United States District Court,
D. New Hampshire.

CENTRICUT, LLC,
Plaintiff.
v.
ESAB GROUP, INC,
Defendant.
v.
CENTRICUT, LLC (New Hampshire) and Centricut, LLC (Delaware),
Counterclaim Defendants.

No. 99-039-M

Feb. 7, 2002.

ORDER

MCAULIFFE**, J.**

Centricut, LLC brought suit against Esab Group, Inc. ("Esab"), holder of United States patent 5,023,425 ("the '425 patent"), seeking a declaratory judgment that: (1) it has not infringed the '425 patent; (2) the '425 patent is invalid on a variety of statutory grounds; FN1 and (3) the '425 patent is unenforceable under the doctrine of laches and estoppel. Esab counterclaims against Centricut, LLC (New Hampshire) and Centricut, LLC (Delaware) (collectively "Centricut"), asserting infringement of the '425 patent and infringement of United States patent Des. 384,682. Before the court is Centricut's motion for summary judgment (document no. 25) on Count I of its petition for declaratory judgment (which includes its claims of non-infringement and statutory invalidity), and Count I of Esab's counterclaim (which claims infringement of the '425 patent). Esab objects. For reasons given below, Centricut's motion for summary judgment is denied.

FN1. Specifically, Centricut asserts that the '425 patent should be declared invalid, void, and/or unenforceable under: (1) 35 U.S.C. s. 112, para. 2 (for indefiniteness); (2) 35 U.S.C. s. 102(a); (3) 35 U.S.C. s. 102(b); (4) 35 U.S.C. s. 103 (for obviousness); and (5) 35 U .S.C. s. 112, para. 1 (for failure to meet the enablement requirement and to set forth the best mode).

Summary Judgment Standard

Summary judgment is appropriate when the record reveals "no genuine issue as to any material fact and ... the moving party is entitled to a judgment as a matter of law." FED. R. CIV. P. 56(c). "To determine whether these criteria have been met, a court must pierce the boilerplate of the pleadings and carefully review the parties' submissions to ascertain whether they reveal a trialworthy issue as to any material fact." Perez v. Volvo Car Corp., 247 F.3d 303, 310 (1st Cir.2001) (citing Grant's Dairy-Me., LLC v. Comm'r of

Me. Dep't of Agric., Food & Rural Res., 232 F.3d 8, 14 (1st Cir.2000)).

Not every factual dispute is sufficient to thwart summary judgment; the contested fact must be "material" and the dispute over it must be "genuine." In this regard, "material" means that a contested fact has the potential to change the outcome of the suit under the governing law if the dispute over it is resolved favorably to the nonmovant. By like token, "genuine" means that the evidence about the fact is such that a reasonable jury could resolve the point in favor of the nonmoving party.

Navarro v. Pfizer Corp., 261 F.3d 90, 93-94 (1st Cir.2001) (quoting McCarthy v. Northwest Airlines, Inc., 56 F.3d 313, 315 (1st Cir.1995)).

In defending against a motion for summary judgment, "[t]he non-movant may not rely on allegations in its pleadings, but must set forth specific facts indicating a genuine issue for trial." Geffon v. Micrion Corp., 249 F.3d 29, 34 (1st Cir.2001) (citing Lucia v. Prospect St. High Income Portfolio, Inc., 36 F.3d 170, 174 (1st Cir.1994)). When ruling upon a party's motion for summary judgment, the court must "scrutinize the summary judgment record 'in the light most hospitable to the party opposing summary judgment, indulging all reasonable inferences in that party's favor." ' Navarro, 261 F.3d at 94 (quoting Griggs-Ryan v. Smith, 904 F.2d 112, 115 (1st Cir.1990)).

Factual Background

Esab makes and sells plasma arc torches that are used for cutting and welding metal. Centricut makes and sells replacement electrodes for plasma arc torches manufactured by Esab and others. In 1998, Esab sued Centricut in the District of South Carolina for infringing the '425 patent, but the suit was dismissed for lack of personal jurisdiction. Centricut filed its petition for declaratory judgment in this court shortly thereafter. Esab responded with a counterclaim asserting, *inter alia,* infringement of the '425 patent.

The '425 patent discloses an electrode for supporting an electrical arc in a plasma arc torch and teaches a method for fabricating the electrode. The patented electrode has a metal emissive insert (which is the intended point of contact for the electrical arc which allows the torch to cut and weld metal), surrounded by a metal "sleeve" which is mounted in a "cavity" in a metal holder, generally made of copper or a copper alloy. At issue here are independent claims 1, 2, and 8 of the '425 patent. Claim 1 recites, in pertinent part:

a metallic holder having a front end, and a cavity in said front end, and

an insert assembly mounted in said cavity and comprising an emissive insert composed of a metallic material having a relatively low work function, and a sleeve surrounding said emissive insert so as to separate said emissive insert from contact with said holder, said sleeve having a radial thickness of at least about 0.01 inches at said front end and being composed of a metallic material having a work function which is greater than that of the material of said emissive insert, and said sleeve being composed of a metal which is selected from the group consisting of silver, gold, platinum, rhodium, iridium, palladium, nickel, and alloys wherein at least 50% of the composition of the alloy consists of one or more of said metals ...

'425 patent, col. 7, ll. 27-43. Claim 2 recites, in pertinent part:

a metallic holder having a front end, and a cavity in said front end, and

an insert assembly mounted in said cavity and comprising an emissive insert composed of a metallic material having a relatively low work function, and a sleeve surrounding said emissive insert so as to separate said emissive insert from contact with said holder, said sleeve having a radial thickness of at least about 0.01 inches at said front end and being composed of a metallic material having a work function which is greater than that of the material of said emissive insert, and said sleeve being composed of an alloy which comprises copper and a second metal which is selected from the group consisting of silver, gold, platinum, rhodium, iridium, palladium, nickel, and alloys thereof, and wherein said second metal comprises at least about 10% of the alloy of copper and the second metal ...

'425 patent, col. 7, ll. 49-66. Finally, claim 8 recites, in pertinent part,

a metallic tubular holder defining a longitudinal axis and having a front end and a rear end, and a transverse end wall closing said front end, said transverse end wall having a substantially planar outer front face which is perpendicular to said longitudinal axis, and a cavity formed in said front face and which extends rearwardly along said longitudinal axis, and

an insert assembly mounted in said cavity and comprising

(a) a generally cylindrical emissive insert disposed coaxially along said longitudinal axis ... said emissive insert being composed of a metallic material having a relatively low work function so as to be adapted to readily emit electrons upon an electrical potential being applied thereto, and

(b) a sleeve positioned in said cavity coaxially about said emissive insert, said sleeve having a radial thickness of at least about 0.01 inches at said front end and being composed of a metallic material having a work function which is greater than that of the material of said holder and greater than that of the material of said emissive insert, said metallic sleeve being selected from the group consisting of silver, gold, platinum, rhodium, iridium, palladium, nickel, and alloys wherein at least 50% of the composition of the alloy consists of one or more of said metals ...

'425 patent, col. 8, 11. 29-58.

The electrode claimed in the '425 patent is purported to be an improvement over previous electrodes because use of a sleeve to separate the emissive insert from the holder increases the use-life of the electrode by preventing the electrical arc from shifting its point of attachment from the emissive insert to the holder, which is subject to melting and failure when contacted by the arc.FN2

FN2. Claims 1, 2, and 8 each conclude as follows: "whereby said sleeve acts to resist movement of the arc attachment point from said insert to said holder."'425 patent, col. 7, 11. 44-46, col. 8, 11. 1-3, 59-61.

The accused electrode, made and sold by Centricut, includes an emissive insert, encircled, at the front end of the electrode, by a "washer" made of a different metal, mounted within a bore drilled through the holder.

After conducting some discovery, Centricut moved for summary judgment on Count I of its petition for declaratory judgment and Count I of Esab's counterclaim. Specifically, Centricut argued that: (1) the '425 patent is invalid because of indefiniteness with respect to the work-function limitation on the material from which the sleeve is made; (2) its electrodes do not literally infringe the '425 patent because: (a) they have no

cavity; (b) they have no sleeve; and (c) the material from which the washer is made cannot be shown to have a work function higher than that of the material of the emissive insert; and (3) its electrodes do not infringe under the doctrine of equivalents because a washer brazed into a through-hole is not equivalent to a sleeve metallurgically bonded to the walls of a cavity. Esab objects, categorically, to Centricut's motion for summary judgment.

Because the '425 patent had not yet been construed, the court denied Centricut's motion for summary judgment, without prejudice, and directed the parties, by order dated April 3, 2001, to file a stipulation as to claim construction, or notify the court whether the claim construction issues could be resolved on the briefs or would require a *Markman* hearing. *See* Markman v. Westview Instruments, Inc., 52 F.3d 967 (Fed.Cir.1995) (in banc), *aff'd* 517 U.S. 370 (1996)). Specifically, the court noted that it could not rule on Centricut's motion for summary judgment without knowing the precise meaning of the terms "work function," "cavity," and "sleeve." The parties filed a joint response, in which they: (1) directed the court to their previously filed papers with respect to the construction of the terms "cavity" and "sleeve;" and (2) agreed upon a definition of "work function" as "the potential step, measured in electron volts, which permits thermionic emission from the surface of a metal at a given temperature" (Jt. Resp. para. 1 (quoting '425 patent, col. 1, 11. 25-28)). Neither party requested a *Markman* hearing, but offered different preferences as to timing in the event the court deemed such a hearing necessary for proper construction of the claims.

Discussion

Based upon a review of the parties' moving papers, it does not appear that a hearing is necessary in order to construe the '425 patent. Accordingly, the court turns to the issues raised by Centricut's motion for summary judgment: (1) invalidity due to indefiniteness; and (2) infringement.

I. *Indefiniteness*

Centricut argues that independent claims 1, 2, and 8 of the '425 patent are invalid as indefinite because: (1) the disputed claims discuss the work functions of various metallic materials rather than the work functions of the surfaces of various metals; and (2) the patent does not provide sufficient information to allow one skilled in the art to determine the relative order of the work functions of the various materials that could be used to construct the claimed holders, sleeves, and emissive inserts. In support of its position, Centricut notes, *inter alia,* that work function is dependent upon a variety of variables, such as surface treatment and crystalline structure, which means that an individual metallic material, such as silver, can have more than one work function. Esab counters by pointing out the existence of standard reference texts which contain reliable data on the work functions of various materials and the availability of tests, routine in the industry, for determining the work function of specific samples of a given metallic material. The court agrees with Esab that the '425 patent is not invalid for indefiniteness.

According to the patent act, a patent "specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." 35 U.S.C. s. 112, para. 2. Once a patent has been issued, its "claims as granted are accompanied by a presumption of validity based upon compliance with, *inter alia,* s. 112 para. 2." S3 Inc. v. nVIDIA Corp., 259 F.3d 1364, 1367 (Fed.Cir.2001) (citing Budde v. Harley-Davidson, Inc., 250 F.3d 1369, 1376 (Fed.Cir.2001)); *see also* 35 U.S.C. s. 282 (Supp.2001) ("A patent shall be presumed valid.... The burden of establishing invalidity of a patent or any claim thereof shall rest on the party asserting such invalidity."). The presumption of validity may be overcome only by clear and convincing evidence. Superior Fireplace Co. v. Majestic Prods. Co., 270 F.3d 1358, 1367 (Fed.Cir.2001) (citing Kaufman Co. v. Lantech, Inc., 807

F.2d 970, 973-74 (Fed.Cir.1986)). However, when a challenger can demonstrate, by clear and convincing evidence, that a patent claim fails to meet the definiteness requirement, the court should declare the claim invalid. *See* Exxon Research & Eng'g Co. v. United States, 265 F.3d 1371, 1376 (Fed.Cir.2001).

"The test for determining whether a claim meets the definiteness requirement is 'whether one skilled in the art would understand the bounds of the claim when read in light of the specification." ' LNP Eng'g Plastics, Inc. v. Miller Waste Mills, Inc., 275 F.3d 1347, 1359 (Fed.Cir.2001) (quoting Personalized Media Communications, LLC v. Int'l Trade Comm'n, 161 F.3d 696, 705) (Fed.Cir.1998)). "If the claims when read in light of the specification reasonably apprise those skilled in the art of the scope of the invention, s. 112 demands no more." S3 Inc., 259 F.3d at 1367 (quoting Miles Labs., Inc. v. Shandon, Inc., 997 F.2d 870, 875 (Fed.Cir.1993)) (additional citations omitted). As for the necessary level of definiteness, a "claim limitation [must be] expressed in terms that are reasonably precise in light of the subject matter." Exxon, 265 F.3d at 1379 (citing Orthokinetics, Inc. v. Safety Travel Chairs, Inc., 806 F.2d 1565, 1576 (Fed.Cir.1986)). Finally, "[a] determination of claim indefiniteness is a legal conclusion that is drawn from the court's performance of its duty as the construer of patent claims." *LPN* Eng'g, 275 F.3d at 1353 (quoting Personalized Media, 161 F.3d at 705).

Based upon the foregoing legal standard, the claims in the '425 patent are not void for indefiniteness. In claims 1 and 2, the inventor discloses an electrode in which the sleeve has a higher work function than the emissive insert, and in claim 8, he discloses an electrode in which the sleeve has a higher work function than both the emissive insert and the holder. In all three claims, the inventor discloses several metals from which the claimed sleeve may be made. While arguing that those claims are indefinite, Centricut offers no evidence suggesting that one skilled in the art would have difficulty in knowing what the inventor claims as his invention, which is the relevant legal test. *See LPN* Eng'g, 275 F.3d at 1349. Rather, Centricut contends that because several of the metals listed in claims 1, 2, and 8 as suitable for sleeves, such as silver, have more than one work function-at least one of which is lower than a work function of one of the metals from which an emissive insert can be made-it is impossible for one to know whether or not an electrode with a silver sleeve infringes.

Centricut's argument misses the mark, because the disputed claims are more than sufficiently definite to indicate their bounds to one skilled in the art. A sleeve made from a metallic material with a higher work function than that of the metallic material of the emissive insert is within claims 1 and 2 while a component made from a metallic material with a work function equal to or lower than that of the metallic material of the emissive insert falls outside those claims.FN3 The claims could not be more definite on this point. It may well be, as Centricut claims, that some silver sleeves could be within the claims while others silver sleeves fall outside the claims, depending upon the physical characteristics of the particular sample of silver used and the identity of the metal used for the emissive insert, but that is not due to any indefiniteness in the claim. Rather, it is due to the nature of work function as an electro-chemical characteristic that is dependent upon a variety of variables. Furthermore, all one must do to make a silver electrode component that avoids the work-function limitation of claims 1, 2, and 8 is to use silver with the necessary physical characteristics (surface treatment, crystalline structure, etc.) to give it a work function equal to or lower than the work function of the material selected for the emissive insert (and, in the case of claim 8, the holder). The fact that all forms of all listed sleeve materials do not have higher work functions than all forms of all possible emissive insert materials-the basic factual assertion on which Centricut relies-is simply inadequate to establish that one skilled in the art cannot discern the bounds of the invention claimed in the '425 patent.FN4 The work-function limitation of those three claims meets the definiteness requirement of 35 U.S.C. s. 112, para. 2.

FN3. As for claim 8, a sleeve made from a metallic material with a work function higher than those of both the emissive insert and the holder is within the claim while a component made from a material with a work function equal to or lower than that of the materials of the emissive insert and the holder falls outside the claim.

FN4. Centricut makes much of its observation that the disputed claims refer to the work functions of various "metallic materials" while work function is defined, in the patent, as the capacity for "thermionic emission from the *surface* of a metal ..." (Jt. Resp. para. 1 (emphasis added).) Based upon that observation, Centricut seems to conclude that claims 1, 2, and 8 are indefinite. Centricut's argument, which is unavailing, might have greater force if the disputed claims referred to "metals," rather than "metallic materials," as having work functions, in that several of the relevant metals appear not to have a single work function but, instead, have a range of work functions based upon surface treatment and other variables. However, because the claims refer to "metallic materials," there is no logical or factual ambiguity or inconsistency. In other words, a sample of silver with the (100) surface is one metallic material while a sample of silver with the (110) surface, which presumably has a different work function, is a different metallic material.

Because Centricut has failed to produce clear and convincing evidence that claims 1, 2, and 8 of the '425 patent are indefinite, its motion for summary judgment on Count I of its petition for declaratory judgment, as to invalidity based upon indefiniteness, is denied.FN5

FN5. Centricut also asserts, in footnote 10 of its memorandum of law, that the '425 patent is invalid under 35 U.S.C. s. 102(b) as having been anticipated by Japanese Laid-Open Patent Application No. Sho 60-247491. Centricut's bare assertion, accompanied by nothing more than a copy of the Japanese patent, is hardly sufficient to support a grant of summary judgment on Centricut's claim of invalidity. Furthermore, without taking a position on this question, the court notes that the Japanese patent claims an electrode in which the emissive insert is separated from the holder by "a boundary layer ... formed by plating treatment such as electroplating, chemical plating, etc. or the welding or the deposition of nickel, chrome, etc...." (Pl.'s Mot. Summ. J., Bujold Aff., Ex. K at 2.)

II. ***Infringement***

In Count I of its amended complaint, Centricut asserts that it "has not at any time infringed, and does not now infringe, on any of the claims in the '425 patent" (Am.Compl.para. 15), and in its prayers for relief, Centricut asks the court to declare that it has not infringed that patent (Am. Compl., Prayer B). In Count I of its amended counterclaim, Esab asserts that Centricut has manufactured and sold electrodes that infringe one or more claims of the '425 patent (Am. Answer & Countercl. para.para. 24-31).FN6

FN6. The fact that Centricut petitioned for a declaratory judgment of non-infringement before Esab made its infringement claim in this court does not shift the burden of proof on infringement from Esab to Centricut. *See* Vivid Techs., Inc. v. Am. Science & Eng'g, Inc., 200 F.3d 795, 802 (Fed.Cir.1999) (citing 12 JAMES WM. MOORE ET AL., MOORE'S FEDERAL PRACTICE s. 57.62[2][d] (3rd ed.1997)). In other words, by filing its declaratory judgment action, Centricut did not obligate itself to prove a negative, *i.e.,* that its electrode does not infringe the '425 patent, either literally or under the doctrine of equivalents.

Centricut contends that it is entitled to judgment as a matter of law as to infringement on grounds that: (1) its electrode does not literally infringe the electrode claimed in the '425 patent because: (a) it has a bore or through-hole rather than a cavity; (b) it has a washer rather that a sleeve; and (c) the material of its washer cannot be shown to have a work function higher than the work function of material of its emissive insert; and (2) the Centricut electrode does not infringe under the doctrine of equivalents because a washer and emissive insert brazed into a through-hole are not equivalent to a sleeve that completely surrounds an emissive insert and that is metallurgically bonded to the walls of a cavity.

Under the United States Patent Act, "[e]xcept as otherwise provided ... whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor, infringes the patent." 35 U.S.C. s. 271(a) (Supp.2001).

An infringement analysis requires two steps: construction of the claims, to determine their scope and meaning, and comparison of the properly construed claims to the allegedly infringing device or method. Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1454 (Fed.Cir.1998) (*en banc*). Claim construction ... is a matter of law.... Lockheed Martin Corp. v. Space Sys./ Loral, Inc., 249 F.3d 1314, 1323 (Fed.Cir.2001). The comparison of claims to the accused device or method, and the corresponding determination of infringement, whether literal or under the doctrine of equivalents, is a question of fact. Tanabe Seiyaku Co. v. United State Int'l Trade Comm'n, 109 F.3d 726, 731 (Fed.Cir.1997).

J & M Corp. v. Harley-Davidson, Inc., 269 F.3d 1360, 1366 (Fed.Cir.2001) (parallel citations omitted).

A. ***Claim Construction***

This case presents two issues of claim construction: (1) whether the claimed "cavity" in the electrode's holder is limited to a hole that extends only partway through the holder, or may consist of a hole that goes all the way through; and (2) whether the claimed "sleeve" must separate the emissive insert from the holder at all possible points of contact, or may separate the emissive insert and the holder at some but not all possible points of contact. According to Centricut, the term "cavity" does not include a bore or through-hole, and the term "sleeve" does not include anything that does not provide total separation between the emissive insert and the holder.

"It is well-settled that, in interpreting an asserted claim, the court should look first to the intrinsic evidence of record, *i.e.,* the patent itself, including the claims, the specification and, if in evidence, the prosecution history." Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed.Cir.1996) (citing Markman v. Westview Instruments, Inc., 52 F.3d 967, 979 (Fed.Cir.1995) (in banc), *aff'd* 517 U.S. 370 (1996)). When examining the intrinsic evidence, the court should first "look to the words of the claims themselves, both asserted and nonasserted, to define the scope of the patented invention." Vitronics, 90 F.3d at 1582 (citing Bell Communications Research, Inc. v. Vitalink Communications Corp., 55 F.3d 615, 620 (Fed.Cir.1995)). When doing so, the court must bear in mind the "heavy presumption in favor of the ordinary meaning of claim language." Kraft Foods, Inc. v. Int'l Trading Co., 203 F.3d 1362, 1366 (Fed.Cir.2000) (quoting Johnson Worldwide Assocs., Inc. v. Zebco Corp., 175 F.3d 985, 989 (Fed.Cir.1999)). After considering the ordinary meaning of the claim language, the court should "review the specification to determine whether the inventor has used any terms in a manner inconsistent with their ordinary meaning," Vitronics, 90 F.3d at

1582, but "any special definition given to a word must be clearly defined in the specification," *Kraft Foods,* 203 F.3d at 1266 (quoting Markman, 52 F.3d at 980). Finally, "the court may also consider the prosecution history of the patent, if in evidence." Vitronics, 90 F.3d at 1582 (citing Markman, 52 F.3d at 980; Graham v. John Deere Co., 383 U.S. 1 (1966)). However, while "the written description may aid in the proper construction of a claim term, limitations, examples, or embodiments appearing only there may not be read into the claim." Kraft Foods, 203 F.3d at 1366 (citing Comark Communications, Inc. v. Harris Corp., 156 F.3d 1182, 1186-87 (Fed.Cir.1998)).

1. *Cavity*

With respect to the proper construction of the cavity element of the patent claims, both parties rest on the arguments in their summary judgment papers. According to Centricut, the '425 patent claims a cavity, which necessarily has an open outer end and a closed inner end.FN7 Centricut further argues that the distinction it draws between a cavity (with an open outer (or front) end and a closed inner (or back) end) and a through-hole or bore (with an open outer end and an open inner end) is supported by the '425 patent itself, which uses the term "cavity" to describe the recess filled by a sleeved emissive insert and the term "bore" to describe certain open passageways, elsewhere in the electrode, designed to permit the flow of gas or water. *See, e.g.,* '425 patent, col. 4, 11. 64-66, col. 5, 11. 50-52. According to Esab, Centricut's proposed construction is unavailing because: (1) the distinction between a blind cavity (i.e., one with a single opening) and a cavity with more than one opening is immaterial when, as here, the cavities in question are both completely filled (with an emissive insert); (2) Centricut limits the term cavity to include only blind cavities by impermissibly treating as a claim limitation a physical characteristic drawn from one of the preferred illustrative embodiments in the specification; and (3) Centricut's distinction between a cavity and a bore ignores the dictionary definition of "bore" as "an interior lengthwise cylindrical cavity."

FN7. Centricut contrasts the cavity claimed in the '425 patent with the analogous feature in the accused electrodes, which it characterizes as a through-hole or bore, which has an open outer end and an open inner end.

The term "cavity," as used in the '425 patent, encompasses both blind cavities and those with openings at both ends. The relevant claims in the patent all disclose a metallic holder with a front end and a cavity in the front end. *See* '425 patent, col. 7, 11. 27-28, 11. 48-48, col. 8, 11. 29-36. In other words, a cavity is an open space formed (and subsequently filled) in the front end of the metallic holder.FN8 Whether such an opening continues through to the back end or terminates somewhere short of the back end is not asserted in the claim. *See* Vitronics, 90 F.3d at 1582 (explaining that proper claim construction takes into account the words of the claim "both asserted and nonasserted) (citation omitted). The plain language of the patent does not limit the claim to blind cavities. Because the relevant claims recite the element of a cavity in the front end, and because a holder with a through-hole meets the limitation of having a cavity in its front end, the cavity element may not be construed with the additional limitation urged by Centricut, which it reads into the claim from other parts of the patent. *See* Kraft Foods, 203 F.3d at 1366 (limitation appearing only elsewhere in the patent may not be read into the claim). In short, for purposes of construing the '425 patent, the term "cavity" includes both blind cavities and through-holes. FN9

FN8. A definition of the term "cavity" that refers exclusively to the front end of the electrode is entirely consistent with the electrode's function, given that the front end is the part of the electrode to which the electrical arc attaches.

FN9. While there is some logic to Centricut's argument that the patent specification uses the term cavity to describe the space filled by the emissive insert and the term bore to describe a cylindrical passageway open on both ends, the force of that argument is substantially diminished by the fact that the cavities in the specification are all filled while the bores identified in the specification remain open for the transmission of gas or water. In other words, to the extent the '425 patent includes a meaningful distinction between cavities and bores, the distinction is based not on the number of openings (one versus two), but, instead, on whether the space has been filled (as with the cavities) or remains open (as with the bores).

2. ***Sleeve***

As with the cavity element, both parties rest on the arguments in their summary judgment papers. According to Centricut, the '425 patent claims a sleeve, which necessarily separates the emissive insert from the holder at all possible points of contact.FN10 Esab counters that: (1) the claimed sleeve need not enclose the emissive insert on all sides to separate it from the holder; and (2) Centricut impermissibly incorporates a "complete encirclement" limitation into the claims from language elsewhere in the specification describing one of the preferred embodiments.

FN10. Centricut contrasts the sleeve claimed in the '425 patent, which it likens to a top hat, with the analogous feature in the accused electrodes, which it characterizes as a washer and likens to the brim of a top hat. (In the '425 patent, the "brim" of the top hat is called the "annular flange," '425 patent, col. 3, 1. 52, and the "stovepipe" portion of the hat is called the "peripheral wall," '425 patent, col. 3, 1. 49.)

The term "sleeve," as used in the '425 patent, encompasses both sleeves that separate the emissive insert from the holder by completely encircling it and those that separate the emissive insert from the holder by partially encircling it, so long as the emissive insert is entirely encircled by the sleeve at its front end and has a radial thickness of at least about 0.01 inches.FN11 The electrodes disclosed in claims 1 and 2 have

FN11. "Encircled" may not be the most apt term to describe a three-dimensional object that is surrounded on all sides, to the extent a circle (as opposed to a sphere) is a two-dimensional geometric figure. Nevertheless, when the court refers to the emissive insert as being "encircled," the intent is to refer to all three dimensions.

a sleeve surrounding said emissive insert so as to separate said emissive insert from contact with said holder, said sleeve having a radial thickness of at least about 0.01 inches at said front end ... whereby said sleeve acts to resist movement of the arc attachment point from said insert to said holder.
'425 patent, col. 7, 11. 32-33, 44-46. The electrode disclosed in claim 8 has
a sleeve positioned in said cavity coaxially about said emissive insert, said sleeve having a radial thickness of at least about 0.01 inches at said front end ... whereby said sleeve acts to resist movement of the arc attachment point from said insert to said holder.

'425 patent, col. 8, 11. 47-50, 11. 59-61.
Nowhere do claims 1, 2, or 8 limit the patented invention to a sleeve that fully surrounds the emissive insert.

Rather, the sleeve surrounds the emissive insert (or is positioned about it) by virtue of separating the emissive insert from the holder, for the purpose of resisting movement of the arc from the emissive insert to the holder. Because the arc attachment point is necessarily on the front end of the emissive insert (or, in the case of electrode failure, on the front end of the holder), and because the only dimensions in claims 1, 2, or 8 that pertain to the sleeve specify its radial thickness at the front end, it necessarily follows that the emissive insert is surrounded, within the meaning of the '425 patent, when the sleeve (or other analogous element) has a radial thickness of at least about 0.01 inches and as much depth as is necessary to allow the sleeve to resist the movement of the arc attachment point from the emissive insert to the holder. In other words, the term "sleeve," as used in the '425 patent, includes both long sleeves that run the full length of the emissive insert and short sleeves that run only part of the length of the emissive insert.

B. ***Literal Infringement***

Centricut argues that the accused electrodes do not literally infringe the '425 patent because: (1) they do not have a cavity; (2) they do not have a sleeve; and (3) even if the washer in the Centricut electrode is a sleeve, or equivalent to the sleeve claimed in the '425 patent, there is no evidence showing that the washer in the Centricut electrode is made from a metallic material with a higher work function than the metallic material of the emissive insert. Esab counters that the Centricut electrode has both a cavity and a sleeve, within the meaning of the '425 patent as properly construed.

"A claim is literally infringed when the accused device literally embodies each limitation of the claim." Kraft Foods, 203 F.3d at 1370 (citing Pall Corp. v. Micron Separations, Inc., 66 F.3d 1211, 1217 (Fed.Cir.1995))

For reasons given above, the court construes the term "cavity" to include both blind cavities, as depicted in Figure 1 of the '425 patent, and through-holes such as those in the Centricut electrode. Similarly, the court construes the term "sleeve" to include both long sleeves, as depicted in Figure 1 of the '425 patent, and short sleeves, such as the washer in the Centricut electrode. Because the Centricut electrode has a cavity, within the meaning of the '425 patent, and because the undisputed factual record does not demonstrate that the Centricut washer has a radial thickness of less than about 0.01 inches, Centricut has failed to demonstrate that Esab cannot prove that the Centricut electrode embodies the "cavity" and "sleeve" elements of claims 1, 2, and 8 of the '425 patent. Furthermore, while Centricut has produced facts supporting the possibility that the material from which its washers are made could have a work function lower than the work function of the material from which its emissive inserts are made, that is not enough to prevent Esab from proving that Centricut's washers have a higher work function than its emissive inserts,FN12 and Esab has produced evidence suggesting that there would be no reason for Centricut to use a washer in its electrode unless it was made from a material with a higher work function than the emissive insert. Accordingly, Esab has demonstrated the existence of a triable issue of material fact relative to the work function of the material from which Centricut makes the washers for its electrodes, thus precluding summary judgment for Centricut on the issue of literal infringement.

FN12. Centricut devotes considerable energy to showing that not all silver has the same work function, due to variables such as crystalline structure, surface treatment, and the like. However, the mere fact that a person cannot know the work function of a piece of metal simply by knowing that the metal is silver does not mean that the work function of any particular piece of silver cannot be ascertained either through testing or knowledge of its crystalline structure, surface treatment, and other physical characteristics.

Because Esab has made a showing sufficient to resist summary judgment on the issue of literal infringement, Centricut's motion for summary judgment, as to that issue (which is raised in both Count I of its amended complaint and Count I of Esab's amended counterclaim), is denied. Esab has not moved for summary judgment on its infringement claim, but at this juncture the court makes the following observations: (1) given the court's construction of the term "cavity," there would appear to be no triable issue of material fact to preclude a finding that the accused electrode embodies the cavity element of the disputed claims; (2) the only issue of material fact pertaining to embodiment of the sleeve element is whether Centricut's short sleeve is long enough to resist movement of the arc attachment point from the emissive insert to the holder; and (3) the only issue of material fact related to the work-function limitation is whether Centricut's sleeves are made from a metallic material with a work function higher than that of the metallic material from which its emissive inserts are made.

C. ***Infringement under the Doctrine of Equivalents***

In addition to claiming that the accused electrode does not literally infringe the '425 patent, Centricut argues that the electrode is not an infringing equivalent. Esab disagrees, and suggests-without so moving-that it is entitled to summary judgment on the issue of infringement by equivalents. Because Centricut is not entitled to summary judgment as to literal infringement, thus leaving open the possibility that Esab could prevail on that claim, there is no occasion to decide the issue of infringement by equivalents. *See* Graver Tank & Mfg. Co. v. Linde Air Prods. Co., 339 U.S. 605, 607 (1950) ("If accused matter falls clearly within the claim, infringement is made out and that is the end of it."). Accordingly, Centricut's motion for summary judgment on the issue of infringement by equivalents (as raised in both Count I of Centricut's amended complaint and Count I of Esab's amended counterclaim) is denied because the question of infringement by equivalents is not ripe for decision unless and until the court decides that Centricut's electrodes do not literally infringe the '425 patent.

Conclusion

For the reasons given, Centricut's motion for summary judgment (document no. 25) is denied. The '425 patent retains the presumption of validity, and the case shall remain on the trial calendar.

SO ORDERED.

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