The Doctrine of Equivalents: Becoming a Derelict on the Waters of Patent Law

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The Doctrine of Equivalents: Becoming a Derelict on the Waters of Patent Law

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In the field of patent law, the doctrine of equivalents extends the scope of a patent beyond its literal language to cover inconsequential variations of a patentable invention. Although the doctrine of equivalents introduces undesirable uncertainty into the scope of patent protection, both the United States Supreme Court and the Court of Appeals for the Federal Circuit have repeatedly reaffirmed the doctrine. Nevertheless, the doctrine of equivalents is in decline. The Supreme Court significantly limited the doctrine twice in the last ten years, and two recent en banc decisions of the Court of Appeals for
the Federal Circuit\textsuperscript{2} have further restricted the doctrine. In its most recent case, the Supreme Court grounded its rationale for the doctrine in the limitations of language.\textsuperscript{3} Ironically, this rationale presages further restrictions on the doctrine because it suggests that the doctrine is not needed, except in rare cases when language is incapable of demarcating the scope of patent protection. Thus, the doctrine of equivalents appears destined to become a “derelict on the waters of the law.”\textsuperscript{4}

The patent statutes confer on a patentee the exclusive right to make, use or sell a patented invention in the United States for a twenty year term.\textsuperscript{5} An exclusive right to make, use or sell a patented invention is not necessarily an economic monopoly, however. Even though a patentee may have an exclusive right to an invention, the patentee will not have an economic monopoly if there are alternatives to the invention that are practical substitutes for it.\textsuperscript{6} For a patent to confer a monopoly that has economic value to its owner, its claims must cover not only the particular device or process the inventor developed but all of the substitutes for it as well so that “there is no alternative way for competitors to provide the same economic functionality to their customers without infringing the claims.”\textsuperscript{7} Otherwise, the patent will have no more value to its owner than a publication in a technical journal.\textsuperscript{8}

The claims of a patent are analogous to the metes and bounds in a legal description of real property, and they stake out the intellectual property that the patent covers. The scope of the claims a patentee is entitled to is limited both by previous discoveries (i.e., the prior art) and by the inventor’s contributions. In order to be patentable, an invention must be novel,\textsuperscript{9} and therefore, a claim that intrudes on prior

\begin{itemize}
\item[3.] \textit{Festo Corp.}, 535 U.S. 722.
\item[6.] \textit{See} Ill. Tool Works, Inc. v. Independent Ink, Inc., 126 S. Ct. 1281, 1293 (2006) (“Congress, the antitrust enforcement agencies, and most economists have all reached the conclusion that a patent does not necessarily confer market power upon the patentee. Today, we reach the same conclusion . . . .”). For an example, however, of the Supreme Court’s blurring the significant distinction between an exclusive right and a monopoly, see \textit{Festo Corp.}, 535 U.S. at 730 (“The patent laws ‘promote the Progress of Science and useful Arts’ by rewarding innovation with a temporary monopoly.”).
\item[8.] Both a patent and a publication describing an invention qualify as prior art under 35 U.S.C. § 102 to bar another person from obtaining a patent on the invention and its obvious variations.
\end{itemize}
art is invalid. A claim is also invalid if it goes beyond what the inventor actually created and disclosed in the patent application.10

However, patent claims are permitted to cover variations of the invention, even though the inventor did not produce physical embodiments of them, if they would be apparent from the written description of the invention in the patent application to a hypothetical person of reasonable skill in the inventor's field.11 For example, if the inventor made a working model out of balsa wood, the claim might state that the device was constructed of wood; or more generally, of a carbon-based material; or more generally still, of a rigid material. The claim might even omit any limitation on materials used to construct the device so that the claim would extend to any material so long as the claim satisfies the novelty requirement and it would be apparent to a person of reasonable skill in the inventor's field how to make the device from any material based upon what was disclosed in the patent application.

It is the responsibility of the patent attorney to draft claims that not only are valid but also cover variations of the invention so that they provide meaningful protection. There are a variety of reasons, however, why patent claims may fail to cover every variation of the invention that would be apparent to a person of reasonable skill in the inventor's field. The most obvious is that the claims drafter may not foresee all the variations that would be apparent to a person of reasonable skill in the inventor's field. Another reason is that the claims drafter may inadvertently omit an obvious variation or include an unnecessary limitation in the claims as a result of a mistake. Alternatively, a patent attorney may narrow a broad claim by amendment during the patent prosecution process in response to a patent examiner's rejection of the claim. Finally, it is conceivable that variations that are apparent with the benefit of hindsight may not have been foreseeable to a person of reasonable skill in the inventor's field at the time the patent application was filed.

10. See Consol. Elec. Light Co. v. McKeensport Light Co. (The Incandescent Lamp Patent), 159 U.S. 465, 474 (1895) ("If the description be so vague and uncertain that no one can tell, except by independent experiments, how to construct the patented device, the patent is void."); Reiffin v. Microsoft Corp., 214 F.3d 1342 (Fed. Cir. 2000) ("The purpose of [35 U.S.C. § 112 1] is to ensure that the scope of the right to exclude as set forth in the claims, does not overreach the scope of the inventor's contribution to the field of art as described in the patent specification.").

11. See 35 U.S.C. § 112 ¶ 1; Nat'l Recovery Techs., Inc. v. Magnetic Separation Sys. Inc., 166 F.3d 1190, 1195 (Fed. Cir. 1999) ("The scope of the claims must be less than or equal to the scope of enablement. The scope of enablement, in turn, is that which is disclosed in the specification plus the scope of what would be known to one of ordinary skill in the art without undue experimentation.").
The doctrine of equivalents expands the scope of patent protection in some circumstances to cover variations of the invention that are not within the literal terms of the claims. While there is no statutory basis for the doctrine of equivalents, and it has been characterized as an anomaly, the Supreme Court has repeatedly reaffirmed the doctrine over the past 150 years. Although the Supreme Court and the lower federal courts continue to recognize the doctrine of equivalents, they have not clearly defined the circumstances in which it is available, nor demarcated the extent to which it expands the scope of patent protection. The consequent lack of certainty has adverse consequences for both patentees and their competitors because determining whether potentially competing products are infringing may require an expensive jury trial with the risk of damages and injunctive relief. A major source of this uncertainty is the fact that neither the Supreme Court nor the lower federal courts have articulated a convincing rationale for the doctrine of equivalents.

This Article provides a critical analysis of the doctrine of equivalents. In Part II, the Article describes the evolution of American patent law from central claiming to peripheral claiming. Next, Part III discusses a statutory vestige of central claiming that is found in paragraph 6 of section 112 of title 35 of the United States Code for particular types of claims having a combination of elements. Part IV surveys the four leading Supreme Court cases addressing the doctrine of equivalents and discusses the limitations these cases have placed on the doctrine. Part V summarizes the current law and discusses future prospects for the doctrine of equivalents.

II. THE CENTRAL DEFINITION AND PERIPHERAL DEFINITION SYSTEMS

Patents have not always included claims. The earliest patent statute in the United States, the Patent Act of 1790, required only a specification in writing, containing a description, accompanied with drafts or models... which specification shall be so particular, and said models so exact, as not only to distinguish the invention or discovery from other things before known and used, but also to enable a workman or other person skilled in the art or manufacture, whereof it is a branch, or wherewith it may be nearest connected, to make, construct, or use the same, to the end that the public may have the full benefit thereof, after the expiration of the patent term.

In the absence of claims, the invention was defined using a central definition system. The patent contained only a description of a particular embodiment of the invention, and the courts extended patent protection to all equivalent embodiments. Under a central definition system, a doctrine of equivalents was needed to prevent competitors from copying the invention but avoiding infringement by making minor changes to the particular embodiment described.

Although it was not necessary under a central definition system to describe variations of an invention in order to define it more broadly, there was nothing to prevent an applicant from doing so. Describing variations of an invention in the patent application might facilitate a court's later finding infringement if a defendant produced one of the variations. Also, defining an invention broadly in the patent application served to give better notice of the scope of the invention to the public than setting out only the single embodiment that the inventor had made. For example, a patent from 1799 included the following expansive language: "The drawings accompanying this description are not laid down by any scale of measurement because the forms, sizes, and the proportions of the whole and its parts may be indefinitely varied." The first claims appeared in Robert Fulton's patent for a steamboat.

The earliest statutory reference to claims appeared in the Patent Act of 1836, which provided that an inventor "shall particularly specify and point out the part, improvement, or combination, which he claims as his own invention or discovery." While the general practice after 1836 was to include one or more claims after the description of the invention, they merely served to highlight what the inventor considered were the most significant aspects of the invention. In-

16. Pennwalt Corp. v. Durand-Wayland, Inc., 833 F.2d 931, 957-58 (Fed. Cir. 1987) (Newman, J., commentary) ("A finding of infringement did not require precise correspondence between the description and the accused device. The trial courts determined, often by jury, whether there was 'substantial similarity' between the accused device and that described in the patent."); Fressola, 27 U.S.P.Q.2d (BNA) at 1609; Ellis, supra note 15, at 4.
18. It has been noted that Fulton may have really been more the inventor of the claim than of the steamboat. William R. Woodward, Definiteness and Particularity in Patent Claims, 46 Mich. L. Rev. 755, 758 (1948); Lutz, supra note 17, at 137.
21. See Pennwalt Corp., 833 F.2d at 959 (Newman, J., commentary) ("[I]n the period from 1836 to 1870] patent claims played a quite limited role in patent enforcement, serving more to identify the essential features of an invention than to set limits to the scope thereof."); Ellis, supra note 15, at 3 ("[B]etween the 1836 and
fringement was not determined on the basis of the claims; instead, the trier of fact determined infringement by comparing the plaintiff’s and defendant’s products to each other.

Patent practice with respect to claims changed with the adoption of the Patent Act of 1870, which provided that the inventor “shall particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention . . . .” This language made claims mandatory, and it is substantially the same as that found in the current statute. After 1870, patent claims practice moved from the central definition system to the modern peripheral definition system, in which the periphery of the area of patent protection is staked out by the claims, and only products or methods within that area may be found to be infringing.

Even after the Patent Act of 1870, claims often concluded with general language that the invention was “substantially as described,” thus referring back to the written description for the scope of the claim. In 1902, the Commissioner of Patents ruled that this language was vague, indefinite, and in violation of the requirement to particularly point out and distinctly claim the invention. A few years later, the Court of Appeals for the Sixth Circuit decided that the phrase “substantially as described” had no legal effect, and its use gradually declined after 1914.

The significance of claims is elevated under the peripheral definition system, because the claims largely define the scope of patent protection. Patent claims resemble the terms of a prohibitory injunction in that they set out the activities that constitute infringement of the patent, and like a prohibitory injunction, they must be specific in

1870 Acts] claims . . . served merely to call attention to what the inventor considered the salient features of his invention.

22. Lutz, supra note 17, at 147 (“During most of [the period from 1836 to 1870] the claims rarely, if ever, received consideration on the question of infringement.”).
23. See Pennwalt Corp., 833 F.2d at 958 (Newman, J., commentary) (“Infringement continued to be determined [in the period between 1836 and 1870] by comparison of the accused device with the description in the specification.”); Lutz, supra note 17, at 147 (“[Infringement] was almost universally treated as a question of fact to be decided by the jury from a comparison of the machines of plaintiff and defendant.”).
27. Id. at 6.
29. Nat'l Tube, 216 F. at 520.
30. Unlike injunctions, however, patent claims are not punishable by contempt of court, and they are not directed to specific named parties. Injunctive relief is a significant remedy for patent infringement, and the patent claims will determine the scope of the injunctive relief for infringement.
their terms in order to be enforced. Under the peripheral definition system, the patent applicant can define the scope of patent protection by drafting claims (as long as they are valid) that cover the range of devices, materials or processes that would infringe the patent.

Using claims to define the scope of patent protection provides greater certainty to a patentee, because the patentee does not have to rely on the court that will eventually try the infringement action to determine which variations of the invention described in the patent are entitled to patent protection. The use of claims permits examination by the Patent Office and once the patent issues, each of the claims is clothed with a presumption of validity. Finally, the claims provide notice to the public of the scope of the patent so that competitors can determine what devices, materials or processes would infringe and make their plans and investments accordingly.

As patent claims practice shifted to the peripheral definition system and the significance of claims in defining the scope of patent protection increased, issues concerning the permissible scope of claims arose. In O'Reilly v. Morse, the Supreme Court decided that a claim by the inventor of the telegraph was invalid because it was too broad. The inventor, Samuel Morse, claimed not only the specific machinery described in the written description of the invention, but also the use of "electro-magnetism, however developed for marking or printing intelligible characters, signs, or letters at any distances . . . ." The Supreme Court ruled the claim was overbroad, because Morse had claimed "an exclusive right to use a manner and process which he has not described and indeed had not invented, and therefore could not describe when he obtained his patent." In other words, while Morse was entitled to a patent for the telegraph, the claims could not extend to other inventions that Morse had not created which might have features in common with a telegraph.

The Supreme Court also addressed the permissible scope of claims in Consolidated Electric Light Co. v. McKeesport Light Co. (The Incandescent Lamp Patent). The patentees developed an incandescent

31. See Fed. R. Civ. P. 65(d) ("Every order granting an injunction . . . shall be specific in terms. . . .").
34. 56 U.S. (15 How.) 62 (1853).
35. Id. at 112.
36. Id. at 113.
37. 159 U.S. 465 (1895).
lamp that used carbonized paper as a filament, and they obtained a patent that included both a narrow claim for a filament of carbonized paper and a broad claim for a filament of "carbonized fibrous or textile material."38 Thomas Edison produced a competing incandescent lamp with a filament fabricated from a particular type of bamboo, which he discovered worked better than other materials. The Supreme Court decided that the broad claim for filaments of any fibrous or textile materials was invalid, because the patentees had not shown that every fibrous or textile material was suitable for use as a filament for an incandescent lamp. In reaching this conclusion, the Supreme Court emphasized the statutory requirement that the patent application must include a written description that would enable a person skilled in the art or science to which it pertains to make and use the invention.39 The Court held: "If the description be so vague and uncertain that no one can tell, except by independent experiments, how to construct the patented device, the patent is void."40 Since Edison's discovery of the superior properties of bamboo as a material for filaments had required extensive investigation, the patentees' broad claim to the use of any fibrous or textile material for a filament of an incandescent lamp was not supported by the written description in their patent application.41

The permissible scope of a patent's claims continues to be confined to the range of variations of the invention that the written description enables a person skilled in the inventor's field to produce.42

For example, the Court of Appeals for the Federal Circuit held in Amgen, Inc. v. Chugai Pharmaceutical Co.,43 that "the scope of the claims must bear a reasonable correlation to the scope of enablement provided by the specification to persons of ordinary skill in the art."44 Thus, under the

38. Id. at 468.
39. The requirement that the written description in a patent application must enable any person skilled in the art to make and use the invention is codified at 35 U.S.C. § 112 (2000).
41. See id. at 475–76.
42. In addition, the written description must "describe the claimed invention so that one skilled in the art can recognize what is claimed." Enzo Biochem, Inc. v. Gen-Probe Inc., 296 F.3d 1316, 1328 (Fed. Cir. 2002) (en banc); see also Crown Operations Int'l v. Solutia Inc., 289 F.3d 1367, 1376 (Fed. Cir. 2002) ("[T]he disclosure must convey with reasonable clarity to those skilled in the art that the inventor was in possession of the invention.").
43. 927 F.2d 1200 (Fed. Cir. 1991).
44. Id. at 1214 (quoting Application of Fisher, 427 F.2d 833, 839 (C.C.P.A. 1970)); see also AK Steel Corp. v. Sollac, 344 F.3d 1234, 1244 (Fed. Cir. 2003) ("[A]s part of the quid pro quo of the patent bargain, the applicant's specification must enable one of ordinary skill in the art to practice the full scope of the claimed invention."); Enzo Biochem, Inc. v. Calgene, Inc., 188 F.3d 1362, 1377 (Fed. Cir. 1999) (finding claims invalid for lack of enablement); In re Vaeck, 947 F.2d 488, 496 (Fed. Cir. 1991) ("[T]here must be sufficient disclosure, either through illustra-
DOCTRINE OF EQUIVALENTS

While the scope of patent protection today for the most part is determined by the peripheral definition system, a vestige of the central definition system for some claims can still be found in section 112 of title 35 of the United States Code. Paragraph 6 of this section provides:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

Under this provision, the scope of patent protection for a combination claim is determined by a central definition system, rather than a peripheral definition system, but only if the claim is expressed as a means or step for performing a specified function.

Paragraph 6 was added to section 112 in 1952 to legislatively overrule the Supreme Court's decision in Halliburton Oil Well Cementing Co. v. Walker. In the Halliburton case, the Supreme Court held that claims expressed as means for performing a specified function violated the requirement that the inventor "particularly point out and distinctly claim" the invention. The Court decided that these claims "failed adequately to depict the structure, mode, and operation" of the invention, because they described elements of the invention in terms of what they did instead of in terms of their own physical characteristics.

Paragraph 6 of section 112 addresses the Halliburton Court's concern with the lack of specificity of claims expressed as means for performing a specified function by providing that the functional language would be construed to cover the particular structure that is described
in the specification.\textsuperscript{49} Thus, the statute incorporates the description of the particular structure from the specification into the claim so that the claim itself does not need to include the description, and the functional language serves as a shorthand reference to what may be a lengthy detailed description. In addition, paragraph 6 provides that the claim covers not only the particular structure in the written description, but also "equivalents thereof." In a throwback to the central definition system, the scope of patent protection for functional claims extends to the particular structure described in the specification and to what the court determines are equivalent structures that perform the function specified in the claims. As is the case with other claims, the scope of functional claims under section 112, paragraph 6 is limited by what would be apparent to a reasonably skilled person in the inventor's field at the time the patent is issued.\textsuperscript{50}

IV. DEVELOPMENT OF THE DOCTRINE OF EQUIVALENTS

The doctrine of equivalents extends the scope of patent protection beyond the literal language of the claims to cover insubstantial variations that would otherwise not be infringing.\textsuperscript{51} The doctrine has been applied by the Supreme Court in four cases, which are discussed below.

A. \textit{Winans v. Demead}

The Supreme Court first recognized the doctrine of equivalents in \textit{Winans v. Denmead}.\textsuperscript{52} The plaintiff in \textit{Winans} obtained a patent in 1847 for an improved railroad car for transporting coal that had a circular-bottomed, rather than a flat-bottomed, cargo bed. The specification included the following language: "What I claim as my invention . . . is making the body of a car for the transportation of coal, &c., in the form of a frustum of a cone, substantially as herein described, whereby the force exerted by the weight of the load presses equally in all directions . . . .\textsuperscript{53} The defendants made similar railroad cars that had an octagonal cargo bed, and there was evidence offered at trial that the defendants' octagonal cars were substantially the same as the plaintiff's circular cars. The trial judge ruled that the defendants did

\textsuperscript{50} See Al-Site Corp. v. VSI Int'l, Inc., 174 F.3d 1308, 1320 (Fed. Cir. 1999) ("[A] structural equivalent under § 112 must have been available at the time of the issuance of the claim.").
\textsuperscript{51} See Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722, 727 (2002) ("[A] patent protects its holder against efforts of copyists to evade liability for infringement by making only insubstantial changes to a patented invention.").
\textsuperscript{52} 56 U.S. (15 How.) 330 (1854).
\textsuperscript{53} Id. at 342.
not infringe the patent, because the defendants' cars were rectilinear, while the patent was for a conical shape. The Supreme Court reversed, holding that whether there was infringement or not depended on whether the octagonal shape was "so near to a true circle as substantially to embody the patentee's mode of operation, and thereby attain the same kind of result as was reached by his invention." It, therefore, remanded the case for the jury to resolve the issue.

The Supreme Court's adoption of the doctrine of equivalents in *Winans* is easily understood in its historical context. A modern patent attorney operating under the peripheral definition system would have drafted perhaps a dozen claims to protect the invention by staking out numerous variations of the shape of the cargo bed—such as hexagonal, heptagonal, octagonal, nonagonal, and other polygonal shapes, as well as elliptical shapes and any other shapes that would be reasonably apparent to a person of reasonable skill in the inventor's field. Moreover, a modern patent attorney would have described the shape as "substantially in the form of a frustum of a cone" to expressly cover minor variations from the precise mathematical shape. At the time of the *Winans* decision, however, claims were not required in patents, and even though the *Winans* patent had claim language, claims were generally not determinative of the issue of infringement prior to 1870.

Under the central definition system that prevailed when *Winans* was decided, a doctrine of equivalents was necessary so that the scope of patent protection would not be limited to the particular embodiment in the written description. Nevertheless, the doctrine of equivalents has survived the evolution from the central definition system to the modern peripheral definition system.

**B. Graver Tank**

Nearly one hundred years after *Winans*, the Supreme Court reaffirmed the doctrine of equivalents in *Graver Tank & Manufacturing Co. v. Linde Air Products Co.* The patent was for an electric welding
process, and it included claims for various welding fluxes used in the process. The issue presented to the Court was whether the defendant's flux, which contained manganese silicate, infringed the claims in the plaintiff's patent for a flux containing alkaline earth metal silicates. In a prior opinion, the Supreme Court had upheld the district court's determination that two claims for fluxes containing metallic silicates or, more broadly, silicates were invalid because they were too broad and beyond the scope of the patentee's invention, since there are many metallic silicates that are not effective as fluxes. On a rehearing that was limited to four narrower claims for fluxes containing alkaline earth metal silicates that the trial court had ruled were valid, the Supreme Court affirmed the trial court's decision that the defendant's flux infringed the narrower claims, even though manganese is not an alkaline earth metal. The Court noted that there was expert testimony in the record that manganese and magnesium (which is an alkaline earth metal) had similar properties, and experts in the field understood that manganese could be substituted for magnesium in the flux. In addition, the trial court had noted that the patent specification had referred to the use of manganese silicate in fluxes. While the Supreme Court acknowledged that there was no literal infringement, it ruled that the claims of the patent were infringed under the doctrine of equivalents.

Assuming that the other requirements for a patent were satisfied, the expert testimony and the patent specification would clearly have supported a claim for a flux containing manganese silicate. In the Graver Tank case, the Supreme Court did not simply allow the patentee to assert a claim for a flux containing manganese silicate, however; instead, the Court ruled that the patent covered a flux containing manganese silicate in the absence of an explicit claim for it. Comparing the piracy of an invention to the piracy of a copyrighted book or play, the Court explained that a doctrine of equivalents was

58. A flux promotes the fusion of metal during welding by preventing the formation of oxides.
60. Manganese is not an alkaline earth metal.
64. Id. at 610-12.
65. Linde Air Prods., 86 F. Supp. at 199.
67. The dissent by Justice Douglas states that the claim for manganese silicate was unpatentable, because it was covered by other patents that had expired. Id. at 618 (Douglas, J., dissenting).
68. See supra text accompanying notes 42-44.
needed because patents would have little value if a competitor could pirate an invention by copying it with insubstantial changes to avoid infringement.\textsuperscript{69} There is a fundamental difference, however, between the infringement of copyrighted materials and a patented invention, because there are no claims for copyrighted works. Consequently, substantial similarity between the copyrighted and infringing works is sufficient for a claim of copyright infringement.\textsuperscript{70} While the Court’s concern would be warranted under a central definition system, there is no (or at least considerably less) justification for a doctrine of equivalents under a peripheral definition system, where the patent attorney drafting the claims may protect against piracy by making the claims broad enough to cover insubstantial changes as well as any other variations of the invention that would be apparent to a person of reasonable skill in the inventor’s field.

Quoting from an earlier case, the Supreme Court declared that a patentee may invoke the doctrine of equivalents against an accused infringer who makes a product that “performs substantially the same function in substantially the same way to obtain the same result.”\textsuperscript{71} The defendant’s use of manganese silicate for a welding flux clearly performed the same function (i.e., preventing the formation of oxides) to obtain the same result (i.e., the welding of metal) as the fluxes made of alkaline earth metal silicate in the claims. Any welding flux would.\textsuperscript{72} But the defendant’s product performed the same function to obtain the same result using manganese silicate, instead of an alkaline earth metal silicate. Is this “substantially the same way” to perform the same function to obtain the same result? If so, how does manganese silicate differ from any other substance that is used as a welding flux? Would the doctrine of equivalents extend to any substance that was used as a welding flux, or is it limited to manganese silicate in some way?

The triple identity test (same function, same way, same result) used by the Court is generally inapposite to inventions that are characterized by their structure (such as machines, products, and composi-

\textsuperscript{69} \textit{Graver Tank}, 339 U.S. at 607-08.
\textsuperscript{70} \textit{See, e.g.}, Smith v. Jackson, 84 F.3d 1213, 1218 (9th Cir. 1996) ("[P]laintiff may establish copying by showing that defendant had access to plaintiff's work and that the two works are 'substantially similar' in idea and in expression of the idea."); Sheldon v. Metro-Goldwyn Pictures Corp., 81 F.2d 49, 56 (2d Cir. 1936) (Hand, J.) ("[I]t is enough [for copyright infringement] that substantial parts were lifted . . . .").
\textsuperscript{71} \textit{Graver Tank}, 339 U.S at 608 (quoting Sanitary Refrigerator Co. v. Winters, 280 U.S. 30, 42 (1929)).
\textsuperscript{72} Similarly, Thomas Edison’s bamboo filament for an incandescent lamp performed the same function to obtain the same result as the patentees’ carbonized paper filament. But the Supreme Court refused to allow the patentees to extend the scope of patent protection beyond carbonized paper. \textit{See Consol. Elec. Light Co. v. McKeesport Light Co. (The Incandescent Lamp Patent)}, 159 U.S. 465 (1895).
as opposed to processes. Claims to machines, products and compositions are defined by their physical characteristics, rather than their functions. Thus, a claim for a machine, product, or composition will be infringed if another person makes or sells it, regardless of its function. Moreover, different objects may be used to perform the same function in the same way to obtain the same result—just because a screwdriver can be used as a toothpick does not mean that a screwdriver and a toothpick are equivalents. Since the claims at issue in *Graver Tank* were for welding flux products, the triple identity test should not have been applied to them.

The Court noted that an important factor in determining equivalence was whether persons having reasonable skill in the inventor's field would have known that an ingredient not contained in a patent (e.g., manganese) was interchangeable with one that was (e.g., an alkaline earth metal). This factor appears to be the same as the standard used for the permissible scope of the claims since both refer to the hypothetical person of reasonable skill in the inventor's field. To the extent it is employed, this factor would eliminate the need for drafting claims, since claims would no longer be needed to define the scope of patent protection. Instead, a patent would need to set out only a written description, and the courts would be required to determine the scope of patent protection based on the range of equivalents that would be familiar to a person of reasonable skill in the inventor's field. Claims are required, though, and they are better suited for defining the scope of patent protection than the doctrine of equivalents.

In the course of its decision, the Supreme Court emphasized that the differences between the claims and the infringing product must be
insubstantial.\textsuperscript{78} A major difficulty with applying this substantiality standard is that it tends to be circular, because any change that avoids a claim of infringement under the doctrine of equivalents is substantial as far as a competitor's liability is concerned. Just as competitors should be discouraged from infringing valid patent claims, they should be encouraged to compete by designing their products so that they do not infringe, and to do so, competitors need to be able to tell whether the differences between their products and the claims are sufficient to not infringe.\textsuperscript{79}

Justice Douglas noted in a brief dissent that the doctrine of equivalents was especially inappropriate in the \textit{Graver Tank} case because the use of manganese silicate as a welding flux had already been disclosed in previous patents, and therefore, if a claim for a welding flux had been included, it would have been invalid.\textsuperscript{80} Justice Douglas concluded: "Thus we end with a strange anomaly: a monopoly is obtained on an unpatented and unpatentable article."\textsuperscript{81}
C. Warner-Jenkinson

The next case in which the Supreme Court examined the doctrine of equivalents was Warner-Jenkinson Co. v. Hilton Davis Chemical Co.,\(^\text{82}\) which was decided fifty years after Graver Tank. The plaintiff's patent was for a process for removing impurities from dyes used for food coloring. The process involved subjecting a fluid containing the dye to ultrafiltration through a membrane at a specified pressure and "at a pH from approximately 6.0 to 9.0."\(^\text{83}\) The defendant developed a process that differed from the plaintiff's process only in that it operated at a pH of 5.0. At trial, the plaintiff conceded that there was no literal infringement of the patent (because a pH of 5.0 was outside the range of approximately 6.0 to 9.0), but the jury nevertheless found infringement under the doctrine of equivalents.

On certiorari, the defendant marshaled four arguments for overturning the doctrine of equivalents. First, the doctrine is inconsistent with the requirement for a patentee to claim the invention the patent covers. Second, the doctrine circumvents the reissue process and avoids its limitations. Third, the doctrine is inconsistent with the role of the Patent and Trademark Office in setting the scope of the patent during the process of issuing the patent. And fourth, the doctrine has implicitly been rejected by the legislative adoption of the provision in section 112, paragraph 6, for expressing a claim as a means or step for performing a specified function. The Supreme Court brushed aside the first three arguments, saying that it had rejected them fifty years earlier in Graver Tank.\(^\text{84}\) It then rejected the fourth argument, saying that section 112, paragraph 6, "was enacted as a targeted cure to [the] specific problem"\(^\text{85}\) created by Halliburton, which had rejected claims that were expressed as a means or step for performing a specified function.\(^\text{86}\) The Court reasoned that it would be quite a stretch to find legislative intent for a broad overruling of the doctrine of equivalents on the basis of the enactment of such a narrow statutory provision. Thus, the Supreme Court reaffirmed the doctrine of equivalents.\(^\text{87}\)

The Court saw a need, however, for limiting the doctrine of equivalents in order to reduce its conflict with the benefits provided by the claims in defining the scope of patent protection and giving notice of the scope to the public. Adopting the reasoning of Judge Nies of the

\(^{82}\) 520 U.S. 17 (1997).
\(^{83}\) Id. at 22. "pH" is a measure of the degree of acidity or alkalinity of a fluid. It ranges from 0.0 to 14.0 with lower numbers for increasing acidity, higher numbers for increasing alkalinity, and 7.0 for a neutral solution.
\(^{84}\) Id. at 25-27.
\(^{85}\) Id. at 28.
\(^{86}\) See supra text accompanying notes 46-49.
\(^{87}\) Warner-Jenkinson, 520 U.S. at 40 ("Today we adhere to the doctrine of equivalents.").
United States Court of Appeals for the Federal Circuit, the Supreme Court decided that while the doctrine of equivalents might modify an element of a claim, it could not eliminate an element entirely. The Court stated:

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. It is important to ensure that the application of the doctrine, even as to an individual element, is not allowed such broad play as to effectively eliminate that element in its entirety. 88

A potential problem with applying this “All Elements”89 rule is determining what is an element. For example, is the pH range from approximately 6.0 to 9.0 an element or part of an element? 90 There is no statutory definition of what constitutes an element of a claim, but the Federal Circuit has defined it as a limitation in a claim. 91

Whether a particular feature of a claim is an “element” for purposes of the doctrine of equivalents might depend on how the claim was drafted, rather than on its substance. Professor Adelman gives the example of a claim for a fork with four tines. 92 Would a claim for the fork with a first tine, a second tine, a third tine, and a fourth tine have four elements—one for each tine? If so, then under the “All Elements” rule, the doctrine of equivalents could not cover a fork with three tines, because this would completely eliminate the element of the fourth tine. But if the claim was drafted as a fork with four tines (rather than being broken down into four separate elements), then the doctrine of equivalents could cover a fork with only three tines without violating the “All Elements” rule, because the number of tines would be a single element that could be modified without being completely

88. Id. at 29.
89. See, e.g., Ethicon Endo-Surgery, Inc. v. U.S. Surgical Corp., 149 F.3d 1309, 1316 (Fed. Cir. 1998) (referring to this requirement as the “All Elements” rule).
90. On remand, the Federal Circuit appears to have determined that the range was only part of an element, because it decided that in the particular context of the case a pH of 5.0 was equivalent to a pH of approximately 6.0, as long as prosecution history estoppel, see infra text accompanying notes 93–95, did not bar the patentee from invoking the doctrine of equivalents. Hilton Davis Chem. Co. v. Warner-Jenkinson Co., 114 F.3d 1161, 1164 (Fed. Cir. 1997) (en banc). Professor Chisum observes, however, that “the Supreme Court implicitly treated the lower end of the pH range as an element, because the Court remanded for a determination whether that element had been vitiated by the finding that 5.0 was equivalent to approximately 6.0 to 9.0 pH.” Donald S. Chisum, The Scope of Protection for Patents After the Supreme Court’s Warner-Jenkinson Decision: The Fair Protection—Certainty Conundrum, 14 SANTA CLARA COMPUTER & HIGH TECH. L.J. 1, 32 (1998).
92. MARTIN J. ADELMAN ET AL., CASES AND MATERIALS ON PATENT LAW 806 (2d ed. 2003).
eliminated. If the "All Elements" rule would indeed make a distinction between these two formats of a claim for a fork, it would not appear to serve any rational purpose.

After rejecting the defendant's arguments for overturning the doctrine of equivalents, the Court then addressed three possible restrictions on its application advanced by the defendant. These were: (1) prosecution history estoppel; (2) a requirement for wrongful intent; and (3) a requirement that the equivalents were disclosed in the patent itself.

The Supreme Court had previously recognized the doctrine of prosecution history estoppel as a limitation on the doctrine of equivalents. Prosecution history estoppel bars a patentee from recapturing subject matter that the patentee had surrendered during prosecution (i.e., the course of applying for a patent). The defendant argued that because the patentee had added the phrase "at a pH from approximately 6.0 to 9.0" to the claim by amendment during prosecution, the patentee was barred from extending the scope of patent protection under the doctrine of equivalents to cover a pH of 5.0. Upholding the doctrine of prosecution history estoppel, the Court nevertheless ruled that the application of prosecution history estoppel was limited by the reason for the amendment. The Court noted that in all of its prior cases applying prosecution history estoppel, the amendments had been made to avoid intruding on prior art or to address a specific concern related to patentability. The Court stated that in some cases an amendment might have been requested by the Patent and Trademark Office without an intent to limit the doctrine of equivalents, or even with the expectation that a range of equivalents would be allowed. It concluded that an amendment would not neces-

93. Prosecution history estoppel is also known as file wrapper estoppel. Warner-Jenkinson, 520 U.S. at 30.
94. See, e.g., Exhibit Supply Co. v. Ace Patents Corp., 315 U.S. 126, 136 (1942) ("[R]ecourse may not be had to [the doctrine of equivalents] to recapture claims which the patentee has surrendered by amendment.").
95. There are two types of prosecution history estoppel: amendment-based estoppel and argument-based estoppel. See Deering Precision Instruments L.L.C. v. Vector Distribution Sys., Inc., 347 F.3d 1314, 1324 (Fed. Cir. 2003); Eagle Comtronics, Inc. v. Arrow Comm'n Labs, Inc., 305 F.3d 1303, 1316 (Fed. Cir. 2002). Amendment-based estoppel arises from the surrender of subject matter by means of amending a claim; it is the more common type and was involved in the Warner-Jenkinson case. Argument-based estoppel arises from statements made during prosecution if they show a clear intent to surrender the subject matter. Deering Precision, 347 F.3d at 1326; Eagle Comtronics, 305 F.3d at 1316; see also Desper Prods., Inc. v. Qsound Labs, Inc., 157 F.3d 1325, 1388 (Fed. Cir. 1998) ("Unequivocal assertions or arguments made during prosecution may also create an estoppel."). In addition, there is a related doctrine called prosecution disclaimer which precludes "patentees from recapturing through claim interpretation specific meanings disclaimed during prosecution." Omega Eng'g, Inc. v. Raytek Corp., 334 F.3d 1314, 1323 (Fed. Cir. 2003).
sarily preclude the patentee from relying on the doctrine of equivalents if the reason for the amendment was not related to patentability.96

Unfortunately, in the case before the Court, there was no indication in the record of the reason for the amendment adding the lower limit for the pH of approximately 6.0.97 Accordingly, the Court remanded the case to the Federal Circuit to determine the reason for the amendment.98 The Court also directed the lower courts to presume that an amendment was made for a purpose related to patentability (so that the patentee would be barred by prosecution history estoppel from invoking the doctrine of equivalents) in the absence of evidence that the amendment was made for another purpose.

It is difficult to understand why the reason for the amendment should matter. After all, the patentee in the Warner-Jenkinson case had expressly restricted its claims to “a pH from approximately 6.0 to 9.0.” It should not matter whether the patentee disclaimed pH levels below 6.0 for the selfish purpose of convincing the Patent and Trademark Office (“PTO”) to issue a patent, the altruistic purpose of dedicating a portion of the invention to the public, or even because the patent attorney was careless. In addition, what is meant by the requirement that the amendment was not related to patentability? The Court said that the United States had informed it in its amicus curiae brief that there were “a variety of reasons why the PTO may request a change in claim language.”99 However, the amicus curiae brief did not give any reasons that were unrelated to patentability. Instead, the brief gave only two reasons to make amendments besides avoiding prior art: to reflect the scope of what is enabled and to add specificity to the claims.100 In a later case, the Court explicitly ruled that prosecution history estoppel applies not only to amendments made to avoid

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96. Warner-Jenkinson, 520 U.S. at 33, 40–41.
97. The record was clear that the reason for including the upper limit for the pH of 9.0 was to avoid a prior patent, but the parties disagreed about the reason for including the lower limit. Id. at 22. The written description of the invention in the patent states “it is preferred to adjust the pH to approximately 6.0 to 8.0 before passage through the ultrafiltration membrane.” U.S. Patent No. 4,560,746 at col.7 1.59-61 (issued Dec. 24, 1985). Professor Chisum has suggested that “the claim amendment may have resulted from a compromise between an attorney and examiner, each of whom may have only imperfectly understood the nature of the invention disclosed in the specification and its relationship to the prior art.” Chisum, supra note 90, at 18 n.82.
prior art but also to amendments that narrow a patent's scope for other reasons related to patentability, such as to reflect the scope of what is enabled or to add specificity.\(^{101}\)

The Supreme Court's discussion of prosecution history estoppel is especially significant, because the claims for the vast majority of patents are amended during patent prosecution. While an applicant for a patent is charged with constructive knowledge of all patents and other publications that predate the invention,\(^{102}\) a patent attorney's actual knowledge is more limited. A patent attorney's objective is to draft claims as broadly as the prior art known to the patent attorney will permit.\(^{103}\) The patent examiner's role in the patent prosecution process is to provide an independent perspective with respect to the prior art. Although the patent examiner may lack the resources or incentive to uncover prior art that a real adversary may have,\(^{104}\) the examiner conducts an independent search of the patents and publications in the inventor's field, and much of the time, the examiner does find some additional prior art that relates to at least some portion of the original claims. To obtain issuance of the patent, the patent attorney will then be required to narrow the claims by amendment in order to avoid the prior art so that the patent may be issued. Because amendments are required for most patents, prosecution history estoppel is a significant limitation on the doctrine of equivalents.

Next, the Warner-Jenkinson Court rejected the defendant's argument to restrict the doctrine of equivalents by requiring a showing of an intent to copy or pirate the invention. In arguing for an intent requirement, the defendant relied on references in Graver Tank to "the unscrupulous copyist" and "piracy." The Court ruled, though, that Graver Tank did not require the doctrine of equivalents to be limited to instances where the accused infringer copied the invention. The Court emphasized the practical difficulty of distinguishing between an intentional copyist and an incremental innovator who was designing around the claims, and it indicated a preference for more objective principles to determine infringement. The Court pointed to the "known interchangeability of substitutes for an element of a pat-


\(^{102}\) See In re Hall, 781 F.2d 897, 898 (Fed. Cir. 1986) ("[O]nce an invention is in the public domain, it is no longer patentable by anyone.").

\(^{103}\) The patent attorney has a duty of candor and good faith in dealing with the patent examiner and is required to disclose all information known by the attorney to be material to patentability. 37 C.F.R. § 1.56 (2005).

\(^{104}\) The Patent and Trademark Office is often criticized for issuing invalid patents. See Mark A. Lemley, Rational Ignorance at the Patent Office, 95 Nw. U. L. Rev. 1495, 1495–96 (2001). Forty-six percent of the issued patents that are tested in court are declared invalid. Id. at 1500.
ent”\textsuperscript{105} as one of the objective factors noted in \textit{Graver Tank} for deciding whether the patented invention and the accused device were substantially the same. The Court concluded: “intent plays no role in the application of the doctrine of equivalents.”\textsuperscript{106}

The defendant’s last argument was that the doctrine of equivalents should be limited to what was disclosed in the patent itself in order to minimize conflict with the notice function of patent claims.\textsuperscript{107} The equivalent (manganese silicate) that was involved in \textit{Graver Tank}, for example, had been disclosed in the patent.\textsuperscript{108} Instead of simply rejecting this argument, though, the Court declared that not only did the equivalents not have to be disclosed in the patent, they did not have to have been known to the patentee or anybody else at the time the patent was issued. Although the Court recognized that the doctrine of equivalents was limited by the knowledge of a skilled practitioner, it ruled that the proper time for evaluating equivalency was the time of infringement, rather than the time of issuance of the patent. The Court concluded that if the equivalents did not need to be known at the time the patent issued, then, a fortiori, these equivalents would not have to be disclosed in the patent.

The Court failed to provide an explanation for its conclusion. It simply stated: “Insofar as the question under the doctrine of equivalents is whether an accused element is equivalent to a claimed element, the proper time for evaluating equivalency—and thus knowledge of interchangeability between elements—is at the time of infringement, not at the time the patent was issued.”\textsuperscript{109} The rationale for this conclusion may have been that while literal infringement is determined by the literal meaning of the claims as of the time of issuance of the patent, infringement under the doctrine of equivalents is determined by the accused infringer’s actions and whether there were “insubstantial differences” between the patented invention and accused device.\textsuperscript{110}

As a result of the Court’s ruling, the scope of patent protection under the doctrine of equivalents will expand continually as more knowledge is acquired over time. Not only is the scope of patent protection freed from the limitations of what the patentee \textit{did} claim, it is

\textsuperscript{105} Warner-Jenkinson, 520 U.S. at 36.

\textsuperscript{106} Id.

\textsuperscript{107} Id. at 37.

\textsuperscript{108} See supra text accompanying note 65.

\textsuperscript{109} Warner-Jenkinson, 520 U.S. at 37.

\textsuperscript{110} See also Hilton Davis Chem. Co. v. Warner-Jenkinson Co., 62 F.3d 1512, 1528 (Fed. Cir. 1995) (en banc) (“Limiting the range of potentially infringing substitutions to those known at the time of the patent’s issuance would undermine the doctrine [of equivalents], denying patent owners protection of the substance of their inventions against new forms of infringement.”), rev’d on other grounds, Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17 (1997).
freed from the limits of what the patentee could have claimed. Thus, under the Warner-Jenkinson decision, the doctrine of equivalents extends patent protection to after-arising equivalents, that is, variations of an invention that were not known at the time of the issuance of the patent but would be considered equivalents from the perspective of a skilled practitioner at the time of infringement.

The Supreme Court also mentioned, but did not resolve, the question of whether the doctrine of equivalents was an issue for the judge or the jury. The Court had previously decided that the construction of patent claims was exclusively within the province of the court, thus facilitating the use of summary judgment to resolve whether there was literal infringement of the claims. The Federal Circuit held in the en banc decision below that infringement under the doctrine of equivalents was a jury issue. Although the jury trial issue had been discussed extensively by the plaintiff and amici curiae on certiorari, and by the Federal Circuit, the defendant made only a passing reference to the issue in its briefs (possibly because the defendant was making so many other arguments on the merits), and so, the Court declined to decide the matter.

By not deciding the jury trial issue, the Court permitted the Federal Circuit's ruling to stand. Requiring a jury to decide whether there is infringement under the doctrine of equivalents allows a patentee whose claim for literal infringement has been rejected by the trial court on summary judgment to nevertheless reach the jury. Not only is a jury trial more expensive than a disposition by the judge, either by summary judgment or after a bench trial, but the outcome is likely to be hard to predict in many cases. Where the technology is complex and the patent claims are convoluted, the jury may have great difficulty understanding even the literal scope of the claims. The jury's difficulty in understanding the technology is compounded by the confused state of the law with respect to the doctrine of equivalents and having to decide the factual question of whether the defendant's product is equivalent to the claimed invention. Since the judge is more likely than the jury to understand both the meaning of the patent claims and the law with respect to the doctrine of equivalents, a judge's decision is likely to be more predictable than a jury's.

The Supreme Court also took time to discuss the appropriate standard for deciding whether there is infringement under the doctrine of equivalents. It noted that the parties and the Federal Circuit were

112. Hilton Davis, 62 F.3d at 1522.
113. Markman, 517 U.S. at 388 ("[J]udges, not juries, are the better suited to find the acquired meaning of patent terms.").
divided on whether the triple identity test (same function, same way, same result) or the insubstantial differences test—both of which were taken from *Graver Tank*—was better.\textsuperscript{115} The Court found fault with both formulations; it observed that there was substantial agreement that the triple identity test was not suitable for inventions other than mechanical devices, while the insubstantial differences test did not offer much guidance as to what was "insubstantial."\textsuperscript{116} It then finessed the question by stating that it was less important which particular linguistic framework was used than that the courts follow the "All Elements" rule.\textsuperscript{117} Rather than micromanage the Federal Circuit as to its formulation of the doctrine of equivalents, the Court said that it expected the Federal Circuit to refine the formulation of the test for equivalence through the Federal Circuit's case law.\textsuperscript{118} Despite the Supreme Court's criticism of the triple identity and insubstantial differences tests for equivalence, however, the Federal Circuit continues to apply them without any further refinement.\textsuperscript{119}

On remand, the Federal Circuit found substantial support in the record for the jury's verdict of infringement under the doctrine of equivalents. It noted particularly the testimony of one of the inventors that the patented process would work for pH values as low as 2.0.\textsuperscript{120} It also ruled that the jury's finding of equivalence for a pH of 5.0 did not entirely eliminate the claim element of a pH of approximately 6.0 under the "All Elements" rule.\textsuperscript{121} The Federal Circuit also decided, however, to remand the case to the trial court for a determination of the reason why the limitation of a pH of approximately 6.0 was added to the claims.\textsuperscript{122} Thus, even though the patentee had expressly limited the claims to a pH of approximately 6.0, the scope of patent protection could nevertheless possibly extend to a pH of 5.0 (or perhaps even 2.0), if the patentee could show that the reason for including this limitation in the claims was not related to patentability.

\textsuperscript{115} Id.
\textsuperscript{116} Id.
\textsuperscript{117} Id. at 40.
\textsuperscript{118} Id. at 39–40.
\textsuperscript{119} See, e.g., *Searfoss v. Pioneer Consol. Corp.*, 374 F.3d 1142, 1150 (Fed. Cir. 2004) ("In determining whether the differences between the accused product and the claim limitation are 'insubstantial,' it is axiomatic that we may determine whether the accused product performs the same function, in the same way with the same result.").
\textsuperscript{120} *Hilton Davis Chem. Co. v. Warner-Jenkinson Co.*, 114 F.3d 1161, 1164 (Fed. Cir. 1997) (en banc). Lemon juice is an example of a fluid with a pH of 2.0.
\textsuperscript{121} Id.
\textsuperscript{122} After the case was fully briefed in the trial court, the parties settled the case just before the trial court handed down a decision. E-mail from David E. Schmit, Counsel for Hilton Davis Chem. Co., to Charles W. Adams, Professor of Law, University of Tulsa College of Law (Aug. 3, 2004, 12:16:44 CST) (on file with the *Nebraska Law Review*).
D. *Festo*

The most recent Supreme Court case concerning the doctrine of equivalents is *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.* While the *Festo* decision once again reaffirmed the doctrine of equivalents, it drastically narrowed its scope in cases where a patent's claims are amended during prosecution. Moreover, some of the language in *Festo* raises the possibility that the drastically narrowed scope of the doctrine may be extended to cases where there were no amendments to the claims.

The *Festo* case was concerned with two patents (the Carroll patent and the Stoll patent), for complicated mechanical devices called magnetically coupled rodless cylinders. A conventional cylinder has a piston that moves up and down inside the cylinder with a rod attached to the piston that protrudes outside the cylinder during part of the stroke. A rodless cylinder has the advantage that it takes up less space than a conventional cylinder because the stroke of the cylinder is contained within the length of the unit.

Although there was no literal infringement of either patent, the trial court granted summary judgment in favor of the patentee for infringement of the Carroll patent under the doctrine of equivalents, and a jury found infringement of the Stoll patent under the doctrine of equivalents. The defendant conceded that its device literally infringed all but one of the elements of claim 9 of the Carroll patent. This element was described as a "pair of resilient sealing rings" at opposite ends of a part of the piston that created a fluid-tight seal in order to hold pressure fluid within the cylinder. The defendant's device used a single two-way seal at the end of the piston that contacted the pressure fluid to create the fluid-tight seal with the cylinder, instead of a pair of one-way sealing rings. The defendant also conceded literal infringement of all but two elements of claim 1 of the Stoll patent. The first element not literally infringed was that there were guide rings and sealing rings at opposite ends of the piston; the defendant's device had guide rings at opposite ends of the piston, but only a two-way sealing ring at one end of the piston. The other element that was not literally infringed was a sleeve around the piston that was made of a magnetizable material to reduce magnetic leakage from the device; the defendant's device used a sleeve made of an aluminum alloy instead of a magnetizable material.

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125. Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 172 F.3d 1361, 1367 (Fed. Cir. 1999) ("Instead of a pair of sealing rings situated at opposite ends of the piston, the [accused] devices have a single two-way sealing ring at the end of the piston that is in contact with the pressure fluid.").
The Federal Circuit first affirmed the judgment of infringement of both patents under the doctrine of equivalents.\textsuperscript{126} The Supreme Court granted certiorari, however, and then vacated and remanded the case in light of the \textit{Warner-Jenkinson} decision.\textsuperscript{127} On remand, the Federal Circuit affirmed the judgment of infringement with respect to the Carroll patent, but remanded to the trial court to determine issues of prosecution history estoppel with respect to the Stoll patent.\textsuperscript{128} The Federal Circuit then granted a rehearing en banc. In an eighty-four page opinion with six separate concurring and dissenting opinions, the Federal Circuit reversed the judgment of infringement under the doctrine of equivalents with respect to both patents on the grounds that prosecution history estoppel barred the use of the doctrine of equivalents because the claims for both patents had been amended.\textsuperscript{129} The en banc court overruled a line of cases that had applied a flexible bar to prosecution history estoppel in which the doctrine of equivalents was not entirely barred by an amendment during patent prosecution, holding that "prosecution history estoppel acts as a complete bar to the application of the doctrine of equivalents when an amendment has narrowed the scope of a claim for a reason related to patentability."\textsuperscript{130} The Federal Circuit also decided that a narrowing amendment that was made for any reason related to the statutory requirements for patentability gives rise to prosecution history estoppel with respect to the amended claim element, regardless of whether the amendment was required by a patent examiner, made in response to a rejection, or was initiated by the patent applicant.\textsuperscript{131}
The Supreme Court granted certiorari and, in a unanimous opinion, vacated the en banc decision of the Federal Circuit and remanded the case. 132 The Supreme Court's decision begins with some general remarks about the patent system and the rationale for the doctrine of equivalents:

The nature of language makes it impossible to capture the essence of a thing in a patent application. . . . The language in the patent claims may not capture every nuance of the invention or describe with complete precision the range of its novelty. If patents were always interpreted by their literal terms, their value would be greatly diminished. Unimportant and insubstantial substitutes for certain elements could defeat the patent, and its value to inventors could be destroyed by simple acts of copying. For this reason, the clearest rule of patent interpretation, literalism, may conserve judicial resources but is not necessarily the most efficient rule. The scope of a patent is not limited to its literal terms but instead embraces all equivalents to the claims described. 133

The limits of language do not really provide a justification for the doctrine of equivalents, however. It is almost trite to say that language is limited. Perhaps the most famous example of the limits of language is Justice Stewart's recognition that he was unable to define obscenity and his conclusion, "I know it when I see it, and the motion picture in this case is not that." 134 But inventions are generally not as hard to describe as obscenity is to define. In each of the Supreme Court cases involving the doctrine of equivalents, the English language was fully capable of describing the equivalents. 135 The failure of the claims to cover the equivalents in those cases was not due to the limits of language, but to other factors, especially the limited foresight of the patent attorneys who drafted the claims too narrowly. As Professor Chisum has noted: "Claims are often written by people with limited resources and time, imperfect expression skills, and incomplete understandings of the invention, the prior art that determines its patentability, and the forms in which it may later be cast." 136 The real reason for the failure of the claims in the Festo case to cover the accused device appears to be that they were so long and confusing. For example, a cursory look at Claim 9 from the Carroll patent shown in the footnote below, 137 reveals how easy it was to lose the unness-

133. Id. at 731-32.
135. The equivalent in Winans would have been covered by adding "substantially" to the claim for the shape of the cargo bed, and the equivalent in Graver Tank would have been covered by adding "manganese silicate" to the claim for the welding flux. Similarly, the equivalent in Warner-Jenkinson would have been covered by deleting the lower limit on the pH, and the equivalent in Festo would have been covered by deleting the reference to the sealing rings in the Carroll patent and the references to the sealing rings and that the sleeve was made of a magnetizable material in the Stoll patent.
136. Chisum, supra note 90, at 7.
137. Claim 9. A device for moving articles, which comprises:
sary limitation of "a pair of," rather than "one or more," resilient sealing rings amid the many other details that were required for the claim. While the rationale that the Festo Court gave for the doctrine of equivalents was not correct, the limitation of "a pair resilient sealing rings" does appear insubstantial in the context of the rest of the elements in claim 9 of the Carroll patent, all of which were conceded to be present in the accused device.

The Court discussed prosecution history estoppel next, and it provided the following rationale for this doctrine:

Prosecution history estoppel ensures that the doctrine of equivalents remains tied to its underlying purpose. Where the original application once embraced the purported equivalent but the patentee narrowed his claims to obtain the patent or to protect its validity, the patentee cannot assert that he lacked the words to describe the subject matter in question. The doctrine of

a hollow cylinder formed of non-ferrous material and having opposite axial ends;
a piston mounted in the interior of the hollow cylinder and reciprocatingly slidable therein, the piston including a central mounting member disposed axially in the cylinder,
a plurality of cylindrically-shaped permanent magnets mounted on the central mounting member and spaced apart axially from each other, each magnet having a bore formed axially there-through for receiving the central mounting member,
at least one pair of end members mounted on the central mounting member and disposed on opposite axial sides of the plurality of magnets,
a pair of cushion members formed of resilient material, the cushion members being situated near opposite axial ends of the central mounting member to help prevent damage to the piston when the piston contacts an axial end of the cylinder,
and a pair of resilient sealing rings situated near opposite axial ends of the central mounting member and engaging the cylinder to effect a fluid-tight seal therewith;
a body mounted on the exterior of the hollow cylinder and reciprocatingly slidable thereon, the body including a plurality of annularly shaped permanent magnets surrounding the cylinder and spaced apart from each other,
the permanent magnets of the piston and body being polarized so as to magnetically couple the body to the piston whereby movement of the piston inside the cylinder causes a corresponding movement of the body outside the cylinder,
the body further including means provided thereon for holding on the body an article to be moved;
and means for controlling the admission of pressure fluid into the cylinder and exhaust fluid from the cylinder for moving the piston in the cylinder,
the attractive forces between the permanent magnets of the piston and the body being such that movement of the piston causes corresponding movement of the body below a predetermined load on the body and such that above said predetermined load movement of the piston does not cause corresponding movement of the body.

equivalents is premised on language's inability to capture the essence of innovation, but a prior application describing the precise element at issue undercuts that premise. In that instance the prosecution history has established that the inventor turned his attention to the subject matter in question, knew the words for both the broader and narrower claim, and affirmatively chose the latter.\textsuperscript{138}

The Court thus tied the rationale for prosecution history estoppel to the rationale for the doctrine of equivalents. Just as the Court's rationale for the doctrine of equivalents as being based on the limits of language is not correct, its rationale for prosecution history estoppel is not entirely convincing.

It is true that if the original application covered the equivalent, the failure of an amendment to capture the equivalent cannot be blamed on the limits of language. Instead, the failure of the amendment likely was due to the drafter's lack of foresight, imperfect understanding of the invention, careless reading of the original claim or amendment, or some other human error. Even though the drafter "knew the words for both the broader and narrower claim," that does not necessarily mean that the drafter fully understood them and thus "affirmatively chose the latter," however.\textsuperscript{139} In fact, it is probable that the drafter did not fully understand the difference between the original claim and the amendment, because a patentee has nothing to gain from a narrowing amendment that goes beyond what is necessary for allowance and gives up a variation of the invention that would otherwise be patentable.\textsuperscript{140} Consequently, a narrowing amendment that unnecessarily limits the scope of patent protection is likely the result of a mistake, rather than an affirmative choice.

Even if a narrowing amendment is the result of a mistake on the part of the drafter, it is not unreasonable to hold the patentee to the amendment. An amendment to a claim that gives up a valuable variation is analogous to a transfer induced by a mistake.\textsuperscript{141} If the owner

\textsuperscript{138} Festo Corp., 535 U.S. at 734–35.
\textsuperscript{139} Id. at 735.
\textsuperscript{140} It is possible for part of an amendment to be necessary to avoid prior art, while another part is not necessary. For example, in the Warner-Jenkinson case, an amendment to restrict the pH to an upper limit of 9.0 was required to avoid prior art, but the patentee gained nothing by restricting the pH to a lower limit of approximately 6.0. See Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17, 22 (1997).
\textsuperscript{141} Cf. \textit{Restatement (Third) of Restitution and Unjust Enrichment} § 5(1) (Tentative Draft No. 1, 2001) ("A transfer induced by mistake is subject to rescission at the instance of the transferor or a successor in interest."). An amendment of a claim might also be analogized to a mistake in a contract, particularly if the amendment was the result of a negotiation between the patentee and patent examiner in which the patent examiner agreed to issuance of the patent if the patentee narrowed the claim. The rules for avoidance or reformation of a contract on account of a mistake may differ from reformation of a transfer. A contract may be voidable on account of a mistake, particularly if the mistake is mutual, as op-
of Blackacre and Whiteacre executes a deed which conveys Blackacre, instead of Whiteacre, as a result of a mistake, a court may reform the deed to reflect the owner's intent.\textsuperscript{142} On the other hand, reformation would not be available if the transfer was intentional, but was the result of an error in judgment.\textsuperscript{143} A patentee who files a narrowing amendment to a claim does so intentionally, even if the patentee does not comprehend the effect the amendment may have on the scope of patent protection. Since the narrowing amendment is an error of judgment, it is not appropriate to allow a patentee to regain the benefit of variations of the invention that the patentee mistakenly surrendered.

After its general discussion of the policies behind the doctrine of equivalents and prosecution history estoppel, the Supreme Court addressed specific questions presented by the case. The first was whether prosecution history estoppel should be limited to amendments made for the purpose of avoiding prior art. Agreeing with the Federal Circuit, the Supreme Court held that "a narrowing amendment made to satisfy any requirement of the Patent Act may give rise to an estoppel."\textsuperscript{144} It added, however, that a truly cosmetic amendment which does not narrow a claim would not raise prosecution history estoppel.\textsuperscript{145} The Court noted that the plaintiff conceded that the

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\textsuperscript{142} See, e.g., Tyler v. Larson, 235 P.2d 39, 41 (Cal. Dist. Ct. App. 1951) ("It is old and well-established law that equity . . . will reform a voluntary conveyance, where, by mistake of law or fact, a larger estate or more land has been granted than was intended to be conveyed; and it is immaterial that the grantee is cognizant of the mistake. The grantee has given nothing for the conveyance; he is deprived of nothing; and he cannot complain if the mistake is corrected.").

\textsuperscript{143} See \textit{Restatement (Third) of Restitution and Unjust Enrichment} § 5 cmt. c (Tentative Draft No. 1, 2001) ("Faulty prediction will not support a claim in restitution, and invalidating mistake is to be distinguished from the error in judgment that is visible in hindsight.").


\textsuperscript{145} \textit{Id.} The opinion also suggests that prosecution history estoppel might be limited to amendments made in response to rejections of claims by patent examiners. It states:

\textit{Estoppel arises when an amendment is made to secure the patent and the amendment narrows the patent's scope. . . . A patentee who narrows a claim as a condition for obtaining a patent disavows his claim to the broader subject matter, whether the amendment was made to avoid the prior art or to comply with § 112. We must regard the patentee as having conceded an inability to claim the broader subject matter or at
claims for both patents had been amended for reasons related to patentability. Because there was no question that the amendments narrowed the scope of the patents, the Court concluded that prosecution history estoppel could bar infringement under the doctrine of equivalents.

The Court then proceeded to the question of whether prosecution history estoppel should result in a complete or flexible bar to the use of the doctrine of equivalents. Overruling the Federal Circuit, the Court concluded that a complete bar is inconsistent with the purpose of prosecution history estoppel, which it said is to hold the patentee to inferences that can reasonably be drawn from an amendment of a claim. The Court explained:

By amending the application, the inventor is deemed to concede that the patent does not extend as far as the original claim. It does not follow, however, that the amended claim becomes so perfect in its description that no one could devise an equivalent. After amendment, as before, language remains an imperfect fit for invention. The narrowing amendment may demonstrate what the claim is not; but it may still fail to capture precisely what the claim is.  

As noted previously, the Court's reliance on the limitations of language to justify the doctrine of equivalents is incorrect. Similarly, the imperfection of language does not justify the rejection of a complete bar for prosecution history estoppel. Surely, the patentee in the Festo case understood what "a pair of resilient sealing rings" and "a cylindrical sleeve made of a magnetizable material" were. The Court then offered a completely different justification for rejecting the complete bar: the patentee's lack of foresight. Shifting abruptly from relying on the limitations of language to the unforeseeability of amendments, the Court continued:

There is no reason why a narrowing amendment should be deemed to relinquish equivalents unforeseeable at the time of the amendment and beyond a

least as having abandoned his right to appeal a rejection. In either case estoppel may apply.  

Id. at 737. The patentee had previously argued to the en banc Federal Circuit that prosecution history estoppel should not apply because its amendments had not been required by the patent examiner or made in response to a rejection. Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 234 F.3d 558, 587, 588, 590 (Fed. Cir. 2000) (en banc), rev'd, 535 U.S. 722 (2002). The en banc court rejected the patentee's argument and held that prosecution history estoppel applies to voluntary amendments as well as amendments made in response to the patent examiner. Id. at 568. As the en banc court pointed out, there is no reason to differentiate between amendments related to patentability on the basis of whether they were initiated by the patentee or the Patent Office. The Supreme Court did not consider the question whether prosecution history estoppel applied to voluntary amendments, however. As a result, on remand from the Supreme Court, the en banc Federal Circuit reinstated its holding with respect to voluntary amendments. Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 344 F.3d 1359, 1366 (Fed. Cir. 2003) (en banc).  

146. Festo Corp., 535 U.S. at 738.  
147. See supra notes 134–37 and accompanying text.
fair interpretation of what was surrendered. Nor is there any call to foreclose claims of equivalence for aspects of the invention that have only a peripheral relation to the reason the amendment was submitted. The amendment does not show that the inventor suddenly had more foresight in the drafting of claims than an inventor whose application was granted without amendments having been submitted.\textsuperscript{148}

The patentee's lack of foresight is a more plausible explanation for the narrowing amendments in the \textit{Festo} case than the limitations of language. It may not be unreasonable for a patentee to fail to include in an amended claim variations of the invention that are not readily foreseeable or have only a peripheral relation to the purpose for making the narrowing amendment. Nevertheless, a patentee's failure to include these variations in the amended claim does not necessarily justify expanding the scope of patent protection under the doctrine of equivalents to include the omitted variations any more than an error in a grantor's judgment justifies reformation of a deed.

Next the Court criticized the Federal Circuit for ignoring \textit{Warner-Jenkinson}'s direction to be cautious before making changes in the patent law that would disrupt settled expectations of the inventing community.\textsuperscript{149} It is difficult to see how a patentee would have much in the way of settled expectations with respect to variations of an invention that were outside the literal scope of the claims, however. The insubstantial differences and triple identity standards for the doctrine of equivalents are ambiguous, and a patentee's expectations are further unsettled by the doctrine of equivalents being decided by a jury, rather than a judge. In addition, as the Federal Circuit noted, the Supreme Court had not previously ruled on whether the complete or flexible bar rule should be applied,\textsuperscript{150} and there were conflicting lines of Federal Circuit decisions, with one line applying a complete bar and the other line applying a flexible bar.\textsuperscript{151} Finally, the flexible bar rule was unpredictable as to which equivalents were barred and which were not.\textsuperscript{152}

Nevertheless, after chastising the Federal Circuit for disrupting settled expectations, the Court proceeded to announce a new standard

\begin{itemize}
  \item \textsuperscript{148} \textit{Festo Corp.}, 535 U.S. at 738.
  \item \textsuperscript{149} \textit{Id.} at 739. The \textit{Warner-Jenkinson} opinion did not contain any instructions for courts not to disrupt the settled expectations of the inventing community, however. All the opinion said was that the lengthy history of the doctrine of equivalents supported the Court's refusal to overrule it in the \textit{Graver Tank} case and that Congress could overturn the doctrine through legislation at any time. \textit{Warner-Jenkinson Co. v. Hilton Davis Chem. Co.}, 520 U.S. 17, 28 (1997).
  \item \textsuperscript{150} \textit{Festo Corp.}, 234 F.3d at 569 ("We think it is fair to say that the question of the scope of equivalents available when prosecution history estoppel applies to a claim element has not been directly addressed or answered by the Supreme Court, at least in circumstances where the claim was amended for a known patentability reason.").
  \item \textsuperscript{151} \textit{See id.} at 573.
  \item \textsuperscript{152} \textit{See id.} at 574.
\end{itemize}
for prosecution history estoppel. It held that a patentee could overcome the presumption that the doctrine of equivalents is barred by prosecution history estoppel if any of the following three conditions are met:

The equivalent may have been unforeseeable at the time of the application; the rationale underlying the amendment may bear no more than a tangential relation to the equivalent in question; or there may be some other reason suggesting that the patentee could not reasonably be expected to have described the insubstantial substitute in question.153

The Court explained that the patentee, as the author of the claim language, is expected to draft claims to encompass readily known equivalents, and a decision to narrow claims by amendment is generally a disclaimer of the area between the original and amended claim. It ruled, though, that if any of these three conditions existed, a patentee could not reasonably be found to have surrendered the particular equivalents. Because the Court could not determine from the record whether the patentee had surrendered the equivalents that were involved in the *Festo* case, the Court remanded the case to the Federal Circuit with directions to determine whether any of these conditions existed.154

The first condition is whether the equivalent is foreseeable at the time of the amendment.155 After-arising technology has been dubbed "the quintessential example of an enforceable equivalent,"156 and accommodating it has been called "a primary justification for the doctrine of equivalents."157 Although a number of other cases besides *Festo* have discussed the use of the doctrine of equivalents to protect

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154. Id.
155. The *Festo* decision uses inconsistent language in the last two quotations above with respect to the time for unforeseeability. In the first instance, see supra text accompanying note 148, the Court referred to unforeseeability "at the time of the amendment," but in the second instance, see supra text accompanying note 153, the Court referred to unforeseeability "at the time of the application." On remand, the en banc Federal Circuit ruled that the time of amendment was the relevant time, because that was when the patentee is presumed to have surrendered the equivalent. *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 344 F.3d 1359, 1365 n.2 (Fed. Cir. 2003) (en banc).
DOCTRINE OF EQUIVALENTS

after-arising technology\textsuperscript{158} and the Federal Circuit has provided two hypothetical examples (transistors in relation to vacuum tubes and Velcro® in relation to fasteners),\textsuperscript{159} actual examples of it in the cases are hard to come by.

Probably the leading example of an after-arising equivalent in the caselaw is in \textit{Hughes Aircraft Co. v. United States}.\textsuperscript{160} The patent was for an apparatus for a communications satellite that would automatically orient the satellite so that its antennas pointed toward the earth and its solar panels faced the sun, using a sensor to detect the satellite’s orientation and jets to discharge gas to change the orientation. The patent’s claims called for means to provide an indication of the satellite’s orientation to a location external to the satellite and means for receiving signals from the external location to control the satellite’s jets. There was no literal infringement of the claims, because the defendant’s satellite had a computer on-board to process the data about the satellite’s orientation, rather than one that was external to the satellite.\textsuperscript{161} Applying the triple identity test, the Federal Circuit nevertheless found that there was infringement under the doctrine of equivalents. The court ruled that the development of advanced computers and digital communications techniques after the launch of the plaintiff’s satellite enabled the defendant to do on-board what the patent called for doing on the ground. It held that “an embellishment made possible by [after-arising] technology . . . does not allow the accused spacecraft to escape the ‘web of infringement.’”\textsuperscript{162} It is not clear, however, that the \textit{Hughes Aircraft} case really involved technology that was not reasonably foreseeable. The claims in issue were added by amendment in 1966, the patent was issued seven years later in 1973, and the infringement action was filed only one month after the patent was issued.\textsuperscript{163} It is unlikely that the state of technology changed so rapidly that an on-board computer which was actually used on a satellite in 1973 was not reasonably foreseeable when the amendment adding the claims was made in 1966.\textsuperscript{164} Even if an on-

\textsuperscript{158} See, e.g., Al-Site Corp. v. VSI Int’l, Inc., 174 F.3d 1308, 1320 (Fed. Cir. 1999); Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus., Inc., 145 F.3d 1303, 1310 (Fed. Cir. 1998).
\textsuperscript{159} \textit{Festo Corp.}, 344 F.3d at 1369. The invention of transistors revolutionized electronics, and Velcro® was a significant invention in its field. It seems incongruous, therefore, for the Federal Circuit to offer them as exemplars for the application of the doctrine of equivalents, when the doctrine’s primary purpose is to extend patent coverage to “insubstantial differences” from the literal language of the patent claims.
\textsuperscript{160} 717 F.2d 1351 (Fed. Cir. 1983).
\textsuperscript{161} \textit{Id.} at 1360–61.
\textsuperscript{162} \textit{Id.} at 1365.
\textsuperscript{163} \textit{Id.} at 1355–56.
\textsuperscript{164} This view is supported by one of the expert witnesses in the \textit{Hughes Aircraft} case, who has noted: “There is some indication that the after-developed technology re-
board computer was not feasible in 1966, surely it was foreseeable then that such a development would be possible someday. After-arising technology that is not reasonably foreseeable may therefore be more of a theoretical concern than a real one.

A more fundamental problem with extending patent protection to unforeseeable technology is that it conflicts with the notion that the scope of a patent should be limited to what the patentee invented and the statutory requirements that the patent must (1) contain a written description of the invention, (2) enable a person skilled in the art to practice it, and (3) distinctly claim the subject matter of the invention. Just as Samuel Morse's patent for the telegraph could not extend to other uses of electromagnetism for communication that he did not invent, a patentee should not be entitled to protection for after-arising technology that was unforeseeable at the time of the amendment to the patent application. Clearly, section 112 of title 35 would prohibit a claim for a variation of an invention that was unforeseeable to a person of reasonable skill in the art. It is paradoxical that the doctrine of equivalents should extend patent protection to variations of an invention that could not be expressly claimed. As the Federal Circuit has said:

[A] patentee should not be able to obtain, under the doctrine of equivalents, coverage which he could not lawfully have obtained from the PTO by literal claims. The doctrine of equivalents exists to prevent a fraud on a patent, Graver Tank & Mfg. Co. v. Linde Air Prods. Co., 339 U.S. 605, 608, 70 S.Ct. 854, 856, 94 L.Ed. 1097 (1950), not to give a patentee something which he could not lawfully have obtained from the PTO had he tried.

ferred to in Hughes was available before the time the Federal Circuit thought." Martin J. Adelman & Gary L. Francione, The Doctrine of Equivalents in Patent Law: Questions That Pennwalt Did Not Answer, 137 U. PA. L. REV. 673, 727 n.226 (1989); see also id. at 712 n.170 (identifying one of the authors as an expert witness in the Hughes Aircraft case).

166. See supra text accompanying notes 34-36.
167. Joshua D. Sarnoff, Abolishing the Doctrine of Equivalents and Claiming the Future After Festo, 19 BERKELEY TECH. L.J. 1157, 1178 (2004) ("It is fundamental to American patent law that patentees are not entitled to protection for what they either did not invent or did not disclose to the public."); see also 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, 1955 (2005) ("We reject the popular notion that the Doctrine of Equivalents is especially appropriate in the case of unforeseeable, later-developed technology because this justification focuses on the wrong question.").
The Supreme Court first ruled that the doctrine of equivalents may reach after-arising technology in the Warner-Jenkinson case, but the Festo decision may have elevated the significance of after-arising technology with respect to the doctrine of equivalents by foreclosing most other possibilities for overcoming prosecution history estoppel when there has been a narrowing amendment. Extending patent protection to after-arising technology therefore threatens to cannibalize well-established principles that limit the scope of patent protection to the inventor's actual contributions.

The second condition the Supreme Court identified which would overcome the presumption that resort to the doctrine of equivalents is barred is that "the rationale underlying the amendment may bear no more than a tangential relation to the equivalent in question." On remand in the Festo case, the Federal Circuit ruled that the patentee had not shown that the rationale for the amendments concerning the sealing rings and magnetizable sleeve bore only a tangential relation to the equivalents. The court decided that if the purpose of an amendment was to avoid prior art that covered the equivalent involved in the case, the rationale for the amendment was not tangential to the equivalent. This second condition might exist, though, if a claim originally included a limitation that excluded the equivalent, and the amendment was not related to that limitation.

The third condition the Supreme Court identified which would overcome the presumption that resort to the doctrine of equivalents is barred is that "there may be some other reason suggesting that the patentee could not reasonably be expected to have described the substantial substitute in question." On remand, the en banc Federal Circuit sensibly ruled that this condition must be construed narrowly. Otherwise, it would swallow the general rule of prosecution history estoppel. The Federal Circuit explained:

[This circumstance] is available in order not to totally foreclose a patentee from relying on reasons, other than unforeseeability and tangentialness, to show that it did not surrender the alleged equivalent. Thus, the third criterion may be satisfied when there was some reason, such as the shortcomings

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173. Id. at 1369-70.
174. See generally Matthew J. Conigliaro et al., Foreseeability in Patent Law, 16 BERKELEY TECH. L.J. 1045, 1071 (2001) (arguing that it would be inequitable to apply a bar on account of an amendment "intended to disclaim a totally different type of change than the one the defendant made"). For a recent example, see Insituform Techs. v. Cat Contracting, Inc., 385 F.3d 1360, 1370-71 (Fed. Cir. 2004) (narrowing amendment was tangential to the equivalent).
176. Festo Corp., 344 F.3d at 1370.
of language, why the patentee was prevented from describing the alleged equivalent when it narrowed the claim. When at all possible, determination of the third rebuttal criterion should . . . be limited to the prosecution history record.177

Significantly, the only example the court gave for satisfying this condition was that the limits of language caused the patentee to make the narrowing amendment. Given the flexibility and power of the English language, it is unlikely a patentee will ever be successful in showing that the limits of language were the reason for the narrowing amendment.

Each of the three conditions that the Supreme Court designated as overcoming the presumption against the use of the doctrine of equivalents is narrow. Thus, although the Supreme Court ostensibly overruled the Federal Circuit's adoption of a complete bar rule for prosecution history estoppel in favor of a flexible bar, the practical result of the Festo decision is to severely limit the use of the doctrine of equivalents where a patentee has filed a narrowing amendment. And the Federal Circuit narrowed the availability of the doctrine of equivalents even further in its opinion on remand from the Supreme Court.

On remand, the Federal Circuit reinstated two of the holdings from its previous en banc decision that it determined had not been disturbed by the Supreme Court's decision. The first was that a narrowing amendment, whether voluntary or made in response to a rejection or a request by a patent examiner, would give rise to prosecution history estoppel if made for a substantial reason related to patentability. The second holding was that a narrowing amendment is presumed to be related to patentability unless there is evidence in the prosecution history record that shows otherwise.178 The Federal Circuit then stated that under the Supreme Court's ruling, there is a presumption of a complete bar to the doctrine of equivalents, unless the patentee proves that there was no surrender of a particular equivalent on account of one of the three conditions listed in the Supreme Court's decision. Next, the Federal Circuit held that the issue of whether prosecution history estoppel applies is an issue of law for the court, rather than the jury.179 Thus, if there has been a narrowing amendment, before a claim for infringement under the doctrine of equivalents may be presented to the jury, the trial court must rule that the patentee has either rebutted the presumption that the amendment was made for a reason related to patentability, or has shown that one of the three conditions the Supreme Court identified exists.

177. Id.
178. Id. at 1366.
179. Id. at 1367-68.
The Supreme Court's decisions in the *Winans*, *Graver Tank*, *Warner-Jenkinson*, and *Festo* cases have produced a complex body of law for the doctrine of equivalents. The next Part of this Article summarizes the current state of the law and offers some comments about the future prospects for the doctrine.

V. THE CURRENT LAW OF THE DOCTRINE OF EQUIVALENTS AND ITS FUTURE PROSPECTS

The most striking feature of the current law is the drastic effect that a narrowing amendment to a patent's claim has on the operation of the doctrine of equivalents. In the absence of a narrowing amendment, infringement under the doctrine of equivalents is a question for the jury.\(^{180}\) Literal infringement is also a question for the jury,\(^{181}\) of course, but since the Supreme Court has ruled that claim construction is an issue of law for the judge,\(^{182}\) summary judgment is often available with respect to claims for literal infringement. Once the judge has construed the claims, the judge may be able to determine whether an accused device comes within their scope as a matter of law in order to grant summary judgment against the patentee. A claim for infringement under the doctrine of equivalents presents additional factual issues, such as whether the differences between the accused device and the claims are insubstantial and whether the triple identity test is satisfied. Consequently, in the absence of a narrowing amendment, summary judgment is generally not available with respect to claims for infringement under the doctrine of equivalents.\(^{183}\) More commonly, however, there will have been a narrowing amendment, since most


\(^{181}\) E.g., Ranbaxy Pharmaceuticals Inc. v. Apotex, Inc., 350 F.3d 1235, 1240 (Fed. Cir. 2003) ("Infringement, both literal and under the doctrine of equivalents, is a question of fact."); Teleflex, Inc. v. Ficosa N. Am. Corp., 299 F.3d 1313, 1323 (Fed. Cir. 2002) ("A determination of infringement, both literal and under the doctrine of equivalents, is a question of fact, reviewed for substantial evidence when tried to a jury.").

\(^{182}\) See Markman v. Westview Instruments, Inc., 517 U.S. 370, 372 (1996) ("We hold that the construction of a patent, including terms of art within its claim, is exclusively within the province of the court.").

\(^{183}\) Probably the only way that summary judgment is available in the absence of a narrowing amendment is if application of the doctrine of equivalents would violate the "All Elements" rule by entirely vitiating an element of a claim. Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17, 39 n.8 (1997); see also Lockheed Martin Corp. v. Space Sys./Loral, Inc., 324 F.3d 1308, 1321 (Fed. Cir. 2003) (affirming summary judgment of no infringement under the doctrine of equivalents on account of the "All Elements" rule).
patent claims are amended during their prosecution, and prosecution history estoppel will bar use of the doctrine of equivalents, unless the trial judge finds either that the amendment was not made for a reason related to patentability or any of the three conditions in the Festo case were met.

When a claim for infringement under the doctrine of equivalents is tried, the jury will be given instructions on the substantive law. An example of what a jury may receive is the following Model Patent Jury Instruction 2.4:

2.4 INFRINGEMENT UNDER THE DOCTRINE OF EQUIVALENTS

If you decide that [alleged infringer]'s [product] [method] does not literally infringe an asserted patent claim, you must then decide whether that [product] [method] infringes the asserted claim under what is called the "doctrine of equivalents."

Under the doctrine of equivalents, the [product] [method] can infringe an asserted patent claim if it includes [parts] [steps] that are equivalent to the requirements of the claim. If the [product] [method] is missing an identical or equivalent [part] [step] to even one requirement of the asserted patent claim, the [product] [method] cannot infringe the claim under the doctrine of equivalents. Thus, in making your decision under the doctrine of equivalents, you must look at each individual requirement of the asserted patent claim and decide whether the [product] [method] has an identical or equivalent [part] [step] to that individual claim requirement.

A [part] [step] of a [product] [method] is equivalent to a requirement of an asserted claim if the differences between the [part] [step] and the requirement would be considered not substantial by a person of ordinary skill in the field at the time of the alleged infringement.

[One way to decide whether any difference between a requirement of an asserted claim and a [part] [step] of the [product] [method] is not substantial is to consider whether, as of the time of the alleged infringement, the [part] [step] of the [product] [method] performed substantially the same function, in substantially the same way, to achieve substantially the same result as the requirement in the patent claim].

[In deciding whether any difference between a claim requirement and the [product] [method] is not substantial, you may consider whether, at the time of the alleged infringement, persons of ordinary skill in the field would have known of the interchangeability of the [part] [step] with the claimed requirement. The known interchangeability between the claim requirement and the [part] [step] of the [product] [method] is not necessary to find infringement under the doctrine of equivalents. However, known interchangeability may support a conclusion that the difference between the [part] [step] in the [product] [method] and the claim requirement is not substantial. The fact that a [part] [step] of the [product] [method] performs the same function as the claim requirement is not, by itself, sufficient to show known interchangeability].

Application of the doctrine of equivalents is the exception, not the rule. Patent claims must give the public fair notice of what was patented, so others

184. Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 234 F.3d 558, 638 n.3 (Newman, J., concurring in part, dissenting in part) ("Informal inquiry reports that for simple inventions, at most 10–15% of patents are granted without claim amendment, although very rarely without argument. For complex inventions the percentage of unamended applications is vanishingly small.").
can avoid infringing the patent by designing around the claims. On the other hand, the patent holder should not be deprived of the benefits of its patent by others who use the essence of an invention while barely avoiding the literal language of the patent claims.

[You may not use the doctrine of equivalents to find infringement if you find that [alleged infringer]'s [product] [method] is the same as what was in the prior art before the application for the [ ] patent or what would have been obvious to persons of ordinary skill in the field in light of what was in the prior art. A patent holder may not obtain, under the doctrine of equivalents, protection that it could not have lawfully obtained from the Patent and Trademark Office. The [patent holder] must prove to you that what it attempts to cover under the doctrine of equivalents was not in or would not have been obvious from the prior art].185

While this instruction does a good job of reflecting the confusing state of the doctrine of equivalents, it is likely to bewilder a jury. The third and fourth paragraphs contain the insubstantial differences and triple identity standards for the doctrine, both of which the Supreme Court criticized in the Warner-Jenkinson case.186 The fifth and sixth paragraphs are equivocal. The fifth paragraph explains that while the known interchangeability of a part of the accused device may support a finding of infringement under the doctrine of equivalents, it will not necessarily do so and known interchangeability is not necessary for infringement. The sixth paragraph sets out the competing considerations with respect to the doctrine of equivalents, but it does not tell the jury what is required for a finding of equivalents. Similarly, while the seventh paragraph explains that the doctrine of equivalents cannot reach variations of an invention that could not be claimed because they were obvious, it does not specify what variations the doctrine of equivalents can reach. Thus although Model Patent Jury Instruction 2.4 offers some guidance on what is not covered by the doctrine of equivalents, nowhere does it clearly specify what elements must be proven to establish a claim for infringement under the doctrine of equivalents. This is no fault of the Model Instruction, which is an accurate summary of the current law, but instead is a consequence of a fundamental indeterminacy in the doctrine of equivalents. This can only result in jury confusion and uncertainty as well as anxiety for a patentee's competitors who cannot tell whether a variation of an invention that is outside the literal scope of the claims is lawful or infringing.

Although the Warner-Jenkinson and Festo decisions reaffirmed the doctrine of equivalents, both narrowed its scope. By articulating a ra-

186. Warner-Jenkinson, 520 U.S. at 39-40 ("There seems to be substantial agreement that, while the triple identity test may be suitable for analyzing mechanical devices, it often provides a poor framework for analyzing other products or processes. On the other hand, the insubstantial differences test offers little additional guidance as to what might render any given difference 'insubstantial.'").
tionale for the doctrine, the Festo Court may also have laid the groundwork for further restrictions on it and possibly the doctrine's eventual demise. The Festo opinion originally stated that the "doctrine of equivalents is premised on language's inability to capture the essence of innovation," but it eventually based its recognition of exceptions to prosecution history estoppel more broadly on whether "at the time of the amendment one skilled in the art could . . . reasonably be expected to have drafted a claim that would have literally encompassed the alleged equivalent." In future cases, it is possible that the Court may not limit this rationale to narrowing amendments that are related to patentability, but may extend it to original patent claims. If a patentee who makes a narrowing amendment is presumed to disclaim the equivalents between the original and amended claim in some circumstances, then might there also be circumstances where a patentee who files an original claim would be presumed to disclaim the equivalents that are outside of it? To be sure, the disclaiming presumption may be stronger for an amendment than an original claim. As the Festo Court noted for the case of a narrowing amendment, "the prosecution history has established that the inventor turned his attention to the subject matter in question, knew the words for both the broader and narrower claim, and affirmatively chose the latter." An amendment may tend to focus the patentee's attention on the particular aspect of the invention to which the amendment relates, and therefore, the courts may expect more of the patentee with respect to drafting the amendment to cover all equivalents that the patentee wants to claim. Nevertheless, there may be circumstances where one could expect the patentee to have gotten it right the first time, and not have had to be prompted by a claim rejection or a patent examiner's request for a narrowing amendment. The clearest example would be the dedication rule for disclosed but unclaimed subject matter, in which the patentee has disclosed a variation of the invention in the written description but then failed to claim it. The disclosure shows that the patentee was

188. Id. at 741.
189. See Johnson & Johnston Assocs. v. R.E. Serv. Co., 285 F.3d 1046, 1056 (Fed. Cir. 2002) (Rader, J., concurring) (advocating the following principle: "the doctrine of equivalents does not capture subject matter that the patent drafter reasonably could have foreseen during the application process and included in the claims"); Jeremy T. Marr, Comment, Foreseeability as a Bar to the Doctrine of Equivalents, 2003 B.C. INTELL. PROP. & TECH. F. 10310 (2003) (arguing for a foreseeability bar to limit the doctrine of equivalents for original claims).
190. Festo Corp., 535 U.S. at 735.
191. See id. at 741 ("When the patentee has chosen to narrow a claim, courts may presume the amended text was composed with awareness [of the prosecution history estoppel] rule and that the territory surrendered is not an equivalent of the territory claimed.").
actually aware of the variation, and therefore, the patentee could reasonably have been expected to draft a claim that covered the variation.

In *Johnson & Johnston Associates v. R.E. Service Co.*,192 the Federal Circuit held in an en banc decision that a patentee could not assert the doctrine of equivalents for a variation of an invention that was disclosed in the patent application but was not within the literal scope of the claims. The patent at issue in the *Johnson & Johnston* case was for a component used in manufacturing printed circuit boards that consisted of an aluminum sheet that was glued to a copper foil and served as a base for the copper foil. The copper foil was extremely thin and provided the electrical connections for printed circuit boards. The aluminum base protected the fragile copper foil from damage during the manufacturing process, and the aluminum base was eventually removed from the printed circuit boards and recycled. The patent application disclosed that while aluminum was the preferred material for the base, other metals such as stainless steel could also be used. The patent claims were limited to aluminum, however, and the defendant's accused product used steel instead of aluminum for the base.193 The jury returned a verdict of infringement under the doctrine of equivalents, but the Federal Circuit reversed. The court held that a patentee who disclosed, but did not claim subject matter, dedicated the unclaimed subject matter to the public, and could not recapture it with the doctrine of equivalents.194

The dedication rule for disclosed but unclaimed subject matter is similar to prosecution history estoppel in that both doctrines preclude reliance on the doctrine of equivalents on account of the patentee's actions during prosecution.195 Both have a common rationale because they represent circumstances where the patentee could reasonably have been expected to draft a claim that encompassed the equivalents. The dedication rule for disclosed but unclaimed subject matter involves a failure to cover the equivalents in the original application, as opposed to in a narrowing amendment, though, and therefore, it involves an extension of the rationale from narrowing amendments to

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192. 285 F.3d 1046 (Fed. Cir. 2002) (en banc).
193. *Id.* at 1049–50.
194. *Id.* at 1054. The Federal Circuit noted that a patentee who inadvertently failed to claim disclosed subject matter could nevertheless receive patent protection for it by either filing a continuation application during the pendency of a related application or else file a reissue application within two years of issuance of the patent. *Id.* at 1055.
195. Toro Co. v. White Consol. Indus., 383 F.3d 1326, 1331 (Fed. Cir. 2004) ("Under both doctrines, resort to the doctrine of equivalents is precluded based on actions of the patentee during prosecution evincing a surrender or dedication of subject matter.").
original patent applications. Another possible extension of this rationale to original patent applications is suggested by the Federal Circuit's en banc decision in *Honeywell International Inc. v. Hamilton Sundstrand Corp.*

In the *Honeywell* case, the Federal Circuit applied prosecution history estoppel to amendments in which dependent claims were rewritten as independent claims when the independent claims to which the dependent claims referred were cancelled. Patent claims are commonly written in groups in which the first claim (the independent claim) is the broadest, and subsequent claims (the dependent claims) incorporate the first claim by reference and include additional limitations. If a patent examiner rejects an independent claim because of prior art that does not affect the dependent claims, the patentee may cancel the rejected independent claims and rewrite the dependent claims as independent claims which include all the limitations of the original independent claim, and then the new independent claims may be allowed. The Federal Circuit held in the *Honeywell* case that amendments in which dependent claims were rewritten as independent claims were narrowing amendments for purposes of *Festo*, and therefore, prosecution history estoppel could apply to equivalents that fell between the original independent and dependent claims. This result is consistent with the rationale for prosecution history estoppel that the Supreme Court articulated in *Festo*, because rewriting a dependent claim in independent form ought to focus the patentee's attention on the differences between the original independent and dependent claims so that the patentee could reasonably be expected to claim the equivalents.

The dissenting opinion in the *Honeywell* case complained that the majority's holding "will simply drive patent applicants away from dependent claims." It appears that the dissent was assuming that patentees could avoid losing the benefit of the doctrine of equivalents

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197. 370 F.3d 1131 (Fed. Cir. 2004) (en banc).

198. See 35 U.S.C. § 112 ¶ 4 (2000) ("[A] claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form shall be construed to incorporate all the limitations of the claim to which it refers.").

199. *Honeywell*, 370 F.3d at 1144. The Federal Circuit remanded to the trial court for a determination of whether the patentee could overcome the presumptive surrender of equivalents. *Id.*

200. Cf. *Festo Corp. v. Shaketsu Kogyo Kabushiki Co.*, 535 U.S. 722, 735 (2002) (stating that by making a narrowing amendment, "the inventor turned his attention to the subject matter in question, knew the words for both the broader and narrower claim, and affirmatively chose the latter").

by using only independent claims. But if the correct focus is on whether the patentee could "reasonably be expected to have drafted a claim that would have literally encompassed the alleged equivalent," there should be no distinction between whether a dependent claim was rewritten as an independent claim and allowed after the cancellation of the independent claim on which the dependent claim was based, or a broader independent claim was cancelled and a narrower independent claim was allowed. The patentee's ability to capture the equivalent would be the same whether a dependent claim or a narrower independent claim was used. Because distinguishing between a dependent claim and a narrower independent claim would exalt form over substance,\(^{202}\) it is likely that the Federal Circuit would conclude that they should be treated the same way.\(^{203}\) If the Federal Circuit reached this conclusion, it would then have extended the *Festo* rationale beyond narrowing amendments to original claims in patent applications.

The cases of disclosed but unclaimed subject matter and an independent claim followed by narrower independent claims both involve instances where the patent application itself indicates that the patentee could reasonably have been expected to include an equivalent in the claims. Other parts of the prosecution history besides the patent application might also show that the patentee was aware of an equivalent, and in future cases, the Federal Circuit might extend the dedication rule\(^{204}\) from *Johnson & Johnston* to any disclosures in the prosecution history. Whether the Federal Circuit would extend the dedication rule to permit the patentee's actual knowledge of the equivalent to be proved by evidence outside the prosecution history is another matter, however. On the one hand, extrinsic evidence of the patentee's knowledge of an equivalent could provide a basis for barring the patentee from asserting the doctrine of equivalents because the patentee could reasonably have been expected to draft claims to encompass the equivalents. On the other hand, the extrinsic evidence would not be in the public record, and so, relying on it could produce uncertainty as to the scope of patent protection. It would therefore be more appropriate to use the standard of a person of ordinary skill in the art,\(^{205}\) instead of the patentee's actual knowledge, to decide

\(^{202}\) *Cf.* Barnes's Lessee v. Irwin, 2 U.S. (2 Dall.) 199, 202 (1793) ("The substance, and not the form, ought principally to be regarded.").

\(^{203}\) *See* Wing H. Liang, Note, Honeywell: *The Straw That May Just Break the Inventor's Back*, 26 CARDOZO L. REV. 2655, 2685-86 (2005) (stating that prosecution history estoppel would apply to independent claims).

\(^{204}\) *See supra* text accompanying note 192-96.

\(^{205}\) *Cf.* Lighting World, Inc. v. Birchwood Lighting, Inc., 382 F.3d 1354, 1357 (Fed. Cir. 2004) ("[E]quivalence [is] evaluated from the perspective of one of ordinary skill in the art.").
whether the patentee could reasonably have been expected to draft claims to encompass the equivalents.

If the rationale from Festo was extended from narrowing amendments to original patent claims, there would be little left of the doctrine of equivalents. The doctrine of equivalents would then be restricted to after-acquired technology or narrow circumstances where there was some other reason that the patentee could not have been expected to describe the equivalent in the patent application.206 As previously noted,207 providing patent protection for after-acquired technology conflicts with well-established principles of patent law that restricts the scope of patent protection to the inventor's contribution. It would create a Catch-22 for the doctrine of equivalents to be limited to unforeseeable variations of an invention that are outside the scope of patent protection because the patentee could not foresee them. The protection for after-acquired technology is therefore not likely to survive for long, and when it finally fades away, the doctrine of equivalents will be gone, too.

VI. CONCLUSION

There was a good rationale for the doctrine of equivalents 150 years ago when the Supreme Court decided Winans v. Dinmead.208 But the development of patent claims to stake out the scope of patent protection has made the doctrine obsolete. By producing uncertain benefits for patentees, the arcane doctrine imposes substantial costs on their competitors who cannot predict what the scope of patent protection will turn out to be. The doctrine's uncertain application also contributes to the high cost of patent litigation. Nevertheless, the Supreme Court has twice reaffirmed the doctrine in the past ten years, because it is "a firmly entrenched part of the settled rights protected by the patent."209 Legal inertia may be powerful, but it will not sustain the doctrine of equivalents forever. As Justice Holmes put it eighty years ago:

It is revolting to have no better reason for a rule of law than that so it was laid down in the time of Henry IV. It is still more revolting if the grounds upon which it was laid down have vanished long since, and the rule simply persists from blind imitation of the past.210

206. The other exception noted in the Festo case was that "the rationale underlying the amendment may bear no more than a tangential relation to the equivalent in question." Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722, 740 (2002). This would not apply to original patent claims.
207. See supra text accompanying notes 165–69.
208. 56 U.S. (15 How.) 330 (1853).
In the course of reaffirming the doctrine of equivalents in the *Warner-Jenkinson* and *Festo* cases, the Supreme Court significantly narrowed its application through the use of prosecution history estoppel. The Supreme Court attempted to justify the doctrine of equivalents on the basis of the limits of language. But the limits of language are not what prevents a patentee from drafting claims that encompass variations of an invention that are later practiced by a competitor. Instead, the patent drafter's lack of foresight is the culprit. Language may be incapable of defining the doctrine of equivalents, but that is the result of the doctrine's incoherence, rather than the fault of language. The other rationale that the Supreme Court has given for the doctrine is that there may be circumstances, such as the possibility of the after-acquired technology, such that a patentee could not reasonably be expected to draft a claim to encompass a variation of the invention that is equivalent to what is claimed. This rationale portends further narrowing of the doctrine and perhaps its eventual demise. Thus, the future for the doctrine of equivalents is less than promising.