (there are over six thousand known patents covering different components in 3G smartphones,[63] plus a potentially even larger number of unknown patents) and patentee search would likely be much easier. It effectively imposes this duty because it levies draconian sanctions (e.g., $612.5 million) for failure to comply.

2. The Literature that Proposes *Helping* Producers to Search

If the law imposes a duty on producers to search (and not only to search, but to *successfully* find), but compliance is very difficult or impossible, how should this contradiction be resolved? One solution that is often contemplated in the literature is to make producer search easier by improving the surrounding infrastructure. Proposals to publish patent applications earlier,[64] to have patent boundaries

57. Although industry participants knew of Rambus's existence, they did not know that Rambus had a patent. In this sense Rambus was an unknown *patentee*. More often, even the person's existence is unknown.

58. 418 F.3d 1282, 1292 (Fed. Cir. 2005).

59. NTP, Inc. v. Research in Motion, Ltd., 270 F. Supp. 2d 751, 755 (E.D. Va. 2003) (noting that RIM invented its technology independently, before it knew of NTP or its patent).

60. *Id.*

61. Oskar Liivak, *Rethinking the Concept of Exclusion in Patent Law*, 98 GEO. L.J. 1643, 1653 (2010).

62. *Id.*

63. Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 2026 (2007).

64. *See, e.g.*, Paul M. Schoenhard, *Reconceptualizing Inventive Conception: Strengthening, Not Abandoning, the First-to-Invent System*, 17 FED. CIR. B.J. 567, 598–99 (2008) (arguing to publish patent applications immediately upon filing).

marked more clearly,[65] and to have better patent databases,[66] routinely arise in the literature.[67]

The important point for purposes of my discussion is that these proposals all embody a one-sided view of search. The focus is always on measures that allow producers to find patentees. Nobody ever discusses making patentees look for producers. There are no proposals, for example, to compile databases of commercial products and their producers so that patentees can find them—only for databases of patents and their owners that producers can search.

The corollary is that these one-sided proposals are often very inefficient and ineffective if our goal is to achieve ex ante negotiation of patent licenses. For example, publishing patent applications early would have made it easi*er* for the memory-chip producers in *Rambus* to find Rambus's patent application ahead of time. That does not mean it would have been easy. The change is instead from *literally* impossible (the application is made secret by law) to merely *almost* impossible (the application is buried in a pile along with 1.1 million other pending applications,[68] plus over two million issued and unexpired patents).[69] Compare this to how easy it would have been for Rambus to find the very memory-chip producers that it sat with on the same standard-setting committee.[70]

3. The Literature that Argues Producers *Cannot* Search

Thus far, I have discussed existing doctrine and proposals to polish and improve it, which both embrace the one-sided view of search. But the deeply ingrained nature of this one-sided view is most

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65. *See, e.g.*, 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, 1975–78 (2005) (arguing for more "refinement" of patent claims).

66. *See, e.g.*, Jeanne C. Fromner, *Patent Disclosure*, 94 IOWA L. REV. 539, 585–86 (2009) (proposing to improve patent databases with better indexing).

67. *See also* BESSEN & MEURER, *supra* note 2, at 235–48 (providing numerous suggestions to make it easier for producers to find and analyze patents).

68. U.S. PATENT & TRADEMARK OFFICE, PERFORMANCE AND ACCOUNTABILITY REPORT FISCAL YEAR 2011, at 161 (2011), *available at* www.uspto.gov/about/stratplan/ar/2011/USPTOFY2011PAR.pdf.

69. Kesan et al., *supra* note 11, at 101.

70. *Cf.* DOUG LICHTMAN, PATENT HOLDOUTS IN THE STANDARD-SETTING PROCESS, ACAD. ADVISORY COUNCIL BULL. 1.3, at 9 (2006), *available at* http://www.pff.org/issues-pubs/ip/bulletins/bulletin1.3patent.pdf (arguing that courts should consider "the ease with which the patent holder could have announced its patent before firms invested in the standard"). Although Lichtman seems to thereby consider the possibility of patentee search, the rest of his paper focuses on producer search concerns.

ironically revealed when we consider the existing doctrine's fiercest critics. Numerous authors including Mark Lemley, Carl Shapiro, Michael Heller, James Besson, and Michael Meurer have all criticized patent law's search doctrine in harsh terms.[71] These critics argue that producers face almost insuperable difficulties in finding all the relevant patentees because there are too many patents for producers to wade through. In short, they argue that producer search will always be incredibly onerous no matter how much we tinker with the infrastructure. With this initial premise I fully agree.

As Mark Lemley and Phillip Weiser note, there are "literally thousands" of patents that cover 3G telephone systems,[72] and these patents are hidden in a thicket of over two million issued and unexpired patents.[73] For a producer like RIM to find all these patents ahead of time would be almost impossible.[74] Of course, it might have been possible for RIM to find a few of those patents, and thus it might have found NTP's in particular. But as long as it could not find *every* such patent, another plaintiff would have come along and sued. From RIM's perspective, whether the plaintiff is named "NTP" or "Company X" is obviously irrelevant. The point is that, unless a producer can find every patent ahead of time, it faces the possibility that it will be held up by some unknown plaintiff.

The 3G smartphone market is not alone in facing patent thickets.[75] The same problem afflicts nearly every modern device, virtually all of which contain thousands of individual components that may each be covered by one or more patents. To produce the finished commercial product requires a license to every one of those hundreds or thousands of patents. If the producer misses even a single patent and does not procure a license ahead of time, then it faces the possibility of being held up later.[76]

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71. *See* sources cited *supra* note 2 (analyzing the shortcomings of the current patent search system).

72. Lemley & Weiser, *supra* note 2, at 797.

73. Lemley & Tangri, *supra* note 11, at 1117 & n.99; *see also* Kesan et al., *supra* note 11, at 101.

74. *See* BESSEN & MEURER, *supra* note 2, at 68–71 (discussing the "patent flood" as a reason for patent clearance becoming less feasible).

75. Lemley & Shapiro, *supra* note 63, at 2025–29 (describing the large numbers of overlapping patents covering products such as 3G smartphones, Wi-Fi devices, DVD players, and radio-frequency identification devices).

76. Martin Campbell-Kelly & Patrick Valduriez, *A Technical Critique of Fifty Software Patents*, 9 MARQ. INTELL. PROP. L. REV. 249, 270 (2005) (noting a single patent can hold up the industry).

Limited proposals such as improving patent databases and publishing patents earlier are unlikely to overcome this basic problem of scale. To take a simple example, a producer like RIM in the smartphone industry may begin by searching all the patents that are classified under the category of "telephones," or "wireless technology," to see if its product infringes. But in order to make a smartphone, it also needs an LCD screen, a plastic cover, and screws. Each of those components might also be patented. So RIM would have to search through patents on displays, on chemistry, and on fasteners.[77] Additionally, a smartphone needs a processor and software, so RIM has to search all computer hardware and software patents. The enormous number of patents in multiple technology sectors that RIM must wade through in order to conduct a comprehensive clearance search makes the thousands of patents it must actually license seem small by comparison.[78] And this same logic applies to virtually every modern device, such as a computer, television, or car (the GPS in the car, alone, would be rather akin to a smartphone).

The patent thicket literature thus makes a fully justified point that producer search is impossibly onerous in many cases, in that producers cannot find every single patent that covers their products. This literature is entirely correct that the doctrine requiring producers to find every single patent is demanding the impossible. But this literature still shares the one-sided view of search because it cannot imagine any other form of search. Once the critics conclude that it is impossible for producers to find patentees, they immediately argue that the only way to avoid holdup is for courts to deny injunctions and impose compulsory licenses that reflect the "fair" value of a patent.[79]

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77. *See* BESSEN & MEURER, *supra* note 2, at 69–70 (noting that firms are frequently sued by patents covering different technology classes and in unrelated industries).

78. *See* Christina Mulligan & Timothy B. Lee, *Scaling the Patent System*, N.Y.U. ANN. SURV. AM. L. (forthcoming) (manuscript at 15–16), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2016968 (estimating that it would take two million patent attorneys working full time to clear every software product against all the software patents issued in a given year). The Mulligan and Lee estimate is probably too high, but it illustrates the basic problem of scale.

79. *See, e.g.*, Lee, *supra* note 3, at 202–04 (arguing for compensation rather than injunctions as a remedy for patent infringement if the infringer substantially improves the patented technology); Lemley & Weiser, *supra* note 2, at 799–800; *see also* BESSEN & MEURER, *supra* note 2, at 251–52 (arguing for "calibrat[ing]" remedies, though expressing reservations about denying injunctions completely). Denying injunctions and awarding compulsory licenses usually go hand-in-hand, since if the patentee does not receive an injunction, he must be given alternative compensation, or else the patentee would be left with nothing. *But see* Stewart E. Sterk, *Property Rules, Liability Rules, and Uncertainty About Property Rights*, 106 MICH. L. REV. 1285, 1316–18 (2008) (exploring efficiencies and weaknesses of a no-liability regime for improvers who infringed on a patent after deciding "reasonably" not to search for such

That is, the patent thicket literature argues for converting the patent system from a property rule that relies on ex ante search and negotiation to a liability rule that requires neither search nor negotiation (since a judge will just impose the license terms ex post by judicial fiat). The only alternative to the doctrine that requires search by *producers*, in the conventional imagination, is *no* search at all.

II. THE RECIPROCAL NATURE OF SEARCH

My point in this Part—and indeed this Article—is that contrary to the universal assumption, search is in fact a reciprocal task. This insight produces a very different view of the patent thicket problem. Before directly applying this insight to patent law, it is useful to consider an analogous context where the literature had previously treated a reciprocal problem as one sided. Exposing the fallacy of the one-sided view was the major contribution of Ronald Coase to tort law.

A. Coase and the Reciprocity of Tort Causation

Suppose that a driver crashes into a pedestrian, causing injury. As an intuitive matter, people are prone to blame the driver.[80] This means they analyze the problem from the perspective of regulating driver behavior and imposing duties on drivers. If there were a spate of driver-pedestrian accidents, there would be many calls for lower speed limits and increased fines for drunk driving. A functionally similar solution would be to impose a tax (known as a Pigovian tax) on gasoline, which would reduce the amount of driving.[81] What we are unlikely to see, however, are proposals to tax or penalize pedestrians. In his famous article on *The Problem of Social Cost*, Ronald Coase showed that this intuitive one-sided view of tort responsibility was misguided.

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infringement). *See generally* Adam Mossoff, *The Rise and Fall of the First American Patent Thicket: The Sewing Machine War of the 1850s*, 53 ARIZ. L. REV. 165, 169–70 (2011) ("Many scholars concerned about patent thickets hail the U.S. Supreme Court's recent decision in *eBay Inc. v. MercExchange, L.L.C.*, because the Court made it more difficult for patentees to become hold-outs through threatening or obtaining injunctions.").

80. *See* John C. P. Goldberg, *Twentieth-Century Tort Theory*, 91 GEO. L.J. 513, 548 (2003) (noting that "notions of responsibility are deeply embedded in ordinary English language" and "[i]n ordinary usage, it would be perfectly appropriate to say that car drivers 'caused' [car-bicyclist accidents]").

81. *See* ARTHUR CECIL PIGOU, THE ECONOMICS OF WELFARE 192–93 (Transaction Publishers 4th ed. 2002) (illustrating taxes as a strategy to rectify the "divergence" between social and private interests by describing a tax on gasoline).

Coase's fundamental insight was that causation is reciprocal: *both* the driver and pedestrian cause the accident.[82] The driver could avoid the accident by driving more carefully; but the pedestrian could also avoid the accident by walking more carefully (or, in the extreme, not walking at all and staying home). In other words, society could levy the Pigovian tax or impose tort liability on either party. If we imposed it on drivers, they would drive less; if we imposed it on pedestrians, they would walk less. Either method would reduce the number of driver-pedestrian accidents. This reciprocity insight is today fundamental to the law-and-economics analysis of tort law.[83]

The reciprocity of causation leads to an important corollary: Given that there are *two* parties who can avoid an accident, who should take the precaution? In more lawyerly terms, on which party should the law impose the duty to take the precaution? As Guido Calabresi later established, the economically efficient tort rule is to allocate the duty to the *least cost avoider*.[84] The point is that although causation is *reciprocal*, the cost of avoidance is not *equal* in a particular case. Sometimes it is easier for a driver to avoid an accident, and other times it is easier for a pedestrian to do so. The optimal allocation of liability depends on a *comparison* between the costs of the two sides, and the resulting solution will vary with each individual case.

Coase's and Calabresi's contributions each marked a revolution in the tort literature. But one irony is that their insights did very little to change doctrine. Although the literature always considered tort responsibility in a one-sided manner, the doctrine was already reciprocal in practice. The contributory negligence doctrine already considered the (pedestrian) victim's conduct, and it already imposed a duty on pedestrians to take precautions when they were the lower-cost avoiders.[85] In a similar vein, patentees sometimes do already conduct

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82. Coase, *supra* note 5, at 2.

83. *See* J.M. Balkin, *The Rhetoric of Responsibility*, 76 VA. L. REV. 197, 210 n.39 (1990) ("[T]he reciprocity of causation and harm first noted by Coase and Calabresi . . . is central to the modern law and economics movement."); Mark F. Grady, *Common Law Control of Strategic Behavior: Railroad Sparks and the Farmer*, 17 J. LEGAL STUD. 15, 16–17 (1988) (describing the literature that analyzes strategic actions taken by injurers and accident victims as part of a "showcase for the new law and economics"). *But see* Richard A. Epstein, *A Theory of Strict Liability*, 2 J. LEGAL STUD. 151, 165 (1973) (rejecting Coasean reciprocity); Thomas W. Merrill & Henry E. Smith, *Making Coasean Property More Coasean*, 54 J.L. & ECON. S77, S91–S92 (2011) (noting that "[l]awyers have always had trouble accepting [Coasean reciprocity]").

84. CALABRESI, *supra* note 8, at 135–40.

85. *See* RESTATEMENT (FIRST) OF TORTS § 467 (1934); WILLIAM M. LANDES & RICHARD A. POSNER, THE ECONOMIC STRUCTURE OF TORT LAW 88–96 (1987) (describing how the common law contributory negligence doctrine allocates responsibility to the least cost avoider).

voluntary searches in real life (though less often than would be optimal, because of the lack of legal duties and incentives), but this observation does not defeat my point that the patent literature has taken a one-sided view of search.

B. The Reciprocity of Patent Search

Applying the analogy of tort causation to patent searches is straightforward. As seen in Part I, the universal focus of the patent search literature is on one side of the equation: producers. In fact, however, the search problem is reciprocal. In order to initiate ex ante negotiation for a license to a patent, we can have producers find patentees, or patentees find producers. Thus, just as Coase criticized Pigou and many others for their one-sided focus, the first point here is that we must consider both sides of the search equation.

The immediate corollary to the reciprocity insight is that, like the least-cost-avoider analysis in tort, the optimal allocation of the search responsibility will depend on a comparison of the two sides. Sometimes it will be cheap for producers to search for patentees but expensive for patentees to search for producers. At other times it will be cheaper for patentees to search for producers.[86] The economically efficient allocation will vary from case to case.

The tort analogy can be seen another way. In negligence law, what the law is trying to do is to avoid a social loss—the accident that causes an injury. The reciprocity of tort causation tells us that there are two parties who each can take precautions to avoid this loss: the driver can drive more carefully, or the pedestrian can walk more carefully. The efficient choice depends on a comparison between the costs of these two precautions. The least cost avoider is the person who has the lower cost of precaution, and the doctrinal insight is to allocate the burden of taking precautions to this least cost avoider.

In patent search, what the law is trying to avoid is also a social loss—the inefficiency of inadvertent infringement and holdup. The reciprocity of search tells us that there are two parties who each can take precautions to avoid this loss: the patentee by finding the producer ex ante, or the producer by finding the patentee ex ante. As long as the parties find each other before the producer makes the irreversible fixed investment, there will be no inadvertent

86. *See* Herbert Hovenkamp, Response, *Notice and Patent Remedies*, 88 TEX. L. REV. SEE ALSO 221, 225 (2011) ("Giving notice of one's own property rights is often far cheaper than searching for the possible but uncertain rights of others.").

infringement and no holdup. The efficient choice, once again, depends on a comparison between the costs of these two precautions.

III. THE IMPLICATIONS OF RECIPROCITY

The immediate implication of recognizing the reciprocity of search, as I have described above, is that scholars need to consider both patentee and producer search costs, because the optimal search rule is to allocate the duty to the lower-cost searcher. This insight is important regardless of whether, after empirical study, one ultimately finds patentees to be the lower- or higher-cost searchers.[87] The difference is between coming to a conclusion after considering the question and ignoring the issue altogether, as the literature has done to date.

My argument in this Part goes further: it is that patentees are the lower-cost searchers at least some of the time, and likely a majority of the time. This conclusion is necessarily tentative because nobody has studied patentee search costs. But if producer search costs are prohibitively high, as the patent thicket literature has demonstrated, then there is at least a good possibility that patentee search costs would be lower in some cases.

If one grants my premise that patentees are sometimes the lower-cost searchers, then the implication is that the law should allocate the duty to search to patentees in those particular cases. A reader does not need to fully agree with me that patentees are the lower-cost searchers in the majority of cases—it is enough that patentees are the lower-cost searchers in a nonnegligible percentage of cases. Such an individualized, case-by-case allocation of the duty to search would function similarly to the doctrine of contributory negligence.

A. Defining Ex Ante Search

Before proceeding, it is important to emphasize one point about my analysis: it pertains to *ex ante* searches. A common reaction to my proposal to make patentees search is that it would usually be impossible for patentees to find producers, because patentees cannot

87. One can expect such empirical disagreement since there is disagreement about the search costs of producers. *Compare supra* notes 72–74 and accompanying text (citing sources arguing that producer search costs are high), *with* Kieff, *supra* note 41, at 395 (describing producer search costs as low because patents are "relatively clear, certain, and . . . easily located").

know about a producers' forthcoming products and producers will hide their infringing activities. This objection relies on a misunderstanding of what it means to conduct an ex ante search.

Consider Coase's famous example of a cattle rancher and a farmer, where the rancher's cattle trample the farmer's crops.[88] *After* the rancher's cattle trample the farmer's crops, it goes without saying that the rancher would have an incentive to hide this fact from the farmer. But Coase never considers this problem in his analysis. The famous Coase Theorem simply says that, if transaction costs are low enough, the rancher and the farmer will negotiate with each other to arrive at the optimal outcome. So why does Coase not consider the problem of ex post evasion?

The reason that Coase never considers the possibility that the rancher might hide his cattle's trampling activities from the farmer is that it is not relevant *at the point in time* that he is considering the problem. The point that Coase was trying to make was that, *before* the cattle trample the crops, the rancher and the farmer could negotiate to achieve the optimal solution. The purpose of the legal system at this point in time is simply to facilitate the efficient negotiation by reducing transaction costs. At the ex ante point in time, the rancher would have no incentive to hide from the farmer, and thus there is no need to consider this possibility.

Patent law works the same way. The goal of patent law is to facilitate a transfer between a genius inventor with a brilliant idea but no capital, and a manufacturer with lots of capital but no ideas, so that both can share the profit that arises from commercializing the invention.[89] It is *not* to have an inventor come up with an idea, a manufacturer to then independently develop the same idea, and then to have the inventor sue the manufacturer for infringement—such a result is wasteful and is exactly what ex ante searching is supposed to *prevent*.[90] In other words, the purpose of patent search is to facilitate an efficient ex ante negotiation between the two parties, occurring *before* the producer independently develops the same invention and invests resources in infringing activity. At this ex ante point in time, there is no need to consider the possibility that a producer would hide from the patentee, because the producer has no incentive to hide and

88. Coase, *supra* note 5, at 2–3.

89. *See* Arrow, *supra* note 18, at 614–17 (noting that patents solve the disclosure paradox that would otherwise frustrate this transaction).

90. *See* Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265, 278 (1977) (arguing that one function of the patent system is to prevent wasteful duplication).

no infringing activities to hide.[91] In this way, a patentee would not be looking for infringing activity in order to determine whom to contact, but rather looking for potential cooperative producers. For example, if I hold a microprocessor patent, the point of an ex ante search is not to investigate whether Intel and AMD are on the verge of commencing infringement, but to contact those producers because they are large chip manufacturers who have the resources and expertise to commercialize the invention. This understanding of ex ante search answers the objection that patentees would be unable to search for producers ex ante because they would lack adequate information. The information that patentees would need—namely, whether a producer is a company with expertise and resources in the general technological area of the invention—is usually public and well known.

In theory, the cutoff point between "ex ante" and "ex post" search is the investment of substantial fixed costs toward infringing activity.[92] Once a producer invests substantial fixed costs (e.g., builds a factory tailored to the particular invention), he has an incentive to hide from the patentee even if the actual infringement by making and selling products has not yet commenced. Moreover, once substantial fixed costs have been invested, a negotiation between the patentee and the producer will no longer reach the efficient outcome because the patentee will be able to engage in holdup. For both these reasons, the investment of substantial fixed costs marks the true theoretical boundary between "ex ante" and "ex post" negotiation. However, because in practice it will be difficult to pinpoint when "substantial" fixed costs have been invested, in the remainder of this Article I will generally define an ex ante search as one occurring before the commencement of infringement—that is, the first manufacture or sale.

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91. A further point to consider, outlined *infra* Part III.C.2, is that the current misallocation of search duty creates a perverse result where *patentees* do have an incentive to hide, even at the ex ante point in time.

92. In a recent article, Richard Epstein, Scott Kieff, and Daniel Spulber argue that this definition of "ex ante" is wrong, and that the proper point in time for measurement is before *anyone* (either patentee or producer) has made fixed investments. Richard A. Epstein, F. Scott Kieff & Daniel F. Spulber, *The FTC, IP, and SSOs: Government Hold-Up Replacing Private Coordination*, 8 J. COMPETITION L. & ECON. 1, 10 (2012). They then argue that this favors the status quo that provides strong rights to patentees. *Id.* Epstein, Kieff and Spulber may be correct that the proper time for measurement should be before either the producer or the patentee has made fixed investments, but that definition does not support their conclusion: if we assess the relative search costs before a patentee has made any fixed investments—i.e., before an inventor has conceived of an invention and when he is merely one person among the undifferentiated mass of seven billion people—then it decisively points toward *always* allocating the search duty on the patentee.

B. Comparing Search Rules

Because search is reciprocal, it follows that the law can impose the duty of search on either producers or patentees. From a social-efficiency perspective, we should choose the legal rule that will result in lower social cost. In comparing the social costs of the two alternative legal rules, however, it should first be noted that they have somewhat different structures.

On the producer side, the current legal rule requiring producers to search, backed by the penalty of injunction threats and associated holdup costs if they fail,[93] creates a binary choice structure for producers. That is, a rational producer operating under this search duty can choose either to conduct an exhaustive search that finds every patentee, or to conduct no search at all. A rational producer is very unlikely to choose to conduct a *partial* search that finds *some* patentees.

This is because finding only *some* patents does a producer very little good. Contrary to the common belief that more missed patents means more holdup,[94] producers face essentially the *same* holdup threat if they miss even a single patent as they do if they miss thousands.[95] Having a thousand people threatening to shut down the factory is not very different from having just one, since the producer is only willing to pay one ransom no matter how many threats there are. Unless the producer can find *all* the patentees ahead of time at a reasonable cost, his rational strategy is to spend nothing on search and simply pay the holdup ransom, letting the patentees fight among themselves over how to divide it.[96]

The picture is different for patentee searches. If patentees are faced with a duty to find producers, backed up by the threat of losing

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93. It should be noted in this context that holdup, despite its pejorative name, is not always bad. In cases where the producer is the lower-cost searcher, the threat of holdup provides an incentive for producers to search ahead of time. *See* Paul J. Heald, *Optimal Remedies for Patent Infringement: A Transactional Model*, 45 HOUS. L. REV. 1165, 1191 (2008).

94. *See, e.g.*, Lemley & Shapiro, *supra* note 63, at 2011 (arguing that "the magnitude of the problem is multiplied by the number of patents that read on the product").

95. *See* Vincenzo Denicolò et al., *Revisiting Injunctive Relief: Interpreting* eBay *in High-Tech Industries with Non-Practicing Patent Holders*, 4 J. COMPETITION L. & ECON. 571, 595 (2008) (presenting a mathematical model illustrating how more patent holders means that each patentee receives a smaller share of the holdup rent).

96. This is a simplification, in that I am assuming that every patentee will become a holdup threat and that the threats will all come at the same time. If these assumptions are not true (and they are not strictly true in real life), then there is some payoff to a partial search. But my point is that the payoff is much smaller than commonly assumed, because the intuitive belief that finding more patents directly and proportionately reduces the holdup threat is wrong.

infringement remedies against any producers whom they do not approach ahead of time, the patentees will not need to find every producer in order to maintain good incomes. For example, if I hold a patent on microprocessors, and the law imposed a new duty on me to search for producers, there are two entities that I would immediately find and approach: Intel and AMD. These two well-known producers together hold over 90% of the market in microprocessors.[97] A patentee who found these two entities and did not search for any others would thus preserve at least 90% of his remedy. Unlike with producers, patentee search is not an on-off proposition.

Stated another way, a rational patentee would not find every producer even under a patentee-search rule, and it is socially efficient that he does not.[98] A numerical example will demonstrate this point. Suppose there are ten producers who would be interested in using the invention. The first is a very large producer, who would be willing to pay $100 for a license (in an ex ante negotiation) because he will use the invention extensively. The second is a slightly smaller producer, who is willing to pay $90, and so on. Suppose also that the marginal cost of search increased. That is, it is very easy to find the first producer because it is a large well-known company ($10), but it becomes progressively more difficult and thus expensive to find smaller and lesser-known producers, so finding the second producer costs $20, and so on. If we required patentees to search on pain of forfeiting any recovery from producers who are not found, then a rational patentee would spend a total of $150 ($10 + $20 + $30 + $40 + $50) to find the five largest and highest-paying producers, and ignore the remaining five, since the sixth-highest-paying producer will pay only $50, but it would cost $60 to find that sixth producer.[99]

Of course, there is still a social loss from the patentee not finding every producer and thus forfeiting part of his remedy. The social loss is the loss of incentives for innovation that a greater patentee remedy would have produced. By definition, the ex ante incentive effect of a patent reward is less than the reward itself, since

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97. Dylan McGrath, *Intel Sets Sights on New Markets*, ELECTRONIC ENGINEERING TIMES, (Dec. 14, 2009), http://www.eetimes.com/electronics-news/4086341/Intel-sets-sights-on-new-markets ("Intel owns more than 80 percent of the microprocessor market. AMD holds about 10 percent, sometimes slightly more.").

98. *Cf.* RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW § 6.5 (8th ed. 2011) (noting that even a strictly liable defendant will not take non-cost-benefit justified precautions).

99. Note the public and private cost is aligned here. As a society, we would not *want* the patentee to spend $60 to find a producer who is only willing to pay $50 in royalties, since the social benefit of the increase in research incentives from the royalty (which cannot be more than $50) is outweighed by the social expenditure of $60 in search costs.

a patentee making investments in research must discount for the risk of failure.[100] But as a conservative first approximation I will use the full royalty payment as a proxy for this incentive loss. The social cost of a patentee-search rule is thus the actual search costs expended by a rational patentee to find the relatively larger and better-known producers (which preserves the incentive effect for those producers that a patentee finds), *plus* the incentive loss arising from the forfeited remedy against smaller and unknown producers. In our hypothetical with ten producers, the social cost of a patentee-search rule is thus only $300, representing the search cost of finding the largest five producers, and the forfeited incentive from the smaller five producers.

Now compare this result with a producer-search rule. Assume for convenience that producers face the exact same amount of search difficulty as patentees. Thus, it costs a producer $10 to find the first patentee, $20 to find the second patentee, $30 to find the third patentee, etc. What is the social cost of the rule? Because a producer-search rule requires the producer to find every *last* patentee, the total search cost expended will be $550. This is an application of the economic law of increasing marginal cost that finding the *last* patentee/producer will be extremely difficult and expensive. [101] Because a producer-search rule requires finding the last patentee but a patentee-search rule does not require finding the last producer, all else being equal, a patentee-search rule would be more efficient.

My hypothetical is rather artificial, but in a conservative way. In real life the difference in difficulty between finding the first patent or producer (really easy) and finding the last patent or producer (really hard) is not going to be only ten times, but millions of times. The difference in efficiency between the two search rules is thus likely to be magnified by orders of magnitude.

Moreover, in calculating the social cost under a patentee-search rule, I have assumed thus far that the lost incentive (when patentees choose to forfeit a producer because search is too expensive) is the full amount of the royalty that a producer would have paid. In reality, the forfeiture of a difficult-to-find producer is likely to have only a very

100. *See* Tun-Jen Chiang, *Fixing Patent Boundaries*, 108 MICH. L. REV. 523, 546 (2010) (explaining how the incentive effect must be adjusted for uncertainty); *see also* Shyamkrishna Balganesh, *Foreseeability and Copyright Incentives*, 122 HARV. L. REV. 1569, 1591–94 (2009) (arguing that copyright law should not protect against uses that are unforeseen at the time of creation). It should be noted that each dollar of investment that is induced by patent incentives can produce more than that amount in social welfare, so I am not saying that the social benefit of a patent is always less than the monopoly reward.

101. *See* SAMPAT MUKHERJEE, MODERN ECONOMIC THEORY 88 (4th ed. 2002) (illustrating the law of increasing marginal cost).

minor effect on incentives. This is because a difficult-to-find producer is also likely to be an unforeseen producer at the time of initial research. Stated differently, producers who were known at the time of initial research are (1) easy to find afterward, and (2) more important to the patentee's incentives. Conversely, a producer who is very hard to find is also likely to be unforeseen at the time of initial research and, therefore, less important to the patentee's incentives.[102] To illustrate with an example, if I am researching microprocessors, then I will attach tremendous importance to being able to have a remedy against Intel and AMD, both because those two companies are the entities most likely to make extensive use of my invention, and because *I know this ahead of time* when I am conducting my research. Conversely, I will attach less importance to other potential producers of microprocessors, both because they are unlikely to use my invention as extensively, and also because it is cognitively more difficult to attach much importance to an entity I do not even know about and cannot concretely imagine.[103] This is not to say that I will attach *no* importance to having a remedy against future startups that might start building microprocessors, but they are less important than Intel and AMD. Limiting my future rights against such unknown producers is much less likely to diminish my incentives than placing the same limits on my rights against Intel and AMD.

In sum, although there is very little empirical data on the costs of patentee searching, three points suggest that imposing the duty of search on patentees is more efficient in many cases, and probably the majority of cases. First, there is an extensive literature on the high costs of producer search.[104] While it is theoretically possible for patentee searching to be even more expensive, at least as a first guess this is unlikely. Second, the social costs of the two search rules are structured differently. There is no need for patentees to find every producer to preserve incentives, whereas producers must find every last patentee to avoid holdup; this difference is significant once we consider the law of increasing marginal cost. Third, the social loss from a rule requiring patentees to search is inherently mitigated by the fact that hard-to-find producers are also likely to contribute less to a patentee's original research incentives,[105] but no such inherent mitigation mechanism applies to the holdup problem that arises under

102. Chiang, *supra* note 100, at 546.

103. Balganesh, *supra* note 100, at 1603.

104. *See supra* Parts I.A.2 & 3.

105. Chiang, *supra* note 100, at 546.

a rule requiring producers to search. The cumulative effect of these three points is that a producer-search rule is likely to be efficient in the majority of cases, or at least in a nonnegligible portion.

C. Consequences of Misallocating Search Duty

The previous Section provided a rather abstract account of how patentees are likely to be the lower-cost searchers. This Section describes some real-life symptoms that manifest when the search duty is misallocated onto the higher-cost searcher. The fact that patent law currently displays these symptoms again illustrates that the search duty is probably misallocated in at least some cases.

To once again take the analogy of tort law, two things happen when we allocate the duty to take precautions to the higher-cost avoider. The first is that, when the cost of compliance becomes too high, people simply breach their duty rather than comply. Second, when the wrong party is given the duty, it creates the so-called "moral hazard" problem on the part of putative victims. Both phenomena have been observed in patent law, as I shall explain below.

1. Breach of Duty as a Cost of Doing Business

A common situation where the duty of taking precautions is placed on the higher-cost avoider is strict liability. For example, the law could hold product manufacturers absolutely liable for any harm caused by their products,[106] with no contributory negligence defense,[107] and this effectively translates into a legal duty on manufacturers to make their products absolutely safe. But, of course, the manufacturer is not always the least cost avoider of harm arising from its products; for example, the consumer would be the lower-cost avoider of harm if he recklessly drives a car and crashes into a tree. At its extreme, an absolute liability regime would *still* allocate the duty to make the product safe to the manufacturer; that is, the manufacturer would have to make the car safe even for reckless drivers, or be liable for any resulting injuries. In reality, while some early product liability cases

106. *See* Escola v. Coca Cola Bottling Co. of Fresno, 150 P.2d 436, 440 (Cal. 1944) (Traynor, J., concurring) (proposing strict product liability).

107. *See, e.g.*, Henderson v. Ford Motor Co., 519 S.W.2d 87, 89–90 (Tex. 1974) (rejecting contributory negligence defense for product liability).

suggested such an extreme duty,[108] courts quickly backed off once they realized the pernicious consequences.[109]

The reason for this retreat is that although the law *could* theoretically impose such an absolute duty, the result is not that car manufacturers would make their product safe for even a reckless driver. Instead, what would happen is that car manufacturers would ignore this legal duty. Since compliance is more costly than the expectation-adjusted damages award, manufacturers will simply breach the duty and treat the consequent legal penalties as a cost of doing business.[110] In such situations, absolute liability does not induce more precaution taking, and therefore does not reduce social cost.

The same phenomenon occurs in patent law. The current law imposes an absolute duty on producers to find every patentee before commencing manufacture of a product, on pain of fairly draconian sanctions (holdup through an injunction).[111] But just because the law can impose an impossibly onerous duty does not mean that producers can or will magically comply with it. Rather, economic theory predicts that they will simply breach the duty and treat the consequent legal penalties as a cost of doing business. As Mark Lemley has described, this is precisely what happens:

> [C]ompanies in component industries simply ignore patents. Virtually everyone does it. They do it at all stages of endeavor. Companies and lawyers tell engineers not to read patents in starting their research. . . . Nor do they conduct a search before launching their own product. Rather, they wait and see if any patent owner claims that the new product infringes their patent.[112]

The fact that producers prefer to pay the penalty rather than comply with the law by searching often elicits strong condemnation.[113] The same is true of manufacturers who prefer to pay the penalty

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108. *See, e.g.*, Luque v. McLean, 501 P.2d 1163, 1169 (Cal. 1972) (rejecting contributory negligence defense for product liability); *Henderson*, 519 S.W.2d at 89–90.

109. *See, e.g.*, Daly v. Gen. Motors Corp., 575 P.2d 1162, 1175 (Cal. 1978) (overruling *Luque* and adopting comparative fault); Duncan v. Cessna Aircraft Co., 665 S.W.2d 414, 428 (Tex. 1984) (overruling *Henderson* and adopting comparative fault).

110. *See* POSNER, *supra* note 98, at 178 (noting that "the expected cost of liability . . . is less than the cost of avoidance, and so avoidance doesn't pay").

111. *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."); *In re* Seagate Tech., LLC, 497 F.3d 1360, 1368 (Fed. Cir. 2007) (en banc) (noting that patent infringement is a strict liability offense).

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

113. *See, e.g.*, Jennifer Kahaulelio Gregory, Comment, *The Troll Next Door*, 6 J. MARSHALL REV. INTELL. PROP. L. 292, 306 n.144 (2007) ("Witnesses for high-tech companies freely admit that they do not perform any patent clearance studies before releasing their products. The current 'head in the sand' approach that is the current standard operating procedure should not be viewed as acceptable to anyone." (internal quotations and alterations omitted)).

rather than make their products absolutely safe, most famously when Ford decided to pay legal damages rather than redesign the Pinto after concluding that the cost of redesign would exceed the expected legal liability.[114] This is a classic divide between normal people and law-and-economics scholars. Normal people think that Ford's conduct (and a producer's decision to ignore patents) is the very definition of evil.[115] Economists think that it is a rational response to legal incentives.[116] But regardless of whether one thinks that deliberately breaching an impossibly onerous legal duty is evil, rational, or both evil and rational, my point is that a legal duty that demands the impossibly onerous from its target is probably a misallocated duty. And the evidence suggests that this is precisely what has happened in patent law, given that producers have demonstrated that they will pay draconian sanctions rather than comply with the absolute duty to search.

2. Moral Hazard and Patent Trolls

The second problem with misallocating the duty from the lower-cost party to the higher-cost party is that it induces so-called "moral hazard" on the part of the putative victim. For example, suppose that the law always held bicycle riders liable for collisions with pedestrians,[117] no matter how little care the pedestrian was taking, and the law always assessed a fully compensatory remedy that made the pedestrian whole. The obvious problem is that pedestrians would have no incentive to take any care for themselves against potential collisions,[118] so they would not watch out for bicycles when hiking on a bike trail (let us assume that the remedy is truly fully compensatory, so that the pedestrian is made indifferent to injury).

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114. Grimshaw v. Ford Motor Co., 174 Cal. Rptr. 348, 384 (Cal. Ct. App. 1981) ("Ford . . . decided to defer correction of the shortcomings by engaging in a cost-benefit analysis balancing human lives and limbs against corporate profits.").

115. *See id.*; Gregory, *supra* note 113, at 306 n.144.

116. Gary T. Schwartz, *The Myth of the Ford Pinto Case*, 43 RUTGERS L. REV. 1013, 1036–38 (1991) (noting that standard law and economics, starting from the *Carroll-Towing* formula down, would call for precisely such cost-benefit balancing); *see also* Lemley, *supra* note 113, at 25–29 (arguing that producers should ignore patents due to high search costs).

117. I choose a bicycle accident instead of car accident here for the obvious reason that a car accident may kill the pedestrian and thereby preclude meaningful recovery of compensation by the victim.

118. POSNER, *supra* note 98, at 172 (noting that in the absence of contributory negligence "the plaintiff would have no incentive to take preventative measures because he will be fully compensated for his injury, and the efficient solution will not be obtained").

The result is more accidents than under a regime where pedestrians had an incentive to take care.

Now imagine something further, which is that instead of being only fully compensated, injured pedestrians are given a *super*compensatory award, so they are in fact made *better* off if they are involved in a collision. This moral hazard problem is obviously increased, in that pedestrians now have an incentive to affirmatively *try* to get run over. In such a world, pedestrians would hide in bushes and jump in front of oncoming bicycles at the last minute.

Even imagining such a world seems absurd. But this is precisely what happens in the patent world. The result of placing absolute liability on producers to search and also giving a supercompensatory remedy (the holdup effect gives a patentee like NTP *more* than what it could have received in an ex ante negotiation) is that patentees affirmatively try to get their patents infringed. Akin to hiding in bushes and jumping in front of bicycles, patentees like Rambus try to hide their patents from the relevant industry, only springing up after the industry has sunk irreversible investments into an infringing project.[119] The phenomenon is so common, and the profits so large, that it has occurred throughout the history of patent law under various names. In the nineteenth century, this was known as the "patent shark" phenomenon,[120] where patentees ambushed farmers who had made irreversible investments in their inadvertently infringing farm equipment.[121] In the twentieth century, this was known as the "submarine patent" phenomenon, where patentees would hide ("submerge") their patents in the patent office until an industry had made irreversible investments, and then the patentee would "surface" to hold the industry to ransom.[122] Today, the problem is known as the "patent troll" phenomenon, after the mythical troll that hides under a bridge before emerging to demand a ransom.[123] In all these cases the patentee's strategy is the same. And in all these cases, the underlying theme is that patentees benefit from, and thus affirmatively seek, to have their patents infringed and obtain an ex

119. *See supra* text accompanying notes 45–56.

120. Gerard N. Magliocca, *Blackberries and Barnyards: Patent Trolls and the Perils of Innovation*, 82 NOTRE DAME L. REV. 1809, 1811 (2007).

121. *Id.* at 1822–24.

122. Donald S. Chisum, *Introduction*, 26 J. MARSHALL L. REV. 437, 445 (1993) (describing submarine patents as those that "hide unseen beneath the PTO 'patent pending' ocean and, after an industry sets sail unaware of proprietary rights claims, surface with torpedoes ready to fire").

123. Donald S. Chisum, *Reforming Patent Law Reform*, 4 J. MARSHALL REV. INTELL. PROP. L. 336, 340 (2005) ("[A] troll hides under bridges, metaphorically speaking, waiting for companies to produce and market products.").

post holdup remedy, rather than to avoid such infringement through ex ante negotiations.

Numerous scholars have discussed the patent troll phenomenon.[124] But the usual explanation focuses on how hard it is for producers to find patents and thus considers only how to make producer search easier.[125] The contribution of this Article is to show that producers' inability to search is only half the story. Looking at the problem through the law-and-economics lens of moral hazard tells us that the more fundamental problem lies on the other side of the equation: *patentees* have inefficiently low incentives to search because they do not bear the cost of inadvertent infringement and actually benefit from the opportunity to engage in holdup. Making holdup pay privately, even as it is inefficient socially, means more holdup occurs than is optimal.

Two lessons emerge. The first is that the provision of a supercompensatory remedy on top of a misallocated search duty creates a super moral hazard problem. Not only do patentees refrain from search, they affirmatively *hide* and then ambush inadvertent infringers. But the second lesson is that the problem is not merely that patentees hide. We not only want pedestrians to refrain from hiding in bushes and ambushing cyclists, but we also want them to affirmatively take care against potential collisions. In a similar vein, a truly optimal solution to the patent search problem involves not just making patentees stop hiding, which others have advocated,[126] but also involves making them affirmatively search.

D. Imposing a Duty of Search on Patentees

My proposal is to impose a duty of search on patentees when they are the lower-cost searchers (and to retain the existing allocation of search duty on producers in all other cases). The duty includes not only finding the producer, but also contacting the producer to initiate

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124. *See, e.g.*, John M. Golden, Commentary, *"Patent Trolls" and Patent Remedies*, 85 TEX. L. REV. 2111, 2113 (2007); Mark A. Lemley, *Are Universities Patent Trolls?*, 18 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 611, 615–19 (2008); Michael J. Meurer, *Controlling Opportunistic and Anti-Competitive Intellectual Property Litigation*, 44 B.C. L. REV. 509, 512–25 (2003) (examining the patent troll phenomenon).

125. *See, e.g.*, Magliocca, *supra* note 120, at 1815 (stating that the troll problem occurs because "the existence of a patent is easy to overlook" and "patent law holds a defendant liable for infringement even if it does not know that an item is patented").

126. *See, e.g.*, Hovenkamp, *supra* note 86, at 225.

negotiations over the patent.[127] At the same time, it is important to emphasize that a patentee would only need to *initiate* the negotiation—there is no requirement that the negotiation *succeed*. The essence of a property rule, after all, is that the property owner has the option of refusal;[128] otherwise, we fall into a compulsory transfer regime. My point in this Article is that we can preserve a property rule for patents yet at the same time overcome the problem of high producer search costs by reallocating the duty of search to patentees.

An objection that may arise at this point is that no patentee can determine ahead of time whether he is the lower-cost searcher; so how would he know whether to conduct the search? The answer to this objection lies, once again, in the analogy to tort law. Nobody knows ahead of time whether a particular tort defendant or a particular tort plaintiff is the lower-cost avoider of an accident. However, by imposing liability on the least cost avoider *as determined ex post*, both parties will respond ex ante by taking efficient precautions against liability.[129] In patent law, the efficient precaution for a party is to perform a cost-justified search.

To see how this works, consider first the common tort situation where a manufacturer sells a product to a consumer, and each side can decide whether to take certain precautions. For example, the product in question might be a heater, and the manufacturer can add a safety switch for $5, which has a 10% chance of preventing a fire that would cause $100 of loss. Additionally, the manufacturer can take the more drastic measure of redesigning the heater completely for $50, which will have a 20% chance of preventing the $100 fire. Of course, the consumer can also take some preventative measures, and so suppose that keeping the heater away from flammable objects is worth $1 in inconvenience but reduces the chance of the $100 fire by 5%, and that the consumer can also undertake a radical safety measure such as installing an automatic sprinkler system in his home for $90, which has a 40% chance of preventing any fires. As should be obvious, from a social perspective we want both the manufacturer and the consumer to take the cheap precautions, but not the radical redesigns, because the (social) costs of the radical measures exceed the expected benefits.

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127. This second prong is necessary to prevent gaming by patentees such as Rambus, who found the relevant producers but then hid the relevant patent.

128. Calabresi & Melamed, *supra* note 13, at 1092.

129. DOUGLAS G. BAIRD, ROBERT H. GERTNER & RANDAL C. PICKER, GAME THEORY AND THE LAW 18 (1994) (demonstrating how both sides have optimal incentives under a rule of strict liability combined with contributory negligence).

As a theoretical matter, we can imagine four possible legal rules that we might adopt to achieve our preferred outcome: (1) no liability, where any loss is always placed on the consumer; (2) absolute liability without contributory negligence, where any loss is always placed on the manufacturer; (3) strict liability *with* contributory negligence, where the loss is placed on the manufacturer by default, but is shifted to the consumer if the consumer fails to take reasonable precautions; and (4) negligence liability (with or without contributory negligence) where the loss is placed on the consumer by default unless the manufacturer fails to take reasonable precautions. As is well established in the tort literature, the first two rules are suboptimal because they induce moral hazard by the immunized party. If we adopted a regime of no liability, the consumer would still take the reasonable precaution, because his own personal gain (a 5% chance of avoiding the $100 fire) is greater than his loss ($1 of inconvenience); but the manufacturer would have no incentive to take any precautions at all. Conversely, in an absolute liability regime the manufacturer will take the proper precaution, but the consumer would not. The result is that we end up with more loss from fires than is desirable.

What is less obvious, but is equally well established in the tort literature, is that rules (3) and (4) have largely the same effects on behavior, and both induce efficient behavior.[130] In a regime of strict liability with contributory negligence, the consumer will have the incentive to keep the heater away from flammable materials (because otherwise he will be found to be contributorily negligent). At the same time, because the manufacturer at the time of making a product cannot casually assume that consumers will be contributorily negligent in later using it—in most cases they will not be—it should assume that it will be held strictly liable. Under this assumption, the manufacturer will take the cost-justified precaution of installing the $5 safety switch, since the private benefit (avoiding a 10% chance of $100 in liability) outweighs the $5 cost. Importantly, the manufacturer will *not* undertake the radical redesign even under a regime of strict liability, because it is cheaper simply to pay the $20 in expected loss than to undertake the $50 precaution.[131] The mirror analysis occurs under a negligence regime, which is equivalent to holding the consumer strictly liable for a loss unless the manufacturer

130. LANDES & POSNER, *supra* note 85, at 80 ("[S]trict liability with a defense of contributory negligence yields the same levels of due care for potential injurers and potential victims as negligence with or without a defense of contributory negligence.").

131. *See id.* at 64 ("[S]trict liability will not cause a potential injurer to take more than due care.").

is negligent. The manufacturer will have the incentive to take cost-justified precautions to avoid liability for negligence; while the consumer—because he cannot casually assume that the manufacturer has been negligent (if the consumer *knows* the manufacturer has been negligent, then he will be held to have voluntarily assumed the risk)—will also have the incentive to take reasonable (but not excessive) safety precautions to prevent harm to himself.[132]

Three important points are worth emphasizing. The first point is that rules (3) and (4) both effectively allocate the loss to the lower-cost avoider. Even though strict liability purports to allocate the loss to the manufacturer regardless of cost advantage, the availability of contributory negligence as a defense means that the consumer will be allocated the loss if the consumer is the lower-cost avoider (if we define "contributory negligence" as failure to take cost-justified precautions, which the law-and-economics literature usually does).[133] The second point is that this beneficial effect occurs even though nobody knows ahead of time who the lower-cost avoider is.[134] The third point follows from the second: the *real-world effects* of a legal duty can differ very significantly from the *semantic wording* of the duty on paper. A supposedly "absolute" duty on manufacturers to design safe products is not really intended to ensure absolutely safe products, and it cannot possibly achieve that outcome. Rather, strict product liability can only induce reasonable precautions by manufacturers.[135] In a similar vein, the point of imposing a duty on patentees to search ex ante if they are the least cost searchers is not to create a regime where patentees ask themselves: "Am I the lower-cost searcher vis-à-vis a producer who I haven't found yet (and thus cannot possibly compare myself against)?" Expecting patentees to make such a comparison would be absurd. The point of imposing the legal duty is to create the real-world effect of inducing patentees to perform reasonable searches based on the fear that they *might* be found liable and lose their remedy if they failed to search.

The translation of the tort paradigm to patent searches is straightforward. Assume that we have a patentee holding a patent on

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132. *Cf.* Davis v. Consol. Rail Corp., 788 F.2d 1260, 1265–66 (7th Cir. 1986) (Posner, J.) (noting that, in general, assessments of reasonableness assume that the other side takes due care).

133. *See* LANDES & POSNER, *supra* note 85, at 74 (defining contributory negligence in these terms).

134. *See* BAIRD, GERTNER & PICKER, *supra* note 129, at 14–16 (using game theory, with the assumption of ignorance of the other side's actions, to demonstrate the efficiency of tort rules).

135. *See supra* text accompanying notes 131–32.

a new type of computer, and a manufacturer of computers is thinking of introducing a new model that would infringe the patent but has not yet sunk fixed costs or commenced infringement. In the absence of the parties finding each other before infringement occurs, the resulting inadvertent infringement would cause $100 of social loss. Importantly, from an economic perspective the loss still occurs even if the patentee eventually sues the manufacturer and the parties either negotiate a license after the fact or have the court impose a remedy—by that point the inadvertent infringement would already have occurred, social resources would already have been wasted by developing the same invention twice, and the patent system would thus already have failed. The way to prevent the social loss is rather to ensure that an *ex ante* negotiation occurs. How can this be effectuated?

As with the tort example, the way to achieve the optimal result is to have both patentees and producers take reasonable ex ante precautions, namely by engaging in cost-justified searches. Now assume that the producer can conduct either an inexpensive patent search costing $5 (e.g., having a low-level associate look up the PTO database), or a very expensive search costing $50. Similarly, the patentee can conduct either an inexpensive $1 search for producers (e.g., looking up the largest computer manufacturers on Google), or a very expensive $90 search. Importantly, the law of diminishing marginal returns means that a search that is ten times more expensive will *not* be ten times more effective: while it is very easy to find the first few patents/producers, it becomes rapidly more difficult to find the remaining patents/producers. Thus, while a cursory $5 search can find 10% of all relevant patents (and thus has a 10% chance of finding a particular patent), a $50 search will only find 20% of all relevant patents. And while a cursory $1 search on Google can easily find the largest 5% of computer manufacturers (and thus has a 5% chance of finding a particular producer), a $90 search will only be able to find 40% of all relevant manufacturers, because it is almost impossible to chase down the last person building a computer in their basement.

Under the current regime of absolute liability for producers, the manufacturer will have some incentive to search for the patentee,[136] but the patentee will have no incentive to search. This

136. Though, as noted *supra* in Part III.B, the manufacturer's incentive to search under an absolute liability rule is actually less than what I have presented in this example, because his marginal benefit to searching is very low, given that he must find every last patentee to avoid holdup. Thus, the patentee's comparative search advantage is even stronger than what I have

means that the patentee will not even perform a $1 search that has a 5% chance of success. This outcome is inefficient, because it means that inadvertent infringement will occur 5% more frequently throughout the patent system. Moreover, this 5% figure dramatically understates the patentee's search advantage: the largest five computer manufacturers in fact control over 60% of the market and thus presumably cause 60% of all infringements of computer patents,[137] and they can all be found almost instantaneously with a simple Google search. Thus, a more realistic estimate of the efficiency loss from not having any incentives for patentee search is that 60% of cases of inadvertent infringement could have been cheaply prevented if we switched the legal rule and provided an incentive for patentee search.

Consider now my proposed legal rule that requires patentees to search when they are the lower-cost searchers. By the same calculus as the tort example, the result of imposing a duty on patentees to search when they are the lower-cost searchers—and leaving the loss with the producer in all other cases—is that *both* patentees and producers will perform cost-justified searches. The patentee will perform the $1 search, while the producer will perform the $5 search. Importantly, neither patentees nor producers will perform the highly expensive search, because the expected benefit will not justify the cost. By imposing a duty to search on patentees in addition to the current strict liability rule for producers, the efficient social outcome can be achieved.

Thus, like the contributory negligence defense in tort law, a "contributory search" defense should be adopted in patent law. What a contributory search defense entails is a duty-breach-causation analysis similar to tort law. Under my proposal, the law would impose a *duty* on patentees to search when they are the lower-cost avoiders. A producer would then bear the burden of proving that a particular patentee *breached* this duty by showing that the patentee failed to perform a cost-justified search, and that the failure *caused* the resulting inadvertent infringement in the sense that a search would have successfully found the producer.[138] And, like the contributory

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outlined here, and this makes the reflexive allocation of search responsibility to manufacturers even less sensible than in the present example.

137. *See Gartner Says Worldwide PC Shipments Grew 3.2 Percent in Third Quarter of 2011*, GARTNER.COM (Oct. 12, 2011), http://www.gartner.com/it/page.jsp?id=1821731 (showing that the five largest computer manufacturers controlled over sixty percent of the market at the time).

138. A reader might question the causation requirement, in the sense that if the patentee only has a five percent chance of finding the producer, then wouldn't there be no causation? And

negligence defense in tort law, establishment of the contributory search defense would provide a full defense to liability—the forfeiture of remedies providing a sanction to enforce the duty of patentee search.[139]

An important note to the proposal is that a willful pirate (i.e., an infringer who copies the patent) will always be the lower-cost searcher. A pirate copying the patent would necessarily know of its existence, and once the patent has been located it is essentially costless to locate the patentee, since the patentee's address can then easily be found through patent office records.[140] Thus, the contributory search analysis would only apply in cases of inadvertent infringement, not of deliberate piracy. This is also the case in tort law: there is no contributory negligence defense to intentional torts, because an intentional tortfeasor is always the lower-cost avoider.[141]

A reader familiar with the tort literature might ask why I favor a contributory search defense over an affirmative negligence requirement for liability. In tort law, strict liability with contributory negligence produces largely the same incentives for behavior as a regime of affirmative negligence liability, but the affirmative negligence rule dominates in the real world.[142] If we took the tort analogy really seriously, then one might argue that I should not be proposing a contributory search defense superimposed on strict producer liability, but should be proposing an affirmative negligence regime where patentees would recover nothing unless they showed that the producer was the lower cost searcher and failed to perform a cost-justified search. My answer is that, while an affirmative negligence regime would indeed also create the correct incentives for behavior, it requires far too radical a departure from existing doctrine. The existing doctrine imposes absolute liability on producers, so that

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if the patentee knew this ahead of time, wouldn't this eviscerate the incentive to search? But one should consider the broader picture: a five percent chance of finding a particular producer means that, in a world with twenty producers, a patentee would have found one. Against that one producer, the patentee would lose his remedy, and this provides the appropriate incentive for patentees to search ahead of time.

139. For discussion of the possible harshness of this forfeiture, and the potential for using lesser sanctions to enforce the duty, see *infra* Part III.E.7.

140. *See* 37 C.F.R. § 1.63(b)(2) (2012) (requiring a patent applicant to record his address).

141. *See* RESTATEMENT (SECOND) OF TORTS § 481 (1965) ("The plaintiff's contributory negligence does not bar recovery against a defendant for a harm caused by conduct of the defendant which is wrongful because it is intended to cause harm to some legally protected interest of the plaintiff or a third person.").

142. *See* James A. Henderson, Jr., *Why Negligence Dominates Tort*, 50 UCLA L. REV. 377, 382–85 (2002) (noting that strict liability, either with or without contributory negligence, has not expanded for the last half century).

producers are always allocated the loss arising from infringement. To change the default all the way to imposing the loss on patentees unless they could affirmatively prove producer negligence in search would be too radical. My comparatively moderate solution, which achieves largely the same economic result, is to superimpose a contributory search defense on top of the existing absolute producer liability, a proposal that requires less doctrinal adjustment.

A contributory search defense does face the problem that it requires a case-by-case comparison of patentee search costs against producer search costs, which is difficult and costly for courts to do even ex post. This problem occurs in an affirmative negligence regime as well, but does not occur in an absolute liability regime. At root it is a reflection of the classic rules-versus-standards problem: individualized analysis achieves great precision at a theoretical level but in practice creates high administrative costs, while more categorical rules have lower administrative costs but less precision.[143] But even if one were to favor rules and lower administrative costs, this alone cannot justify the existing regime, which significantly misallocates search responsibility and seems to generate extremely high administrative costs (in the form of frequent litigation) notwithstanding the categorical rule. For those readers who find case-by-case determinations of search costs too administratively difficult, I will present a more rule-based proposal in Part IV. That proposal is less theoretically precise than the contributory search defense, but it has the advantage of lower administrative costs, while still achieving better outcomes than the absolute producer liability rule.

E. Addressing Objections

1. Producers Will Hide Their Infringing Activities

The most common objection to my proposal is that producers will hide their infringing activities. As previously explained in Part III.A, this objection fundamentally misunderstands the nature of the search problem and my proposal to address it. Contrary to the frequent assumption of lawyers (whose jobs center around ex post litigation and negotiation), the social purpose of the patent system is not to have patentees and infringers negotiate a license after an

143. *See* Richard A. Posner, *Employment Discrimination: Age Discrimination and Sexual Harassment*, 19 INT'L REV. L. & ECON. 421, 423 (1999) ("Rules have higher error costs but lower administrative costs; standards have lower error costs but higher administrative costs. The relative size of the two types of cost will determine the efficient choice.").

infringing product has been developed.[144] The fact that patent litigation revolves around such a fact pattern is an unfortunate byproduct of the patent system, not the fundamental social problem it is trying to solve.

The social problem that the patent system is trying to solve is how to bring ingenious inventors with no capital and capital-rich manufacturers with no ideas together *before* an infringing product has been independently reinvented and developed.[145] At this ex ante point in time, there is no problem of the manufacturer hiding from the inventor because there is nothing to hide and no incentive to hide. And my proposal is to impose a duty on patentees at this point in time to find the producer. There is no need to consider the problem of producers hiding their infringing activities at this point in time, because there is no infringing activity to hide.

2. Requiring Property Owners to Search Is Unprecedented

Another objection that is commonly voiced is that a duty of patentee search seems completely contrary to standard principles of property law.[146] The one-sided view of search is deeply ingrained and is usually regarded as intrinsic to a property right.[147] In one sense, the very point of this Article is to demonstrate that this objection and the one-sided view of search that it embodies are misguided.

An additional, and slightly different, answer is that requiring property owners to search for trespassers is actually neither unprecedented nor unknown to property law. As Jonathan Masur discusses,[148] patent law in fact imposes search duties on patentees *after* infringement occurs: unless the patentee finds and sues an infringer within six years from when a reasonable search would have discovered the infringement, the defense of laches deprives the

144. *See* Paice LLC v. Toyota Motor Corp., 504 F.3d 1293, 1316–17 (Fed. Cir. 2007) (Rader, J., concurring) (arguing that patent law should favor *ex post* negotiated licenses over judicially imposed compulsory licenses).

145. *See* Arrow, *supra* note 18, at 615 (noting that the owner of information "may not be able to exploit it as effectively as others").

146. *See, e.g.*, Authors Guild v. Google Inc., 770 F. Supp. 2d 666, 681 (S.D.N.Y. 2011) ("The law of the United States is a copyright owner may sit back, do nothing and enjoy his property rights untrammeled by others exploiting his works without permission." (internal alterations omitted)).

147. *See, e.g.*, MICELI, *supra* note 32, at 157 (reflexively assuming that a property right against injury means that the injurer must identify the victim ahead of time).

148. Masur, *supra* note 4, at 187 (noting that patent law's liability rules "allocate search responsibilities").

patentee of his remedy against that infringer permanently.[149] In real property law, the doctrine of adverse possession does the same thing, and goes even further by depriving the property owner of his entire property right.[150]

There are important conceptual and operational differences between patentees performing ex post searches for infringers and ex ante searches for cooperative producers, as I discussed in Part III.A. At the same time, imposing a duty on patentees to perform an ex ante search is not very radical if one regards it as a logical extension of laches and adverse possession doctrine. Perhaps the greatest irony of the situation is that judges and lawyers find a duty of ex ante patentee/property-owner search to be unimaginable when a duty of ex post patentee/property-owner search is so well established.

3. Preserving the Trade-Secrecy Option

A conceptual cousin of the previous objection is the argument that requiring patentee notice—at least requiring notice before patent issuance—destroys the trade-secrecy option that inventors have under current law. That is, current law provides patentees with the option to keep their invention secret until the patent issues,[151] on the theory that if the patent is denied, the inventor will be able to resort to the trade secret system to exploit his invention.[152] Imposing a duty on patentees to search for producers and inform them of the patent application lies in tension with the idea that inventors have the option to return to trade secrecy if their patent application is denied.

Although there is tension between these two ideas, this tension is reflective of a broader tension in the patent system's attitude towards the trade-secrecy option. While patent law does allow inventors to keep their inventions secret before a patent issues, it also does many things to penalize inventors who wish to maintain this option and to encourage early public disclosure. Most directly, in cases where two people invent the same thing close in time,[153] the inventor

149. A.C. Aukerman Co. v. R.L. Chaides Constr. Co., 960 F.2d 1020, 1028 (Fed. Cir. 1992) (en banc) (creating a presumption of laches after six years).

150. *See generally* 3 AM. JUR. 2D *Adverse Possession* § 1.

151. 35 U.S.C. § 154 (2006) (requiring patent applications be kept confidential).

152. Daniel R. Cahoy, *An Incrementalist Approach to Patent Reform Policy*, 9 N.Y.U. J. LEGIS. & PUB. POL'Y 587, 624 (2006).

153. This phenomenon occurs with regularity. *See* Tun-Jen Chiang, *A Cost-Benefit Approach to Patent Obviousness*, 82 ST. JOHN'S L. REV. 39, 68–69 (2008) (citing historical examples of individuals who invented the same device close in time); Mark A. Lemley, *The Myth of the Sole Inventor*, 110 MICH. L. REV. 709, 712–15 (2012) (noting that multiple individuals and groups

who publicly discloses the invention has an enormous advantage in obtaining priority to the patent over the competing inventor who keeps the invention secret.[154] In short, while patent law technically permits inventors to retain the trade-secrecy option, it also seeks to make maintaining secrecy as practically unattractive as possible.[155]

In this sense, my proposal is consistent with the theoretical framework underlying patent law. It does not absolutely forbid patentees from keeping their inventions secret during the pendency of an application—that is, it does not invalidate a resulting patent as a penalty for such conduct. Rather, all my proposal does is create a practical incentive against such secrecy, because a patentee who fails to search will risk losing his infringement remedies against individual producers. Compared to the already-existing risk of losing priority against a competing inventor—and, therefore, losing the entire patent—my proposal is actually quite mild.

4. Patentees Cannot Foresee All Uses of Their Inventions

An objection that is facially similar to the first objection—but is in fact quite conceptually distinct—is that patentees cannot foresee all possible producers and all possible uses of their inventions.[156] I have already dealt with the argument that patentees cannot foresee all possible producers in Part III.A, the short version being that it is unnecessary for patentees to find *all* possible producers, when finding the largest and most well-known producers will preserve over 90% of a patentee's original remedy and corresponding incentives to invent.[157] Perhaps equally important, royalties from producers that a patentee *cannot foresee* are the least likely to contribute to the original incentive to invent, since by definition they were unforeseeable at the time of invention.

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historically have worked on the same types of projects at the same time but independently from each other).

154. This is true even under the new patent statute. *See* Leahy-Smith America Invents Act, Pub. L. No. 112-29, § 3, 125 Stat. 284 (2011) (to be codified at 35 U.S.C. § 102(b)(1)(B)) (giving priority to the first person to file a patent application for, *or to publicly disclose*, the invention).

155. *See* Apotex USA, Inc. v. Merck & Co., 254 F.3d 1031, 1038 (Fed. Cir. 2001) ("[T]he spirit and policy of the patent laws encourage an inventor to take steps to ensure that 'the public has gained knowledge of the invention which will insure its preservation in the public domain' or else run the risk of being dominated by the patent of another." (quoting Palmer v. Dudzik, 481 F.2d 1377, 1387 (C.C.P.A. 1973))).

156. *Cf.* Grant v. Raymond, 31 U.S. (6 Pet.) 218, 243 (1832) (arguing for broad patentee rights to amend due to concern about unforeseen uses).

157. *See supra* text accompanying notes 97–100.

A similar response applies to the objection that patentees cannot foresee all future uses. As an initial matter, this objection's factual premise is true enough, in that patentees often discover new markets and new uses for an invention after it has been developed. A good example of such a serendipitous new use is Play-Doh,[158] which Kutol Products originally formulated as a nontoxic wallpaper cleaner.[159] It was only after Kutol discovered that children were using the substance to mold figures that it was sold as a toy.[160] It would obviously have been difficult for Kutol to have foreseen a toymaker as a potential licensee for its wallpaper cleaner and search for producers in the toy industry.

To this objection there are two responses. First, the determination of the least cost searcher is a comparative one. If a toymaker such as Mattel has the idea to use Kutol wallpaper cleaner as a toy, it would need to find out the chemical formula for that wallpaper cleaner by reading the patent, and in doing so would necessarily know that the substance is patented and who the owner is.[161] At this point—which is ex ante because it occurs before infringement and before the substantial investment of fixed costs—there would be no conceivable argument that it is more expensive for Mattel to find the patentee than for the patentee to find Mattel. Thus, at least in cases where the unforeseen use occurs by derivation from the patent, the producer would always be the least cost searcher.

Second, the very unforeseeability of the alternative use brings into play the same inherent mitigation mechanism as described in Part III.A. That is, to the extent that the later use is completely unforeseeable at the time of the patentee's original conception, the unforeseen use is also unlikely to form a significant part of the patentee's original research incentive.[162] The serendipitous and

158. *See* U.S. Patent No. 3,167,440 (filed May 17, 1960) (patent for Play-Doh).

159. TIM WALSH, TIMELESS TOYS: CLASSIC TOYS AND THE PLAYMAKERS WHO CREATED THEM 115 (2005).

160. *Id.* at 116–17.

161. Of course, there are methods of derivation that do not require reading the patent directly. For example, Mattel might purchase some Kutol wallpaper cleaner and have its chemists reverse engineer the formula. But, as shall be seen in Part IV *infra*, that is why 35 U.S.C. § 287 is so important. If Kutol marks its wallpaper cleaner with the patent number, then Mattel will know that the formula is patented. *Cf.* Global-Tech Appliances, Inc. v. SEB S.A., 131 S. Ct. 2060, 2071 (2011) (finding it to be willful blindness to reverse engineer a product without considering that it might be patented).

162. Balganesh, *supra* note 100, at 1603.

unexpected discovery of a new use is, in this sense, a windfall. Removing the windfall would cause relatively little social loss.[163]

5. Patentees Will Spam Producers

An objection on the other side is that patentees would game any requirement that they initiate contact with producers by spamming every conceivable producer with an email attaching their patent.[164] If this sufficed to meet a duty of search and preserved the patentee's infringement remedies, then every patentee will immediately follow this strategy, and the result would be that producers receive two million issued patents (and every future issued patent) in their inboxes. The producers would then have to sift through all these patents or risk being held up afterwards, landing us right back at square one.

Essentially, the problem is how to define the "search" that satisfies a patentee duty to search. How *complete* must a search be? If a search is completed by any contact with a producer—no matter how minimal or how indiscriminately such contact is made—then spam would count. But even a slightly more demanding requirement would solve the spam problem.

Somewhat ironically, the well-known way to deal with a spam problem is to slightly—but only slightly—increase the cost on the spammer, usually through an intermediary who can levy the charge.[165] The point here is that a patentee who indiscriminately emails the patent to every potential recipient on the planet is not truly doing a "search" in any meaningful sense, but is instead de facto shifting the burden to the recipient to sift through massive amounts of email.[166] But even a fairly small cost placed on the sender will require prioritization and dramatically reduce the number of recipients.

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163. And of course it is the social, not private, losses that matter for our inquiry.

164. *Cf.* Kevin J. Kelly, *Placing the Burden Back Where It Belongs: A Proposal to Eliminate the Affirmative Duty From Willful Infringement Analyses*, 4 J. MARSHALL REV. INTELL. PROP. L. 509, 526–27 (2005) (noting that patentees adopted a similar strategy in order to obtain enhanced damages from infringers).

165. *Cf.* Ian Ayres & Matthew Funk, *Marketing Privacy*, 20 YALE J. ON REG. 77, 110–13 (2003) (proposing an "authorized intermediary" regime where an intermediary would charge senders and pay recipients to reform the telemarketing industry).

166. *See id.* at 83 (noting the basic problem of spam is that it externalizes costs to the recipient).

Proposals to reduce unwanted email often suggest a penny would be enough to prevent most spam.[167]

A fairly simple way to prevent patentees from spamming producers is to define a reasonable patentee search as requiring contact (which then leads to licensing negotiations) to be initiated through an attorney, and not by the patentee *pro se*. This makes the attorney an intermediary who can increase the transaction cost and thereby indirectly filter out spam through patentee self-selection.[168] More directly, a manifestly frivolous initiation of contact—one involving a patent that has no relationship whatsoever with the producer's usual business—could then be punished with disciplinary sanctions on the attorney, providing a direct measure of quality control.[169] Of course, the standard for imposing sanctions should be very high: the point of a patentee-search regime is for patentees to approach *potential* licensees before they sink irreversible investments in designing a product, so a concrete allegation of infringement against a specific product should not be required. The goal is only to require that patentees give a reasonable amount of individualized consideration to each producer in the process of fulfilling their duty to search, rather than indiscriminately make contact with all possible producers in the manner of a spammer. The combination of attorney fees and potential sanctions should be more than enough to prevent the spam problem from occurring.

It should be noted that the optimal balance between the competing imperatives of making transaction costs high enough to deter spamming, but not too high so as to deter legitimate patentee contact with producers, is an empirical question. It may emerge that requiring a lawyer to make the contact is too onerous for patentees because attorney fees are too high, and some cheaper mechanism, for example requiring patentees to initiate contact through another

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167. *See* Jeffrey D. Sullivan & Michael B. de Leeuw, *Spam After Can-Spam: How Inconsistent Thinking Has Made a Hash out of Unsolicited Commercial E-Mail Policy*, 20 SANTA CLARA COMPUTER & HIGH TECH. L.J. 887, 924 & n.140 (2004). Given the prevalence of junk mail in the actual mail system, however, something more than the cost of a first-class postage stamp is likely required to reduce the volume of irrelevant mail to a manageable level. This is particularly the case given that many patentees adopted a spamming strategy back when a single letter was enough to open an infringer to enhanced damages. *See* Kelly, *supra* note 164, at 526–27 (discussing the low cost at which a patent owner could send a letter in the mail); *see also In re* Seagate Tech., LLC, 497 F.3d 1360, 1371 (Fed. Cir. 2007) (en banc) (raising the legal standard for obtaining enhanced damages).

168. *Cf.* Jonathan S. Masur, *Costly Screens and Patent Examination*, 2 J. LEGAL ANALYSIS 687 (2010) (arguing that the PTO serves as a "costly screen" to filter out worthless patents).

169. *Cf.* FED. R. CIV. P. 11(b)(3) (requiring that factual allegations in complaints have evidentiary support, or potentially have evidentiary support after further discovery).

intermediary such as the patent office (which could charge a smaller fee), would work just as well.[170] The main point is that the concern with patentees gaming the search rule through spam can be addressed by fairly simple mechanisms.

One potential counterargument is that, even properly winnowed, producers will need to license so many patents for a single product that it is impossibly expensive to negotiate. For example, if designing a new smartphone would require licensing six thousand patents, then even if all these patents—and only these patents—were sent to RIM ahead of time and flagged so that the search cost were zero, it would still be extremely expensive to conduct negotiations with six thousand patent holders.

This objection is true enough, but is directed to a somewhat different problem than is addressed by this Article. The entire search literature (including this Article) is premised on the assumption that reducing search costs will help alleviate at least some of patent law's problems, even if negotiation costs will still arise after the parties are found. If, contrary to this assumption, the problem lies not in *finding* the relevant patent holders, but in *negotiating* with a great many patent holders, then the entire body of existing search literature becomes irrelevant. Proposals to publish patent applications and to build better patent databases will do no good if the problem lies not in finding the patent holders, but in having six thousand legitimate transactions to process after the patent holders are found. Nor do proposals to convert to a liability rule and grant compulsory licenses solve this problem: if there are six thousand legitimate patent holders who have a claim over the resulting product, then the "optimal solution" under a liability rule is for six thousand infringement suits and six thousand judicial determinations of the amount of compulsory-license royalties ex post, which is certainly not cheaper than six thousand ex ante negotiations. In short, if the problem is that negotiating with six thousand legitimate patent holders is too expensive, then the only solution is to raise the standards of patentability and grant fewer patents, which is a distinct problem beyond the scope of this Article.

170. Obviously this works in the reverse as well, in that if lawyer fees prove too *low* to deter spam, then perhaps this administrative mechanism is needed to charge higher fees.

6. Producers Will Seek Declaratory Judgment

Besides the profits from holdup, another reason that patentees often hesitate to contact producers is to maintain their first-strike advantage. That is, patentees can choose when and where to file the lawsuit,[171] and this forum-shopping ability is highly valuable in a world where judges and juries in different locales have well-known predispositions in favor of certain parties. The Eastern District of Texas, for example, is notoriously favorable to patentees, and patentees therefore try very hard to place their cases in this district.[172]

Patentees can only forum shop, however, if they are the only ones that can file suit. The Declaratory Judgment Act allows a producer to file suit against the patentee, seeking a declaration that the producer's planned activities do not infringe the patent or that the patent is invalid.[173] If the producer can file suit first, then the patentee would lose his first-strike advantage.[174]

Two important limits exist on producers seeking declaratory judgment and making the first strike. First, it is obviously impossible for a producer to file a declaratory judgment suit if the producer is unaware of the patent's existence. Second, under prevailing Federal Circuit doctrine, even if the producer discovers the patent through his own independent search, in the absence of a *patentee-initiated* contact, there is no standing to maintain the declaratory judgment suit.[175] Therefore, a patentee can prevent a producer from filing for declaratory judgment simply by not initiating any communication with the producer.[176]

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171. Masur, *supra* note 4, at 187 (noting this as an important reason for patentees to look for infringers).

172. *See* Yan Leychkis, *Of Fire Ants and Claim Construction: An Empirical Study of the Meteoric Rise of the Eastern District of Texas as a Preeminent Forum for Patent Litigation*, 9 YALE J.L. & TECH. 193, 215 (2007) ("[T]he Eastern District of Texas is about the worst place in the country to be a defendant in a patent infringement lawsuit.").

173. 28 U.S.C. § 2201 (2006) (allowing declaratory judgments).

174. Once suit is filed, usually both the producer and the patentee seek to transfer the suit to a locale that is in their interest. *See* 28 U.S.C. § 1404(a) (2006) (allowing transfers). Under the so-called "first to file" rule, the forum in which the suit is first filed (including by a producer seeking declaratory judgment) is the preferred forum in this analysis. Micron Tech., Inc. v. Mosaid Techs., Inc., 518 F.3d 897, 904 (Fed. Cir. 2008) (citing Genentech, Inc. v. Eli Lilly & Co., 998 F.2d 931, 937 (Fed. Cir. 1993)).

175. Prasco, LLC v. Medicis Pharm. Corp., 537 F.3d 1329, 1339 (Fed. Cir. 2008) (requiring that the threat of future injury be "caused by" the patentee).

176. Even if the producer initiates contact with the patentee, this will not create standing for declaratory judgment. *Id.* at 1341 (noting that patentee refusal to give covenant not to sue in response to producer demand is not enough).

The imposition of a duty on patentees to initiate contact—which is a component of my duty to search—would therefore deprive patentees of an important strategic advantage. But this is a *benefit* of my proposal, not a downside. The point of ex ante negotiation is to have the parties delineate their rights ahead of time, and if the parties cannot agree on what the property right consists of, ultimately both sides must ask a judge to adjudicate the boundary.[177] This is not converting the system to a liability rule: a producer seeking declaratory judgment that the patent is invalid or not infringed is not asking the judge to *value* the invention, but to say what the invention *consists of*. To take an analogy, if your neighbor argues that your house is trespassing on his land, it is a perfectly good response to say that it does not; and ultimately if the two of you disagree on where the boundary of the land lies, then a judge will have to resolve the dispute. Such adjudication of land boundaries does not convert the real property system to a liability rule, but is instead a desirable adjudication of property rights so that everyone knows where they stand. Given that the general preference is to have property rights delineated clearly ahead of time,[178] allowing earlier recourse to declaratory judgment will help achieve this.

7. The Unfairness of Enforcing Contributory Search

A more amorphous—but not necessarily unimportant—objection to my proposal is based on fairness. There is a common feeling that contributory negligence is a harsh doctrine because it deprives a contributorily negligent victim of his entire remedy. This has led the overwhelming majority of states to convert to a comparative fault regime for tort law.[179] In a similar vein, one could

177. *See* Russell B. Hill & Jesse D. Mulholland, *Effective Use of the Declaratory Remedy in the Patent Context*, 13 TEX. INTELL. PROP. L.J. 43, 44 (2004) (noting that declaratory judgment actions "remove the patentee's Sword of Damocles").

178. *See* Samuel L. Bray, *Preventive Adjudication*, 77 U. CHI. L. REV. 1275, 1331 (2010) (arguing that "patent infringement . . . [is] especially amenable to preventive adjudication"). One other consideration is that making declaratory judgment actions easier to initiate might mean more litigation. But making declaratory judgment hard to initiate might mean that the adjudication of rights is only delayed until a later date, when the stakes are higher (with accrued damages and fixed investments on the line) and the parties correspondingly litigate harder and spend even more in litigation costs. There is little evidence on which effect predominates. *See id.* at 1301 (noting that "a highly reticulated, case-by-case cost-benefit analysis . . . would not be judicially manageable").

179. David Horton, Comment, *Rethinking Assumption of Risk and Sports Spectators*, 51 UCLA L. REV. 339, 350 n.67 (2003) (collecting citations for the forty-six states that have adopted comparative fault).

argue that the contributory search defense is equally harsh. And the objection is quite true.

An initial point needs to be made, however, that harshness is reciprocal. If *depriving* patentees of a massive payday is harsh because the penalty is so large, then *imposing* this massive liability on a producer is equally harsh. One cannot say that a large figure is harsh for one side but justified for the other, when both sides bear responsibility for the resulting infringement due to the reciprocity of search. If one were to argue for a comparative fault approach where patentees kept some portion of their remedy even in cases where the patentee is the lower-cost searcher, one would also need to argue for the same comparative fault regime where producers had some portion of their liability remitted even in cases where they are the lower-cost searchers.

Another way of saying this is that the harshness of the remedy is proportional to its incentive effect. Imposing draconian sanctions on producers, like a $612.5 million holdup ransom, creates strong incentives for producers to search. In cases where producers are the lower-cost searchers, harsh penalties like holdup actually promote socially efficient outcomes, since producers will then be more likely to perform the searches.[180] In cases where the producers are the higher-cost searchers, such harsh penalties are wasteful, since they either produce a suboptimal outcome (producers search when they are the inefficient party) or exact a socially costly punishment for no purpose. The exact same analysis applies to patentees: depriving patentees of a lucrative remedy creates a strong incentive, but whether the incentive is good or bad depends on whether the legal duty is properly allocated. While contributory negligence may be very harsh in one sense, it is also balanced and efficient.[181]

With all that said, however, it remains true that there is intuitive discomfort with the idea of patentees forfeiting their entire remedy due to failure to search, much as there is discomfort at the idea of tort plaintiffs forfeiting their entire recovery due to contributory negligence. A comparative fault regime would lessen this discomfort by reducing the recovery in proportion to the amount of fault that is attributable to the patentee (in failing to search) or plaintiff (in failing to take precautions).[182] Somewhat surprisingly,

180. Heald, *supra* note 93, at 1191 (noting that holdup "has the benefit of increasing incentives to search where searching is the efficient strategy").

181. POSNER, *supra* note 98, at 172–74 (explaining the efficiency of contributory negligence).

182. RESTATEMENT (THIRD) OF TORTS: APPORTIONMENT OF LIABILITY § 7 (2000).

there is no great difference in the economic effects of contributory and comparative negligence:[183] comparative negligence reduces the penalty and thus reduces the incentive, but when the plaintiff is less at fault there is presumably less *need* for a strong incentive to induce the correct behavior. The main economic difference is that comparative negligence has higher administrative costs, since it requires judges or juries to allocate fault on a case-by-case basis.[184] In this sense the choice between contributory and comparative negligence is yet another iteration of the efficiency-fairness tradeoff that is ubiquitous across law.[185]

I do not mean to disparage fairness considerations, and there is no fundamental reason that one could not implement my proposal through a comparative fault regime instead of a contributory search defense, if one were prepared to accept the higher administrative costs.[186] The only point I would emphasize is that a comparative fault regime must still acknowledge that every inadvertent infringement is "caused" by *both* sides' failures to search. Without this acknowledgement, which will surely be highly counterintuitive to judges and juries, a comparative fault regime will surreptitiously revert back to an absolute duty on producers to search, since producers will be disproportionately allocated 100% of the fault. In all other respects the conversion of a contributory search defense to a comparative fault allocation is so simple as to require little elaboration.

A more complicated fairness concern relates to the distributive impact of my proposal among producers. Stated simply, the objection is that a contributory search defense will disproportionately benefit the larger producers while doing little to benefit smaller producers. This arises because, for any particular patentee, it is usually easier to find large producers than small producers. Thus, a patentee may be the lower-cost searcher vis-à-vis some larger producers, but the higher-cost searcher vis-à-vis the smaller producers. The result is that

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183. POSNER, *supra* note 98, at 174 ("Surprisingly, comparative negligence has—at least as a first approximating [sic], and setting administrative costs to one side—the same effects on safety as contributory negligence.").

184. *Id.* at 174–75.

185. *Cf.* Thomas D. Rowe, Jr., *American Law Institute Study on Paths to a "Better Way": Litigation, Alternatives, and Accommodation*, 1989 DUKE L.J. 824, 847–48 (discussing the tradeoff between fairness and efficiency in civil procedure).

186. One obvious objection, of course, is that comparative fault requires judges to divide value in a way that is reminiscent of the problem of liability rules. *See supra* text accompanying note 33. This is especially the case for patent law because a comparative fault regime would require the court to divide up the value of an injunction.

the smaller producers will be strictly liable (the default rule), while larger producers will potentially gain the benefit of the new contributory search defense. This creates a distributive-fairness concern.

The objection is true enough, though there are several responses. The first is that the contributory search defense, even for large producers, will arise only in cases where patentees fail to conduct cost-justified searches, which will presumably be rare. The second is that small producers are not made any worse off than under current law—under current law, they are absolutely liable anyway—and in this sense my proposal is Pareto efficient.[187] The third and final response is that, if we really wished to remove this concern, it is possible to do so, but only by more radical changes in doctrine. For example, if we shifted to an affirmative negligence regime where patentees received no remedy unless the producer is the lower-cost searcher, then the fairness problem would be resolved. But although this mirror regime would be equally efficient and would remove the fairness concern, it would require a very radical departure from existing doctrine and would disadvantage patentees very strongly, since patentees would presumptively get no remedy unless they proved the producer was negligent. Such radical change seems unjustified given the weight of the concern.

IV. REVERSING SEARCH: § 287'S NOTICE REQUIREMENT

Although a contributory search defense, with a case-by-case comparison of patentee and producer search costs, provides the most theoretically perfect mechanism to determine the lower-cost searcher, it faces two problems. First, it has no support in the statute. Second, it requires a highly individualized determination that creates high administrative costs for courts. In this Part, I suggest a more administrable alternative with statutory support.

The proposal is based on 35 U.S.C. § 287. As I describe below in Section A, the plain text of this statutory provision imposes a duty on all patentees to give prior notice of their patents to potential infringers, which would normally require search. As I describe in Section B, however, courts have ignored the plain language and eviscerated the provision, because it conflicts with the deeply ingrained one-sided view that says producers should always be the

187. LOUIS KAPLOW & STEVEN SHAVELL, FAIRNESS VERSUS WELFARE 5 (2002) (noting that conventional economic analysis disregards distributional concerns).

ones doing the searching and patentees have a right to be passive. Repudiating this erroneous one-sided view of search duty thus allows § 287 to be reinvigorated and helps reallocate the search duty to patentees in an efficient way.

A. Section 287 as a Search Rule

Section 287(a) of the patent statute states:

> Patentees, and persons making, offering for sale, or selling within the United States any patented article for or under them, or importing any patented article into the United States, may give notice to the public that the same is patented, either by fixing thereon the word "patent" or the abbreviation "pat.", together with the number of the patent . . . or when, from the character of the article, this can not be done, by fixing to it, or to the package wherein one or more of them is contained, a label containing a like notice. In the event of failure so to mark, no damages shall be recovered by the patentee in any action for infringement, except on proof that the infringer was notified of the infringement and continued to infringe thereafter, in which event damages may be recovered only for infringement occurring after such notice. Filing of an action for infringement shall constitute such notice.[188]

To parse this rather long statutory section, it first helps to consider the penalty for noncompliance: "In the event of failure so to mark, no damages shall be recovered by the patentee . . . except on proof that the infringer was notified of the infringement." Thus, § 287 imposes a duty on patentees either to mark a product, or to provide actual notice, *before* infringement occurs, on pain of forfeiting damages. The phrasing of the statute is rather awkward in the sense that it delineates the option of constructive notice (i.e., marking) before it delineates the option of actual notice, whereas most notice statutes provide for actual notice before discussing constructive notice—but it is clear enough that the statute provides these two alternatives.

My main argument in this Section is that § 287 is best read as a *notice* statute that emphasizes actual notice as the gold standard and constructive notice (through marking) as a subsidiary alternative, in contrast to the conventional view of § 287 as a *marking* statute that emphasizes marking as the gold standard and actual notice as a subsidiary alternative.[189] The distinction matters because courts have eviscerated § 287 through two moves: (1) courts have held there is no

188. 35 U.S.C. § 287(a) (2006). A recent amendment allows the replacement of the patent number in a mark with an internet address (which must link to a web page containing the patent number). Leahy-Smith America Invents Act, Pub. L. No. 112-29, § 16, 125 Stat. 284, 328–29 (2011). This amendment does not affect my argument here.

189. *See* Nike, Inc. v. Wal-Mart Stores, Inc., 138 F.3d 1437, 1443–46 (Fed. Cir. 1998) (referring to § 287 and its predecessor statutes as "marking" statutes).

duty to give notice *unless* there is a duty to mark,[190] and (2) courts have construed the duty to mark extraordinarily narrowly.[191] My argument is that the plain language of the statute contradicts both of these moves.

First, the statutory language that imposes a duty to give notice does not condition this duty on the existence of an obligation to mark; it only conditions the duty to give notice on the fact of lack of marking. The statute says, "In the event of failure so to mark, no damages shall be recovered by the patentee . . . except on proof that the infringer was notified of the infringement." It does not say, "In the event of failure to mark *when there is a duty to mark*," actual notice is required. The distinction is crucial. To take an analogy, the Internal Revenue Code conditions the duty to file a tax return (i.e., to give notice to the IRS) on the failure to earn a taxable income of zero;[192] this is completely different from conditioning the duty to file a tax return on the breach of a *legal duty* to earn a zero income. If the condition were of the latter variety, then nobody would be obliged to file tax returns (because nobody has a legal duty to earn a zero income).

A reader may object that the statute does say that actual notice is required only if there is a failure to "*so* mark," and concededly the "so" may be plausibly read as referring to an earlier provision of the statute imposing a duty to mark. But the "so" could equally be taken to refer to the *manner* of marking prescribed by the statute—that is, the requirement that marking, if done, be done by including the word "patent" and the patent number. On this reading, there is a duty to give actual notice whenever there is a failure to mark in the manner prescribed, whether that failure occurs because there is no product to mark, no marking, or a nonconforming mark. As a grammatical matter, both interpretations are plausible.

As a textual matter, however, the latter interpretation is superior. According to the conventional interpretation, when the statute says that patentees "*may* give notice" through marking, it really means "*must* give notice," so that the language imposes a duty to mark. To denote the creation of a duty to mark by the use of the

190. *See* Wine Ry. Appliance Co. v. Enter. Ry. Equip. Co., 297 U.S. 387, 398 (1936).

191. *See id.* at 397–98 (finding that the duty to attach a mark arises only if patentee makes a product).

192. 26 U.S.C. § 6011 (2006) (requirement to file tax return if one is liable for a tax).

word "may"—a word usually associated with voluntary conduct and not legal duty—is at least somewhat strange.[193]

Under my interpretation, there is no such thing as a duty to mark. Rather, § 287 imposes a duty to *give notice* by the provision that "no damages shall be recovered by the patentee in any action for infringement, except on proof that the infringer was notified of the infringement."[194] Specifying a penalty for failure to undertake certain conduct is the classic language of imposing of a legal duty. On this view, marking is simply one *option* for compliance with the more general duty to give notice: by marking a product, the patentee "*may* give notice" of his patent, and the infringer is accordingly "notified of the infringement" at the time of such marking. But while a patentee *may* comply with the duty of giving notice through marking in the manner prescribed, the gold standard for compliance would still be providing actual notice. This reading, where actual notice is the gold standard and marking is an alternative, is more consistent with the textual meaning of "may." My interpretation also gives every word in the statute meaning, including the "so" part, rendering it consistent with standard legal canons of textual interpretation.[195]

Second, even if my interpretation is wrong, § 287 would still be a rule that imposes the duty to give notice on patentees. Assuming for argument's sake that the word "may" really means "must," and the "so" refers to the duty to mark, the question becomes how far that duty to mark extends. In *Wine Railway Appliance Co. v. Enterprise Railway Equipment Co.*, the Supreme Court held that this duty to mark extends only to patentees who make products.[196] As a matter of plain text, this narrow interpretation of the duty to mark is wrong.

On its face, the statute distinguishes between two separate classes of people who must mark: (1) "Patentees" and (2) "persons making, offering for sale, or selling within the United States any patented article for or under them, or importing any patented article into the United States." The reference to "[p]atentees" is unqualified by any requirement that patentees make an article capable of being marked. The phrase "making . . . any patented article for or under them" clearly modifies only the "person" and not the "patentee," since

193. *Cf.* eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 392 (2006) (noting that equitable relief is not mandatory where the patent statute provides that the court "may" grant an injunction).

194. 35 U.S.C. § 287(a) (2006).

195. *See* Murphy v. Utter, 186 U.S. 95, 111 (1902) ("Every word or clause in a statute is presumed to have a meaning of its own . . . .").

196. 297 U.S. at 397–98.

there is no comma after "person"; in any case, a sentence such as, "Patentees . . . making . . . any patented article for or under them," would be nonsensical.[197] Because, under this argument, *all* patentees have a duty to mark, it follows that all patentees—even patentees who make no products—must give notice in the absence of marking, and once again § 287 becomes a statute that requires patentees to give either actual or constructive notice before infringement occurs.

In sum, two judicial moves have led to the current moribund state of § 287. First, courts have read a duty to give notice as contingent on a duty to mark. Without this move the duty to give notice would apply to all patentees. Second, courts have read a duty to mark extraordinarily narrowly; otherwise the duty to mark (and its contingent duty to give notice) would once again apply to all patentees. Both of these moves are implausible as a matter of textual interpretation, but courts have made them anyway. The next Section details the motivation for courts to twist statutory text as they have: courts have quite candidly admitted that the motivation is the deeply ingrained view that producers should always bear the obligation of search.

B. Judicial Evisceration of § 287

Courts have narrowed the duties imposed by § 287 in numerous ways, but they all trace back to the Supreme Court's decision in *Wine Railway*, which held that § 287 does not apply when the patentee makes no products.[198] In response to the argument regarding the plain text of the statute (upon which the court of appeals being reversed had relied), the Court stated:

> Obviously, but not [sic] [§ 287], a patentee might recover for all damages suffered through infringement without giving prior actual notice to the infringer. That section subtracts something and creates an exception.
>
> If respondent's position is correct, process patents and patents under which nothing has been manufactured may be secretly infringed with impunity, notwithstanding injury to owners guilty of no neglect.[199]

The motivation of the Court in construing § 287 narrowly is made very clear by this passage. It regards § 287 as a narrow "exception" to a patentee's otherwise-absolute right to damages, which is to be narrowed further because a broad construction would penalize

197. *Contra id.* at 395 (adopting this nonsensical reading in order to narrow § 287).

198. *Id.* at 397–98.

199. *Id.* at 395.

patent holders who were "guilty of no neglect." But this is begging the question. The Court *assumes* that patentees who fail to provide notice of their patents to inadvertent infringers are nonetheless blameless by definition. This clearly reflects the one-sided assumption that producers bear the exclusive duty of search, and patentees bear none.

Faithfully following the path blazed by the Supreme Court, the Federal Circuit has grafted even more exceptions onto § 287. First, the Federal Circuit held that a patentee who claims only a method as his invention—as opposed to a product—need not provide notice, since it is impossible to affix a physical mark on a method.[200] Even more recently, the Federal Circuit has made clear that even when a patentee claims[201] both a method and a product, and makes a patented product, there is no need to mark that product (and thus no penalty for failure) if he only asserts the method claim during litigation.[202] This most recent holding basically eviscerates § 287, because virtually every patent contains method claims, and the method claims usually provide equivalent coverage to the product claim.[203]

This may seem strange to those who are unfamiliar with patent drafting practice. But a skilled patent drafter can describe almost any invention as either a product or a method at will.[204] For example, suppose the invention is a wheeled cart (back in the Stone Age). The most intuitive way of describing this invention is as a product: "a transportation device comprising a platform supported by wheels." But I can also describe the same invention as a method: "a process of transporting things comprising *moving* a platform supported by wheels." For all practical purposes, the first and second claims are the same, in that both cover every likely use of a wheeled cart, and most patents include both types of claims. But under the Federal Circuit's holding, a patentee who asserts the method claim

200. Bandag, Inc. v. Gerrard Tire Co., Inc., 704 F.2d 1578, 1581 (Fed. Cir. 1983).

201. A patent "claim" is a one-sentence description of what the invention is, appearing at the end of the patent and delineating the legal right. *See* 35 U.S.C. § 112 (2006) (requiring patentee to list his claims to the invention).

202. Crown Packaging Tech., Inc. v. Rexam Beverage Can Co., 559 F.3d 1308, 1316–17 (Fed. Cir. 2009) (holding that the marking requirement of § 287(a) cannot be violated where the patentee asserts only method claims during litigation).

203. *See* Quanta Computer, Inc. v. LG Elecs. Inc., 553 U.S. 617, 629 (2008) ("Apparatus and method claims 'may approach each other so nearly that it will be difficult to distinguish the process from the function of the apparatus.' " (quoting United States *ex rel.* Steinmetz v. Allen, 192 U.S. 543, 559 (1904))).

204. *Id.* at 629 n.5 (noting that " 'even the most novice claims drafter would encounter scant difficulty in converting a patent claim from artifact to technique and back again' " (quoting John R. Thomas, *Of Text, Technique, and the Tangible: Drafting Patent Claims Around Patent Rules*, 17 JOHN MARSHALL J. COMPUTER & INFO. L. 219, 225 (1998))).

will be exempt from § 287. Since virtually any invention can be described as a method, this holding eviscerates the statute.[205]

Beyond the legalistic problem created by an interpretation that eviscerates the statute and contradicts standard canons of interpretation,[206] the policy problem created by *Wine Railway* and its progeny is that it creates an incentive for a patentee to not produce any products and therefore to not practice the invention. The patentee not only has the incentive to refrain from producing any products himself, he also has the incentive to prevent any licensee from doing so, since licensees are also required to mark to the extent they produce products.[207] The sum is that two bad things happen: (1) the invention will not be legitimately used, since neither the patentee nor any legitimate licensee will produce a product, and (2) the only people who practice the invention are inadvertent infringers, who receive no notice because patentees are not required to give any, and who are then held up by the patentee after making irreversible fixed investments.

This is the problem of patent trolls, which has been described above, and on which there is an extensive literature.[208] The phenomenon of patent holders making no products and providing no notice of their patent, only to later ambush producers who independently recreate the same invention, is well known.[209] The policy problem is easy to state: in a case such as this, the patent does nothing except act as a tax on subsequent development—it does not incentivize the creation, disclosure, or commercialization of anything useful, since the producer being ambushed is by definition unaware of the patent and gained no technical knowledge from it (if the producer *had* been aware of the patent, it would not have walked into the holdup trap).[210] A patent system that facilitates patent trolls is thus

205. *Cf. id.* at 630 (rejecting argument to limit exhaustion doctrine to apparatus claims because doing so would eviscerate the exhaustion doctrine).

206. *See* United States v. Menasche, 348 U.S. 528, 539 (1955) (holding that courts should not "emasculate an entire section").

207. *See* Maxwell v. J. Baker, Inc., 86 F.3d 1098, 1111 (Fed. Cir. 1996) (noting that the marking requirement of § 287(a) applies to licensees).

208. *See supra* Part III.C.2.

209. *See, e.g.*, Ben Klemens, *The Rise of the Information Processing Patent*, 14 B.U. J. SCI. & TECH. L. 1, 28 (2008) ("[A] patent troll is one who unfairly takes advantage of informational asymmetries by suing independent inventors who are ignorant of the field of patents in which the troll works.").

210. *See* Christopher A. Cotropia, *The Individual Inventor Motif in the Age of the Patent Troll*, 12 YALE J.L. & TECH. 52, 62 (2009).

contradictory to the basic purpose of patents in promoting progress.[211] While the patent troll problem is well known, my point here is that this problem should be blamed on the misallocation of search responsibility created by such cases as *Wine Railway*, a point that the literature has not considered.

C. Reinvigorating § 287

A textual application of § 287 would impose a duty on all patentees to give notice to infringers before infringement. If a patentee fails to give notice, he forfeits damages until notice is given. The required notice can be given actually or constructively through marking. But to the extent that patentees choose to give actual notice, it will obviously require the patentee to find the producer first.

This regime differs in several respects from the contributory search regime I suggested earlier. First, unlike a contributory search regime where patentees need only search when they are the lower-cost party, the plain language of § 287 imposes a duty of giving notice on all patentees, regardless of their cost of search. This has the potential to create a misallocation of search duty in the opposite direction. That is, patentees may now be required to search even when patentee search costs are very high, and when producers might be the lower-cost searchers.

The potential onerousness of an absolute duty on patentees is mitigated, however, by the second difference, which is that the penalty for noncompliance is much less harsh. A patentee forfeits only damages, not a right to injunctive relief, and moreover damages are only forfeited to the point in time when notice is given, either through actual notice or the commencement of marking. A patentee can thus preserve most of his remedy by giving notice even after infringement has commenced, and the statute in fact provides that the "filing of an action for infringement shall constitute such notice."[212]

The fact that patentees retain their right to injunctive relief raises the opposite concern, which is that the forfeiture of damages may not be sufficient to deter opportunistic holdup. In cases where the holdup strategy is sufficiently lucrative, some patentees may still choose to engage in the patent troll tactic of hiding their patents and giving no notice, choosing to forfeit damages in pursuit of the greater profit from using injunctions for holdup. For example, in *NTP v.*

211. U.S. CONST. art. I, § 8, cl. 8.

212. 35 U.S.C. § 287(a) (2006).

Research in Motion, the assessed damages of $53.7 million[213] pale in comparison to the eventual $612.5 million settlement.

Both the possibility of too much deterrence in some cases (where the producer is the lower-cost searcher) and insufficient deterrence in others (where the patentee is the lower-cost searcher) are valid concerns. The bottom line is that the § 287 route is less theoretically perfect than a contributory search defense, where the least cost searcher can be identified and the remedy properly tailored on a case-by-case basis.[214] The counterpoint is that the § 287 route has the advantages of lower cost of administration and more solid statutory support, making it a more practical route for courts to implement.[215] Overall, because patentees are likely to be the lower-cost searchers quite often,[216] creating a robust duty to search through § 287 is likely to be better than the status quo where § 287 is effectively dead and no other statutory provision requires patentee search.

V. RECIPROCITY OF SEARCH IN OTHER PROPERTY CONTEXTS

As a matter of theory, the same one-sided view of search pervades every area of property law. Real property law expects someone who wants to use Blackacre to find the owner and purchase the property before using it. Copyright law expects someone who wishes to use a copyrighted work to find the owner and negotiate a license before copying it. And in theory, the assumption is false in all of these contexts. There is no intrinsic reason that a real property owner cannot be made to find potential trespassers; and there is no

213. NTP, Inc. v. Research in Motion, Ltd., 418 F.3d 1282, 1292 (Fed. Cir. 2005).

214. *See* Roger D. Blair & Thomas F. Cotter, *Strict Liability and Its Alternatives in Patent Law*, 17 BERKELEY TECH. L.J. 799, 833 (2002) (arguing that the costs and benefits under different search and liability regimes cannot be precisely quantified).

215. There is, of course, the problem that *Wine Railway* is a Supreme Court case, and lower courts such as the Federal Circuit cannot directly overrule it. But a motivated lower court can dodge a disfavored precedent in numerous ways. *See* K.N. LLEWELLYN, THE BRAMBLE BUSH: ON OUR LAW AND ITS STUDY 72–74 (10th ed. 1996) (discussing the "honorable technique[s]" by which lawyers and courts avoid "unwelcome precedents"). The simplest is to hold that, because *Wine Railway* interpreted the predecessor statute to § 287, it does not apply to § 287 itself, which has slightly different language. This is admittedly disingenuous because the language differences are immaterial. But the Federal Circuit pulled precisely this trick in *Forest Group, Inc. v. Bon Tool Co.*, 590 F.3d 1295 (Fed. Cir. 2009), where it distinguished the prior interpretation of the prohibition on false marking (*see* 35 U.S.C. § 292 (2006)) because the older cases arose under the predecessor statute. *Id.* at 1302. This reliance on immaterial linguistic changes was clearly motivated by the policy concern that the prior interpretation had rendered § 292 toothless. *Id.* at 1304. *Wine Railway* has rendered § 287 equally toothless.

216. *See supra* text accompanying notes 104–06.

intrinsic reason that copyright owners cannot be made to find potential users.

But the practical consequences of subscribing to the one-sided view of search matters far less if the user/producer is the lower-cost searcher in the overwhelming number of cases. The reason the reciprocity insight has practical relevance in tort law and patent law is that producers are not always the least cost searchers, just as manufacturers are not always the least cost avoiders. Placing the duty of avoidance on the wrong party in those cases then leads to inferior social outcomes. This Part takes a brief look at the implications of the reciprocity insight for nonpatent property.

A. Real Property

A simple observation is that real property law has long adhered to the one-sided view of search, but we have observed very few problems in real property as a result of the absolute allocation of search duty to users. As Herbert Hovenkamp has observed: "The real-property system has no equivalent of the . . . 'patent troll.' People do not often surreptitiously acquire land, leave it vacant, and then make a surprise announcement of ownership only after someone else has developed it."[217] The reason is simple: in real property, the lower-cost searcher is almost always the potential trespasser and not the property owner.

The reasons for this are manifold, but two are most important. Hovenkamp and others usually focus on the first: in real property, the system of notice is better, and better notice means lower producer search costs.[218] Everyone knows that Blackacre is owned, and the owner is easy to find by looking up "Blackacre" in the local property records office. The size and scope of the property is also easy to demarcate with precision because land is tangible, and can be enclosed with a literal fence. In contrast, a commercial product may not be patented at all, and in any case one will not find the owner of a patent covering the Blackberry by looking up "Blackberry" in the patent office database.[219] And the "fences" that surround inventions are notoriously

217. Hovenkamp, *supra* note 86, at 228.

218. *Id.*; *see also* BESSEN & MEURER, *supra* note 2, at 8–11 (discussing the problems arising from poor or nonexistent notice); Christina Bohannan & Herbert Hovenkamp, *IP and Antitrust: Reformation and Harm*, 51 B.C. L. REV. 905, 941 (2010) (arguing for the placement of "greater responsibility on the patent applicant to communicate effective and timely notice of what he has invented").

219. *See supra* text accompanying notes 76–78.

imprecise and much less effective in providing notice to potential infringers.[220] These differences in the infrastructure of notice make producer/user search harder in patent law and easier in real property.

But a more important reason is the owner-to-user ratio and the corresponding scale of a search. A piece of land usually only has one owner but an almost unlimited number of potential users. This is quite unlike the situation in patent law, where a single commercial product may have zero, one, or thousands of patentees who have a claim over it.[221] And unlike the situation where a patentee can keep most of his income just by finding a few of the most well-known producers and letting the small fry go, the rivalrousness of land use means that if any single trespasser is given the right to continue using the land, the owner is necessarily deprived of that land. What this means is that creating something akin to my contributory search defense in real property law would then force a landowner to find every potential trespasser ahead of time, with the same increasing-marginal-cost problem that finding the last trespasser is exponentially harder than finding the first. Thus, quite apart from the higher quality of notice infrastructure in real property—a problem that we may be able to partially address in patent law with better databases and clearer patent boundaries—the insurmountable difference in scale is responsible for the fact that users are almost always the lower-cost searchers in real property. And that means that, as a practical matter, a flat rule that users have the absolute duty to search is efficient in the real property context.

B. Copyright Law

At least one (attempted) application of the reciprocity insight in the field of copyright law was the Google Books settlement, which was recently rejected by a district court.[222] At the heart of the Google Books settlement was a provision that Google would have the right to electronically scan and store copyrighted books in its database, subject to a copyright holder's ability to opt out of such scanning and

220. *See, e.g.*, BESSEN & MEURER, *supra* note 2, at 8–11; 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, 213 (2001).

221. *Cf.* Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1590 (2003) (arguing that much of the patent system is built on the assumption of a "one-to-one correspondence" between the patent and a commercial product, but that this assumption is untrue).

222. Authors Guild v. Google Inc., 770 F. Supp. 2d 666, 685 (S.D.N.Y. 2011) (denying a motion for final approval of the Amended Settlement Agreement (ASA)).

storage.[223] In order to see why this provision was crucial, one must first understand the underlying problem that the Google Books settlement was attempting to solve, which is known in the copyright literature as the "orphan works" problem.[224]

An orphan work is one where the copyright owner cannot be easily found.[225] An example would be a novel whose author is dead, and whose heirs cannot be located. People who wish to use the copyrighted work in some productive capacity (e.g., scanning the book into the Google Books database) then have the problem that they must search for the lost heirs.

The orphan works problem in copyright law is a mirror image of the patent troll problem in patent law.[226] Both patent trolls and orphan works are examples of the more general problem of holdup threats. If the heirs of an orphan work *never* show up, Google would have no problem including the novel in Google Books. The concern is that, once the database is created, the heirs will *then* emerge and hold up Google for ransom.[227]

Viewed through this prism, the solution that the Google Books settlement attempted is exactly what this Article has suggested: reverse the search obligation. In effect, the Google Books settlement represented a recognition that it is far easier for the owner of a copyright to find Google and negotiate than it is for Google to find the owner and negotiate.[228] This is especially the case because the Google Books project was well publicized and widely known, so the asymmetry in underlying search costs was striking.

I do not mean to unreservedly praise the Google Books settlement. Others have pointed to potential antitrust concerns in that the settlement would have given Google a de facto monopoly over all

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223. *Id.* at 672.

224. *See* REGISTER OF COPYRIGHTS, REPORT ON ORPHAN WORKS 1 (2006), *available at* http://www.copyright.gov/orphan/orphan-report-full.pdf (discussing the orphan works problem).

225. *See id.* (defining the term "orphan works").

226. For arguments in the copyright context that are very similar to my arguments regarding patents, see Ariel Katz, *The Orphans, The Market, and the Copyright Dogma: A Modest Solution to a Grand Problem*, BERKELEY TECH. L.J. (forthcoming), *available at* http://ssrn.com/abstract=2118886.

227. *See* Steven Hetcher, *Orphan Works and Google's Global Library Project*, 8 WAKE FOREST INTELL. PROP. L.J. 1, 21 (2007) (noting the "fear that the owner of the orphan work may later surface and hold up the release of the transformative work").

228. *See* Katharina de la Durantaye, *Finding a Home for Orphans: Google Book Search and Orphan Works Law in the United States and Europe*, 21 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 229, 234–35 (2011) (noting the difficulty of locating authors).

out-of-print books,[229] an issue that is outside the scope of this Article. My point is that, in dealing with the orphan works problem as a search costs problem, the Google Books settlement attempted a reversal of the search obligation in a situation where it is clearly easier for a copyright holder to find Google than vice versa; and in this sense it reflects precisely the reciprocity insight that I have outlined in this Article.

This solution to an underlying economic problem, however, immediately hit a legal brick wall. Judge Chin's opinion sets aside the settlement, and in doing so *condemns* rather than praises Google for "revers[ing] the default copyright arrangement by shifting the burden to rightsholders to assert their rights."[230] According to Judge Chin, "it is incongruous with the purpose of the copyright laws to place the onus on copyright owners to come forward to protect their rights when Google copied their works without first seeking their permission."[231]

As a matter of copyright doctrine, Judge Chin is on solid ground. The assumption that users must bear the entire burden of search and the property owner bears none—no matter how impossible it is for the user to find the property owner and how easy it is for the property owner to find the user—is woven deeply into the fabric of copyright law;[232] just as it is woven deeply into the fabric of patent law and real property law. In condemning Google's actions, Judge Chin is merely repeating the conventional wisdom and faithfully applying well-settled doctrinal understandings. But the whole point of this Article is that this legalistic understanding is contrary to the underlying economics of the situation, and the outcome of the Google Books decision is therefore pernicious from a policy perspective. By condemning Google's reversal of the search burden, Judge Chin has basically ensured that no solution to the orphan works problem will be found—by Google or by any other competitor.

The Google Books example suggests that the reciprocity insight has much theoretical and practical relevance to copyright law. At the same time, it is important to state here that my conclusions about the

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229. *See, e.g.*, Pamela Samuelson, *Google Book Search and the Future of Books in Cyberspace*, 94 MINN. L. REV. 1308, 1335 (2010) (expressing concerns about the de facto monopoly). *But see* Einer Elhauge, *Why the Google Books Settlement Is Procompetitive*, 2 J. LEGAL ANALYSIS 1, 2 (2010) (dismissing antitrust concerns and arguing instead that the Google Settlement "expand[s] unfettered competition").

230. Authors Guild v. Google, Inc., 770 F. Supp. 2d 666, 670 n.3 (S.D.N.Y. 2011) (quoting Alessandra Glorioso, *Google Books: An Orphan Works Solution*, 38 HOFSTRA L. REV. 971, 993 (2010)).

231. *Id.* at 682.

232. *See* Katz, *supra* note 226 (calling this copyright "dogma").

relevance of the reciprocity insight to copyright law are more qualified than in the patent context. The Google Books project was rather exceptional in that it was widely publicized and thus the search costs for copyright owners to find Google were likely to be very low. It is much more difficult to say whether copyright holders in general are usually the lower-cost searchers vis-à-vis potential users. Unlike in the patent context, where there is often only a small number of producers who can realistically commercialize an invention, the potential derivative uses of a copyrighted work are very numerous, and the number of potential users even more so. A novel may be subject to sequels written by an almost-infinite number of potential authors, for example, and it can also be converted into other formats such as movies and plays, or translated into numerous languages.[233] The comparison of search costs in the copyright context thus presents a more complicated question than in the patent context. It is not clear that a misallocation of the search duty occurs very frequently, or that such misallocations can be easily identified.

For this reason, my argument is not that copyright law should necessarily change its doctrine to allocate the search duty to copyright holders, either through a general rule or even on a case-by-case basis.[234] The evidence does not yet support such broad conclusions. My more limited point is that the reciprocity of search is an economic insight that has explanatory power for theoretically analyzing the orphan works problem in copyright law, and it also has a practical payoff in suggesting a potential solution. In this sense, it is an insight that makes a contribution to the copyright literature, and it is relevant to future discussion of the orphan works problem.

CONCLUSION

This Article makes two contributions to the literature on search and property law. First, it argues that search is a reciprocal problem. Thus, at a minimum, those studying the problem of search costs should at least *consider* both the search costs of property owners as well as the search costs of potential infringers. Second, it argues that, in the context of patent law, placing the search obligation on patent holders is likely to be efficient in many cases, because patentees are often the lower-cost searchers.

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233. *Cf.* 17 U.S.C. § 106(2) (2006) (providing an exclusive right to create derivative works).

234. This marks a point of disagreement between Katz and myself. *See* Katz, *supra* note 226 (arguing for a case-by-case assessment of the lower-cost searcher).

The first point is probably more important. Contrary to the conventional assumption, there is no inherent reason that search must be done by the producer. The ex ante negotiation that a property-rule regime requires can occur as long as the parties find each other. Whether one side or the other should have the obligation of search depends on which side can fulfill this function more cheaply, effectively, and efficiently. Even if one were to conclude after conducting an empirical analysis that producers often have lower search costs, and that the current regime is therefore correct, the point is still that the search costs of patent owners cannot be taken for granted but must be considered. This point is generalizable across all property law: property owners should not be reflexively relieved of the responsibility for search; the proper allocation is a matter of system design and should be carefully analyzed.

The second point is that, in the patent law context, there are at least some circumstances where the patent owner is the lower-cost searcher and should be given the obligation to search, enforced by some penalty for failure to comply. Given the difficulties faced by producers in finding every patent and its owner—difficulties that have been described by the existing patent thicket literature in detail—there is much reason to believe patentees will often have lower search costs. Reallocating the duty of search in such circumstances will bring greater efficiencies to the patent system.