

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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MASIMO CORPORATION,  
Petitioner,

v.

APPLE INC.,  
Patent Owner.

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IPR2023-00745  
Patent 10,076,257 B2

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Before KEN B. BARRETT, JOSIAH C. COCKS, and  
ROBERT L. KINDER, *Administrative Patent Judges*.

KINDER, *Administrative Patent Judge*.

JUDGMENT  
Final Written Decision  
Determining No Challenged Claims Unpatentable  
Dismissing Patent Owner's Revised Motion to Amend  
35 U.S.C. § 318

## I. INTRODUCTION

### A. *Background and Summary*

Masimo Corporation (“Petitioner”)<sup>1</sup> filed a Petition requesting *inter partes* review of claims 1–4 and 8–22 of U.S. Patent No. 10,076,257 B2 (“the ’257 patent,” Ex. 1001). Paper 1 (“Pet.”). Apple Inc. (“Patent Owner”)<sup>2</sup> filed a Preliminary Response to the Petition. Paper 7 (“Prelim. Resp.”). We instituted the petitioned review (Paper 8).

Patent Owner filed a Patent Owner Response (Paper 15, “PO Resp.”) to oppose the Petition. Petitioner filed a Reply (Paper 21, “Pet. Reply”) to the Patent Owner Response. Patent Owner filed a Sur-reply (Paper 29, “Sur-reply”) to the Reply. We conducted an oral hearing on August 12, 2024. A transcript has been entered into the record (Paper 43, “Tr.”).

We have jurisdiction under 35 U.S.C. § 6(b)(4) and § 318(a). This Decision is a final written decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73 as to the patentability of claims 1–4 and 8–22 of the ’257 patent. We determine Petitioner has not shown by a preponderance of the evidence that any of those claims are unpatentable.

### B. *Related Proceedings*

Both parties identify, as a matter involving the ’257 patent, *Apple Inc. v. Masimo Corporation and Sound United, LLC*, No. 1:22-cv-01378-MN (D. Del.). Pet. 2; Paper 3.

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<sup>1</sup> Petitioner identifies Masimo Corporation as the real party-in-interest. Pet. 2.

<sup>2</sup> Patent Owner identifies Apple Inc. as the real party-in-interest. Paper 3.

### *C. The '257 Patent*

The '257 patent is titled “Seamlessly Embedded Heart Rate Monitor” and “is directed to an electronic device having an integrated sensor for detecting a user’s cardiac activity and cardiac electrical signals.” Ex. 1001, codes (54), (57). The '257 patent’s “seamlessly integrated cardiac sensor . . . can be integrated in any suitable portion of the electronic device” including “a portion with which the user is typically in contact (e.g., an input mechanism or a housing held by the user), or metallic or conductive portions of the device.” *Id.* at 2:6–13. The '257 patent illustrates, in Figure 1, a schematic view of an electronic device for receiving the output of one or more sensors, and in Figure 3, a schematic view of the elements (including integrated leads) of the electronic device. *Id.* at 3:22–29.

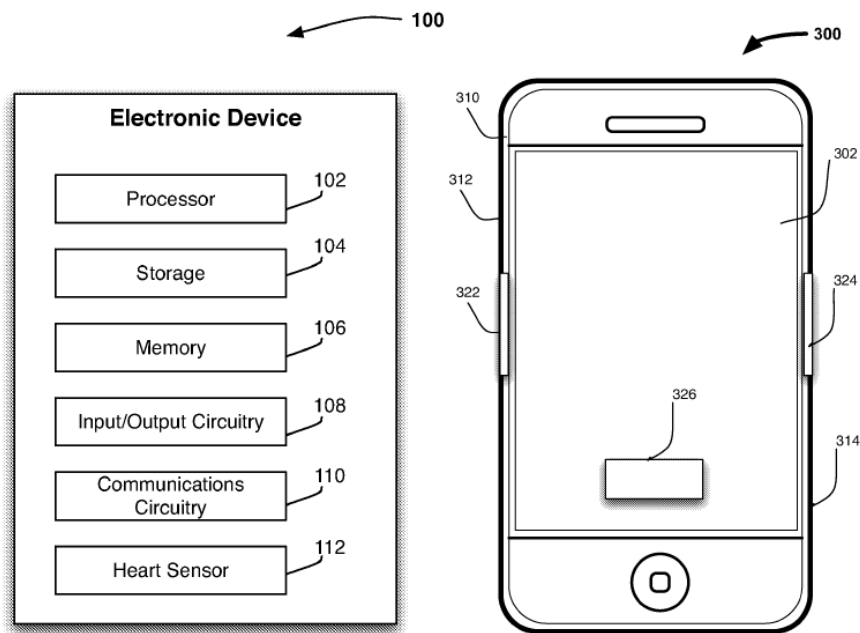


FIG. 1

FIG. 3

Figure 1 is a schematic view of an electronic device 100 for receiving the output of one or more sensors, and Figure 3 is a schematic view illustrating an electronic device 300 having several integrated leads. *Id.* at 3:47–49, 8:13–16.

As shown in Figure 1, the electronic device includes control circuitry 102, storage 104, memory 106, input/output circuitry 108, communications circuitry 110, and heart sensor 112. *Id.* at 3:49–52. Control circuitry 102 includes processing circuitry or a processor operative to control the operations and performance of electronic device 100. *Id.* at 3:62–63. The control circuitry may be used to run operating system applications, firmware applications, media playback applications, media editing applications, and may also drive a display and process inputs received from a user interface. *Id.* at 3:64–4:2. Heart sensor 112 is operative to detect a user's heartbeat, heart rate, or other signal generated by the user's heart. *Id.* at 6:3–5. Thus, heart sensor 112 may serve as an EKG monitor. *Id.* at 6:5–6. Heart sensor 112 may include lead(s) connected to the exterior of the electronic device such that the user may contact one or more of the leads to provide an electrical signal associated with the user's heart to heart sensor 112. *Id.* at 6:6–10. Cardiac signals detected by the heart sensor leads are analyzed by the processor, which generates, from the received signals, one or more characteristic quantities of the user's heartbeat or heart rate for authentication. *Id.* at 6:10–16. The leads may be integrated in any suitable portion of the electronic device. *Id.* at 8:11–13. Figure 3 illustrates an electronic device having such integrated leads. *Id.* at 8:13–15.

Electronic device 300 illustrated in Figure 3 includes display 302 and bezel 310, and is portable such that a user can hold the electronic device with fingers extending against one of sides 312 and 314 of bezel 310, and the user's thumb extending against the other of sides 312 and 314. *Id.* at 8:15–20. Leads 322 and 324, which may include conductive pads, may be coupled to sides 312 and 314 of bezel 310, respectively, such that when the

user holds the device, the user's thumb and fingers are placed in contact with leads 322 and 324. *Id.* at 8:20–24. Alternatively, bezel 310 may include any other suitable number of leads, or any other suitable distribution of leads along bezel 310 and in other portions of electronic device 300. *Id.* at 8:24–27. The leads detect the user's cardiac activity through the contact with the user's thumb and fingers, and provide the detected activity to the electronic device processor for processing. *Id.* at 8:27–30.

Electronic device 300 may also include additional lead 326 embedded in or behind display 302, as shown in Figure 3. *Id.* at 8:40–42. Lead 326 is operative to detect a user's heart activity as the user moves a finger across display 302, for example in the vicinity of or directly over lead 326 (e.g., as the user drags a finger over lead 326 to move a slider when unlocking the electronic device). *Id.* at 8:42–46. Using lead 326, the electronic device can detect an electrical signal from a different portion of the user's body (e.g., leads 322 and 324 detect signals through a first hand, and lead 326 detects signals through the second hand), which can provide the processor with additional information for determining characteristics of the user's cardiac activity. *Id.* at 8:46–52.

To prevent leads 322, 324 and 326 from shorting, electronic device 300 may include at least one non-conductive component positioned between each of leads 322, 324 and 326: for example, a rubber gasket can be positioned between leads 322 and 324 (in bezel 310) and lead 326 (in display 302). *Id.* at 8:53–58. The cardiac electrical signals detected by leads 322, 324, and 326 may be faint or have particular characteristics that require materials having particular properties (e.g., silver-based compounds) to detect and transmit. *Id.* at 8:58–62. In such cases, although the material

used for bezel 310 or other electronic device components can be conductive, its conductivity can be insufficient to transmit signals detected by lead 322 directly to lead 324 (e.g., shorting leads 322 and 324). *Id.* at 8:63–67. Leads 322 and 324 may be embedded directly in bezel 310 without the need for additional isolating material. *Id.* at 8:67–9:3.

Figures 4A and 4B, reproduced below, illustrate electronic devices having bezels with embedded heart sensor leads. *Id.* at 3:30–36.

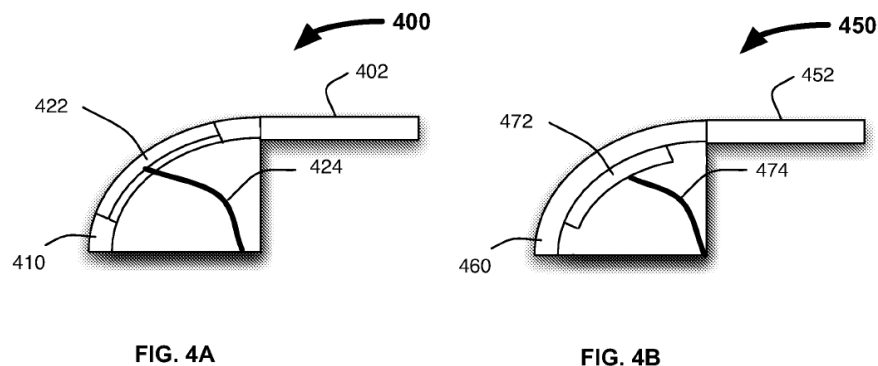


Figure 4A is a cross-sectional view of electronic device 400 having bezel 410 with embedded heart sensor lead 422, and Figure 4B is a cross-sectional view of another electronic device 450 having bezel 460 with embedded heart sensor lead 472. *Id.* at 9:18–21, 9:35–40.

Electronic device 400 includes display 402 and bezel 410. *Id.* at 9:21–22. Lead 422 may be embedded along the outer surface of bezel 410 such that lead 422 is exposed to the user during use. *Id.* at 9:22–24. Connector 424 may be coupled to the inner surface of lead 422 and extend into electronic device 400 to be coupled with the processor. *Id.* at 9:24–26. Electronic device 400 may further include an isolating layer positioned between lead 422 and bezel 410 (not shown in Figure 4A). *Id.* at 9:26–28. The isolating layer may be constructed from a suitable material having non-conductive properties. *Id.* at 9:28–30. Alternatively, if the material of bezel 410 is not conductive, or insufficiently conductive to cause several distinct leads 422

positioned on bezel 410 from shorting, no isolating layer may be necessary. *Id.* at 9:32–35.

Electronic device 450 includes display 452 and bezel 460. *Id.* at 9:39–40. If the electrical conductivity and size of bezel 460, and the strength or characteristics of the cardiac signal provided by the user and detected by the heart sensor are adapted such that the signal can be transmitted along short distances in bezel 460, lead 472 of the heart sensor may be positioned against the back surface of bezel 460. *Id.* at 9:40–45. Alternatively, lead 472 may be placed within the thickness of bezel 460 (e.g., in a pocket within the bezel wall), but underneath the outer surface of the bezel. *Id.* at 9:45–48. The short thickness of bezel 460 allows electrical signals to propagate from the user to the outer surface of bezel 460, through bezel 460, and into lead 472, which may in turn transmit the signals to the processor using connector 474. *Id.* at 9:48–52. In addition, if several leads are placed along different portions of bezel 460, the distance between adjacent leads may be sufficiently large (e.g., substantially larger than the thickness of bezel 460) that different leads of bezel 460 cannot detect the same electrical signal. *Id.* at 9:52–57.

#### *D. Illustrative Claim*

Claims 1 and 15 are independent claims. Claim 1, reproduced below, is illustrative.

1. An electronic device for detecting a user's cardiac signal, comprising:
  - an enclosure;
  - a heart sensor configured to detect the user's cardiac signal, the heart sensor comprising:
    - a first lead comprising a first pad that is embedded in a first portion of the enclosure, wherein an exterior

surface of the enclosure comprises an exterior surface of the first portion, wherein the first pad is positioned underneath the exterior surface of the first portion, and wherein the first pad is configured to detect a first electrical signal of the user's cardiac signal via the user's skin's contact with the exterior surface of the first portion of the enclosure; and

a second lead comprising a second pad that is embedded in a second portion of the enclosure, wherein the second pad is configured to detect a second electrical signal of the user's cardiac signal via the user's skin's contact with at least one of the second pad and the second portion of the enclosure; and

a processor coupled to the heart sensor and configured to receive and process the detected cardiac signal, wherein the first lead further comprises a first connector coupled to the first pad and configured to provide the first electrical signal detected by the first pad to the processor, and wherein the second lead further comprises a second connector coupled to the second pad and configured to provide the second electrical signal detected by the second pad to the processor.

Ex. 1001, 12:21–49. Independent claim 15 is similar in scope to claim 1, but additionally requires “a display screen,” and “a second lead embedded in the display screen.” *Id.* at 14:1–2, 14:12.

#### *E. Evidence*

Petitioner relies on the following references:

Name	Reference	Exhibit(s)
Markel	US 2007/0021677 A1, pub. Jan. 25, 2007	1005
Mills et al.	US 5,351,695, iss. Oct. 4, 1994	1006

Petitioner supports its arguments by submitting, *inter alia*, four declarations from Alan L. Oslan, MSBE, MBA: the first declaration (Ex. 1003), the second declaration (Ex. 1051), the third declaration



(Ex. 1065), and the fourth declaration (Ex. 1069). Petitioner also relies on other exhibits as discussed below. Patent Owner submits, *inter alia*, two declarations from Thomas W. Kenny, Ph. D.: the first declaration (Ex. 2003) and the second declaration (Ex. 2014).

*F. Asserted Grounds of Unpatentability*

Petitioner asserts that the challenged claims are unpatentable on the following grounds:

<b>Claim(s) Challenged</b>	<b>35 U.S.C. §<sup>3</sup></b>	<b>Reference(s)/Basis</b>
1–4, 8, 10, 11, 14	102	Mills
1–4, 8–22	103	Markel, Mills

II. ANALYSIS OF PETITIONER’S CHALLENGES

*A. Principles of Law*

Petitioner bears the burden of persuasion to prove unpatentability of the claims challenged in the Petition, and that burden never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

“Under 35 U.S.C. § 102 a claim is anticipated ‘if each and every limitation is found either expressly or inherently in a single prior art reference.’” *King Pharm., Inc. v. Eon Labs, Inc.*, 616 F.3d 1267, 1274 (Fed. Cir. 2010) (quoting *Celeritas Techs. Ltd. v. Rockwell Int’l Corp.*, 150 F.3d

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<sup>3</sup> The Leahy-Smith America Invents Act (“AIA”) includes revisions to 35 U.S.C. §§ 102 and 103 that became effective on March 16, 2013. Because the earliest filed application identified in the ’257 patent has a filing date of at least as early as January 23, 2009 (Ex. 1001, code (63), 1:7–12), we apply the pre-AIA-versions of 35 U.S.C. §§ 102 and 103.

1354, 1360 (Fed. Cir. 1998)). “Anticipation requires the presence in a single prior art disclosure of all elements of a claimed invention arranged as in the claim.” *Therasense, Inc. v. Becton, Dickinson & Co.*, 593 F.3d 1325, 1332 (Fed. Cir. 2010) (quoting *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983)).

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4), if present, any objective evidence of obviousness or non-obviousness.<sup>4</sup> *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

#### *B. The Level of Ordinary Skill in the Art*

In determining the level of ordinary skill in the art, various factors may be considered, including 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.” *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (quoting *Custom Accessories, Inc. v. Jeffrey–Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986)).

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<sup>4</sup> Neither party has introduced any objective evidence in this proceeding.

Petitioner contends that:

A POSITA of the '257 patent would have at least a B.S. degree in electrical or biomedical engineering or a related field, with at least two years of experience designing patient monitoring or similar systems. A higher level of education may compensate for less work experience and vice versa.

Pet. 7 (citing Ex. 1003 ¶ 38).

Patent Owner, in turn, contends that:

A person of ordinary skill in the art on or about the claimed priority date of the '257 Patent ("POSITA") would have had at least a bachelor's degree in electrical engineering, mechanical engineering, biomedical engineering, computer engineering, physics, or a related field, and would have had at least two years of relevant work experience with capture and processing of data or information, including but not limited to physiological information, or equivalents thereof. Less work experience may be compensated by a higher level of education and vice versa.

PO Resp. 4–5 (Ex. 2003 ¶¶ 23–24) (internal citation omitted).

Patent Owner's proposed level of ordinary skill in the art is somewhat broader in both education and proposed work experience. Patent Owner's proposed work experience is somewhat vague and potentially outside the scope of the claimed invention. For example, the requirement that the person of ordinary skill in the art have experience with the "capture and processing of data or information, including but not limited to physiological information," would seemingly encompass data processing areas that do not relate to the scope of the claimed invention. We adopt Petitioner's level of the level of ordinary skill in art because it is consistent with the level of ordinary skill reflected in the prior art references of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (recognizing that the prior

art itself may reflect an appropriate level of skill in the art). Our analysis and the end result are the same under either proposed definition.

### *C. Claim Construction*

We apply the same claim construction standard used in district court actions under 35 U.S.C. § 282(b), namely that articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). See 37 C.F.R. § 42.100(b). In applying that standard, claim terms generally are given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips*, 415 F.3d at 1312–13. “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

Petitioner proposes constructions for the terms “embedded” (recited in claims 1, 9, and 15), “lead” (recited in the independent claims), “pad” (recited in claim 1 and some of its dependent claims), and “pocket” (recited in dependent claim 8). Pet. 7–12.

Patent Owner contends that Petitioner has offered an “improperly broad construction of the term ‘embedded in,’” and thereafter presents evidence and argument in favor of its proposed construction for “embedded in.” PO Resp. 5–13.

Based on the final record before us, we determine it necessary to construe the term “embedded in” to resolve the dispute before us.

“Embedded In”

Independent claim 1 requires, in pertinent part:

a first lead comprising a first pad that is *embedded in* a first portion of the enclosure

. . . .

a second lead comprising a second pad that is *embedded in* a second portion of the enclosure

Ex. 1001, 12:26–27, 12:35–36 (emphases added). Claim 15 similarly requires, “a first lead *embedded in* a first portion of the enclosure of the electronic device.” *Id.* at 14:5–6 (emphasis added).

Petitioner Contentions

With respect to the claim term “embedded,” Petitioner submits that

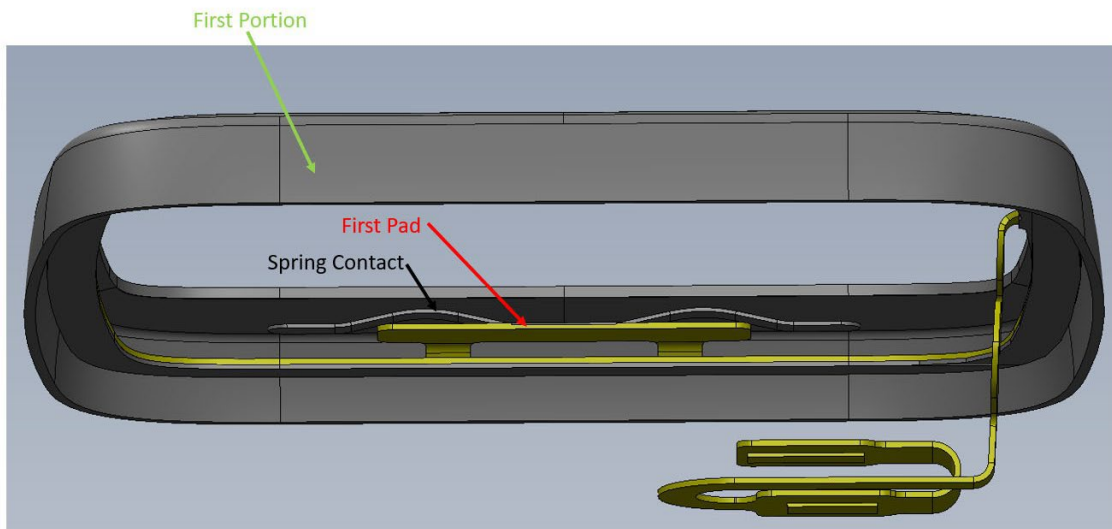
A POSITA would understand at the time of the ‘257 patent disclosure based on its usage in the specification, the claim term “embedded” means “*an integral part of*” such as, by “*being placed in the thickness of a surrounding material including forming an outer and/or inner surface*” or “*placed underneath an exterior surface and against an inner surface.*”

Pet. 8–9 (citing Ex. 1001, 9:19–20, 9:22–24, 9:34–48, Fig. 4A–4B; Ex. 1003 ¶¶ 44–46; Ex. 1016, 406; Ex. 1017, 635; Ex. 1018, 583).

Petitioner contends, “construing ‘embedded more broadly than the narrower phrase ‘embedded in’ is appropriate,” and “Apple’s ‘embedded in’ construction is not significantly narrower.” Pet. Reply 1. Petitioner points out that if “embedded in,” is construed as “at least partially set in or partially surrounded by a material,” then Patent Owner “does not specify a threshold for ‘partially,’ so its construction covers pads *minimally* set in *or* surrounded by an enclosure.” *Id.* Regardless, Petitioner argues that because it can “prove[] the claims unpatentable under” its position in the Petition or under

Patent Owner’s claim construction position, “no construction is needed.” *Id.* at 2. Petitioner’s expert, Mr. Oslan, recognizes that “‘embedded in’ is narrower than ‘embedded,’” but he does not offer any opinion as to the scope of “embedded in.” Ex. 1065 ¶ 212; Ex. 2011, 28:21–29.

Petitioner also contends that Patent Owner’s infringement contentions in district court contradicts its claim construction position here. Pet. Reply 12–14. Petitioner alleges that in district court, Patent Owner asserted embedded in pads need not be surrounded at all, relying on infringement contentions for the product depicted below.



*Id.* at 13 (image from Ex. 1063, 3–4). Petitioner relies on the allegation that the yellow-colored exposed copper region (labeled “first pad”) in the annotated CAD drawing above is “embedded in” the bezel (labeled “first portion” in green) of Masimo’s W1 watch. *Id.* at 14 (citing Ex. 1063, 3–4; Ex. 1064, 9–13; Ex. 1065 ¶¶ 237–238).

Patent Owner Contentions

Patent Owner proposes that the term “embedded in” (recited in claims 1, 9, and 15) should be given its plain and ordinary meaning. PO Resp. 5 (citing Ex. 2003 ¶¶ 30–31). Consistent with the ordinary meaning, Patent Owner also proposes construing “embedded in” as “at least partially set in or partially surrounded by a material.” *Id.* (citing Ex. 2003 ¶¶ 27–46). In support of its construction, Patent Owner cites to embodiments where the device includes “a housing forming the exterior surface” that “one or more leads can be embedded in or adjacent to the housing.” *Id.* (quoting Ex. 1001, 10:24–29). This language, according to Patent Owner, “makes a clear distinction between a lead that is ‘embedded in’ the housing and a lead that is merely ‘adjacent to’ the housing.” *Id.* at 5–6 (citing Ex. 2003 ¶ 32). Thus, in embodiments requiring the lead to be embedded in the housing, Patent Owner contends that the ’257 patent establishes that “it is not sufficient for two components to be merely in parallel contact or adjacent to each other.” *Id.* at 6 (citing Ex. 2003 ¶ 32; Ex. 2008, 34:20–35:3, 124:7–16, 126:2).

Patent Owner contends that the ’257 patent “distinguishes a lead that is embedded in a portion of the enclosure from a lead that is merely ‘positioned against’ or in parallel contact with a portion of the enclosure.” *Id.* at 6–7 (citing Ex. 1001, 8:20–24, 8:40–41, 8:67–9:1, 9:44–48; Ex. 2003 ¶¶ 33–37). Patent Owner further relies on the Specification, conveying that “lead 472 of the heart sensor can be positioned against the back surface of bezel 460,” or “[a]lternatively, lead 472 can be placed within the thickness of bezel 460 (e.g., in a pocket within the bezel wall), but underneath the outer surface of the bezel.” *Id.* at 6 (quoting Ex. 9:44–48) (emphases

omitted). According to Patent Owner, and Dr. Kenny, “[t]his passage distinguishes a lead that is embedded in a portion of the enclosure from a lead that is merely ‘positioned against’ or in parallel contact with a portion of the enclosure.” *Id.* at 6–7 (citing Ex. 2003 ¶¶ 33–35).

Patent Owner points to several examples in the Specification that show embodiments of leads being “embedded in” and “embedded directly in” a bezel. *Id.* at 7 (citing Ex. 1001, 8:40–41, 8:20–24, 8:67–9:1). According to Dr. Kenny, these examples “identif[y] a distinction between leads that are merely in contact with the bezel 310 of the device housing and leads that are ‘embedded directly in’ the bezel. In other words, a lead that is embedded in the bezel 310 must be at least partially set in or partially surrounded by the bezel 310.” Ex. 2003 ¶ 37.

Patent Owner further contends that under claim differentiation between claims 1 and 9, “the term ‘embedded in’ has a narrower scope than ‘embedded with.’” *Id.* at 7–8 (citing Ex. 2003 ¶ 38). According to Patent Owner “a lead that is ‘embedded in’ a first portion of the enclosure” would be one that is “at least partially set in or partially surrounded by the first portion of the enclosure,” but a lead that is “merely being ‘embedded with’” would more broadly encompass a lead that may be “adjacent/parallel to the first portion of the enclosure.” *Id.*

Patent Owner argues that Petitioner’s construction of “embedded” is too broad because it would encompass “two materials that are merely positioned ‘adjacent to’ or ‘against’ each other such that the two surfaces are parallel rather than the first material being ‘embedded in’ the second material by being at least partially set in or partially surrounded by the second material.” PO Resp. 8–9 (citing Ex. 2003 ¶¶ 27–30, 39). Patent



Owner contends that Petitioner's expert, Mr. Oslan, admitted during deposition that "a first component or object in parallel contact with and positioned under a second component or object would not necessarily indicate that the first component or object is embedded in the second component or object." *Id.* at 9 (citing Ex. 2008, 31:4–33:18, 109:18–110:19). Patent Owner contends that an ordinary artisan would have understood that "'embedded in' requires more than two materials or substrates that are merely positioned adjacent to, parallel, or against each other." *Id.* at 9–10 (citing Ex. 2003 ¶ 40). Patent Owner contends that dictionaries support that "embed" means "envelope or enclose" and that "embedded in" would have a narrower definition than the one proposed by Petitioner. *Id.* at 10 (citing Ex. 1016; Ex. 1017; Ex. 1018; Ex. 2003 ¶ 41).

Patent Owner points out that in the district court proceeding, Petitioner construed "embedded in" to mean "set firmly into and surrounded by material," which is narrower than Petitioner's construction in this proceeding "because it requires that a first material be 'surrounded by' a second material and does not encompass arrangements in which a first material merely 'form[s] an outer and/or inner surface' of a second material or is 'placed underneath an exterior surface and against an inner surface' of the second material." *Id.* at 10–11 (citing Ex. 2003 ¶¶ 42–43; Ex. 2004, 57). Patent Owner contends that in the district court proceeding, Petitioner distinguished between "leads [that] are 'embedded *along*' the bezel" and "leads that are 'embedded in' the bezel/housing." *Id.* at 11–12 (citing Ex. 2003 ¶¶ 43–44; Ex. 2004, 58–59, 61). Patent Owner concludes by arguing that although that Petitioner's construction in the current proceeding is too broad, Petitioner's construction in the district court proceeding is also

too narrow because the '257 patent discloses embodiments where the leads are exposed and not entirely surrounded by material. *Id.* at 12–13 (citing Ex. 1001, 9:22–24, Fig. 4A; Ex. 2003 ¶ 45; Ex. 2004, 57–61).

### Analysis

We adopt Patent Owner’s position that “embedded in” means “at least partially set in or partially surrounded by a material.” The '257 patent supports this construction in several ways. First, several embodiments describe how “leads 322 and 324 [may] be embedded directly in bezel 310” (Ex. 1001, 8:63–9:1), “lead 422 can be embedded along the outer surface of bezel 410 such that lead 422 is exposed to the user during use” (*id.* at 9:22–24), and “one or more leads can be embedded in or adjacent to the housing” (*id.* at 10:28–29). Figures 4A and 4B, reproduced below, illustrate examples of embedded heart sensor leads:

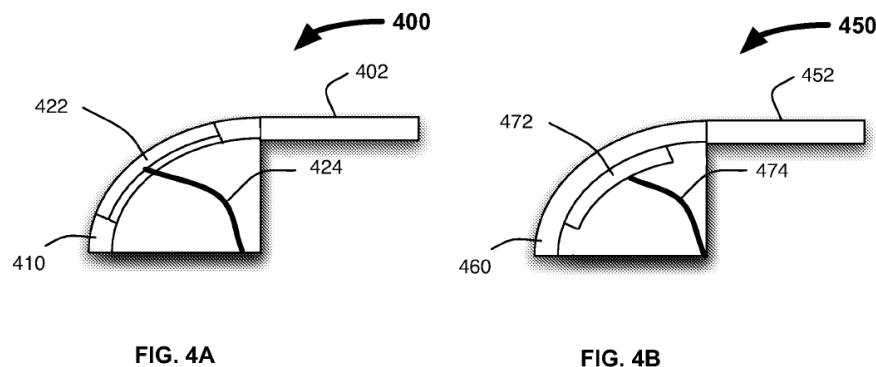


Figure 4A depicts bezel 410 with embedded heart sensor lead 422 and Figure 4B depicts bezel 460 with embedded heart sensor lead 472. *Id.* at 9:18–21, 9:35–40.

Next, and as explained by Dr. Kenny, the '257 patent distinguishes structure where a lead is embedded in a portion of the enclosure from other embodiments where a lead is merely positioned against or in parallel contact with a portion of the enclosure. *See* Ex. 2003 ¶¶ 36–37. The Specification describes distinct embodiments such as “lead 472 of the heart sensor can be

positioned against the back surface of bezel 460,” or “[a]lternatively, lead 472 can be placed within the thickness of bezel 460 (e.g., in a pocket within the bezel wall), but underneath the outer surface of the bezel.” Ex. 9:44–48. We agree with Patent Owner, and Dr. Kenny, that “[t]his passage distinguishes a lead that is embedded in a portion of the enclosure from a lead that is merely ‘positioned against’ or in parallel contact with a portion of the enclosure.” PO Resp. 6–7 (citing Ex. 2003 ¶¶ 33–35). *See also* Ex. 2008, 31:10–33:18, 109:18–110:19 (Petitioner’s expert, Mr. Oslan, suggesting that a first component or object in parallel contact with and positioned under a second component or object would not necessarily indicate that the first component or object is embedded in the second component or object).

Similarly, we also agree that “the claims of the ’257 use the term ‘embedded in’ while also using the word ‘embedded’ in other contexts, which” indicates distinct claim scope for “the term ‘embedded in,’” versus “the broader term ‘embedded.’” Ex. 2003 ¶ 38. For instance, claim 9 distinctly requires “embedded with,” which is a broader term that, according to Dr. Kenny, encompasses embodiments where a lead may be adjacent/parallel to the first portion of the enclosure. *Id.*

We also note that although Petitioner wants the admittedly broader term “embedded” construed separately, it does not directly challenge Patent Owner’s construction of “embedded in” or offer its own scope for this claim term. Pet. Reply 1–2; *see also* Tr. 21:10–16 (“So instead of providing a construction for ‘embedded in,’ Masimo had shown that under all of the construction, the claims would be invalid under view of the prior art. But if

the Board wants to construe ‘embedded in,’ then we’re fine with whichever of the constructions the Board chooses.”); Sur-reply 2–4.

Finally, we decline to adopt Petitioner’s construction of just “embedded” alone. As Petitioner recognized in district court, it is proper to construe the full term “embedded in.” *See* Ex. 2004, 57 (In the related district court proceeding, Petitioner proposes a narrower construction for the term “embedded in” as “set firmly into and surrounded by material.”) (citation to added page numbering). In the district court proceeding, Petitioner also recognized that “‘embedded in’ must be construed to be more than merely ‘mounted on,’” and that arrangements in which a first material is merely “‘behind,’ ‘embedded along,’ [or] ‘adjacent to’” a second material do not fall within the scope of the term “embedded in.” *Id.* at 58–59, 61.

Regardless, the ’257 patent does not support Petitioner’s proposed construction of “embedded.” Petitioner initially relies on embodiments in Figures 4A and 4B and corresponding description of the ’257 patent. *See* Pet. 13; Ex. 1001, 9:19–45, Figs. 4A and 4B. Those embodiments disclose that the lead is *along* the outer surface or *against* the back surface of the bezel, which does not support the portion of Petitioner’s construction that recites “placed in the *thickness* of a surrounding material” or “placed *underneath* an exterior surface.” Petitioner also points to an alternative embodiment in which the lead is placed *within* and *underneath* the bezel, but this embodiment does not support the portion of Petitioner’s construction that recites “*forming* an outer and/or inner surface” or “*against* an inner surface.” Petitioner’s construction thus requires features from both the primary and alternative embodiments, which makes the resulting construction different in scope from both embodiments. *See Corephotonics,*

*Ltd. v. Apple Inc.*, 84 F.4th 990 (Fed. Cir. 2023) (cautioning against construing the claims in a way that would omit a disclosed embodiment); *see also Pacing Techs., LLC v. Garmin Int’l, Inc.*, 778 F.3d 1021, 1026 (Fed. Cir. 2015) (“[W]here the patent describes multiple embodiments, every claim does not need to cover every embodiment.”). Accordingly, we decline to adopt Petitioner’s construction of “embedded.”

Finally, even if we were to consider just the plain meaning of “embedded,” we note that the extrinsic evidence offered by Patent Owner contradicts Petitioner’s proposed construction of embedded as “an integral part of . . . including forming an outer and/or inner surface.” Pet. 8–9. For instance, dictionary definitions of embedded construe the term as “[t]hat which have been incorporated into a surrounding mass or enclosure,” “to enclose closely in or as if in a matrix,” and “to fix into a surrounding mass.” PO Resp. 9–10 (quoting Ex. 2005, 3; Ex. 2006, 3; Ex. 2007, 3). These definitions suggest that the plain meaning of embedded requires more than just forming a surface.

Based on the final record before us, we conclude no explicit construction of any additional claim term is needed to resolve the issues presented by the arguments and evidence of record. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Matal*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (per curiam) (claim terms need to be construed “only to the extent necessary to resolve the controversy” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

*D. Anticipation of Claims 1–4, 8, 10, 11, and 14 By Mills*

Petitioner alleges that claims 1–4, 8, 10, 11, and 14 are anticipated by Mills. Pet. 12, 16–40; *see generally* Pet. Reply. Patent Owner contends that Petitioner has failed to demonstrate how Mills discloses certain claim limitations. *See generally* PO Resp; Sur-Reply.

For the reasons set forth below, and based on the final record before us, Petitioner has not established by a preponderance of the evidence that any of these claims of the '257 patent are anticipated based on this ground. Claim 1 requires, in pertinent part, “*a first lead comprising a first pad that is embedded in a first portion of the enclosure, wherein an exterior surface of the enclosure comprises an exterior surface of the first portion, wherein the first pad is positioned underneath the exterior surface of the first portion.*” Ex. 1001, 12:26–31 (emphases added). Below, we focus our analysis on these limitations. First, we summarize Mills and then provide Petitioner’s contentions and Patent Owner’s response regarding these limitations. Finally, we provide our analysis and explanation as to why we determine that Mills fails to disclose these limitations and thus Mills does not anticipate claim 1.

*1. Mills (Ex. 1006)*

Mills is titled “Wrist Worn ECG Monitor” and relates to “a wrist-worn ECG monitor having integral electrodes for recording and teletransmitting ECG data to a remote site for analysis by a diagnostician.” Ex. 1006, codes (54), (57), 1:10–14. Mills’ wrist-worn ECG monitor can be worn by a cardiac patient and includes fully integrated dry skin electrodes, as illustrated below in Figure 1 (in an isometric view), Figure 2 (in an exploded frontal isometric view with the wrist band removed), and

Figure 3A (in an exploded isometric view showing the ECG monitor from the rear). *Id.* at 1:46–49, 2:39–47, 3:1–5.

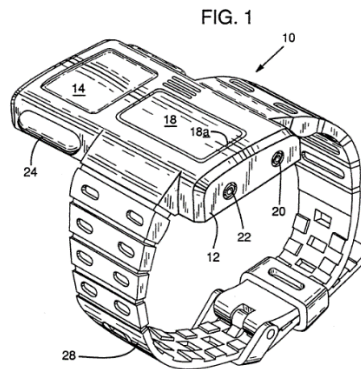


Figure 1 is an isometric view of a wrist-worn ECG monitor 10. *Id.* at 2:39–41.

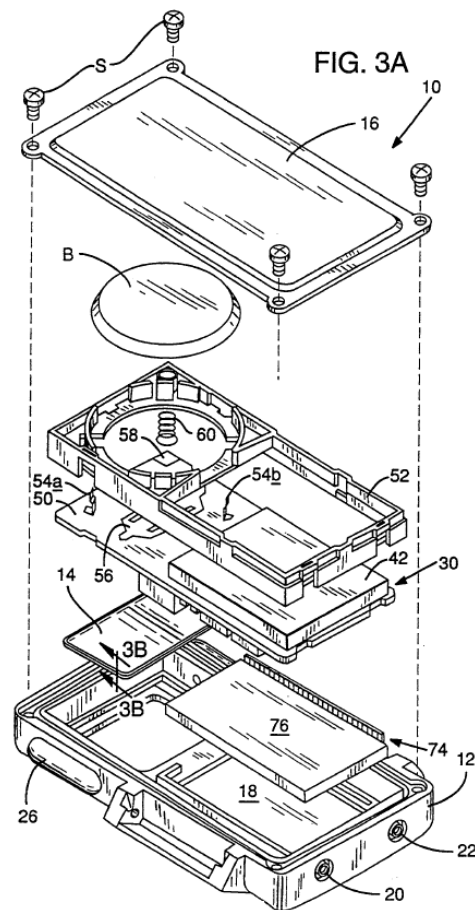
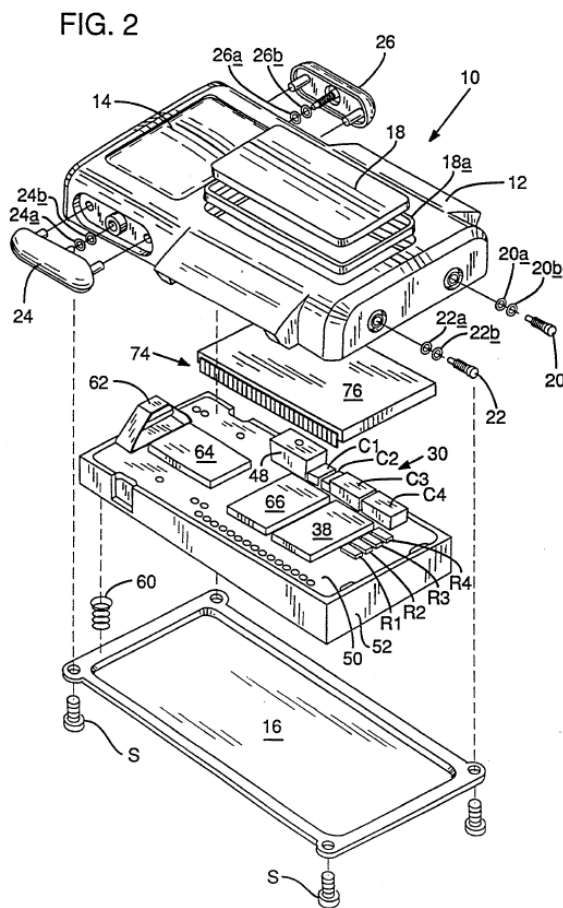


Figure 2 is a frontal isometric view of ECG monitor 10 (with the wrist band removed), and Figure 3A is an exploded isometric view of the ECG monitor (shown from the rear instead of the front). *Id.* at 2:42–47.

The wrist-worn ECG (or cardiac data) monitoring apparatus 10 illustrated in Figures 1, 2, and 3A includes: (i) housing 12 including first and second dry skin electrodes 14 and 16 unitarily connected for making conductive contact with a cardiac patient's skin surface, and bezel 18 (with associated gasket 18a) also forming an integral part of the housing; (ii) plural pushbutton switches 20, 22, 24, and 26 which may be accessed by the patient; (iii) a watchband 28; and (iv) electronics (indicated generally at 30 in Figure 2) which are contained within housing 12. *Id.* at 3:6–18, 3:47–51.

Mills' wrist-worn ECG monitor enables local, multiple event ECG data recording and telecommunication to a remote site. *Id.* at 1:61–65. The ECG monitor is operable by the patient by placing the other palm over a portion of the monitor's face to contact an upper skin electrode. *Id.* at 1:65–2:1. The ECG monitor's dry skin electrodes 14 and 16 are designed for use with equipment capable of producing or monitoring changing electrical conditions (indicative of changing cardiographic conditions) at the surface of a patient's skin, for, e.g., cardiac monitoring. *Id.* at 3:61–67.

Mills explains that electronics 30 may be implemented “in various discrete and integrated circuits surface-mounted or ultrasonic wire bonded onto a multi-layer printed circuit board (PCB) 50 supported within housing 12.” *Id.* at 4:50–55. Thus, PCB 50 is used to mount and interconnect on its bottom side (shown in Figure 3A) various circuitry, including: interconnecting and mounting support members 54a and 54b for connection with one terminal of a battery B; double-leaf spring member 56 for connection with the other terminal of battery B; a “land” or circuit pad 58



for connecting lower electrode 16 via coil spring 60 to one signal input terminal of ECG amplifier 32 (shown in Mills' Figure 4, reproduced *infra*); circuitry shown schematically in Figure 4, including microcontroller (with integral ROM) chip 42. *Id.* at 4:55–66. Upper electrode 14 is connected to the other signal input terminal of ECG amplifier 32 via a generally trapezoid-shaped, split, and thus slidably yielding, leaf spring 62 connected to a circuit pad formed on the top side of PCB 50. *Id.* at 4:67–5:3.

In operation, ECG monitor 10 is worn on the wrist of the cardiac patient like a conventional wrist watch. *Id.* at 6:57–58. With monitor 10 positioned, e.g., on the left wrist, the palm of the right hand can be placed into contact with upper electrode 14, thus impressing between upper electrode 14 and lower electrode 16 a signal representative of the patient's cardiography (as indicated by a varying electrical potential at the patient's skin surface). *Id.* at 6:63–7:1. When the recording of a cardiac waveform is desired, the patient depresses pushbutton 26, effecting a "demand" recording of what may prove to be an arrhythmic cardiac waveform representing an abnormal cardiac event. *Id.* at 7:1–7:6. Microcontroller 42 monitors pushbuttons 20, 22, 24, and 26 continuously for momentary closure, via pushbuttons logic 68 and power, speed and device access control 72. *Id.* at 7:7–10. Upon the depression of pushbutton 26, microcontroller 42 supplies power to ECG amplifier 32 and to ADC 36, and then provides a delay of a few seconds, which provides time for the user to position the palm on upper electrode 14, and for the ECG signal to stabilize. *Id.* at 7:10–7:15. After the delay, microcontroller 42 stores, or captures, ECG data input via ECG electrodes 14 and 16, ECG amplifier 32, and ADC 36, in SRAM 38 as a

cardiac data record. *Id.* at 7:16–19. Such a stored ECG data record is available for immediate or delayed payout. *Id.* at 7:19–20.

2. *Independent Claim 1.*

Independent Claim 1 requires, in pertinent part, limitations [1][b(i)–(iv)]<sup>5</sup>:

*1[b(i)] a first lead comprising a first pad that is  
1[b(ii)] embedded in a first portion of the enclosure,  
1[b(iii)] wherein an exterior surface of the enclosure  
comprises an exterior surface of the first portion,  
1[b(iv)] wherein the first pad is positioned underneath  
the exterior surface of the first portion*

Ex. 1001, 12:26–31. *See also* Pet. 18–25. We examine these limitations below by presenting each party’s contentions and then our analysis.

Petitioner’s Contentions

*1[b(i)] “a first lead comprising a first pad”*

Petitioner contends that Mills discloses such a first lead because Mills’ electrode 14 “is a pad that forms part of the first lead of Mills.” Pet. 18–19 (citing Ex. 1006, 4:19–24, 4:67–5:3, 7:16–18, Fig. 1). Petitioner relies on Mills’ disclosure explaining that “electrode 14 comprising such plated expanse obviates use of a messy, conductive gel, and even the so-called ‘residue-free’ self-adhesive gelatinous pads that often are used to enhance conductivity between an electrode and a patient’s skin,” and “microcontroller 42 stores, or captures, ECG data input via ECG electrodes 14, 16.” Ex. 1006, 4:19–24, 7:16–18. Based on these disclosures and the specification of the ’257 patent stating that a “lead can include a pad or

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<sup>5</sup> We use the bracketed designations added by Petitioner for Ground 1 (*see* Pet. 18–25).

extended area placed on the outer . . . surface of an electronic device . . . housing” and which can then be “coupled to a wire or other connector for providing cardiac signals to a processor for processing,” Mr. Oslan testifies that “[e]lectrodes 14 and 16 are both on the outer surface of the device housing and therefore are the pads described in the ‘257 patent.” Ex. 1003 ¶ 59.

*1[b(ii)] “[a first pad that is] embedded in a first portion of the enclosure”*

Petitioner contends that Mills discloses a first pad that is embedded in a first portion of the enclosure because “Mills discloses its electrode 14 (first pad) is ‘integrally molded’ (*i.e.*, embedded) into the housing [12].” Pet. 19–20 (citing Ex. 1003 ¶ 59; Ex. 1006, 3:8–11, 4:65–67, Figs 1 and 3A–3B). Petitioner contends that electrode 14 “also has a base material embedded underneath an outer surface coating” and that “the pad (base metal 14a) is positioned underneath the exterior of the first portion (conductive surface coating 14b) and is therefore also embedded under the exterior of the first portion.” Pet. 21–22 (citing Ex. 1003 ¶ 59; Ex. 1006, 3:67–68, 4:2–5, 4:35–39, 4:43–47, Figs 1, 2, and 3A–3B).

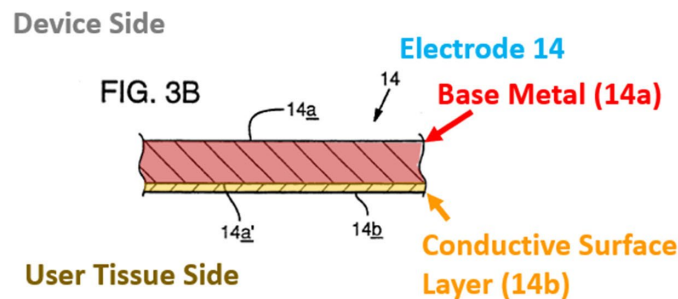
Petitioner additionally argues that “electrode 14 is physically and electrically connected to processing circuitry by a leaf spring 62.” Pet. 22–24 (citing Ex. 1003 ¶ 60; Ex. 1006, 4:1–5, 4:65–5:3, Fig 2). Petitioner notes that “[t]he top of the trapezoid-shaped leaf spring 62 is a pad,” and because “[t]he pad is pressed against the inner wall of electrode 14 in Mills and surrounded by the housing 12 of Mills,” it must therefore be “embedded in the device of Mills.” *Id.* at 23.

*1[b(iii)] “wherein an exterior surface of the enclosure comprises an exterior surface of the first portion”*

Petitioner contends that Mills discloses this limitation because “Fig. 1 of Mills . . . discloses a housing 12 with electrode[] 14 which is a first portion forming part of the exterior surface of Mills” and “electrode 14 (first portion) has an exterior surface 14b shown in Fig. 3B.” Pet. 24 (citing Ex. 1003 ¶ 60; Ex. 1006, 2:16–20, Figs. 1 and 3B).

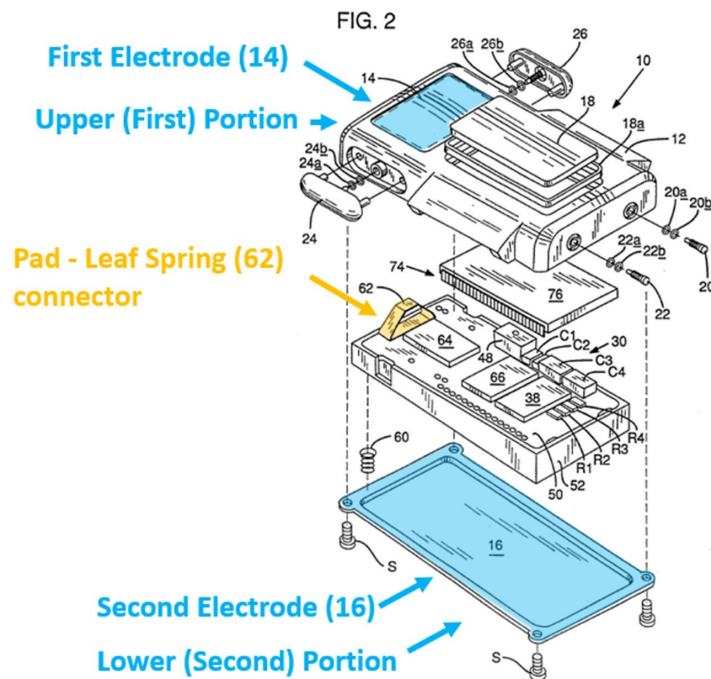
*1[b(iv)] “wherein the first pad is positioned underneath the exterior surface of the first portion”*

Petitioner contends that Mills discloses this limitation because “embedded lead 14a is underneath or covered by the exterior surface 14b” as depicted below in Petitioner’s annotated Figure 3B. Pet. 24–25 (citing Ex. 1003 ¶ 60; Ex. 1006, 4:43–47, Fig. 3B).



Petitioner’s annotated Figure 3B is an enlarged, fragmentary cross-sectional view of the lower electrode shown in Figure 3A with: “Electrode 14,” “Base Metal (14a),” and “Conductive Surface Layer (14b).”

Petitioner contends that “[a]lternatively, the pad of leaf spring 62 is positioned underneath the electrodes/first portion 410b [sic, 14] which forms an exterior surface of Markel [sic, Mills],” as depicted below in Petitioner’s annotated Figure 2. Pet. 25 (citing Ex. 1003 ¶ 60; Ex. 1006, Fig. 2).



Petitioner's annotated Figure 2 of Mills depicts First Electrode (14) and Upper (First) Portion and Second Electrode (16) and Lower (Second) portion all shaded in light blue and Pad – Leaf Spring (62) connector shaded in orange. Pet. 25.

### Patent Owner's Response

Patent Owner contends that Petitioner's contentions are inconsistent and contradictory because they rely on different theories in an anticipation ground. PO Resp. 13, 15–16 (citing Ex. 2003 ¶¶ 61–70). More particularly, “the Petition presents numerous contradictory and inconsistent mappings of Mills’ upper electrode 14, mapping the electrode 14 to various, distinct structures recited by the claims while jumping between these different mappings throughout its analysis of the claims.” *Id.* at 13. Patent Owner contends that Mills discloses that “[e]lectrode 14 is ‘formed of a base metal such as stainless steel’ 14a with a thin outer ‘metal-plating’ 14b that is ‘approximately 3-microns’ thick applied as a coating on the base metal 14a

‘by known chemical or physical vapor deposition techniques.’” *Id.* at 14–15 (quoting Ex. 1006, 3:67–4:10, 4:32–37).

Patent Owner contends that Petitioner presents at least three mappings of the electrode 14 of Mills to claim 1’s features: (1) the electrode 14 of Mills is the claimed “first pad,” (2) the base metal expanse 14a of Mills is the claimed “first pad” and the exterior surface plating 14b of Mills is the claimed “first portion of the enclosure,” and (3) the leaf spring 62 of Mills is the claimed “first pad.” *Id.* at 16–22 (citing Pet. 16–26, 29, 31, 37; Ex. 2003 ¶¶ 71–84). Patent Owner argues Petitioner improperly “jump[s] between these various mappings without specifying which mapping is being addressed at any given time while also failing to demonstrate how any one mapping actually provides all elements of claim 1.” *Id.* at 15; *see also* PO Resp. 23–27 (citing Ex. 2003 ¶¶ 91–92, 127) (Patent Owner contending that none of Petitioner’s mappings discloses every element of claim 1).

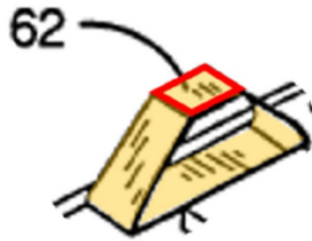
In regard to Petitioner’s first mapping, Patent Owner contends that “electrode 14 is not both ‘embedded in a first portion of the enclosure’ and ‘positioned underneath the exterior surface of the first portion’ as required by claim 1.” *Id.* at 27–30 (citing Ex. 2003 ¶¶ 93–98). Relying on Petitioner’s annotated Figure 1, Patent Owner contends that electrode 14 is exposed to the outside of the device and therefore not “positioned underneath” the housing 12. *Id.* at 28.

In regard to Petitioner’s second mapping, Patent Owner contends that “the main electrode expanse 14a of electrode 14 is not ‘embedded in’ the outer plating 14b” and that “the outer plating 14b of electrode 14 is not a part of the housing/enclosure.” PO Resp. 30–39 (citing Ex. 2003 ¶¶ 99–116). Relying on the testimony of Dr. Kenny, Patent Owner argues “the

outer plating 14b of electrode 14 is not a part of the housing/enclosure of Mills' device but rather, an imperceptibly thin coating deposited/plated on the main electrode expanse 14a." PO Resp. 30 (citing Ex. 2003 ¶¶ 101–107). Next, Patent Owner contends that "the main electrode expanse 14a of electrode 14 is not 'embedded in' the outer plating 14b but is merely positioned adjacent to the outer plating 14b." *Id.* at 30–31 (citing Ex. 2003 ¶¶ 108–112).

In regard to Petitioner's third mapping, Patent Owner contends that the electrode 14 is not part of the housing 12 and that "the top portion of the leaf spring 62 is not 'embedded in' the electrode 14." PO Resp. 39–46 (citing Ex. 2003 ¶¶ 118–132). Patent Owner first alleges that "housing 12 and electrode 14 are separate components," and further notes that the Petition identifies only housing 12 of Mills as providing the claimed enclosure. *Id.* at 40–41. Patent Owner contends that "Masimo does not identify what disclosures of Mills support its assertion that the electrode 14 reads on the claimed 'first portion of the enclosure' nor does Masimo ever expressly allege that the first electrode is actually part of the enclosure/housing." *Id.* at 41.

Patent Owner next alleges that "even if the electrode 14 is considered part of the housing of Mills' device, the top portion of the leaf spring 62 is not "embedded in" the electrode 14 but rather positioned behind and parallel/adjacent to the electrode 14 so as to contact the electrode 14." *Id.* at 42.



A portion of Mills Figure 2 with the top portion of leaf spring 62 annotated with a red square. PO Resp. 39 (citing Pet. 23).

Patent Owner argues that Petitioner’s position requiring that the pad (leaf spring 62 above) be pressed against the inner wall of electrode 14 in Mills does not disclose the required “embedded in” limitation. According to Patent Owner, “it is not sufficient for the first pad to be simply ‘pressed against’ and parallel to the first portion of the enclosure, the claims require that the first pad be ‘embedded in’ the first portion of the enclosure.” PO Resp. 42.

### Petitioner’s Reply

In reply to Patent Owner’s arguments about inconsistent mappings, Petitioner contends that the Petitioner presented two theories. Petitioner contends that in a first theory based on electrode 14, Petitioner identifies “Mills’s base metal 14a (‘pad 14a’) as the claimed ‘first pad’” that is embedded in “an upper portion of Mills’s housing 12 and conductive surface coating 14b (‘plating 14b’) as the claimed ‘first portion.’” Pet. Reply 3–4. Petitioner contends that the “electrode 14 has *two separate parts* corresponding to different limitations: (1) base metal 14a is the ‘first pad’ and (2) plating 14b is part of the ‘first portion,’” so “when [Petitioner] refers to electrode 14 as a pad, it refers to pad 14a and when it refers to electrode 14 as part of the enclosure, it refers to plating 14b.” Pet. Reply 5.



Petitioner contends that in a second theory based on leaf spring 62, Petitioner identifies “(1) the top of Mills’s leaf spring 62 (‘leaf-spring pad’) as the claimed ‘first pad’ and (2) an upper part of housing 12 and electrode 14 as the claimed ‘first portion.’” *Id.* at 5–6. Petitioner contends that the leaf spring 62 is embedded in the first portion because “the leaf-spring pad is ‘pressed against the inner wall of electrode 14’ and ‘surrounded by the housing 12 of Mills.’” Pet. Reply 6.

Petitioner contends that Mills anticipates claim 1 under either Petitioner’s construction of “embedded” or Patent Owner’s construction of “embedded in.” Pet. Reply 7–8. Petitioner contends that because Mills discloses that pad 14a is surrounded by the housing 12, Mills discloses the claimed first pad embedded in the enclosure. Pet. Reply 8–9 (citing Ex. 1065 ¶¶ 227–228). Petitioner suggests that because the leaf spring 62 is floating within the enclosure, it would be “embedded in” the enclosure. Pet. Reply 9–10 (citing Ex. 1065 ¶¶ 229–230).

Petitioner contends that because Mills discloses that pad 14a is underneath plating 14b, Mills shows the claimed first pad is positioned underneath the exterior surface of the first portion. Pet. Reply 14 (citing Ex. 1065 ¶¶ 241–247). Petitioner contends that because Mills discloses that leaf spring 62 is underneath electrode 14, Mills discloses the claimed first pad is positioned underneath the exterior surface of the first portion. Pet. Reply 14–15 (citing Ex. 1065 ¶¶ 248–252).

Petitioner maps “pad 14a as the ‘first pad’ and plating 14b and part of housing 12 as the ‘first portion’” to contend that Mills discloses that “[p]ad 14a is both embedded in and underneath the first portion.” Pet. Reply 15–16 (citing Ex. 1065 ¶ 253). Petitioner contends that because “the claims do not

require the enclosure to be a unitary piece,” plating 14b and housing 12 can both be the enclosure. Pet. Reply 16–17 (citing Ex. 1065 ¶¶ 254–258). Petitioner contends that because (i) the first portion includes part of the housing 12 and (ii) pad 14a is separate from plating 14b, and pad 14a is embedded in the first portion. Pet. Reply 17–18 (citing Ex. 1065 ¶¶ 259–260).

Petitioner contends that because its alternative theory maps an upper part of housing 12 and the electrode 14 to the claimed first portion, “the leaf spring 62 is pressed against the electrode *and* surrounded by the housing makes it embedded in the first portion.” Pet. Reply 18 (citing Ex. 1065 ¶ 261). Petitioner contends that an ordinary artisan would have understood that the leaf spring 62 would be embedded because it is compressed between the electrode 14 and PCB 50. Pet. Reply 18–19 (citing Ex. 1065 ¶¶ 262–264).

#### Patent Owner’s Sur-reply

Patent Owner contends that Petitioner raised new theories in its Reply not set forth in the Petition. Sur-reply 4–5. Patent Owner contends that the Petition identified the entire electrode 14 as the claimed “first pad” but then the Reply identified only pad 14a as the claimed “first pad.” *Id.* at 5–6. Patent Owner contends that the Petition identified the plating 14b or electrode 14 as the claimed “first portion” but then the Reply identified the housing 12 and the plating 14b or electrode 14 as the claimed “first portion.” *Id.* at 6–11.

Patent Owner rebuts the “new theory” by arguing that the housing 12 cannot be part of the claimed “first portion of the enclosure.” *Id.* at 11. Patent Owner contends that because the housing 12 is formed from non-

conductive plastic, it cannot satisfy the claimed requirement “to detect a first electrical signal of the user's cardiac signal via the user's skin's contact with the exterior surface of the first portion of the enclosure.” *Id.* at 12–15 (citing Ex. 1001, 2:44–50, 2:64–3:13, 6:33–39; 9:45–48; Ex. 2003 ¶ 98; Ex. 2008, 65:8–67:7; Ex. 2011, 35:6–22).

Patent Owner contends that if Petitioner's theory is that the electrode 14 is the claimed first pad, then the theory fails because the electrode 14 is not positioned underneath the claimed first portion of the enclosure. Sur-reply 17. Patent Owner contends that if Petitioner's theory is that plating 14b is the claimed first portion and base metal expanse 14a is the claimed first pad, then the theory fails because the base metal expanse 14a is not embedded in nor separate from the plating 14b. *Id.* Patent Owner contends that if Petitioner's theory is that electrode 14 is the claimed first portion and leaf spring 62 is the claimed first pad, then the theory fails because leaf spring 62 is not embedded in the electrode 14. *Id.* at 17–18. Patent Owner contends that Petitioner's arguments about the leaf spring including a top and bridging portion are new theories in the Reply that should be disregarded. *Id.*

### Analysis

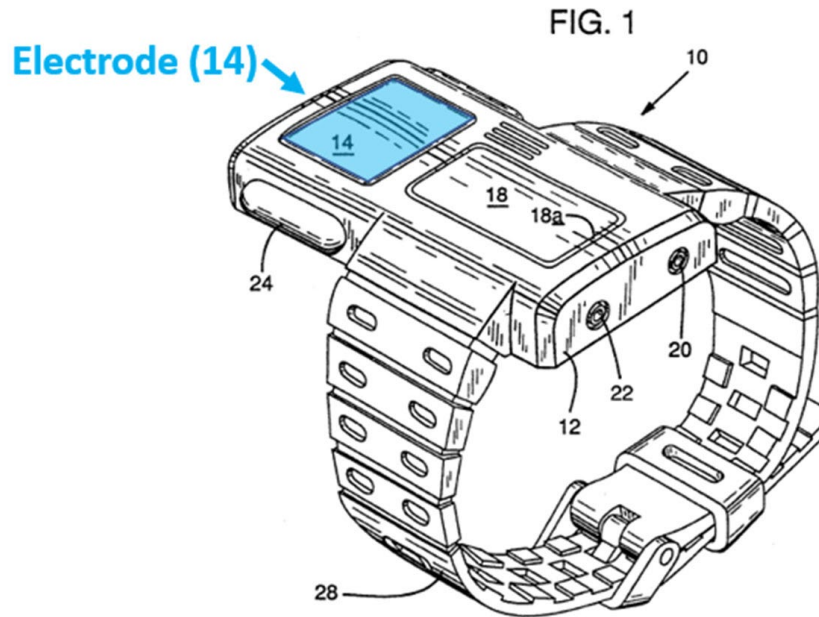
Based on the final record before us, we conclude that Petitioner has not persuasively shown that Mills discloses all of the disputed limitations of claim 1.

Petitioner seemingly advances three theories in its Petition for anticipation: (1) electrode 14 is embedded in housing 12 (*see* Pet. 18–20); (2) “the pad (base metal 14a) is positioned underneath the exterior of the first portion (conductive surface coating 14b) and is therefore also embedded

under the exterior of the first portion” (*see* Pet. 21–22, 24–25; Pet. Reply 4); and (3) leaf spring 62 is embedded in housing 12 and electrode 14 (*see* Pet. 22–24). None of Petitioner’s mappings disclose every element of claim 1 and Petitioner improperly jumps between these various mappings without fully examining a single mapping for each and every limitation of claim 1. *See* Pet. 18–25. In essence, Petitioner invites the Board to piece together a single theory that meets all claim elements from these disparate theories that each require distinct structure within Mills. *See Amazon.com, Inc., et al. v. Avago Technologies General IP (Singapore) PTE. LTD.*, IPR2017-01112, Paper 11, at 13 (PTAB Aug. 23, 2017) (“Petitioner is inviting us to assume the role of archeologist of the record, which invitation we decline.”).

In Reply, in relation to its second mapping, Petitioner adds two new theories contending that the Petition mapped the claimed portion of the enclosure to (1) an upper portion of the housing 12 and the plating 14b (*see* Pet. Reply 3, 8, 15, 17); and (2) an upper part of the housing 12 and the electrode 14 (*see* Pet. Reply 5, 6, 18). In other words, the Reply maps to the recited “portion of the enclosure” a combination of both the housing and the electrode or component thereof. In regard to claim limitations 1(b)(iii)–(iv), Petitioner maps exterior surface 14b to the claimed exterior surface of the portion of the enclosure. *See* Pet. 24–25; Pet. Reply 5. Although we determine these new theories are waived, even if we consider them, they are also deficient for the reasons set forth below.

In support of Petitioner’s first theory that electrode 14 is embedded in housing 12, Petitioner presents an annotated version of Mills’ Figure 1, which is reproduced below:



Petitioner's annotation of Mills' Figure 1 illustrates the heart sensor and electrode 14 (shaded in light blue). Pet. 19–20.

Mills' Figure 1 illustrates “a housing 12 including first and second dry skin electrodes 14, 16 unitarily connected therewith and forming an integral part thereof for making conductive contact with a cardiac patient's skin surface.” Ex. 1006, 3:8–12, Fig. 1. Petitioner contends that Mills discloses that base metal expanse 14a is underneath plating 14b and housing 12 (*see* Pet. 24–25; Pet. Reply 15), but Mills discloses that base metal 14a and its plating 14b are part of electrode 14 rather than housing 12. *See* Ex. 1006, 3:67–4:10. As Dr. Kenny persuasively testifies,

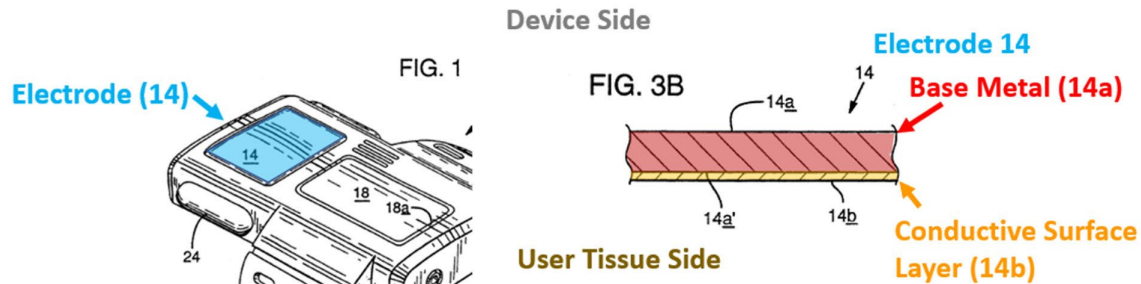
a POSITA would recognize the straight forward fact that a component cannot be positioned underneath itself. Logic also indicates that the electrode 14 cannot read on both the claimed first pad and the first portion of the enclosure because it is physically impossible for the electrode 14 to be embedded in and positioned underneath itself.

Ex. 2003 ¶ 96.

Because Mills discloses that electrode 14 is exposed “for making conductive contact with a cardiac patient’s skin surface” (*id.*), Mills does not disclose that the electrode is both embedded in and underneath the housing 12 as required by limitations 1(b)(ii) and 1(b)(iv). *See also* PO Resp. 27–30. As depicted in Mills annotated Figure 1 above, and as explained by Dr. Kenny, electrode 14 (in blue above) does not meet all the limitations for the “first pad” limitation “because the electrode 14 is not both ‘embedded in a first portion of the enclosure’ and ‘positioned underneath the exterior surface of the first portion,’” this is so, “because the upper surface of the electrode 14 is exposed to the outside of the device and is therefore not ‘positioned underneath the exterior surface of the first portion’ as required by claim 1.” Ex. 2003 ¶ 93.

Moreover, Petitioner appears to abandon this first theory in favor of its second theory by clarifying that “when [Petitioner] refers to electrode 14 as a pad, it refers to pad 14a and when it refers to electrode 14 as part of the enclosure, it refers to plating 14b.” *See* Pet. Reply 5. We determine that Petitioner’s first theory fails to establish that Mills discloses claim limitations 1(b)(i)–(ii).

In support of Petitioner’s second theory that base metal expanse 14a is embedded in plating 14b, Petitioner presents an annotated version of Mills’ Figure 1 alongside Figure 3B, which are reproduced below:



Petitioner’s annotation of Mills’ Figures 1 and 3B illustrates the base metal 14a and the plating layer 14b of the electrode 14. Pet. 21–22.

Mills’ Figure 3B illustrates base metal expanse 14a that is “electrically connectable with such monitoring equipment” as shown in Figure 1 and plating layer 14b that can “provide high conductivity and thus to produce a high quality electrical interface between an electrode such as electrode 14 and the patient's skin surface.” Ex. 1006, 4:2–3, 43–47. Mills discloses that the plating layer 14b is disposed over metal 14a:

Plating an outer, skin-contactable region or surface 14a’ of expanse 14a is a composition 14b (**shown in greatly enlarged thickness in FIG. 3B relative to that of expanse 14a**) . . . Preferably base metal-plating composition 14b is in order of preference a titanium nitride (TiN), titanium carbide (TiC) or titanium carbo-nitride (TiCN) layer **approximately 3-microns (0.003-inch) thick**. Such composition can be plated by known chemical or physical vapor deposition techniques, and preferably the plating composition is polished to a smooth finish primarily for aesthetic reasons.

Ex. 1006, 4:4–7, 4:32–39 (emphases added). As Dr. Kenny persuasively testifies, “the base metal layer 14a is coated with a parallel layer 14b and not embedded in the layer 14b.” Ex. 2003 ¶ 111. Petitioner contends that “[p]ad 14a is integrally formed in housing 12 under plating 14b, making it embedded” (*see* Pet. Reply 17–18), but this statement is unavailing and

Mr. Oslan’s testimony is a similarly conclusory statement (*see* Ex. 1065 ¶ 260). Because plating layer 14b is a thin plating that is disposed on metal 14a, Mills does not disclose that metal 14a is embedded in plating layer 14b as required by limitation 1(b)(ii). *See also* PO Resp. 36–38. Accordingly, Petitioner’s second theory fails to establish that Mills discloses claim limitations 1(b)(i)–(ii).

As noted above, Petitioner asserts for the first time in its Reply that the claimed “first portion” is a combination of an unspecified “upper portion of housing 12 and plating 14b” and the second portion is a combination of an unspecified “lower portion of Mills’s housing 12 and electrode 16’s plating.” *See* Pet. Reply 8, 4. At the outset, we determine this argument was waived because it presents an entirely new theory that does not clarify an earlier position, is not responsive to arguments presented in the Patent Owner’s Response, and it raises entirely new issues and evidence, such as those addressed below. Petitioner can respond to Patent Owner’s arguments, but it “may not submit new evidence or argument in reply that it could have presented earlier [in the petition], e.g., to make out a prima facie case of unpatentability.” US Patent Trial and Appeal Board, Consolidated Trial Practice Guide 73 (Nov. 2019); *see also Rembrandt Diagnostics, LP v. Alere, Inc.*, 76 F.4th 1376, 1384 (Fed. Cir. 2023) (“[T]he very nature of the reply and sur-reply briefs are to respond (whether to refute, rebut, explain, discredit, and so on) . . . within the confines of 37 C.F.R. § 42.23(b).”).

Even considering the merits of these new arguments, we agree with Patent Owner that this mapping fails to provide all elements of claim 1 because housing 12 cannot be part of the “first portion of the enclosure” as that element is recited in claim 1. *See* Sur-reply 11–14. Specifically, claim



1 requires several additional elements for the “first portion of the enclosure,” including:

- a first lead comprising a first pad that is embedded in a first portion of the enclosure
- wherein the first pad is positioned underneath the exterior surface of the first portion
- wherein the first pad is configured to detect a first electrical signal of the user’s cardiac signal via the user’s skin’s contact with the exterior surface of the first portion of the enclosure

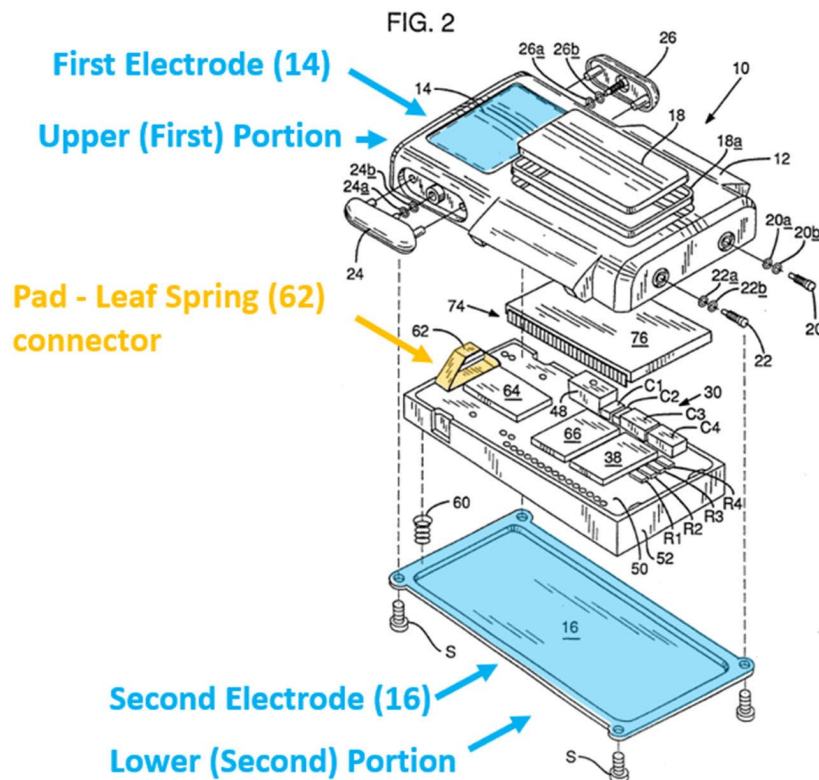
Ex. 1001, 12:21–49. We agree with Patent Owner, and Dr. Kenny, that housing 12 of Mills device cannot properly serve as a part of the first portion of the enclosure at least because it fails to provide the ability “to detect a first electrical signal of the user’s cardiac signal via the user’s skin’s contact.” PO Sur-reply 12 (citing Ex. 2003 ¶ 98); *see* Ex. 1001, 12:31–34 (claim 1: “the first pad is configured to detect a first electrical signal of the user’s cardiac signal via the user’s skin’s contact with the exterior surface of the first portion of the enclosure”).

As Dr. Kenny testified “the housing 12 in Mills is formed from a non-conductive plastic” and “[t]herefore, it is impossible for the user’s cardiac signal to be detected ‘via the user’s skin’s contact with the exterior surface *of the first portion of the enclosure*’ . . . because the housing 12 is non-conductive.” Ex. 2003 ¶ 98 (citing Ex. 1006, 6:40–45; Ex. 2008, 65:8–67:7). Mr. Oslan, Petitioner’s expert, has also confirmed that housing 12 of Mills’ device is an insulator insufficient to convey “a first electrical signal of the user’s cardiac signal via the user’s skin’s contact” with the housing 12. *See, e.g.*, Ex. 1003 ¶ 68 (“Mills discloses its housing 12 may be molded plastic, such as acrylonitrilebutadiene-styrene (ABS) (citing Ex. 1006, 6:40–43)); Ex. 2008, 66:3–5 (“in Mills the user 4 would have to contact electrode

14 at least to get an ECG signal”), 66:21–7 (confirming that “contact with both the electrode 14 and the electrode 16 is required to detect the ECG signal”).

Accordingly, we agree with Patent Owner that “[t]he housing 12 of Mills’ device therefore cannot be a part of the claimed ‘first portion of the enclosure’ because Mills’ device is an insulating plastic and therefore cannot convey ‘a first electrical signal of the user’s cardiac signal via the user’s skin’s contact’ with the housing 12.” Sur-reply 13 (citing Ex. 2003 ¶ 98). Claim 1 requires more than the first pad to be merely embedded in the enclosure or device but rather requires that the first pad be embedded in a first portion of the enclosure that is sufficiently conductive to convey a first electrical signal of the user’s cardiac signal via the user’s skin’s contact with the first portion of the enclosure. *Id.* We agree with Patent Owner that “Masimo’s new theory fails because Mills’ housing 12, which is made of insulating, non-conductive plastic, cannot convey the user’s cardiac signal and therefore does not satisfy the claimed requirements for the ‘first portion of the enclosure.’” *Id.* at 14. Petitioner’s modified mapping of Mills fails to persuasively account for these additional requirements.

In support of Petitioner’s third theory that leaf spring 62 is embedded in housing 12 and electrode 14, Petitioner presents an annotated version of Mills’ Figure 2, which is reproduced below:



Petitioner’s annotation of Mills’ Figure 2 illustrates leaf spring 62 under electrode 14. Pet. 22–23.

Mills’ Figure 2 illustrates that “electrode 14 is connected to the other signal input terminal of ECG amplifier 32 via a generally trapezoid-shaped, split and thus **slidably yielding**, leaf spring 62 connected to a circuit pad formed on the top side of PCB 50.” Ex. 1006, 4:67–5:3 (emphasis added). As Dr. Kenny persuasively testifies, “when in contact with the electrode 14, the top surface of the leaf spring 62 is merely a flat surface positioned behind and parallel/adjacent to the flat bottom surface of the electrode 14 so as to contact the electrode 14 . . . the top of the leaf spring would not have been ‘embedded in’ the electrode 14 to allow for relative, sliding motion between the two components.” Ex. 2003 ¶¶ 122, 124.

Petitioner contends that “in a fully assembled device, the leaf spring would be compressed tightly between electrode 14 and PCB 50, and, thus, the pad would remain fixed within a small tolerance” (*see* Pet. Reply 18–19; Ex. 1065 ¶ 262), but mere compression between leaf spring 62 and electrode 14 does not establish that leaf spring 62 would be “at least partially set in or partially surrounded by” electrode 14 or housing 12 as required by the interpretation of “embedded in.” Because leaf spring 62 is a trapezoid-shaped and slidably yielding structure that is connected by contacting electrode 14, Mills does not disclose that leaf spring 62 (mapped to the first pad) is embedded in electrode 14 (mapped to the first portion of the enclosure) as required by limitation 1(b)(ii). *See also* PO Resp. 42–44. Accordingly, and for these reasons, Petitioner’s third theory fails to establish that Mills discloses claim limitations 1(b)(i)–(ii).

### Summary

For the reasons explained above, Petitioner does not demonstrate by a preponderance of the evidence that the subject matter of claim 1 is anticipated by Mills.

#### *3. Dependent Claims 2–4, 8, 10, 11, and 14.*

Petitioner asserts that claims 2–4, 8, 10, 11, and 14 (which depend from claim 1) are anticipated by Mills. Pet. 12, 33–40.

For the reasons explained above in connection with independent claim 1, Petitioner does not persuasively show that the subject matter of claims 2–4, 8, 10, 11, and 14 is anticipated by Mills.

#### *E. Obviousness of Claims 1–4 and 8–22 Over Markel and Mills*

Petitioner alleges that claims 1–4 and 8–22 would have been obvious over Markel and Mills. Pet. 13, 40–84; *see generally* Pet. Reply. Patent

Owner contends that Petitioner has failed to demonstrate how the combination of references teach certain claim limitations. *See generally* PO Resp; Sur-reply.

For the reasons set forth below and above, Petitioner has not established by a preponderance of the evidence that any of these claims of the '257 patent would have been obvious based on this ground. Below, after examining Markel, we focus our analysis on certain limitations that we likewise determine are dispositive for this ground. We provide Petitioner's contentions and Patent Owner's response regarding those limitations. Finally, we provide our analysis and explanation as to why we determine that Petitioner has failed to demonstrate that the combination of prior art references discloses those limitations required by each independent claim. For purposes of our analysis, we presume Petitioner has provided a persuasive rationale for combining Markel and Mills in the manner alleged.

*1. Markel (Ex. 1005)*

Markel is titled "Mobile Communication Device and Other Devices with Cardiovascular Monitoring Capability" and it relates to "a general-purpose mobile communication device (e.g., a cellular telephone, portable email device, personal digital assistant, etc.) comprising a communication interface module adapted to communicate with a general-purpose communication network, and at least one module operational to acquire cardiac information from a user of the general-purpose mobile communication device." Ex. 1005, codes (54), (57). Figure 1 of Markel, reproduced below, illustrates such a mobile communication device. *Id.* ¶ 6.

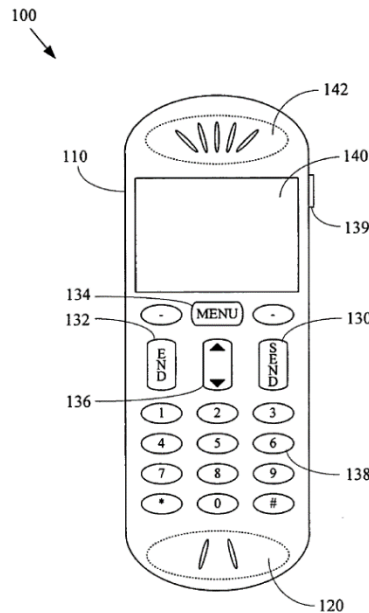


Figure 1

Figure 1 illustrates a mobile communication device 100 including a cardiac sensor. *Id.* ¶¶ 33, 35.

Mobile communication device (“MCD”) 100 illustrated in Figure 1 may comprise characteristics of a cellular or portable telephone, of a personal digital assistant with mobile communication capability, portable email device, or pager. *Id.* ¶ 33. MCD 100 includes main body portion 110, user input features (including microphone 120), user output features (including display 140 that may also function as a touch screen input feature, and speaker 142), and pushbuttons (such as send button 130, end button 132, menu button 134, scroll button 136, numeric button 138 and volume control button 139). *Id.* ¶ 34. MCD 100 also includes “at least one cardiac sensor (e.g., one or more electrodes, an audio monitoring or acoustical detection device, etc.) that is adapted to detect cardiac activity of a user of the MCD 100.” *Id.* ¶ 35. The electrodes may be adapted to detect cardiac activity of a user that is conductively coupled to the electrodes (e.g., by touching the electrodes). *Id.* Such electrodes may be incorporated into MCD 100. *Id.*

The electrodes include a conductive material. *Id.* ¶ 37. For example, an electrode may comprise a metallic surface exposed for user contact. *Id.* The electrode may also be formed from conductive plastic (or another material) that may be integrated into various molded components of the mobile communication device. *Id.* Electrodes may also be identified for the user in any of a variety of manners, or may be concealed (or hidden) from the user. *Id.* ¶¶ 39–40.

The electrodes may be positioned such that the one or more electrodes contact a user during normal (or typical) use of MCD 100. *Id.* ¶ 41. Such normal use may include talking on a telephone, reading messages, perusing a phone book, typing a message, initiating a phone call, sending an email message, or entering information in a notepad. *Id.* For example, an electrode may be disposed on a pushbutton of MCD 100. *Id.* ¶ 42. As illustrated in Figure 1, an electrode may be disposed on alphanumeric pushbuttons (e.g., pushbutton 138), or on send button 130, end button 132, menu button 134, scroll button 136, or volume control button 139. *Id.* An electrode may also be placed on main body portion 110 of MCD 100. *Id.* ¶ 43. For example, main body portion 110 may include the portion of MCD 100 that is generally held in the hand during normal use of MCD 100. *Id.* One or more electrodes may also be placed on side or rear portions of main body portion 100. *Id.* An electrode may also be placed on (or proximate to) an audio output portion 142 (e.g., a speaker) of MCD 100, or on video display device 140. *Id.* ¶ 44.

Figure 4 of Markel is a diagram illustrating an MCD having electrodes disposed on a main body portion. *Id.* ¶¶ 9, 45.

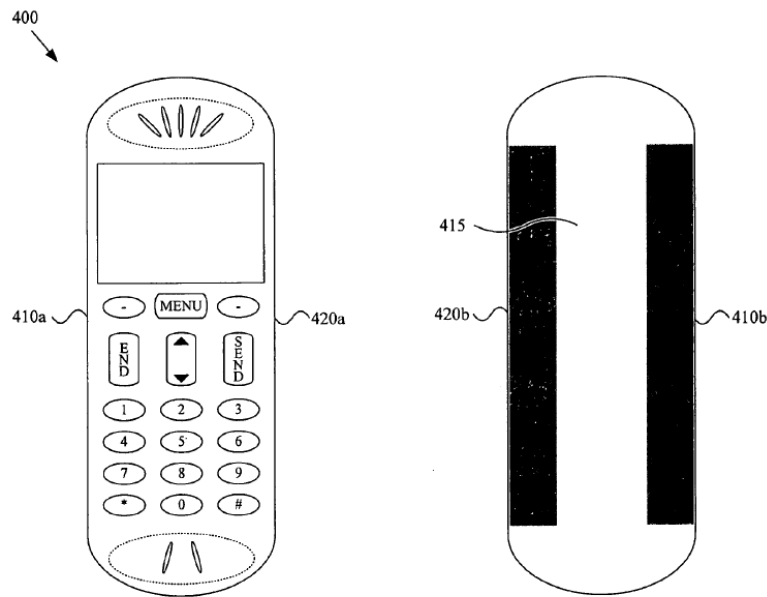


Figure 4

Figure 4 of Markel is a diagram illustrating a mobile communication device having electrodes disposed on a main body portion thereof. *Id.* ¶¶ 9, 45.

As shown in Figure 4, first and second electrodes may be disposed on main body portion 110 of MCD 400. *Id.* ¶ 45. MCD 400 includes a left side portion 410 and a right side portion 420, with a first electrode placed on left side portion 410 (e.g., placed on or molded into region 410b), and a second electrode placed on right side portion 420 (e.g., placed on or molded into region 420b). *Id.* In a case where regions 410b and 420b include conductive plastic, an insulating region 415 may separate regions 410b and 420b. *Id.*

Figure 10 of Markel illustrates portions of an MCD 1000 including two or more electrodes. *Id.* ¶¶ 15, 58.



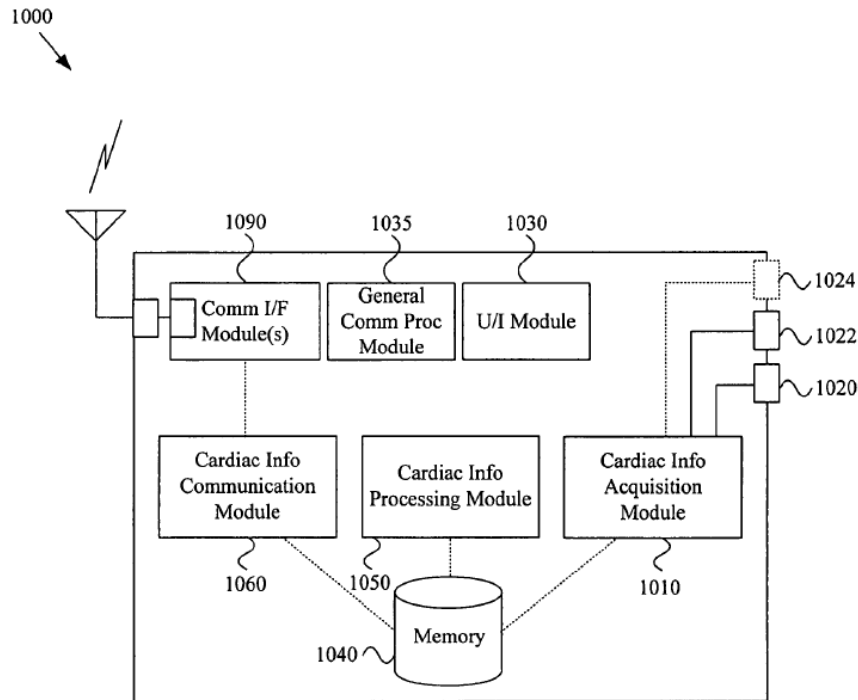


Figure 10

Figure 10 of Markel illustrates portions of an MCD 1000 including electrodes. *Id.* ¶¶ 15, 58.

MCD 1000 illustrated in Figure 10 includes a first electrode 1020 and a second electrode 1022 (and, for example, a third or Nth electrode 1024). *Id.* ¶ 58. MCD 1000 may also include a cardiac information acquisition module 1010 coupled to first and second electrodes 1020 and 1022, the module utilizing first and second electrodes 1020, 1022 to detect and acquire various cardiac signals from a user. *Id.* Cardiac information acquisition module 1010 stores the acquired cardiac information in memory 1040. *Id.* ¶ 59. MCD 1000 may further include: a cardiac information processing module 1050 that processes acquired cardiac information; a cardiac information communication module 1060 that communicates acquired cardiac information or analysis results to another system; a U/I module

1030; a general communication processing module 135; and communication interface module(s) 1090. *Id.*

2. *Independent Claim 1.*

Independent Claim 1 requires, in pertinent part:<sup>6</sup>

- a. *1[b(i)] a first lead comprising a first pad that is embedded in a first portion of the enclosure*  
*1[b(iii)] the first pad is positioned underneath the exterior surface of the first portion*

Ex. 1001, 12:26–27, 29–31. *See also* Pet. 42. We examine these limitations below by presenting each party’s contentions and then our analysis.

Petitioner’s Contentions

Petitioner contends the combination of Markel and Mills discloses these limitations. Pet. 42–50. Petitioner contends that Markel discloses electrodes for detecting the cardiac signals disposed in various locations, including concealed. Pet. 42 (citing Ex. 1005 ¶¶ 39, 40, 45). These “electrodes may be ‘exposed for user contact’ or ‘may be integrated into various molded components.’” *Id.* (citing Ex. 1005 ¶ 37; Ex. 1003 ¶ 81). Petitioner relies on Markel’s disclosure “of MCD (device) 400” and “a first electrode ‘placed on or molded into region 410b.’” *Id.* (citing Ex. 1005, Fig. 4) (quoting *id.* ¶ 45). Petitioner contends that a “POSITA [person of ordinary skill in the art] would understand that Markel describes a first pad formed of conductive plastic embedded in a first portion of the enclosure.” *Id.* (citing Ex. 1003 ¶ 82). Petitioner argues that Markel also discloses a

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<sup>6</sup> We use the bracketed designation added by Petitioner for Ground 2 (*see* Pet. 42).

cardiac information acquisition module with electrodes 1020 and 1022 that correspond to electrodes 410b and 420b. Pet. 43 (citing Ex. 1003 ¶ 83).

For this limitation, Petitioner states that “Markel does not provide details of the internal components of its device,” and Petitioner argues that a person of ordinary skill in the art “would have looked to other references in the same field of disclosure for information on internal components and structures to make the device of Markel.” Pet. 44. Petitioner relies on Mills as providing these necessary additional details and for information on internal components to teach the claimed “first lead comprising a first pad that is embedded in a first portion of the enclosure.” *Id.* According to Petitioner, Mills’ electrode 14 (discussed above) is similar to Markel’s electrodes 410b and 420b. *Id.* (citing Ex. 1003 ¶ 84). Petitioner contends that “[i]t would have been obvious to incorporate the pad (leaf spring 62) teachings of Mills into the device of Markel because Mills provides details of internal physical connections on which Markel is silent.” Pet. 47.

According to Petitioner, “[a] POSITA seeking to implement Markel’s device would look to Mill’s disclosure for ways to internally connect the electrodes of Markel to internal electronic components using pads,” and as such, “a POSITA would utilize the leaf spring 62 taught by Mills to connect the electrodes 410b, 420b of Markel to internal processing components taught by Markel.” Pet. 47–48 (citing Ex. 1003 ¶ 86). Petitioner contends that “[a] POSITA would have an expectation of success in the combination as it is a mere rearrangement of known mechanical components in known ways in a complementary device.” Pet. 48 (citing Ex. 1003 ¶ 87).

### Patent Owner's Contentions

Patent Owner contends that Petitioner presented multiple inconsistent mappings that each fail to establish obviousness of claim 1. PO Resp. 50.

Patent Owner contends that Petitioner's first theory is that the claimed enclosure and first pad respectively map to Markel's main body portion 110 and electrode 410b. *Id.* at 50–53 (citing Ex. 2003 ¶¶ 144–147, 152). Patent Owner contends that because electrode 410b is disposed on main body portion 110, Petitioner's mapping fails to satisfy the claimed requirement that “the first pad is positioned underneath the exterior surface of the first portion.” *Id.* at 53–55 (citing Ex. 1005 ¶¶ 43, 45, Fig. 4; Ex. 2003 ¶¶ 152–154).

Patent Owner contends that Petitioner's second theory is that the claimed enclosure and first pad respectively map to Markel's electrode 410b and Mills' leaf spring 62 so that the Mills-Markel combination results in the leaf spring 62 placed against the electrode 410b. PO Resp. 52–53, 55–56 (citing Ex. 2003 ¶¶ 148–151, 156). Patent Owner contends that because leaf spring 62 would be placed against electrode 410b, Petitioner's mapping fails to satisfy the claimed requirement of “a first pad that is embedded in a first portion of the enclosure.” *Id.* at 56–57 (citing Ex. 1006, 4:67–5:3; Ex. 2003 ¶¶ 157–164).

### Petitioner's Reply

Petitioner contends that the Petition put forth an obviousness combination “including coupling Markel's electrode 410b and internal components with Mills's leaf spring 62.” Pet. Reply 21. Petitioner contends that the combination proposes embedding Mills's leaf spring 62 into the Markel's main body portion 110 to render obvious the claimed pad

embedded into and underneath the first portion. *Id.* at 22 (citing Ex. 1065 ¶¶ 273–276). Petitioner contends that under both its construction of “embedded” and Patent Owner’s construction of “embedded in,” Mills’ leaf spring 62 is embedded in Markel’s enclosure because the leaf spring 62 would be firmly pressed against Markel’s electrodes 410, 420 and surrounded by Markel’s housing 110. *Id.* at 22–23 (citing Ex. 1065 ¶¶ 277–279).

#### Patent Owner’s Sur-reply

According to Patent Owner, the “Markel-Mills combination to claim 1 is deficient because Masimo has failed to demonstrate that the first pad (top of Mills’ leaf spring 62) is embedded in the first portion of the enclosure (Markel’s electrode 410b).” Sur-reply 23. Specifically, Petitioner has failed to demonstrate that “the top of Mills’ leaf spring 62 (identified by Masimo as the ‘first pad’) is at least partially set in or partially surrounded by Markel’s electrode region 410b (identified by Masimo as the ‘first portion of the enclosure’).” *Id.* at 23–24. Patent Owner contends that leaf spring 62 has a flat surface and parallel contact with electrode 410 rather than be embedded in electrode 410 as required by the claim. *Id.* at 20–24 (citing Ex. 2003 ¶¶ 157–166). Patent Owner contends that Petitioner has not put forth any explanations or modifications for how the leaf spring 62 would be embedded into the electrode 410. *Id.* at 25 (citing Ex. 2003 ¶ 161).

Patent Owner contends that the Reply presents a new theory by asserting that leaf spring 62 would be embedded in Markel’s enclosure rather than electrode 410 as proposed in the Petition. Sur-reply 26 (citing Pet. Reply 23); *see also* Pet. 47–48. Patent Owner contends that because Markel’s enclosure is an insulating material, Markel’s enclosure cannot be

the claimed enclosure that conveys electrical signals. *Id.* at 27–28 (citing Ex. 1005 ¶ 45; Ex. 2011, 33:2–13).

### Analysis

Based on the final record before us, we conclude that Petitioner has not persuasively shown that the combination of Markel and Mills teaches the limitation of “a first lead comprising a first pad that is embedded in a first portion of the enclosure.”

Petitioner presents an annotated version of Markel’s Figure 4, which is reproduced below:

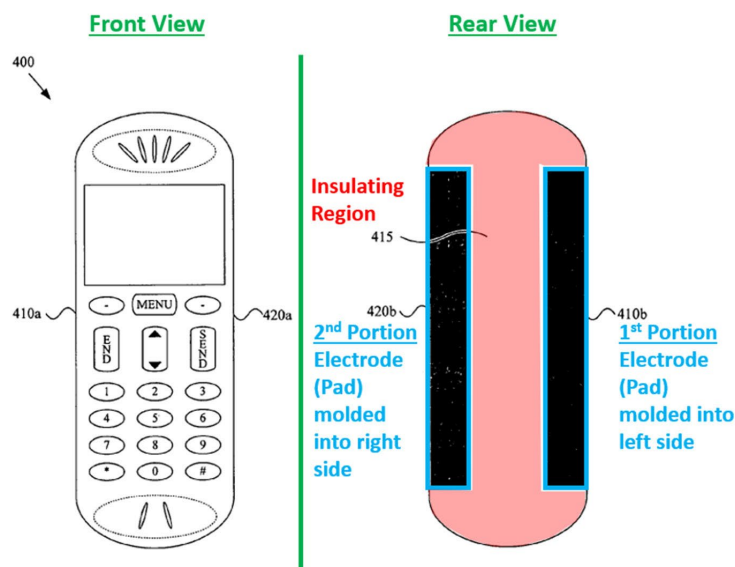


Figure 4

Petitioner’s annotated Figure 4 depicts an “insulating region” and a “1<sup>st</sup> Portion Electrode (Pad) molded into left side” as 410b. Pet. 42–43.

Markel discloses:

FIG. 4 provides a non-limiting example of such electrode placement. The mobile communication device 400 illustrated in FIG. 4 may comprise a left side portion 410 and a right side portion 420. A first electrode may, for example, be placed on the left side portion 410 (e.g., placed on or molded into region 410b),

and a second electrode may, for example, be placed on the right side portion 420 (e.g., placed on or molded into region 420b).

Ex. 1006 ¶ 45. We do not read Petitioner’s contentions as arguing that Markel alone discloses limitation 1(b)(i) (*see* Pet. 42–44) because Petitioner acknowledges that “Markel does not provide details of the internal components of its device.” Pet. 44; *see also id.* at 49 (Petitioner, for limitation 1(b)(iii) (calling for the pad to be positioned underneath the exterior surface of the first portion of the enclosure), relying only on a position requiring the leaf spring of Mills (not Markel’s electrode) to be mapped to the first pad and “the electrodes/first portion 410b exterior surface of Markel” mapped to the exterior surface of the first portion).

Instead, Petitioner contends that the combination of Markel and Mills teaches the “embedded in” limitation because the leaf spring 62 of Mills would be embedded in the region 410b of Markel (*see* Pet. 42–48; Pet. Reply 22–23). We find persuasive Patent Owner’s contentions that the top of Mills’ leaf spring 62 would have been in flat, parallel, and slidable contact with the back surface of Markel’s conductive electrode region 410b, and therefore not at least partially set in or partially surrounded by electrode region 410b in the device. *See* Sur-reply 24 (citing Ex. 2003 ¶¶ 157–166, ¶ 162 (“[T]wo flat surfaces being placed in parallel contact with each other does not constitute the leaf spring 62 being ‘embedded in’ the electrode 410b.”), ¶ 164 (“POSTIA would have further recognized that the leaf spring 62 is not ‘embedded in’ the electrode located at region 410b in the proposed combination of Markel with Mills based on Mills’ disclosure that leaf spring 62 is ‘slidably yielding,’” which “allow[s] for relative, sliding motion between the two components.”) (citing Ex. Ex. 1006, 4:67–5:3).

Petitioner contends that it “would have been obvious to incorporate the pad (leaf spring 62) teachings of Mills into the device of Markel because Mills provides details of internal physical connections on which Markel is silent.” Pet. 43–47. Petitioner contends that “[o]nce incorporated into the internal components of Markel, the leaf spring 62 of Mills would be embedded in the housing of Markel because its top pad portion is placed underneath an exterior surface material and *against an inner wall* of the exterior surface material.” Pet. 48 (emphasis added); *see also* Pet. Reply 22–23.

For reasons similar to those examined above, we find Petitioner’s positions unpersuasive. As Dr. Kenny persuasively testifies, “two flat surfaces being placed in parallel contact with each other does not constitute the leaf spring 62 being ‘embedded in’ the electrode 410b.” Ex. 2003 ¶ 157, 162. As previously discussed herein, Mills conveys that the leaf spring 62 is a slidably yielding contact point for electrode 14. Ex. 1006, 4:67–5:3 (“Upper electrode 14 is connected to . . . trapezoid-shaped, split and thus slidably yielding, leaf spring 62.”). In the proposed combination, Petitioner fails to establish that making this connection by placing leaf spring 62 against region 410b teaches or suggests that leaf spring 62 is “at least partially set in or partially surrounded by” the region 410b as required by the construction of “embedded in.” *See also* PO Resp. 55–57. Accordingly, Petitioner fails to establish that the combination of Markel and Mills teaches claim limitation 1(b)(i).



### Summary

For the reasons explained above, Petitioner does not persuasively show that the subject matter of claim 1 would have been obvious over the combination of Mills and Markel.

#### *3. Independent Claim 15.*

Independent Claim 15 is similar in scope to claim 1 and requires, in pertinent part:<sup>7</sup>

*15[c(i)] “the heart sensor comprising: a first lead embedded in a first portion of the enclosure of the electronic device”*

Ex. 1001, 14:5–6. *See also* Pet. 66.

### Petitioner’s Contentions

Similar to claim 1, Petitioner contends the combination of Markel and Mills discloses this limitation. Pet. 66–73. Petitioner first contends that Markel describes a first pad formed of conductive plastic embedded in a first portion of the enclosure and electrodes for detecting the cardiac signals disposed in various locations, including concealed. Pet. 66 (citing Ex. 1005 ¶¶ 45, 39, 40). These “electrodes may be ‘exposed for user contact’ or ‘may be integrated into various molded components.’” Pet. 67 (citing Ex. 1005 ¶ 37; Ex. 1003 ¶ 114). Petitioner relies on Markel’s disclosure “of MCD (device) 400” and “a first electrode ‘placed on or molded into region 410b.’” *Id.* (citing Ex. 1005, Fig. 4) (quoting *id.* ¶ 45).

Petitioner admits however that “Markel does not provide details of the internal components of its device,” and, as such, a person of ordinary skill in

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<sup>7</sup> We use the bracketed designation added by Petitioner for Ground 2 (*see* Pet. 66).

the art would have relied upon Mills. Pet. 69. Petitioner relies on Mills as providing additional details and for information on internal components and structures to make the device of Markel. *Id.* According to Petitioner, Mills' electrode 14 is similar to Markel's electrodes 410b and 420b. Petitioner, and Mr. Oslan, convey that Mills physical and electrical connections (such as its electrode 14 connected to processing circuitry by a leaf spring 62) would provide a teaching for Markel's internal physical and electrical connections on which Markel is silent. Pet. 69–72 (citing Ex. 1003 ¶ 117).

According to Petitioner, “[a] POSITA seeking to implement Markel's device would look to Mill's disclosure for ways to internally connect the electrodes of Markel to internal electronic components using pads,” and as such, “a POSITA would utilize the leaf spring 62 taught by Mills to connect the electrodes 410b, 420b of Markel to internal processing components taught by Markel.” Pet. 72–73 (citing Ex. 1003 ¶¶ 86, 118). Petitioner contends that “[a] POSITA would have an expectation of success in the combination as it is a mere rearrangement of known mechanical components in known ways in a complementary device.” Pet. 73 (citing Ex. 1003 ¶ 119).

#### Patent Owner's Contentions

Patent Owner maintains that the term “embedded in” in claim 15 should be interpreted the same as the term found in claim 1. PO Resp. 5–13. In addition to the related arguments made above for claim 1, Patent Owner additionally contends Petitioner has failed to meet its burden for claim 15 because Petitioner improperly mixed and matched multiple embodiments of Markel without explaining why modifying one embodiment based on the other would have been obvious. *Id.* at 65–66. Specifically, Patent Owner contends that “Masimo fails to explain why a POSITA would have modified

the telephone shown in Markel's FIGS. 4 and 5 based on disclosure provided with respect to the computer display device shown in Markel's FIG. 15." *Id.* at 66 (citing Ex. 1005 ¶¶ 60–62, 78; Ex. 2003 ¶¶ 191–193).

### Petitioner's Reply

Petitioner contends that the Petition did not mix and match embodiments because the Figure 1 embodiment of Markel also discloses a "display-screen-embedded electrode." Pet. Reply 28 (citing Ex. 1005 ¶ 44; Ex. 1065 ¶ 304).

### Patent Owner's Sur-reply

Other than the related arguments for claim 1 examined above, Patent Owner does not provide any additional arguments specific to claim 15 in its Sur-reply. *See generally* Sur-reply.

### Analysis

As noted above, Petitioner recognizes that "Markel does not provide details of the internal components of its device," and, as such, Petitioner contends that a person of ordinary skill in the art would have relied upon Mills for its "disclosure for information on internal components and structures to make the device of Markel." Pet. 69. To teach the elements of claim limitation 15[c(i)], Petitioner again relies on "[t]he top of the trapezoid-shaped leaf spring 62" as being "a pad . . . that is *pressed against the inner wall* of electrode 14 in Mills and surrounded by the housing 12 of Mills and is therefore embedded in the device of Mills." *Id.* at 71–72 (emphasis added). Petitioner relies on Mills and its leaf spring 62 assembly in the same manner as claim 1 to teach the similar claim 15 requirement of

“a first lead embedded in a first portion of the enclosure of the electronic device.” *See* Pet. 69–73, 73 (“Once incorporated into the internal components of Markel, the leaf spring 62 of Mills would be embedded in the housing of Markel because its top pad portion is placed underneath an exterior surface material and against an inner wall of the exterior surface material.”).

For similar reasons as explained in relation to claim 1 for this ground, Petitioner fails to establish that placing Mills leaf spring 62 against Markel’s region 410b (or against an exterior surface material and against an inner wall) teaches that the leaf spring 62 is “at least partially set in or partially surrounded by” these regions as required by the construction of “embedded in.” Mills describes the leaf spring 62 as being “slidably yielding” which would have indicated to a person of ordinary skill in the art that the top of the leaf spring would not have been “embedded in” the electrode 410b in the proposed combination to allow for relative sliding motion between the two components. *See* Ex. 1006, 4:67–5:3; Ex. 2003 ¶ 164. Accordingly, Petitioner fails to establish that the combination of Markel and Mills teaches claim limitation 15(c)(i).

### Summary

For the reasons explained above, Petitioner does not persuasively show that the subject matter of claim 15 would have been obvious over the combination of Markel and Mills.

#### *4. Dependent Claims 2–4, 8–14, and 16–22.*

Petitioner also contends that claims 2–4, 8–14, and 16–22 would have been obvious over Markel and Mills. Pet. 13, 54–64, 78–84.

For the reasons explained above in connection with independent claims 1 and 15, Petitioner does not persuasively show that the subject matter of claims 2–4, 8–14, and 16–22 would have been obvious over the combination of Markel and Mills.

*F. Patent Owner’s Revised Motion to Amend*

Patent Owner filed a Contingent Motion to Amend. *See generally* Paper 13. Petitioner filed an Opposition to Patent Owner’s Contingent Motion to Amend. *See generally* Paper 18. The Board issued Preliminary Guidance on Patent Owner’s Motion to Amend. *See generally* Paper 23. Patent Owner filed a Revised Contingent Motion to Amend. *See generally* Paper 27. Petitioner filed an Opposition to Patent Owner’s Revised Contingent Motion to Amend. *See generally* Paper 30. Patent Owner filed a Reply to Petitioner’s Opposition. *See generally* Paper 37. Petitioner filed a Sur-Reply to Reply to Opposition to Patent Owner’s Contingent Motion to Amend. *See generally* Paper 39.

Patent Owner’s Revised Contingent Motion to Amend asserts that in “the event the Board finds at least one challenged [Revised Motion to Amend] claim unpatentable, [Patent Owner] respectfully requests that the Board grant this Motion with respect to the corresponding proposed substitute claim(s).” Paper 27, 1. Because we determine that Petitioner has not established that any of the challenged claims 1–4 and 8–22 are unpatentable, Patent Owner’s Revised Contingent Motion to Amend is moot.

### III. CONCLUSION

Based on the evidence presented with the Petition, the evidence introduced during the trial, and the parties’ respective arguments, Petitioner

has not shown by a preponderance of the evidence that any of claims 1–4 and 8–22 are unpatentable.

In summary:

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–4, 8, 10, 11, 14	102	Mills		1–4, 8, 10, 11, 14
1–4, 8–22	103	Markel, Mills		1–4, 8–22

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment	23–27
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	
Substitute Claims: Not Reached	23–27

#### IV. ORDER

Accordingly, it is

ORDERED that claims 1–4 and 8–22 of U.S. Patent No. 10,076,257 B2 are not determined to be unpatentable;

FURTHER ORDERED that Patent Owner’s Motion to Amend is *dismissed* as moot; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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