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Paper 57
Entered: October 21, 2015

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AVX CORPORATION and
AVX FILTERS CORPORATION,
Petitioner,

v.

GREATBATCH, LTD,
Patent Owner.

Case IPR2014-00697
Patent 5,905,627

Before JEREMY M. PLENZLER, JON B. TORNQUIST, and BETH Z. SHAW, *Administrative Patent Judges.*

TORNQUIST, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318 and 37 C.F.R. § 42.73

I. INTRODUCTION

AVX Corporation and AVX Filters Corporation (collectively "Petitioner") filed a Petition (Paper 2, "Pet.") requesting *inter partes* review of claims 1–9 and 11–29 of U.S. Patent No. 5,905,627 (Ex. 1001, "the '627 patent"). Greatbatch, Ltd. ("Patent Owner") filed a Preliminary Response to the Petition. Paper 10.

Pursuant to 35 U.S.C. § 314(a), we instituted an *inter partes* review of claims 1, 2, 4, 6, 7, 9, 11, 13–20, 23, 25, and 26 of the '627 patent on the following grounds:

> 1. Whether claims 1, 2, 4, 9, 11, 13–17, 20, 23, 25, and 26 would have been obvious under 35 U.S.C § 103(a) over Stevenson[1] and Hazzard;[2]
>
> 2. Whether claims 6, 7, 18, and 19 would have been obvious under 35 U.S.C. § 103(a) over Stevenson, Hazzard, and Colburn.[3]

Paper 13 ("Dec. on Inst."), 23–24.

Following institution of trial, Patent Owner filed a Patent Owner Response (Paper 19, "PO Resp."), to which Petitioner filed a Reply (Paper 27, "Reply"). In support of its arguments, Petitioner relies on three declarations from Mr. John Galvagni (Exs. 1002, 1018, 1024) and a declaration from Mr. John Prymak (Ex. 1023). In support of its arguments, Patent Owner relies on five declarations from Dr. Robert A. Stevenson (Exs. 2144, 2145, 2146, 2147, 2175).

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[1] U.S. Patent No. 5,751,539, issued May 12, 1998 (Ex. 1012).
[2] Harry Hazzard & John Prymak, *EMI Suppression Utilizing MLC Discoidal Arrays*, AVX Corporation, July 1992 (Ex. 1011). *See* Ex. 1002 ¶ 45 (providing a date for the publication of Exhibit 1011).
[3] U.S. Patent No. 5,635,775, issued June 3, 1997 (Ex. 1007).

Patent Owner also filed a Motion to Exclude (Paper 38, "Mot. to Excl."), to which Petitioner filed a Response (Paper 48, "Resp. to Mot. to Excl.") and Patent Owner filed a Reply (Paper 52, "Reply to Mot. to Excl.").

Patent Owner filed a Motion for Observations on cross-examination (Paper 37, "Mot. for Obs."), to which Petitioner filed a Response (Paper 49), and Patent Owner filed a Reply (Paper 53).

Patent Owner filed a Motion to Seal portions of the transcript of Dr. Stevenson's deposition (Exhibit 2199), which is addressed herein. Paper 25 ("Mot. to Seal").

An oral hearing was held on June 17, 2015, and a transcript of the oral hearing is included in the record. Paper 55 ("Tr.").

We have jurisdiction under 35 U.S.C. § 6(c). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 1, 2, 4, 6, 7, 9, 11, 13–20, 23, 25, and 26 of the '627 patent are *unpatentable*.

A. Related Proceeding

The parties inform us that the '627 patent is currently at issue in *Greatbatch LTD v. AVX Corp.*, No. 1:13-cv-00723-LPS (D. Del.). Pet. 1; Paper 9, 4.

B. The '627 Patent

The '627 patent discloses an internally grounded feedthrough filter capacitor assembly used to prevent the passage of externally generated electromagnetic interference ("EMI") into an electronic device, such as a cardiac pacemaker. Ex. 1001, 1:6–11, 3:66–4:6. Figures 4 and 5 of the '627 patent are reproduced below:

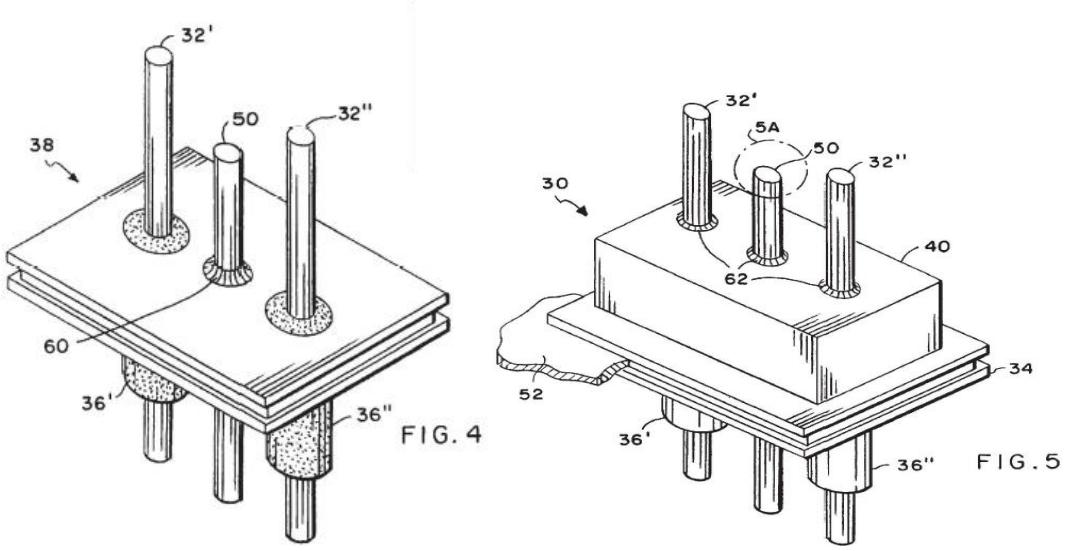


Figure 4 illustrates a terminal pin subassembly of the ’627 patent

Figure 5 shows a bipolar feedthrough capacitor mounted to the terminal pin subassembly of Figure 4

As shown in Figure 4, conductive ferrule 34 has three apertures. *Id.* at 7:51–53. Conductive terminal pins 32' and 32" are supported through the outer apertures of ferrule 34 by insulators 36' and 36", respectively. *Id.* at 7:54–56. Ground pin 50 is supported through the central aperture of ferrule 34 by conductor 60, which serves to conductively couple ground pin 50 to ferrule 34. *Id.* at 6:62–64, 7:57–6:1.

In Figure 5, feedthrough capacitor 40 is mounted to the terminal pin subassembly of Figure 4. According to the ’627 patent, the feedthrough capacitor assembly of Figure 5 is attached to conductive substrate 52, which may represent the housing of an implantable medical device. *Id.* at 8:6–8.

Figure 6 of the ’627 patent is reproduced below:

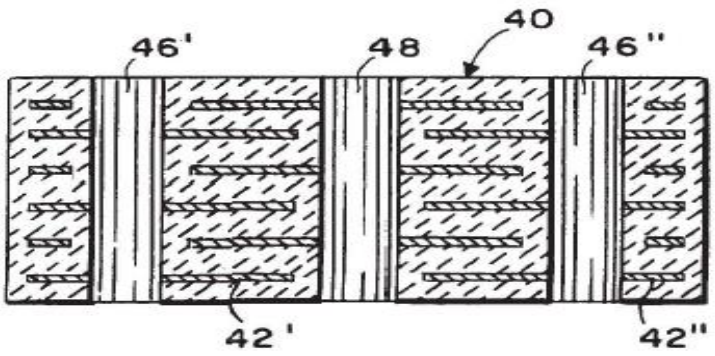


FIG. 6

Figure 6 is an enlarged sectional view of the feedthrough filter capacitor of Figure 5

In Figure 6, electrode plates 42' and 42" are embedded within an insulative ceramic material and form a first set of electrode plates. *Id.* at 7:34–40. Terminal pins 32' and 32" (as shown in Figure 5) pass through passageways 46' and 46", respectively, of feedthrough capacitor 40 in conductive relation with the first set of electrode plates. *Id.* at 7:31–35. Ground lead 50 (as shown in Figure 5) passes through second passageway 48 of feedthrough filter capacitor 40 in conductive relation with a second set of electrode plates (not numbered) and conductive ferrule 34 (as shown in Figure 4). *Id.* at 6:62–64, 7:42–50. According to the '627 patent, electrically connecting the second set of electrode plates to the ferrule via a ground lead creates an internally grounded feedthrough capacitor. *Id.* at 6:36–39, 8:9–14.

The '627 patent discloses that internally grounding a ceramic feedthrough capacitor through a ground lead "has heretofore not been considered because such construction increases the electrical impedance (particular inductance) of the connection between the internal capacitor ground electrode plates and the conductive ferrule . . . However, with cost

becoming an increasingly important issue, the internal grounding method becomes an attractive alternative." *Id.* at 8:9–17.

C. Illustrative Claim

Of the challenged claims, claims 1, 11, and 25 are independent. Claim 1 is illustrative of the subject matter of the '627 patent and is reproduced below:

> 1. A feedthrough filter capacitor assembly, comprising:
>
> at least one conductive terminal pin;
>
> a conductive ferrule through which the terminal pin passes in non-conductive relation;
>
> a feedthrough filter capacitor having first and second sets of electrode plates and a first passageway through which the terminal pin extends in conductive relation with the first set of electrode plates; and
>
> a ground lead conductively coupled to the conductive ferrule, and extending into a second passageway through the feedthrough filter capacitor in conductive relation with the second set of electrode plates.

Ex. 1001, 10:64–11:8.

II. ANALYSIS

A. Claim Construction

In the Decision to Institute, we determined that resolution of the issues presented in the Petition did not require explicit construction of any claim terms. Dec. on Inst. 8. We did, however, provide guidance as to the scope of the term "feedthrough filter capacitor." *Id.* at 8–9. During trial, neither party asserted that the Board's prior discussion of "feedthrough filter capacitor" was in need of revision or that any claim terms required construction. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803

(Fed. Cir. 1999) (noting that only claim terms that are in controversy need be construed, "and only to the extent necessary to resolve the controversy").

B. Level of Ordinary Skill in the Art

To determine the level of ordinary skill in the art, we may consider the "type of problems encountered in [the] art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field." *Custom Accessories, Inc. v. Jeffery-Allan Indus., Inc.*, 807 F.2d 955, 962–63 (Fed. Cir. 1986). We may also consider the level of ordinary skill in the art as reflected by the prior art of record. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

Mr. Galvagni contends that

> a person of ordinary skill in the art of filter capacitors at the time of the filing of the '627 patent is generally one who has a Bachelor's degree in electrical engineering, chemistry, and/or physics along with several years of relevant applied research or industry work experience in the field of filter capacitors.

Ex. 1002 ¶ 17.

Patent Owner disagrees and, based on the testimony of Dr. Stevenson, identifies a person of ordinary skill in the art as an "EMI passive component filter designer." PO Resp. 2–3 (citing Ex. 2144 ¶¶ 4–11). Patent Owner also identifies certain knowledge it contends a person of ordinary skill in the art would have, including "advance[d] knowledge in filtering concepts including insertion loss, how resonant frequency of an RLC filter varies with inductance, capacitance, and resistance, and how inductance, capacitance, and resistance, vary as a function of geometry and material properties." *Id.* at 3 (citing Ex. 2144 ¶¶ 11–25).

In response, Mr. Galvagni asserts that electrical design is but one area of expertise necessary to design a feedthrough capacitor, and a background in chemistry, including an understanding of the use of conductive polyimides or epoxies and the formulation, firing, and termination of ceramic/metal capacitors, is necessary for the successful design of a feedthrough capacitor. Ex. 1024 ¶¶ 2, 4. Mr. Galvagni further testifies that, due to the multidisciplinary nature of EMI capacitor design, it is customary for a "team of professionals," including "electrical design experts, and manufacturing and materials experts," to work on the development of an EMI filter. *Id.* ¶ 2.

Mr. Galvagni's testimony is consistent with Patent Owner's argument that an electrical design expert would be involved in the design of the electrical connections of the feedthrough capacitor assembly, and with the prior art of record, which discloses various methods of connecting, arranging, and electrically coupling the components of the disclosed feedthrough filter capacitor assemblies. *See, e.g.*, Ex. 1001, 1:6–8, 4:66–5:4, 10:14–28; Ex. 1012, 1:27–33, 4:36–43, Fig. 16. Thus, we conclude that a person of ordinary skill in the art would have a degree in electrical engineering, chemistry, or physics, or a related field, and would have work experience in the electrical or structural design of EMI filter capacitors or assemblies.[4]

[4] Patent Owner asserts a level of ordinary skill in the art that is *higher* than that asserted by Mr. Galvagni, including "advance knowledge" of electrical filtering concepts. PO Resp. 3. We note that, in general, a lower level of skill in the art favors a determination of nonobviousness, while a higher level of skill favors a finding of obviousness. *See Innovention Toys, LLC v. MGA Entm't, Inc.*, 637 F.3d 1314, 1323 (Fed. Cir. 2011).

C. Alleged Obviousness of Claims 1, 2, 4, 9, 11, 13–17, 20, 23, 25, and 26 in view of Stevenson and Hazzard

Petitioner contends that claims 1, 2, 4, 9, 11, 13–17, 20, 23, 25, and 26 of the '627 patent are unpatentable under 35 U.S.C. § 103(a) in view of Stevenson and Hazzard. Pet. 38–46; Dec. on Inst. 18. Patent Owner disputes Petitioner's position. PO Resp. 3–56. As discussed below, after consideration of the arguments and evidence presented by both parties, we determine that Petitioner has shown by a preponderance of the evidence that claims 1, 2, 4, 9, 11, 13–17, 20, 23, 25, and 26 of the '627 patent are unpatentable in view of Stevenson and Hazzard.

1. Stevenson

Stevenson discloses feedthrough filter capacitors for use in implantable medical devices, such as heart pacemakers. Ex. 1012, 1:7–10, Figure 14 of Stevenson is reproduced below:

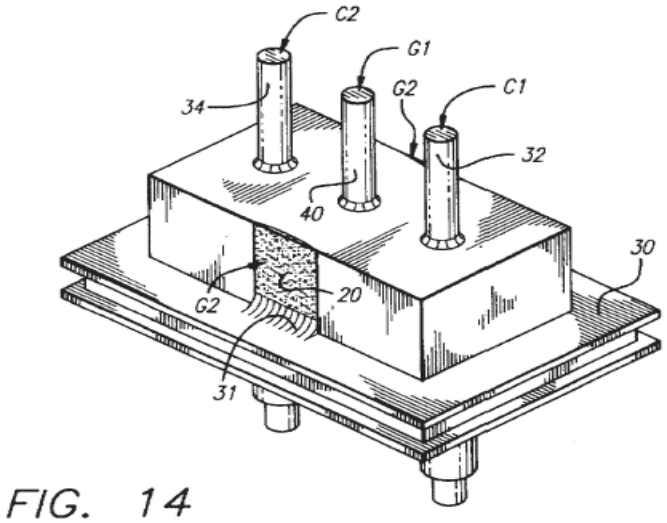


FIG. 14

Figure 14 is a perspective view showing assembly of a bipolar feedthrough device with an isolated ground point G1

In Figure 14, terminal pins 32 and 34 pass through capacitors C1 and C2, respectively, of a feedthrough capacitor. *Id.* at 4:41–42. Terminal pin

40 extends through a central passageway of the feedthrough capacitor to form test point G1. *Id.* at 3:52–64, 4:65–67. In this configuration, terminal pin 40 does not contact terminal plate 30. Ex. 1002 ¶ 46 (pp. 72–73); Ex. 2147 ¶ 8; Ex. 1012, 5:3–5. Ground point G2, which is exposed by surface metallization 20 on the long edge of the rectangular feedthrough capacitor, represents the metal housing or shield to which EMI signals are decoupled. Ex. 1012, 3:67–4:3, 4:6–10.

Figures 26 and 27, reproduced below, depict a second, discoidal embodiment of the feedthrough capacitor assembly of Stevenson:

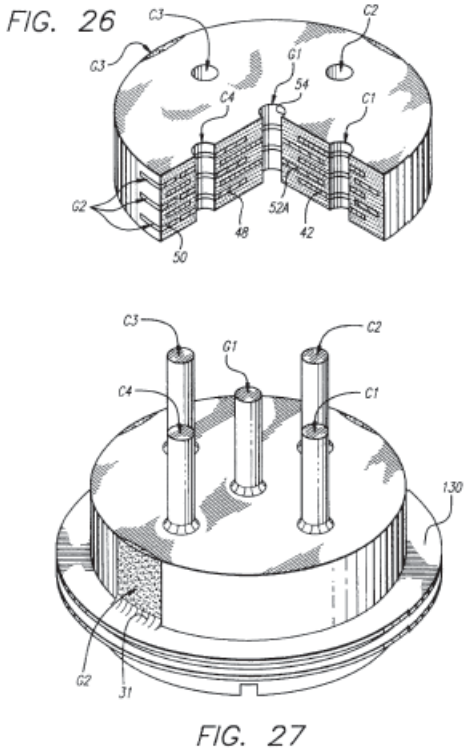


FIG. 27

Figure 26 is a fragmented perspective view of a quad feedthrough device in discoidal form
Figure 27 is a perspective view showing the device of Figure 26 mounted on a terminal plate

In Figure 26, central plate 50 is embedded within the ceramic structure of the capacitor and is associated with termination point G2. *Id.* at

5:18–22. Similarly, embedded electrode plates 42 are associated with capacitor C1, embedded electrode plates 48 are associated with capacitor C4, and embedded electrode plates 52A are associated with test point G1. *Id.* at 5:13–24, 5:33-37, 5:53–58. As shown in Figure 27, terminal pins pass through capacitors C1, C2, C3, and C4, and ground point G1 and are available for connection to internal circuitry of the device. *Id.* at 5:25–61.

As in the Figure 14 embodiment discussed above, the connection to common ground in Figures 26 and 27 of Stevenson is via ground points on the peripheral, exterior surface of the feedthrough capacitor. *Id.* at 5:18–22. Thus, the embodiments of Stevenson do not disclose an internally grounded feedthrough filter capacitor.

2. Hazzard

Hazzard is an AVX Corporation publication directed to EMI suppression using multilayer ceramic discoidal arrays. Ex. 1011, 1–2.[5] Similar to the capacitors of Stevenson, Hazzard's discoidal capacitors are formed from two sets of interleaving planar electrodes embedded within a monolithic ceramic block. *Id.* at 2.

Hazzard discloses terminating the common ground connection of the arrays, as follows:

> The electrodes contacted by the feed-thru, form a capacitor to ground through the counter electrode. A common ground connection is normally terminated along the long edges of rectangular arrays and around the periphery of circular arrays. *The ground can also be brought to the pin(s), but an edge ground is preferred for solid RF performance*.

Id. at 2–3 (emphasis added).

[5] Hazzard contains two sets of page numbers. Our citations are to the page numbers found in the lower left corner of each page.

3. Analysis

Petitioner contends that Stevenson discloses every limitation of independent claims 1, 11, and 25, except "a ground lead conductively coupled to the conductive ferrule" or "substrate." Pet. 40–42; Reply 1. Petitioner contends, however, that it would have been obvious to modify the feedthrough capacitor assembly of Stevenson to replace the *peripheral* ground point G2 with Hazzard's *internal* ground lead. Pet. 41. According to Petitioner, because Stevenson discloses a ground lead that extends through a feedthrough capacitor to the level of the ferrule, it would have been a simple step to modify the assembly of Stevenson to conductively couple the ground lead to the ferrule, as disclosed in Hazzard. *Id.* at 40–41, 45–46 (citing Ex. 1002 ¶ 46 (pp. 73–75)); Reply 13 (citing Ex. 1023 ¶¶ 34–35).

Petitioner asserts that one of ordinary skill in the art would have been motivated to combine Stevenson and Hazzard because the combination would allow for "redundant feedthrough ground leads for internal circuits" and would eliminate "the need for creating exterior metallizations on the filter capacitor." Pet. 45. Petitioner further asserts that modifying Stevenson to couple the ground lead to the conductive ferrule would involve merely "substituting one element for another known element," according to its known function, to form "a predictable internal ground connection with a reasonable expectation of success." *Id.* at 45–46; *see also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007) ("The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.").

Patent Owner asserts the combination of Stevenson and Hazzard would not have been obvious because: (1) Hazzard does not disclose that a

ground pin can replace a peripheral ground; (2) there is no credible motivation to modify Stevenson's EMI filter as proposed by Petitioner; (3) Petitioner's proposed combination, as set forth by Mr. Galvagni, would be inoperable, and (4) secondary indicia of non-obviousness confirm that claim 1 defines a patentable invention. PO Resp. 14–56. We address these points in turn.

a. Scope of Hazzard's Disclosure

As noted above, Hazzard discloses that "[a] common ground connection is normally terminated along the long edges of rectangular arrays and around the periphery of circular arrays. The ground can also be brought to the pin(s), but an edge ground is preferred for solid RF performance." Ex. 1011, 2–3.

Patent Owner contends Petitioner, as well as the Board in its Decision on Institution, misread Hazzard's disclosure that "the ground can also be brought to the pin(s)" to mean that the ground connection may be placed at the external edge of the capacitor array *or* may be brought to the pins. PO Resp. 6. According to Patent Owner, Hazzard would be understood by one of ordinary skill in the art to disclose "the exact opposite," i.e., that "an edge termination contacting to common ground is *always necessary* for EMI filtering." *Id.* at 32–33 (emphasis added).

Patent Owner reasons as follows. First, Patent Owner contends the word "normally" in Hazzard refers to only terminations along the long edges of rectangular arrays, and not to terminations along the periphery of circular arrays. *Id.* at 29–32. Next, Patent Owner asserts the word "also" means "in addition," not "or" or "instead of." *Id.* at 5, 32–33. Finally, Patent Owner contends the phrase "but an edge ground is preferred" does not refer to the peripheral metallization discussed in the preceding sentence, but to the

different concept of a grounded hole *near* the edge metallization. *Id.* at 35–39. For the reasons that follow, we are not persuaded by Patent Owner's arguments.

With respect to the word "normally," Patent Owner asserts it was known in the art that arrays could be terminated along both the long and short edges of rectangular arrays. *Id.* at 30–31. According to Patent Owner, given this knowledge in the art, the phrase "'normally terminated along the long edges' meant to Messrs. Hazzard and Prymak the optional termination along the short side of rectangular arrays," and would not be understood by one of ordinary skill in the art to be an indication that an edge ground was optional. *Id.* at 31–32 (citing Ex. 2146 ¶¶ 10–11). In this interpretation, however, Patent Owner would completely ignore the second half of the sentence "and around the periphery of circular arrays." We find the more reasonable reading of the sentence to be that proffered by Mr. Prymak, an author of the Hazzard reference, who testifies that "[i]n Hazzard, the language 'normally terminated' applies to both the phrases 'along the long edges of the rectangular arrays' and 'around the periphery of circular arrays.'" Ex. 1023 ¶ 43.

With respect to Patent Owner's argument that "also" means "in addition" and not "instead of," we agree with Patent Owner that the word "also" can mean "in addition." Exs. 2097, 2111–2113, 2116, 2118. We must look, however, at Hazzard's paragraph in its entirety, and in context of the document as a whole, to determine the meaning one of ordinary skill in the art would give to the word "also" in Hazzard's disclosure. In this case, we agree with Petitioner and Mr. Prymak that use of the terms "normally" and "also," in conjunction with the phrase "but an edge ground is preferred," strongly suggest that the two methods are alternatives, i.e., one can bring the

ground to the pins *or* use the normal and preferred method of an edge or peripheral ground (as discussed in the preceding sentence of Hazzard). Pet. 41 (citing Ex. 1002 ¶ 46 (pp. 73–74)); Reply 5–6 (citing Ex. 1023 ¶¶ 44–51).

With respect to Patent Owner's argument that "an edge ground" means a grounded hole near an edge of the device, we note that this interpretation would inject an entirely new concept into the sentence, i.e., a grounded hole near an edge of the device. The more reasonable interpretation, as supported by the testimony of Mr. Galvagni and Mr. Prymak, is that this clause refers to the normal method of using perimeter metallization around the edge or periphery of the capacitor, as set forth in the proceeding sentence of Hazzard. Ex. 1002 ¶ 46 (p. 73); Ex. 1023 ¶ 45; *see also* Ex. 1023 ¶¶ 47–48 (noting that the term "edge ground" in one of Mr. Stevenson's own patents refers to "a perimeter/edge metallization of a capacitor array" and not to a grounded hole near the periphery of the device).

Patent Owner also asserts that, to the extent Hazzard contemplated removing the edge termination, there would "have been some other structure completing the connection from the pin to common ground." PO Resp. 41. And, because such structure is not disclosed in Hazzard, Patent Owner concludes that "Hazzard did not contemplate a grounded pin instead of an edge termination." *Id.* (citing *Reflectone, Inc. v. Dalton*, 60 F.3d 1572, 1576 (Fed. Cir. 1995); Ex. 2146 ¶ 27). We find the more reasonable conclusion, however, is that Hazzard does not depict structure for connecting the end of the pin to common ground because such a ground was not necessarily preferred and is not discussed further in the reference. *See* Ex. 1023 ¶ 51.

Based on the foregoing, we credit the testimony of Mr. Galvagni and Mr. Prymak, and conclude that Hazzard discloses internally grounding a feedthrough capacitor by replacing a peripheral ground with a grounded pin. Ex. 1002 ¶ 46 (p. 73); Ex. 1023 ¶¶ 40–45, 51.

b. Motivation to Combine

Patent Owner argues there would have been no motivation to modify Stevenson in view of Hazzard because "[n]o filter designer would intentionally design an EMI filter that lowers attenuation of an EMI filter over its intended filtering range." PO Resp. 53. According to Patent Owner, lowered attenuation was only acceptable in the "unique situation" described in the '627 patent where shielding and absorption properties of human tissues offset the reduced filtering of the internally grounded device. *Id.* (citing Ex. 2147 ¶ 28).

The evidence of record, however, demonstrates that internally grounding a feedthrough capacitor was known in the art, as was the decreased attenuation from such a design. Modifying a known device, using a known method, to achieve a predictable result, is obvious, even if one is willing to accept a known loss in performance others sought to avoid. *KSR*, 550 U.S. at 416 ("The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.").

With respect to Patent Owner's contention that the patentees in the '627 patent identified a limited circumstance where shielding of human tissues partially offsets the reduction in filtering performance, thereby making the reduction in filtering performance acceptable, we note that the claims of the '627 patent are not limited to implantable medical devices. PO Resp. 53; Ex. 2147 ¶ 28. Thus, Patent Owner's argument and evidence are

not commensurate in scope with the challenged claims. *See, e.g., In re Grasselli*, 713 F.2d 731, 743 (Fed. Cir. 1983) ("It is well settled 'that objective evidence [of] non-obviousness must be commensurate in scope with the claims which the evidence is offered to support'") (quoting *In re Tiffin*, 448 F.2d 791 (CCPA 1971)).

Patent Owner also argues that removing the edge ground connection of Stevenson and bringing the common ground point to pin G1 would "destroy" the intended purpose of Stevenson. PO Resp. 52. Specifically, Patent Owner asserts that bringing the ground to the pin in Stevenson would remove the "isolated" ground point, destroy the "lower frequency filtering" of the feedthrough capacitor, and remove the superior "common mode" and "differential mode" EMI suppression. *Id.* at 46–47, 52. Mr. Prymak persuasively testifies, however, that an "isolated" ground point, as well as "common mode" and "differential mode" EMI suppression, could be maintained in Stevenson by simply using multiple ground pins. Reply 11 (citing Ex. 1023 ¶¶ 83–86). Mr. Prymak also persuasively testifies that the feedthrough capacitor of Stevenson and Hazzard would be a functional EMI filter with the same inductance and insertion loss characteristics achieved in the '627 patent.[6] Ex. 1023 ¶¶ 82–86; *see also* Ex. 2200, 139:5–11, 141:11–21 (Dr. Stevenson agreeing that, if asked to do so, one or ordinary skill in

[6] In its Motion for Observations, Patent Owner contends that during his deposition, Mr. Prymak admitted device size for implantable medical devices is a critical design consideration, and that the proposed combination of Stevenson and Hazzard would either increase the size of the implantable medical device or reduce capacitance. Mot. for Obs. 15 (citing Ex. 2413, 5:3–19:5). As noted above, however, the challenged claims are not limited to implantable medical devices. Thus, we are not persuaded that Patent Owner's arguments are commensurate in scope with the challenged claims.

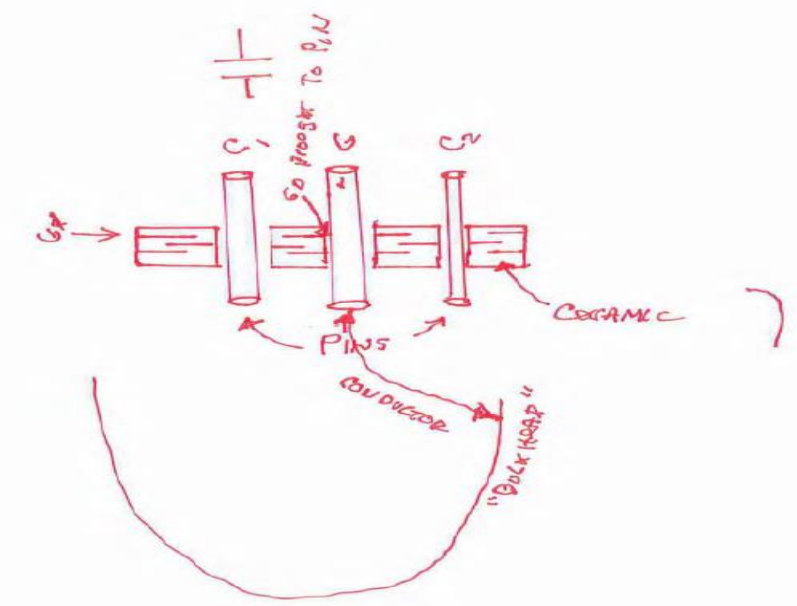
the art could bring the G3 ground point to the ground pin and minimize insertion loss for this ground connection).

Patent Owner also argues that Stevenson and Hazzard do not disclose the problem identified in the '627 patent of mechanical stress within the feedthrough capacitor caused by the application of an exterior metallization, or the solution to that problem of bringing the ground to the pins. PO Resp. 49–51. A reason to combine references, however, may come from recognition of a different problem or from the prior art itself. *See KSR*, 550 U.S. at 420 (noting that the finder of fact should look beyond "the problem the patentee was trying to solve" and may rely on "any need or problem known in the field of endeavor at the time of invention . . . [as] a reason for combining the elements in the manner claimed"); *Cross Med. Prods., Inc. v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1322 (Fed. Cir. 2005). Here, Petitioner presents persuasive evidence that one of ordinary skill in the art would have sought to use an internal ground pin to provide for multiple, redundant ground points for internal circuits, and to allow for removal of the soldered connections on the exterior of the capacitor. Pet. 45 (citing Ex. 1002 ¶ 46 (p. 74)). Patent Owner does not explain persuasively why these asserted reasons to combine the references are unreasonable or incorrect. *See* Ex. 1001, 3:39–43 (noting in the Background of the Invention section that soldered connections on the outside perimeter of feedthrough capacitors were "known to damage such prior art devices").

Based on the foregoing, and upon review of the parties' arguments, evidence, and supporting testimony, we conclude that Petitioner has set forth sufficient rationale with factual underpinnings to support the combination of Stevenson and Hazzard. *See KSR*, 550 U.S. at 418.

c. Galvagni Drawing

During cross-examination, Patent Owner's counsel asked Mr. Galvagni to draw a feedthrough assembly with the "ground brought to the pins as disclosed in Hazzard." Ex. 2101, 135:4–24. Mr. Galvagni's resulting drawing (Ex. 2096) is reproduced below:



Patent Owner contends that Mr. Galvagni's drawing, "using a long and relatively thin (compared to the diameter of the vias) line extending from the interior end of the 'G' pin to a point on the interior . . . of the 'metal container,'" or "bulkhead," would not under any circumstances meet what Hazzard described to be an acceptable low pass filter. PO Resp. 21–22. In support of this argument, Dr. Stevenson measures the various elements of Mr. Galvagni's drawing, calculates the insertion loss curves for this device, and concludes that the device defined by Mr. Galvagni's drawing would be a "disaster." *Id.* at 24–25 (citing Ex. 2145 ¶¶ 48, 55, 55.1–24).

Petitioner contends that any conclusions drawn from Mr. Galvagni's drawings are flawed because the drawing was not drawn to scale and, even if

it had been drawn to scale, the disclosed device would still provide some level of EMI filtering. Reply 8.

As noted by Petitioner, Mr. Galvagni was not asked to make his drawing to scale. Tr. 25:1–4. Thus, any calculations based on Mr. Galvagni's drawing are of limited value. Moreover, Patent Owner's counsel repeatedly asked Mr. Galvagni during his deposition to draw "a tie line" or "a line" to identify or connect the various elements in his drawing. *See* Ex. 2101, 138:9–22 (requesting a "tie line" to identify where the ground was brought to the pins), 138:23–139:3 ("Now, there's a bulkhead somewhere on all these devices for these feedthrough capacitors you're feeding through, the bulkhead, right . . . So can you identify with a line or a structure how the pin – well, what happens next? What happens to that ground pin on the inside?"). Thus, we are not persuaded that Mr. Galvagni's use of a line to connect the ground pin to the bulkhead represents an attempt to provide a faithful representation of the size and shape of the physical structure proposed for linking the ground pin to the bulkhead, as opposed to Mr. Galvagni's compliance with counsel's specific suggestion to use a line to connect these points.

Based on the foregoing, we find Patent Owner's structural analysis and measurements of Mr. Galvagni's drawing to be of little probative value.

d. Secondary Considerations

"Secondary considerations of non-obviousness must be considered when present." *Geo. M. Martin Co. v. Alliance Mach. Sys. Int'l LLC*, 618 F.3d 1294, 1304 (Fed. Cir. 2010). Secondary considerations of non-obviousness include, copying, long felt but unsolved need, failure of others, commercial success, unexpected results, licenses showing industry respect for the invention, and skepticism of skilled artisans before the invention. *In*

re Rouffet, 149 F.3d 1350, 1355 (Fed. Cir. 1998) (collecting cases). For objective evidence of secondary considerations to be accorded substantial weight, however, "its proponent must establish a nexus between the evidence and the merits of the *claimed invention*." *In re Kao*, 639 F.3d 1057, 1068 (Fed. Cir. 2011) (quoting *Wyers* v. *Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010)).

Patent Owner argues that sales of Greatbatch item number 2670-F011-001 of $185,172, $714,742, $1,571,152 in 2011, 2012, and 2013, respectively, is "strong evidence of commercial success." PO Resp. 55–56 (citing Ex. 2163; Ex. 2164 ¶¶ 1–4). Without an indication that the reported sales volume represents a substantial quantity in the market, Patent Owner's evidence of the number of units sold provides only a very weak showing of commercial success. *See In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996) ("This court has noted in the past that evidence related solely to the number of units sold provides a very weak showing of commercial success, if any."). Moreover, to establish commercial success, Patent Owner must provide "proof that the sales were a direct result of the unique characteristics of the claimed invention—as opposed to other economic and commercial factors unrelated to the quality of the patented subject matter." *In re Applied Materials, Inc.*, 692 F.3d 1289, 1299–1300 (Fed. Cir. 2012). Here, as noted by Petitioner, Patent Owner merely notes the level of sales for item number 2670-F011-001 and asserts that this item number falls within the scope of claim 1 of the '627 patent. Reply 14–15. This is not sufficient to establish a nexus between the reported sales and the "unique characteristics of the claimed invention." *Id.*

Patent Owner also argues that a paper authored by Stevenson and Brendel, the two named inventors of the '627 patent, discloses that "[o]ver

one million internally grounded feedthrough capacitor circuits have been installed in hermetic terminals and implanted in humans with no (zero) reported field failures." PO Resp. 56 (quoting Ex. 2107, 8). According to Patent Owner, this is evidence of "beneficial results addressing a problem with prior art devices." *Id.* Patent Owner, however, provides no proof that the lack of field failures was a direct result of the internal grounding of the feedthrough capacitors, as opposed to other mechanical or structural characteristics of the devices disclosed in the Stevenson and Brendel paper. Thus, we are not persuaded that Patent Owner has proven sufficient nexus between the alleged lack of field failures and the merits of the claimed invention.

Based on the foregoing, and in light of the failure to prove sufficient nexus, we are not persuaded by Patent Owner's argument that commercial success and lack of field failures overcomes Petitioner's evidence of obviousness in this case.

e. Conclusion

Based on the foregoing, and upon review of Petitioner's and Patent Owner's analysis, evidence, and supporting testimony, we find that Stevenson and Hazzard disclose or suggest each limitation of 1, 2, 4, 9, 11, 13–17, 20, 23, 25, and 26 of the '627 patent.[7] Accordingly, we conclude that Petitioner has shown by a preponderance of the evidence that claims 1, 2, 4, 9, 11, 13–17, 20, 23, 25, and 26 of the '627 patent would have been obvious over Stevenson and Hazzard.

[7] Patent Owner does not argue claims 2, 4, 9, 11, 13–17, 20, 23, 25, and 26 separately from claim 1, but asserts that "all arguments for patentability of claim 1 regarding EMI filters in which the common ground is the housing/bulkhead apply equally to claims 1, 11, and 25." PO Resp. 54–55.

D. Obviousness of Claims 6, 7, 18, and 19 over Stevenson, Hazzard, and Colburn

Claims 6 and 18 recite the use of a "nail-head lead having one end that abuts a portion of the conductive ferrule." Ex. 1001, 11:19–21, 12:4–6. Claims 7 and 19 require a nail-head lead that "extends from the conductive ferrule, through and beyond the feedthrough filter capacitor to provide a ground pin." *Id.* at 11:22– 24, 12:7–9.

Petitioner argues that Colburn discloses the "nail-head lead" of claims 6, 7, 18, and 19, and one of ordinary skill in the art would have sought to use this nail-head lead in the device of Stevenson and Hazzard because such leads were known to provide a "secure, reliable, and/or high quality connection." Pet. 46–48. Petitioner also argues that use of Colburn's nail-head lead in place of the Stevenson's ground pin would comprise a simple substitution of one known element for another known element, yielding a predictable result. *Id.* at 48. Patent Owner does not address the disclosure of Colburn in its Patent Owner Response.

Upon review of the disclosures of Stevenson, Hazzard, and Colburn, as well as Petitioner's arguments and supporting declaration testimony, we determine that Petitioner has established by a preponderance of the evidence that claims 6, 7, 18, and 19 of the '627 patent would have been obvious under 35 U.S.C. § 103 over the combination of Stevenson, Hazzard, and Colburn. *See KSR*, 550 U.S. at 416 ("The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.").

E. Motion to Exclude

Patent Owner moves to exclude the testimony of Mr. Galvagni in its entirety. Mot. to Excl. 3. Patent Owner also moves to exclude those

portions of Mr. Prymak's testimony directed to (1) the meaning of the term "also" in Hazzard, and (2) the technical requirements of defibrillators and pacemakers. *Id.* at 13–15.

1. Testimony of Mr. Galvagni

Patent Owner contends that Mr. Galvagni's testimony should be excluded because he is not a person of ordinary skill in the art. Mot. to Excl. 3–8. According to Patent Owner, Mr. Galvagni has a degree in chemistry, not electrical engineering, and his work experience is directed not to the electrical design of EMI capacitors, but the general design and construction of capacitors. *Id.* Patent Owner further contends that during his deposition Mr. Galvagni could not provide the equations for several electrical design concepts and did not clearly understand the meaning of the term "insertion loss," which Patent Owner contends any person of ordinary skill in the art would have been "intimately familiar with." *Id.* at 4–8. Patent Owner further contends that Mr. Galvagni showed bias in his insistence that the word "also" in Hazzard meant "instead of." *Id.* at 10.

As discussed above, we are not persuaded that a person of ordinary skill in the art must be an electrical designer of EMI filter capacitors, as asserted by Patent Owner. Moreover, a declarant's expertise and experience need not match perfectly the experience and education of a person of ordinary skill in the art to provide testimony. *SEB S.A. v. Montgomery Ward & Co., Inc.*, 594 F.3d 1360, 1373 (Fed. Cir. 2010). The declarant must, instead, have sufficient "knowledge, skill, experience, training, [and] education" of such specialized nature to assist the trier of fact to understand the evidence. *Id.* (quoting Fed. R. Evid. 702).

Mr. Galvagni testifies that he has over 50 years of experience in the field of capacitors, including EMI filter capacitors, and has published

numerous technical articles and papers in this field, including on the topics of "low inductance capacitors, actuators, and passive components." Ex. 1002 ¶ 3. He also testifies that he is named as an inventor on at least 55 U.S. Patents related to capacitors, filters, or similar electronic structures, and has work experience in the design of filter capacitors similar to the '627 patent, including capacitors with internally connected common ground planes, multiple capacitor access through vertical feeds, and non-circumferential terminations. Ex. 1002 ¶ 5; Ex. 1018 ¶ 8; Ex. 1024 ¶¶ 3, 6, 10. Petitioner contends this work experience in feedthrough filter capacitor construction and design would be helpful in understanding the construction and design of the EMI filter capacitor assemblies claimed in the '627 patent. Resp. to Mot. to Excl. 3.

The claims of the '627 patent are directed to a feedthrough filter capacitor assembly constructed of various individual components. Ex. 1001, 10:64–11:8. Upon review of Mr. Galvagni's work experience, including his experience relating to the construction and manufacture of EMI filters, we conclude that an adequate relationship exists between Mr. Galvagni's education and work experience and the claimed invention. *See SEB S.A.*, 594 F.3d at 1373 (finding no error in admitting testimony where the proffering party established an adequate relationship between the expert's work experience and the claimed invention). Accordingly, we *deny* Patent Owner's Motion to Exclude the testimony of Mr. Galvagni.

To the extent Mr. Galvagni's deposition testimony indicates he does not have knowledge of particular electrical design concepts or equations, as argued by Patent Owner, this goes to the weight to be given his testimony, and has been considered in that context.

2. Testimony of Mr. Prymak

Patent Owner moves to exclude the testimony of Mr. Prymak directed to the meaning of the term "also" in Hazzard, because Patent Owner alleges his testimony is based on a mistaken belief that "various dictionary definitions" define "also" to mean "in place of." Mot. to Excl. 14. This assertion, however, goes to the weight to be given Mr. Prymak's testimony, not its admissibility. Moreover, Mr. Prymak was one of the authors of Hazzard and is qualified to speak to what one of ordinary skill in the art would understand Hazzard to disclose, regardless of any alleged "mistaken belief" that the dictionary definition of "also" could mean "in place of."

Patent Owner also moves to exclude Mr. Prymak's testimony related to EMI filters for implantable defibrillators and pacemakers because, according to Patent Owner, Mr. Prymak is not an expert in this area. *Id.* Patent Owner does not, however, dispute that Mr. Prymak is a person of ordinary skill in the art. Thus, to the extent Mr. Prymak's testimony related to the operation of defibrillators and pacemakers is not supported sufficiently by underlying facts or data, this goes to the weight of his testimony and not its admissibility.

Accordingly, we *deny* Patent Owner's Motion to Exclude the testimony of Mr. Prymak.

F. Motion to Seal

Patent Owner filed a Motion to Seal portions of the deposition transcript of Dr. Stevenson. Paper 25. With its Motion, Patent Owner filed the Board's default protective order and redacted (Ex. 2200) and unredacted (Ex. 2199) versions of Dr. Stevenson's transcript. *Id.* Petitioner does not oppose Patent Owner's Motion to Seal Exhibit 2199. Paper 31.

A motion to seal may be granted upon a showing of "good cause." 37 C.F.R. § 42.54. Patent Owner, as the moving party, has the burden of showing entitlement to the requested relief. 37 C.F.R. § 42.20(c).

Patent Owner proposes to seal Dr. Stevenson's deposition testimony, spanning portions of pages 22 and 23 of his transcript, which Patent Owner contends contains confidential business information of Patent Owner. Patent Owner also seeks to seal the entire index, which Patent Owner contends would otherwise suggest what words were redacted therefrom. Paper 25, 3; Ex. 2200, 22:20–23:14.

Upon review of the redacted portions of Dr. Stevenson's deposition transcript, we conclude that Exhibit 2199 contains confidential business information of Patent Owner that has not been relied upon in this Final Written Decision. We are persuaded, therefore, that good cause exists to grant the motion to seal and to enter the default Protective Order.

The sealed documents will remain under seal pending the outcome of any appeal taken from this Final Written Decision. At the conclusion of any appeal proceeding, or if no appeal is taken, the documents will be made public. *See* Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,760–61 (Aug. 14, 2012). Either party may, however, file a motion to expunge the sealed documents from the record pursuant to 37 C.F.R. § 42.56. Any such motion will be decided after the conclusion of any appeal proceeding or the expiration of the time period for appeal.

III. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1, 2, 4, 6, 7, 9, 11, 13–20, 23, 25, and 26 of the '627 patent are held unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *denied*;

FURTHER ORDERED that Patent Owner's unopposed Motion to Seal is *granted*;

FURTHER ORDERED that the Board default Protective Order, as set forth in Paper 25, is hereby *entered* in this proceeding; and

FURTHER ORDERED that any party to the proceeding seeking judicial review of the Final Written Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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Patent 5,905,627

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