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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AVX CORPORATION,
Petitioner,

v.

GREATBATCH LTD.,
Patent Owner.

Case IPR2015-00713
Patent 7,035,077 B2

Before MICHAEL P. TIERNEY, JON B. TORNQUIST, and ELIZABETH M. ROESEL, *Administrative Patent Judges.*

TORNQUIST, Administrative Patent Judge.

DECISION
Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

AVX Corporation ("Petitioner") filed a Petition (Paper 3) requesting *inter partes* review of claims 1, 2, 6–9, 13, 14, 18, 19, 23, 24, 28–31, 35, 36, 40, and 41 of U.S. Patent No. 7,035,077 B2 (Ex. 1001, "the '077 patent"). Greatbatch, Ltd. ("Patent Owner") filed a Preliminary Response (Paper 7, "Prelim. Resp.") to the Petition.

We have jurisdiction under 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted "unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." For the reasons given below, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing with respect to claims 1, 2, 8, 9, 23, 24, 30, and 31 of the '077 patent. Accordingly, we authorize an *inter partes* review to be instituted as to these claims on the ground set forth below.

A. The '077 Patent

The '077 patent is directed to an electromagnetic interference (EMI) feedthrough terminal assembly, and a process for manufacturing the same, where the assembly utilizes an insulative shield to prevent damage to the feedthrough capacitor and/or its conformal coating during fabrication of the assembly. Ex. 1001, 1:9–21, 2:46–58, 2:66–3:4, Abstract.

Figures 3 and 4 of the '077 patent are reproduced below:

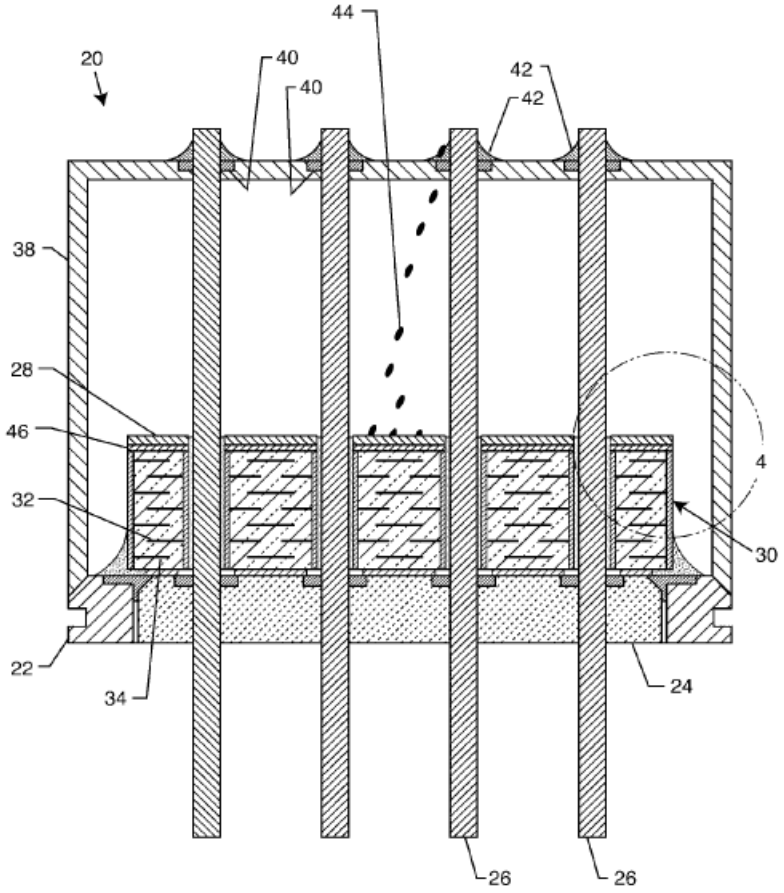

FIG. 3

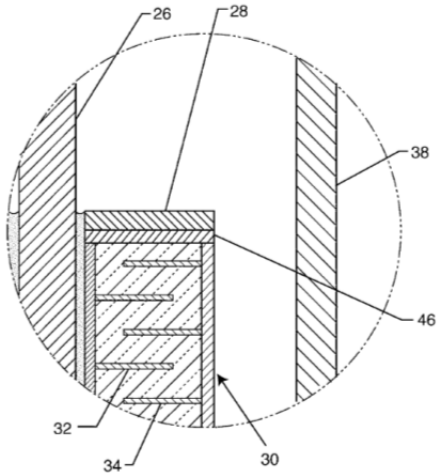

FIG. 4

Figure 3 of the ’077 patent is a cross-sectional view of a quad polar feedthrough terminal assembly, and Figure 4 is an enlarged view of the circled area in Figure 3. *Id.* at 4:1–7, 4:56–59. In Figure 3, terminal pins 26 extend through housing 38, feedthrough capacitor 30, and insulator 24. *Id.* at 4:60–5:12. Conductive pads 40 are conductively coupled to terminal pins 26 “by laser welding, thermal or ultrasonic bonding, soldering, brazing, or the like,” which forms “a solid mechanical and electrical connection 42.” *Id.* at 5:3–4, 5:27–31. As shown in Figure 4, insulative shield 28 is co-bonded to the feedthrough capacitor 30 by a conformal coating 46 on the surface of the capacitor. *Id.* at 5:6–8. Insulative shield 28 protects the conformal coating 46 from the heat, splatter or debris 44 created during the electrical connection process. *Id.* at 5:33–45.

Conformal coating 46 “may comprise a non-conductive polymer, a thermal setting epoxy, or a polyimide,” such as an insulative polyimide washer. *Id.* at 2:36–43, 3:32–36. The ’077 patent discloses that the conformal coating should be “flexible and stress absorbing” to help prevent cracking of the feedthrough capacitor due to “any mismatches in the thermal coefficients of expansion.” *Id.* at 6:43–48.

The ’077 patent instructs that insulative shield 28 “must have a high structural integrity” and may be formed from a broad range of materials, including “a ceramic, alumina-oxide, Fosterite, alumina, BT epoxy, [beryllia] alumina oxide, polyimide, modified polyimide, cyanate ester, composite epoxy, multifunctional epoxy, tetra-functional epoxy, modified epoxy, or standard epoxy.” *Id.* at 3:25–29. The insulative shield may also comprise a circuit board formed with a resin reinforced by a fabric cloth. *Id.* at 3:29–31.

1. Illustrative Claim

Of the challenged claims, claims 1, 13, 23, and 35 are independent. Challenged claims 2 and 6–9 depend, directly or indirectly, from claim 1; challenged claims 14, 18, and 19 depend from claim 13; challenged claims 24, 28–31 depend, directly or indirectly, from claim 23; and challenged claims 36, 40, and 41 depend from claim 35.

Challenged claims 1, 6, and 13, set forth below, are illustrative of the claimed process:

> 1. A process for manufacturing a feedthrough terminal assembly for an active implantable medical device, comprising the steps of:
>
> associating a feedthrough capacitor with a conductive ferrule, the feedthrough capacitor having first and second sets of electrode plates, wherein the second set of electrode plates is conductively coupled to the ferrule;
>
> passing a terminal pin or leadwire through the ferrule in non-conductive relation and through the feedthrough capacitor in conductive relation with the first set of electrode plates;
>
> placing an insulative shield over a surface of the feedthrough capacitor; and
>
> conductively coupling electronic circuitry for the active implantable medical device to the terminal pin or leadwire, wherein the insulative shield protects the surface of the feedthrough capacitor from heat, splatter or debris occasioned by said coupling of the electronic circuitry to the terminal pin or leadwire.

Ex. 1001, 7:34–52.

> 6. The process of claim 1, including the step of co-bonding the insulative shield to the feedthrough capacitor using a conformal coating on the feedthrough capacitor.

Id. at 7:65–67.

> 13. A process for manufacturing a feedthrough terminal assembly for an active implantable medical device, comprising the steps of:
>
> associating a feedthrough capacitor with a conductive ferrule, the feedthrough capacitor having first and second sets of electrode plates, wherein the second set of electrode plates is conductively coupled to the ferrule;
>
> passing a terminal pin or leadwire through the ferrule in non-conductive relation and through the feedthrough capacitor in conductive relation with the first set of electrode plates;
>
> placing an insulative shield over a surface of the feedthrough capacitor;
>
> co-bonding the insulative shield to the feedthrough capacitor using a conformal coating on the feedthrough capacitor; and
>
> laser welding, thermal or ultrasonic bonding, soldering, or brazing electronic circuitry for the active implantable medical device to the terminal pin or leadwire, wherein the insulative shield protects the surface of the feedthrough capacitor from heat, splatter or debris occasioned by said coupling of the electronic circuitry to the terminal pin or leadwire.

Id. at 8:26–47.

2. Related Proceeding

The'077 patent is being asserted against Petitioner in *Greatbatch Ltd. v. AVX Corp.*, No. 1:13-cv-00723-LPS (D. Del.). Pet. 1; Paper 4, 4.

B. The Asserted Grounds

Petitioner asserts the following grounds of unpatentability:

1. Whether claims 1, 2, 6–9, 13, 14, 18, 19, 23, 24, 28–31, 35, 36, 40, and 41 are unpatentable under 35 U.S.C. § 102(e) as anticipated by the '347 patent.[1]

2. Whether claims 1, 2, 6–9, 13, 14, 18, 19, 23, 24, 28–31, 35, 36, 40, and 41 would have been obvious under 35 U.S.C. § 103 over Engmark,[2] Kurihara,[3] and Stevenson.[4]

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are given their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *In re Cuozzo Speed Techs., LLC*, No. 2014-1301, 2015 WL 4097949, at *5–7 (Fed. Cir. July 8, 2015) (confirming that the broadest reasonable construction standard was properly adopted by PTO regulation). In determining the broadest reasonable construction, we presume that claim terms carry their ordinary and customary meaning. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). This presumption may be rebutted when a patentee, acting as a lexicographer, sets forth an alternate definition of a term in the

[1] U.S. Patent No. 6,985,347 B2 (Jan. 10, 2006) (Ex. 1003).
[2] U.S. Patent Pub. No. 2003/0040779 A1 (published Feb. 27, 2003) (Ex. 1004).
[3] U.S. Patent Pub. No. 2004/0130849 A1 (published July 8, 2004) (Ex. 1005).
[4] U.S. Patent No. 5,333,095 (July 26, 1994) (Ex. 1010).

specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

Petitioner provides proposed constructions for seven claim terms. Pet. 5–14. For purposes of this Decision, we construe the terms "insulative shield," "co-bonding," and "on a surface of the feedthrough capacitor."[5]

In the Preliminary Response, Patent Owner asserts that the '077 patent expressly disavows any embodiment wherein the insulative shield is not co-bonded to the top surface of the feedthrough capacitor. Prelim. Resp. 3–6. We also address this contention below.

1. Insulative shield

Petitioner contends that the purpose of the "insulative shield" of the '077 patent is to shield "the surface of the feedthrough capacitor from heat, splatter or debris," and that each of the various materials described for use as an "insulative shield" is an insulator. Pet. 6–7 (citing Ex. 1001, 5:31–45, Fig. 3). Thus, Petitioner construes "insulative shield" to mean "an insulating material capable of shielding a surface from heat, splatter, and/or debris." *Id.* at 7 (citing Ex. 1002 ¶ 28). Patent Owner does not propose a construction for this term.

We agree with Petitioner that the '077 patent consistently describes the "insulative shield" as an insulative material that protects the surface of the capacitor from "heat, splatter, or debris." Ex. 1001, 1:16–21 (noting the insulative shield is used "to prevent damage or degradation to a feedthrough

[5] We address Patent Owner's specific arguments as to the scope of the phrase "placing an insulative shield over a surface of the feedthrough capacitor" in our discussion of claims 1 and 13 below.

capacitor or its adjunct conformal coating"), 3:21–24 ("the insulative shield protects the surface of the feedthrough capacitor from heat, splatter or debris" occasioned by the coupling of the electronic circuitry to the terminal pin or leadwire), 4:16–18 ("The insulative shield provides protection from heat, splatter or debris from lead attachment techniques."), Abstract ("The insulative shield is a thin substrate that provides protection against damage and degradation of the feedthrough capacitor and/or its conformal coating from heat, splatter or debris . . . ."). Thus, we construe "insulative shield" to mean "an insulating material capable of shielding a surface from heat, splatter, and/or debris."

2. Co-bonding

The '077 patent does not expressly define the claim terms "co-bonding" and "co-bonds." Pet. 8. Petitioner asserts that the ordinary meaning of a "bond" is a "substance or an agent that causes two or more objects or parts to cohere" or a "union or cohesion brought about by such a substance or agent," and the prefix "co-" means "together; joint; jointly; mutually." *Id.* (citing Ex. 1008, 163, 274). Petitioner contends, therefore, that co-bonding is properly construed to mean "causing two or more objects to cohere together." *Id.* at 9. Patent Owner does not propose a specific construction for the term "co-bonding," but asserts that co-bonding "is not limited to two bonding layers in direct contact with one another." Prelim. Resp. 12.

The Specification of the '077 patent describes co-bonding the insulative shield to the feedthrough capacitor using a conformal coating. Ex. 1001, 3:32–36, 5:6–9, Fig. 4. In this arrangement, the insulative shield and the feedthrough capacitor, although not in direct contact, cohere together

through their respective bonds to the conformal coating. *Id.* at 5:46–52, Fig. 4. Accordingly, on the present record, we agree that co-bonding means "causing two or more objects to cohere together" and does not require direct contact between the co-bonded objects or layers.

3. On a surface of the feedthrough capacitor

Independent claims 23 and 35 are directed to a feedthrough terminal assembly and require that the insulative shield be "on a surface of the feedthrough capacitor." Ex. 1001, 9:15–32, 10:10–29. This is in contrast to independent claims 1 and 13 which are directed to a process for manufacturing a feedthrough terminal assembly and require placing the insulative shield "over a surface of the feedthrough capacitor." *Id.* at 7:34–52, 8:26–47.

Despite the use of the term "on," Petitioner contends that the phrase "on a surface of the feedthrough capacitor" does not require contact between the insulative shield and the feedthrough capacitor. Petitioner points to claim 28, which depends from claim 23 and requires a conformal coating "on the feedthrough capacitor." Pet. 5–6. Since the conformal coating co-bonds the insulative shield to the capacitor, Petitioner contends the conformal coating would prevent direct contact between the insulative shield and the feedthrough capacitor. *Id.* (citing Ex. 1001, 5:37–42, Figs. 3, 4). Petitioner, therefore, construes the term "on a surface of the feedthrough capacitor" to mean "over a surface" of the feedthrough capacitor. *Id.* at 6.

Patent Owner contends that the term "on" requires "touching," but concedes that the Figures of the '077 patent show the insulative shield bonded to the conformal coating, which Patent Owner contends is part of the feedthrough capacitor. Prelim. Resp. 13–14 (citing Ex. 2015, 1). Patent

Owner contends, therefore, that the term "'insulative shield on a surface of the feedthrough capacitor' reads on the insulative shield being *in contact* with either (1) a conformal coating or (2) the surface of the high k dielectric constant material of the feedthrough capacitor." *Id.* at 14.

As noted by Patent Owner, the term "on" generally connotes touching or contact. *See* Ex. 2015, 1. Yet, as noted by Petitioner and Patent Owner, the Figures of the '077 patent, as well as claims 28 and 35, imply that a layer may be "on" the feedthrough capacitor without being in direct contact with the capacitor, for example, when it is on a conformal coating of the capacitor. Thus, on this record, we agree with Patent Owner that an insulative shield is "on a surface of a feedthrough capacitor," at a minimum, when it is either (1) in contact with the conformal coating or (2) in contact with the feedthrough capacitor. Prelim. Resp. 14.

4. Disavowal of claim scope

Claim 1 of the '077 patent recites "placing an insulative shield over a surface of the feedthrough capacitor." Ex. 1001, 7:45–46. Although claim 1 does not recite co-bonding the insulative shield to the feedthrough capacitor, Patent Owner contends that an express disavowal limits the "placing" step of claim 1 to co-bonding. Prelim. Resp. 3.

Patent Owner contends that a disavowal results from the following disclosures in the '077 patent Specification:

> The present invention resides in a thin substrate or insulative shield co-bonded to the top surface of a feedthrough capacitor in a feedthrough filter assembly.

Ex. 1001, 4:14–20.

> An insulative shield is co-bonded to the top of a ceramic capacitor in a feedthrough terminal assembly on an active implantable medical device.

Id. at Abstract; *see* Prelim. Resp. 4–5. According to Patent Owner, use of the phrases "[t]he present invention resides in" and "is co-bonded," along with the single disclosed embodiment of Figures 2–4, limits the "placing" step of claim 1 to co-bonding the insulative shield to the top surface of the feedthrough capacitor. *Id.* at 3–6. Patent Owner contends that this limiting disclosure is "on all fours" with the disavowal found in *Honeywell Int'l., Inc. v. ITT Indus., Inc.*, 452 F.3d 1312, 1318 (Fed. Cir. 2006), where the repeated description of a narrower embodiment as "the present invention" or "this invention" served to limit the scope of the claims to the narrower embodiment, even though the claim term was otherwise broad enough to encompass additional devices. *Id.* at 3.

In contrast to the disavowal in *Honeywell*, the '077 patent does not indicate that only one embodiment was contemplated by the patentee. For example, whereas claim 1 does not recite co-bonding, claim 6, which depends from claim 1, includes "the step of co-bonding the insulative shield to the feedthrough capacitor," indicating that claim 1 does not require co-bonding. Ex. 1001, 7:65–67; *see also id*. at 8:37–40 (independent claim 13 requiring the separate steps of placing an insulative shield over the feedthrough capacitor *and* co-bonding the insulative shield to the feedthrough capacitor using the conformal coating). Moreover, the primary statement relied upon by Patent Owner is from the section entitled "Detailed Description of the Preferred Embodiment," suggesting that the statement refers to the preferred embodiment and does not limit all embodiments within the scope of the claims. *Id.* at 4:11–12; *see also id.* at 7:29–32 ("Although various embodiments have been described in detail for purposes of illustration, various modifications may be made without departing from

the scope and spirit of the invention.") *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004) (noting that, without a clear intent to limit the scope of a claim, "it is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims"). And, the "Summary of the Invention" states that the "present invention" includes "placing an insulative shield over a surface of the feedthrough capacitor," with no requirement that the insulative shield be co-bonded to the feedthrough capacitor. *Id.* at 3:17–18, 32–34 ("The insulative shield *may be* co-bonded to a surface of the feedthrough capacitor . . . .").

Given the use of dependent claims to describe a co-bonding step, the non-uniform descriptions of the "present invention" in the Specification, and the placement of the alleged disavowal under the description of the preferred embodiment, we are not persuaded that the patentee clearly and unambiguously disavowed embodiments that do not include the step of co-bonding an insulative shield to the feedthrough capacitor. *See Thorner v. Sony Comput. Entm't Am. LLC*, 669 F.3d 1362, 1366 (Fed. Cir. 2012) (noting that the standard for disavowal of claim scope is "exacting").

B. Anticipation of Claims 1, 2, 6–9, 13, 14, 18, 19, 23, 24, 28–31, 35, 36, 40, and 41 by the '347 Patent

Petitioner argues that claims 1, 2, 6–9, 13, 14, 18, 19, 23, 24, 28–31, 35, 36, 40, and 41 of the '077 patent are anticipated under 35 U.S.C. § 102(e) by the embodiment disclosed in Figure 43 of the '347 patent, and that a subset of these claims are also anticipated by the embodiment disclosed in Figures 36–42 of the '347 patent. Pet. 34, 51. In support of this argument, Petitioner relies upon the declaration testimony of Dr. Pedro Irazoqui (Ex. 1002). *Id.* at 34–60.

1. Figure 43 Embodiment of the '347 Patent

The '347 patent is directed to feedthrough capacitor terminal pin subassemblies that are adapted for direct body fluid exposure. Ex. 1003, 1:13–15, Abstract. Figure 43 of the '347 patent, reproduced below, discloses one embodiment of an adapted subassembly:

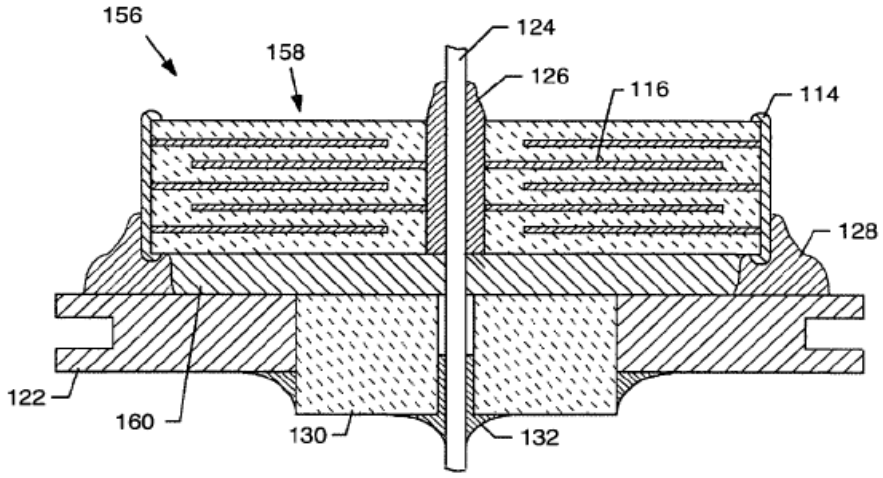

FIG. 43

Id. at Fig. 43. Figure 43 "is a cross-sectional view of a feedthrough capacitor assembly, wherein the inner metallization of the capacitor has been removed." *Id.* at 13:14–17.

In Figure 43, lead wire or terminal pin 124 is conductively coupled to active electrodes plates 116 of monolithic capacitor 158 using electrical connective material 126. *Id.* at 19:25–34. A second set of electrode plates (not numbered) is in contact with outer metallization or outer termination surface 114, which is conductively coupled to conductive ferrule 122 via thermal-setting conductive material 128. *Id.* at 16:4–6, 19:52–56.

Insulating material 160 is disposed below capacitor 158 to prevent connective material 126 from extending underneath capacitor 158 and potentially causing a short between terminal pin 124 and conductive ferrule

122 or outer metallization 114. *Id.* at 19:35–48. "In a particularly preferred embodiment, the insulating material 160 is an adhesively coated polyimide washer." *Id.* at 19:46–48.

Insulators 130 are disposed below insulating washer 160 to maintain an insulative relationship between the lead wires and the conductive ferrule and housing. *Id.* at 10:54–55, 14:16–21, 16:34–35, 16:64–67, 18:65–19:3. Insulators 130 are connected to the ferrule using hermetic sealing material 132. *Id.* at 10:55–60, 16:35–41.

a. Claims 1, 2, 6–9, 13, 14, 18, and 19

Petitioner asserts that the '347 patent's Figure 43 embodiment discloses every limitation of independent claims 1 and 13, including a feedthough filter capacitor having: a first set of electrode plates, a second set of electrode plates that is conductively coupled to the ferrule, and a terminal pin passing through the ferrule in conductive relation with the first set of electrode plates. Pet. 35–38; Ex. 1002 ¶ 55. Petitioner further asserts that insulator 130 "is analogous to the claimed 'insulative shield'" and "is capable of and does shield" a surface of the feedthrough capacitor from "heat, splatter, and/or debris." Pet. 36–37 (citing Ex. 1002 ¶ 55 (pp. 97, 98, 100, 107, 108)).

Patent Owner contends that claims 1 and 13 are not anticipated by Figure 43 of the '347 patent because the claim limitation "placing an insulative shield over a surface of the feedthrough capacitor" requires that the insulative shield be over "the entire surface" of the capacitor. Prelim. Resp. 6–7. Patent Owner reasons that the insulative shield must be over the entire surface of the feedthrough capacitor because the conformal coating, which the insulative shield is designed to protect, must be over the entire

dielectric surface of the capacitor to prevent arcing. *Id.* at 7. As further support for this argument, Patent Owner notes that the sole embodiment of the '077 patent depicts the insulative shield, the conformal coating, and the capacitor's dielectric surface as "co-extensive." *Id.* (citing Ex. 1001, Fig. 3).

We are not persuaded by Patent Owner's argument. The claims do not require that the insulative shield cover the "entire surface" of the feedthrough capacitor and, on this record, absent a clear and unambiguous statement in the '077 patent indicating the insulative shield must cover the entire surface of the feedthrough capacitor, we will not read such a limitation into the claims. *See Deere & Co. v. Bush Hog, LLC*, 703 F.3d 1349, 1358 (Fed. Cir. 2012) (noting that it is improper to import limitations into the claims from the specification, even if the limitation is disclosed in the sole embodiment described in the specification); *Liebel-Flarsheim*, 358 F.3d at 906 (noting that "claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using 'words or expressions of manifest exclusion or restriction'" quoting *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1327 (Fed. Cir. 2002)).

Patent Owner also argues that claims 1 and 13 are not anticipated by the Figure 43 embodiment because the '347 patent does not disclose co-bonding the insulative shield to the feedthrough capacitor. Prelim. Resp. 3–6, 18–21. With respect to claim 1, we are not persuaded by Patent Owner's argument because it is premised on an express disavowal of claim scope that is not supported by the '077 patent, as discussed above. With respect to claim 13, which requires co-bonding, Dr. Irazoqui testifies that, in Figure 43 of the '347 patent, insulating material 160 co-bonds insulator 130 to feedthrough capacitor 158, citing the '347 patent's disclosure that the

insulating material 160 may be an "adhesively coated polyimide washer." Ex. 1002 ¶¶ 48, 55 (p. 110) (citing Ex. 1003, 19:46–48). In response, Patent Owner contends that the '347 patent does not expressly or inherently disclose bonding insulator 130 to insulating washer 160 because there is no disclosure in the '347 patent that insulating washer 160 is necessarily coated on both sides with an adhesive. Prelim. Resp. 19–20. We agree.

As noted by Petitioner, the '347 patent discloses that insulating material 160 may be "an adhesively coated polyimide washer." Ex. 1003, 19:46–48. The '347 patent does not disclose explicitly, however, that the adhesive coating is present on both sides of the polyimide washer, such that the washer may bond to both the feedthrough capacitor and insulator 130. Moreover, Petitioner does not present any persuasive evidence that one of ordinary skill in the art would understand that an "adhesively coated polyimide washer" necessarily, or inherently, has an adhesive coating on both sides. *See* Pet. 40–41; Ex. 1002 ¶ 55 (p. 110); *see also Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1269 (Fed. Cir. 1999) ("Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient."). Thus, we are not persuaded that claim 13 of the '077 patent is anticipated by the '347 patent's disclosure of the Figure 43 embodiment.

As dependent claim 6 also requires co-bonding the insulative shield to the feedthrough capacitor, and claims 7, 14, 18, and 19 depend from either claim 6 or 13, we are likewise not persuaded that these claims are anticipated by the Figure 43 embodiment of the '347 patent.

With respect to dependent claims 2, 8, and 9, which do not require co-bonding, Petitioner contends each limitation of these claims is expressly or

inherently disclosed in the ’347 patent. Pet. 47–50. For example, Petitioner contends that the ’347 patent discloses using alumina or glass as the insulative shield (claim 2) and that the feedthrough assembly may be used in a cardiac pacemaker (claim 8). *Id.* at 47–49. Petitioner also contends that the ’347 patent discloses connecting the various components of the assembly using thermal-setting, brazing, welding or soldering materials (claim 9). *Id.* at 50 (citing Ex. 1003, 10:32–34). Patent Owner does not address Petitioner’s arguments with respect to these dependent claims.

Upon review of Petitioner’s evidence and supporting testimony, we are persuaded that Petitioner has demonstrated a reasonable likelihood that claims 1, 2, 8, and 9 of the ’077 patent are anticipated by the ’347 patent’s disclosure of the Figure 43 embodiment.

b. Claims 23, 24, 28–31, 35, 36, 40, and 41

Claim 23 requires, in relevant part, “an insulative shield on a surface of the feedthrough capacitor.” Ex. 1001, 9:25–26. As discussed above, we construe an insulative shield to be “on a surface of the feedthrough capacitor,” at a minimum, when the insulative shield is in contact with either (1) a conformal coating or (2) the surface of the feedthrough capacitor. *See also* Prelim. Resp. 8 (asserting that “the surface of the conformal coating may be the top surface of the feedthrough capacitor”).

Petitioner contends that insulator 130 of the ’347 patent is “on the feedthrough capacitor,” as recited in claim 23, because it is located over a surface of feedthrough capacitor 158. Pet. 43. Patent Owner asserts that claims 23 is not anticipated by Figure 43 of the ’347 patent because insulator 130 is not “touching the feedthrough capacitor” but, instead, “the adhesive of washer 160.” Prelim. Resp. 21. On this record, we are persuaded that

Petitioner's evidence is sufficient to show a reasonable likelihood of prevailing on its assertion that the '347 patent discloses "an insulative shield on a surface of the feedthrough capacitor" because Figure 43 shows insulator 130 in contact with insulating material 160, which Petitioner contends is a conformal coating on feedthrough capacitor 158. Ex. 1003, Fig. 43; Pet. 40, 46–47. We are not persuaded by Patent Owner's argument because it is inconsistent with its previous argument that insulative washer 160 does not have adhesive on both sides. Prelim. Resp. 19–20. Accordingly, on this record, we are persuaded that Petitioner has demonstrated a reasonable likelihood that claim 23 is anticipated by the '347 patent.

With respect to dependent claims 24, 30 and 31, Petitioner shows where the limitations of these claims are allegedly disclosed in the '347 patent. Pet. 47–51 (citing Ex. 1003, 1:15–19 (disclosing the use of the feedthrough assembly in a cardiac pacemaker), 10:32–34 (disclosing the use of thermal-setting, brazing, welding or soldering materials), 14:18–26 (disclosing that insulator 130 may be formed of alumina or glass)). Patent Owner does not address Petitioner's arguments with respect to these dependent claims. Upon review of Petitioner's argument and supporting evidence, we are persuaded that Petitioner has demonstrated a reasonable likelihood that claims 24, 30, and 31 are anticipated by the '347 patent.

Independent claim 35, as well as dependent claims 28, 29, 36, 40, and 41, recite, or depend from a claim that recites, that "the conformal coating co-bonds the insulative shield to the feedthrough capacitor." Ex. 1001, 9:47–50, 10:21–23. For the reasons discussed above in connection with claim 1, we are not persuaded that the '347 patent discloses, expressly or inherently, that insulator 130 is co-bonded to insulating washer 160 in

Figure 43. Accordingly, Petitioner has not demonstrated a reasonable likelihood that claims 28, 29, 35, 36, 40, and 41 are anticipated by the '347 patent.

c. Conclusion

Based on the foregoing, we are persuaded that Petitioner has demonstrated a reasonable likelihood that claims 1, 2, 8, 9, 23, 24, 30, and 31 of the '077 patent are anticipated by the Figure 43 embodiment of the '347 patent; we are not persuaded, however, that claims 6, 7, 13, 14, 18, 19, 28, 29, 35, 36, 40, and 41 have been shown to be anticipated.

2. The Embodiment Disclosed in Figures 36–42 of the '347 Patent

Petitioner contends that claims 1, 2, 8, 9, 23, 24, 30, and 31 of the '077 patent are also anticipated by the embodiment disclosed in Figures 36–42 of the '347 patent. Pet. 51. As Petitioner demonstrates a reasonable likelihood that these same claims are anticipated by Figure 43 of the '347 patent, we do not address Petitioner's additional arguments with respect to the embodiment disclosed in Figures 36–42.

C. Obviousness of Claims 1, 2, 6–9, 13, 14, 18, 19, 23, 24, 28–31, 35, 36, 40, and 41 of the '077 Patent over Engmark, Stevenson, and Kurihara

Petitioner contends that claims 1, 2, 6–9, 13, 14, 18, 19, 23, 24, 28–31, 35, 36, 40, and 41 of the '077 patent would have been obvious under 35 U.S.C. § 103(a) over Engmark, Stevenson, and Kurihara. Pet. 15–33.

1. Engmark

Engmark is directed to an implantable medical device having a feedthrough capacitor assembly. Ex. 1004 ¶ 6. Figure 41 of Engmark is reproduced below:

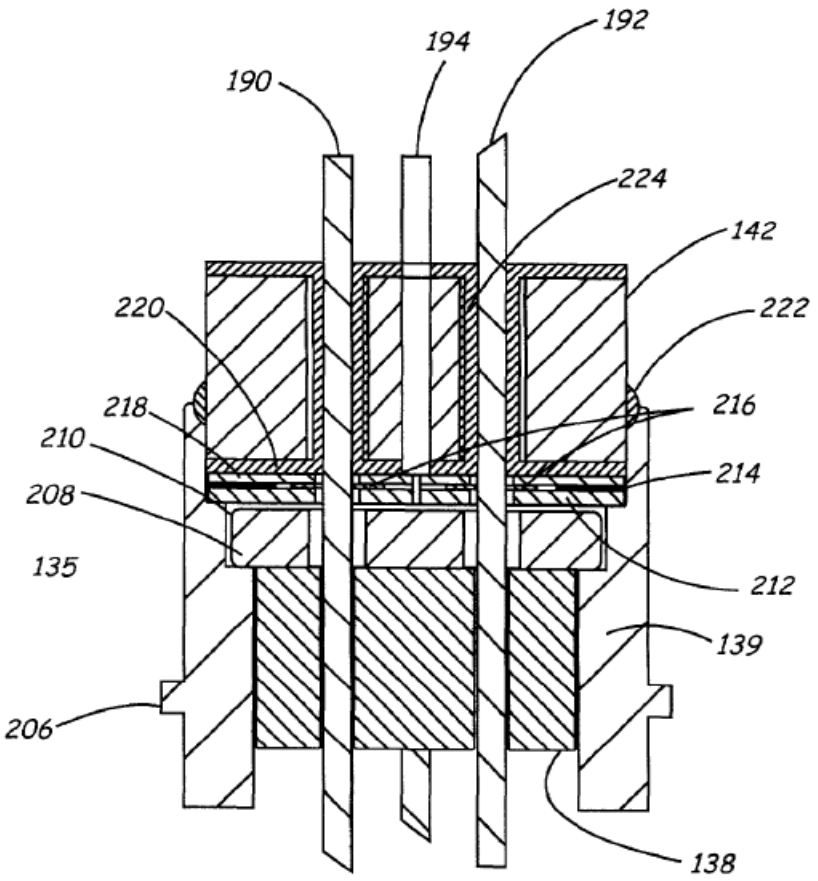

FIG. 41

Figure 41 of Engmark discloses "an enlarged cross-sectional side view" of feedthrough 135. *Id.* ¶¶ 57, 96. In this Figure, pins 190, 192, and 194 extend through feedthrough 135, where discoidal capacitor 142 is positioned to filter electromagnetic interference. *Id.* ¶ 96. Seal section 138 hermetically seals the feedthrough assembly from the environment outside the implanted device. *Id.* ¶¶ 90, 95.

A non-conductive epoxy layer 210 bonds barrier glass 208 to the inner surface of ferrule wall 139. *Id.* ¶ 97. Engmark discloses that "metal platform washer 212, polyimide ferrule washer 214, polyimide pin washer 216, and polyimide platform washer 218 may be placed between" barrier

glass 208 and capacitor section 142. *Id.* "[N]onconductive epoxy 220 bonds capacitor section 142 to glass 208 and washer 218." *Id.* "A layer 224 of conductive polyimide also lines the inner diameter of capacitor section 142 between pins 190, 192, 194." *Id.*

2. Stevenson

Stevenson discloses a feedthrough terminal pin assembly for implantable medical devices. Ex. 1010, 1:1–11. Stevenson discloses using a monolithic discoidal capacitor having two sets of conductive plates embedded in a dielectric material. *Id.* at 6:30–50. A terminal pin passes through this capacitor and is connected to the capacitor by "means of a conductive adhesive bead" or by "soldering or brazing or the like." *Id.* at 7:21–28.

3. Kurihara

Kurihara discloses thin layer capacitors having a lower electrode layer, a dielectric metal oxide layer, and an upper electrode layer deposited on a supporting substrate, such as silicon. Ex. 1005 ¶¶ 7, 11, 24. Kurihara discloses that it was known in the art to apply a protective insulating layer over the metal oxide layer of these thin layer capacitors to prevent reduction of the dielectric metal oxide layer during fabrication. *Id.* ¶¶ 8, 15.

Due to differences in thermal expansion coefficients between the various components of the thin layer capacitors, Kurihara discloses that the protective insulating layer should be formed of a material, such as polyimide, that absorbs mechanical stress:

> [0016] With this type of connection form, the mechanical stress generated by the *difference in thermal expansion* coefficients of the thin layer capacitor and the circuit board on which the thin layer capacitor is mounted can directly bear on

> the thin layer capacitor terminals, without being mediated by a buffer material such as a lead.
>
> [0017] An internal capacitor composed of an extremely thin layer easily tends to undergo a problem such as interlayer peeling due to the aforementioned mechanical stress and, in order to avoid this problem, it is essential to use as the protective insulating layer a resin material such as polyimide *which absorbs the mechanical stress from bumps, etc*.

Id. ¶¶ 16, 17 (emphases added).

4. Analysis

Petitioner contends that in combination Engmark, Stevenson, and Kurihara disclose every limitation of the challenged claims. Pet. 15–30. Petitioner concedes that Engmark does not disclose placing an insulative shield over a conformal coating, but contends that one of ordinary skill in the art would have provided an insulative shield in view of Kurihara. *Id.* at 20–21; Ex. 1002 ¶ 44 (pp. 29–32). In support of this argument, Dr. Irazoqui testifies that the purpose of the polyimide layer of Kurihara "is to protect the 'capacitor []' from harmful effects produced by heat, e.g., thermal expansion," and one of ordinary skill in the art would understand that this layer likewise could be used in Engmark to prevent heat caused by soldering electrical connections from reaching the capacitor. Ex. 1002 ¶ 44 (pp. 30–32, 46–47).

Patent Owner responds that the challenged claims would not have been obvious over Engmark, Stevenson, and Kurihara because, *inter alia*, Kurihara "says nothing about preventing heat flow," and the protective layers of Kurihara are too thin (2 to 4 microns) to provide any significant resistance to heat. Prelim. Resp. 42. Patent Owner also asserts that the insulating layer could not have been used in Kurihara to prevent the

movement of heat through the capacitor, because metallic solder balls in Kurihara extend through the insulating layer to the lower electrode layer and would obviate any heat protection the insulating layer might provide. *Id.*; Ex. 1005 ¶ 273, Fig. 16.

The disclosed purpose of the polyimide insulating layer in Kurihara is two-fold—it prevents reduction of the metal oxide layer and it absorbs the mechanical stress from "bumps." Ex. 1005 ¶¶ 12, 15, 17, 22, 32. Petitioner directs us to no disclosure or statement in Kurihara indicating that the protective polyimide insulating layer is also used to prevent or reduce the flow of heat through the capacitor (as opposed to relieving the mechanical strain caused by the flow of heat through the capacitor). *Id.* ¶¶ 16, 17. Moreover, neither Petitioner nor Dr. Irazoqui persuasively explains why the discoidal capacitor of Engmark and Stevenson, which has not been shown to have a source of mechanical stress, e.g., "bumps" or a metal oxide layer prone to reduction during fabrication, would otherwise benefit from the polyimide layer of Kurihara. *See* Ex. 1002 ¶ 44 (pp. 46–47). Accordingly, on this record, Petitioner has not provided a persuasive rationale for why one of ordinary skill in the art would have sought to apply the polyimide layer of Kurihara to the feedthrough assembly of Engmark and Stevenson.

As all the challenged claims require an "insulative shield," we are not persuaded that Petitioner has demonstrated a reasonable likelihood that claims 1, 2, 6–9, 13, 14, 18, 19, 23, 24, 28–31, 35, 36, 40, and 41 of the '077 patent would have been obvious under 35 U.S.C. § 103(a) over Engmark, Stevenson, and Kurihara.

III. ORDER

For the foregoing reasons, it is:

ORDERED that pursuant to 35 U.S.C. § 314 an *inter partes* review of the ’077 patent is hereby instituted on the following ground:

Whether claims 1, 2, 8, 9, 23, 24, 30, and 31 are anticipated under 35 U.S.C. § 102(e) by the ’347 patent.

FURTHER ORDERED that the trial is limited to the ground identified above and no other grounds are authorized; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(a), *inter partes* review of the ’077 patent is hereby instituted commencing on the entry date of this Order, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of trial.

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