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(Cite as: 904 F.2d 677)
14 U.S.P.Q.2d 1942
United States Court of Appeals,
Federal Circuit.

WILSON SPORTING GOODS CO., Plaintiff-Appellee,
v.
DAVID GEOFFREY & ASSOCIATES d/b/a Slazenger, and Dunlop Slazenger Corporation aka Dunlop Sports Corporation, Defendants-Appellants.

Nos. 89-1554, 89-1555.

May 23, 1990.
Rehearing Denied July 5, 1990.
Suggestion for Rehearing In Banc
Declined July 27, 1990.

In actions alleging infringement of patent claim for certain configuration of dimples on golf ball cover, the United States District Court for the District of South Carolina, William M. Catoe, Jr., United States Magistrate, found the patents valid and infringed, and entered judgments accordingly. Appeals were taken and consolidated. The Court of Appeals, Rich, Circuit Judge, held that: (1) alleged infringer's motion for JNOV on infringement was timely and supported by its motion for directed verdict, and (2) claims were not infringed under doctrine of equivalents.
Reversed in part and vacated in part.

West Headnotes

[1] Federal Civil Procedure k2606
170Ak2606

Motion for JNOV must be served, but need not be filed, within ten days of judgment. Fed.Rules Civ.Proc.Rule 50(b), 28 U.S.C.A.

[2] Federal Civil Procedure k2123
170Ak2123

Statement of motion for directed verdict was insufficient to notify adversary of evidentiary shortcomings, but it would have been unfair to require counsel to have developed more extensive statement, where trial court cut short counsel's statement, making clear its view that the issue presented a jury question and that it wanted to move on to consider jury instructions. Fed.Rules Civ.Proc.Rule 50(a), 28 U.S.C.A.

[3] Patents k237
291k237

Infringement may be found under doctrine of equivalents if accused product performs substantially the same overall functional work, in substantially the

same way, to obtain substantially the same overall result as the claimed invention; even if this test is met, however, there can be no infringement if asserted scope of equivalency of what is literally claimed would encompass the prior art.

[4] Patents k324.5
291k324.5

Whether asserted range of equivalents would cover what is already in public domain is issue of law, which is reviewed de novo.

[5] Federal Civil Procedure k2197
170Ak2197

Jury is presumed to have resolved evidentiary conflicts in favor of verdict winner.

[6] Patents k237
291k237

Doctrine of equivalents does not involve expansion of the claims; rather, application of doctrine expands the right to exclude to "equivalents" of what is claimed.

[7] Patents k237
291k237

Patentee should not be able to obtain, under doctrine of equivalents, coverage which he could not lawfully have obtained from Patent and Trademark Office by literal claims.

[8] Patents k237
291k237

If hypothetical claim could not have been allowed by Patent and Trademark Office over prior art, it would be improper to permit patentee to obtain that coverage in infringement suit under doctrine of equivalents; if hypothetical claim could have been allowed, then prior art is not a bar to infringement under doctrine of equivalents.

[9] Patents k312(1.1)
291k312(1.1)
(Formerly 291k312(1))

Burden is on patent owner relying on doctrine of equivalents to prove that range of equivalents which it seeks would not ensnare prior art; burden does not shift to accused infringer simply because infringement in this context might require inquiry into patentability of hypothetical claim.

[10] Patents k237
291k237

Patent claim for certain configuration of dimples on golf ball cover was not infringed under doctrine of equivalents; a range of equivalents broad enough to cover the accused balls would also have encompassed prior art.

[11] Patents k237

291k237

Dependent patent claims for golf balls asserting small variation on theme of icosahedral ball having six great circles were not infringed by accused balls under doctrine of equivalents; a range of equivalents broad enough to cover the accused balls would also have encompassed prior art.

Patents k328(2)
291k328(2)

4,141,559. Not infringed.
*678 John W. Chestnut, Tilton, Fallon, Lungmus and Chestnut, Chicago, Ill., argued, for plaintiff-appellee. With him on the brief, was Vasilios D. Dossas.
David B. Tulchin, Sullivan and Cromwell, New York City, argued, for defendants-appellants. With him on the brief, were James H. Carter, John L. Hardiman and Michael J. Farrell. Also on the brief, was Anthony M. Lorusso, Lorusso and Loud, Boston, Mass., of counsel.

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 *679 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. [FN1]

FN1. 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 triangles." The latter are so named because each of them contains an apex or tip of the larger icosahedral triangle.

RPT.CC.1990083709.00010 #0895;1;(2.75 X 5.5)

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. [FN2]

FN2. 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.

*680 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.

RPT.CC.1990083709.00020 #0895;2;(2.5 X 5.25)

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 *681 icosahedral ball having six great circles with 30 or more dimples intersecting the great circles by about 12-15 thousandths of an inch. [FN3] We discuss it extensively below.

FN3. Although no physical embodiment of the Uniroyal ball was admitted, there was extensive testimony on its characteristics.

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"):

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

ISSUES

1. Whether Dunlop's motion for JNOV on infringement was timely and supported by Dunlop's motion for a directed verdict.
2. Whether the magistrate erred as a matter of law by denying Dunlop's motion for JNOV on infringement.

OPINION

A. Dunlop's Motion For JNOV

1. Timeliness

At the threshold of this appeal, Wilson contends that the magistrate's denial of Dunlop's motion for JNOV on infringement is not properly before us for review, because Dunlop's motion for JNOV was untimely. It concedes that Dunlop's motion was served on opposing counsel within 10 days of the court's entry of judgment, but asserts that Fed.R.Civ.P. 50(b) requires the motion to be filed in the court within 10 days of judgment. We disagree.

The language of Rule 50(b) provides no clear answer to this question. It states: "Not later than 10 days after entry of judgment, a party ... may move [for JNOV]." Nor does any Fourth Circuit decision provide guidance. [FN4] The Third Circuit has suggested that service within ten days *682 should be sufficient, but has not decided the issue. Wall v. United States, 592 F.2d 154, 162 (3rd Cir.1979). We are the first circuit court to expressly decide the question.

FN4. We defer to Fourth Circuit law on this procedural question not unique to patent law. See Wahpeton Canvas Co., Inc. v. Frontier, Inc., 870 F.2d 1546, 1550-52 & n. 8, 10 USPQ2d 1201, 1206-07 & n. 8 (Fed.Cir.1989) (JNOV on infringement).

[1] We are persuaded by the Notes of the Advisory Committee on the 1963 Amendments to the Federal Rules of Civil Procedure and by comparison of Rule 50 with Rules 52 and 59. The Advisory Committee Notes to Rule 50 state that the time limit for Rule 50(b) is consistent with that set forth in Rule 59(b) for moving for a new trial and in Rule 52(b) for moving to amend findings by the district court. Rule 59(b) explicitly states that a motion for new trial "shall be served not later than ten days after entry of the judgment" (our emphasis). Similarly, the Sixth Circuit has held that a Rule 52(b) motion, which contains language very similar to Rule 50(b), is timely if served on the tenth day after judgment and filed on the eleventh day. Keohane v. Swarco, Inc., 320 F.2d 429, 432 (6th Cir.1963).

In Keohane, the Sixth Circuit did not consider the Advisory Committee Notes, but relied on Rule 5(d) which states:

(d) Filing. All papers after the complaint required to be served upon a party shall be filed with the court either before service or within a reasonable time thereafter.

The court concluded "there would not be much reason to have Rule 5(d) if the papers had to be both served and filed within the 10 day period." Id. at 431. The court recognized that some of the Rules specify filing as the critical event, but since Rule 52(a) does not, filing could postdate service under Rule 5(d). Id. at 432. [FN5]

FN5. Compare Keohane with Hahn v. Becker, 551 F.2d 741 (7th Cir.1977) (motion under Rule 50(b) timely when filed on the 8th day but not served until the 22nd day after judgment).

We find this analysis persuasive and find no reason why a motion for JNOV under Rule 50(b), which contains language similar to Rule 52(a), should receive different treatment. Moreover, if we were to hold that a motion for JNOV must be filed within 10 days of the court's entry of judgment, the result would be that a motion for JNOV/new trial--which Rules 50 and 59 expressly allow--could be untimely insofar as it requested JNOV but timely insofar as it alternatively requested a new trial. This result has been roundly criticized by the commentators and, as we have said, the Advisory Committee on the Rules. See, e.g., 9 C. Wright & A. Miller, Federal Practice & Procedure ¤ 2537 at 602 (1971).

In support of its position that a motion for JNOV must be filed within 10 days of judgment, Wilson cites two district court cases. See McConnell v. United States, 50 F.R.D. 499, 501 (E.D.Tenn.1970) (motion untimely when served on the eighth day but not filed until the thirteenth day after judgment); United States v. Valdosta/Lowndes County Hosp. Auth., 91 F.R.D. 521, 523 (M.D.Ga.1981) (motion untimely when served on the fourth day but not filed until the thirteenth day after judgment). Each case relied heavily on a statement by the Supreme Court in Johnson v. New York, N.H. & H.R. Co., 344 U.S. 48, 73 S.Ct. 125, 97 L.Ed. 77 (1952), that a "motion for judgment notwithstanding the verdict [must be] made in the trial court within ten days." Id. at 50, 73 S.Ct. at 127 (our emphasis). The district courts' analyses, however, focused on the language in Johnson without due regard to the context in which it was written. The issue in Johnson was not the timeliness of any motion, but whether a motion to "set aside the jury verdict" could be treated as if it were a motion for JNOV. Id. at 52, 73

S.Ct. at 128. Since the Supreme Court seldom decides an issue not expressly before it, the dictum in Johnson is not helpful to Wilson's position.

We hold that Dunlop's motion for JNOV was timely when served on the 10th day after the magistrate's entry of judgment and filed in the district court the following day.

2. Dunlop's Prior Motion For Directed Verdict

Wilson also contends that Dunlop had no right to move for JNOV, because it failed *683 to make a sufficiently specific prior motion for a directed verdict. See Kinzenbaw v. Deere & Co., 741 F.2d 383, 387, 222 USPQ 929, 931 (Fed.Cir.1984) (motion for a directed verdict is a prerequisite to a motion for JNOV and, ultimately, to review by this court); Fed.R.Civ.P. 50. We again disagree.

The facts are undisputed. At the close of all the evidence, counsel for Dunlop made the following motion:

BY MR. PAVELKO: Your Honor, I would move for a directed verdict at the close of all the evidence at this time on both the issue of non-infringement and invalidity.

BY THE COURT: All right. It is a matter for the jury.

* * * * * *

BY MR. PAVELKO: Your Honor, I am moving for both Counterclaim and--

BY THE COURT: I understand. It's in the record. All right. Let's go through these instructions ...

Wilson argues that Dunlop's motion did not satisfy Fed.R.Civ.P. 50(a), which states: "A motion for a directed verdict shall state the specific grounds therefor." Dunlop counters that under Fourth Circuit precedent, its motion was specific enough.

In Miller v. Premier Corp., 608 F.2d 973 (4th Cir.1978), the only Fourth Circuit case on point, the court stated the test to be whether there was a "clear failure by counsel to observe [the specificity requirement of Rule 50(a)]." Id. at 979 n. 3. The court concluded that an oral motion for "dismissal" in a confusing colloquy between counsel and the court did not permit "confident assessment" that counsel had failed to observe Rule 50(a). Id.

[2] Dunlop's statement of the motion, in itself, is insufficiently specific to satisfy the purpose of Rule 50(a), i.e. to notify an adversary of holes in his evidence so that they might be filled, if possible, before the case goes to the jury. As in Miller, Wilson's contention is "serious and bothersome." Id. Here, however, the court cut short counsel's statement, making clear its view that the issue presented a jury question and that it wanted to move on to consider the jury instructions. It would be unfair to require counsel to have developed a statement of evidentiary shortcomings which the magistrate obviously did not want to hear, at the risk of forfeiting its right to move for JNOV.

In sum, we hold that Dunlop's motion for JNOV on infringement was timely and supported by Dunlop's motion for a directed verdict. Therefore, the question of whether the magistrate erroneously denied Dunlop's motion is properly before this court.

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

[3][4][5] 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), cert. denied, 485 U.S. 961, 108 S.Ct. 1226, 99 L.Ed.2d 426, 485 U.S. 1009, 108 S.Ct. 1474, 99 L.Ed.2d 703 (1988). 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 *684 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.

[6] 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 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.

[7] 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, 70 S.Ct. 854, 856, 94 L.Ed. 1097 (1950), not to give a patentee something which he could not lawfully have obtained from the PTO had

he tried. Thus, since prior art always limits what an inventor could have claimed, it limits the range of permissible equivalents of a claim.

[8] 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 *685 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.

[9] 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.

[10] 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.

*686 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.

[11] 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. [FN6] 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.

FN6. The jury's decision was embodied in answers to special verdicts, which requested only that the jury answer "infringed" or "not infringed" to each claim.

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.

C. Validity

We need not review the validity of asserted patent claims when we can decide a case on the basis of noninfringement. See, e.g., Vieau v. Japax, Inc., 823 F.2d 1510, 1517, 3 USPQ2d 1094, 1100 (Fed.Cir.1987). Accordingly, we vacate the magistrate's judgment that none of the asserted claims was proved invalid.

CONCLUSION

Dunlop's motion for JNOV on infringement was timely and supported by Dunlop's motion for a directed verdict. Therefore, the question of whether the magistrate erroneously denied Dunlop's motion was properly before this court. We conclude that the magistrate erred in denying *687 Dunlop's motion for JNOV on infringement, because, as a matter of law, a range of equivalents broad enough to cover Dunlop's balls would also have encompassed the prior art.

Accordingly, in No. 89-1554 we reverse the judgment of infringement by Dunlop and vacate the judgment that the claims were not proved invalid. In No. 89-1555, we reverse the judgment of infringement by DGA, which was based upon the doctrine of collateral estoppel and the judgment against Dunlop in 89- 1554, and vacate the judgment that the claims were not proved invalid.

COSTS

No costs.

89-1554 REVERSED IN PART, VACATED IN PART.

89-1555 REVERSED IN PART, VACATED IN PART.

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