

An Economic Analysis of the Doctrine of Equivalents

by Joseph S. Cianfrani^[1]

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I. Introduction

1. The problem is familiar to patent practitioners. A client planning to enter an area of technology dutifully consults his patent counsel to ensure that there are no patents that cover a proposed

product. The patent counsel returns with a number of patents related to the technology at issue. The client wants only a single piece of information: "If I produce this product, will I be sued for patent infringement?" After reviewing the claims of the patent, the lawyer tells the client: "You don't literally infringe any of the patents we could find, but..." At this point the lawyer tries to explain to the client that the product could infringe under the doctrine of equivalents but that only a jury to be picked several years and several million dollars later truly knows the answer.

2. While analysis under the doctrine of equivalents is certainly more sophisticated than this, the ultimate answer to the client can often be no more than a legalese version of 'probably' or 'probably not'. Armed with this information, the client is expected to make decisions on whether to invest millions of dollars in a technology, risk millions more in damages from possible infringement, have the engineering department make costly redesigns in the product, or to forego the business area altogether.^[2]
3. This note will trace the history and development of the doctrine of equivalents and will examine the application of the doctrine by modern courts. It will then examine the economic costs and benefits of the doctrine of equivalents and attempt to explain how significant cases in the U.S. Supreme Court and the Court of Appeals for the Federal Circuit affect the economic incentives of both the patentee and the potential infringer. Finally, this note will explain how the doctrine of equivalents should be applied to reach the most socially efficient solution by allowing the doctrine to be applied only where its social benefits outweigh its costs.

II. The Economic Purposes of the Patent System

4. The United States Constitution provides that "Congress shall have Power To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."^[3] Pursuant to this power, over the last two hundred years, Congress has passed a series of Patent Acts which allow inventors to obtain, for a limited time, the right to exclude others from making, using or selling their inventions^[4] in exchange for a public disclosure of the invention and a detailed description of how to make and use the invention. The detailed disclosure serves dual purposes. First, it enables the public to make and use the invention once the statutory period has expired and to make use of the disclosure to develop improvements even before the patent expires. Second, the disclosure serves to provide notice to the public of the boundaries of the patent grant, thereby enabling parties to avoid infringement and to "design around" the patent. In this way, further advances in the field of the disclosed invention can be made even before the patent expires.

III. The History of The Doctrine of Equivalents

A. The 1790 Act

5. Originally, claims were not required of a patentee. The patentee was merely required to submit a

description to the Patent Office of that process or device to which the patentee thought he was entitled. The Patent Act of 1790 did not use the term "claim", but simply required the inventor "to distinguish the invention or discovery from other things before known and used".^[5] A similar provision appeared in the 1793 Patent Act which required only a "written description of ... [the] invention ... in such full, clear and exact terms, as to distinguish the same from all other things before known, and to enable any person skilled in the art or science of which it is a branch, ... to make, compound and use the same."^[6] Without a claims requirement, the 1790 and 1793 Patent Acts relied on the description of the invention to define the scope of the rights granted to the patentee.

6. Under the 1790 and 1793 Patent Acts, when a patent was litigated, the court simply read the description and decided whether the accused device or process violated the "spirit" of the invention.^[7] Courts stated that their mission was to determine whether the accused device was "substantially, in [its] principles and mode of operation, like" the patented invention as defined by the statement of the invention filed in the patent office.^[8] With respect to minor changes evading the language of the description, one court noted that "[m]ere colorable differences, or slight improvements, cannot shake the right of the original inventor."^[9] With this interpretation of the patent rights, courts granted broad and sweeping rights to the patentee to exclude competitors who had very little information from which to determine whether or not they infringed.

B. The 1836 Act

7. In 1836, Senator Ruggles moved the Congress to supersede the patent Act of 1793 as unworkable.^[10] According to Sentaor Ruggles, the problem with the 1793 Act was that there was no system of examination and many invalid patents were issued which 'read' on the prior art.^[11] The Congress undertook an effort to revamp the patent laws to ensure that the patents issued were valid in order to avoid litigation over validity which had become commonplace under the 1793 Act.^[12] The new patent Act was enacted on July 4, 1836 and included a heightened description requirement and instituted a procedure whereby patent applications were examined for validity in light of the prior art.^[13] Although the Patent Act of 1793 had no explicit claims requirement, practitioners had been including claims in the description of their invention to ensure the protection of what they perceived to be their invention so that the courts did not overly restrict the scope of their patent.^[14]
8. In the 1836 Patent Act, Congress codified the judicial interpretation requiring "claim language" and required for the first time that patents be examined before issue.^[15] The act required applicants to "particularly specify and point out the part, improvement, or combination which he claims as his own invention or discovery."^[16] The act did not explain how the description or the claims were to be used in interpreting the patent. Inventors attempted to meet the claim requirement by including the statement "substantially as herein set forth"^[17] or similar language in the description. The purpose of this statement was to transform the entire description or specification into a claim so that the patentee essentially 'claimed' everything in the specification.

Despite the additional requirement of claim language, infringement analysis generally remained the same with courts looking not at the claims in order to determine the bounds of the patent grant, but to the "essence" of the invention.

9. In 1853, the Supreme Court handed down the *Winans v. Denmead*[\[18\]](#) decision, which is generally regarded as having spawned the doctrine of equivalents. The *Winans* patent was directed to a coal car body formed in the shape of a cone. At that time, coal cars were of primarily rectangular shape and required heavy reinforcements on the side walls of the car. The only claim at issue in the *Winans* patent stated that the body of the coal car was "in the form of a frustum of a cone, substantially herein described, whereby the force exerted by the weight of the load presses equally in all directions, and does not tend to change the form thereof".[\[19\]](#) The conical shape evenly distributed the weight of the coal, eliminating the need for heavy reinforcements on the side walls, thereby making the car much lighter and more efficient to transport. The patent stated that the improvement allowed the car to carry double the weight of earlier cars, thereby reducing transportation costs by up to 50 percent. The accused structure was in the form of an octagon, or a "pyramid" and also did not require side wall reinforcements.[\[20\]](#)
10. All of the parties agreed that the accused device did not literally infringe the claim of the *Winans* patent since it was not formed "in the frustum of a cone". The Supreme Court likewise determined that the device did not literally infringe the patent since the device did not 'read on' the claim. However, the Supreme Court nonetheless reversed a finding of non-infringement by the lower court which instructed the jury that the patent covered conical and not rectilinear cars and in so doing announced the creation of the doctrine of equivalents. The Court found that the claim language "frustum of a cone" simply referred to a single embodiment as an example of what the patentee intended to claim.

It is generally true, when a patentee describes a machine, and then claims it as described, that he is understood to intend to claim, and by law does actually cover, not only the precise form he has described, but all other forms which embody his invention; it being a familiar rule, that to copy the principle or mode of operation as described, is an infringement, although such copy should be totally unlike the original in form or proportions.[\[21\]](#)

The Supreme Court's opinion was primarily concerned with what the individual Justices thought the invention by *Winans* was, and not the 'conical' claim limitation. "It is the duty of courts and juries to look though the form for the substance of the invention - for that which entitled the inventor to his patent, and which the patent was designed to secure."[\[22\]](#) "The patentee having claimed in that form which most perfectly embodies it, is, in contemplation of law, deemed to claim every form in which his invention may be copied, unless he manifests an intention to disclaim some of those forms."[\[23\]](#)

11. The four dissenters were concerned that there would be a large chilling effect on the public if the Court announced an unbounded expansion to the breadth of the patent rights conferred on the

patentee.^[24] Justice Campbell, in dissent, warned that "[n]othing ... will be more mischievous, more productive of oppressive and costly litigation, of exorbitant and unjust pretensions and vexatious demands, more injurious to labor, than a relaxation of these wise and salutary requisitions of [the claims requirement]."^[25]

12. Soon after the *Winans* decision courts began to follow a form of the function, way, result test seen much later in *Graver Tank*.^[26]

If the invention of the patentee be a machine, it will be infringed by a machine which incorporates in its structure and operation the substance of the invention; that is, by an arrangement of mechanism which performs the same service or produces the same effect in the same way, or substantially the same way.^[27]

This became the *de facto* test of infringement for many years.

C. The 1870 Act

13. In 1870, Congress once again amended the Patent Act. The new act required both a description and claims and added the requirement of a 'best mode'.^[28] The Patent Act of 1870 introduced the peripheral system of claims and required the applicant to "particularly point out and distinctly claim" his invention.^[29] This requirement indicated an intent by Congress to move away from the central definition theory and to accommodate the notice function of claims in a peripheral system of claiming the invention.^[30] The central definition theory seeks to ensure that the patentee is protected for the entire advance bestowed upon the public. It uses the doctrine of equivalents to hold devices infringing which are not within the literal claim language, but which retain the benefit of the advance bestowed on the public by the patentee.^[31] When claims are interpreted under a central definition theory paradigm they function as merely an example of the invention or an illustration of the inventive idea.^[32] Under the central definition theory the claim requirement functions as a means to specify the subject matter to be examined by the patent office, not to measure the scope of protection.^[33] It is therefore left to the courts to determine the scope of protection. The central definition theory comes at the expense of certainty to the public. When the central definition theory is employed, the public has little evidence from which to ascertain whether a particular device will infringe a patent. The 1836 Patent Act requiring that the inventor 'point out' the part, etc., which he claims as his invention or discovery is an example of the central definition theory of patents.^[34] It was under this system that the doctrine of equivalents was developed. However, today the focus of the patent system has changed and is now operating under a peripheral system of definition in which the patentee is required to particularly point out the boundaries of the invention through the use of claims.
14. The peripheral system of patents seeks to increase the reliability on the claims by the public by limiting the bounds of the patent to that covered by the claims and a narrow range of equivalents. After the 1870 Patent Act the Supreme Court began to use claims as the sole measure of the rights

granted to the patentee. In *Merrill v. Yeomans*, the Supreme Court stated that the claims limit the rights granted by the patent.^[35] In *Yeomans*, the claims only covered the apparatus and the process, but not the resulting product.^[36] In an infringement suit for the distilled oil, the Supreme Court stated that "[the 1870 Patent Act] requires of the applicant a distinct and specific statement of what he claims to be new, and to be his invention".^[37] "The distinct and formal claim is, therefore, of primary importance, in the effort to ascertain precisely what it is that is patented to the appellant in this case."^[38] The Court subsequently refused to extend the patent protection to the unclaimed, but fully described, distilled oil from the patented process.^[39] The Court was wary that the public would be harmed by vague and nebulous claims.^[40] This holding was followed in *Keystone Bridge v. Phoenix Iron Co.*^[41] in which the Supreme Court stated that the claims were necessary to permit the public to know what the extent of the patent rights were.^[42] "The courts have no right to enlarge a patent beyond the scope of its claim as allowed by the Patent Office".^[43] The Supreme Court decided several other cases in the same manner, noting that the public has the right to know with reasonable certainty, the rights conferred by the patent.^[44]

15. Even though the claims defined the invention, courts also allowed 'equivalents' of claimed devices or combinations to be held infringing under *Winans*. In *Gould v. Rees*^[45] the Supreme Court continued to utilize the doctrine of equivalents in situations where the accused infringer used known substitutes for claimed elements. "[I]f the substitute performs the same function and was well known at the date of the patent as a proper substitute for the omitted ingredient it is an 'alteration' and still infringes the patent."^[46] In *Burr v. Duryee*^[47], the Supreme Court stated that where a substantial identity existed between the patented and accused process, infringement was made out.^[48] The Court stated that "infringement is possible because the accused process is a copy of the patented invention with such variation as is consistent with it being the same thing."^[49]
16. Early in the life of the 1870 Patent Act, commentators recognized that the general principle "that a patentee is held to be bound by the claim of his patent ... is in reality almost worthless on account of its corollary, that a claim must be construed according to the specifications and drawings [and according to the doctrine of equivalents]."^[50] Commentators continued to question whether the method of paying only lip service to the claims was really the best way of advancing the goals of the patent system as it placed an enormous burden on the courts and private individuals to determine the true scope of the patent grant.^[51]
17. In the following years, the Supreme Court limited the range of equivalents through several mechanisms, most notably file wrapper estoppel. File wrapper estoppel prevents a patentee from claiming as an equivalent those elements given up during prosecution.^[52] "[R]ecourse may not be had to that doctrine [of equivalents] to recapture claims which the patentee has surrendered by amendment."^[53]
18. In *Graver Tank v. Linde Air Products*^[54] the Supreme Court addressed the situation in which the

accused process was outside the literal claims but where the interchangeability of the accused composition with that of the claimed composition was obvious to those skilled in the art.^[55] In *Graver*, the patented invention related to arc welding, in which large plates, several inches thick, are welded at high speed in a single pass.^[56] The patent claimed the process together with its electric welding flux. Claim 1 included the limitation that a combination of an alkaline earth metal silicate and calcium fluoride be used as the welding flux in the patented process. The specification, but not the claims, disclosed that the preferred alkaline earth metal is magnesium, but that manganese which is not an alkaline earth metal will work in a similar fashion.^[57] The accused flux used a similar composition, but substituted manganese for magnesium as the flux base, thereby avoiding the literal language of the claim.^[58]

19. The Supreme Court stated that the doctrine of equivalents encompasses a device outside the literal claims of the patent when it performs "the same function in the same way achieving the same result."^[59] This became known as the 'triple identity' test or 'tripartite' test for determining whether there is infringement under the doctrine of equivalents. In *Graver Tank*, the Supreme Court stated the purpose of the doctrine of equivalents:

Courts have also recognized that to permit imitation of a patented invention which does not copy every literal detail would be to convert the protection of the patent grant into a hollow and useless thing. Such a limitation would leave room for -- indeed encourage -- the unscrupulous copyist to make unimportant and insubstantial changes and substitutions in the patent which, though adding nothing, would be enough to take the copied matter outside the literal claim, and hence outside the reach of the law. Outright and forthright duplication is a dull and very rare type of infringement. To prohibit no other would place the inventor at the mercy of mere verbalism and would be subordinating substance to form. It would deprive him of the benefit of his invention and would foster concealment rather than disclosure of inventions, which is one of the primary purposes of the patent system.^[60]

20. According to the *Graver* court, an important factor in determining whether an element is an equivalent of a claimed element is whether persons reasonably skilled in the art would have known of the interchangeability of an ingredient not contained in the patent with one that was.^[61] The specification need not specifically disclose the element as a substitute for the doctrine to apply. In holding that the accused product infringed the patent, the Court focused on the fact that those skilled in the art commonly knew manganese could be substituted to achieve the same results as a flux using an alkaline metal.^[62]
21. Similar to the *Winans* dissent, the dissent in *Graver* was concerned with the chilling effect the uncertainty introduced into the patent system by the doctrine of equivalents would have on the public.^[63] The dissent believed that any equivalents the patentee failed to cover literally should be corrected through statutory reissue proceedings.^[64] The decision by the Supreme Court in *Graver Tank* marked a significant retreat from the principle that "[w]hat is not specifically claimed

is dedicated to the public."[\[65\]](#)

D. The 1952 Act

22. The Patent Act of 1952, like the 1870 Patent Act, is a peripheral system of patent protection requiring that an applicant "definitely and particularly point out what the applicant claims as his invention."[\[66\]](#) Additionally, the Act allowed claims to be written in a means-plus-function form:
- an element in a claim or 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 or acts described in the specification and equivalents thereof.[\[67\]](#)
23. The above reference to "equivalents" is the only place in the entire patent act where the term is mentioned or even suggested. As an important exception to the peripheral system of patent protection the doctrine of equivalents has become a license for judges to "do justice". Despite the lack of statutory basis for the doctrine of equivalents, one of the writers of the 1952 Patent Act stated that the purpose of the 1952 Patent Act was to codify the existing patent laws in view of recent decisions by the Supreme Court.[\[68\]](#) Since the *Graver* decision was handed down two years before the 1952 Patent Act was enacted, Congress' silence on the doctrine of equivalents has been seen as tacit approval.[\[69\]](#) Any disagreement with the *Graver* decision and its progeny going all the way back to *Winans* certainly would have been addressed explicitly since the 1952 Patent Act was avowedly part of a larger effort to recodify outdated law. This is especially true in light of the fact that the notes to the 1952 Patent Act explicitly make clear the several Supreme Court decisions the Act was intended to overrule and one decision the new Act explicitly intended to leave intact.[\[70\]](#)

IV. The *Hilton-Davis* Decision

24. Hilton Davis and Warner Jenkinson both manufacture food dyes. In order to obtain FDA approval, food dyes cannot contain impurities above a certain level. Ultrafiltration is a well known process for removing impurities in dyes to meet FDA standards. The ultrafiltration process forces the dye solution through a permeable membrane under pressure. Impurities too large to fit through the apertures in the membrane are retained by the membrane and removed. Hilton-Davis owned a patent (U.S. Patent No. 4,560,746) that claimed an ultrafiltration process for food dyes using a set pore diameter for the membrane, a pH between 6 and 9, and a pressure between 200 and 400 p.s.i.g.[\[71\]](#) The prior art included references using the process claimed by Hilton Davis at a pH above 9, and other ultrafiltration processes using pH ranges from 2 to 8. However, none of the prior art references disclosed the use of the ultrafiltration process for food dyes.[\[72\]](#) Originally claiming a larger range, Hilton Davis narrowed the claimed range to between 6 and 9 to avoid the prior art and the patent was issued.[\[73\]](#) Hilton Davis learned that Warner Jenkinson used a similar

process and sued for patent infringement in 1991. Warner-Jenkinson avoided the literal language of Claim 1 by using a pH of 5 and a pressure of 200 to 500 p.s.i.g.^[74] Conceding that the Warner-Jenkinson process did not literally infringe the '746 patent, Hilton Davis claimed that the process infringed under the doctrine of equivalents.

25. The Federal Circuit asked the parties to brief three questions for the court:

1. Does the doctrine of equivalents involve anything more than the "function, way, result" test identified in *Graver Tank*?
2. Is infringement under the doctrine of equivalents an equitable remedy to be decided by a judge or an issue of fact to be decided by a jury?
3. Is the application of the doctrine of equivalents discretionary to be applied depending on the facts of each case?

The court also received nine *amicus curiae* briefs stating a myriad of positions for various parties.

26. In answering question 1 above, the Federal Circuit stated that "[a]s technology becomes more sophisticated, and the inventive process more complex, the function-way-result test may not invariably suffice to show the substantiality of the differences."^[75] The court further stated that the function-way-result test is not "the" test for the doctrine of equivalents, but is "a" test that is applicable in many cases. However, the court stressed other factors that must be considered when determining whether a variation on a patented device is an "insubstantial change". Recognizing that designing around "is the stuff of which competition is made and is supposed to benefit the consumer"^[76], the Federal Circuit permits the fact finder to infer that "a competitor attempting to design around has designed substantial changes into the new product to avoid infringement."^[77] The court is careful to explain that independent development is not designing around, but is evidence of whether copying took place.^[78] Where there is evidence of copying, the court would allow the fact-finder to infer that a fair copy has been made and that there are no "insubstantial changes".^[79]
27. In answering the second question, the Federal Circuit held that there is no equitable element to the doctrine of equivalents despite explicit statements in several recent Federal Circuit cases to the contrary.^[80] The court explains that the use of the word "equity" by the *Graver* Court did not refer to the equity courts of England, making the issue one for decision by the court, but rather used the term in the general fairness sense of the word.^[81] The court emphasized that the doctrine is a doctrine of fairness, not invoking the traditional equitable power of the English courts. Thus, there is no equitable component to the doctrine of equivalents and the issue is one for the jury.^[82]
28. In answering the third question, the Federal Circuit restates earlier decisions holding that

"Patentees ... are entitled in all cases to invoke to some extent the doctrine of equivalents..."^[83]
In her concurrence in *Hilton-Davis*, Judge Newman criticized the majority opinion because it provided no more certainty than the *Graver* decision.^[84] Judge Newman acknowledged the difficulty of reconciling the patentee's interest in maintaining protection over the invention with the public's interest in being reasonably certain in ascertaining the bounds of the patent.^[85] She also acknowledged that she could conceive of no other way of simultaneously satisfying both interests and called on Congress for a legislative solution.^[86]

V. Policy Considerations Underlying the Doctrine of Equivalents

29. The doctrine of equivalents presents a compromise between two competing goals. On the one hand, the claims must be definite and distinct because the public is entitled to fair notice of what the patentee and the PTO have agreed to be the boundaries of the exclusive right granted to the patentee. Commenters have stated that "a property rights system will not function very well, if the boundaries of the rights are not clearly and cheaply defined. The market will not respond very well to the incentives those rights seek to create if people do not have inexpensive, clear information about patent rights."^[87] On the other hand, the patentee should not be deprived of the benefits of the patent by competitors who can take the benefit of the invention while avoiding the literal language of the claims. The doctrine of equivalents must be delicately administered to properly balance these competing goals. If the doctrine is applied too expansively, the public will never know what rights are truly covered by the patent. If the doctrine is applied too restrictively, the patentee may be deprived of the benefit of the patent, thereby reducing the financial rewards of the patent system and reducing the incentives to innovate promoted by the Constitution.

VI. Inadequacy of Literal Language to Adequately Capture the Invention

30. One of the objectives of the doctrine of equivalents is to eliminate the problems resulting from "literalism in construction and application of claim language."^[88] The doctrine is only used in situations in which there has been no literal infringement. Implicit in the recognition that literal infringement alone is sometimes inadequate to protect the patentee is the recognition that the literal claim language did not fully capture the patentee's contribution to the art.
31. In several cases, courts have addressed the problem that claim language is inherently incapable of perfectly capturing the essence of an invention. In *Autogiro v. U.S.*,^[89] the Court of Claims stated:

The lucidity of a claim is determined in light of what ideas it is trying to convey. Only by knowing the idea, can one decide how much shadow encumbers the reality.^[90]

The Court went on to state:

This conversion of machine to words allows for unintended idea gaps which cannot be satisfactorily filled. *Often the invention is novel and words do not exist to describe it.*^[91]

The *Autogiro* court thus recognized the limitations on language to accurately convey an inventor's contribution to the art. The inability of language to accurately capture the invention is one type of information cost that the doctrine of equivalents is used to overcome.

32. In *Scripps Clinic and Research Foundation v. Genentech*,^[92] the Northern District of California recognized that at times the English language is inadequate to describe an invention."^[93] A product may be defined by the process of making it if the English language is inadequate to describe the invention." When this situation occurs, patent law allows the patentee to describe the product through the process used to create it. This is known as a product-by-process claim and reflects that in some situations words are inadequate to fully describe an invention. An invention claimed as a product-by-process is not a process claim, but a product claim.^[94] While the product-by-process line of cases do not directly implicate the doctrine of equivalents, it does recognize the inability of words to adequately capture the essence of an invention. The product-by-process method of claiming is one judicially developed solution to this problem.
33. One commentator described the inherent limitations of words to describe an invention as follows:

"[a] verbal portrayal [of the invention] is usually an afterthought written to satisfy the requirements of patent law. This conversion of machine to words allows for unintended gaps which cannot be satisfactorily filled. Often the invention is novel and words do not exist to describe it. Loss of the doctrine of equivalents would give patent attorneys added incentive to blur the borders of their claims with broadening terms and imprecise adjectives. Infringement evaluations would become more uncertain, not less."^[95]

Professor Chisum also cites the case of *Hoechst Celanese v. BP Chems. Ltd.*^[96] describing the intense dispute over the meaning of the term "stable". While the word is seemingly clear, and was defined in the specification of the patent at issue, Professor Chisum points out that the meaning of even a seemingly clear term in a patent claim can be hotly contested in an infringement suit where an entire case can turn on which definition the court accepts. Words, quite simply are only as good as the meanings people ascribe to them and inevitably the same word will mean different things to different people. As a theoretical matter, language is inherently incapable of perfectly capturing the essence of an invention.

VII. Economic Analysis of the Bargaining Process Between the Applicant and the PTO

A. The Prosecution Process

34. Patentees are required by statute to specifically and definitely claim their invention.[\[97\]](#) The PTO requires that these claims take on a certain form to improve readability and understanding of the meaning during examination. The claims are used to determine the initial scope of infringing devices in an investigation into literal infringement. It is the claims, therefore, that determine the "metes and bounds of the patentee's right to exclude".[\[98\]](#)
35. During the application process, the breadth of the claims is limited by the prior art and the scope of the invention disclosed in the specification.[\[99\]](#) An inventor may not claim exclusive rights to a technology that is already in the public domain,[\[100\]](#) nor is an inventor permitted to claim exclusive rights on an innovation that would have been obvious to one having ordinary skill in the relevant art.[\[101\]](#) Since the purpose of the patent act is to promote advances in the useful arts, these limitations on patentability reflect the belief that no incentives need to be given to inventors to produce something which society already has (the novelty requirement) or to which society is certain to obtain without incentives (the obviousness requirement).
36. The PTO evaluates these limiting factors and rejects claims it believes are too broad and cover products and processes that are already (or will be) in the public domain, or that are not enabled by the specification of the patent application.[\[102\]](#) Applicants thus "bargain" with the PTO over the scope of patent claims in an attempt to get the broadest valid claims possible allowed by the PTO. The PTO restricts the breadth of claims by rejecting those claims that cover only old or obvious subject matter. The patentee attempts to protect the widest range of devices enabled by the specification by amending the claims throughout the prosecution process to exclude that subject matter which the PTO has deemed is already in the public domain or is obvious under the § 102/103 standards, or by pointing out why the controversial subject matter is new or nonobvious. This process of determining the proper claim scope can take several years and can cost thousands of dollars in attorney fees.[\[103\]](#) However, the broader the claims obtained by the patentee, the greater the exclusive right granted and the more valuable the patent will be to the owner (assuming the patent is not subsequently held invalid). For this reason, broad claims often increase the incentive to the patentee to innovate by increasing the value of a valid patent to the patentee.

B. Economic Analysis of Patent Prosecution

37. While there are many factors that affect the breadth of the claims and the resulting scope of the patent, we can expect patent applicants to continue to attempt to increase the scope of the claims until the cost of further prosecution[\[104\]](#) outweighs the applicant's *ex ante* expected value of the increased claim scope. In economic terms, the patentee will continue to attempt to increase the claim scope until the marginal benefit of further prosecution is zero. At this point, the patent application will accept the PTO's 'offer' of claim scope and the patent will presumably issue.[\[105\]](#)
38. After issuance, the patentee has 2 years in which to have the patent reissued with broader claims, and can have the patent reissued anytime with narrower claims.[\[106\]](#) Thus, under statutory reissue the patentee can reevaluate the value of the patent and can correct mistakes in the claim breadth. If

the patentee believes that the unclaimed breadth is now worth more than the costs of reissuance (including the costs of possibly having the patent found to be invalid), they will attempt to have the patent reissued with broader claims, again bargaining for increased claim scope until the marginal benefit of further prosecution is zero. At this point in the patent's life, the scope of the claims are fixed and the patentee will have to rely on the doctrine of equivalents for any claim breadth that they could have claimed, but which was not worth the costs to do so at the time.

39. The patentee thus has on average 3.5 years from the filing date of their application to evaluate the proper scope of the claims and to attempt to persuade the PTO to grant what the patentee perceives to be the proper scope of the invention.[\[107\]](#) In this 3.5 year time period, the patentee will have the opportunity to make evaluations about the commercial viability of the invention and will be in the best position to know the value of the patent. The patentee will also be in the best position to know what the value of additional claim scope will be and should adjust their prosecution campaign accordingly. A rational patentee will therefore evaluate the various possible levels of claim scope and the cost to attain each, and pick the greatest wealth maximizing combination.
40. We would not expect a rational inventor to expend more resources to prosecute the patent than the increased claim scope is worth to the patentee *ex ante*, just as we would not expect a rational actor to spend \$10 to gain \$9.[\[108\]](#) It is true that once an improver enters a technological area that the patentee did not claim, or the patent owner gains additional information about the market value of the patent, that the patentee's *ex post* evaluations of the cost / benefit of additional prosecution may differ from their *ex ante* evaluations. However, this does not affect the patentee's *ex ante* expectations when involved in the original prosecution of the patent. The patentee has up to 2 years after the patent issues to reevaluate the costs and benefits of additional claim breadth. At the time the patent issues and up to 2 years afterward, we can expect that the patentees subjective value of the marginal claim breadth will equal the marginal cost of prosecution. At this point, the patentee will end prosecution because the cost of further prosecution is greater than the *ex ante* benefits that additional prosecution can provide.

VIII. The Economic Efficiency of the Doctrine of Equivalents

A. The Efficiency Increasing Effects of the doctrine of Equivalents

41. In an infringement suit, any device that falls within the literal claims is protected by literal infringement analysis. If the device falls outside the literal claims, then the patent owner must rely on the doctrine of equivalents for protection of their invention. The doctrine of equivalents operates only when literal infringement has not been committed and brings devices on the fringes of the literal claims within the literal claims if they satisfy the function, way, result test set forth in *Graver Tank*. Thus, the doctrine of equivalents protects only that territory which the patentee deems worth less than the marginal cost of prosecution.[\[109\]](#)
42. The doctrine of equivalents promotes efficiency in the prosecution of patents by reducing transactions costs to the patentee by giving the patentee that claim area to which he or she is

equitably entitled without forcing them to inefficiently expend resources to claim it. In this respect, the doctrine of equivalents is valuable to patent applicants because it gives them all of the rewards to which they are entitled without the costs of obtaining the additional protection. Additionally, the doctrine of equivalents gives patentees protection that they would never be able to get under a literal infringement analysis since the area protected by the doctrine of equivalents is only the unclaimed area which is more costly to claim than it is of *ex ante* value to the patentee.

43. Were the patent system perfectly efficient, the issued patent would literally encompass the entire advance made by the inventor. In reality, there are information costs in determining the true scope of the advance bestowed by the inventor, costs in reducing this advance to words, and actual costs of prosecuting the application before the PTO. Increasing the certainty of the claims is also costly and would most often be achieved by increasing the length of the claims at a cost to both the patentee and those who read the claim. As a result of these costs, the patentee is sometimes forced to forego literally claiming every aspect of the advance they bestow upon the public. The doctrine of equivalents is a judicially created method to give some of the unclaimed advance back to the patentee, without requiring inefficient expenditures to literally claim it.

B. The Economic Value of the Doctrine of Equivalents to a Potential Patentee

44. It has been previously stated that a patent applicant will continue to attempt to increase the breadth of a patent up to the point where the marginal benefits equal the marginal costs of further prosecution. At this point the patent applicant believes that the value of the unclaimed advance is less than the cost to obtain the unclaimed territory. Therefore, since the doctrine of equivalents only protects the unclaimed area, at the time of issuance the patentee values the ability to utilize the doctrine of equivalents less than or equal to the cost of claiming all of the possible ways a copyist could evade the literal claims, yet still appropriate the value of the invention.[\[110\]](#)
45. If the *ex ante* value to the patentee of the territory protected by the doctrine of equivalents is less than the cost of prosecution, then incentives to innovate would be reduced by an equal amount if the doctrine were to be eliminated. When deciding whether to invest in research and development in an area, a patentee will consider the economic benefits they will receive should the research result in a patent grant. The potential patentee will theoretically evaluate the costs and benefits of the patent system along with the cost and expected benefits to the research. The patentee's reward for a significant advance in the field will be determined by the commercial value of the advance and the protection they will get from a patent on that advance. Should the patent system be weakened by elimination of the doctrine of equivalents, the patentee's reward will be reduced by the *ex ante* decrease in value of the patent protection to the patentee. Since a patentee's incentives stem in large part from the protection he will receive from a patent, a potential patentee's incentives will be reduced somewhat from a regime in which the doctrine of equivalents is present to protect them.
46. As noted above, the patentee values the protection of the doctrine of equivalents up to the costs of literally claiming the aspects of the invention covered by the doctrine. It can be said therefore that

the patentee values the protection from the doctrine of equivalents at a value equal to the marginal cost of claiming the additional scope during prosecution.

C. Costs of the Doctrine of Equivalents

47. Second comers to a technological area are not only deterred by the doctrine of equivalents from entering the penumbra protected by the doctrine, but are also chilled an extra margin due to litigation costs, and potentially massive judgments.[\[111\]](#) There is thus a social loss equal to the benefits that society would have gained due to activity in this permissible but chilled area, but which is not forthcoming due to the uncertainty in the application of the doctrine of equivalents.
48. Risk aversion places costs of uncertainty on both the patentee and a possible infringer. Since both sides are risk adverse, both attach costs (or a reduction in benefits) to the uncertainty in the breadth and application of the doctrine. This is true of any rule that is not perfectly clear and costless to administer.[\[112\]](#) The measure of this cost is dependent upon the amount of the uncertainty and the potential cost of violating the legal rule.
49. Were the doctrine of equivalents eliminated, society would gain the dual benefits of businesses being able to operate in both the penumbra and the chilled area. Society would lose the benefits provided by the incentives to innovate equal to the costs of the patentee in having to claim every conceivable variation on the claims, or bear the costs of unenforcability against unclaimed variations. Since the point of the patent system is to promote progress in the useful arts, we must decide which regime we value more. The break even point in efficiency will occur when an increase in the scope of the doctrine of equivalents as an incentive is worth less to the patentee than it costs society in uncertainty.
50. I have stated that the patentee values the doctrine of equivalents at a value equal to the cost of prosecution of the marginal claim breadth, but we have not stated what this cost is. The cost of prosecution of additional claim breadth will vary from invention to invention. When the reason that the additional claim breadth was not attained is due to the inadequacy of words to completely capture the invention, the cost to claim the additional breadth is infinite and cannot be done at any cost. However in some situations, the cost to claim additional claim breadth is due to inadvertence on the part of the patentee who did not know that a particular aspect of the invention was valuable. In these cases the cost of additional prosecution is often quite small and therefore the value to the patentee of the doctrine of equivalents at the time of prosecution must also be quite small. The doctrine of equivalents should be eliminated in situations where its value to the patentee is small, but the costs of its application to society is large.
51. In *Hilton-Davis v. Warner Jenkinson*, the Federal Circuit eschewed an opportunity to limit the doctrine of equivalents to cases in which equity required its application (i.e. where there was evidence of direct copying). The court focused on the changes made to the patentee's product. In an attempt to conglomerate the seemingly intractable function, way, result test, the court stated that the function, way, result test is only a part of an overall test to determine whether there are substantial changes between the allegedly infringing product and the claims. If there are no

substantial changes, the court presumes copying and the doctrine of equivalents essentially broadens the patentee's claims to include the accused product.

52. In particular, the Court held that a ten fold change in the hydrogen ion concentration (reflected by change of one unit of pH) of a chemical process was an insubstantial change to a dye purification process. The claim at issue claimed a pH from "approximately 6 to 9" and the defendants pH of 5 (a full factor of 10) was held to be an insubstantial change and infringed under the doctrine of equivalents.

IX. A New Approach To the Doctrine of Equivalents

53. The doctrine of equivalents, while an efficient method to assign liability for infringement, has a noble purpose as its goal - to prevent fraud on a patent. Commentators have argued that the test for equivalents under the doctrine of equivalents should be the same as the nonobviousness test for patentability.^[113] The nonobviousness test, it is argued, would provide an objective test for evaluating modifications to a patented device and the magnitude of those modifications.^[114] The nonobviousness test would also guarantee a range of equivalents that correspond to the significance of the invention as the Federal Circuit attempted to do in *Corning Glass*.^[115] A nonobviousness test also has the additional feature that no one else could have obtained a patent for the accused device if it is obvious over the patented device.^[116] While these arguments seem fair, they do not take into consideration the public's interest in certainty of patent claims. An obviousness test is no more certain than the 'insubstantial changes' test promulgated by the Federal Circuit in *Hilton Davis*. It also does not consider the balance of economic efficiencies that the doctrine of equivalents affects. Any reformulation of the doctrine of equivalents must take into consideration the goal of joint wealth maximization as between the patentee and the public. Any other test is likely to create perverse economic incentives that reduce, not increase the effectiveness of the patent system in spurring innovation.
54. As discussed above, it is the patentee's conscious commitment not to claim the borderline subject matter that makes this possible. In certain circumstances, however, it is impossible at any cost to claim the extra subject matter, regardless of its value to the patentee. This is due to the inability of words to capture the essence of an idea. Words can only approximate true contribution of the patentee to the useful arts to which the patentee is entitled to exclusive rights. The inability of words to completely capture the essence of an idea or machine leaves potentially valuable territory unclaimable at any reasonable cost. In these cases, the doctrine of equivalents functions to add the extra protection where that patentee could not have possibly claimed the valuable area of the patent. This is a far smaller measure of protection granted to the patentee through the current interpretation of the doctrine of equivalents. It is in these cases where the doctrine of equivalents is the most useful and efficient. In these cases, the doctrine of equivalents makes it possible for applicants to ensure that the inherent ambiguity of words does not work to their detriment. It is in these cases alone where the doctrine of equivalents should apply.
55. The *Hilton-Davis* case serves as a prime example where the doctrine of equivalents should not

apply. There was no ambiguity in the meaning of numbers as the plaintiff Hilton-Davis claimed "Approximately 6 to 9 pH". A pH of 5 is not in this range and Hilton-Davis clearly could have claimed a pH of 5 rather easily. The reason the plaintiff did not include a pH of 5 in this range was because they did not think the process could effectively work in this range. The use of the doctrine of equivalents in this case does not reduce transactions costs by allowing the patentee to claim otherwise unclaimable areas at a lower cost, it simply expands the claims that Warner-Jenkinson and the rest of society had a right to rely upon. As Chief Judge Markey stated in *Perkin-Elmer v. Westinghouse Electric*,[\[117\]](#) "though a 'non-pioneer' invention may be entitled to some range of equivalents, a court may not, under the guise of applying the doctrine of equivalents, erase a plethora of meaningful structural limitations of the claim on which the public is entitled to rely in avoiding infringement."[\[118\]](#) The public should be able to rely on a limitation as clear as "5.0" where there can be no dispute that Hilton-Davis did not intend to claim below that range because they believed that processes below that range were economically infeasible and worthless for their purposes.

56. Without Warner-Jenkinson, the world may never have known that the purification process could work at a pH of 5. Hilton-Davis would have no incentive to expend resources to explore the outer limits of its claims and neither would a licensee. Whether purification in a pH of 5 is actually valuable to society is debatable, but the point is that we would never have known if second comers such as Warner-Jenkinson are continually thwarted in their attempts to make incremental improvements as they try to design around the literal claims.

X. Conclusion

57. It is clear that the present state of the doctrine of equivalents is unsatisfactory. Commentators have even proposed a standard jury instruction by which they hoped to reduce the uncertainty in its application in a jury trial.[\[119\]](#) Even Judge Newman acknowledges that the decision in *Hilton-Davis* is imperfect, but can conceive of no better method for its application.[\[120\]](#) The doctrine has become a tradeoff between the rights of the patentee to protect their entire invention and the rights of the public to know where the limits of that protection are. The compromise fashioned by the Supreme Court and more recently by the Federal Circuit is that the patentee has the right to exclude competitors from making insubstantial changes to the claimed invention. If the definition of 'insubstantial changes' in every case could be accurately known, all would be satisfied. This not being the case, the 'insubstantial changes' test leaves a great uncertainty in the application of the law, especially when it is to be considered that the definition of 'insubstantial changes' is for now a jury question and is apt to be inconsistently applied across cases.[\[121\]](#)
58. While there is no way to make the words 'insubstantial changes' more certain, there is a way to relieve the public of some of the uncertainty in the application of the doctrine of equivalents. The courts could make the determination of whether the additional scope sought by the patentee could have been easily included in the claims, but was omitted. In these cases, the court should deny patentees the right to assert the doctrine of equivalents knowing that the *ex ante* benefit received by the patentee in these situations are minimal, whereas the burden of uncertainty placed upon the

designing public is significant.

59. To deny the use of the doctrine of equivalents in the above situations increases the incentives to potential innovators in the same field by more than it will reduce the *ex ante* incentives to the patentee to innovate in the first place. By eliminating the doctrine in situations where it is more costly than beneficial, a more efficient solution can be achieved to the benefit of society as a whole. However since the doctrine has been a part of the federal law for 100 years and many patentees have relied upon it to protect them from "unscrupulous infringers", any major change to the doctrine is best achieved by the legislature which is in a better position to weigh the costs and benefits of the change on patentees not presently before the courts.

Footnotes

[1] J.D. University of Virginia, 1997. After graduating, Mr. Cianfrani will clerk for Arthur Gajarsa on the Federal Circuit. He will then join Knobbe, Martens, Olson and Bear in Newport Beach, California as an associate. Mr. Cianfrani also expresses his thanks to Prof. Kitch who sponsored the project as independent research.

[2] This presumes that licensing is impossible. In many instances, the above problem is resolved by purchasing the patent or by obtaining a license from the patentee. The resulting license price is influenced by both the strength of the patent and the likelihood that the patent will be infringed. However, many times a patent will either be owned by a competitor who is not willing to license, or the parties cannot agree on a price. The latter problem is exacerbated by any uncertainty in the patent system, especially by the doctrine of equivalents as the parties can have widely divergent views on whether the patent is infringed. Other licensing strategies such as cross licensing can ameliorate this problem, but the basic problem in uncertainty of the rights conveyed by the grant of a patent cannot be completely overcome by these compromise devices which essentially seek to split the costs of the uncertainty between the parties.

[3] U.S. CONST. art. I. § 8, cl. 8.

[4] For patents filed after June 8, 1995, the term is 20 years from the filing date. For patents filed on or before June 8, 1995, the term is the greater of 20 years from the filing date or 17 years from the issue date.

[5] Patent Act of 1870.

[6] Patent Act of 1793, ch. 11 § 3, 1 Stat. 318, 321-22 (1793).

[7] *See* Evans v. Eaton, 16 U.S. 454 (1818).

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

[9] *Id.*

[10] Outline of the History of the United States Patent Office, Vol. 18, No. 7 J. Pat. Off. Soc'y (1936), p. 94.

[11] *Id.*

[12] *Id.*

[13] *Id.* at 95-100.

[14] Warren T. Jessup, The Doctrine of Equivalent, 54 J. Pat. Off.Soc'y 248, 254 (1972). *See also*, McCormick plow patent of 1826 containing five numbered claims and the Howe sewing machine patent No. 4750 in 1846 with five numbered claims.

[15] The Act required that the applicant "particularly out the part, improvement, or combination, which he claims as his own invention." Patent Act of 1836, ch. 357, 5 Stat. 117, 119 (1836).

[16] Patent Act of 1836, §6.

[17] *See*, e.g., Sanitary Refrigerator Co. v. Winters, 280 U.S. 30 (1929).

[18] 56 U.S. (15 How.) 330 (1853).

[19] *Id.*

[20] *Id.*

[21] Winans at 347 (1853).

[22] *Id.*

[23] *Id.*

[24] *Id.*

[25] *Id.*

[26] *Graver Tank & Manufacturing Co. v. Linde Air Products Co.*, 339 U.S. 605, 608 (1950).

[27] *Burr v. Duryee*, 68 U.S. (1 Wall.) 531, 573 (1863); *see also*, *Gray v. James*, 10 F. Cas. 1015, 1016 (C.C.D. Pa. 1817) (No. 5,718) ("[W]e think it may safely be laid down as a general rule, that where the machines are substantially the same, and operate in the same manner, to produce the same result, they must be in principle the same"). *See also*, *Whitney v. Carter*, 29 F. Cas. 1070, 1078 (C.C.D. Ga. 1810) (No. 17,583).

[28] The inventor is required to point out "the best mode in which he has contemplated applying that principle so as to distinguish it from other inventions". Patent Act of 1870, § 22.

[29] *See* Warren T. Jessup, *The Doctrine of Equivalents*, 54 J. Pat. Off. Soc'y 248, 254 (1972).

[30] *See* Andrei Iancu, *A Two-Track Approach to the Doctrine of Equivalents in Patent Law: Responding to Hilton Davis*, 35 *Jurimetrics* 325, 329.

[31] For an in depth discussion of the relative differences between the peripheral definition theory and the central definition theory see generally, Toshiko Takenaka, *Interpreting Patent Claims: The United States, Germany and Japan*, IIC Studies, Vol. 17 (1995), pp. 3-68. *See also*, Comment, *Peripheral Definition Theory v. Central Definition Theory in Patent Claim Interpretation: A Survey of the Federal Circuit*, 32 *Geo. Wash. L. Rev.* 609 (1967).

[32] Toshiko Takenaka, *Interpreting Patent Claims: The United States, Germany and Japan*, IIC Studies, Vol. 17 (1995), p. 6.

[33] *Id.* at 6-7.

[34] *Id.*

[35] *Merrill v. Yeomans*, 94 U.S. 568 (1876).

[36] *Id.*

[37] *Id.* at 570-73.

[38] *Id.*

[39] *Id.*

[40] *Id.* at 573-74.

[41] 95 U.S. 274, 278 (1877).

[42] *Id.*

[43] *Id.*

[44] *See* *McClain v. Ortmyer*, 141 U.S. 419, 424-25 (1891); *Mahn v. Harwood*, 112 U.S. 354, 361 (1884).

[45] 82 U.S. 187 (1872).

[46] *Id.* at 194.

[47] 68 U.S. (1 Wall.) 531.

[48] *Burr v. Duryee*, 68 U.S. (1 Wall.) 531, 572-73 (1863).

[49] *Id.*

[50] Simon G. Crosswell, *Infringement Cases in Patent Law*, 2 Harv. L. R. 206, 211 (1889).

[51] *Id.* at 212.

[52] *See* *Exhibit Supply Co. v. Ace Patents Corp.*, 315 U.S. 126, 136-137 (1942).

[53] *Id.*

[54] *Graver* at 608.

[55] *Id.*

[56] *Id.*

[57] *Id.*

[58] *Id.*

[59] *Id.*

[60] *Id.* at 609.

[61] *Id.*

[62] *Id.*

[63] *Id.* at 614.

[64] *Id.*

[65] *Miller v. Bridgeport Brass Co.*, 104 U.S. 350, 352 (1881).

[66] 35 U.S.C. § 112.

[67] *Id.* at p. 6.

[68] P.J. Federico, *Commentary on the New Patent Act*, 35 U.S.C.A. 1, 9 (West 1954).

[69] *See Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 342 (1961) (The new patent act "left intact the entire body of case law on direct infringement.").

[70] P.J. Federico, *Commentary on the New Patent Act*, 35 U.S.C.A. 1, 24-25 (West 1954). (§ 112 p. 6 intended to overrule cases holding patents invalid as vague for using functional language in the claims). See also, p. 21, (noting that the addition of § 103 was intended to eliminate the "flash of genius" test espoused by the Supreme Court in *Hotchkiss v. Greenwood*, 52 U.S. 248 (1850) and to replace it with the "obviousness" test of § 103. But see, comments on decisions explicitly not overruled by the new patent act, P.J. Federico, *Commentary on the New Patent Act*, (1954) at p. 16 (noting the case of *In re Thuau*, 135 F.2d 344 (30 C.C.P.A. 979).

[71] *Hilton Davis* at 1515.

[72] *Iancu* at 329.

[73] Hilton Davis at 1515.

[74] *Id.* at 1516.

[75] *Id.* at 1517.

[76] *Id.* at 1519 (quoting *State Indus., Inc. v. A.O. Smith Corp.*, 751 F.2d 1226, 1236, 224 U.S.P.Q. 418, 424 (Fed. Cir. 1985)); *see also* *Slimfold Manufacturing v. Kinkead Industries*, 932 F.2d 1453, 1457 (Fed. Cir. 1991) ("Designing around patents is, in fact one of the ways in which the patent system works to the advantage of the public in promoting progress in the useful arts, its constitutional purpose.").

[77] *Id.*

[78] *Id.*

[79] *Id.*

[80] *London v. Carson Pirie Scott & Co.*, 946 F.2d 1534 (Fed. Cir. 1991); *American Home Products v. Johnson and Johnson Co.*, 25 U.S.P.Q.2d 1954, 1956 ("the doctrine of equivalents is not an automatic second prong to every infringement charge. It is an equitable remedy available only upon a suitable showing. AHP must put forth proof of the equities and the trial court must provide sufficient explication of its reasoning to support any finding of infringement under the doctrine of equivalents.").

[81] Hilton Davis at 1520.

[82] *Id.*

[83] *Id.* (Quoting *Seymour v. Osbourne*, 78 U.S. (11 Wall.) 516 (1870)).

[84] *Id.* at 1534.

[85] *Id.*

[86] *Id.*

[87] John W. Schlicher, *Patent Law: Legal and Economic Principles*, rel. # 3, 1995, Clark, Bourdman, Callaghan, New York, N.Y..

[88] Donald S. Chisum, Patents Sec. 18.04[1] (1978, Supp. 1992).

[89] 384 F.2d 391, 396 (Ct. Cl. 1967).

[90] *Id.*

[91] *Id.* (emphasis added).

[92] 666 F.Supp 1379 (N.D. Cal. 1987).

[93] *Id.* at 1386.

[94] *In re Bridgeford*, 357 F.2d 679, 682 (53 C.C.P.A. 1182) (1966).

[95] Donald S. Chisum & William Aslup, Brief for Amicus Curiae Urging Reversal of Judgment Under Review at 20, *Hilton-Davis Chem. Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512 (Fed. Cir. 1995) (No. 93-1088), cert. granted, 116 S.Ct. 1014 (1996).

[96] 78 F.3d 1575 (Fed. Cir. 1996).

[97] 35 U.S.C. § 112 p6.

[98] *Graver Tank* at 609.

[99] 35 U.S.C. §§ 102, 103.

[100] 35 U.S.C. §102.

[101] 35 U.S.C. §103.

[102] 35 U.S.C. § 112.

[103] The average patent takes 18 months to issue.

[104] These costs can come from a myriad of sources, due to a delay in the issuance of a patent, actual prosecution costs or even the costs of the uncertainty in what devices are actually covered by the current claims as written.

[105] There are many factors that will determine when a patent will issue, the skill of the

prosecuting attorney, the particular patent examiner examining the application, the purpose of seeking patent protection, the significance of the advance described in the patent and the applicant's expected value of the patent are among the factors considered by the patent attorney while prosecuting the patent before the PTO. Each will have an effect on the resulting claim breadth.

[106] 35 U.S.C. § 251.

[107] The average examination period for a patent in the PTO is 1.5 years and the statutory period during which a patentee can seek to have the claim broadened is 2 years for a total of 3.5 years after the filing date.

[108] This assumes that there are no transactions costs in evaluating the cost to gain broader claims. In reality, there may be significant costs to determining the cost to increase the scope of the claims since additional expenditures in the prosecution of the patent may not result in increased claim scope. However, patentees must subjectively evaluate these probabilities even if they are not known with certainty. Patentees will certainly know the amount of effort they want their counsel to use in the prosecution of a patent, and they certainly know the costs afterward. The decision to "take" what the patent office has given them and end prosecution at some point must be based upon a rational evaluation of the costs and benefits of proceeding and filing another amendment or remarks intended to persuade the examiner to retreat from their position. A number of cases are appealed to the board of patent appeals each year and some are even argued before the Federal Circuit. The decision to incur the expenses of these actions must be based upon a cost / benefit analysis made by the applicant after an evaluation of the ex ante value of the patent. It is therefore safe to assume that the same cost / benefit analyses are made during routine prosecution of the patent.

[109] As noted earlier, the additional cost of prosecution could well be infinite due to the uncertainty and inherent inability of words to accurately capture the entire advance bestowed on the public by the patentee. The cost could also be low such as claiming a broader range of pH states a process operates in. Burdening the patentee with these requirements would most likely raise the costs of issuance to the patentee and perhaps discourage marginal investment in making the claims more definite.

[110] Note that this value is also affected by the expected probability that the doctrine will be applied properly. Any error in the application of the doctrine of equivalents changes the value of its protection to the patentee. If the doctrine is applied too expansively, the patentee will value it more highly, and if too narrowly, the patentee will value it less highly.

[111] Note that a potential infringer's costs will also be affected by errors in application of the doctrine. If applied too broadly, the costs are greater and if too narrowly, the costs are lower presumably by an amount equal to the benefits received by the patentee.

[112] Costs including the costs of type I and type II errors in administration.

[113] 35 U.S.C. § 103 defines the test for patentability as nonobvious over the prior art.

[114] Toshiko Takenaka, *Interpreting Patent Claims: The United States, Germany and Japan*, IIC Studies, Vol. 17 (1995), p. 299.

[115] *Id.*

[116] *Id.* at 300.

[117] 822 F.2d 1528 (Fed. Cir. 1987).

[118] *Id.* at 1532.

[119] *See generally* Craig Wallace, *A Proposed Standard Jury Instruction for a Patent Infringement Inquiry Under the Doctrine of Equivalents*, 10 Santa Clara Comp. & High Tech.L. J. 425 (1994).

[120] *Hilton Davis* at 1539 (Newman, J. concurring).

[121] *Hilton Davis* has been accepted on writ of certiorari by the Supreme Court and was argued October 15, 1996.

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