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Breaking Aro's Commandment: Recognizing That Inventions Have Heart

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Breaking Aro's Commandment: Recognizing That Inventions Have Heart

Bernard Chao*

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Based on the landmark 1961 Supreme Court decision, Aro Manufacturing Co. v. Convertible Top Replacement Co., the long held wisdom in patent law has been that there is no heart or gist of the invention. In other words, patent law does not attribute any special significance to a particular subset of claim limitations regardless of how important those limitations are. Under Aro, judges and juries are told that they need to view all the limitations, even stock components, with equal significance. They must resist focusing on the heart of the invention when making any decision.

Aro's commandment has spread far beyond the doctrine of repair and reconstruction, the subject matter of Aro. In fact, it has become a basic tenet of patent law and has been adopted by the doctrines of infringement, anticipation, obviousness, and the written description requirement. To this day, judges and commentators continue to cite to Aro and proclaim that patent law does not recognize the heart of the invention.

This Article challenges the conventional wisdom as neither accurate nor wise. It is not accurate because other doctrines unwittingly consider the heart of invention while using different nomenclature. For example, the doctrines of contributory infringement and inequitable conduct do not openly challenge Aro, yet they rely on the "material part of the invention" and "point of novelty" respectively. Aro's commandment is unwise because a rule against considering the heart of the invention is bad policy. On a purely intuitive level, it is entirely sensible for judges and juries to focus on the heart of the invention in making their decisions. This Article demonstrates why this intuition is correct by analyzing how different patent law doctrines rightly and wrongly rely on the heart of invention.

The Article then provides a framework for determining when the heart of the invention should and should not be considered. Applying this framework to various areas of patent law, this Article explains: 1) why the fifty years of jurisprudence in the doctrine of repair and reconstruction is wrong; 2) why the heart of the invention may be a permissible consideration in various developing areas of patent law including subject matter patentability; and 3) how the Supreme Court got it "almost" right

in *Quanta Computer, Inc. v. LG Electronics, Inc.*, when it decided that the “essential features” (another pseudonym for the heart of the invention) was an important consideration within the doctrine of patent exhaustion.

INTRODUCTION

For almost fifty years, the Supreme Court's decision in *Aro Manufacturing Co. v. Convertible Top Replacement Co.*¹ has been the foundation for one of the basic commandments in patent law: there is no legally recognizable heart of an invention in combination patents.² In other words, patent law does not attribute any significance to a subset of claim limitations regardless of how important those limitations are; it looks at all the limitations together. Imagine a computer patent that shows how to speed up the microprocessor. Under *Aro*, judges and juries are told that they cannot focus on what makes the microprocessor faster and that they need to view all the limitations, even stock components (e.g., memory, mouse, and display), with equal significance. They must resist focusing on the heart of the invention when making *any* decision. Although *Aro*'s commandment was only one factor used to develop a new standard for the doctrine of repair and reconstruction, it has found its way into numerous other doctrines in patent law including infringement, anticipation, obviousness, and the written description requirement. Moreover, *Aro* continues to influence the thinking in other developing doctrines.

More recently, the Supreme Court's decision in *Quanta Computer, Inc. v. LG Electronics, Inc.*³ showed that *Aro*'s commandment is not absolute. In *Quanta*, the Supreme Court found that the doctrine of patent exhaustion could apply to the sale of a product even though it does not contain all the elements of the patented invention.⁴ So long as the “essential features” are present,

¹ 365 U.S. 336 (1961).

² *Id.* at 344–45 (“[T]here is no legally recognizable or protected ‘essential’ element, ‘gist’ or ‘heart’ of the invention in a combination patent.”).

³ 128 S. Ct. 2109 (2008).

⁴ *See id.* at 2120–21 (“The sale of a device that practices patent A does not, by virtue of practicing patent A, exhaust patent B. But if the device practices patent A *while*

that is sufficient.⁵ Thus, unlike *Aro*, *Quanta* plainly recognizes that a subset of key claim limitations (i.e., the heart of the invention) can have legal significance.

This Article critically explores how different doctrines in patent law have addressed the heart of the invention, in many cases using different nomenclature. The issue has arisen in many contexts beyond the doctrines of repair and reconstruction (*Aro*) and exhaustion (*Quanta*). It cuts a broad swath across patent law. The doctrines of infringement, anticipation, obviousness, the written description requirement, contributory infringement, inequitable conduct, joint inventorship, patentable subject matter, and enablement have all contemplated whether it is appropriate to consider the heart of the invention within their particular areas.

After exploring these far ranging doctrines, the author has come to the surprising conclusion that nearly fifty years of jurisprudence is wrong in several respects. First, courts and commentators inaccurately cite to *Aro* as if it presides over all of patent law. It does not. The heart of the invention is considered in several different doctrines, albeit using different nomenclature. Second, rejecting the heart of the invention in *Aro* was both bad jurisprudence and policy. The Supreme Court incorrectly relied on precedent that had already been legislatively overruled by the Patent Act of 1952.⁶ Moreover, subsequent repair and reconstruction decisions have shown that applying *Aro*'s standard can lead to absurd results.

This Article does not recommend a complete reversal of *Aro*'s commandment. Rather, it provides an analytical framework for determining when it is appropriate to reject the heart of the invention and when it is not. The current framework of making

substantially embodying patent B, its relationship to patent A does not prevent exhaustion of patent B.”).

⁵ *Id.* at 2116–17 (“[W]here one has sold an uncompleted article which, because it embodies essential features of his patented invention, is within the protection of his patent, and has destined the article to be finished by the purchaser in conformity to the patent, he has sold his invention so far as it is or may be embodied in that particular article.” (quoting *United States v. Unis Lens Co.*, 316 U.S. 241, 250–51 (1942))).

⁶ See Patent Act of 1952, Pub. L. No. 593, 66 Stat. 792 (codified as amended at 35 U.S.C. §§ 100–376 (2006)); Craig Allen Nard, *Legal Forms and the Common Law of Patents*, 90 B.U. L. REV. 51, 72 & n.105 (2010); *infra* note 133 and accompanying text.

that decision based on the particular label used to describe the heart of the invention is obviously wrong. The heart of the invention should not be considered when the law needs to determine when something falls within the boundaries outlined by a patent's claims. In these situations, it is entirely appropriate to apply what is known as the "all elements" rule. However, the "all elements" rule is a subtly different concept than the "heart of the invention." The former rule recognizes that patent law defines the property rights of a patent by looking at *all* its claim limitations.⁷ In contrast, considering the heart of the invention suggests that courts should focus on certain "key" claim limitations when deciding particular issues. When the law is not seeking to determine when something falls within the boundaries outlined by a patent's claim, it may be appropriate to focus on the heart of the invention.

This framework is useful for two reasons. First, it can identify when certain existing doctrines have gone wrong. For example, the doctrine of repair and reconstruction does not assess whether one patent infringes another.⁸ Thus, this framework suggests that the heart of the invention may be a proper consideration there. Second, a sound framework can help the courts understand when the heart of the invention should be considered in developing areas of patent law. Even now, there are several areas in patent law that are developing; whether the heart of the invention is an appropriate consideration is still yet to be determined. Just recently, the Supreme Court implicitly allowed courts to consider the heart of the invention when determining whether the subject matter of an

⁷ See *Freedman Seating Co. v. Am. Seating Co.*, 420 F.3d 1350, 1358 (Fed. Cir. 2005) (noting that the "all elements rule" "holds that an accused product or process is not infringing unless it contains each limitation of the claim, either literally or by an equivalent"). The "all elements rule" is sometimes called the "all limitations rule." See Michael J. Meurer & Craig Allen Nard, *Invention, Refinement, and Patent Claim Scope: A New Perspective on the Doctrine of Equivalents*, 93 GEO. L.J. 1947, 1979 (2005).

⁸ Rather, this doctrine analyzes whether repair of a patented product is so substantial as to constitute an unlicensed reconstruction of that product. See *Leesona Corp. v. United States*, No. 130-70, 1978 WL 14862, at *16 (Ct. Cl. May 1, 1978) ("Under the doctrine of repair or reconstruction, a device is reconstructed if it takes on the nature of a new infringing device, whereas, if the device is merely repaired, it does not take on the nature of a new device.").

invention is patentable.⁹ The heart of the invention has also been debated in the context of damages and the written description requirement's "omitted elements" test and mentioned less prominently in the context of enablement.¹⁰

Part I of this Article defines the "heart of the invention" and introduces *Aro*'s commandment: the heart of the invention should not be considered in patent law. It then explains how this rule has been inconsistently obeyed. The doctrines of infringement, anticipation, obviousness, and the written description requirement follow *Aro*. But the doctrines of contributory infringement, inequitable conduct, and joint inventorship consider the heart of the invention. Yet no one suggests that these doctrines are inconsistent with *Aro*'s commandment because the different doctrines use different terminology. This Part shows how instead of discussing the heart of the invention, each area of the law uses a different label to capture the same concept. Finally, Part I compares the current argument in favor of considering the heart of the invention to recent thinking about central claiming. Both arguments attempt to focus the law on the actual invention and disfavor bright line rules that may detract from that focus.

Part II of this Article critically analyzes *Aro* and explains that the majority opinion improperly relied on the Supreme Court's earlier *Mercoïd* decisions—decisions that Congress had already rejected by enacting the Patent Act of 1952.¹¹ What's more, this Part argues, *Aro* did not just interpret precedent wrongly; it is also bad policy. *Aro*'s test has led to results that are at odds with commonsense notions of what repair and reconstruction are.

Part III then outlines an analytical framework for reconciling how different doctrines treat the heart of the invention and explains when it makes sense to reject the heart of the invention and when it does not. The decision turns on the nature and context of the question being asked. If the doctrine at issue asks whether something falls within the boundaries protected by a patent, the heart of the invention should not be considered. Rather, the "all

⁹ See *Bilski v. Kappos*, 130 S. Ct. 3218 (2010); see *infra* Part III.B.

¹⁰ See *infra* Part III.B.

¹¹ See *supra* note 6 and accompanying text; *infra* Part II.C.

elements” rule should apply. However, there are many doctrines that do not evaluate whether a product or process falls within a patent’s boundaries. In those cases, courts should be free to consider the heart of the invention. Part III goes on to apply this framework to several developing areas of patent law where scholars are currently examining whether the heart of the invention is an appropriate consideration. They are patentable subject matter, the “omitted elements” test, damages, and enablement.

Part IV discusses the recent *Quanta* decision on exhaustion. Patent exhaustion and contributory infringement share a similar question and both appropriately focus on the heart of the invention. Part IV then acknowledges that *Quanta* outlined a two-pronged standard that may be difficult to apply. The author therefore recommends that the lower courts focus on the contributory infringement prong because it provides an objective test for determining when a subset of limitations is “essential.”

I. UNDERSTANDING THE HEART OF THE INVENTION

The term “heart of the invention” gained notoriety in the 1961 Supreme Court case, *Aro Manufacturing Co. v. Convertible Top Replacement Co.*¹² In this landmark case, the Supreme Court said that it was improper to consider the heart of the invention in determining whether the defendant’s actions constituted a permissible repair or an impermissible infringing reconstruction.¹³ The courts have used many different labels to capture the same

¹² 365 U.S. 336 (1961). The Supreme Court issued two decisions involving the same parties. Even though the first decision is often referred to as *Aro I*, this Article refers to it as *Aro*. The second decision, *Aro Manufacturing Co. v. Convertible Top Replacement Co. (Aro II)*, 377 U.S. 476 (1964), is notable because it found that to be liable for contributory infringement, there must be a showing that an alleged infringer not only knew of the patent, but also that the use of the component would infringe the patent. It said nothing about the heart of the invention.

¹³ See *infra* Part III.A. Under the doctrine of repair and reconstruction, a patentee cannot prevent a purchaser of a patented article from repairing that article. See *Aro*, 365 U.S. at 342. That is part of the bundle of rights that comes with purchasing the patented article. However, when the repair becomes so substantial that it is considered a reconstruction, there is a patent infringement. See *id.* at 346.

concept. For example, the terms “essential features/elements,”¹⁴ the “gist”¹⁵ of the invention, “the point of novelty,”¹⁶ and “central concept”¹⁷ have all been used to identify a part of a patent’s claims that is crucial to understanding the invention and distinguishing it from the prior art. For simplicity’s sake, this Article uses the “heart of the invention” to refer to any subset of claim elements or limitations that are more important than the remaining elements or limitations for the particular decision under consideration.

This Article does not wish to overstate the significance of the heart of the invention. For many patents, there is no separable “heart of the invention.”¹⁸ Consider a Post-it note. If the patent for a Post-it note had only two limitations—a piece of paper and a re-adherable strip of adhesive—we could not identify just one of those two as the heart of the invention.¹⁹ Both limitations are absolutely necessary to understand and practice the claimed invention. To focus on one component by itself would clearly not do justice to the invention. The fact that some patents do not reveal a distinct heart of the invention shows that patent doctrines cannot be solely based on this consideration. Nonetheless, the

¹⁴ Decisions discussing the written description doctrine (in the context of the “omitted elements” test) have used the “essential elements” terminology. *See infra* notes 199–211 and accompanying text. The current debate over damages patent reform also uses this label. *See infra* notes 212–15 and accompanying text. The Supreme Court has just recently used the phrase “essential features” in the context of patent exhaustion. *Quanta Computer, Inc. v. LG Elecs., Inc.*, 128 S. Ct. 2109, 2119 (2008); *see infra* Part IV.B.

¹⁵ *Aro*, 365 U.S. at 345.

¹⁶ Decisions discussing inequitable conduct refer to the point of novelty. *See infra* notes 44–46 and accompanying text. Similarly, the term “novel aspect of the invention” has been used in evaluating enablement. *Auto. Techs. Int’l, Inc. v. BMW of N. Am., Inc.*, 501 F.3d 1274, 1284–85 (Fed. Cir. 2007).

¹⁷ A recent highly publicized decision on subject matter patentability used the phrase “central to the purpose of the claimed process.” *In re Bilski*, 545 F.3d 943, 962 (Fed. Cir. 2008) (en banc), *aff’d sub nom. Bilski v. Kappos*, 130 S. Ct. 3218 (2010).

¹⁸ *See* Timothy R. Holbrook, *Extraterritoriality in U.S. Patent Law*, 49 WM. & MARY L. REV. 2119, 2137 (2008) (stating that “[t]here need not be a singular, defining feature of an invention that is key to its patentability”); *see also* Howard T. Markey, *Some Patent Problems*, 80 F.R.D. 203, 209 (1979) (“[T]here ain’t no new elements! Only God makes things out of new elements.”).

¹⁹ Holbrook, *supra* note 18, at 2160 (noting that “the creation of Post-It Notes® involved the use of two known elements”).

“heart of the invention” should play an important role in formulating and applying many doctrines.²⁰

Whether the heart of the invention exists is not just a function of the underlying technology. Often the way attorneys draft the patent's claims determines whether there is a heart of the invention. If the same Post-it note patent has a third limitation—for example, restricting the paper to be square—we might identify the heart of the invention as the first two limitations. The physical dimensions of the paper are of lesser importance and are not part of the “heart of the invention.” This example shows how attorneys can graft additional limitations to an invention and thereby elevate the importance of the original claim limitations to the point where they become the heart of the invention.

A. *Treatment of the Heart*

Having defined the heart of the invention, the next step in the analysis is to understand how that concept is treated in patent law. The established view is that the issue has been settled for some time and the courts are not permitted to consider the heart of the invention in their analysis.²¹ The following statement illustrates the prevailing viewpoint:

the idea of dissecting a component from a patented combination and analyzing it violates principles that today at least, are well-settled in patent law. Patent law inquiries as to the inventiveness of a claim must consider the combination as a whole, rather than isolate an individual element, whether or not the element is identifiable as the gist or heart of the invention.²²

²⁰ See Dan L. Burk & Mark A. Lemley, *Fence Posts or Sign Posts? Rethinking Patent Claim Construction*, 157 U. PA. L. REV. 1743, 1799 n.204 (2009) (acknowledging that for many inventions there may be no “point of novelty,” but arguing that “doesn’t mean it can’t be helpful [for claim construction] in particular cases”).

²¹ Mark D. Janis, *A Tale of the Apocryphal Axe: Repair, Reconstruction, and the Implied License in Intellectual Property Law*, 58 MD. L. REV. 423, 454 (1999).

²² *Id.*; see Burk & Lemley, *supra* note 20, at 1798 (“‘Point of novelty’ as a concept has a bad reputation in patent law” (citing *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1548 (Fed. Cir. 1983))); Holbrook, *supra* note 18, at 2160 (“The entire concept of a particular ‘patentably distinctive’ aspect of an invention harkens back to the

However, a closer look at the case law shows that patent law often treats the *concept* of the heart of the invention differently depending on what label is used. Decisions rejecting the concept rely on *Aro* and use the term “heart of the invention.”²³ Decisions in the area of direct infringement, anticipation, obviousness, the written description requirement, and the doctrine of repair and reconstruction fall within this category.²⁴

Thus, to find infringement, it is not sufficient to show that the accused device possesses the heart of the patented invention.²⁵ A patentee must prove that each limitation of the claimed invention is present.²⁶ The same principle applies to the related doctrines of anticipation²⁷ and obviousness.²⁸ Under these doctrines, an invention is not patentable if it is either anticipated or rendered obvious by the prior art.²⁹ To show that the patent is invalid as

rejected concept of the ‘heart’ or ‘gist’ of the invention.” (quoting *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 345 (1961)); *F. Scott Kieff, Quanta v. LG Electronics: Frustrating Patent Deals by Taking Contracting Options Off the Table?*, 2008 CATO SUP. CT. REV. 315, 321. In contrast, the Federal Circuit has only recently rejected the concept of considering the “point of novelty” when determining infringement for design patents. *Egyptian Goddess, Inc. v. Swisa, Inc.*, 543 F.3d 665, 672 (Fed. Cir. 2008).

²³ See, e.g., *Holbrook*, *supra* note 18, at 2160 (quoting *Aro*, 365 U.S. at 345).

²⁴ See *infra* Part III.A.

²⁵ See *Janis*, *supra* note 21, at 454.

²⁶ In *Allen Engineering v. Bartel*, 299 F.3d 1336, 1343 (Fed. Cir. 2002), the district court relied on the fact that the defendant’s product included the heart of the patented invention to find both literal infringement and infringement under the doctrine of equivalents. *Id.* at 1345 (citing *Aro* for the proposition that “[i]t is well settled that ‘there is no legally recognizable or protected ‘essential’ element, gist or ‘heart’ of the invention in a combination patent’”). The Federal Circuit vacated the district court’s findings, and instructed the district court to construe each disputed limitation and compare each of those limitations to the accused device to determine infringement. See *id.* at 1354–55.

²⁷ *PharmaStem Therapeutics, Inc. v. ViaCell, Inc.*, 491 F.3d 1342, 1369 (Fed. Cir. 2007) (“‘Anticipation’ means lack of novelty; that is, that the invention was already known.”). 35 U.S.C. § 102 (2006) defines “novelty” and says that a person is not entitled to a patent if the invention was known in one of several different categories of prior art.

²⁸ Another condition of patentability is non-obviousness. 35 U.S.C. § 103 states that even if an invention satisfies § 102’s novelty requirement, the invention is not patentable if it is obvious in view of the prior art.

²⁹ “Anticipation requires the presence in a single prior art disclosure of all elements of a claimed invention arranged as in the claim.” *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983). In contrast, obviousness is a much more flexible test that may take into account multiple references and secondary factors. See *KSR Int’l Co.*

anticipated, it is not sufficient to show that the prior art discloses the heart of the invention;³⁰ each and every limitation must be found in the reference.³¹ Similarly, the doctrine of obviousness requires an examination of “the subject matter as a whole.”³²

The courts also do not consider the heart of the invention when determining if a claim satisfies the written description requirement.³³ Under this requirement, an inventor must show possession of the invention at the time the application was filed.³⁴ Again, the written description requirement cannot be satisfied by merely proving that the heart of the invention was described in the original specification; rather, the inventor must prove that there was a written description supporting every limitation found in the

v. Teleflex Inc., 550 U.S. 398, 415 (2007); *see also* Graham v. John Deere Co., 383 U.S. 1, 17–18 (1966).

³⁰ Panduit Corp. v. Dennison Mfg. Co., 774 F.2d 1082, 1101 (Fed. Cir. 1985) (“The law looks to the particular inquiries set forth in 35 U.S.C. § 102(a)–(g), which focus on knowledge, use, sale, disclosure, etc., of the *invention*. Notions of ‘concept’, ‘essence’, ‘key’, ‘gist’, etc., are no more useful in the context of § 102 than elsewhere, because they divert the fact-finder’s attention from the subject matter of the invention as a whole.”).

³¹ Amgen Inc. v. F. Hoffman-LA Roche Ltd., 580 F.3d 1340, 1366 (Fed. Cir. 2009) (“Anticipation under § 102(a) generally requires the presence in the prior art of each and every limitation of the claimed invention.”).

³² 35 U.S.C. § 103(a); *see also* W.L. Gore & Assocs., Inc. v. Garlock, Inc., 721 F.2d 1540, 1548 (Fed. Cir. 1983) (stating that it was error to focus on a single step of a multi-step process to establish invalidity and that “[i]n determining obviousness, there is ‘no legally recognizable or protected ‘essential’ [element], ‘gist’, or ‘heart’ of the invention.’” (quoting Aro Mfg. Co. v. Convertible Top Replacement Co., 365 U.S. 336, 345 (1961))); Para-Ordnance Mfg. v. SGS Importers Int’l, Inc., 73 F.3d 1085, 1087 (Fed. Cir. 1995) (“[W]hen determining obviousness, the claimed invention should be considered as a whole; there is no legally recognizable ‘heart’ of the invention.” (citing *W.L. Gore*, 721 F.3d at 1548)).

³³ The written description requirement is found in 35 U.S.C. § 112, ¶ 1:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same

³⁴ In practice, the written description requirement prevents an inventor from amending an application’s claims during the prosecution to encompass subject matter that was not described in the original application. *See* Vas-Cath Inc. v. Mahurkar, 935 F.2d 1555, 1561 (Fed. Cir. 1991) (“Adequate description of the invention guards against the inventor’s overreaching by insisting that he recount his invention in such detail that his future claims can be determined to be encompassed within his original creation.” (quoting Rengo Co. v. Molins Mach. Co., 657 F.2d 535, 551 (3d Cir. 1981))).

claim.³⁵ Of course, decisions applying the doctrine of repair and reconstruction must follow *Aro*, and those do not consider the heart of the invention.³⁶

On the other hand, there are a number of other doctrines that focus on a subset of unpatented limitations without labeling it the heart or gist of the invention, and without discussing *Aro*. The most prominent of these doctrines is contributory infringement, which is codified in 35 U.S.C. § 271(c).³⁷ Contributory infringement assumes that a party did not make, use, or sell the entire patented invention.³⁸ Nonetheless, the statute imposes liability for a party that contributes to another's act of direct infringement.³⁹

³⁵ In *Vas-Cath*, the Federal Circuit found that the district court incorrectly attempted to identify the “novel or important” part of the invention to determine whether a specification provided a written description for claims under 35 U.S.C. § 112. *Id.* at 1565 (quoting *Vas-Cath, Inc. v. Mahurkar*, 745 F. Supp. 517, 522 (N.D. Ill. 1990)). Again, the Federal Circuit relied on *Aro* for the proposition that “[t]here is ‘no legally recognizable or protected ‘essential’ element, ‘gist’ or ‘heart’ of the invention in a combination patent.’” *Id.* (quoting *Aro*, 365 U.S. at 345). The court then compared the written description to the claim limitations to determine whether there was a factual issue with respect to priority date. *See id.* at 1565–67.

³⁶ *See, e.g., Porter v. Farmers Supply Serv., Inc.*, 790 F.2d 882, 887 (Fed. Cir. 1986) (explaining that the Supreme Court “has eschewed the suggestion” of considering “whether the element of the combination that has been replaced is an ‘essential’ or ‘distinguishing’ part of the invention” (quoting *Dawson Chem. Co. v. Rohm & Haas Co.*, 448 U.S. 176, 217 (1980))).

³⁷ 35 U.S.C. § 271(c) states in full:

Whoever offers to sell or sells within the United States or imports into the United States a component of a patented machine, manufacture, combination, or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention, knowing the same to be especially made or especially adapted for use in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial noninfringing use, shall be liable as a contributory infringer.

³⁸ *See Giles S. Rich, Infringement Under Section 271 of the Patent Act of 1952*, 21 GEO. WASH. L. REV. 521, 531 (1953) (“Contributory infringement within its proper bounds has always, by its very nature, given protection to something not strictly within the claim, and in this sense alone ‘unpatented.’” (emphasis omitted)).

³⁹ For contributory infringement to exist, there must be direct infringement by another party. *See BMC Resources, Inc. v. Paymentech, L.P.*, 498 F.3d 1373, 1379 (Fed. Cir. 2007) (“Indirect infringement requires, as a predicate, a finding that some party amongst the accused actors has committed the entire act of direct infringement.”).

To determine if a party is liable for contributory infringement, the statute asks a series of questions. Is the component a “material part of the [patented] invention”?⁴⁰ Is it “especially made or especially adapted for use in an infringement of [the] patent”?⁴¹ Is the component a “staple article or commodity of commerce suitable for substantial non-infringing use[s]”?⁴² If the party supplies a “material part” of the patented invention (i.e., the heart of the invention) and satisfies the other requirements of § 271(c), the party can be held liable for contributing to another’s infringement.⁴³

The doctrine of inequitable conduct also considers the heart of the invention. Inequitable conduct occurs when a patentee fails to disclose material information to the patent office with deceptive intent.⁴⁴ The issue of materiality is often hotly contested.⁴⁵ When undisclosed prior art corresponds to the “point of novelty,” that showing strongly weighs in favor of finding materiality.⁴⁶ Again, the phrase “point of novelty” captures the idea of the “heart of the invention” without using that label.

The determination of joint inventorship is yet another area in which patent law considers the heart of the invention. As a general rule, 35 U.S.C. § 116 requires all the inventors of the claimed

⁴⁰ 17 U.S.C. § 271(c); *see also* DONALD S. CHISUM, CHISUM ON PATENTS § 17.03(4) (2005).

⁴¹ 17 U.S.C. § 271(c); *see also* CHISUM, *supra* note 40, § 17.03(4).

⁴² 17 U.S.C. § 271(c); *see also* CHISUM, *supra* note 40, § 17.03(3).

⁴³ 17 U.S.C. § 271(c); *see also* CHISUM, *supra* note 40, § 17.03(4).

⁴⁴ *See Star Scientific, Inc. v. R.J. Reynolds Tobacco Co.*, 537 F.3d 1357, 1365–71 (Fed. Cir. 2008), for a discussion and analysis of inequitable conduct.

⁴⁵ *See, e.g.,* Tech. Licensing Corp. v. Videotek, Inc., 545 F.3d 1316, 1337 (Fed. Cir. 2008); Honeywell Int’l Inc. v. Universal Avionics Sys. Corp., 488 F.3d 982, 1000 (Fed. Cir. 2007).

⁴⁶ *McKesson Info. Solutions, Inc. v. Bridge Med., Inc.*, 487 F.3d 897, 918–19 (Fed. Cir. 2007) (affirming inequitable conduct finding when undisclosed prior art disclosed two of the “points of novelty”); *Pharmacia Corp. v. Par Pharm., Inc.*, 417 F.3d 1369, 1373 (Fed. Cir. 2005) (upholding district court’s finding that misleading declarations that went to the “very point of novelty” were material); *Bruno Indep. Living Aids, Inc. v. Acorn Mobility Servs., Ltd.*, 394 F.3d 1348, 1353–54 (Fed. Cir. 2005) (finding materiality where the undisclosed prior art disclosed what the applicant touted as the “point of novelty”); *Critikon, Inc. v. Becton Dickinson Vascular Access, Inc.*, 120 F.3d 1253, 1256–59 (Fed. Cir. 1997) (holding that there was inequitable conduct regarding undisclosed prior art that disclosed the “point of novelty”).

invention to jointly apply for a patent.⁴⁷ If all the proper inventors are not named, a defendant can argue that a patent is invalid.⁴⁸ “[T]o be a joint inventor, an individual must make a contribution to the conception of the claimed invention that is not insignificant in quality, when that contribution is measured against the dimension of the full invention.”⁴⁹ This requires that a person “do more than merely explain to the real inventors well known concepts and/or current state of the art.”⁵⁰ In application, this means that a person is only an inventor if the person contributed to a “significant” part of the invention that corresponded to the heart of the invention. If the person simply provided elements from the prior art that did not require any special insight, the person is not an inventor.⁵¹

Thus, a review of different patent law doctrines shows a fundamental inconsistency in the way patent law treats the heart of the invention. On the one hand, many doctrines rely on *Aro* for a fundamental rule: patent law does not recognize the heart of the invention.⁵² Indeed, this rule has been treated with such unquestioned reverence that this Article calls the rule *Aro*’s commandment. Yet, as shown above, many doctrines in patent law consistently break this commandment by using different labels. This conflict clearly needs to be resolved. If *Aro*’s commandment is correct, the rule should be followed in all areas of patent law. If it is not, there needs to be an analytical framework for understanding when it is appropriate to consider the heart of the invention. This Article argues that *Aro*’s commandment is wrong; there should be no rule against considering the heart of the

⁴⁷ See CHISUM, *supra* note 40, § 11.02(2).

⁴⁸ See, e.g., *BJ Servs. Co. v. Halliburton Energy Servs., Inc.*, 338 F.3d 1368, 1373–74 (Fed. Cir. 2003). Defendants have relied on 35 U.S.C. § 102(f) (2006) to argue that the failure to name the proper inventors renders a patent invalid. See *Pannu v. Iolab Corp.*, 155 F.3d 1344, 1349–50 (Fed. Cir. 1998) (“[S]ection 102(f) still makes the naming of the correct inventor or inventors a condition of patentability; failure to name them renders a patent invalid.”). It should be noted that 35 U.S.C. § 256 allows inventorship to be corrected if there was no deceptive intent.

⁴⁹ *Fina Oil & Chem. Co. v. Ewen*, 123 F.3d 1466, 1473 (Fed. Cir. 1997); see 35 U.S.C. § 102(f); *Ethicon, Inc. v. U.S. Surgical Corp.*, 135 F.3d 1456, 1460 (Fed. Cir. 1998).

⁵⁰ *Pannu*, 155 F.3d at 1351.

⁵¹ See *Hess v. Advanced Cardiovascular Sys., Inc.*, 106 F.3d 976, 978–79, 980–81 (Fed. Cir. 1997); see *infra* notes 178–83 and accompanying text.

⁵² See *supra* Part I.

invention. It then proceeds to outline a framework for determining when to consider the heart of the invention.

B. A Rule Outlawing Heart

Even without a detailed examination of *Aro*'s impact on patent law, there is something intuitively strange about the rule. This is not a situation where a rule incidentally causes the judges to overlook a basic principle in favor of bright line rule. Rather, *Aro* expressly instructs courts and juries to continually ignore the fundamental nature of what a patentee invented.⁵³ However, when courts pretend that there is no heart of the invention, some results will inevitably be incorrect, and in many cases, absurd.

This issue is representative of a larger class of problems. Courts often focus on formalistic rules that ignore the central goals of the patent system. Rules certainly have their benefits. They provide objective guidelines for judges and juries to follow.⁵⁴ However, those rules should not be followed blindly at the expense of overlooking basic principles.

Jeanne Fromer, Dan Burk and Mark Lemley address a very similar problem in two recent articles.⁵⁵ Patent law defines “what the patentee owns not by what . . . [the patent describes in the specification], but by what [it] claims.”⁵⁶ Thus, patent claims have been compared to “the ‘metes and bounds’ of a real property deed, defining the outer boundaries of a ‘property’ right conferred on the patentee.”⁵⁷ Fromer, Burk and Lemley argue that this system of peripheral claiming frequently overlooks the fundamental nature of the invention.⁵⁸

⁵³ See *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 345 (1961).

⁵⁴ See John R. Thomas, *Formalism at the Federal Circuit*, 52 AM. U. L. REV. 771, 774 (2003) (“Advocates of formally realized rules argue that they reduce judicial discretion, lead to more certain outcomes and provide private actors with the certainty necessary to order their affairs in an efficient fashion.”).

⁵⁵ See Burk & Lemley, *supra* note 20; Jeanne C. Fromer, *Claiming Intellectual Property*, 76 U. CHI. L. REV. 719 (2009).

⁵⁶ Burk & Lemley, *supra* note 20, at 1744.

⁵⁷ *Id.* (footnotes omitted). This is called peripheral claiming. Fromer, *supra* note 55, at 726.

⁵⁸ See Burk & Lemley, *supra* note 20, at 1745–46; Fromer, *supra* note 55, at 757–58.

As a remedy, they propose incorporating central claiming features into the current system.⁵⁹ Under a central claiming approach, the patentee describes the central or prototypical embodiments with the understanding that the patent will cover a broader set of similar embodiments.⁶⁰ According to Burk and Lemley, central claiming “puts the focus on what the patentee actually invented rather than on what patent lawyers later (often much later) drafted as claims to cover the ground in that invention.”⁶¹ Similarly, Fromer argues that central claiming or claiming by exemplar would serve to provide the public with better notice about what the patent covers and make it easier for the United States Patent and Trademark Office to determine whether an application is patentable.⁶² Burk and Lemley recognize that a complete shift to central claiming may not be realistic.⁶³ Instead, they suggest an intermediate proposal of limiting claim construction “to terms that are (1) technical and (2) the point of novelty.”⁶⁴

Fromer, Burk and Lemley made their recommendations because the current system of peripheral claiming often leads judges and juries unintentionally to ignore the actual invention and instead focus on claims drafted by attorneys.⁶⁵ Since claims are

⁵⁹ See Burk & Lemley, *supra* note 20, at 1746–47; Fromer, *supra* note 55, at 772.

⁶⁰ See Burk & Lemley, *supra* note 20, at 1746 (“Under a central-claiming approach, the patentee does not delineate the outer reach of what it claims. Rather, the patentee discloses the central features of the invention—what distinguishes it from the prior art—and the courts determine how much protection the patent is entitled to by looking at the prior art that cabins the invention, how important the patentee’s invention was, and how different the accused device is.” (footnotes omitted)); Fromer, *supra* note 55, at 727 (stating that in central claiming, “the rightsholder describes the central, or prototypical, set members, but the right tends to cover a broader, similar set of items”).

⁶¹ Burk & Lemley, *supra* note 20, at 1787.

⁶² See Fromer, *supra* note 55, at 775–77.

⁶³ See Burk & Lemley, *supra* note 20, at 1795.

⁶⁴ *Id.* at 1798. Burk and Lemley state that current claim construction disputes often have nothing to do with the heart of the invention. See *id.* Instead, they state that these disputes focus on drafting errors to limit the patent “in ways the inventor did not intend or on a deliberate ambiguity to broaden the patent to cover things the patentee did not invent.” *Id.* (footnote omitted).

⁶⁵ Fromer, *supra* note 55, at 776 (describing how central claiming provides a “narrower and more concrete [description] covering the heart of the invention rather than every esoteric variation”).

only imperfect written proxies for the invention, they should not be treated as if they absolutely define it.⁶⁶

This Article does not examine central claiming, but tries to achieve some of the same goals advanced by its proponents. Courts and juries should not be told that they must always give equal weight to each limitation of a claim. Like peripheral claiming, this rule diverts attention to the outer bounds of the invention, not the heart. Under the right circumstances, courts should reject *Aro*'s commandment and focus attention on what the patentees actually invented. That is fundamentally what Fromer, Burk and Lemley are trying to do, albeit in a different context. Indeed, it is very odd that patent law has even arrived at this point. It seems self evident that some doctrines in patent law need to examine the heart of the invention. To understand why patent law has arrived at this anomalous point, this Article goes back half a century to *Aro*.

II. THE FOUNDATION, *ARO*

A. *Rejecting the Heart*

Although there is certainly relevant older precedent,⁶⁷ modern cases cite to *Aro Manufacturing Co. v. Convertible Top Replacement Co.* for the proposition that there is no “heart of the invention” in combination patents and thus courts should not rely on such a construct in making decisions.⁶⁸ In *Aro*, the Supreme Court rejected the idea that replacing an “essential” or “distinguishing” part of a patented combination constitutes an impermissible infringing reconstruction.⁶⁹ Under the doctrine of repair and reconstruction, a patentee cannot prevent a purchaser of

⁶⁶ Burk & Lemley, *supra* note 20, at 1794 (“The problem is . . . the pretense that the language on which the interpretation is based can or does concretely define the outer boundary of the patent holder’s rights. This is essentially an impossibility because patents describe not a physical entity, but a set of legal entitlements.”).

⁶⁷ In *Aro*, the Justices analyzed the historical roots of the doctrine of repair and reconstruction in arriving at their different opinions. *See, e.g.*, Janis, *supra* note 21, at 431–43 (discussing the pre-*Aro* case law on repair and reconstruction).

⁶⁸ *See supra* Part I.A.

⁶⁹ *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 344 (1961).

a patented article from repairing that article.⁷⁰ That is part of the bundle of rights that comes with purchasing the patented article. However, when the repair becomes so substantial that it is considered a reconstruction, there is a patent infringement.⁷¹ In *Aro*, the issue was how to distinguish between a permissible repair and an impermissible reconstruction.⁷²

The plaintiff, Convertible Top Replacement Co., had the rights to a patent for automobile convertible tops.⁷³ The patent covered the combination of “a flexible top fabric, supporting structures, and a mechanism for sealing the fabric against the side of an automobile body in order to keep out the rain.”⁷⁴ As might be expected, the fabric has a much shorter life than the other components. The defendant, Aro Manufacturing Co., manufactured and sold “replacement fabrics designed to fit the models of convertibles equipped with tops embodying the combination covered by the patent.”⁷⁵

The automobile owners were authorized to use their convertible tops by virtue of a license that the automobile manufacturer took from the patentee.⁷⁶ Under the patentee’s theory, the automobile owners exceeded the scope of their license when they replaced the fabric in the convertible tops.⁷⁷ Accordingly, the patentee sued Aro for contributory infringement under 35 U.S.C. § 271(c).⁷⁸ After trial, the jury returned a verdict in favor of patentee and Aro appealed.⁷⁹

⁷⁰ See *id.* at 342–43.

⁷¹ See *id.* at 346.

⁷² See *id.* at 342.

⁷³ Convertible Folding Top with Automatic Seal at Rear Quarter, U.S. Patent No. 2,569,724 (filed Aug. 12, 1949) (issued Oct. 2, 1951).

⁷⁴ *Aro*, 365 U.S. at 337.

⁷⁵ *Id.* at 338.

⁷⁶ In a subsequent decision, the Supreme Court addressed the liability of the defendant for replacement tops that were used in automobiles that were not licensed to the patent. *Aro Mfg. Co. v. Convertible Top Replacement Co. (Aro II)*, 377 U.S. 476, 478–81 (1964).

⁷⁷ *Aro*, 365 U.S. at 337–38; *Aro II*, 377 U.S. at 483.

⁷⁸ *Aro*, 365 U.S. at 337–38.

⁷⁹ *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 270 F.2d 200, 201 (1st Cir. 1959), *rev’d*, 365 U.S. 336 (1961).

The First Circuit Court of Appeals affirmed the jury's verdict.⁸⁰ The decision framed the basic question as whether Aro was "merely . . . making a permissible replacement of a part which expectedly became worn out or defective sooner than other parts of the patented combination"⁸¹ or whether such replacement constituted a "forbidden reconstruction of the combination."⁸² The court noted that, "[e]ach case must be decided on its own facts, pretty much as an individual instance."⁸³

The court then found that Aro was impermissibly reconstructing the patented combination by examining two factors.⁸⁴ First, the court looked at the nature of the component being replaced and concluded that "the fabric portion of the top [was] not a minor or relatively inexpensive component of the patented combination."⁸⁵ Second, the court examined the expected life of the same component and concluded that "the life of the fabric is not so short, nor is the fabric so cheap, that we can safely assume that an owner would rationally believe that in replacing it he was making only a minor repair to his top structure."⁸⁶ Relying on these factors, the court concluded "that the defendants were not making permissible repairs to, but were substantially reconstructing, the convertible top combination."⁸⁷ This decision was in turn appealed to the Supreme Court.⁸⁸

In an opinion authored by Justice Whittaker, the Supreme Court reversed the First Circuit Court of Appeals and found that Aro's actions constituted a permissible repair.⁸⁹ More importantly, the Court specifically rejected analysis that relied on the "essential" or "distinguishing" part of the patented combination by stating:

⁸⁰ *Id.* at 206.

⁸¹ *Id.* at 202.

⁸² *Id.* at 205.

⁸³ *Id.*

⁸⁴ *Id.*

⁸⁵ *Id.*

⁸⁶ *Id.*

⁸⁷ *Id.*

⁸⁸ *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 338 (1961).

⁸⁹ *Id.* at 346.

The basic fallacy . . . is that it requires the ascribing to one element of the patented combination the status of patented invention in itself. Yet this Court has made it clear in the two *Mercoid* cases that *there is no legally recognizable or protected “essential” element, “gist” or “heart” of the invention in a combination patent.*⁹⁰

It is this oft quoted passage (in italics) that has become a foundation of modern patent law. Numerous decisions cite to this passage when rejecting attempts to focus on only part of a claim.⁹¹ It is as if *Aro* carved a commandment in stone: thou shall not look at the heart of the invention in patent law.

The Supreme Court went on to discuss what factors could be properly considered by defining the difference between repair and reconstruction. With respect to repair, the Court proclaimed: “We hold that maintenance of the ‘use of the whole’ of the patented combination through replacement of a spent, unpatented element does not constitute reconstruction.”⁹²

With respect to reconstruction, the Court stated, “reconstruction of a patented entity, comprised of unpatented elements, is limited to such a true reconstruction of the entity as to ‘in fact make a new article.’”⁹³

Aro was far from unanimous. Justice Brennan agreed with the result (that there was a repair), but disagreed with the majority’s test.⁹⁴ He argued that the test described “too narrow a standard of what constitutes impermissible ‘reconstruction’” and that “there are circumstances in which the replacement of a single unpatented component of a patented combination short of a second creation of the patented entity may constitute ‘reconstruction.’”⁹⁵ He went on

⁹⁰ *Id.* at 344–45 (emphasis added); *see also id.* at 344 (“For if anything is settled in the patent law, it is that the combination patent covers only the totality of the elements in the claim and that no element, separately viewed, is within the grant.”).

⁹¹ *See supra* notes 21–36 and accompanying text.

⁹² *Aro*, 365 U.S. at 346.

⁹³ *Id.* (quoting *United States v. Aluminum Co. of Am.*, 148 F.2d 416, 425 (2d Cir. 1945)).

⁹⁴ *Id.* at 362 (Brennan, J., concurring in result).

⁹⁵ *Id.*

to argue that under precedent, “there is no single test to which all must yield; rather the determination is to be based upon the consideration of a number of factors.”⁹⁶ Justice Brennan then described those factors:

Appropriately to be considered are the life of the part replaced in relation to the useful life of the whole combination, the importance of the replaced element to the inventive concept, the cost of the component relative to the cost of the combination, the common sense understanding and intention of the patent owner and the buyer of the combination as to its perishable components, whether the purchased component replaces a worn-out part or is brought for some other purpose, and other pertinent factors.⁹⁷

The second factor, “the importance of the replaced element to the inventive concept,” is simply another way of determining its connection to the heart of the invention.⁹⁸

The dissent, authored by Justice Harlan and joined by Justices Frankfurter and Stewart, agreed with Justice Brennan’s multi-factor approach, but disagreed with his ultimate conclusion.⁹⁹

⁹⁶ *Id.* at 363.

⁹⁷ *Id.* at 363–64 (footnotes omitted). For the purposes of this Article, only one footnote in Justice Brennan’s concurrence is important. Footnote 3 of Justice Brennan’s concurrence listed the historical precedent that showed that the heart of the invention was considered when determining whether a repair or reconstruction had taken place. *See id.* at 364 n.3 (citing *Leeds & Catlin Co. v. Victor Talking Mach. Co.*, 213 U.S. 325 (1909); *Morrin v. Robert White Eng’g Works*, 143 F. 519 (2d Cir. 1905); *Davis Elec. Works v. Edison Elec. Light Co.*, 60 F. 276, 279–80 (1st Cir. 1894) (“[I]n certain stages of use the essence of a device, though in appearance only a small portion of it, may be lost, and its renewal amount to reconstruction.”)).

⁹⁸ *See id.* at 360 (Black, J., concurring) (“A fundamental error underlying the misleading standards suggested by my Brothers HARLAN and BRENNAN is the notion that in a case of this kind a court is obliged to search for the alleged ‘heart’ or ‘core’ of the combination patent.”).

⁹⁹ Like Justice Brennan, Justice Harlan argued that “there is no single yardstick for determining whether particular substitutions of new for original unpatented parts of a patented combination amount to permissible repair or forbidden reconstruction.” *Id.* at 371 (Harlan, J., dissenting). Harlan’s dissent went on to criticize the Court’s reconstruction test. *Id.* at 376 (“[N]one of the past cases in this Court or in the lower

Justice Harlan argued that the lower courts applied the correct standards and the Supreme Court should defer to the lower courts' findings.¹⁰⁰ Thus, four Justices thought that the heart of the invention should be considered as one factor in a multi-factor standard.

Justice Black agreed with the majority decision, yet he wrote a separate concurrence particularly critical of Justices Brennan's and Harlan's opinions.¹⁰¹ The concurrence characterized the multi-factor approach as a "Pandora's flock of insignificant standards,"¹⁰² and went on to suggest that the test had "ambiguous evidentiary standards" and would lead to "mischievous results."¹⁰³ Justice Black was particularly critical of examining the "alleged 'heart' or 'core' of a combination patent."¹⁰⁴ He reasoned that "[a] patented combination is no more than that, a novel relationship brought to bear on what presumably are familiar elements already in the public domain. Such familiar elements are not removed from the public domain merely because of their use, however crucial, in the novel combination."¹⁰⁵

In the end, six justices found that the defendant had permissibly repaired the convertible top. However, only five justices agreed on the standard announced by the majority—a standard that rejected the heart of the invention analysis. Four justices, including Justice Brennan, disagreed with the majority's test and favored a multi-factored approach that looked at, *inter alia*, the importance of the replaced element to the inventive concept.

federal courts remotely suggest that 'reconstruction' can be found only in a situation where the patented combination has been rebuilt *de novo* from the ground up.").

¹⁰⁰ *Id.* at 379 ("For reasons larger than this particular litigation I cannot agree that it is either necessary or appropriate for us to substitute our particular judgment on this particular application of correct standards to the facts.").

¹⁰¹ *Id.* at 346 (Black, J., concurring).

¹⁰² *Id.* at 355.

¹⁰³ *Id.* at 357; *see also* Janis, *supra* note 21, at 444 (relying on *Wilson v. Simpson*, 50 U.S. 109 (1850), to argue that the "[*Aro*] Court's opinion repudiated the multifactor approach to repair-reconstruction, *asserting inaccurately* that such an approach had appeared only in lower court opinions" (emphasis added)).

¹⁰⁴ *Aro*, 365 U.S. at 361 (Black, J., concurring).

¹⁰⁵ *Id.*

To this day, the 5–4 *Aro* decision serves as the basis for the proposition that there is no “heart of the invention” in combination patents. Now that the *Quanta* decision has recently focused on the essential elements of an invention in the context of patent exhaustion,¹⁰⁶ this Article argues that it is time to revisit *Aro*. In Part II.B and C *infra*, this Article explains why *Aro*'s analysis suffers from a number of deficiencies. First and foremost, the standard leads to results that are difficult to apply and inconsistent with notions of justice. Second, the *Aro* decision incorrectly relied on principles from the two *Mercooid* decisions. In enacting § 271(c), Congress explicitly rejected the results of these two decisions and, implicitly, their principles.

B. Problems with *Aro*'s Standard

The *Aro* standard suffers from two analytical problems. First, the test is simply unhelpful. Second, the test leads to results that are inconsistent with commonsense notions of what repair and reconstruction are. These problems can be seen by examining the two end points found in *Aro*. At one end, a reconstruction “is limited to such a true reconstruction of the entity as to ‘in fact make a new article.’”¹⁰⁷ The test is tautological and simply re-characterizes the term using words that sound just like the original term. Federal Circuit Judge Gajarsa characterized the test as “we know a reconstruction when we see it.”¹⁰⁸ It sheds no new light on what a reconstruction is.¹⁰⁹

¹⁰⁶ *Quanta Computer, Inc. v. LG Elecs., Inc.*, 128 S. Ct. 2109, 2113 (2008).

¹⁰⁷ *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 346 (1961) (quoting *United States v. Aluminum Co. of Am.*, 148 F.2d 416, 425 (2d Cir. 1945)).

¹⁰⁸ Arthur J. Gajarsa, Evelyn Mary Aswad & Joseph S. Cianfrani, *How Much Fuel to Add to the Fire of Genius? Some Questions About the Repair/Reconstruction Distinction in Patent Law*, 48 AM. U. L. REV. 1205, 1222 (1999); see also *FMC Corp. v. Up-Right Inc.*, 21 F.3d 1073, 1078 (Fed. Cir. 1994) (declining to state a bright line test where the plaintiff complained that the entire standard was too “amorphous” and asked the Federal Circuit to “state the standard more clearly in a way that can be understood and applied both by patent owners and potential infringers”).

¹⁰⁹ See Janis, *supra* note 21, at 446 (stating that this passage “is nothing but a restatement of the exhaustion principle unaccompanied by any thoughtful analysis as to whether exhaustion is an appropriate organizing principle for repair-reconstruction”).

At the other end of the spectrum, *Aro* says that “replacement of a spent unpatented element” is a repair.¹¹⁰ That may help classify some simple cases. However, it does not help resolve the more difficult cases that reside in the middle. If a claim is made of components A through H, would someone replacing components A through G be found to be repairing the item? What if they replaced all the components over time?

This issue was explored by the Federal Circuit in *FMC Corp. v. Up-Right Inc.*¹¹¹ The plaintiff argued that “when the replacement parts added over time dominate the original parts, reconstruction has occurred.”¹¹² The Federal Circuit carefully avoided commenting on the correctness of plaintiff’s theory. However, the decision stated that even under this theory, the plaintiff would have lost because it “had failed to establish that a majority of the parts of the patented combination had been replaced in any particular [product].”¹¹³ Thus, the Court in *FMC* did not reject the possibility that the replacing of parts may be so extensive as to constitute an impermissible reconstruction.¹¹⁴

However, a subsequent Federal Circuit decision stated that the theory was not viable. In *Husky Injection Molding Systems, Ltd. v. R & D Tool & Engineering Co.*,¹¹⁵ the court said that “[e]ven if the owner sequentially replaces all of the worn-out parts of a patented combination, this sequential replacement does not constitute reconstruction.”¹¹⁶ This conclusion was dicta, but it shows how narrowly one Federal Circuit panel interpreted the reconstruction standard. Indeed, this is the kind of narrow interpretation of

¹¹⁰ *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 346 (1961).

¹¹¹ 21 F.3d 1073 (Fed. Cir. 1994).

¹¹² *Id.* at 1078.

¹¹³ *Id.* (“The district court found this to be the case regardless of whether one counted the number of parts in the grape harvester having corresponding elements in the claimed combination without assigning to them any relative values, economic or otherwise, or whether one attempted to assign such values.”).

¹¹⁴ *See id.* at 1077 (“This case therefore does not present us with the more difficult issue of how much repair to a grape harvester made altogether at any single point in time would have risen to the level of reconstruction of a ‘spent’ grape harvester.”).

¹¹⁵ 291 F.3d 780 (Fed. Cir. 2002).

¹¹⁶ *Id.* at 786 (citing *Surfco Haw. v. Fin Control Sys. Pty, Ltd.*, 264 F.3d 1062, 1065 (Fed. Cir. 2001); *FMC*, 21 F.3d at 1077).

reconstruction that concerned Justices Brennan and Harlan.¹¹⁷ Of course, the next question is how close in time can all the parts be replaced: a year, a month, a day? More importantly, why should the span of time over which all the parts are replaced distinguish a permissible repair from an impermissible reconstruction?

Other portions of *Husky* go on to suggest some bizarre inconsistencies. While acknowledging that *Aro* rejected the heart of the invention analysis, the Federal Circuit suggested that “there may be some concept of proportionality inherent in the distinction between repair and reconstruction.”¹¹⁸ In particular, the court suggested that if a patent covered an automobile, “few would argue that the retention of the spark plugs and the replacement of the remainder of the car at a single stroke was permissible activity akin to repair.”¹¹⁹ Thus, while *Husky* says that replacing *all* of the parts of a patented combination over time is merely a repair, it also suggests that if sufficient components are replaced at the same time, reconstruction has taken place. Adding uncertainty to confusion, the court gave no guidance on how to determine when that reconstruction threshold has been reached.

The two results of the *Husky* analysis are not reconcilable. But that is not the Federal Circuit's fault. The conflicting results simply reflect the inherent tension between *Aro*'s standard and commonsense. On the one hand, the Supreme Court has held that replacement of a spent part of a combination patent, which is not separately patented, is not an impermissible reconstruction no matter how essential it may be to the patented combination and no matter how costly or difficult replacement may be.¹²⁰ On the other hand, the Federal Circuit correctly noted that no one would seriously argue that *Husky*'s automobile example was a mere

¹¹⁷ See *supra* text accompanying note 95 (regarding Justice Brennan's view); see also *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 346 (1961) (Harlan, J., dissenting) (characterizing the majority's concept of what constitutes reconstruction as “narrow”).

¹¹⁸ *Husky*, 291 F.3d at 786–87; see also *Canon, Inc. v. GCC Int'l Ltd.*, 263 F. App'x 57, 61 (Fed. Cir. 2008) (stating that the concept of proportionality is pertinent to determining whether a refurbishment is considered a repair or a reconstruction; the same is true for the case of replaceable parts, but less so).

¹¹⁹ *Husky*, 291 F.3d at 786.

¹²⁰ *Aro*, 365 U.S. at 346.

repair.¹²¹ But that example uses the heart of the invention test, albeit without calling it such. Instead of identifying the essential elements of the invention and suggesting that replacing those elements constitutes reconstruction, the Federal Circuit used the automobile example to identify the insignificant part of the invention and suggest that if only that part is retained, there is a reconstruction.¹²² Both *Husky* and *FMC* demonstrate how difficult it is to apply *Aro*'s standard in a manner that comports with commonsense notions of what repair and reconstruction are.

Those decisions are not alone. Earlier, Judge Gajarsa asked if another Federal Circuit decision, *Aktiebolag v. E.J. Co.*¹²³ “implicitly resurrect[ed] the ‘heart of the invention’ test that was rejected by *Aro [I]?*”¹²⁴ He also noted that yet another decision, *Lummus Industries, Inc. v. D.M. & E. Corp.*,¹²⁵ approved jury instructions that “seem[ed] to direct the jury to focus on a ‘heart of the invention’ test contrary to the mandate in *Aro [I]*.”¹²⁶

Another example illustrates why considering the heart of the invention would help draw a more sensible line between repair and reconstruction. Consider a patent that claims a computer with a microprocessor, a memory, and a bus.¹²⁷ Of course, computers with these elements are well known in the prior art. In this case, the microprocessor contains additional limitations that distinguish the claimed invention from the prior art. Specifically, the microprocessor ensures that the most current data is retrieved from main memory by monitoring data requests and updating main memory when stale data is requested. Common sense would suggest that the additional microprocessor limitations are the essential features of invention.

Now assume that the technology is accepted by the market place, and that the patent holder licenses the patent to personal computer manufacturers. A refurbishing company comes along

¹²¹ *Husky*, 291 F.3d at 786.

¹²² *Id.*

¹²³ 121 F.3d 669 (Fed. Cir. 1997).

¹²⁴ See Gajarsa et al., *supra* note 108, at 1217.

¹²⁵ 862 F.2d 267 (Fed. Cir. 1988).

¹²⁶ See Gajarsa et al., *supra* note 108, at 1221.

¹²⁷ See *Quanta Computer, Inc. v. LG Elecs., Inc.*, 128 S. Ct. 2109, 2113 (2008).

and takes personal computers (that are licensed) and replaces the old microprocessors with new faster microprocessors that also update memory in the manner claimed by the patent. Since the refurbishing company simply replaced a component, an activity that *Aro* specifically labeled a repair,¹²⁸ the company has not infringed the patent.¹²⁹ Yet the only contribution the patent added to the prior art were limitations found in the microprocessor. This is precisely the kind of activity that should be considered an infringing reconstruction. If it were otherwise, a resourceful company could take old IBM personal computer frames from the scrapheap, place new hardware (motherboards, memory buses, etc.) into the frames and automatically receive licenses to the same personal computer patents that IBM has licensed.¹³⁰

In contrast, assume that the refurbishing company only replaces the memory with faster memory that can store more information. In this case, it seems entirely appropriate that the law calls this activity a repair and that the patent holder receive nothing. Although memory was a component of the patented invention, it certainly was not an essential element of the invention. The critical distinction between these examples is how essential the replaced component is to the invention. Does the replaced component go to the heart of the invention or not? *Aro* forbids this kind of analysis.¹³¹

C. *The Shaky Precedent Underlying Aro*

Not only does the standard in *Aro* lead to unjust results, it is also based on shaky precedent. The Supreme Court explicitly relied on the two *Mercoid* decisions to prove that there is no

¹²⁸ See *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 346 (1961).

¹²⁹ See *id.*

¹³⁰ Take the analysis one step further. Imagine if the same company were to combine old stock parts from various competing computer manufacturers while filling the key parts with the latest technology. Would the computers have patents rights from all these competitors? Surely, this is an absurd result.

¹³¹ *Gajarsa et al.*, *supra* note 108, at 1210 (explaining that the Supreme Court “rejected the ‘heart of the invention’ test, which analyzes whether the most essential element is being replaced”).

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legally recognizable or protectable heart of the invention.¹³² However, the Patent Act of 1952 superseded the results of the *Mercoïd* decisions¹³³ and thus implicitly rejected the reasoning that *Aro* used.

In the *Mercoïd* cases, the patent holder argued that the defendant was liable for contributory infringement because it made and sold an unpatented component (stoker switches) used in the patented invention (a home heating system).¹³⁴ The defendant argued that the patent holders had committed patent misuse by attempting to control an unpatented component.¹³⁵ In analyzing the issues, the Supreme Court explained that:

The fact that an unpatented part of a combination patent may distinguish the invention does not draw to it the privileges of a patent. That may be done only in the manner provided by law. However worthy it may be, however essential to the patent, an unpatented part of a combination patent is no more entitled to monopolistic protection than any other unpatented device.¹³⁶

The Supreme Court held that the patent holder had committed patent misuse even though the court of appeals found that there was no other use for the unpatented component.¹³⁷ As a result, the patent holder could not pursue a theory of contributory infringement.¹³⁸ Although the *Mercoïd* decisions did not formally reject the doctrine of contributory infringement, the Supreme Court acknowledged that it was limiting the doctrine “substantially.”¹³⁹

¹³² See *Aro*, 365 U.S. at 344–45; *id.* at 361 n.13 (Black, J., concurring) (relying on *Mercoïd I*).

¹³³ See Nard, *supra* note 6, at 72 n.105.

¹³⁴ *Mercoïd Corp. v. Mid-Continent Inv. (Mercoïd I)*, 320 U.S. 661, 662–63 (1944).

¹³⁵ See *id.* at 666–67.

¹³⁶ *Mercoïd Corp. v. Minneapolis-Honeywell Regulator (Mercoïd II)*, 320 U.S. 680, 684 (1944).

¹³⁷ *Mercoïd I*, 320 U.S. at 664.

¹³⁸ *Id.* at 668.

¹³⁹ *Id.* at 669; see also Charles W. Adams, *A Brief History of Indirect Liability for Patent Infringement*, 22 SANTA CLARA COMPUTER & HIGH TECH. L.J. 369, 384 (2006) (“The effect of the *Mercoïd* decisions was to render combination patents, which comprise nearly all patents, unenforceable whenever it was impractical to bring individual actions against infringers who were widely dispersed.”); Rich, *supra* note 38, at 535

The *Mercoid* decisions caused considerable consternation in the patent bar¹⁴⁰ and lead to the enactment of 35 U.S.C § 271(c) by the Patent Act of 1952, setting forth the elements of contributory infringement.¹⁴¹ A party can be liable for providing an unpatented component of a combination patent so long as § 271(c)'s requirements are satisfied.¹⁴² The component must constitute a material part of the invention; the alleged infringer must know that the component is especially made or adapted for use in an infringement; and the component cannot be a staple of commerce with substantial non-infringing uses.¹⁴³ Subsection (d) protects parties from charges of patent misuse when they pursue a theory of contributory infringement.¹⁴⁴ Thus, to the extent the *Mercoid* cases limited the doctrine of contributory infringement, the Patent Act of 1952 removed those limits.

By supplanting the *Mercoid* decisions, the Patent Act of 1952 suggests that Congress disagreed with the Supreme Court's decisions and the underlying analysis in those cases—that there is no heart of an invention. At least part of the legislative history of § 271 provides additional support for that conclusion. The Senate Report accompanying the Patent Act of 1952 stated, “[o]ne who

(“[C]ontributory infringement, as a doctrine, was left untouched by the misuse cases. But its applicability was rendered progressively more difficult by the things the Supreme Court said in the line of misuse cases that happened to come before it.”).

¹⁴⁰ See *Dawson Chem. Co. v. Rohm & Haas Co.*, 448 U.S. 176, 199 (1980) (“The *Mercoid* decisions left in their wake some consternation among patent lawyers and a degree of confusion in the lower courts.” (footnote omitted)).

¹⁴¹ See *id.* at 200 (explaining that the Patent Act of 1952 was instituted as corrective legislation).

¹⁴² 35 U.S.C. § 271 (2006).

¹⁴³ See *id.* § 271(c).

¹⁴⁴ *Id.* Section (d) states:

No patent owner otherwise entitled to relief for infringement or contributory infringement of a patent shall be denied relief or deemed guilty of misuse or illegal extension of the patent right by reason of his having done one or more of the following: (1) derived revenue from acts which if performed by another without his consent would constitute contributory infringement of the patent; (2) licensed or authorized another to perform acts which if performed without his consent would constitute contributory infringement of the patent; (3) sought to enforce his patent rights against infringement or contributory infringement

Id. § 271(d).

makes a special device constituting the *heart of a patented machine* and supplies it to others with directions (specific or implied) to complete the machine is obviously appropriating the benefit of the patented invention.”¹⁴⁵ That statement directly contradicts the view advanced in the *Mercoïd* cases.¹⁴⁶

Of course the Supreme Court was aware of the Patent Act of 1952 in *Aro*. The defendant was being accused of contributory infringement under 35 U.S.C. § 271(c).¹⁴⁷ Moreover, Justice Brennan’s concurrence indirectly identified the inconsistency between the Patent Act of 1952 and *Mercoïd*’s rejection of the “heart of invention”:

It is true that some decisions of this Court in patent misuse cases raised doubt as to the continuing vitality of this [multi-factor] standard in actions such as this one for relief from contributory infringement. But the Congress swept away that doubt when it gave the standard statutory sanction in 1952.¹⁴⁸

Similarly, Justice Harlan argued that the “opinion of the Court seems to reconfirm *Mercoïd* to fuller effectiveness than it had even before the 1952 Act by treating it as if the test of whether there was contributory infringement at all was to be found in its language.”¹⁴⁹ However, both Justice Whittaker’s majority opinion¹⁵⁰ and Justice Black’s¹⁵¹ concurrence failed to address this inconsistency. It

¹⁴⁵ *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 366 n.9 (1961) (quoting H.R. REP. NO. 82-1923, at 9 (1952)).

¹⁴⁶ Compare *supra* text accompanying note 136, with *supra* text accompanying note 145.

¹⁴⁷ *Aro*, 365 U.S. at 340–41.

¹⁴⁸ *Id.* at 365 (Brennan, J., concurring in result) (footnotes omitted).

¹⁴⁹ *Id.* at 378 n.6 (Harlan, J., dissenting) (emphasis added).

¹⁵⁰ The majority opinion mentions that *Mercoïd II* also stood for the proposition that there can be no contributory infringement without direct infringement and that the Patent Act of 1952 did not change that part of the law. *Id.* Those statements are undoubtedly correct, but say nothing about the “heart of the invention” analysis.

¹⁵¹ Justice Black’s concurrence does not reflect an understanding that the Patent Act of 1952 has any direct relationship to the *Mercoïd* decisions. In one part of his opinion, he argues that discussion of contributory infringement and the Patent Act of 1952 are “confusing and beside the point.” *Id.* at 347 (Black, J., concurring). In another part, he cites to *Mercoïd I* to demonstrate that the Supreme Court has “unequivocally” rejected

could be that the Justices did not fully appreciate the issue. Justice Brennan's argument was not straightforward, and Justice Harlan's discussion was relegated to a footnote. Moreover, the "heart of the invention" analysis was not the primary issue in *Aro*. It was simply one factor in the multi-factor approach that Justices Brennan and Harlan were advocating.¹⁵² Alternatively, *Aro* could simply illustrate the Supreme Court's continued hostility toward the doctrine of contributory infringement.¹⁵³ Regardless of the reason, the fact remains that the majority's reliance on the *Mercoïd* precedent is questionable. Nonetheless, modern cases continue to cite to the discussion of the "heart of the invention" in *Aro* as one of the basic tenets of patent law.¹⁵⁴

Instead of relying on the *Mercoïd* decisions and stating that there is no legally recognizable or protected "essential" element, "gist" or "heart" of the invention in a combination patent, *Aro* should have relied on § 271(c). If it had, the Supreme Court would have understood that Congress had rejected the view in *Mercoïd* and recognized that a subset of claim limitations may be sufficiently important to result in liability under the theory of contributory infringement. The same should be true for the doctrine of repair and reconstruction. If a party replaces component(s) that can properly be considered the heart of a patented invention, that fact should weigh in favor of finding an impermissible reconstruction. As Justice Brennan's multi-factor approach suggests, there may be other factors. However, the heart of the invention analysis should certainly be an important one.

In sum, *Aro*'s refusal to recognize the "heart of the invention" was approved by a narrow 5–4 majority. That refusal has made the test for repair and reconstruction difficult to apply and inconsistent

the notion that the Court should search for the "heart" or "core" of a combination patent. *Id.* at 360–61.

¹⁵² See *supra* notes 97–100 and accompanying text.

¹⁵³ *The Supreme Court, 1960 Term*, 75 HARV. L. REV. 40, 244 (1961) ("[S]ection 271 has not abated the Court's hostility toward the incidental monopolies of unpatented elements that combination-patent holders frequently seek.").

¹⁵⁴ See, e.g., *In re Bilski*, 545 F.3d 943, 994 (Fed. Cir. 2008) (en banc), *aff'd sub nom. Bilski v. Kappos*, 130 S. Ct. 3218 (2010).

with commonsense notions of what those concepts are.¹⁵⁵ Moreover, the decision was based on precedent that had already been overruled by the time *Aro* was decided. Nonetheless, modern decisions continue to rely on *Aro* for the proposition that there is no “heart of the invention” in combination patents and that courts should not rely on such a construct in making decisions. The weakness in the Supreme Court’s analysis of both the law and the policy suggests that the lower courts should not be so quick to give such uncritical reverence to *Aro* and automatically apply its commandment to other patent law doctrines. Indeed, these flaws suggest that *Aro* was wrongly decided.¹⁵⁶

III. RECONCILING A BROKEN HEART

Although the preceding section was highly critical of *Aro*, this Article does not recommend a complete reversal of *Aro*’s commandment. A rule proclaiming the universal importance of the heart of the invention would be equally as foolish as the rule rejecting that consideration. As is often the case, the law should

¹⁵⁵ Professor Janis also criticizes how the doctrine of repair and reconstruction has evolved. However, instead of proposing to more accurately align the test with what our general notions of what repair and reconstruction are, he argues that the entire framework should be reconceptualized. Rather than considering what he calls “spentness,” Janis suggests that the standard of permissible repair should be thought of as an implied license based on the reasonable expectations of the parties. Janis, *supra* note 21, at 520–21. It is beyond the scope of this Article to provide a full critique of this recommendation. However, one major concern comes to mind quickly. The doctrine of repair and reconstruction often relates to what third parties can do with a product. Therefore, if the law follows the expectation of the parties to the transaction, third party rights that society may wish to exist (e.g., the ability to refurbish an almost new product) may suffer. See Thomas W. Merrill & Henry E. Smith, *Optimal Standardization in the Law of Property: The Numerus Clausus Principle*, 110 YALE L.J. 1, 26–27 (2000) (explaining that standard rights (i.e., non-negotiable) in property law exist, in part, because of the difficulty in measuring externality costs (e.g., the costs imposed on strangers)). Thus, Professor Janis’s recommendation would probably curtail the ability of consumers to perform even minor repairs because there would be little incentive for a buyer to protect their third party rights.

¹⁵⁶ Commentators of the time both approved of and criticized the *Aro* decision. The discussion focused on the proper test for repair and reconstruction and how that impacted contributory infringement. See Janis, *supra* note 21, at 443 n.102 (citing to various articles that appeared soon after *Aro*).

apply a more nuanced approach. In some contexts examining the heart of the invention is imminently sensible. In others, it is not.

By examining the existing case law, this section provides an analytical framework for determining when specific patent law doctrines should and should not consider the heart of the invention. If the doctrine at issue needs to determine whether a product or process falls within the boundaries protected by a patent, the heart of the invention should not be considered. Rather, the “all elements” rule should apply.¹⁵⁷ However, there are many doctrines that do not seek to make that determination. In those cases, the particular aims of the doctrine may call for considering the heart of the invention.

This framework is useful for two reasons. First, it can identify when certain existing doctrines have gone wrong. For example, the preceding section argued that the heart of the invention was incorrectly rejected in the context of repair and reconstruction.¹⁵⁸ Since the doctrine of repair and reconstruction does not assess whether something falls within the boundaries of a patent, the proposed framework supports that conclusion. Second, a sound framework can help the courts understand when the heart of the invention should be considered in developing areas of patent law. Even now, there are several ongoing debates as to whether the heart of the invention should be considered. These debates include subject matter patentability, damages, the “omitted elements” test, and even enablement. This section proceeds to apply the analytical framework outlined above to those areas and make recommendations.

A. Existing Doctrines

By examining direct infringement, anticipation, and obviousness on the one hand and contributory infringement, inequitable conduct, and joint inventorship on the other hand, this section explains why it makes sense to reject the heart of the invention in some situations while considering that factor in other

¹⁵⁷ See Meurer & Nard, *supra* note 7, at 1979–80, for a brief historical discussion of the all elements rule.

¹⁵⁸ See *supra* Part II.B–C.

contexts. For the most part, those decisions that reject considering the “heart of the invention,” do so for basically the same reason. They are applying or extending the “all elements” rule. That rule “holds that an accused product or process is not infringing unless it contains each limitation of the claim, either literally or by an equivalent.”¹⁵⁹

The patent law defines “what the patentee owns not by what she actually built or disclosed, but by what she claimed.”¹⁶⁰ The “all elements” rule is a natural consequence of using the claims to define the boundaries of a patented invention. It is entirely reasonable to insist that all of the limitations of a claim be present when determining whether a particular product, process, or embodiment falls within those boundaries or not.

With that understanding in mind, rejecting the heart of the invention in some contexts is necessary because all of a patent’s limitations must be considered. For example, in the context of direct infringement, every element of the claimed invention must be found in the accused device to show infringement.¹⁶¹ To prove that a patent is invalid as anticipated, the prior art reference must disclose each and every limitation.¹⁶² Similarly, to show that a patent is invalid as obvious, all the limitations of a patented invention must be considered.¹⁶³ This is actually a statutory requirement. Section 103 discusses how obviousness must be judged by looking at both the prior art and the invention “as a whole.”¹⁶⁴ Thus, each of these doctrines sensibly examines all of

¹⁵⁹ *Freedman Seating Co. v. Am. Seating Co.*, 420 F.3d 1350, 1358 (Fed. Cir. 2005) (citing *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 29 (1997)); *see also id.* (“Each element contained in a patent claim is deemed material to defining the scope of the patented invention, and thus the doctrine of equivalents must be applied to individual elements of the claim, not to the invention as a whole.” (quoting *Warner-Jenkinson*, 520 U.S. at 29) (internal quotation marks omitted)).

¹⁶⁰ *See* Burk & Lemley, *supra* note 20, at 1744. Much of Fromer, Burk and Lemley’s criticisms of peripheral claiming apply directly to the “all elements” rule.

¹⁶¹ *See supra* note 26 and accompanying text.

¹⁶² *See supra* notes 29–31 and accompanying text.

¹⁶³ *See supra* note 32 and accompanying text.

¹⁶⁴ Section § 103(a) states:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the

the limitations of a claim and refuses to consider the heart of the invention.

Other doctrines do not need to determine whether a product or process falls within the boundaries protected by a patent. In these contexts, it makes sense to focus on a subset of the patent's claims that make up the heart of the invention. For example, the doctrine of contributory infringement sets forth the requirements for holding a party liable for contributing to another's infringement when the party does not directly infringe the patent itself.¹⁶⁵ In other words, contributory infringement only applies to a party that is not directly infringing a patent. Thus, § 271(c) focuses on the "material part of an invention."¹⁶⁶ This is the only sensible way to impose liability for contributory infringement.

Indeed, rejecting the heart of the invention in contributory infringement would lead to undesirable results. Such a rejection could take one of two basic forms. First, the law could discard this consideration entirely and impose no liability for supplying a part of an invention, no matter how important, thereby making the heart of the invention analysis unnecessary. Under this hypothetical rule, a manufacturer supplying a microprocessor to a computer manufacturer could not be held liable for contributing to the infringement of the computer patent requiring a microprocessor with specialized algorithms. In essence, this was the rule from the *Mercoïd* decisions, which were overruled by § 271(c).¹⁶⁷ This rule is consistent with *Aro's* commandment, but it would have allowed parties an easy way to escape infringement. They could supply all but one very insignificant part of an invention, allowing their

prior art are such that the *subject matter as a whole* would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. . . .

35 U.S.C. § 103(a) (2006) (emphasis added).

¹⁶⁵ See *supra* notes 37–43 and accompanying text.

¹⁶⁶ See 35 U.S.C. § 271(c) ("Whoever offers to sell or sells within the United States or imports into the United States a component of a patented machine, manufacture, combination or composition, or a material or apparatus for use in practicing a patented process, *constituting a material part of the invention*, knowing the same to be especially made or especially adapted for use in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial noninfringing use, shall be liable as a contributory infringer." (emphasis added)).

¹⁶⁷ See *supra* Part II.C.

customers to complete the invention.¹⁶⁸ Alternatively, the law could say that contributory infringement exists whenever a party supplies *any* part of the patented invention. This rule also does not require examining the heart of the invention. However, it would impose liability on those that provide very basic components, or to use the language of § 271, staples of commerce.¹⁶⁹

Instead, § 271(c) only imposes liability on those that supply a “material part of the invention” knowing that it will be used to infringe the patent.¹⁷⁰ By considering the heart of the invention, § 271 narrowly focuses liability on those parties that actually bear responsibility for third party infringement. Since this analysis does not evaluate whether something falls within a patent’s boundaries, contributory infringement represents an entirely appropriate treatment of the heart of the invention.

Inequitable conduct is another doctrine that does not ask whether something—in this case, the prior art—falls within the boundaries protected by the patent. Rather, in assessing whether a patentee failed to disclose material prior art during the prosecution of its application, inequitable conduct sensibly focuses on the “point of novelty.”¹⁷¹ This is just another pseudonym for the heart of the invention. The fact that patent law examines the point of novelty when determining materiality is not controversial. Indeed, use of a claim chart analysis (i.e., examining all the elements) would restrict the doctrine to those few cases in which a complete anticipation was suppressed and lead to absurd results. Consider one of the patents involved in *Paice LLC v. Toyota Motor Corp.*¹⁷² U.S. Patent No. 5,343,970 (the “970 patent”) relates to a hybrid

¹⁶⁸ Although a patent holder technically can sue the end customers, it is far easier to sue one supplier than multiple end users. In fact, the Supreme Court recognized this principle in a copyright infringement case. *See Metro-Goldwyn-Mayer Studios, Inc. v. Grokster, Ltd.*, 545 U.S. 913, 929–30 (2005) (recognizing that for practical reasons a plaintiff may need to sue distributors of the “copying device” instead of the direct infringers who downloaded pirated music).

¹⁶⁹ In other words, would those parties that sell monitors be liable for the infringement of every computer patent that happened to recite a monitor?

¹⁷⁰ *See* 35 U.S.C. § 271(c).

¹⁷¹ *See supra* notes 44–46 and accompanying text.

¹⁷² 504 F.3d 1293 (Fed. Cir. 2007). The issue of inequitable conduct was not at issue in this case. This decision was merely selected to provide an example of an actual patent.

electric vehicle.¹⁷³ In traditional vehicles, an internal combustion engine transfers power to the wheels.¹⁷⁴ One of the technical issues in a hybrid vehicle is how to control the relative contributions of both the internal combustion engine and the electric motor.¹⁷⁵

The '970 patent disclosed a “controllable torque transfer unit” that accepts torque from both sources.¹⁷⁶ However, the claims include other elements such as a battery that supplies and stores electric energy.¹⁷⁷ Of course, suitable batteries are well known in the prior art and the Patent Office would not expect the patentee to disclose all prior art related to rechargeable batteries. However, the patentee probably was under a duty to disclose any prior art that described controllable torque transfer units that accepted energy from two different sources. Again, the critical distinction between these two examples is whether the undisclosed prior art goes to the heart of the invention, and in this case, undisclosed prior art relating to the controllable torque transfer units does go to the heart of the invention. This example shows why inequitable conduct does and should consider the heart of the invention.

Finally, the doctrine of joint inventorship does not attempt to evaluate whether a product or process falls within the boundaries outlined by a patent, and therefore, it also makes sense for this doctrine to consider the “heart of the invention.” *Hess v. Advanced Cardiovascular Systems, Inc.*¹⁷⁸ illustrates this point. In *Hess*, an engineer brought an action against a patentee seeking to be named as a co-inventor of a patent covering a balloon angioplasty catheter.¹⁷⁹ The named inventors were doctors and “[t]hey explained to the [plaintiff] what they were trying to do, and what difficulties they encountered.”¹⁸⁰ The plaintiff was an engineer unfamiliar with angioplasty catheterization.¹⁸¹ He “recommended

¹⁷³ See *id.* at 1296.

¹⁷⁴ See *id.*

¹⁷⁵ See *id.*

¹⁷⁶ *Id.*

¹⁷⁷ See *id.* at 1298.

¹⁷⁸ 106 F.3d 976 (Fed. Cir. 1997).

¹⁷⁹ *Id.* at 977.

¹⁸⁰ *Id.* at 980.

¹⁸¹ *Id.*

a . . . product that he believed would be suitable for making a balloon, showed [the inventors] how a balloon could be formed by heating both ends of the tube . . . , and made other suggestions for making the catheter, using [specific] tubing.”¹⁸² Despite the engineer’s contributions, the Federal Circuit said that the lower court had “justifiably concluded . . . that it was [the doctors], and not [the plaintiff], who actually conceived and made the patented invention and that [the plaintiff’s] contributions to the inventions did not constitute the conception necessary to establish co-inventorship.”¹⁸³ The engineer was not an inventor because his contributions were not related to the heart of the invention.

In sum, an examination of different patent law doctrines reveals that there are sound reasons to both consider and reject an inquiry as to the “heart of the invention.” If the doctrine at issue needs to determine whether a product or process falls within the boundaries protected by a patent, the “heart of the invention” should not be considered. Rather, the “all elements” rule should apply. However, there are many doctrines that do not entail that inquiry. In those cases, the particular aims of the doctrine may call for considering the “heart of the invention.”

B. *Developing Doctrines*

The analytical framework discussed above can provide some insights into several of the ongoing debates in patent law. Subject matter patentability, damages determinations, the written description requirement, and enablement have all recently discussed whether the “central concept,” “essential elements,” or “novel aspect” of the invention should play an important role in their respective doctrines.

In 2008, the Federal Circuit addressed the issue of patentable subject matter in *In re Bilski*.¹⁸⁴ The applicants sought a patent on a method of hedging risk in trading commodities and commodity options.¹⁸⁵ The claims were not specifically tied to any computer

¹⁸² *Id.*

¹⁸³ *Id.* at 980–81.

¹⁸⁴ 545 F.3d 943 (Fed. Cir. 2008) (en banc), *aff’d sub nom.* *Bilski v. Kappos*, 130 S. Ct. 3218 (2010).

¹⁸⁵ *Id.* at 949.

or other device and did not result in a tangible product.¹⁸⁶ The Federal Circuit found that the claims of the application did not cover patentable subject matter.¹⁸⁷ In arriving at this decision, the opinion set out a new test requiring a claimed “process” under 35 U.S.C. § 101 to be either: (1) tied to a particular machine or apparatus, or (2) transform a particular article into a different state or thing.¹⁸⁸ More recently, the Supreme Court found that while the so called “machine-or-transformation” test is “a useful and important clue, an investigative tool, for determining whether some claimed inventions are processes under § 101 . . . [it] is not the sole test for deciding whether an invention is a patent-eligible ‘process.’”¹⁸⁹

Regardless of the primacy of the machine-or-transformation test, it is a test that considers the heart of the invention. In the Federal Circuit decision, Judge Michel’s plurality opinion did not refer to the heart of the invention, but used other language that describes the same concept. First, the *Bilski* decision stated that “even if a claim recites a specific machine or particular transformation of a specific article, the recited machine or transformation must not constitute mere ‘insignificant postsolution activity.’”¹⁹⁰ Thus, adding a data-gathering step to an algorithm

¹⁸⁶ *See id.* Claim 1 said:

A method for managing the consumption risk costs of a commodity sold by a commodity provider at a fixed price comprising the steps of: (a) initiating a series of transactions between said commodity provider and consumers of said commodity wherein said consumers purchase said commodity at a fixed rate based upon historical averages, said fixed rate corresponding to a risk position of said consumer; (b) identifying market participants for said commodity having a counter-risk position to said consumers; and (c) initiating a series of transactions between said commodity provider and said market participants at a second fixed rate such that said series of market participant transactions balances the risk position of said series of consumer transactions.

Id.

¹⁸⁷ *Id.* at 966.

¹⁸⁸ *Id.* at 961; *see also id.* at 960 (reaffirming “that the machine-or-transformation test outlined by the Supreme Court is the proper test to apply”).

¹⁸⁹ *Bilski v. Kappos*, 130 S. Ct. 3218, 3227 (2010).

¹⁹⁰ *Bilski*, 545 F.3d at 957.

does not make the algorithm patentable.¹⁹¹ Second, the decision said that the “transformation must be central to the purpose of the claimed process.”¹⁹² The terms “insignificant postsolution activity” and “central to the purpose” both require identifying the heart of the invention. Thus, under *Bilski*, the limitations which form the heart of the invention must be identified, and then the machine/transformation test is applied to those specific limitations.

The relationship between the language used by Judge Michel and *Aro* did not go unnoticed. Judge Newman’s dissent complained that the concepts mentioned above “raise new conflicts with precedent.”¹⁹³ The dissent went on to recite *Aro*’s commandment and list a number of cases that followed *Aro*.¹⁹⁴ Judge Newman was concerned that it was too difficult to identify process components for the “centrality” and “significance” of their “extra-solution activity.”¹⁹⁵ Thus, Judge Newman argued that the test announced by *Bilski* would not provide a reliable standard. In reviewing the Federal Circuit’s decision, the Supreme Court had the opportunity to comment on the impact that *Aro* might have on the machine-or-transformation test. It did not do so. This silence can be interpreted in two ways. The most likely explanation is that the Court simply overlooked how the machine-or-transformation may be inconsistent with *Aro*.¹⁹⁶ Alternatively, by characterizing

¹⁹¹ See *id.* at 963 (citing *In re Grams*, 888 F.2d 835, 840 (Fed. Cir. 1989); *In re Meyer*, 688 F.2d 789, 794 (C.C.P.A. 1982)).

¹⁹² *Id.* at 962.

¹⁹³ *Id.* at 994 (Newman, J., dissenting).

¹⁹⁴ *Id.* (“This court and the Supreme Court have stated that ‘there is no legally recognizable or protected ‘essential’ element, ‘gist’ or ‘heart’ of the invention in a combination patent.’ This rule applies with equal force to process patents, and is in accord with the rule that the invention must be considered as a whole, rather than ‘dissected,’ in assessing its patent eligibility under Section 101.” (internal citations omitted) (citing *Diamond v. Diehr*, 450 U.S. 175, 188 (1981); *Allen Eng’g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1345 (Fed. Cir. 2002); *W.L. Gore & Assocs. v. Garlock, Inc.*, 721 F.2d 1540, 1548 (Fed. Cir. 1983))).

¹⁹⁵ *Id.* (“It is difficult to predict an adjudicator’s view of the ‘invention as a whole,’ now that patent examiners and judges are instructed to weigh the different process components for their ‘centrality’ and the ‘significance’ of their ‘extra-solution activity’ in a Section 101 inquiry.”).

¹⁹⁶ A review of *Bilski v. Kappos* shows that *Aro* is never mentioned by any of the opinions.

the test as a useful tool,¹⁹⁷ the Supreme Court may have implicitly found that *Aro* did not invalidate its use. In either case, the machine-or-transformation is clearly part of patent law despite the fact that it considers the heart of the invention.

The framework set forth in this Article suggests that the current state of affairs is acceptable. The issue of patentable subject matter does not try to assess whether some process falls within a patent's boundaries. Rather, it asks whether the subject matter of the claim is of the type that can be patented. Therefore, Judge Newman's reliance on *Aro* and its progeny is misplaced. There is no reason to reject the "heart of the invention" and apply the "all elements" rule. Indeed, focusing on the "heart of the invention" when determining patentability is quite rational. To blindly assume that all the limitations are equal would allow clever applicants to add superfluous limitations to render an otherwise unpatentable idea patentable. For example, having a computer print data limitation does not mean that an invention suddenly passes the machine-or-transformation test when the printing step has nothing to do with the central concept of the invention. Thus, this Article recommends that the courts decline to rely on *Aro* as the law of patentable subject matter develops.¹⁹⁸

There is also currently a question of whether a claim can omit an essential element of the invention and still satisfy the written description requirement.¹⁹⁹ In *Gentry Gallery, Inc. v. Berkline Corp.*,²⁰⁰ the Federal Circuit found that amended claims omitting an element essential to the invention were invalid for failing to satisfy the written description requirement.²⁰¹ Commentators have

¹⁹⁷ *Bilski v. Kappos*, 130 S. Ct. 3218, 3227 (2010).

¹⁹⁸ Of course, this should not be interpreted as an endorsement of *Bilski*'s machine/transformation test. That is beyond the scope of this Article.

¹⁹⁹ This issue should not be confused with the question of whether the written description provides adequate support for the claims. *See supra* notes 33–35 and accompanying text. That issue was whether the *specification* included sufficient disclosure of the claimed invention. Here, the issue is whether the *claims* omit essential elements of the invention.

²⁰⁰ 134 F.3d 1473 (Fed. Cir. 1998).

²⁰¹ *Id.* at 1474; *see also* Matthew L. Goska, *Of Omitted Elements and Overreaching Inventions: The Principle of Gentry Gallery Should Not Be Discarded*, 29 AIPLA Q.J. 471, 477 (2001) ("The Federal Circuit reversed because it was clear to the court that the inventor considered the location of the recliner controls on the console to be an essential

called this the “omitted element” or “essential element” test.²⁰² Soon thereafter, the Federal Circuit stated that *Gentry Gallery* did not create an “essential element” test.²⁰³ Instead, the Federal Circuit characterized *Gentry Gallery* as merely holding that “claims in an application which are broader than the applicant’s disclosure are not allowable.”²⁰⁴ However, more recently in *ICU Medical, Inc. v. Alaris Medical Systems, Inc.*,²⁰⁵ the Federal Circuit appeared to apply the “essential element” test (without using that label or referring to *Gentry Gallery*). The technology at issue involved medical valves used in the transmission of fluids to or from a medical patient.²⁰⁶ The specification described a spike that was used to pierce a seal inside the valve.²⁰⁷ The defendant successfully argued that the “spikeless” claims were invalid for lack of a written description under 35 U.S.C. § 112 because the specification limited the invention to valves with a spike.²⁰⁸ The Federal Circuit agreed, stating that “based on the disclosure a person of ordinary skill in the art would not understand the inventor . . . to have invented a spikeless medical valve.”²⁰⁹ In other words, the spikes were an essential part of the invention.

element of the invention. Therefore, by amending the claims during prosecution to eliminate this essential element, the patent applicant improperly broadened the claims beyond the original supporting disclosure. In other words, there was no written description in the specification that taught or suggested moving the controls to places other than the console. The broadened claims were thus held invalid for lack of written description.” (footnotes omitted)).

²⁰² See Goska, *supra* note 201, at 473; *The Essential Element Test and ICU Medical*, PATENTLY-O (Mar. 18, 2009, 12:18 PM), <http://www.patentlyo.com/patent/2009/03/the-omitted-element-test-and-icu-medical.html> [hereinafter *The Essential Element Test*].

²⁰³ *Cooper Cameron Corp. v. Kvaerner Oilfield Prods., Inc.*, 291 F.3d 1317, 1323 (Fed. Cir. 2002) (“[W]e did not announce a new ‘essential element’ test mandating an inquiry into what an inventor considers to be essential to his invention and requiring that the claims incorporate those elements.”).

²⁰⁴ *Reiffin v. Microsoft Corp.*, 214 F.3d 1342, 1348 (Fed. Cir. 2000) (Newman, J., concurring) (quoting *Application of Sus*, 134 U.S.P.Q. 301, 310 (C.C.P.A. 1962)); *see also Johnson Worldwide Assocs. v. Zebco Corp.*, 175 F.3d 985, 993 (Fed. Cir. 1999) (holding that the court’s determination in *Gentry Gallery* was “premised on clear statements in the written description that described the location of a claim element”).

²⁰⁵ 558 F.3d 1368 (Fed. Cir. 2009).

²⁰⁶ *Id.* at 1372.

²⁰⁷ *Id.* at 1374–75.

²⁰⁸ *Id.* at 1377.

²⁰⁹ *Id.* at 1378.

Thus, Dennis Crouch has questioned whether *ICU Medical* revives the “essential elements” test.²¹⁰

Despite the “essential element” test’s possible resurgence, Matthew Goska suggested that one reason this test may not survive is because it “contradicts prior case law [*Aro*] rejecting the idea of a ‘gist’ of the invention.”²¹¹ Since the issue does not hinge upon whether a particular item falls within the boundaries of a patented invention, *Aro* should not stand in the way of the “essential element” test. This does not mean that the analysis found in this Article endorses the “essential elements” test here. It simply means that the previous conventional wisdom about the heart of the invention should not muddle our thinking on this topic.

Similarly, in the context of patent reform,²¹² one of the hotly contested issues is damages,²¹³ and one of the suggested reforms is focusing on the essential elements of the invention to determine patent damages.²¹⁴ The proponents of this reform argue that damages calculations should be based on the contribution that the patented invention provides over the prior art.²¹⁵ Since the issue has nothing to do with whether a particular item falls within the boundaries of a patented invention, this Article suggests that opponents of this proposal who would mechanically rely on *Aro*

²¹⁰ See *The Essential Element Test*, *supra* note 202 (comparing the analysis in *ICU Medical* and *Gentry Gallery*).

²¹¹ Goska, *supra* note 201, at 497–98; see also *id.* at 500 (“The Supreme Court previously held: ‘There is no legally recognizable or protected essential element, gist, or heart of the invention in a combination patent.’” (quoting *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 345 (1961))).

²¹² In 2009, there was proposed legislation regarding patent reform in both the House and Senate. See, e.g., Patent Reform Act of 2009, S. 515, 111th Cong. (2009); Patent Reform Act of 2009, H.R. 1260, 111th Cong. (2009). A similar bill was introduced in the Senate in 2010. See *Patent Reform Act of 2010: An Overview*, PATENTLY-O (Mar. 8, 2010, 2:50 PM), <http://www.patentlyo.com/patent/2010/03/patent-reform-act-of-2010-an-overview.html>.

²¹³ See *Patent Reform Act of 2009*, PATENTLY-O (Mar. 3, 2009, 2:58 PM), <http://www.patentlyo.com/patent/2009/03/patent-reform-act-of-2009.html> [hereinafter *Patent Reform Act of 2009*].

²¹⁴ IBM, TOWARDS AN EFFICIENT MARKET FOR INNOVATION 4–5 (2009), <http://www.ftc.gov/bc/workshops/ipmarketplace/feb11/docs/munderweiser.pdf> (suggesting that looking at the “essential elements” of a patent “will focus the damages determination on the value of what the inventor actually invented”).

²¹⁵ See *Patent Reform Act of 2009*, *supra* note 213.

are avoiding the real issues. Again, this is not an endorsement of the “essential elements” proposal. It simply means that the debate should focus on other more important issues and not be stopped by a reflexive invocation of dogma.

Finally, in the context of enablement, the Federal Circuit has recently relied on the “novel aspect of [the] invention” to show lack of enablement.²¹⁶ Patents are required to “enable” a person of ordinary skill in the art to practice the claimed invention.²¹⁷ Even though a patentee is generally allowed to rely on the knowledge of a person of ordinary skill in the art, in *Automotive Technologies International, Inc. v. BMW of North America, Inc.*,²¹⁸ the court said that a “novel aspect of an invention must be enabled by the patent.”²¹⁹ Since enablement has nothing to do with whether a particular item falls within the boundaries of a patented invention, this Article suggests that the “all elements” rule does not apply and considering the heart of the invention is permissible.²²⁰

In sum, Part III has demonstrated four points. First, it explains how the “all elements” rule differs from the heart of the invention. Second, it uses infringement, anticipation, obviousness, and written description analyses to show that applying the “all elements” rule makes sense in certain contexts. Third, it uses contributory infringement, inequitable conduct, and joint inventorship analyses to demonstrate that considering the heart of the invention makes sense in other contexts. Finally, this Article explains that determining whether to apply one doctrine or the

²¹⁶ See *Auto. Techs. Int’l, Inc. v. BMW of N. Am., Inc.*, 501 F.3d 1274, 1283 (Fed. Cir. 2007).

²¹⁷ The statutory basis of the enablement requirement is found in § 112, which states that the specification shall describe “the manner and process of making and using [the invention], in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the [invention].” 35 U.S.C. § 112 (2006).

²¹⁸ 501 F.3d 1274 (Fed. Cir. 2007).

²¹⁹ *Id.* at 1283.

²²⁰ However, there may be other reasons against considering the heart of the invention. In the case of enablement, the author has previously criticized the *Automotive Technologies* decision for its reliance on the heart of the invention based on particular goals of the enablement doctrine. See Bernard Chao, *Rethinking Enablement in the Predictable Arts: Fully Scoping the New Rule*, 2009 STAN. TECH. L. REV. 3, ¶¶ 64–68, <http://stlr.stanford.edu/pdf/chao-rethinking-enablement.pdf>.

other depends on the nature and context of the question being asked. If the question is whether something falls within the boundaries protected by a patent, the “all elements” rule should apply. However, there are many doctrines that ask different questions. In those cases, courts should be free to consider the heart of the invention as appropriate. Two other important examples are the doctrine of repair and reconstruction discussed in Part I, and the doctrine of patent exhaustion discussed in Part IV.

IV. RESUSCITATING THE HEART OF THE INVENTION

Patent exhaustion limits the patent rights that survive the initial authorized sale of a patented item.²²¹ The question that arose in *Quanta* was whether exhaustion should only apply to the sale of the entire patented invention or should also apply to the sale of components that had to be combined with other components in order to practice the patented methods.²²² In other words, should exhaustion apply to the sale of components that correspond to the heart of the invention.

A. *The Facts of Quanta*

The plaintiff, LG Electronics, Inc. (“LGE”) had purchased three patents.²²³ The three patents claimed specific technology for managing different components found in a computer.²²⁴ LGE sued Quanta Computer, Inc. (“Quanta”) for infringing the three LGE

²²¹ *Quanta Computer, Inc. v. LG Elecs., Inc.*, 128 S. Ct. 2109, 2115 (2008) (“The longstanding doctrine of patent exhaustion provides that the initial authorized sale of a patented item terminates all patent rights to that item.”).

²²² *Id.* at 2113.

²²³ *Id.* LGE’s three patents were U.S. Patent No. 4,939,641 (“the ’641 patent”), U.S. Patent No. 5,379,379 (“the ’379 patent”), and U.S. Patent No. 5,077,733 (“the ’733 patent”). *Id.*

²²⁴ *See id.* The ’641 patent “discloses a system for ensuring that the most current data are retrieved from main memory by monitoring data requests and updating main memory from the cache when stale data are requested.” *Id.* The ’379 patent discloses an efficient method of organizing read and write requests while maintaining accuracy by allowing the computer to execute only read requests until it needs data for which there is an outstanding write request. *See id.* “The ’733 patent addresses the problem of managing the data traffic on a bus connecting two computer components, so that no one device monopolizes the bus.” *See id.* at 2113–14.

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patents.²²⁵ Quanta was a group of companies that “manufactured computers using Intel parts in combination with non-Intel memory and buses in ways that practice the LGE patents.”²²⁶

In response to LGE’s complaint, Quanta raised the defense of patent exhaustion.²²⁷ Quanta pointed to a license that LGE had already granted Intel.²²⁸ The license permitted Intel to manufacture and sell microprocessors and chipsets that use the LGE patents.²²⁹ However, the license stated that

no license “is granted by either party hereto . . . to any third party for the combination by a third party of Licensed Products of either party with items, components, or the like acquired . . . from sources other than a party hereto, or for the use, import, offer for sale or sale of such combination.”²³⁰

In two separate decisions, the district court granted summary judgment to Quanta, finding that exhaustion applied to some but not all of the patents’ claims.²³¹ The district court reasoned that “although the Intel products do not fully practice any of the patents at issue, they have no reasonable non-infringing use and therefore their authorized sale exhausted [LGE’s] patent rights.”²³² However, the court found that exhaustion only applied “to apparatus or composition-of-matter claims that describe a physical object,” not to process or method claims that describe how to make or use a product.²³³ As a practical matter, this was a victory for LGE because a patent is infringed so long as any of its claims are infringed.

²²⁵ *Id.* at 2114.

²²⁶ *Id.*

²²⁷ *Id.* at 2114–15.

²²⁸ *Id.*

²²⁹ *Id.* at 2114.

²³⁰ *Id.* (quoting Brief for Petitioners at 8, *Quanta*, 128 S. Ct. 2109 (2008) (No. 06-937)) (internal quotation marks omitted).

²³¹ *See id.* at 2114–15.

²³² *Id.* at 2115 (citing *LG Elecs., Inc. v. Asustek Computer, Inc.*, 65 U.S.P.Q.2d 1589, 1598–1600 (N.D. Cal. 2002)).

²³³ *Id.* (citing *LG Elecs., Inc. v. Asustek Computer, Inc.*, 248 F. Supp. 2d 912, 918 (N.D. Cal. 2003)).

The case was appealed. The Federal Circuit Court of Appeals agreed with the district court and found that exhaustion did not apply to method claims.²³⁴ However, the Federal Circuit disagreed with the district court's application of exhaustion. The Federal Circuit held that exhaustion did not apply because the court did not interpret the license to grant Intel the right to sell its products "to Quanta for use in combination with non-Intel products."²³⁵ The Federal Circuit reasoned that since there was no authorized sale, exhaustion could not apply.²³⁶ Quanta appealed this decision to the Supreme Court.²³⁷

B. The Supreme Court's Analysis

In an opinion authored by Justice Thomas, the Supreme Court unanimously reversed the Federal Circuit and found that all of LGE's patent rights had been exhausted by LGE's license to Intel.²³⁸ After describing the historical roots of patent exhaustion,²³⁹ the Supreme Court's analysis was laid out in three sections. First, based on both precedent and policy, the Supreme Court held that exhaustion applied to method claims.²⁴⁰ Second, the Supreme Court determined that Intel's components substantially embodied the LGE patents to trigger exhaustion.²⁴¹

²³⁴ *Id.* (citing *LG Elecs., Inc. v. Bizcom Elecs., Inc.*, 453 F.3d 1364, 1370 (Fed. Cir. 2006)).

²³⁵ *Id.* (citing *LG Elecs.*, 453 F.3d at 1370).

²³⁶ *LG Elecs.*, 453 F.3d at 1370.

²³⁷ *Quanta*, 128 S. Ct. at 2115.

²³⁸ *See id.* at 2122.

²³⁹ *See id.* at 2115–17.

²⁴⁰ *See id.* at 2117–18. The Court reasoned that "[e]liminating exhaustion for method patents would seriously undermine the exhaustion doctrine. Patentees seeking to avoid patent exhaustion could simply draft their patent claims to describe a method rather than an apparatus." *Id.* at 2117. "By characterizing their claims as method instead of apparatus claims, or including a method claim for the machine's patented method of performing its task, a patent drafter could shield practically any patented item from exhaustion." *Id.* at 2118.

²⁴¹ *See id.* at 2118–21. The Court held that the Intel Products constitute a material part of the patented invention and all but completely practice the patent. Here . . . the incomplete article substantially embodies the patent because the only step necessary to practice the patent is the application of common processes or the addition of standard parts. Everything inventive about each patent is embodied in the Intel Products.

Finally, the Court analyzed the license to Intel and determined that there was an authorized sale to Quanta of licensed Intel components that triggered exhaustion.²⁴²

This Article is only concerned with the second section because it assesses whether patent exhaustion can be triggered by the sale of an item that does not satisfy all the limitations of the claimed invention.²⁴³ In resolving the issue, *Quanta* drew heavily on the last Supreme Court decision that addressed exhaustion, *United States v. Univis Lens Co.*²⁴⁴

In the *Univis* case, Univis Corporation (the “Corporation”) owned patents on a particular type of eyeglass lens.²⁴⁵ It licensed a related company, the Univis Lens Company, to manufacture and sell lens blanks.²⁴⁶ In addition, the Corporation issued three other types of licenses.²⁴⁷ The license to wholesalers authorized the licensees to purchase the blanks, and finish them by grinding and polishing.²⁴⁸ The license to finishing retailers allowed the licensees to purchase blanks, finish them, and sell them to their customers at prices set by the Corporation.²⁴⁹ The license to prescription retailers granted them a license to buy and resell finished lenses at a fixed price.²⁵⁰

The United States sued Univis for violations of the Sherman Antitrust Act alleging unlawful restraints on trade.²⁵¹ In response, Univis asserted its patent monopoly rights as a defense to the antitrust suit.²⁵² Even though the Univis patents were only

Id. at 2120.

²⁴² *Id.* at 2121–22. “Because Intel was authorized to sell its products to Quanta, the doctrine of patent exhaustion prevents LGE from further asserting its patent rights with respect to the patents substantially embodied by those products.” *Id.* at 2122.

²⁴³ *See id.* at 2118–21.

²⁴⁴ 316 U.S. 241 (1942); *see also Quanta*, 128 S. Ct. at 2118–20 (discussing the *Univis* case).

²⁴⁵ *Univis*, 316 U.S. at 243.

²⁴⁶ *Id.*

²⁴⁷ *Id.* at 244. The three licenses are to wholesalers, finishing retailers, and prescription retailers. *Id.*

²⁴⁸ *Id.*

²⁴⁹ *See id.*

²⁵⁰ *See id.* at 245.

²⁵¹ *Id.* at 242–43.

²⁵² *See id.* at 243.

practiced in part by the wholesalers and finishing retailers who ground the blanks into lenses, the Supreme Court found that the sale of the lens blanks exhausted the patent on the finished lens because the lens blanks “embod[y] essential features” of the patented invention and were destined to be “finished” in “conformity to the patent.”²⁵³ As a result, the Supreme Court affirmed an injunction suppressing the license contracts and licensing system.²⁵⁴

In *Quanta*, the Supreme Court considered “the extent to which a product must embody a patent in order to trigger exhaustion.”²⁵⁵ The Court noted that in *Univis*, patent rights had been exhausted by the sale of an incomplete article.²⁵⁶ By “incomplete,” the Supreme Court meant that the article satisfied some (but not all) of the limitations of the patented invention.²⁵⁷ Thus, the Court interpreted *Univis* to mean that the sale of an article that contained a subset of the patent’s claims limitations could trigger patent exhaustion.

The only question was how to determine when an “incomplete article” sufficiently embodied a patent to trigger exhaustion. The *Quanta* decision relied on two factors. First, the Supreme Court said that “*Univis* held that ‘the authorized sale of an article which is capable of use only in practicing the patent is a relinquishment

²⁵³ *Id.* at 250–51. The Court held that

[w]here one has sold an uncompleted article which, because it embodies essential features of his patented invention, is within the protection of his patent, and has destined the article to be finished by the purchaser in conformity to the patent, he has sold his invention so far as it is or may be embodied in that particular article. The reward he was demanded and received is for the article and the invention which it embodies and which his vendee is to practice upon it. He has thus parted with his right to assert the patent monopoly with respect to it and is no longer free to control the price at which it may be sold either in its unfinished or finished form.

Id.

²⁵⁴ *Id.* at 254.

²⁵⁵ *Quanta Computer, Inc. v. LG Elecs., Inc.*, 128 S. Ct. 2109, 2118 (2008).

²⁵⁶ *See id.* at 2119 (“The lens blanks in *Univis* . . . were ‘without utility until [they were] ground and polished as the finished lens of the patent.’” (alteration in original) (citing *Univis*, 316 U.S. at 249)).

²⁵⁷ *See id.* at 2120.

of the patent monopoly with respect to the article sold.”²⁵⁸ Second, the Court pointed out that the “lens blank in *Univis* embodie[d] *essential features* of [the] patented invention.”²⁵⁹ The Supreme Court explained how the Intel components satisfied both these criteria²⁶⁰ and concluded that they embodied the patents.²⁶¹

Determining whether an incomplete article “embodies” a patent is yet another way of asking if the article goes to the heart of the invention. Thus, under *Quanta*, considering the heart of the invention is critical to the doctrine of patent exhaustion. This result is entirely consistent with the framework discussed in Part III of this Article.

The doctrine of exhaustion does not ask if some item falls within the boundaries defined by a patent. As a result, it should not apply the “all elements” rule. Rather, patent exhaustion can be thought of in the same vein as contributory infringement. For contributory infringement, the question is whether someone can avoid being charged with infringement by omitting a minor limitation when selling a product. To prevent this tactic, § 271(c) must apply the doctrine of contributory infringement to parties that sell the heart of the invention. Similarly for exhaustion, the question is whether companies can avoid the impact of the exhaustion doctrine by omitting a minor limitation when selling the product.²⁶² To avoid this tactic, the *Quanta* Court properly found that exhaustion applied to the sale of products that comprise the essential features (i.e., the heart) of the invention.²⁶³

²⁵⁸ *Id.* at 2119 (citing *Univis*, 316 U.S. at 249).

²⁵⁹ *Id.* (alteration in original) (emphasis added) (citing *Univis*, 316 U.S. at 250–51).

²⁶⁰ *See id.* at 2120–21 (noting that “[l]ike the *Univis* lens blanks, the Intel Products constitute a material part of the patented invention and all but completely practice the patent” and “[e]verything inventive about each patent is embodied in the Intel Products”).

²⁶¹ *Id.* at 2121.

²⁶² *See id.* at 2118 (“*Quanta* . . . argues that exhaustion doctrine will be a dead letter unless it is triggered by the sale of components that essentially, even if not completely, embody an invention.”).

²⁶³ *See id.* at 2122 (“The authorized sale of an article that substantially embodies a patent exhausts the patent holder’s rights and prevents the patent holder from invoking patent law to control postsale use of the article.”).

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BREAKING ARO'S COMMANDMENT

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C. Aro v. Quanta

Quanta's decision to look at the “essential features” of an invention in the context of patent exhaustion seems to be inconsistent with *Aro*. However, the Supreme Court chose not to address this tension directly. As might be expected, LGE relied on *Aro* to argue that exhaustion should not apply to the sale of products that form only part of a patented invention.²⁶⁴ LGE argued that

Univis does not apply because the Intel Products are analogous to individual elements of a combination patent, and allowing sale of those components to exhaust the patent would impermissibly “ascrib[e] to one element of the patented combination the status of the patented invention in itself.”²⁶⁵

The Supreme Court rejected that argument on two grounds. First, the Court said that *Aro* was only concerned with whether the replacement of a part of a patented combination constituted infringement.²⁶⁶ Since the “replacement question” was not at issue in *Quanta*, the Court implied (but did not say) that *Aro* was not applicable.²⁶⁷ Second, the Supreme Court said that “*Aro's* warning that no element can be viewed as central to or equivalent to the invention is specific to the context in which the combination itself is the only inventive aspect of the patent.”²⁶⁸ However, this passage shows that the Court does not fully appreciate the significance of *Aro*. *Aro* was not simply recognizing that some patents may not have an identifiable heart, like the Post-it note discussed earlier. *Aro* said that the unpatented part of a combination patent was not entitled to any protection regardless of

²⁶⁴ See *id.* at 2118–19.

²⁶⁵ *Id.* (alteration in original) (quoting *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 344–45 (1961)).

²⁶⁶ *Id.* at 2121.

²⁶⁷ *Id.*

²⁶⁸ *Id.* The Supreme Court characterized this argument as “more important.” *Id.* (“[M]ore importantly, *Aro* is not squarely applicable to the exhaustion of patents like the LGE Patents that do not disclose a new combination of existing parts. *Aro* described combination patents as ‘cover[ing] only the totality of the elements in the claim [so] that no element, separately viewed, is within the grant.’” (alteration in original) (quoting *Aro*, 365 U.S. at 344)).

how “worthy” or “essential” the part was to the invention²⁶⁹—that is, even if one part did contain the inventive aspect of the patent.

By relying on these distinctions, the Supreme Court did not have to discuss what role the heart of the invention should play in patent law generally. Nor did it mention the numerous cases that dogmatically repeat *Aro*’s commandment. Nonetheless, *Quanta* can arguably be interpreted to limit *Aro* to the “replacement question” and thus strike at the foundation of those cases that rely on *Aro* outside the doctrine of repair and reconstruction. After *Quanta*, the heart of the invention is considered in the context of exhaustion. At the same time, *Aro* prevents it from being considered under the doctrine of repair and reconstruction. But now, *Aro*’s commandment does not preside over all of patent law. Although *Quanta* did not overrule those cases that relied on *Aro* in other doctrines, by limiting *Aro*, the Supreme Court wiped the slate clean. The Federal Circuit is now free to explicitly acknowledge that patent law recognizes the heart of the invention and look to that factor in the appropriate contexts. Part III of this Article explained how that choice should be made.

Of course this is not a totally satisfactory situation. The Supreme Court should eventually resolve the tension between *Aro* and *Quanta*. Why does the heart of the invention play an important role in patent exhaustion, when it is not even “legally recognize[ed]”²⁷⁰ for the purposes of repair and reconstruction? And more fundamentally, should it? The answer is it should not play a different role. For the reasons discussed in Part II, the heart of the invention should be considered in the context of repair and reconstruction. In view of *Quanta*, the time is ripe for the Supreme Court to overrule that part of *Aro* as well.

²⁶⁹ *Aro*, 365 U.S. at 340 (“The fact that an unpatented part of a combination patent may distinguish the invention does not draw to it the privileges of a patent. That may be done only in the manner provided by law. However worthy it may be, however essential to the patent, an unpatented part of a combination patent is no more entitled to monopolistic protection than any other unpatented device.” (quoting *Mercoid II*, 320 U.S. 680, 684 (1944))); see *supra* text accompanying note 136.

²⁷⁰ See *supra* text accompanying note 2.

D. Addressing Criticisms of *Quanta*

Quanta has its critics. Most notably, Scott Kieff²⁷¹ argues that the Supreme Court has revived a previously discredited doctrine:

During the early 1900s, courts routinely focused on which element of a patent claim was “key” or at the “heart of the invention” to determine questions of contributory infringement, induced infringement, patent misuse, and antitrust. The inquiry was so subjective that it became the plaything of the judiciary, with most courts in the early part of that period routinely ruling in favor of patentees on each issue, while most courts in the later part of the period routinely ruling against patentees. One of the two central motivating factors behind the congressional decision to promulgate the 1952 Patent Act—essentially our present patent statute—was to statutorily jettison this entire line of cases and create an objective framework for determining patent infringement and valid patent licenses.²⁷²

Although Kieff’s description of the motivation underlying the Patent Act of 1952 is *generally* correct, he arrives at the wrong conclusion because he overlooks the specific problems the legislation was intended to correct. Giles Rich,²⁷³ one of the authors of the Patent Act of 1952, explained that section 271 was

²⁷¹ Together Troy Paredes and F. Scott Kieff also filed an amicus brief in the Supreme Court in *Quanta* arguing that exhaustion should not apply to the sale of Intel’s processors. *See generally* Brief of Various Law Professors as Amici Curiae Supporting Respondents, *Quanta*, 128 S. Ct. 2109 (No. 06-937). The primary argument of the brief and Kieff’s article is that the freedom to contract in these cases should take precedence over the freedom from servitudes. *See generally id.*; Kieff, *supra* note 22. It is beyond the scope of this Article to fully address this argument. But the author suggests that Kieff and his colleagues’ argument proves too much. The freedom to contract argument really attacks the entire doctrine of patent exhaustion, not whether exhaustion should apply to parts whose only use is to form part of the patented invention. That discussion needs to be left for another day.

²⁷² Kieff, *supra* note 22, at 321.

²⁷³ Giles Rich later served as a Judge for the Court of Customs and Patent Appeals and the Federal Circuit. *History of the Federal Judiciary*, Rich, Giles Sutherland, FED. JUD. CTR., <http://www.fjc.gov/servlet/nGetInfo?jid=2002&cid=17&ctype=ac&instat=fc> (last visited June 15, 2010).

enacted because “the courts [had] departed from the fundamental principles underlying the patent system” in two waves.²⁷⁴ “[T]he first excess was a period of undue expansion of contributory infringement. The second period of excess . . . was the ever-expanding doctrine of misuse of patents.”²⁷⁵ That second period culminated in the *Mercoïd* decisions which effectively interpreted the doctrine of patent misuse to render contributory infringement “entirely dead.”²⁷⁶ As described in Part II, the Patent Act of 1952 was a repudiation of the *Mercoïd* decisions and thus their underlying rationale—in other words, the refusal to recognize the heart of the invention.²⁷⁷ Contrary to what Kieff argues, the Patent Act of 1952 suggests that courts should focus on the “heart of the invention.”

However, the concern underlying Kieff’s complaint is understandable. It may be difficult to determine when certain components constitute the “essential features” of a patented invention.²⁷⁸ William Rooklidge, the former President of the American Intellectual Property Law Association, and Mansi Shah echo this concern and argue that identifying the “essential elements” is “inherently subjective.”²⁷⁹ They also point out that the *Quanta* decision failed to explain “how to separate the essential from non-essential, what the inventor actually invented from what she did not.”²⁸⁰

²⁷⁴ Rich, *supra* note 38, at 522.

²⁷⁵ *Id.*

²⁷⁶ *Id.* at 535–36.

²⁷⁷ *See supra* Part II.C.

²⁷⁸ *See, e.g., In re Bilski*, 545 F.3d 943, 994 (Fed. Cir. 2008) (Newman, J., dissenting) (suggesting that there is a “delay, uncertainty and cost” associated with determining what is “adequately central, or the significance of process steps” (internal quotation marks omitted)), *aff’d sub nom. Bilski v. Kappos*, 130 S. Ct. 3218 (2010).

²⁷⁹ *See generally* William C. Rooklidge & Mansi H. Shah, *Essential Features of the Invention: Patent Damages Reform Dead End*, INTELL. PROP. TODAY (Mar. 10, 2009), <http://www.iptoday.com/news-article.asp?id=3646&type=ip>.

²⁸⁰ *Id.* (“The *Quanta* Court’s suggestion that essential elements are different from ‘application of common processes’ or ‘the addition of standard parts,’ ‘standard components,’ or ‘common and noninventive’ steps suggests that the essential elements analysis is similar if not identical to prior art subtraction. Not to put to fine a point on the matter, the *Quanta* Court did not set out to identify what the inventor ‘really invented’ and has not identified a standard remotely useful in doing so.” (internal citations omitted)).

In fact, the Supreme Court analyzed a number of different factors to determine that Intel's products were "essential" to the patented invention:

- "[T]he Intel Products constitute a material part of the patented invention and all but completely practice the patent."²⁸¹
- "Everything inventive about each patent is embodied in the Intel Products."²⁸²
- "The Intel Products were specifically designed to function only when memory or buses are attached."²⁸³
- "Quanta was not required to make any creative or inventive decision when it added [memory and buses]."²⁸⁴

A review of these findings shows that the Court is engaged in two distinct types of analysis. By using the terms "material part of the patented invention" and "specifically designed," the first and third statements are applying a kind of contributory infringement analysis.²⁸⁵ The second and fourth statements suggest that the Court is applying a kind of patentability analysis.

The patentability analysis leads to the question of whether the component has to be separately patentable to be essential. This kind of analysis is dangerously complex. On a purely logistical level, the inquiry asks the fact finder to determine whether a hypothetical claim made up of a subset of claim limitations is valid. Of course validity must be judged under both 35 U.S.C. § 102 (anticipation) and § 103 (obviousness). The same question may have to be repeated for various different possible combinations of limitations. That could lead to multiple invalidity presentations. This problem is magnified even further if several claims are at issue. If the "inventiveness" issue is only one factor in the entire "essential elements" calculus, this leads to the very kind of unpredictability that worries the critics. Thus, the *Quanta*

²⁸¹ *Quanta Computer, Inc. v. LG Elecs., Inc.*, 128 S. Ct. 2109, 2120 (2008).

²⁸² *Id.*

²⁸³ *Id.*

²⁸⁴ *Id.*

²⁸⁵ See *supra* note 37 for the text of 35 U.S.C. § 271(c) (2006).

standard has the potential to become the “flock of insignificant standards” that concerned Justice Black in *Aro*.²⁸⁶

The lower courts can lessen this problem by focusing on a contributory infringement analysis to determine whether a component is “essential.”²⁸⁷ This standard is already recognized as a test for determining when the heart of the invention is present.²⁸⁸ Under this analysis, a component of a patented invention would be sufficiently essential to trigger exhaustion if the component: 1) constituted a material part of the invention, 2) was especially made or especially adapted for use in an infringement of the patent, and 3) was not a staple article or commodity of commerce suitable for substantial noninfringing use.²⁸⁹ This is essentially the test for contributory infringement without the intent requirement.²⁹⁰

The benefit of this standard is apparent. It avoids the critics’ complaint by setting forth a straightforward and objective standard. There have been almost fifty years of case law interpreting § 271(c).²⁹¹ Thus, courts should have no trouble applying it to the issue of exhaustion. Moreover, the standard is also firmly rooted in both the *Quanta* and *Univis* decisions. Therefore, the courts can refine the standard in a sensible way now without having to wait for another Supreme Court decision.

CONCLUSION

This Article argues that one of the basic foundations of patent law should fall. For over half a century, courts and commentators have said that there is no heart or gist of the invention in patent

²⁸⁶ See *supra* text accompanying notes 102–05.

²⁸⁷ This is really only a band-aid. Unfortunately, the best solution is probably unrealistic. To create a clear standard, the Supreme Court should revisit *Quanta* and repudiate its discussion of patentability as a factor in determining what are the essential features of the invention.

²⁸⁸ See *supra* notes 37–43 and accompanying text.

²⁸⁹ See *supra* notes 37–43 and accompanying text.

²⁹⁰ The test for contributory infringement has a knowledge requirement. See *supra* note 37.

²⁹¹ Of course, contributory infringement existed prior to the enactment of § 271 in 1952. See generally Rich, *supra* note 38, at 526–30 (referencing early contributory infringement cases).

law. However, by analyzing numerous different patent doctrines, this Article has shown that the conventional wisdom is wrong in many respects. Depending on the label that the particular doctrine uses, the doctrine either relies on or rejects the heart of the invention.

This Article reconciles this apparent inconsistency and provides an analytical framework for determining when it is appropriate to reject the heart of the invention and when it is not. When the question is whether a particular product or process falls within the scope of the patent, the heart of the invention is not an appropriate consideration and the “all elements” rule should be applied. For example, the doctrines of infringement, anticipation, obviousness, and the written description requirement respectively ask if an accused product, the prior art, or an embodiment from the specification falls within the scope of a claim. In those contexts, it is entirely appropriate to examine all the limitations together. However, other doctrines including repair and reconstruction, contributory infringement, inequitable conduct, and joint inventorship ask different questions and sensibly focus on part of the invention. In those cases, courts should be allowed to focus on the heart of the invention.

This analysis has led to several recommendations. First, with respect to the specific doctrine of repair and reconstruction, the Supreme Court should overturn *Aro* and allow courts to consider the heart of the invention in that context.

Second, considering the heart of the invention in the developing areas of patentable subject matter, the “omitted elements” test, and damages is entirely permissible and should depend on the goals of each particular doctrine.

Third, this Article argues that the Supreme Court correctly decided *Quanta*. Like contributory infringement, exhaustion necessarily looks at what elements short of the entire patented invention should trigger particular legal consequences. Consequently, exhaustion properly considers the heart of the invention. However, *Quanta* missed the mark. It used both patentability and contributory infringement principles to assess whether limitations are “essential.” The lower courts should focus

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the analysis on the contributory infringement prong which provides a clearer standard.

In sum, the Supreme Court went too far when it issued *Aro*'s commandment in 1961. Now that the Court has implicitly recognized the significance of the heart of the invention in *Quanta*, it is time to rethink all of *Aro* and explicitly recognize that the heart of the invention has its place in patent law.