

**VEHICULAR TECHNOLOGIES CORP. V. TITAN
WHEEL INTERNATIONAL, INC.,
ZODIAC POOL CARE, INC. V. HOFFINGER
INDUSTRIES, INC.,
& OPTICAL DISC CORP. V. DEL MAR AVIONICS**

By Daniel H. Mao

The doctrine of equivalents was established to prevent an infringer from insubstantially modifying a patented invention and thereby escaping liability from infringement.¹ The application of this equitable doctrine may, however, improperly broaden the scope of the claimed invention. In a number of recent cases, the Federal Circuit attempted to balance between these competing concerns. This Note examines three of those cases. In two cases, *Zodiac Pool Care, Inc. v. Hoffinger Industries, Inc.*² and *Optical Disc Corp. v. Del Mar Avionics*,³ the Federal Circuit properly limited the scope of the doctrine of equivalents by avoiding a claim interpretation that would vitiate a claim element in its entirety,⁴ while in *Vehicular Technologies Corp. v. Titan Wheel International, Inc.*,⁵ the court improperly adopted an “all-advantages” approach in applying the function-way-result test. This second approach blurs the difference between the essential and incidental functions of a claim element, and is thus inconsistent with the public policy that underlies the doctrine of equivalents.

I. BACKGROUND

Under the doctrine of equivalents, the accused product or process infringes the asserted patent if the accused product or process is equivalent

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1. Under the doctrine of equivalents, the accused product or process infringes the asserted patent if the accused product or process is equivalent to the patented invention. See ROBERT L. HARMON, PATENTS AND THE FEDERAL CIRCUIT 270 (4th ed. 1998).

2. 206 F.3d 1408 (Fed. Cir. 2000).

3. 208 F.3d 1324 (Fed. Cir. 2000).

4. See *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 29 (1997) (“It is important to ensure that the application of the doctrine, even as to an individual element, is not allowed such broad play as to effectively eliminate that element in its entirety.”).

5. 212 F.3d 1377 (Fed. Cir. 2000).

to the patented invention.⁶ The doctrine of equivalents was established to prevent an infringer from insubstantially modifying a patented invention and thereby escaping liability.

A. All Elements Approach for the Doctrine of Equivalents

In *Warner-Jenkinson Co. v. Hilton Davis Chemical Co.*, the Supreme Court, required that the doctrine of equivalents be applied element by element.⁷ The Supreme Court held that in determining whether two devices or processes are equivalent, "each element contained in a patent claim is deemed material to defining the scope of the patented invention, and thus the doctrine of equivalents must be applied to individual elements of the claim, not to the invention as a whole."⁸ The all-elements approach does not require a one-to-one correspondence between the components of the accused device or process and elements of the asserted claim.⁹ Infringement may occur when several components of the accused device, in combination, perform a function accomplished by a single claim limitation¹⁰ or when several claim limitations perform functions carried out by a single component of the accused device.¹¹

This all-elements approach lessens the tension between the doctrine of equivalents and the definitional and public-notice functions of the statutory claiming requirement.¹² If the doctrine of equivalents is not applied to each claim element, an accused device or process may infringe a patented invention even if the accused device or process does not possess a feature corresponding to a claim element. Consequently, this claim element would fail to limit the scope of the invention and to inform the public of the boundary of the patentee's patent rights.

B. Various Equivalency Tests for the Doctrine of Equivalents

Courts have used a number of tests to determine whether an element of a claim and a feature of an accused device or process are equivalent. For

6. See HARMON, *supra* note 1, at 270.

7. 520 U.S. 17, 29 (1997) (affirming the holding of the Federal Circuit in *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931, 934-935 (Fed. Cir. 1987) that infringement can be found only if every claim limitation or its substantial equivalent is found in the accused device or process).

8. *Warner-Jenkinson*, 520 U.S. at 29.

9. *Dolly, Inc. v. Spalding & Evenflo Co.*, 16 F.3d 394, 398 (citing *Intel Corp. v. Int'l Trade Comm'n*, 946 F.2d 821, 832 (Fed. Cir. 1991)).

10. See *Dolly*, 16 F.3d at 398 (citing *Intel*, 946 F.2d at 832)).

11. See *id.* (citing *Sun Studs, Inc. v. ATA Equip. Leasing Inc.*, 872 F.2d 978 (Fed. Cir. 1989), *overruled on other grounds*, *A.C. Aukerman Co. v. R.L. Chaides Constr. Co.*, 960 F.2d 1020, 1038-1039 (Fed. Cir. 1992)).

12. See *Warner-Jenkinson*, 520 U.S. at 29.

example, equivalence can be established if the two “do the same work in substantially the same way, and accomplish substantially the same result.”¹³ The Supreme Court adopted this function-way-result test in *Graver Tank & Manufacturing Co. v. Linde Air Products Co.*¹⁴

In *Graver Tank*, the Court applied the function-way-result test by considering interchangeability between a claim element and a feature of an accused device or process in the eyes of a person having ordinary skill in the art.¹⁵ The function-way-result test is another way of determining whether differences between the claimed invention and the accused device or process are insubstantial. Hence, the Federal Circuit has also used the “insubstantial differences” test to evaluate equivalency.¹⁶

In *Warner-Jenkinson*, the Supreme Court held that as to the various tests to evaluate equivalency, “different linguistic frameworks may be more suitable to different cases, depending on their particular facts.”¹⁷ Whether the function-way-result test or the “insubstantial differences” test is better in the abstract is less important than the tests’ probative effect in determining whether the differences are insubstantial.¹⁸ Regardless of which test is used, the doctrine of equivalents cannot broaden the scope of any claim element so much that the element no longer limits the scope of the invention. In other words, the doctrine of equivalents cannot effectively eliminate a claim element in its entirety.¹⁹

C. The Federal Circuit Cases Following *Warner-Jenkinson*

Since *Warner-Jenkinson*, the Federal Circuit has limited the scope of equivalents in cases such as *Sage Products, Inc. v. Devon Industries, Inc.*²⁰ and *Tronzo v. Biomet Inc.*,²¹ in order to avoid vitiating a claim element.

In *Sage*, Sage Products, Inc. (“Sage”) sued Devon Industries, Inc. (“Devon”) for infringing its patent on a container for disposing of medical waste.²² Sage’s patent claimed a disposal container comprising:

13. *Union Paper-Bag Mach. Co. v. Murphy*, 97 U.S. 120, 125 (1877).

14. 339 U.S. 605, 608 (1950).

15. *See id.* at 609-12 (reasoning that the differences between magnesium used in the patented composition and manganese used in the accused composition are insubstantial because “persons reasonably skilled in the art would have known of the interchangeability of an ingredient not contained in patent with one that was”).

16. HARMON, *supra* note 1, at 276-277 (citing *Hilton Davis Chem. Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512, 1518-1520 (Fed. Cir. 1995) (en banc)).

17. *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 40 (1997).

18. *Id.*

19. *Id.* at 29.

20. 126 F.3d 1420 (Fed. Cir. 1997).

21. 156 F.3d 1154 (Fed. Cir. 1998).

- a. a hollow upstanding container body,
- b. an elongated slot *at the top of the container body* for permitting access to the interior of the container body,
- c. barrier means disposed adjacent said slot . . . comprising
 - i. a first constriction extending over said slot, and
 - ii. a complementary second constriction extending beneath said slot, and
 - iii. a closure disposed adjacent said slot.²³

The accused device possessed one constriction above and another below an elongated slot, but the elongated slot was not at the top of the container body.²⁴ Instead, the elongated slot lay within the container body.²⁵ The Federal Circuit held that Sage's claim required that the first constriction be situated above the elongated slot.²⁶ Because the elongated slot was claimed to be "at the top of the container body," the first constriction had to be above the top of the container body.²⁷ But Sage argued that "one constriction above and one constriction below" as claimed was equivalent to "two constrictions below the top of the container" in the accused device.²⁸ In ruling against Sage, the Federal Circuit held that Sage's argument would effectively remove the "top of the container" and "over said slot" limitations from the claim.²⁹

Similarly, in *Tronzo*, a patentee sued a competitor for infringing a patent that claimed an artificial hip socket with "a generally conical outer surface."³⁰ The accused device had a hemispherical surface.³¹ In the written description, the patentee had specifically touted the advantages of the conical surface over other shapes.³² However, in the infringement lawsuit, the patentee argued that the conical surface was equivalent to the accused device's hemispherical surface because any shape would be equivalent to

22. 126 F.3d at 1422.

23. *Id.* at 1422.

24. *Id.* at 1423.

25. *Id.*

26. *Id.* at 1422-23 ("The court also properly interpreted 'extending over said slot' to require that the first constriction be 'above' the elongated slot.").

27. *See id.* at 1422 ("The district court properly interpreted 'top of the container body' to mean the 'highest point, level, or part of.'").

28. *Id.* at 1424.

29. *Id.*

30. 156 F.3d 1154, 1156 (Fed. Cir. 1998) (citing claims 2 and 10 of *Tronzo's* U.S. Patent No. 4,743,262 (issued May 10, 1988)).

31. *See id.* at 1160.

32. *Id.* at 1159.

the conical shape.³³ The Federal Circuit found the patentee's argument unpersuasive because "it would write the 'generally conical outer surface' limitation out of the claims." Following the all-elements approach the court ruled that the accused device did not infringe the patent under the doctrine of equivalents.³⁴

In both *Tronzo* and *Sage*, the Federal Circuit refused to expand the patent's scope through the doctrine of equivalents so much as to vitiate a claim element.

II. CASE SUMMARIES

In the following three cases, the Federal Circuit continued its efforts to establish some bright-line rules for evaluating equivalence.³⁵

A. *Zodiac Pool Care, Inc. v. Hoffinger Industries, Inc.*³⁶

Zodiac Pool Care, Inc. ("Zodiac") sued Hoffinger Industries, Inc. ("Hoffinger") for infringing U.S. Patent No. 5,014,382 ("the '382 patent").³⁷ After a jury verdict of infringement under the doctrine of equivalents, the district court granted Hoffinger's motion for judgment as a matter of law and issued a noninfringement ruling.³⁸ Zodiac appealed.

1. *Technical Background of the '382 Patent and the Accused Device*

The patent-in-suit claimed a swimming pool cleaner. Such devices typically have a body and a flexible disk that actually contacts the pool surface. The '382 patent claimed a swimming pool cleaner comprising "a stop for preventing upward flexing of the peripheral edge [of the disk] beyond a predetermined amount located forward of the body and above and *substantially inward* of the peripheral edge."³⁹ Hoffinger's pool cleaner

33. *Id.* at 1160 ("According to [plaintiff's] expert testimony, any shape would be equivalent to the conical limitation. . .").

34. *Id.*

35. In addition to the three cases discussed in this Note, see *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 234 F.3d 558 (Fed. Cir. 2000) (en banc). There, the Federal Circuit established a bright-line rule for evaluating equivalents when claims have been amended during patent prosecution. This decision was issued too late for inclusion in this Note.

36. 206 F.3d 1408 (Fed. Cir. 2000).

37. *Id.* at 1410.

38. *Id.*

39. U.S. Patent No. 5,014,382, claim 1 (issued May 14, 1991) (emphasis added).

had an arm, used as a stop, that extended at least to the peripheral edge of the disk.⁴⁰

2. *The Federal Circuit Decision*

In *Zodiac*, the Federal Circuit affirmed the district court's noninfringement ruling under the doctrine of equivalents.⁴¹ The Federal Circuit construed the phrase "a stop . . . located . . . substantially inward of the peripheral edge" to mean that the entire stop must be inside the peripheral edge of the disk.⁴² The court held that a stop that extends at least to the peripheral edge of a disk was not equivalent to a stop located substantially inward of the peripheral edge.⁴³ Otherwise, the doctrine of equivalents would reduce claim limitations to "functional abstracts, devoid of meaningful structural limitations, on which the public could rely"⁴⁴ and would "effectively eliminate that element in its entirety."⁴⁵

B. *Optical Disc Corp. v. Del Mar Avionics*⁴⁶

Optical Disc Corp. ("ODC") sued Del Mar Avionics ("Del Mar") for infringing U.S. Patent No. 5,297,129 ("the '129 patent").⁴⁷ The district court granted Del Mar's motion for summary judgment and ruled that Del Mar's FireTrac system did not infringe the '129 patent either literally or under the doctrine of equivalents.⁴⁸ ODC appealed this noninfringement ruling.

1. *Technical Background of the '129 Patent and the Accused Device*

The '129 patent relates to the fabrication of compact discs ("CDs").⁴⁹ Commercial CDs are usually copied from a master CD, which is fabri-

40. See 206 F.3d at 1412 ("Hoffinger produced evidence that its weight arm could not function as the stop in limitation (d), because its arm extended at least to the peripheral edge of the disk, and thus was not located 'substantially inward' thereof.").

41. *Id.* at 1417.

42. See *id.* at 1414 ("[T]he applicant obtained the patent only after he disclaimed a relationship between the stop and the disk's edge that permitted the stop to extend up to and beyond the edge.").

43. *Id.* at 1416.

44. *Id.* (citing *Sage Prods., Inc. v. Devon Indus., Inc.*, 126 F.3d 1420, 1424 (Fed. Cir. 1997)).

45. *Id.* (citing *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 29 (1997)).

46. 208 F.3d 1324 (Fed. Cir. 2000).

47. *Id.* at 1331.

48. *Id.* at 1332-33.

49. *Id.* at 1326-27.

cated through a “thermal dye polymer process.”⁵⁰ In this process, a layer of dye polymer is deposited on a blank master CD, and a laser beam is then focused onto the dye polymer layer.⁵¹ During the fabrication, the laser beam moves relative to the dye polymer layer, and the power of the laser varies in order to control which parts of the polymer layer get vaporized. The polymer layer becomes vaporized when the heat generated by the laser beam raises the layer’s temperature above a threshold, leaving a pit in the dye polymer layer.⁵² The pitted and non-pitted areas store information in the master CD.⁵³

The ’129 patent optimizes the shape of the pits to minimize errors in data retrieval from a CD. Each pit has a leading edge, formed when the temperature of the polymer layer exceeds the threshold temperature, and a trailing edge, formed when the temperature of the polymer layer falls below the threshold temperature.⁵⁴ If the layer’s temperature decreases gradually, the trailing edge of the pit develops a preferred “canoe” shape, rather than an undesirable “hot dog” shape.⁵⁵ The “canoe” shape, as well as a desirable symmetry between the leading and the trailing edges, can be achieved by controlling the increase and decrease of the laser beam power. Since the laser beam power is modulated by a modulator drive signal, the shape of the leading and trailing edges are ultimately determined by the modulator drive signal, which is generated by a waveform shaping circuit.⁵⁶

The ’129 patent claims “a waveform shaping circuit for use in an optical recording apparatus, which includes . . . waveform shaping means . . . for producing a shaped modulator drive signal having steep leading edges . . . and *ramped trailing edges* changing amplitude at a prescribed rate”⁵⁷ The steep leading edge and the ramped trailing edge of the modulator drive signal create the preferred leading and trailing edges in the master CD, which are symmetrical and canoe shaped.⁵⁸ In contrast, Del Mar’s FireTrac system employed a modulator drive signal with a double-

50. *Id.* at 1325-26.

51. *Id.* at 1326.

52. *Id.*

53. *See id.*

54. *Id.*

55. *See id.* at 1326-29.

56. *Id.* at 1327.

57. *Id.* at 1330-31 (quoting U.S. Patent No. 5,297,129, claim 1 (issued Mar. 22, 1994) (emphasis added)).

58. *See id.* at 1326, 1328.

step trailing edge to create similarly symmetrical and canoe shaped leading and trailing edges.⁵⁹

2. *The Federal Circuit Decision*

The Federal Circuit held that there was an issue of material fact as to whether the double-step trailing edge was equivalent to the claimed ramped trailing edge. The Federal Circuit first construed the element "ramped trailing edges" to mean "a . . . trailing edge which moderates its decrease in laser power from a write level to a base level, over time, to produce a less abrupt passage through the thermal threshold of the moving medium."⁶⁰ Del Mar contended that the *Tronzo* court held that a specific shape of an accused device cannot be equivalent to a different shape of a claimed structure.⁶¹ The Federal Circuit disagreed, reasoning that *Tronzo* applied the all-elements approach to avoid writing a limitation out of a claim.⁶² Consequently, the Federal Circuit vacated the noninfringement ruling under the doctrine of equivalents and remanded the case for further consideration.⁶³

C. *Vehicular Technologies Corp. v. Titan Wheel International, Inc.*⁶⁴

Vehicular Technologies Corp. ("Powertrax") sued Titan Wheel International, Inc. et al. (collectively "Tractech") for infringing U.S. Patent No. 5,413,015 ("the '015 patent").⁶⁵ In response to Powertrax's motion, the district court issued a preliminary injunction against Tractech under the doctrine of equivalents.⁶⁶ Tractech appealed this injunction, and the Federal Circuit vacated the district court's ruling in *Vehicular Technologies Corp. v. Titan Wheel International, Inc.* ("*Vehicular P*").⁶⁷ Subsequently, the district court granted summary judgment of noninfringement under the doctrine of equivalents.⁶⁸ Powertrax then appealed this noninfringement ruling.

59. *See id.* at 1331-32.

60. *Id.* at 1334.

61. *See id.* at 1337.

62. *Id.*

63. *Id.* at 1339.

64. 212 F.3d 1377 (Fed. Cir. 2000).

65. *Vehicular Techs. Corp. v. Titan Wheel Int'l, Inc.* [hereinafter "*Vehicular P*"], 141 F.3d 1084, 1085, 1087 (Fed. Cir. 1998).

66. *Id.* at 1087.

67. *Id.* at 1092-93.

68. *Vehicular Techs. Corp. v. Titan Wheel Int'l, Inc.* [hereinafter "*Vehicular IP*"], 212 F.3d 1377, 1378 (Fed. Cir. 2000).

1. *Technical Background of the '015 Patent and the Accused Device*

The '015 patent claims a locking differential mechanism for motor vehicles.⁶⁹ A locking differential is installed between the two half-axles of an automotive vehicle, and can shift all the drive force to the wheel that has traction if the other wheel slips.⁷⁰ Prior art locking differentials comprise a spring-disk-pin assembly, in which a spring contacts a stop pin through a thin disk.⁷¹ The disk, however, often slides at the end of the spring and can even fall off.⁷² To overcome this problem, the '015 patent replaces the spring-disk-pin assembly with a spring-spring-pin assembly, in which two concentric springs, without a disk, are directly in contact with a stop pin.⁷³ The '015 patent claims “[a] differential mechanism comprising . . . biasing means interposed between said driving surface faces comprising at least a pin in alignment with a spring assembly consisting of two concentric springs bearing against one end of said pin”⁷⁴ Tractech, in making the accused device, replaced the inner spring of the patented device with a plug, which was stuck in one end of the outer spring and directly contacted the pin.⁷⁵

2. *The Federal Circuit Decision*

In *Vehicular Technologies Corp. v. Titan Wheel International, Inc.* (“*Vehicular I*”),⁷⁶ the Federal Circuit applied the function-way-result test in determining that the spring-spring-pin assembly of the '015 patent was not equivalent to the spring-plug-pin assembly of Tractech's accused device.⁷⁷ The court reasoned that the spring-spring-pin assembly enhanced the reliability of the locking differential because the inner spring served as a backup for the outer spring.⁷⁸ The court held that providing enhanced reliability was a key function of the claim limitation “consisting of two concentric springs.”⁷⁹ Since the accused spring-plug-pin assembly could not serve as a backup, the court ruled that the accused device was not

69. U.S. Patent No. 5,413,015, col. 1, ll. 7-8 (issued May 9, 1995).

70. *Vehicular I*, 141 F.3d at 1085.

71. *See id.* at 1086.

72. *Id.*

73. *See id.*

74. U.S. Patent No. 5,413,015, claim 1 (issued May 9, 1995) (emphasis added).

75. *Vehicular I*, 141 F.3d at 1087.

76. 212 F.3d 1377 (Fed. Cir. 2000).

77. *See id.* at 1382 (citing *Vehicular I*, 141 F.3d at 1091).

78. *Id.* at 1380.

79. *See id.* at 1382.

equivalent to the claimed spring-spring-pin assembly.⁸⁰ The court reinforced this conclusion by noting that the claim recited a “spring assembly *consisting of two concentric springs*,” which forbids an open-ended construction.⁸¹

Judge Rader, in his concurring opinion, reasoned that the narrow scope of the “*consisting of two concentric springs*” limitation was foreseeable, and its substitute structure in the accused device were both foreseeable.⁸² Nonetheless, the patentee adopted this limitation in his claims.⁸³ “[A]s between the patentee who had a clear opportunity to negotiate broader claims but did not do so, and the public at large, it is the patentee who must bear the cost of his failure to seek protection for this foreseeable alteration of its claimed structure.”⁸⁴

III. DISCUSSION

The doctrine of equivalents prevents a competitor from escaping infringement liability by making insubstantial changes to a patented invention and thereby taking the copied matter outside of the literal scope of a claim.⁸⁵ On the other hand, patent claims are intended to inform the public of the scope of the patentee’s rights.⁸⁶ Hence, the equitable objective of the doctrine of equivalents may conflict with the notice function of claims. To reduce this tension, the Federal Circuit has attempted to provide some standards for applying the doctrine of equivalents.

In *Zodiac* and *Optical Disc*, the Federal Circuit applied and further clarified the helpful standards set forth in *Sage* and *Tronzo*, while the court in *Vehicular* improperly adopted an “all-advantages” approach for the function-way-result test. This second approach blurs the difference between the essential and incidental functions of a claim element, and is thus inconsistent with the public policy underpinning the doctrine of equivalents.

80. *See id.* at 1382-83.

81. *Id.* (emphasis added).

82. *See id.* at 1384 (emphasis added).

83. *Id.*

84. *Id.* at 1383-84 (quoting *Sage Prods., Inc. v. Devon Indus., Inc.*, 126 F.3d 1420, 1425 (Fed. Cir. 1997)).

85. *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 607 (1950).

86. *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 29 (1997).

A. *Zodiac and Optical Disc: Applying and Clarifying the Holdings of Sage and Tronzo*

1. *A Claimed Structural Relationship is Not Equivalent to a Contradictory Structural Relationship*

The Federal Circuit in *Sage* provided a guideline to minimize the conflict between the equitable objective of the doctrine of equivalents and the public-notice function of claims: a claimed structural relationship cannot be equivalent to a contradictory structural relationship.⁸⁷ The application of such guideline starts with claim construction. In *Zodiac*, the claim language “substantially inward” literally precluded the stop from extending to the peripheral edge of a disk and perhaps beyond.⁸⁸ Because the accused cleaner possessed a stop that extended at least to the peripheral edge of the disk,⁸⁹ the structural relationship in the accused device was excluded by the claim limitation. Therefore, according to *Sage*, the accused structural relationship could not be equivalent to the claim element.⁹⁰

The restriction imposed by the *Zodiac* court on the range of equivalents is just what the public needs if it is to rely on the claim language. The claim language “substantially inward” would make the public reasonably believe that the claim element, a stop “substantially inward” of the edge of a disk, does not cover a stop that extends at least to the peripheral edge of a disk. Therefore, if the court found this claim element equivalent to the accused device under the doctrine of equivalents, the claim “would be reduced to [a] functional abstract[], devoid of meaningful structural limitations on which the public could rely.”⁹¹ Consequently, due to fear of infringement, the public would hesitate to come up with related inventions. Patent law would then fail to achieve its policy goal of “providing a market-driven incentive to invest in innovation.”⁹² Therefore, the Federal Cir-

87. See Craig Y. Allison, *What It Means to “Entirely Vitiolate” a Claim Element in Light of Warner-Jenkinson*, 82 J. PAT. & TRADEMARK OFF. SOC’Y 563, 570 (2000).

88. See *Zodiac Pool Care, Inc. v. Hoffinger Indus., Inc.*, 206 F.3d 1408, 1414 (Fed. Cir. 2000). This claim construction is controversial. Judge Bryson, in his dissenting opinion, interpreted “substantially inward” as “mostly or mainly inward.” *Id.* at 1418.

89. *Id.* at 1412.

90. *Sage Prods., Inc. v. Devon Indus., Inc.*, 126 F.3d 1420 (Fed. Cir. 1997); see also *Dolly, Inc. v. Spalding & Evenflo Co.*, 16 F.3d 394, 400 (Fed. Cir. 1994) (“[T]he concept of equivalency cannot embrace a structure that is specifically excluded from the scope of the claims.”).

91. *Sage*, 126 F.3d at 1424.

92. ROBERT P. MERGES ET AL., *INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE* 137 (2d ed. 2000).

cuit in *Zodiac* properly affirmed the district court's noninfringement ruling under the doctrine of equivalents.

2. *A Structural Relationship that Is Highly Touted for its Advantages over the Prior Art Has a Narrow Range of Equivalents*

Courts can mitigate the tension between the equitable objective of the doctrine of equivalents and the public-notice function of the claim if a structural relationship, highly touted by the patentee, receives a narrow range of equivalents.⁹³ The patentee's emphasis on a particular structural relationship would make the public believe that the patented invention must possess that structural relationship without much variation. In *Tronzo*, the patentee touted the advantages of a conical surface, and thereby led the public to believe that a surface with a different shape would fall outside the scope of the invention. Hence, if the touted structural relationship received a broad range of equivalents, the doctrine of equivalents would conflict with the public-notice function of the claim. Consequently, fear of infringement would discourage the public from coming up with related inventions.

On the other hand, when the patentee did not tout the advantages or emphasize the importance of a specific claimed shape, the claim limitation may be held equivalent to a different specific shape, as exemplified in *Optical Disc*. In this case, the Federal Circuit construed a "ramped trailing edge" as "a . . . trailing edge which moderates its decrease in laser power from a write level to a base level, over time, to produce a less abrupt passage through the thermal threshold of the moving medium."⁹⁴ In contrast, the accused device employed a double-step trailing edge.⁹⁵ In the written description of the '129 patent, ODC did not claim that "ramped trailing edges" were superior to all other types of edges; instead, ODC only stated that "ramped trailing edges" could produce a desirable result that some other types of edges, including single-step edges, could not produce.⁹⁶ In

93. See Allison, *supra* note 87, at 573 ("[In *Tronzo*], [t]he patent owner's theory of equivalents was erroneous as a matter of law at least in part because the specification touted the advantages of a 'conical' cup and distinguished other shapes as being inferior. The court was not willing to allow the asserted claims to cover an accused device that did not have the specifically touted 'conical' shape.").

94. *Optical Disc Corp. v. Del Mar Avionics*, 208 F.3d 1324, 1334-35 (Fed. Cir. 2000).

95. *Id.* at 1331.

96. See *id.* at 1329 (citing U.S. Patent No. 5,297,129, col. 9, ll. 39-42, 44-60 (issued Mar. 22, 1994) ("The written description [of the '129 patent] notes that, while the [single-

other words, ODC did not state that other types of edges, including double-step edges, could not generate the preferred symmetrical and canoe-shaped leading and trailing edges. Therefore, the public does not need to assume that variations in the signal edge fall outside the scope of the claim under the doctrine of equivalents. The court would not harm the public by finding that Del Mar's FireTrac system infringed ODC's invention. Therefore, the Federal Circuit's decision to vacate the district court's summary judgment of noninfringement did not conflict with the public-notice function of the claim and instead furthered the equitable objective of the doctrine of equivalents.

B. *Vehicular*: Improperly Adopted the "All-Advantages" Approach

In contrast to *Zodiac* and *Optical Disc*, *Vehicular* in effect adopted a new approach, the "all-advantages" approach, that limits the range of equivalents.⁹⁷ This approach undermines the public policy underpinning the doctrine of equivalents, and should be abolished by the Federal Circuit.

1. The Federal Circuit in Effect Adopted the "All-Advantages" Approach for the Function-Way-Result Test

In its application of the function-way-result test for the doctrine of equivalents, the *Vehicular* court, without explicit declaration, in effect adopted a new "all-advantages" approach by requiring that the corresponding component of the accused device possesses all the advantages of a claim element.

More specifically, the court relied solely on the written description of the patent in suit and determined that providing enhanced reliability was a substantial function of "a spring assembly consisting of two concentric springs."⁹⁸ To support this conclusion, the court cited two paragraphs from the patent specification.⁹⁹ But the two paragraphs only indicate that im-

]step[] modulator drive signal B1 results in good pit symmetry (B3), the pits have blunt ends, making tracking difficult for some players.").

97. See *Vehicular I*, 141 F.3d 1084, at 1093-98 (Fed. Cir. 1998) (Newman, J., dissenting). In the section titled "The 'All-Advantages' Rule," Judge Newman stated that "[t]he panel majority holds that the advantages mentioned in the specification, although not included in the claims, must be possessed by the accused device before there can be a finding of infringement by equivalency." *Id.* at 1093.

98. See *Vehicular II*, 212 F.3d 1377, 1382 (Fed. Cir. 2000).

99. See *id.* at 1380, 1382 (quoting U.S. Patent No. 5,413,015 (issued May 9, 1995)). The two paragraphs are as follows:

proving reliability is one of several functions of a spring assembly, not necessarily a substantial function.

Further, other evidence indicate that enhanced reliability is not a substantial function. For instance, the summary of the invention clearly states that "the *primary* object of the present invention is to provide a means of assembly which simplifies both manufacture and installation of component parts in said differential mechanism."¹⁰⁰ In comparison with this primary object, enhancing reliability is a less important function of the spring assembly. Enhanced reliability is not characterized as "a long-standing need,"¹⁰¹ nor is it described as a primary object of the invention.¹⁰² Therefore, enhanced reliability seems incidental to Powertrax's adoption of the spring assembly.

Defendant's expert testimony also supports this interpretation that favors the plaintiff.¹⁰³ In his testimony, defendant's expert did not mention

Another object of the present invention is to provide a differential mechanism wherein component parts of the assembly, such as clutch members, are joined together by a resilient means comprising a pair of oppositely-wound concentric springs bearing against a pin so that the strength of the spring and reliability of the resilient means are increased.

U.S. Patent No. 5,413,015, col. 2, ll. 14-20 (issued May 9, 1995).

[Because of the dual spring feature], should one spring break or become weakened, the mechanism will continue to function as the second spring will bear the load and prevent the broken spring from exiting the assembly.

Id. at col. 4, ll. 26-29.

100. *Id.* at col. 2, ll. 10-13 (emphasis added). This primary object was achieved by the utilization of the spring assembly, as stated in the patent:

The double spring arrangement of the resilient means 23 comprising the two oppositely-wound concentric springs 33 and 34 replace the single spring used in conventional mechanisms. By such means, the subject invention greatly improves manufacturability and assembly. The present invention further permits impingement of the spring assembly 23 directly on the end of the opposing pin 24. *This practice of assembly simplifies both manufacture and installation*, and assembly and installation may be performed by unskilled persons using simple hand tools rather than complicated specialized tools so that a viable, marketable product which functions well is provided.

Id. at col. 4, ll. 37-39 (emphasis added).

101. *Cf. id.* at col. 1, ll. 45-49. The patentee stated the long-standing need for the primary object of the invention, but not for enhanced reliability.

102. *See id.* at col. 2, ll. 14-20.

103. *Vehicular I*, 141 F.3d 1084, 1095 (Fed. Cir. 1998) (Newman, J., dissenting). During the trial, the defendant's Director of Engineering testified:

enhancing reliability as a function of the spring assembly. His testimony shows that enhancing reliability may not be a substantial function, even though another non-primary object of the invention, “provid[ing] a resilient means interconnecting the clutch members,”¹⁰⁴ may have been.

Given the evidence above, a reasonable fact-finder could conclude that the defendant’s spring-plug-pin assembly performs substantially the same function as the plaintiff’s spring-spring-pin assembly. Therefore, the Federal Circuit should have vacated the district court’s summary judgment of noninfringement under the doctrine of equivalents and remanded the case.

Instead, the Federal Circuit affirmed the district court’s summary judgment and completely ignored the substantiality. The court emphasized that enhanced reliability was a stated object of the invention without considering whether all of the stated objects were substantial. In effect, the court declared that all of the advantages listed as the objects of the invention are substantial functions of a claim element, regardless of whether the patentee has listed an insubstantial function in an effort to promote the commercial value of his patent. Hence, the *Vehicular* court improperly required, for finding equivalence under the function-way-result test, that the corresponding component of the accused device possesses all the advantages of a claim element. This new requirement may be called the “all-advantages” approach.¹⁰⁵

2. *The “All-Advantages” Approach Is Inconsistent with the Public Policy Underpinning the Doctrine of Equivalents*

The “all-advantages” approach is detrimental to achieving the equitable objective of the doctrine of equivalents, which is to prevent “a fraud on a patent.”¹⁰⁶ An unscrupulous competitor may avoid literal infringement by making insubstantial modifications to a patented device and conse-

[The inner spring has] only two possible functions. Number one is to fill up a hole, that was my judgment is the reason that it was in. So that the pin that was adjacent to the spring would bear against a nice, full flat surface, and the only other possible reason would be to give you more spring force, and I didn’t feel that we needed additional spring force.

Id.

104. See U.S. Patent No. 5,413,015, col. 2, ll. 33-39 (issued May 9, 1995). Among the non-primary objects, another object of the spring assembly is “to provide a resilient means interconnecting the clutch members in a differential assembly which includes springs that impinge *directly* on the ends or their respective opposing pins rather than on a connecting medium or some other portion of the assembly as is experienced with conventional differential mechanisms.” *Id.* (emphasis added).

105. See *Vehicular I*, 141 F.3d at 1093-98 (Fed. Cir. 1998) (Newman, J., dissenting).

106. *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 608 (1950).

quently, producing an inferior device that performs the primary function of the patented device, but does not provide one minor advantage listed in the written description of the patent. Under the doctrine of equivalents, these modifications should not enable the competitor to escape liability for infringement.¹⁰⁷ In contrast, the "all-advantages" approach compels the court to find the modified device noninfringing under the doctrine of equivalents if one component of the inferior device does not perform one minor function of the corresponding, novel claim element. Thus, the "all-advantages" approach undermines the equitable objective of the doctrine of equivalents.

It may be argued that the "all-advantages" approach is necessary to avoid an application of the doctrine of equivalents that vitiates a claim element. This same objective can be achieved relying on the "insubstantial differences" test or the function-way-result test.¹⁰⁸ For example, according to *Sage and Zodiac*, the *Vehicular* court could have reached the same conclusion without inventing the "all-advantages" approach, because the spring-spring-pin assembly is contradictory in structure to the spring-disk-pin assembly. Being insubstantially different or performing "substantially the same function" is conceptually distinct from providing all of the advantages listed in the written description, because not all of the listed advantages are substantial functions. Thorough evaluations of the importance of each listed advantage are critical for the proper application of the doctrine of equivalents. By excluding such substantive evaluations, the "all-advantages" approach places the inventor "at the mercy of verbalism and subordinating substance to form," contradicting the underlying rationale of the doctrine of equivalents.¹⁰⁹

Furthermore, the "all-advantages" approach would make the patent drafter hesitant to disclose the advantages of an invention in the written description, and thus cannot effectively assist the public to "promote the progress of science and useful arts."¹¹⁰

Under the patent law, the written description must only satisfy the enablement requirement, the clear claim requirement, and the written description requirement.¹¹¹ None of these requirements obliges the patentee

107. *See id.* at 607.

108. *See Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 39-40 (1997).

109. *Graver Tank*, 339 U.S. at 607.

110. U.S. CONST. art I, § 8, cl. 8.

111. *See* 35 U.S.C. § 112, ¶ 1 (1994), and MERGES, *supra* note 92, at 224 ("The first paragraph of § 112 has been interpreted in such a way that three distinct requirements are

to disclose the advantages of the invention.¹¹² On the other hand, the patentee may choose to disclose at least some advantages of his invention in order to overcome the prior art and promote the commercial value of his patent. During patent examination, the patentee can overcome the prior art by claiming a novel and nonobvious device structure, or by claiming an unexpected function if the claimed device structure is anticipated or obvious. Since claiming an unexpected function in addition to a novel and nonobvious structure would unnecessarily narrow the scope of the invention, the patentee in his initial application usually discloses, but does not claim, the unexpected function of the claimed device. If the examiner finds the claimed structure anticipated or obvious, then the patentee can insert the unexpected function into the claim. On the other hand, anticipated or obvious functions of the invention cannot help the claim to overcome the prior art. Nonetheless, the patentee usually discloses many such advantages in order to promote the commercial value of his patent.

The “all-advantages” approach invented by the Federal Circuit would deter the patentee from disclosing any advantage that is unnecessary to the patentability of his invention, because unnecessary disclosure of such an advantage would limit the range of equivalents.¹¹³ The narrow range of equivalents would reduce the commercial value of the patent. Therefore, most patentees would choose not to disclose any unexpected advantage if the device structure is itself novel and nonobvious. In addition, most patentees would avoid disclosing expected or obvious advantages. The nondisclosure of advantages, especially the nondisclosure of the unexpected functions of a pioneer invention, would impede the dissemination of knowledge because the public would have difficulty in recognizing these advantages. Consequently, patents would become less effective in assisting the public to “promote the progress of science and useful arts.”¹¹⁴

Finally, the “all-advantages” approach cannot be applied consistently to all patents. If a patent does not disclose any advantage, the Federal Circuit would be forced to rely on other evidence such as expert testimony to identify the substantial function of a claim element. On the other hand, if a patent discloses some advantages, the Federal Circuit, adopting the “all-advantages” approach, would ignore expert testimony. Hence, the “all-

now said to spring from it: (1) the written description requirement; (2) the clear claim requirement; and (3) the enablement requirement.”).

112. The utility requirement under § 101 may require some disclosure. *See* 35 U.S.C. § 101 (1994).

113. The patentee may still disclose the structural differences between the claimed device and the prior-art devices.

114. U.S. CONST. art I, § 8, cl. 8.

advantages" approach cannot treat a patent without any disclosed advantage the same way as a patent with even one disclosed advantage. In other words, the "all-advantages" approach is, itself, inconsistent.

3. *The Application of the "All-Advantages" Approach May Create Confusion*

If the "all-advantages" approach established in *Vehicular* were deemed proper, it might be possible for an accused device to escape a finding of infringement under the doctrine of equivalents by performing one minor advantage that is not listed in the asserted patent and then exaggerating the importance of this advantage in a patent application for the accused device. The accused device would be patentable if its variation in structure were novel and nonobvious over the asserted patent and other prior art, even if the asserted patent is a blocking patent. By, extending the "all-advantages" approach to the patent of the accused device, the court could find the accused device noninfringing under the doctrine of equivalents, because the accused device performs one function that is not performed by the asserted device. Such an extension would further erode patent protection under the doctrine of equivalents. The Federal Circuit should reject this extension and instead perform a substantive evaluation of the importance of each listed advantage.

In addition, the lack of substantive evaluation of the importance of advantages under the "all-advantages" approach may lead to arbitrary results in infringement cases. The finding of infringement or noninfringement would depend upon whether any advantage was disclosed and which advantage the drafter decided to enumerate. This arbitrariness could be cured by requiring that a component of the accused device possesses all the advantages of a claim element, including those not enumerated in the asserted patent. This modification to the "all-advantages" approach would require courts to rely on expert testimony to find out what all the advantages were. More fundamentally, this modification makes the range of equivalents narrower for inventions possessing multiple advantages than for inventions possessing fewer advantages. Inventions with multiple advantages are often pioneering, and pioneer inventions should enjoy a broad, not narrow, range of equivalents.¹¹⁵ Therefore, the court should not modify the "all-advantages" approach to encompass the advantages not described in the asserted patent.

115. MERGES, *supra* note 92, at 279 (citing 4 DONALD S. CHISUM, CHISUM ON PATENTS §18.04[2] (1998)).

4. *The Federal Circuit Should Abandon the "All-Advantages" Approach*

In summary, the Federal Circuit should consider all available evidence to distinguish substantial functions from incidental functions under the doctrine of equivalents. Courts developed this equitable doctrine to prevent an accused infringer from changing only minor details of a claimed invention while retaining its essential functionality.¹¹⁶ In determining whether an advantage is essential, the Federal Circuit should perform a substantive evaluation, rather than rely solely upon whether the advantage was listed as an object of the invention in the written description.

IV. CONCLUSION

The Federal Circuit needs to strike a balance between the equitable objective of the doctrine of equivalents and the public-notice function of patent claims. The court in *Zodiac* and *Optical Disc* appropriately limited the range of the doctrine of equivalents. In *Zodiac*, the Federal Circuit held that a claim limitation that recites a particular structural relationship cannot be equivalent to a contradictory structural relationship in an accused device. When the difference between the claimed invention and the accused device lies on a continuum, and the claimed structure was not highly touted by the patentee, the *Optical Disc* court held that infringement under the doctrine of equivalents should be decided by a jury.

In *Vehicular*, however, the Federal Circuit overly emphasized the importance of the public-notice function of claims and in effect adopted an "all-advantages" approach for the function-way-result test. The "all-advantages" approach unduly narrows the patentee's right under the doctrine of equivalents, and is thus not consistent with the public policy underpinning patent law. The court should have performed a substantive evaluation to distinguish the essential advantages from merely incidental ones, and properly determine the range of equivalents in order to prevent "a fraud on a patent."¹¹⁷

116. *Sage Prods., Inc. v. Devon Indus., Inc.*, 126 F.3d 1420, 1424 (Fed. Cir. 1997).

117. *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 608 (1950).

