

Chapter 7

Doctrine of Equivalents Infringement

Prior Art as a Limit on the Doctrine of Equivalents

Wilson Sporting Goods Co. v. David Geoffrey & Associates

904 F.2d 677, 14 USPQ2d 1942 (Fed. Cir. 1990)

Before MARKEY, Chief Judge, RICH, Circuit Judge, and COWEN, Senior Circuit Judge.

RICH, Circuit Judge.

These appeals, consolidated by agreement, are from judgments of the United States District Court for the District of South Carolina in two actions brought by Wilson Sporting Goods Co. (Wilson) for infringement of United States Patent 4,560,168 ('168), entitled "Golf Ball." Trial was before a United States Magistrate by consent. In the first action, the magistrate entered judgment of liability against Dunlop Slazenger Corporation (Dunlop) upon jury verdicts of patent validity and willful infringement. In the second action, the magistrate entered summary judgment of liability against David Geoffrey & Associates (DGA) under the doctrine of collateral estoppel, holding that DGA had been effectively represented by Dunlop in the first action. Our jurisdiction is under 28 U.S.C. §§ 1292(c)(2) (1982) and 1295(a)(1) (1982). We reverse in part and vacate in part each judgment.

BACKGROUND

A. The Proceedings

Wilson is a full-line sporting goods company and is one of about six major competitors in the golf ball business. Among its well-known balls are the ProStaff and Ultra. Dunlop is also a major player in the golf ball business. It competes head-to-head with Wilson by selling the Maxfli Tour Limited and Slazenger balls. It sells the Maxfli Tour Limited ball to numerous distributors, but sells the Slazenger ball only to DGA, which distributes the ball to U.S. customers.

On August 2, 1988, Wilson separately sued Dunlop and DGA for patent infringement in the United States District Court for the District of South Carolina. Wilson accused Dunlop of infringing claims 1, 7, 15-16, and 19-22 of its '168 patent, and made a general accusation of infringement against DGA.

The Dunlop case went to trial in late February, 1989. After a five day jury trial on the issue of liability, the jury returned special interrogatories finding the asserted claims "valid" (i.e., not proved invalid) and willfully infringed. Judgment was entered upon the verdict, Dunlop's motion for JNOV was denied, and Dunlop appealed. Wilson then moved for summary judgment of liability in the DGA case. It argued that DGA's interests in the second action had been effectively represented by Dunlop in the jury trial, and that Wilson was therefore entitled to summary judgment on the basis of collateral estoppel. The magistrate agreed, Order of May 15, 1989, and entered judgment. DGA appealed.

B. The Technology

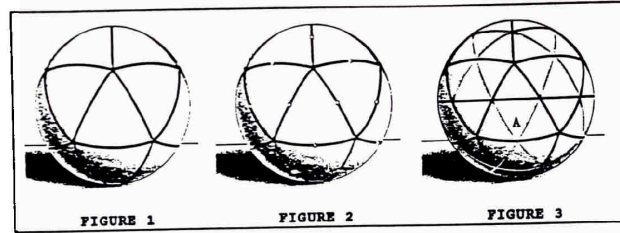
For more than a century, golfers have been searching for a "longer" ball. As one of the parties put it, "distance sells." Inventors have experimented with numerous aspects of ball design over the years, but as United States Golf Association (U.S.G.A.) rules began to strictly control ball size, weight, and other parameters, inventors focused their efforts on the "dimples" in the ball's surface. According to one witness, new dimple designs provide the only real opportunity for increasing distance within the confines of U.S.G.A. rules.

Dimples create surface turbulence around a flying ball, lessening drag and increasing lift. In lay terms, they make the ball fly higher and farther. While this much is clear, "dimple science" is otherwise quite complicated and inexact: dimples can be numerous or few, and can vary as to shape, width, depth, location, and more.

Wilson's '168 patent claims a certain configuration of dimples on a golf ball cover. The shape and width of the dimples in the '168 patent is for the most part immaterial. What is critical is their location on the ball. The goal is to create a more symmetrical distribution of dimples.

Generally speaking, the dimples in the patent are arranged by dividing the cover of a spherical golf ball into 80 imaginary spherical triangles and then placing the dimples (typically several hundred) into strategic locations in the triangles. The triangles are constructed as follows. First, the ball is divided into an imaginary "icosahedron," as shown in Figure 1. An icosahedral golf ball is completely covered by 20 imaginary equilateral triangles, 5 of which cover each pole of the ball and ten of which surround its equator. Second, the midpoints of each of the sides of each of the 20 icosahedral triangles are located, as shown in Figure 2. Third, the midpoints are joined, thus subdividing each icosahedral triangle into four smaller triangles.¹

¹ The central sub-triangles are referred to in the patent claims as "central triangles" (we have labeled one "A"), whereas the three sub-triangles surrounding each central triangle are referred to as "apical



The resulting 80 imaginary triangles are shown in Figure 3. Critically important are the light lines which join the midpoints. As can be seen from Figure 3, they form the arcs of circles which pass completely around the widest part of the ball. There are six such circles, referred to in the patent as "great circles."

All of the claims of the '168 patent require this basic golf ball having eighty sub-triangles and six great circles. Particular claims require variations on the placement of dimples in the triangles, with one common theme--the dimples must be arranged on the surface of the ball so that no dimple intersects any great circle. Equivalently stated, the dimples must be arranged on the surface of the ball so that no dimple intersects the side of any central triangle. See Figure 4, below. When the dimples are arranged in this manner, the ball has six axes of symmetry, compared to prior balls which had only one axis of symmetry.²

C. Patent and Trademark Office (PTO) Proceedings

Wilson employee Steven Aoyama filed his patent application on April 27, 1984. Twenty seven claims were presented. All were allowed on the first action without comment by the examiner. The patent issued on December 24, 1985, to Wilson as assignee of Aoyama.

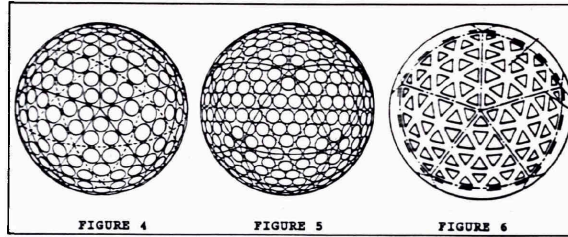
Claim 1, the only independent claim, reads:

1. A golf ball having a spherical surface with a plurality of dimples formed therein and six great circle paths which do not intersect any di[m]ples, the dimples being arranged by dividing the spherical surface into twenty spherical triangles corresponding to the faces of a regular icosahedron, each of the twenty triangles being sub-divided into four smaller triangles consisting of a central triangle and three apical triangles by connecting the midpoints [of the sides] of each of said twenty triangles along great circle paths, said dimples being arranged so that the dimples do not intersect the sides of any of the central triangles. [Bracketed insertions ours.]

The remaining 26 claims are dependent upon claim 1. They contain further limitations as to the number and location of dimples in the sub-triangles. Claim 7, for example, requires that all "central triangles [have] the same number of dimples." Other dependent claims locate dimples on the perimeter of the apical triangles, so that dimples are shared by adjacent apical triangles. See Figure 5.

triangles." The latter are so named because each of them contains an apex or tip of the larger icosahedral triangle.

² This is Wilson's view of the prior art, which is disputed by Dunlop. The parties agree, however, that every golf ball has at least one great circle which is not intersected by dimples. It is the "mold parting line," a seam around the ball which is created where the two halves of the mold used to make the ball are joined.



D. The Prior Art

The most pertinent prior art is a 1932 British patent to Pugh, which was cited by the examiner. Pugh teaches that a golf ball can be divided into any regular polyhedron, including an icosahedron. Pugh also discloses sub-dividing each of the twenty icosahedral triangles into smaller triangles. As an example, shown in Figure 6, Pugh divides each icosahedral triangle into sixteen sub-triangles, in contrast to the four sub-triangles required by the '168 patent. (The dimples in Pugh are triangular.) Nonetheless, Figure 6 (which is Figure 3 of the Pugh patent) makes clear that Pugh's sixteen sub-triangles are merely further divisions of four larger sub-triangles. Claim 3 of Pugh explains his invention (our emphasis):

3. A method of distributing a pattern with substantial uniformity over the surface of a sphere, such as a golf ball, which consists in ... form[ing] equilateral triangles in the case of the ... icosahedron ..., dividing the sides of the triangles so found into the same number of equal or substantially equal parts and finally joining corresponding points in each pair of sides of each triangle by a series of arcs of great circles, substantially as described.

The prior art also includes several patents to Uniroyal and a Uniroyal golf ball sold in the 1970's. The Uniroyal ball is an icosahedral ball having six great circles with 30 or more dimples intersecting the great circles by about 12-15 thousandths of an inch.³ We discuss it extensively below.

E. The Accused Balls

There are four accused products, all of which the jury found to infringe. The following table summarizes the characteristics of each accused ball:

Ball	Dimples	Cover	Infringer
Maxfli Tour Limited MD	432	Surlyn	Dunlop
Maxfli Tour Limited HT	432	Balata	Dunlop
Slazenger Interlock 480 (S)	480	Surlyn	Dunlop & DGA
Slazenger Interlock 480 (B)	480	Balata	Dunlop & DGA

The accused balls (collectively "Dunlop's balls") have dimples which are arranged in an icosahedral pattern having six great circles, but the six great circles are not dimple-free as the claims literally require. The number of dimples which intersect great circles and the extent of their intersection were disputed by the parties, but the evidence most favorable to appellee Wilson can be summarized as follows (units of last two columns are 0.001"):

³ Although no physical embodiment of the Uniroyal ball was admitted, there was extensive testimony on its characteristics.

Ball	Dimples	Dimples Intersected	Dimple Radius	Extent of Intersection
MD	432	60	60-80	7.5
HT	432	60	60-80	8.7
Interlock (S)	480	60	60-80	4.0
Interlock (B)	480	60	60-80	4.0

* * * *

OPINION

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B. Denial of JNOV On Infringement

1. Dunlop's Argument

The only theory of liability presented to the jury by Wilson was infringement under the doctrine of equivalents. Dunlop's argument for reversal is straightforward. It contends that there is no principled difference between the balls which the jury found to infringe and the prior art Uniroyal ball; thus to allow the patent to reach Dunlop's balls under the doctrine of equivalents would improperly ensnare the prior art Uniroyal ball as well.

2. Independent Claim 1

Infringement may be found under the doctrine of equivalents if an accused product "performs substantially the same overall function or work, in substantially the same way, to obtain substantially the same overall result as the claimed invention." Pennwalt Corp. v. Durand-Wayland, Inc., 833 F.2d 931, 934, 4 USPQ2d 1737, 1739 (Fed.Cir.1987) (en banc). . . . Even if this test is met, however, there can be no infringement if the asserted scope of equivalency of what is literally claimed would encompass the prior art. Id.; Senmed, Inc. v. Richard-Allan Medical Indus., 888 F.2d 815, 821, 12 USPQ2d 1508, 1513 (Fed.Cir.1989). This issue—whether an asserted range of equivalents would cover what is already in the public domain—is one of law, which we review de novo, Loctite Corp. v. Ultraseal Ltd., 781 F.2d 861, 870, 228 USPQ 90, 96 (Fed.Cir.1985), but we presume that the jury resolved underlying evidentiary conflicts in Wilson's favor, see DMI, Inc. v. Deere & Co., 802 F.2d 421, 425, 231 USPQ 276, 279 (Fed.Cir.1986).

This court on occasion has characterized claims as being "expanded" or "broadened" under the doctrine of equivalents. See, e.g., Intervet America v. Kee-Vet Laboratories, 887 F.2d 1050, 1054, 12 USPQ2d 1474, 1477 (literal meaning of claim is expanded under the doctrine of equivalents); Brenner v. United States, 773 F.2d 306, 308, 227 USPQ 159, 161 (Fed.Cir.1985) (describing doctrine of equivalents as "broadening" claims); Thomas & Betts Corp. v. Litton Sys., Inc., 720 F.2d 1572, 1582, 220 USPQ 1, 7 (Fed.Cir.1983) (claims have a "broadened scope"); Carman Indus., Inc. v. Wahl, 724 F.2d 932, 942, 220 USPQ 481, 489 (Fed.Cir.1983) ("Even with this expansion in the scope of the claims ..."). Precisely speaking, these characterizations are inaccurate.

To say that the doctrine of equivalents extends or enlarges the claims is a contradiction in terms. The claims—i.e., the scope of patent protection as as defined by the claims—remain the same and application of the doctrine expands the right to exclude to "equivalents" of what is claimed. The doctrine of equivalents, by definition, involves going beyond any permissible interpretation of the claim language; i.e., it involves determining whether the accused product is "equivalent" to what is described by the claim language.

This distinction raises an interesting question: If the doctrine of equivalents does not involve expanding the claims, why should the prior art be a limitation on the range of permissible equivalents? It is not because we construe claims narrowly if necessary to sustain their validity. E.g., Lewmar Marine, Inc. v. Barient, Inc., 827 F.2d 744, 749, 3 USPQ2d 1766, 1770 (Fed.Cir.1987). As we have said, the doctrine of equivalents does not involve expansion of the claims. Nor is it because to hold otherwise would allow the patentee to preempt a product that was in the public domain prior to the invention. The accused products here, as in most infringement cases, were never "in the public domain." They were developed long after the invention and differ in several respects from the prior art.

The answer is that 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 (1950), not to give a patentee something which he could not lawfully have obtained from the PTO had he tried. Thus, since prior art always limits what an inventor could have claimed, it limits the range of permissible equivalents of a claim.

Whether prior art restricts the range of equivalents of what is literally claimed can be a difficult question to answer. To simplify analysis and bring the issue onto familiar turf, it may be helpful to conceptualize the limitation on the scope of equivalents by visualizing a hypothetical patent claim, sufficient in scope to literally cover the accused product. The pertinent question then becomes whether that hypothetical claim could have been allowed by the PTO over the prior art. If not, then it would be improper to permit the patentee to obtain that coverage in an infringement suit under the doctrine of equivalents. If the hypothetical claim could have been allowed, then prior art is not a bar to infringement under the doctrine of equivalents.

Viewing the issue in this manner allows use of traditional patentability rules and permits a more precise analysis than determining whether an accused product (which has no claim limitations on which to focus) would have been obvious in view of the prior art. Compare with Ryco, Inc. v. Ag-Bag Corp., 857 F.2d 1418, 1426, 8 USPQ2d 1323, 1330 (Fed.Cir.1988) (comparing accused product with prior art). In fact, the utility of this hypothetical broader claim may explain why "expanded claim" phraseology, which we now abandon, had crept into our jurisprudence. See Carman Indus., Inc. v. Wahl, 724 F.2d 932, 942, 220 USPQ 481, 489 (Fed.Cir.1983) (affirming finding of infringement because claims as "expand[ed]" would not have been obvious in view of prior art). Finally, it reminds us that Wilson is seeking patent coverage beyond the limits considered by the PTO examiner.

In this context it is important to remember that the burden is on Wilson to prove that the range of equivalents which it seeks would not ensnare the prior art Uniroyal ball. The patent owner has always borne the burden of proving infringement, see Under Sea Indus., Inc. v. Dacor Corp., 833 F.2d 1551, 1557, 4 USPQ2d 1772, 1776 (Fed.Cir.1987), and there is no logical reason why that burden should shift to the accused infringer simply because infringement in this context might require an inquiry into the patentability of a hypothetical claim. Any other approach would ignore the realities of what happens in the PTO and violate established patent law. Leaving this burden on Wilson does not, of course, in any way undermine the presumed validity of Wilson's actual patent claims. In the present situation, Wilson's claims will remain valid whether or not Wilson persuades us that it is entitled to the range of equivalents sought here.

The specific question before us, then, is whether Wilson has proved that a hypothetical claim, similar to claim 1 but broad enough to literally cover Dunlop's balls, could have been patentable. As we have explained above, Dunlop's balls are icosahedral balls with six great circles, five of

which are intersected by dimples. The balls contain 432 to 480 dimples, 60 of which intersect great circles in amounts from 4 to 9 thousandths of an inch. In order for a hypothetical claim to cover Dunlop's balls, its limitations must permit 60 dimples to intersect the great circles by at least 9 thousandths of an inch. Thus, the issue is whether a hypothetical claim directed to an icosahedral ball having six great circles intersected by 60 dimples in amounts up to 9 thousandths of an inch could have been patentable in view of the prior art Uniroyal ball.

On the Uniroyal ball, the extent to which the dimples intersect the great circles is from 12 to 15 thousandths of an inch. Stated as a percentage of dimple radius, the intersection permitted in the hypothetical claim is 13% or less, and the dimples on the Uniroyal ball intersect by 17% to 21%. The number of dimples which intersect the great circles is also similar for the hypothetical claim and the prior art Uniroyal ball. The pertinent hypothetical claim limitation reads on any ball having 60 or less intersecting dimples. This limitation reads on the prior art Uniroyal ball, which has 30 intersecting dimples. If viewed in relative terms, the hypothetical claim limitation reads on any ball which has less than 14% of its dimples intersecting great circles. Roughly 12% of the dimples on the Uniroyal ball intersect great circles.

We hold that these differences are so slight and relatively minor that the hypothetical claim--which permits twice as many intersecting dimples, but with slightly smaller intersections--viewed as a whole would have been obvious in view of the Uniroyal ball. As Dunlop puts it, there is simply "no principled difference" between the hypothetical claim and the prior art Uniroyal ball. Accordingly, Wilson's claim 1 cannot be given a range of equivalents broad enough to encompass the accused Dunlop balls.

3. Dependent Claims

Before separately analyzing the asserted dependent claims, we should first explain why we are bothering to do so. This court has stated: "It is axiomatic that dependent claims cannot be found infringed unless the claims from which they depend have been found to have been infringed." Wahpeton Canvas Co., Inc. v. Frontier, Inc., 870 F.2d 1546, 1553 & n.9, 10 USPQ2d 1201, 1208 & n.9 (Fed.Cir.1989). While this proposition is no doubt generally correct, it does not apply in the circumstances of this case.

Here, we have reversed the judgment of infringement of independent claim 1 solely because the asserted range of equivalents of the claim limitations would encompass the prior art Uniroyal ball. The dependent claims, of course, are narrower than claim 1; therefore, it does not automatically follow that the ranges of equivalents of these narrower claims would encompass the prior art, because of their added limitations. In contrast, in Wahpeton Canvas the court affirmed the judgment of noninfringement of the independent claims because the accused products did not include particular claim limitations or their substantial equivalents. 870 F.2d at 1552, 10 USPQ2d at 1207. Where that is the reason for noninfringement of the independent claim, it follows that, for the same reason, the dependent claims will not be infringed. But that is not true here and we therefore turn to the asserted dependent claims, to determine whether they can be infringed under the doctrine of equivalents.

Implicit in the jury's conclusion that the Dunlop balls infringe the asserted dependent claims is a finding that the Dunlop balls have, in addition to the features we have described above, the further limitations of the dependent claims. Each dependent claim contains a small variation on the theme of an icosahedral ball having six great circles. We have considered each asserted dependent claim and conclude that none could be given a range of equivalents broad enough to encompass Dunlop's balls because that would extend Wilson's patent protection beyond hypothetical claims it could lawfully have obtained from the PTO.

The jury found that the central triangles of each Dunlop ball have "the same number of dimples," which is the additional limitation of claim 7. This feature, however, is shown in the Pugh patent. See Figure 6, above. The jury also found, as required by claim 15, that some dimples on each Dunlop ball reside completely within the apical triangles and some dimples intersect two of the sides of the apical triangles. This arrangement again is disclosed in the Pugh patent, as well as in Uniroyal patent 4,141,559 (U.S.), Uniroyal patent 1,402,273 (British), and Uniroyal patent 1,407,730 (British). Necessarily implied in the above findings, the jury found that each Dunlop ball has the combined features of claims 7 and 15, which is what claim 16 requires. Yet Wilson has failed to persuade us that the range of equivalents sought for any of these claims could be broad enough to encompass Dunlop's balls without also encompassing the Uniroyal ball and other cited prior art.

The jury also found that the Dunlop balls (except for the "480" balls, not accused) have a one-fifth dimple at the apexes of their apical triangles, as required by claim 19. This arrangement, as is the arrangement in which each apical triangle has some half dimples (claim 20), is again disclosed by each of the three Uniroyal patents. Wilson has failed to persuade us that the range of equivalents sought for these claims, as for claims 21 and 22 (which contain further variations on the number and/or fractions of the dimples in the apical triangles), could be broad enough to encompass Dunlop's balls without encompassing the Uniroyal ball and other prior art of record.

Questions, Comments, Problems

1. There is a maxim of patent law that says that patent claims must be construed the same way for validity as for infringement. Is Wilson Sporting Goods simply an application of that principle to the doctrine of equivalents? In other words, if a patentee were to assert coverage under the doctrine of equivalents that would sweep in something that was obvious from the prior art, then such a hypothetical claim would have been obvious (and invalid). Thus, perhaps Wilson Sporting Goods simply provides a gloss and some structure to a commonsense rule.

2. Think of the two other limitations on the doctrine of equivalents that we have discussed: the all-elements rule and prosecution history estoppel. What is the rationale for applying these limiting doctrines in the way they are applied? With regard to the all-elements rule, what is wrong with applying a claimed invention generally to an accused product or process? Is the all-elements rule simply a convenient way to put some recognizable limits on the doctrine of equivalents? Nevertheless, does the rule have a positive effect as long as practitioners are aware of it and work around it? Likewise, is there any particular reason why prosecution history estoppel must limit equivalents rather than simply changing the literal scope of a patent and still permitting full (or almost full) coverage by equivalents? Again, perhaps such estoppel furthers the public interest in certainty regarding patent scope and does not prejudice anyone who knows how the doctrine operates.

3. Many opinions note that a pioneering invention will be given a very broad range of equivalents. How does this rule differ from the prohibition against providing a range of equivalents that would encompass something in the prior art?

The Reverse Doctrine of Equivalents

The reverse doctrine of equivalents forces a finding of noninfringement of a claim even though the accused product or process literally meets all of the claim limitations, where the accused product or process is sufficiently different from the claimed invention (despite the literal

correspondence). The doctrine received its genesis in Boyden Power Brake Co. v. Westinghouse, 170 U.S. 537 (1898), where the Court stated:

But, even if it be conceded that the Boyden device corresponds with the letter of the Westinghouse claims, that does not settle conclusively the question of infringement. We have repeatedly held that a charge of infringement is sometimes made out, though the letter of the claims be avoided. . . . The converse is equally true. The patentee may bring the defendant within the letter of his claims, but if the latter has so far changed the principle of the device that the claims of the patent, literally construed, have ceased to represent his actual invention, he is as little subject to be adjudged an infringer as one who has violated the letter of a statute has to be convicted, when he has done nothing in conflict with its spirit and intent. 'An infringement,' says Mr. Justice Grier in Burr v. Duryee, 1 Wall. 531, 572, 'involves substantial identity, whether that identity be described by the terms, 'same principle,' same 'modus operandi,' or any other. ... The argument used to show infringement assumes that every combination of devices in a machine which is used to produce the same effect is necessarily an equivalent for any other combination used for the same purpose. This is a flagrant abuse of the term 'equivalent.'"

Even with this explanation, the reverse doctrine may seem anomalous, for if the claims measure the invention, how can the claims cease to represent the actual invention? It seems that the proper resolution of a case in which the claims exceed the scope of the disclosed invention is to hold the claims invalid as lacking enablement or a written description. The Federal Circuit discussed the rationale for the reverse doctrine as follows:

The reverse doctrine of equivalents is invoked when claims are written more broadly than the disclosure warrants. The purpose of restricting the scope of such claims is not only to avoid a holding of infringement when a court deems it appropriate, but often is to preserve the validity of claims with respect to their original intended scope.

Texas Instruments Inc. v. United States Int'l Trade Comm'n, 846 F.2d 1369, 1372, 6 USPQ2d 1886 (Fed. Cir. 1988) (denial of rehearing). Thus, perhaps the reverse doctrine actually helps the patentee, in that it gives the patentee half-a-loaf rather than no loaf at all (in much the same way that Judge Learned Hand used to hold claims not infringed rather than invalid, see, e.g., H.K. Regar, supra). Does a patentee that overclaims deserve such protection? Apparently, such help is not often needed, because the authors are aware of no Federal Circuit opinion that actually applies the reverse doctrine to find noninfringement. The closest the court came was the in banc decision in SRI International v. Matsushita Electric Corp. of America, 775 F.2d 1107, 227 USPQ 577 (Fed. Cir. 1985) (in banc), which, in a 6-5 vote, reversed a summary judgment of noninfringement based on the reverse doctrine of equivalents, finding issues of fact and remanding for trial on the issue. The five dissenters believed that noninfringement based on the reverse doctrine had been established as a matter of law. Thus, all eleven judges at the time believed the doctrine was alive and well.