UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MASIMO CORPORATION,

Petitioner,

v.

APPLE INC.,

Patent Owner.

Case No. IPR2023-00745
U.S. Patent No. 10,076,257

SECOND SUPPLEMENTAL DECLARATION OF ALAN L. OSLAN

I declare that all statements made herein on my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

I reserve the right to supplement my opinions in the future to respond to any arguments or positions Apple may raise, taking account of new information as it becomes available to me.

Dated: April 22, 2024

Alan L. Oslan

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I. INTRODUCTION

200. I previously submitted an initial declaration on March 17, 2023 and a supplemental declaration on April 1, 2024, in connection with this IPR, IPR2023-00745. These declarations have been submitted as EX1003 and EX1051. Also for convenience, I continue paragraph numbering in this declaration at paragraph 200 because my most recent declaration contained 199 numbered paragraphs.

201. I have been asked by counsel to review additional materials and render my expert opinion in connection with additional technical matters related to the Inter Partes Review of U.S. Patent 10,076,257 ("the '257 patent").

202. I continue to be compensated for my work in this matter at my standard hourly rate for expert consulting services. My compensation in no way depends on the outcome of this proceeding. I have no financial interest in any of the parties to these matters.

II. INFORMATION AND MATERIALS CONSIDERED

203. In order to render opinions on this matter, in addition to the materials I listed in my previous declaration, I have reviewed the following materials:

Masimo's Exhibit No.	Description
1052	Deposition of Thomas Kenny, March 26, 2024
1053	*Titanium Carbide Coating*, CGT CARBON, (last visited March 22, 2024), https://cgt-carbon.com/coating/titanium-carbide-coating/

1054	J. Huhta and J. Webster, IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING, BME-20, NO. 2 (1973)
1055	Israel et al., *ECG to identify individuals*, PATTERN RECOGNITION 38 (2005)
1056	U.S. Pat. No. 5,738,104, issued Apr. 14, 1998 ("Lo")
1057	J. Francis, *ECG monitoring leads and special leads*, Indian Pacing and Electrophysiology J., 16 (2016)
1058	U.S. Pat. No. 5,623,926, issued Apr. 29, 1997 ("Weiss")
1059	E. Hornung and U. Scheuermann, *Reliability of low current electrical spring contacts in power modules*, Microelectronics Reliability 43 (2003)
1060	F. Lang and U. Scheuermann, *Reliability of spring pressure contacts under environmental stress*, Microelectronics Reliability 47 (2007)
1061	*PCB Spring Contacts*, MorePCB (last visited March 21, 2024), https://morepcb.com/pcb-spring-contacts/#:~:text=between%20electronic%20devices.-,What%20are%20PCB%20Spring%20Contacts%3F,other%20electronic%20devices%20or%20systems
1062	*Apple Inc. v. Masimo Corporation, et al.*, Oct. 20, 2022, Complaint for Patent Infringement, Case No. 1:22-cv-01378-MN (D. Del.)
1063	*Apple Inc. v. Masimo Corporation, et al.*, Nov. 22, 2023, Excerpts of Opening Expert Report of Pedro P. Irazoqui, Case No. 1:22-cv-01378-MN (D. Del.)
1064	*Apple Inc. v. Masimo Corporation, et al.*, Dec. 15, 2023, Excerpts of Rebuttal Expert Report of Alan L. Oslan, Case No. 1:22-cv-01378-MN (D. Del.)
1066	Tom Anderson, *Portable Electronics Require Smaller, More Modular SMT Battery Connectors*, CONNECTOR SPECIFIER (2007)
1067	U.S. Patent No. 11,160,926, issued Nov. 2, 2021 ("Halac")

Apple's Exhibit No.	**Description**
2005	Definition of "embedded" from Wiley Electrical and

	Electronics Engineering Dictionary, IEEE Press, Wiley-Interscience (2004)
2006	Definition of "embed" from Merriam-Webster's Collegiate Dictionary, Eleventh Edition, Merriam-Webster, Inc. (2005)
2007	Definition of "embed" from Webster's College Dictionary, Random House (2005)
2008	Transcript of January 12, 2024, deposition of Alan L. Oslan

204. Any other materials referenced directly or indirectly in this declaration.

III. EXPERIENCE AND QUALIFICATIONS

205. In my earlier declaration, I outlined my qualifications. A true and correct copy of my curriculum vitae (CV) has been submitted as EX1004.

206. I make this declaration based on personal knowledge, and I am competent to testify about the matters set forth herein.

IV. APPLICABLE LEGAL STANDARDS

207. I am an electrical and biomedical engineer by training and profession. The opinions I express in this Declaration involve the application of my knowledge and experience to the evaluation of the '257 Patent and certain prior art to the '257 Patent.

208. Although I have been involved as a technical expert in patent matters before, I am not an expert in patent law. Therefore, I have been advised of certain

principles of patent law applicable in this matter, which I have used in arriving at my determinations and opinions.

V. SUMMARY OF OPINIONS

209. My earlier declaration, which has been submitted as EX1003, describes my opinions regarding the grounds of unpatentability of Claims 1–4 and 8–22 of the '257 patent. In this declaration I address Apple's response to those grounds of unpatentability provided in the Patent Owner's Response ("POR").

210. To summarize my opinions, I continue to hold to my conclusion that Claims 1–4 and 8–22 of the '257 Patent would have been obvious to a POSITA based on the teachings of the prior art at the time of invention. My opinions are expressed in the paragraphs below:

VI. CLAIM CONSTRUCTION

211. I understand that the parties do not propose to construe the same terms in this IPR. Pet. at 7-12; POR at 5-13. Masimo proposed a construction of "embedded" and proved that the prior art meets the "embedded" limitation under that construction. Pet. at 8-9, §IV.

212. In the POR, Apple does not propose a construction of "embedded." Apple argues that Masimo's construction of "embedded" is overly broad and incorrect and instead construes "embedded in." POR at 8-10. However, these two

constructions are not inconsistent because "embedded in" is narrower than "embedded."

213. The POR asserts that "embedded in" should be given its ordinary meaning and "does not necessarily require an explicit construction." POR at 13. Apple argues that if the Board construes "embedded in" it should be construed to mean "at least partially set in or partially surrounded by a material." *Id*. Apple does not specify a threshold for "partially," so it is my opinion that a POSITA would understand that this construction covers pads that are ***minimally*** set in ***or*** surrounded by an enclosure. Apple asserts its construction excludes a pad pressed against a single flat surface but does not provide an adequate explanation. EX2003 at ¶34. Dr. Kenny admitted that the construction covers a pad pressed against a single ***curved*** surface but could not say how much curvature is required. EX1052 at 128:4-131:5. Regarding "embedded in," Kenny said, "you sort of know it when you see it." *Id.* at 131:4-5.

214. Apple argues the Board should require Masimo to prove unpatentability under Masimo's district court construction of "embedded in": "set firmly into and surrounded by material." POR at 10-12. But it is my understanding that Masimo should not be required to prove unpatentability under a construction Apple does not propose. First, neither party proposes use of the district-court construction in this IPR, much less shows it is necessary to resolve the parties' patentability dispute.

Second, Apple's POR disputes Masimo's district court construction and does not commit to be bound by it in attempting to prove infringement. POR at 12-13. Thus, Apple's argument that claims should be construed consistently for validity and infringement is hollow.

215. Nevertheless, in response to Apple's newly raised claim-construction arguments, the declaration illustrates below that the claims would have been obvious under Apple's construction or Masimo's district court construction. This shows that under any reasonable "embedded in" construction there is not any consequential dispute over the meaning of "embedded." Therefore, the Board does not necessarily need to construe "embedded" or "embedded in."

VII. ANALYSIS

A. Mills Discloses First and Second Pads "Embedded In" First and Second Portions of An Enclosure Under All Constructions

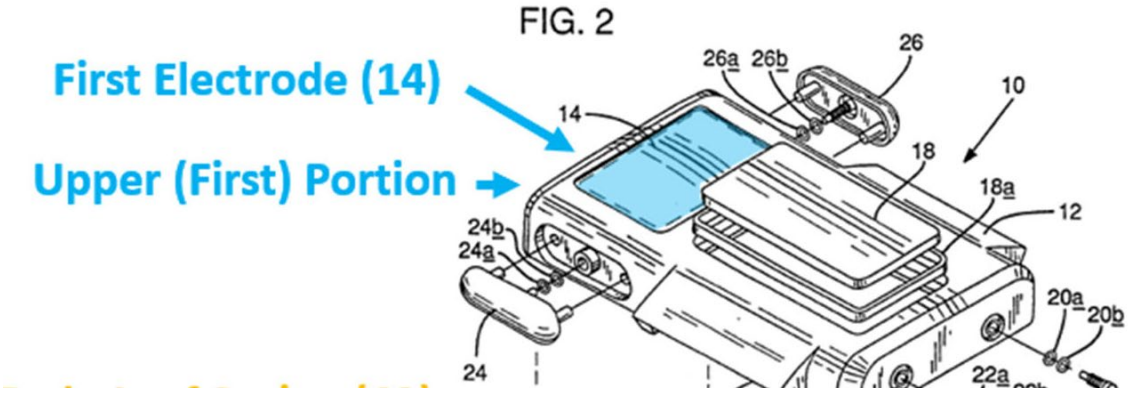
1. The Petition identifies the first and second pads and portions of the enclosure with particularity.

216. Throughout the POR Apple argues that Masimo failed to identify its grounds with particularity. POR at 13-16. For instance, Apple alleges that the Petition inconsistently maps different structures of Mills to the claimed first and second pads embedded in first and second portions of the enclosure. *Id*. To the contrary, while Ground 1 of the Petition includes two alternative unpatentability theories, each of those theories clearly and consistently identifies which of Mills's

structures satisfy the limitations requiring the first and second pads to be embedded in first and second portions of the enclosure. To add to this, the Institution Decision demonstrates that the Board understood the Petition's mapping of Mills to the claim language under each mapping.

a. Masimo's first mapping

217. For its first unpatentability mapping, the Petition identified Mills's base metal 14a as the claimed "first pad" and an upper portion of Mills's housing 12 and conductive surface coating or plating 14b as the claimed "first portion." Pet. at 19-22. The Petition explained that electrode 14 is "integrally molded" into housing 12 and "also has a base material" 14a "embedded underneath an outer surface coating" 14b. *Id.* at 21. The Petition expressly identified "base metal 14a" as the "first pad" that is "embedded under the exterior of the first portion." *Id.* Thus, the Petition includes plating 14b as part of the first portion. The Petition also provided the figure below, which shows the electrode 14 (identified by an arrow) molded into the first portion of housing 12 (identified by a separate arrow):



Id. at 23.

218. Masimo expressly identified "base metal 14a" as the "first pad" that is "embedded under the exterior of the first portion." *Id.* at 21. The figure below separately identifies base metal 14a and conductive surface layer (plating) 14b.

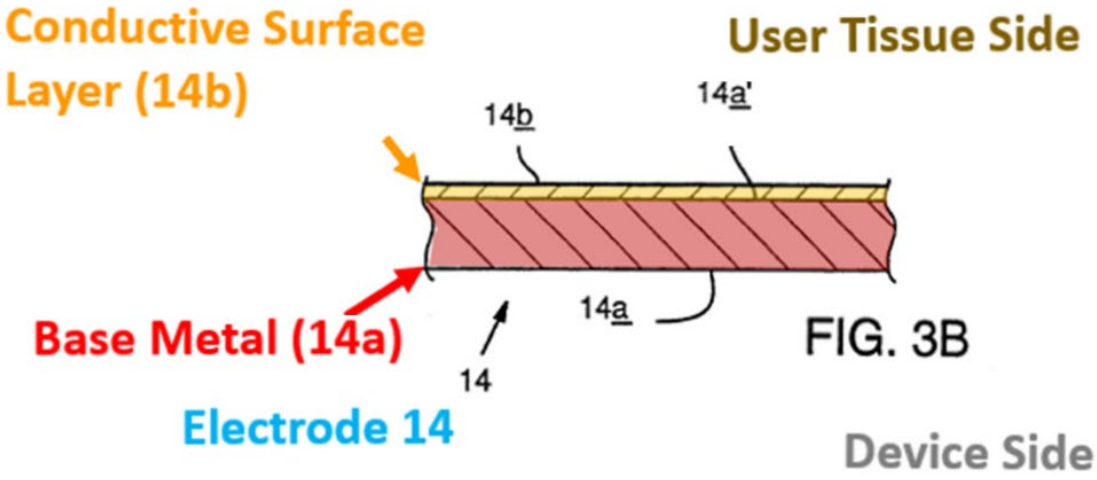


FIG. 3B

Pet. at 22; EX1006 at Fig. 3B (flipped vertically to better show orientation of cross-section during operation).

219. Masimo further explained that Mills's "second electrode 16 includes identical material content and cross-sectional structure as the first lead 14 discussed above." Pet. at 29 (citing EX1006 at 4:10-13). Thus, electrode 16 has the same base metal 14a and plating 14b as electrode 14. Pet., 29. Masimo identified the base metal (equivalent to 14a) of electrode 16 as the claimed "second pad," and a lower portion of Mills's housing 12 and the plating (equivalent to 14b) of electrode 16 as the claimed "second portion." *Id.* at 28-30.

220. The POR attempts to read ambiguity into this mapping in three ways. First, Apple points out the Petition sometimes refers to the "electrode 14" as the "first pad" and sometimes refers to it as part of the "first portion." *See, e.g.,* POR at 15 (citing Pet. at 19, 24). Apple incorrectly interprets these references to suggest that Masimo relies on electrode 14 as a unitary structure for both the "first pad" and the "first portion." *Id*. However, the Petition resolves any confusion about Apple's misinterpretation. The petition explained that electrode 14 has ***two separate parts*** corresponding to different limitations: (1) the "base metal 14a" corresponds to the claimed "first pad" and (2) the plating or "conductive surface coating 14b" corresponds to part of "the first portion." Pet. at 21. A POSITA would easily understand that the Petition's references to electrode 14 as a pad refer to base metal 14a, and its references to electrode 14 as a portion of the enclosure refer to plating 14b. Accordingly, Apple's arguments that that a single structure cannot be mapped to separate elements do not apply, because electrode 14 is not a single unitary structure. POR at 29.

221. Second, the POR argues that Masimo's reference to Mills's "housing 12" as disclosing limitation 1[a] of "an enclosure" is inconsistent with the Petition's reliance on plating 14b as part of the enclosure for limitation 1[b(ii)]. But the Petition's arguments are consistent. Masimo showed that Mills discloses "an enclosure," comprising at least housing 12, without needing to identify every portion

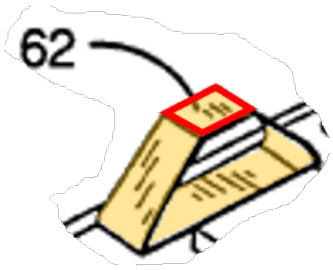
of the enclosure. Pet., 16-17. Masimo identified an additional part of the first portion of the enclosure—namely, the plating 14b—to show that first pad 14a is embedded in the first portion of the enclosure. Pet., 21-22.

222. Third, Apple incorrectly suggests that Masimo identified the plating 14b as the entire "first portion of the enclosure." POR at 18-19. Masimo identified plating 14b as only an "***exterior surface***" of the first portion. Pet., 22. As explained above, Masimo identified the upper portion of Mills's housing 12 and plating 14b as the first portion. Pet., 19-22.

b. <u>Masimo's second mapping</u>

223. For its second mapping, Masimo identified the top of Mills's leaf spring 62 as the claimed "first pad" and electrode 14 (which includes base metal 14a and plating 14b) as part of the claimed "first portion." Pet., 22-24. Masimo explained that the top of the leaf spring is "pressed against the inner wall of electrode 14" and "surrounded by the housing 12 of Mills," and, thus, it is embedded in the first portion of the enclosure. *Id.*

224. Apple argues that Masimo did not identify the top of the leaf spring as the first pad. POR at 20-21. However, for the limitation of a first pad "embedded in a first portion of the enclosure" the Petition stated that the "top" of the leaf spring is such a pad, including annotating a figure highlighting the top of the leaf spring.



Pet. at 23.

c. <u>The Board understood Masimo's mapping of Mills to the claims.</u>

225. I understand that the Board instituted this IPR based on the Mills and Markel-Mills grounds presented in the Petition. The Board confirmed the clarity of the first theory, agreeing that electrode 14 is "'integrally molded' (*i.e.*, embedded) into the housing [12]' and electrode 14 'also has a base material embedded underneath an outer surface coating.'" Inst. Dec. at 23. The Board also understood the second theory, stating that "leaf spring 62 carries the electrical signal from the electrode 14 through the leaf spring 62 via the leaf spring's ***top pad***." *Id.*, 24 (emphasis added).

2. <u>The identified first and second pads are embedded in the identified first and second portions of the enclosure.</u>

a. <u>Mills discloses the embedded-in pads under Apple's "embedded in" construction.</u>

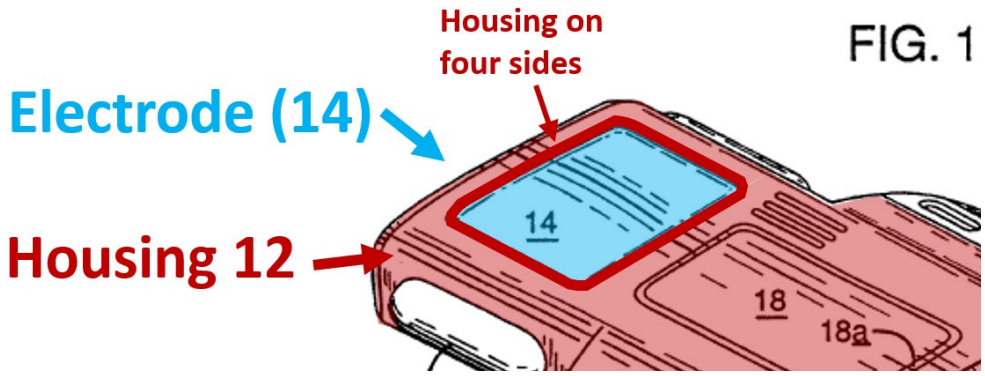
226. Masimo demonstrated under its construction of "embedded" that Mills discloses first and second pads embedded in first and second portions of an enclosure. Pet. at § IV. Apple does not dispute that Mills discloses first and second

pads embedded in first and second portions of the enclosure under Masimo's "embedded" construction. POR at 3-13.

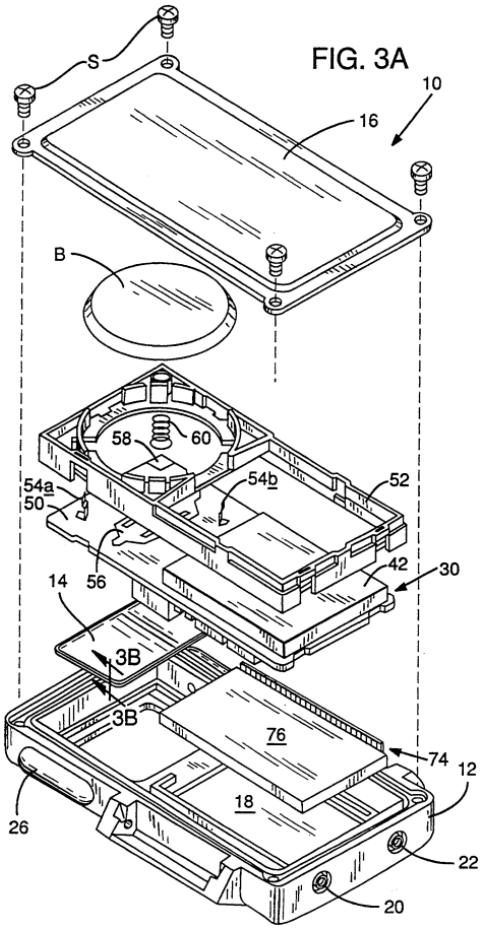
b. <u>Mills discloses the embedded-in pads under Apple's "embedded in" construction.</u>

227. Apple cites its newly proposed construction of "embedded in" to argue that Mills does not disclose pads embedded in an enclosure. POR at 5, 36-38. To the contrary, Mills discloses embedded-in pads under Apple's construction. As a confirmation of this, Apple's expert, Dr. Kenny, admitted that Mills's pads 14a and 16 are "embedded in" the enclosure. EX1052 at 186:18–187:6 (testifying that electrode 14, which necessarily includes 14a, is "definitely surrounded by the housing 12"), 191:5–14. I agree with Dr. Kenny that pads 14a and 16 are "embedded in" Mills's enclosure. Under Apple's construction, Mills's pads 14a, 16, and 62 (top of leaf spring) are all at least partially surrounded by, and, thus, "embedded in," the first portion of the enclosure (upper portion of housing 12 and plating 14b). EX1052 at 186:18–187:6, 191:11–14.[1]

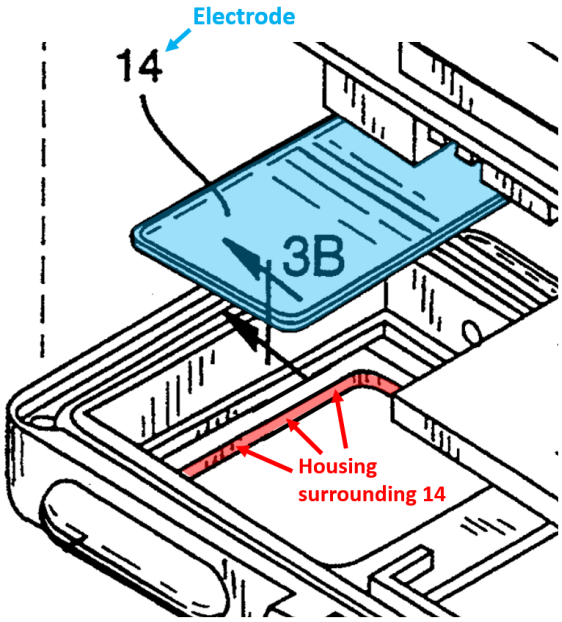
[1] Figures herein have been provided with colored annotations.



EX1006 at Fig. 1; *See* Pet. at 19-20, 70.



EX1006 at Fig. 3A.



EX1006 at Fig. 3A (detailed view with one instance of text "3B" removed).

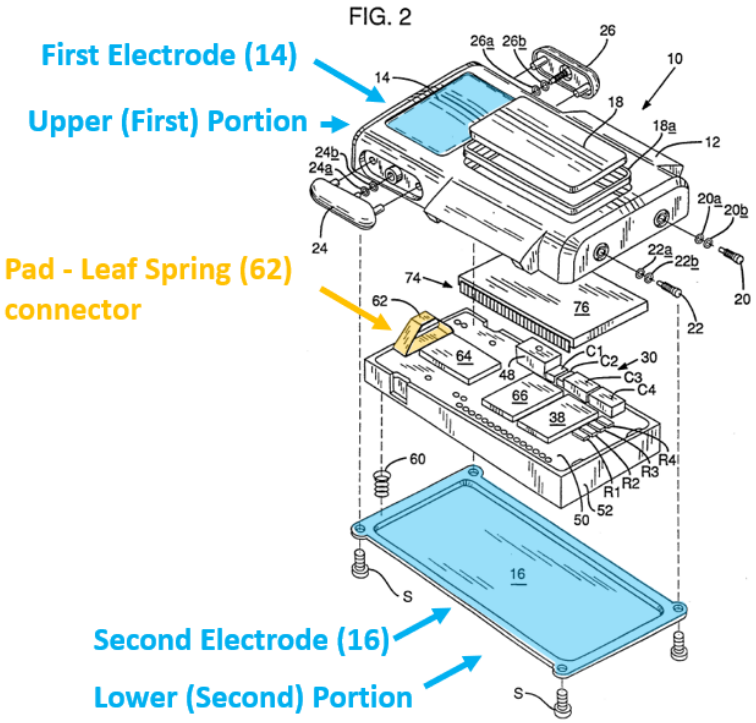
See Pet. at 21.

228. As shown in the annotated figures above, the pad 14a[2] of electrode 14 is surrounded on its four edges by the housing 12, part of the enclosure. Dr. Kenny agreed that Figure 1's electrode 14 is "definitely surrounded by the housing 12." EX1052 at 186:21–187:2. *See also* EX1052 at 186:1–20. Then he confirmed that "electrode 14 is embedded in the housing 12 as shown in Figure 1 and 2." EX1052 at 187:3–6. He similarly agreed that electrode 16 was "set in the housing" and that "housing 12 would surround the electrode 16" after assembly. EX1052 at 190:12–191:10. Accordingly, there is no dispute that electrodes 14 and 16 are at least partially surrounded by, and, thus, embedded in, the enclosure of Figures 1 and 2.

229. Alternatively, Mills discloses leaf spring 62 as shown in Fig. 2 (reproduced below with annotations). EX1006 at 4:67 – 5:3; *See also Id.* at 4:1–3. The top of the leaf spring 62 constitutes a pad that satisfies Apple's construction because it is at least "partially surrounded" by electrode 14 and other parts of the

[2] Electrode 14 consists of pad 14a and plating 14b, which is explained further below. *See* EX1006, Figure 3B.

enclosure. Dr. Kenny testified that a book "floating" within a desk drawer would be "embedded in" the desk, even if the book did not touch the drawer. EX1052 at 55:8–56:17, 143:16-144:22. Thus, under Apple's construction of "embedded in" the top of the leaf spring 62 is an "embedded in" pad.



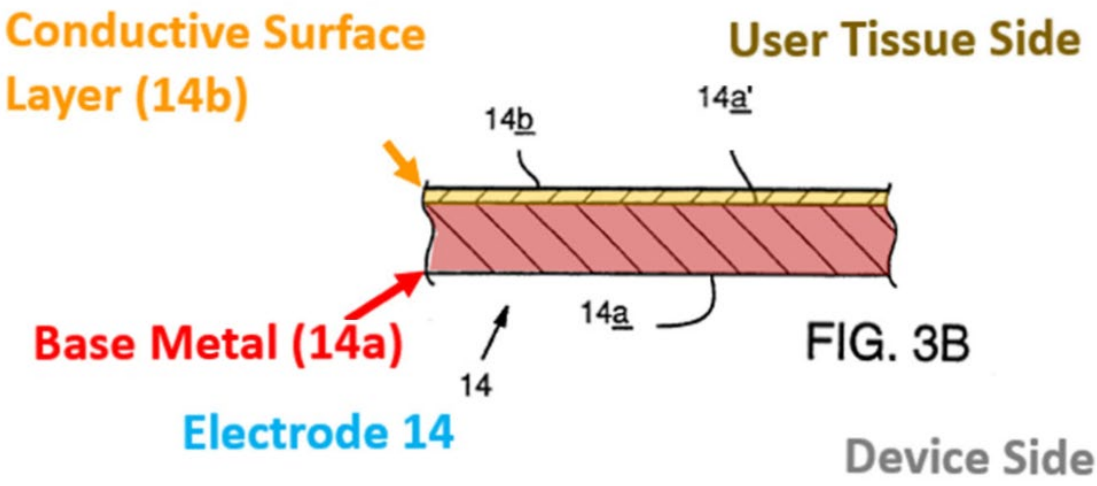
Pet. at 22-24.

230. It is worth noting that the boundaries of Apple's "embedded in" construction do not appear to be coherent. For example, Dr. Kenny described in his declaration that a pad on a flat surface is not embedded, but a pad on a curved surface is embedded. EX2003 at ¶34. During Dr. Kenny's deposition he could not describe

what type of curvature was necessary for lead to be "embedded in" an enclosure. EX1052 at 114:4–115:9. For example, he testified that a POSITA would get "uncomfortable somewhere along the way" to a flat surface and "say no, it is not embedded". *Id.* Dr. Kenny often subjectively described embedded as something visible that a POSITA knows when they see it. *Id.* at 113:1–7 ("I think one of ordinary skill in the art knows when they see curvature that leads to a thing being partly surrounded by material. It could be millimeters. It could be more."); *Id.* at 112:4–22 (curvature has to be "sufficient for a person of ordinary skill in the art to look at it and see that there is a departure from a flat surface"). Thus Apple's expert was unable to elucidate Apple's construction of embedded or how a particular curvature resulted in embedding.

c. Mills discloses the embedded-in pads under Masimo's district-court "embedded in" construction.

231. Mills's pad 14a is embedded in the first portion of the enclosure because it is set firmly into and surrounded by all four edges by the housing 12 and also on the top by the plating 14b shown in Figure 3B below. Mills's electrode 16 has the same structure as 14, with the plating on the outside. EX1006 at 2:16–20 ("[t]he electrodes" are plated), 4:10-13.



EX1006 at Fig. 3B (flipped vertically); Pet. at 22, 24, 25, and 30.

232. Mills's embedded electrode shown in Figure 3B consists of a base metal 14a (the claimed "pad" under a first mapping) and a "base metal-plating composition 14b" on the "outer, skin-contactable region." EX1006 at 4:4–5, 4:32. The base metal 14a or pad is firmly set into and surrounded by the enclosure consisting of the housing 12 and the plating 14b. Apple argues that the plating 14b is not part of the enclosure but is merely an "imperceptibly thin coating." POR at 30, 32. However, Mills explains that the plating 14b "has been found to *protect, and thus to greatly extend the life*, of a dry skin electrode such as electrode 14 by producing an *extremely hard, exterior, skin-contactable surface*." EX1006 at 4:43–47. Thus, a POSITA would understand that 14b is part of the enclosure by providing a protective function, and that pad 14a and the correponding pad of electrode 16 are set firmly in and surrounded by the enclosure of Mills.

233. Mills's specification confirms that the the electrode pads are embedded in the enclosure by describing the electrodes as "***integral with the monitor's housing***." EX1006 at Abstract, 1: 43–45. Moreover, Mills describes its "housing 12" as including "electrodes 14, 16 ***unitarily connected therewith and forming an integral part thereof***." *Id.* at 3:7–13, 3:44–51. The specification's consistent description that the electrodes 14 and 16 are "integral" with the housing supports that the electrode pads are set firmly into and surrounded by the enclosure.

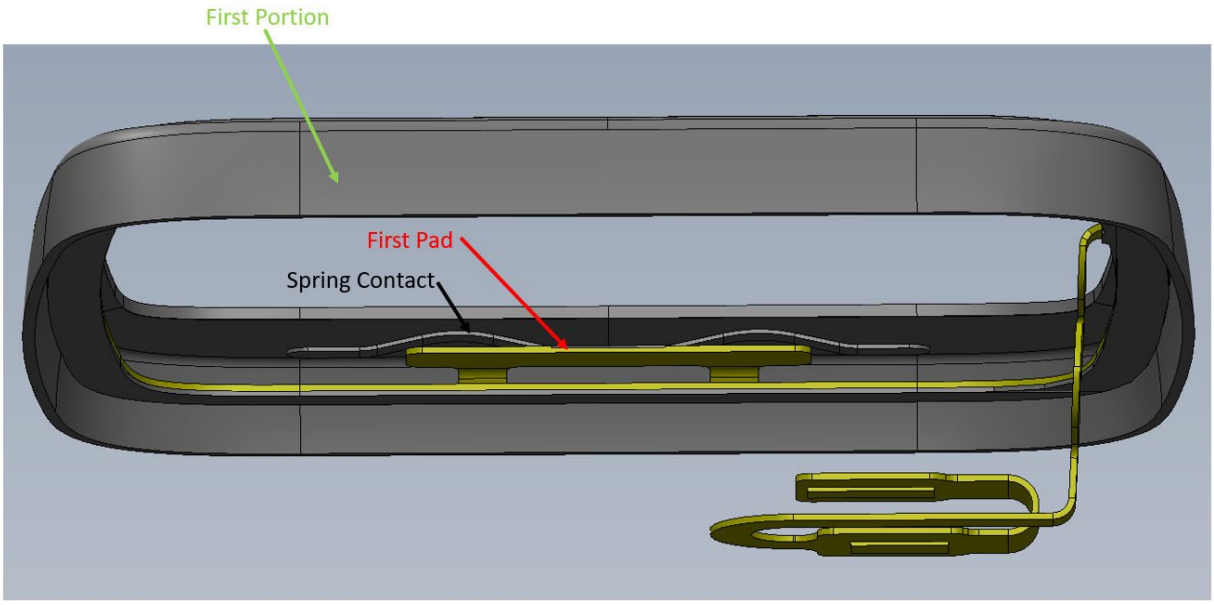
234. Under the second mapping the top of Mills's leaf spring 62 is also set firmly into and surrounded by the first portion of the enclosure. The top of the leaf spring is surrounded by an upper portion of the housing 12 and the electrode 14 and is held firmly in place by being compressed tightly between the PCB and the electrode.

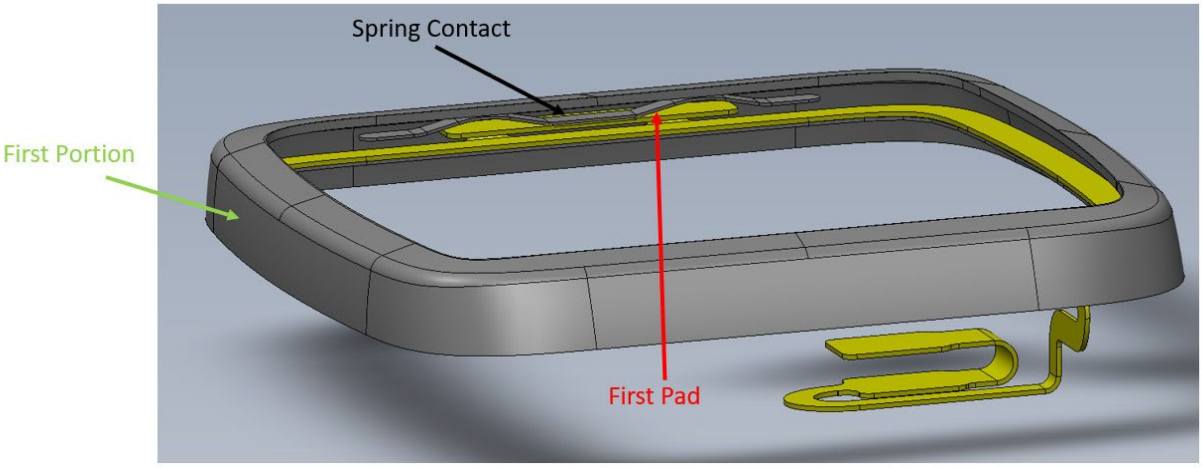
235. Therefore, the electrodes relied on in the Petition are "embedded in" the first and second portions of the enclosure under the various constructions.

3. <u>Apple's district court infringement allegations undermine its argument that Mills lacks embedded-in pads.</u>

236. In the district court case, of which I am a part, Apple alleges that Masimo's W1 watch infringes Claim 1. Apple alleges that (1) the W1's bezel is the claimed "first portion of the enclosure" and (2) an "exposed copper region" of an ECG flex circuit located under the W1's bezel is the claimed "first pad … embedded

in" the first portion of the enclosure. EX1063 at 2, 5. Apple annotated the Masimo CAD drawings below to show its alleged "first pad" and "first portion":





EX1063 at 3-4.

237. As illustrated, the W1's exposed copper region Apple identifies as the "first pad" does not touch,[3] and is not attached or secured to, the W1's bezel that

[3] For this reason, the W1's spring contact is included to provide an electrical connection between the bezel and the exposed copper region.

Apple identifies as the "first portion." *See* EX1064 at 9-10, 13. As shown in the figures above, the exposed copper region is located under the top surface and along one edge within the perimeter of the bezel.

238. Under Apple's district-court construction, Apple alleges the W1's exposed copper region "is embedded in the bezel" because it "is at least partially set in the bezel." EX1063 at 2. Apple alleges that under Masimo's district-court construction the W1's exposed copper region "is embedded in the bezel because it is set firmly into and surrounded by it." EX1063 at 5. I do not agree with Apple's district-court infringement allegations. Furthermore, Apple's district-court infringement allegations undermine its IPR argument that Mills lacks embedded-in pads. Under either Masimo unpatentability mappings (discussed in sections VII.A.1.a and VII.A.1.b above), the identified pads—*e.g.,* component 14a and leaf spring 62—are located under the top surface and within the perimeter of a first portion of the enclosure.

B. Ground 1 – the Claims are Anticipated by Mills

239. Apple's POR lodges numerous complaints against the presentation of grounds in the Petition, alleging that the grounds are inconsistent or unclear. *See* POR generally. These arguments attempt to create ambiguity that is not present.

1. Claim 1

240. Apple argues that none of the Petition's mappings in Ground 1 satisfy Claim 1, specifically the claimed first pad and its features. POR at 23-24.

a. Mills's electrode 14 discloses all the features of the claimed first pad

241. In Ground 1, Mills's electrode 14, which includes pad 14a positioned underneath plating 14b, satisfies the claimed first pad that is **embedded in** and **positioned underneath** a portion of the device enclosure. EX1006 at 3:67–4:47. As explained above in Section VII.A.2, Mills's electrode 14a is "embedded in" a first portion of the enclosure under any of the parties' constructions. Regarding the "positioned underneath" limitation, Mills's electrode 14a is also a first pad that is **positioned underneath** the exterior surface of a first portion of the enclosure (the plating 14b), as shown below in Figure 3B:

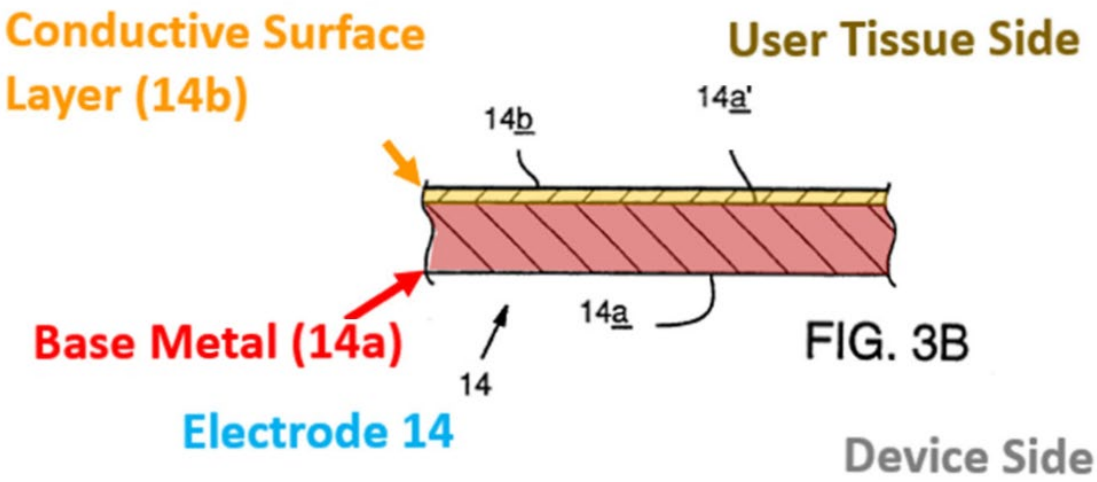


FIG. 3B

EX1006 at Fig. 3B (flipped). Pet. at 25, 30. *See* Pet. at 21–22, 24–25, and 30.

242. Apple alleges in its POR that "electrode 14 cannot provide both the claimed 'first pad' and the 'first portion of the enclosure'" and that "it is physically impossible for the electrode 14 to be embedded in and positioned underneath itself." POR at 15, 29. *See also* POR at 48–49 (arguing similarly for Mills's electrode 16). These arguments are groundless. The Petition consistently identified electrode 14 as having two components: "the pad (base metal 14a) is positioned underneath the exterior of the first portion (conductive surface coating 14b)." Pet. at 21–22. This was illustrated throughout the Petition, as shown in Figure 3B above. Pet. at 22, 24, 25, 30. Apple ignores this clear argument and illustration invoking Mills's Figure 3B. Thus, Mills's electrode 14 comprises both a "first pad" and a part of the "first portion" of the enclosure.

243. Apple further argues that Mills's plating "is not a part of the housing/enclosure" of the device because it is an "imperceptibly thin coating" that "would not have the structural integrity to support other components." POR at 30, 32, 34–35. These arguments fail for several reasons.

244. First, whether Mills's plating constitutes a "housing" or is part of the "housing 12" in Mills is irrelevant to the claims. The claims never use the term "housing" but instead require an "enclosure." EX1001 at 12:21–14:50. An enclosure may comprise more than just the housing, as discussed herein. Therefore, the plating

is part of the enclosure because it constitutes an exterior portion of the device that encloses other parts of the device.

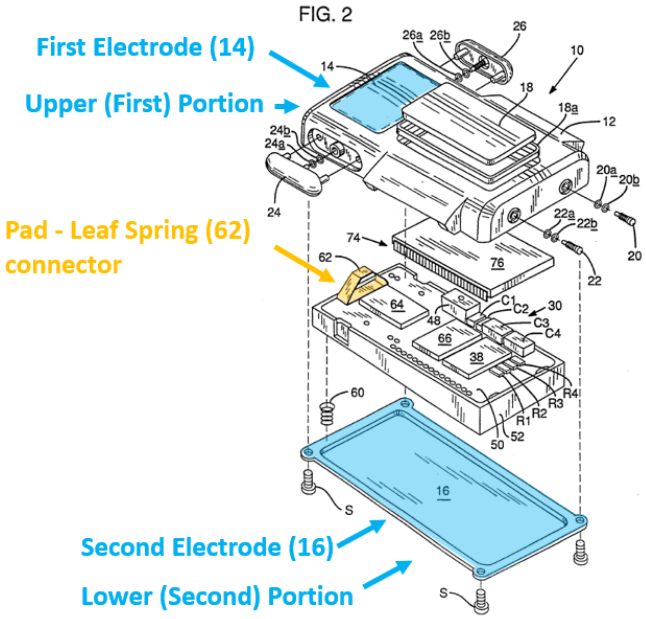
245. Second, the '257 claims and specification do not require that the enclosure must possess a certain thickness or structural rigidity. EX1001 at 12:21–14:50. Apple's expert confirmed that there are no specifications for thickness. EX1052 at 182:3–13; *see also* 1052 at 182:9–13 (testifying the enclosure could have different thicknesses at different locations). Additionally, Mills teaches that its plating *does* provide rigidity and that it "has been found to protect, and thus to greatly extend the life, of a dry skin electrode such as electrode 14 by producing an *extremely hard*, exterior, skin-contactable surface." EX1006 at 4:40–43.

246. Third, the '257 patent itself teaches that its "device enclosure can be *finished* using a suitable process to disguise the leads" and that "leads 322 and 324 can be *finished* to resemble bezel 310" via a "a *conductive coating* [that] can be applied to leads 322 and 324 to match the color, tone and reflectivity of bezel 310." EX1001 at 2:62–63, 9:5–10. *See also* EX2001 at Claim 27. Therefore, the '257 patent teaches a similar conductive coating that may be applied to the '257 device to finish the enclosure and "disguise the leads." EX1001 at 2:62–63, 9:5–10 Accordingly, the Petition's mapping of Mills's plating does not "stretch[] the breadth of the claims beyond reason" (POR at 33) but rather is consistent with the '257 disclosure.

247. Finally, Apple's expert agreed that the function of an enclosure is "to enclose" and "provide some protection" in the context of the '257 patent. EX1052 at 185:1–15. Mills's plating does just that. It encloses the electrodes and "has been found to *protect*, and thus to greatly extend the life, of a dry skin electrode." EX1006 at 4:39–41. A POSITA would have understood that an enclosure is something that encloses. Therefore, Mills's plating constitutes a portion of the enclosure under which the pad 14a is positioned.

b. Mills's leaf spring 62 discloses all the features of the claimed first pad

248. Grounds 1 and 2 include an alternative argument, namely that Mills's leaf spring 62 also satisfies the limitations of the claimed first pad. Pet. at 23. As explained above in Section VII.A.2 and shown below in Figure 2, the top portion of Mills's leaf spring 62 is "embedded in" a first portion of the enclosure. The top of leaf spring 62 is also a first pad that is positioned underneath the exterior surface of a first portion of the enclosure (electrode 14), as shown below.



EX1006 at Fig. 2.

249. Apple argues that the "[p]etition never expressly maps the top of leaf-spring 62 to the claimed 'first pad.'" POR at 39 (footnote 5). But the Petition explained that "[t]he top of the trapezoid-shaped leaf spring 62 is a pad" and showed that the top of the leaf spring presses against the "upper (first) portion", thus constituting a "first pad" under the alternative mapping of Ground 1. Pet. at 23–24. In this alternate mapping for Ground 1, electrode 14 operates as a "first portion" of the enclosure with the leaf spring pad 62 embedded in and positioned underneath. *Id.*

250. Apple also argues that Ground 1's alternative mapping of limitation 1[c(i)] is deficient because the leaf spring cannot include a "first connector"

according to Claim 1. POR at 44–45. This assumption is based on an incorrect interpretation that a "first connector" must be a separate component, which is not required in Claim 1. The Petition identified the top of the leaf spring 62 as a pad (POR at 23), so the other portions of the leaf spring or the leaf spring's connection to the circuit board constitute a first connector that provides the electrical signal "to the processor." Pet. at 47 ("[l]eaf springs are well known electrical connectors" and are "placed between two components as an electrical connector (or bridge).") . Thus, the leaf spring 62 includes a first pad and a first connector under this alternative mapping in Ground 1. *Id.*

251. Apple further argues that Ground 1 does not clearly identify electrodes 14 and 16 as part of Mills's enclosure. POR at 18–19, 22–23, 35, 38, 40. This mischaracterizes Ground 1. For example, Ground 1 cites Mills's consistent teaching of a "wrist-worn cardiac data and event monitor having *dry skin electrodes integral with the monitor's housing*." EX1006, Abstract; Pet. at 20, 28, 33–34. As shown in Figure 2 above, Ground 1 clearly identifies electrode 14 (which includes surface plating 14b) as comprising an upper portion of the enclosure and electrode 16 (which includes a surface plating) as comprising a lower portion of the enclosure. Thus, Mills's leaf spring pad is embedded in and positioned underneath a first portion of the enclosure.

252. Apple's POR also alleges that Mills's leaf spring 62 cannot constitute an embedded "pad" because the leaf spring is "positioned behind and parallel/adjacent to the electrode 14." POR at 42; *Id.* at 56–57 ("there is no disclosure in Mills of the leaf spring 62 being "embedded in" an electrode or any other component"); *Id.* at 69 ("the leaf-spring 62 is not 'embedded in' the electrode but rather 'placed…against' an inner surface of electrode 410b"). However, Dr. Kenny testified in a hypothetical scenario where a book is provided within a drawer of a desk it would be "embedded in" the desk, even if the book did not touch the drawer or the desk. EX1052 at 56:2–8. Thus, according to Dr. Kenny when a book is merely within the larger entity it is "embedded in," but contrarily when a leaf spring is within a larger entity it is not "embedded in." EX1052 at 202:12–15. However, Apple's own dictionary definition does not make a distinction between the embedding of a book or the embedding of a component of a leaf spring. *See* EX2005 at 3 (providing a definition of embedded as "that which has been included within a larger entity"). It is my opinion that a POSITA would understand that a leaf spring surrounded by a device enclosure would meet Apple's construction of "embedded in," consistent with Dr. Kenny's description of a book within a drawer of a desk.

2. Apple's Claim 1 Arguments Are a Distraction

a. Apple's "first mapping" arguments are incorrect

253. The POR misconstrues the Petition's "first mapping" as identifying the entire electrode 14 as the first pad. POR at 27. Apple then argues that the electrode 14 is exposed, and, thus, cannot both be embedded in and underneath the first portion. *Id*. at 27-28. As explained above, however, Masimo identified the base metal 14a as the "first pad" and plating 14b and part of the housing 12 as the "first portion." Thus, Masimo did not identify the entire electrode 14 as both the first pad and the first portion. *Supra* VII.1.A. Under the correct mapping, base metal 14a is both embedded in and underneath the first portion. *Id*. Additionally, the cardiac signal is detected from skin contact with the plating 14b that is a part of an exterior surface of the first portion. *Id.;* EX1006 at 4:32-47.

b. Apple's "second mapping" arguments are incorrect

i. Mills's plating 14b is part of the enclosure

254. The POR argues Mills's plating 14b is not a portion of the enclosure because electrode 14 is "a separate component from the housing 12 that is affixed to the housing 12." POR at 31. As explained above, however, Masimo identified both the plating 14b and the housing 12 as part of the enclosure. None of Masimo's mappings limited the enclosure to only Mills's housing 12.

255. Apple argues Mills's plating 14b is not part of the enclosure because it is an "imperceptibly thin coating" that lacks structural integrity. POR at 30, 32, 34-35. This argument is incorrect for several reasons. First, the ordinary meaning of "enclosure" includes the plating 14b because the plating cooperates with the housing 12 to enclose other components. *See* EX1052 at 185:1-15 (Dr. Kenny agreeing that the function of an enclosure is "to enclose" or "provide some protection"). Thus, a POSITA would have understood that an enclosure is something that encloses and can also protect whatever it encloses.

256. Dr. Kenny also stated that some of the ancillary functions of an enclosure are to protect the interior "from moisture, dust, and other things that might get in and cause problems." See EX1052 at 185:1-15. Consistent with Dr. Kenny's analysis, a POSITA would understand that the plating 14b cooperates with the housing 12 to enclose interior components including the base metal 14a.

257. Second, the claims and specification do not require a minimal thickness or structural rigidity for the enclosure. EX1001 at 12:21-14:50. Dr. Kenny agreed. EX1052 at 182:3-13. Regardless of this, Mills teaches that plating 14b provides rigidity and protects and extends the life of electrodes like electrode 14 by "producing an ***extremely hard***, exterior, skin-contactable surface." EX1006 at 4:40-43.

258. Finally, Dr. Kenny agreed the functions of an enclosure are "to enclose" and to "provide some protection." EX1052 at 185:1-15. Mills's plating serves those functions, as explained above. Therefore, Mills's plating 14b is part of the first portion of the enclosure under which pad 14a is positioned.

ii. Mills's base metal 14a is embedded in the first portion

259. Apple argues Mills's pad 14a is not "embedded in" plating 14b and therefore not embedded in a first portion of the enclosure. POR at 36-38. However, as explained above, the pad 14a is embedded in the first portion of the enclosure under the various constructions. *Supra,* VII.A.2. Apple's arguments regarding the plating 14b being parallel to the pad 14a are baseless because the first portion of the enclosure also includes part of the housing 12. Moreover, Dr. Kenny admitted that Mills's pad 14a is embedded in the enclosure. EX1052 at 186:18–187:6.

iii. Mills anticipates claim 1 under Apple's "second mapping"

260. The POR argues the "second mapping" should be disregarded because Mills's pad 14a is not separate from the plating 14b. POR at 38-39. Specifically, Apple asserts that there is no disclosure in Mills of the outer plating 14b being integrally molded in the housing 12 with the expanse 14a being a separate component." *Id.* But Claim 1 does not require that the pad be separate from the enclosure and not integrally molded. As described in the petition, the plating 14b is

integrally molded with the housing 12 as a part of the enclosure and pad 14a is integrally molded (and embedded in) the first portion of the enclosure. Pet. at 19-22.

c. Apple's "third mapping" arguments are incorrect because the identified "first pad" is "embedded in" the "first portion"

261. Apple characterizes Masimo's "third mapping" as identifying electrode 14 ***alone*** as the first portion. POR, 41. Apple then argues the leaf spring pad is merely "positioned behind" or "pressed against" this electrode. *Id*. at 42. But Masimo's second mapping (which corresponds to Apple's "third mapping") identified an upper part of housing 12 and the electrode as the "first portion." Pet. at 22-24. Under this mapping, the leaf spring pad is not just pressed against the electrode but surrounded by the housing, and, thus, embedded in the first portion, even under Apple's construction. *Supra* VII.A.2. Dr. Kenny's embedded-in testimony supports that conclusion. Specifically, he said a book within a desk drawer is embedded in the desk even if it does not touch the drawer or desk. EX1052, 56:2-8. Further, Apple's dictionary citation (from Wiley) defines "embedded" as "that which has been included within a larger entity." EX2005, 3.

262. Apple argues the pad is not "firmly set into" the first portion under Masimo's district court construction because the leaf spring is "slidably yielding." POR, 43. But in a fully assembled device, the leaf spring 62 would be compressed

tightly between electrode 14 and PCB 50, and thus would be fixed. *See* EX1006 at Fig. 2.

263. Apple cites one sentence of the Petition stating the pad is embedded in the ***device***. POR at 44. But Apple ignores the next sentence asserting the pad is embedded in the ***enclosure***. Pet. at 23-24.

264. Apple argues electrode 14 is not part of the enclosure because it is separate from the housing 12. POR at 40-41. But the claims do not require the enclosure to be a unitary piece. The electrode helps enclose other components and is part of the enclosure.

d. Apple's "third mapping" arguments are incorrect because the "first pad" and "first connector" are separate parts of the leaf spring

265. Apple argues the leaf spring cannot include both the "first pad" and the "first connector." POR at 44-45. But the top of the leaf spring Masimo identifies as the "first pad" is readily distinguishable from the bridging portion of the leaf spring Masimo identifies as the "first connector." Pet. at 31-32, 47. Moreover, unlike the cases Apple cites, the claim language and specification do not require the first pad and first connector to be physically separate parts. Indeed, a POSITA would have understood that the physical connection of the top of the leaf spring (first pad) to the bridging portion (first connector) serve the claimed function of transmitting signals from the first pad to the first connector.

3. Claim 3

266. The Petition explained that Mills's housing 12 makes up part of the enclosure and is a plastic electrical insulator. Thus, the enclosure's first and second portions are electrically isolated. Pet. at 34-35. All but one of Apple's Claim 3 arguments rely on an incorrect assertion that Masimo did not specify which parts of the housing are the first and second portions. POR at 46-48. The Petition identified the upper portion of Mills's housing 12 and plating 14b as the claimed "first portion." Pet. at 21-22. The Petition also identified the lower portion of Mills's housing 12 and the plating (equivalent to 14b as discussed above) of electrode 16 as the claimed "second portion." Pet. at 29-30.

267. The POR's other argument is that in the Petition the housing separates two ***electrodes*** rather than the first and second ***portions***. POR at 46. But that distinction is meaningless because the electrodes are embedded in the first and second portions. Thus, the housing separates ***both*** electrodes ***and*** first and second portions. Further, the Petition expressly states, "Mills teaches that the first and second portions are electrically isolated." Pet. at 35.

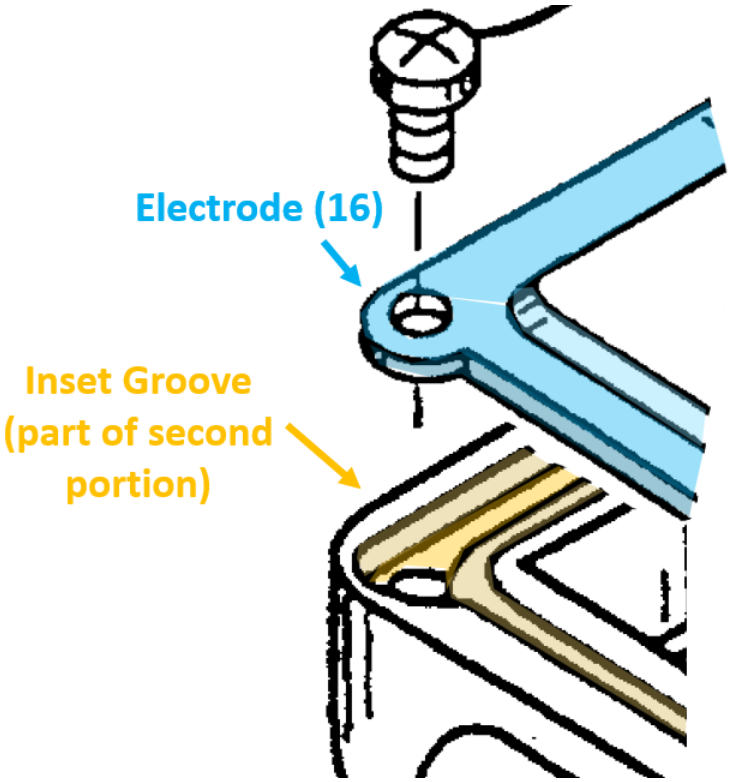
4. Claim 4

268. Apple's Claim 4 arguments are the same as the Claim 3 arguments and should be rejected for the same reasons as explained above for Claim 3. POR at 48.

5. Claim 10

269. Regarding Claim 10, Apple argues that Mills's electrode 16 cannot be part of the housing 12. POR at 48-49. But this mischaracterizes Ground 1 which explains that the plating 14b of electrode 16 comprises a portion of the **enclosure** which is not limited to the housing 12. Pet. at 29-30 ("electrode 16 with its base metal pad 14a is embedded into the housing 12 with exposed outer conductive surface 14b forming an exterior surface"); 39.

270. Apple also argues that Mills's electrode 16 cannot provide both the claimed "second pad" and the "second portion of the enclosure" because Claim 1 requires that the "second pad … is embedded in a second portion of the enclosure." POR at 49. But it is undisputed that electrode 16 is embedded in a portion of the enclosure, including being embedded in plating 14b and a lower portion of the housing 12. This plating 14b electrically connects the user to the second lead. One example of the embedding of electrode 16 is shown below, in addition to the plating of electrode 16.



Pet., 28-29.

271. Electrode 16 is constructed with the same electrode plating 14b as that of electrode 14. EX1006 at 4:10-13 ("electrode 16 of apparatus 10 is of identical material content and cross-sectional structure as electrode 14"); *Id.* at 2:16-17 ("The electrodes preferably are formed by plating"). Thus, the arguments in Section VII.B.1.a above apply here because the plating (14b) on electrode 16 constitutes a part of the second portion of the enclosure and the electrode 16 constitutes a second pad. *See* Pet. at 29-30.

C. Ground 2 – The Claims are Obvious over Markel and Mills

272. Apple argues that Ground 2 lacks clarity and fails to identify all the elements of Claim 1 in the prior art references. POR at 50–53. Contrary to Apple's arguments, Ground two clearly shows that the claims would have been obvious in view of Markel and Mills.

1. Claim 1

a. The Markel/Mills combination includes a first pad positioned underneath the first portion.

273. The POR argues that Markel's electrode 410b cannot be the "first pad" because it is not positioned underneath the first portion. POR at 53. Apple further argues electrode 410b is "disposed on a main body portion 110" and provides "electrode contact with a user's hand." *Id*. at 54.

274. These arguments do not address Masimo's proposed combination. Masimo relied on the top of Mills's leaf spring 62, incorporated into Markel's enclosure, as the first pad. Pet. at 45-48. The Petition's Ground 1 and Ground 2 sections explained that the top of leaf spring 62 is embedded in the first portion. *Id*. at 16-33, 45-48. Further, the top of Mills's leaf spring 62, when incorporated into Markel, would be positioned underneath the exterior surface of the first portion. *Supra*, Section VII.B.1.b; Pet. at 49. Therefore, Masimo's combination satisfies the "positioned underneath" limitation.

275. As explained above, Mills's top of leaf spring 62 is positioned underneath the exterior surface of the first portion. *Supra*, Section VII.B.1.b. Therefore, The Petition's combination satisfies the "positioned underneath" limitation.

276. Further, this "positioning underneath" corresponds well with Markel's teaching that electrodes that may be integrated into the housing of a device. In several instances Markel explains that its electrodes may be "molded into" various portions of the enclosure such that they may be "integrated into various molded components of the mobile communication device." EX1005 at [0037], [0045] (an electrode may be "placed on or molded into region 410b"); [0050] (an electrode may be "molded into the main body portion 620"). *See also Id.* at [0040] ("an electrode (or all electrodes) or other sensor may be substantially concealed (or hidden) from a user"). Thus, Markel and Mills compatibly teach electrodes that are molded into or embedded in a device housing.

b. <u>The Markel/Mills combination includes a first pad embedded in the first portion.</u>

277. Regarding Mills's leaf spring 62, Apple argues that the top portion/pad is not "embedded in" because it is merely placed underneath and against an inner wall of the enclosure. POR at 56. This is incorrect for all the reasons provided above in Section VII.B.1.b, explaining how the top portion of leaf spring 62 would

be surrounded by and "embedded in" the enclosure of Markel under any of the parties' constructions.

278. In making these arguments Apple's POR ignores the Petition's statements that:

> The pad 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. Accordingly, leaf spring 62 is a pad that would be embedded in the enclosure of the device of Mills.

Pet. at 46. It is my opinion that a POSITA would understand this mapping satisfies Apple's construction of an "embedded in" pad as "at least partially set in or partially surrounded by a material."

279. Apple argues that the leaf spring 62 is "slidably yielding," and, thus, its top would not be embedded in the first portion. Pet. at 57. However, Apple's expert later disagreed that the movement had any relevance on "embedded in":

> Q. And is the -- would that book inside the drawer be embedded even if the book is able to shift or change positions within the drawer?
>
> A. I think so, yes. The book, as long as it stays within the drawer, while it is in the drawer, it is partially surrounded by the material of the drawer. And therefore, I would say it is embedded in the drawer.

EX1052 at 58:22-59:8. I agree with Dr. Kenny. Apple's construction of "embedded in" says nothing about a pad being fixed and immovable. Rather, Apple's construction of "embedded in" only asks that a pad be "partially surrounded."

c. <u>The Markel/Mills combination includes the claimed first connector to a processor</u>

280. Apple also argues that Ground 2 fails to describe how the leaf spring 62 of Mills "is connected to the processor via a first connector." POR at 59-60. But Apple's argument disregards the teachings of Markel, which is in combination with Mills. I have been informed that it is improper to attack individual references when the obviousness analysis is based upon a combination of references. *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) ("Non-obviousness cannot be established by attacking references individually where the [challenge] is based upon the teachings of a combination of references.").

281. Furthermore, the Petition explained that "[l]eaf springs are well known *electrical connectors*" and are "placed between two components as an *electrical connector (or bridge)*." Pet. at 47 (emphasis added). The Petition identified the *top* of the leaf spring 62 as a pad (POR at 23), and a POSITA would have understood that the other portions of the leaf spring or the leaf spring's connection to the circuit board constitute a bridge or a first connector that provides the electrical signal "to the processor."

282. Apple also argues that the Petition's reference to Figure 20 "reverts to" a different mapping that involves pads 2022 and 2024 as first and second pads and annotates the figure:

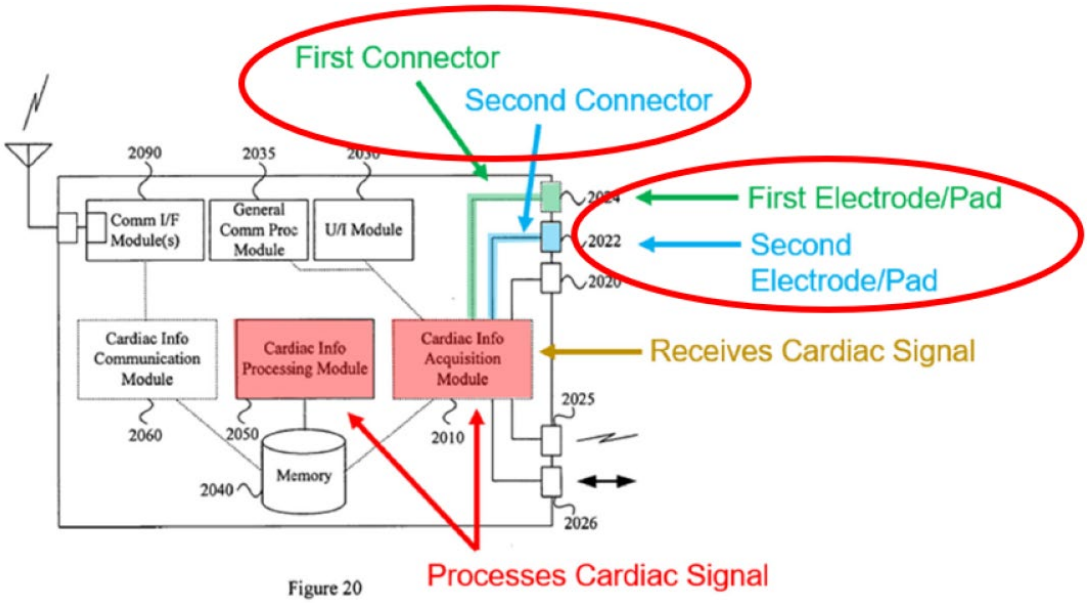


Figure 20

POR, 59.

283. But the Petition made clear that Figure 20 applied to *any* embodiment and was not relying upon Figure 20's specific implementation. Pet. at 52 (footnote 5). *See also* EX1005, [0108] (stating Figure 20 can "share various characteristics with the exemplary mobile communication devices and other devices illustrated in FIGS. 1-19 and discussed previously"). Masimo included Figure 20 to conceptually show a first and second pad (which are part of first and second electrodes) would couple to a processor through a connector. Apple also complains that Mills's leaf spring was not described with relation to the "first connector," but

this ignores that the Petition cited Mills's internal circuitry as a mapping, which is absolutely compatible with Mills's leaf spring. Pet. at 53-54. Masimo explained "[l]eaf springs are well known electrical ***connectors***" and are "placed between two components as an electrical ***connector*** (or bridge)." Pet., 47. Thus, connecting the pad to the processor with a leaf spring would have been well within the routine skill of a POSITA.

d. <u>A POSITA would have been motivated to combine Markel and Mills</u>

284. Contrary to Apple's arguments, the Petition showed that a POSITA would have been motivated, with a reasonable expectation of success, to use Mills's embedded-electrode teachings to implement Markel's electrodes and related connections. Pet. at 44-48.

285. Masimo explained that Markel discloses that its electrodes "may be ***integrated into*** various molded components" or "***molded into*** the region 410b." *Id*. at 42; EX1005 at [0037], [0045]. While that disclosure has the conceptual aspects of embedded-in electrodes, Masimo acknowledged Markel "does not provide details of the internal components of its device." Pet. at 44. Therefore, Masimo explained:

> A POSITA looking to implement Markel 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.

Id. Indeed, because Markel does not disclose how to implement its embedded-in electrodes, a POSITA would have been strongly motivated by ***necessity*** to find implementation details in another reference.[4]

286. A POSITA would have been motivated to look to Mills for information on internal components and structures to make a device like that taught by Markel. *Id.* at 44. The POR argues that the Petition only demonstrates that a "POSITA *could* have combined teachings of the two references" not that they would have. POR at 70 (emphasis in original). But the Petition expressly says a POSITA ***would*** have combined the references and explains in detail why a POSITA would have combined the teachings of Mills with Markel. Pet. at 47-48. Masimo identified Mills's disclosure of two types of embedded-in electrodes—electrode 14 (specifically, 14a) formed in "an integral part of the housing 12 by being molded therein" and the leaf-spring pad 62—as examples of information a POSITA would use to implement Markel's electrodes. A POSITA would have been motivated by necessity and found it obvious to add either of Mills's electrode structures into Markel at least because

[4] To be clear, Markel enables embedded-in electrodes because its disclosure is sufficient to lead a POSITA to prior-art disclosures of well-known electrode structures such as Mills.

Markel conceptually discloses embedded-in electrodes and Mills provides additional implementation details. EX1005, [0037]; EX1006, 3:44-51, 6:51-56.

287. For example, the Petition explains that 1) both Markel and Mills teach electrodes that are integral with a device's housing (Pet. at 44–45); 2) in both references the electrodes are molded into the housing (Pet. at 45); 3) Mills provides details of internal physical connections on which Markel is silent (Pet. at 47); 4) spring connectors are commonly employed as electrical connectors (*Id.*); 5) leaf springs provide good electromechanical contact between two components (*Id.*); 6) leaf springs maintain good contact pressure (*Id.*); 7) leaf springs solve manufacturing and assembly complexities by, for example, eliminating the need to solder a wire between the electrode and a circuit board to electrically connect the two together (*Id.*); and the incorporation of a spring connector would have been a mere rearrangement of known mechanical components in known ways in a complementary device (*Id.* at 48). These facts were supported by my detailed expert testimony, not attorney argument. EX1003 at ¶84–86.

288. In addition, leaf springs and spring connectors are often used in electronic equipment and have many benefits, as explained in the Journal of Microelectronics Reliability and other literature. *See* EX1059-1061 and EX1066-1067. For example, a POSITA would have been motivated to combine the leaf spring of Mills with the device of Markel because a leaf spring ensures a continuous,

reliable, and low-resistance electrical connection between the components. *See* EX1059 at Abstract; EX1060 at Abstract; EX1061 at 2. Leaf springs allow for easier assembly, disassembly, and maintenance of an electronic device, as a leaf spring may be connected and disconnected from an electrical contact at the top of the leaf spring without having to solder or unsolder the connection. EX1060 at 1 (spring contacts "offer many advantages like easy assembly without soldering"). In particular, leaf springs are designed to withstand vibration or a high number of movement and mating cycles without a significant reduction in performance. ; EX1061 at 7; EX1060 at 4 (showing reliability over 4.65 million micro-movements). These benefits are also seen under harsh conditions and rapid temperature changes. EX1060 at 1 ("The reliability of spring contacts under environmental stress by mechanical wear, rapid temperature change and corrosive atmosphere is significant"); EX1061 at 7; EX1059 at 5. Leaf springs are also compact and ideal for consumer devices where space is limited. EX1061 at 7 ("PCB spring contacts come in various compact form factors, making them suitable for applications with limited space, such as miniature electronic devices"); EX1067 at 4:1-6, 32:32-34; 33:51-34:22 (teaching conductive portions and a leaf spring as an electrical interconnect in a medical device), 34:23-40 (teaching a leaf spring that functions, in part, to "secure and align sensor 138"). Moreover, a leaf spring such as Mills's "slideably yielding" leaf spring (EX1006, 5:1) provides a constant contact via the spring-induced presure.

EX1061 at 7 ("constant pressure exerted by the spring ensures low electrical resistance"). The leaf spring's "self-adjusting nature helps compensate for any minor misalignments or deformations, reducing the risk of connection failure." EX1061 at 7. Leaf springs and spring contacts are also highly versatile and may be used in a variety of applications and electrical current levels, from load connectors to sensor contacts, such as ECG sensor contacts. EX1059 at Abstract (teaching spring contacts may be "can be applied to load connectors, control contacts and auxiliary sensor contacts"); EX1060 at Abstract (teaching spring contacts may be used "in a wide current range from sensor currents of a few milliamps to load currents of several amps"); EX1061 at 8 (teaching spring contacts, which include cantilevered leaf springs, may be used in robotics, energy, IoT, medical devices, and telecommuncations equipment). Finally, leaf springs and cantilevered contacts are inexpensive and preferred for consumer electronics produced in volume. EX1066 at 1 ("cantilever contacts provide the more economical interconnect for volume consumer electronic level products"); EX1061 at 4 (teaching that cantilevered spring contacts are "commonly used in applications with limited space"). Therefore, a POSITA would have found the combination of the leaf spring of Mills into the device of Markel as obvious and nothing more than a rearrangement of known mechanical components in known ways in a complementary device. Apple's expert agreed with this and confirmed that a leaf spring is an interchangeable component

that POSITA would have considered as a "reasonable choice" in a device like Markel's. EX1052, 197:19-199:3. *See also* EX1067 at 40:21-28 (teaching "conductive springs" as interchangeable with other conductive attachment members such as solder welds and clips in a medical device).

289. Apple alleges that there are "stark differences between" Markel and Mills that would prevent their combination. POR at 70. Without knowing the internal arrangement of any of the components of Markel, Apple alleges that providing a leaf spring within Markel's device would not have been a mere rearrangement of known mechanical components. *Id.* at 71. Specifically, Apple alleges that Mills's only provides electrodes on opposite sides of the device whereas Markel only provides electrodes on the same side of the device. POR at 71–73. This grossly misconstrues Markel and the variety of configurations in its Fig. 1 to Figure 15 embodiments. Additionally, this ignores the abilities of a POSITA to use knowledge from prior art and experience to design embodiments for particular requirements. Further, Apple provides no explanation as to why two leafsprings cannot be placed on the same side of a device.

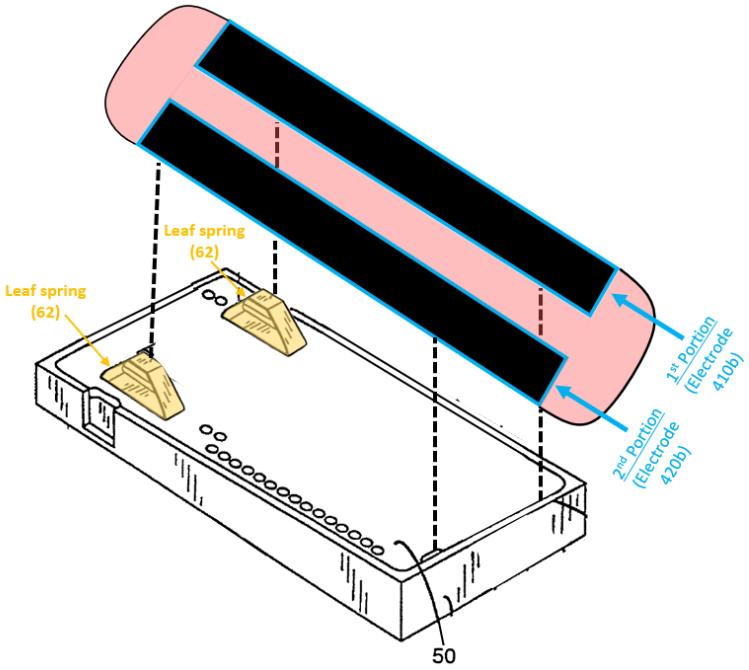
290. Markel explicitly teaches that electrodes may be provided in mutliple different devices with unique configurations. For example, Markel shows that electrodes may be provided in close proximity on a pushbutton (Figures 2 and 3), on the back side of a mobile device (Figures 4 & 9), in a front pushbutton and on the

back of a mobile device (Figure 5), in the front audio port and the back of a mobile device (Figure 6), in an auxiliary device (Figure 7/8), in a desktop keyboard key, in a touchpad, and in the bezel of the keyboard (Figure 13), in the front, rear, and sides of a desktop mouse (Figure 14), and in the bezel and the display screen of a tablet (Figure 15). EX1005 at 2–13. *See also* Pet. at 55–56. Markel did not express any constraint as to where electrodes (and their underlying connections and electronics) can be placed and where they cannot. EX1005 at [0045] ("A plurality of electrodes (or other sensors) may be disposed in *any of a variety of locations*"). Therefore, Apple's assertion that Markel only provides electrodes on the same side of the device is factually incorrect.

291. Kenny confirmed leaf springs function similarly to other connectors. EX1052, 197:19-199:3. He testified a POSITA would have considered them a "reasonable choice" at the time of Mills but later would prefer flex cable. EX1052, 197:19-199:3. However, recent publications still extoll the widespread use and advantages of leaf springs and spring contacts. EX1061 at 7-10; EX1067 at col. 32-34. Moreover, incorporating Mills's leaf spring into Markel need not be optimal—but only a "suitable" alternative—to make the combination obvious.

292. Apple alleges that Mills's PCB is only oriented parallel to the "width side" of Mills's device, so it would *need* to be oriented parallel to the width side of Markel's device, which would produce a "cumbersome" device. POR at 73–74. This

argument is unclear and unsupported, as Mills's never refers to a "width side" and Apple never explicitly shows what the width side is or why it is allegedly cruical to Mills. *Id.* To add to this, this argument uses a rigid and formulaic combination of the two references and relies upon the "bodily incorporation" of Mills's PCB, which I have been informed is the wrong legal standard. *In re Keller,* 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981) ("The test for obviousness is not whether the features of a secondary reference may be *bodily incorporated* into the structure of the primary reference . . . Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art."). *See also In re Nievelt,* 482 F.2d 965, 179 USPQ 224, 226 (CCPA 1973) ("Combining the *teachings* of references does not involve an ability to combine their specific *structures*."). Moreover, this argument fails to account for the abilities of a POSITA, as I understand that a POSITA is a person of ordinary creativity. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) (a POSITA "is also a person of ordinary creativity, not an automaton."). Changing from a front-back to a left-right orientation is a mere rearrangement of known mechanical components in known ways. Leaf springs would couple components to both front-back-oriented and left-right-oriented electrodes in essentially the same way. For example with reference to Figure 4 of Markel, a POSITA having ordinary creativity would have been able to align and rearrange Mills's leaf spring as illustrated below:



See EX1005 at Figure 4; EX1006 at Fig. 2 (leaf springs provided on Mills's PCB and aligned behind Markel's 410b and 420b).

293. Apple has not shown why such a configuration would not have been feasible. Many other configurations are also possible and within the purview of a POSITA. Further, it is unclear how Apple's expert is qualified to comment on the capabilities of a POSITA or the location of biosensing leads. It appears that his expertise with electrodes revolves around an EKG that he had as a patient rather than as an engineer, and none of his personal work or the work of his students has included leads for an EKG. EX1023 at 17:7–18:13; 29:1–20; 30:19–31:16; 228:6–19. Thus, Apple's assertions regarding a lack of motivation to combine the references with a reasonable expectation of success are baseless.

2. Claim 2

294. Apple alleges that Markel does not teach first/second portions of electrodes "located on opposite sides of the electronic device." POR at 60–61. But it appears that Apple incorrectly interpreted Claim 2 to require that the electrodes be on opposite **faces**, rather than opposite sides. Even so, the Petition explains that Markel discloses electrodes on opposite (left and right) sides in Figure 4 (410b, 420b) and opposite faces in Figure 5:

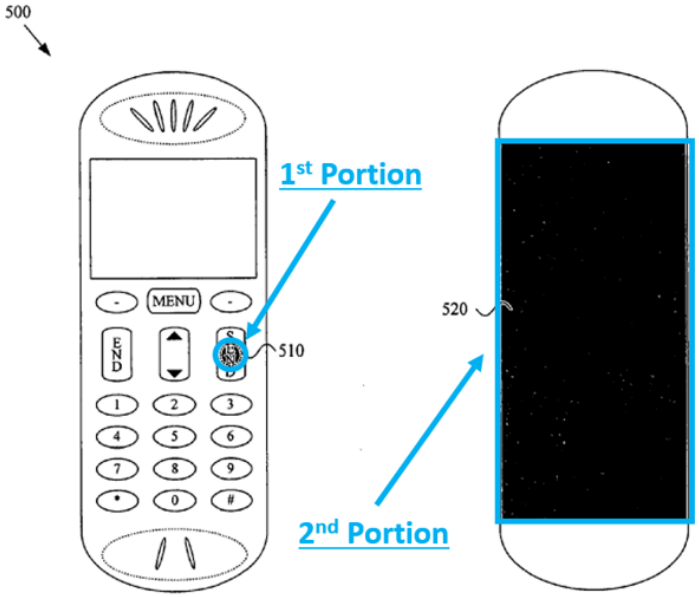


Figure 5

Pet. at 55.

3. Claim 9

295. The POR contests that the Petition has "not even attempted to demonstrate" the limitations regarding a portion of an exterior surface "behind the display" of Markel. POR at 61–62. As explained in the Petition, Markel includes an

enclosure that supports a display and is "behind" a portion of the display, as required by Claim 9. For example, the Petition referred to Figures 1 and 15, which both support a display and have a portion of the enclosure behind the display. Pet. at 59. Markel's Figure 1/Figure 4 housing wraps behind the display, enclosing Markel's electronic components and protecting the device interior. EX1005 at Figs. 4, 5, and 15, [0043] (discussing "rear portions of the main body portion 100" that are shown in Fig. 4), [0045]. Thus, Markel teaches a portion of the housing "behind" the display and Apple's arguments are baseless.

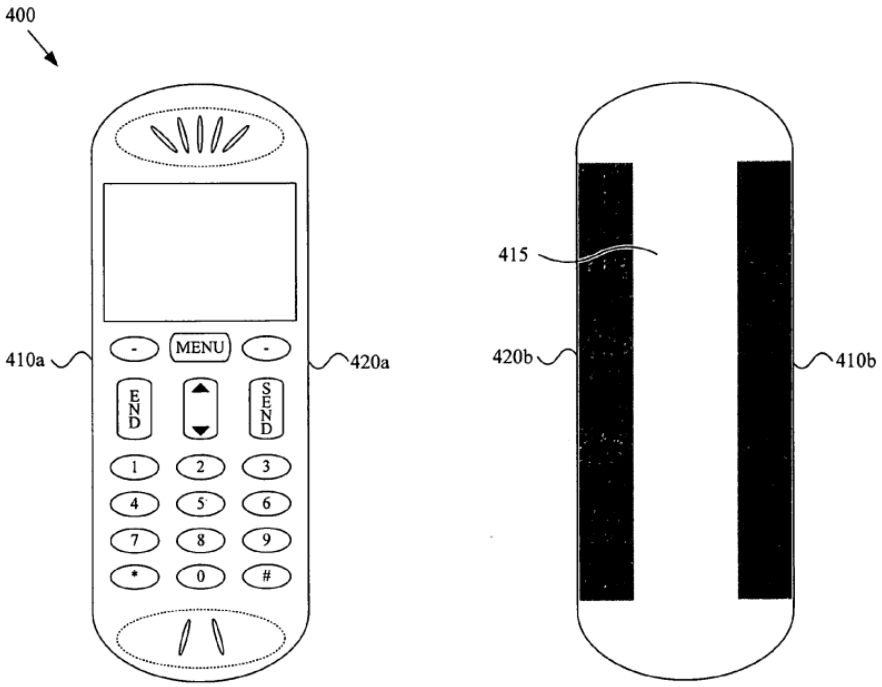
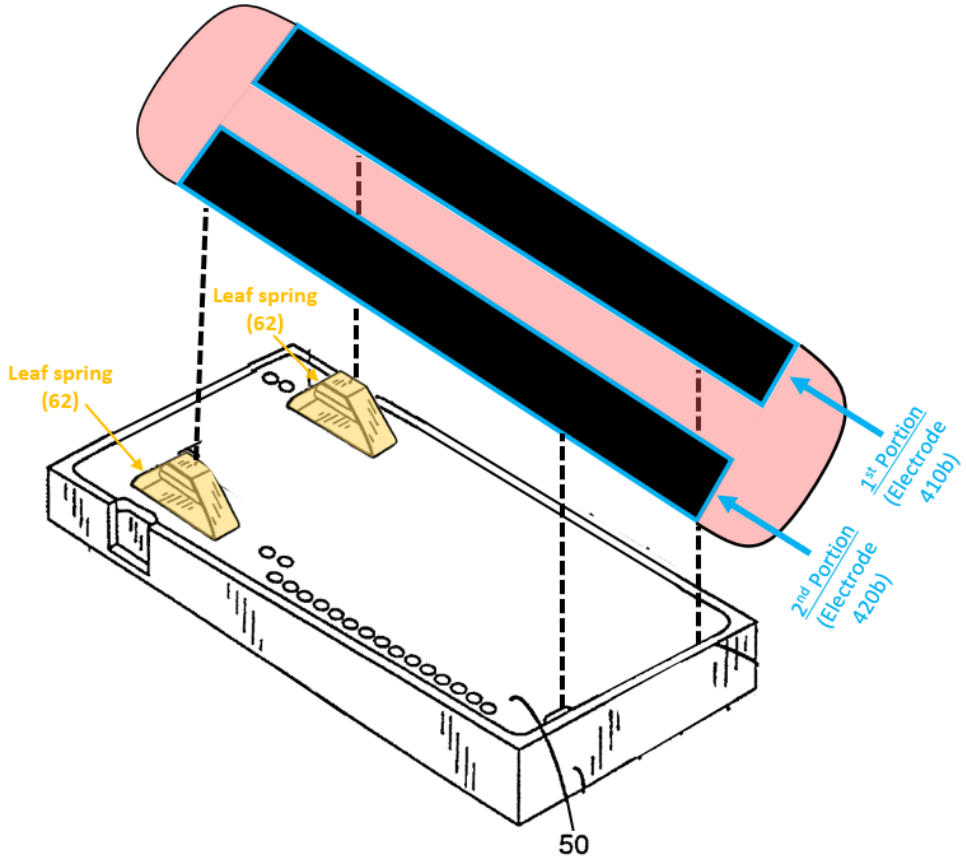


Figure 4

EX1005, Fig. 4 (showing front and back of the housing).

4. Claim 10

296. Apple incorrectly argues that electrode 420b is an "externally exposed" electrode. POR, 62-63. This is not true. Markel teaches that the electrode may be "***placed on*** or ***molded into*** region 420b." EX1005 at [0045]. Further, this ignores Markel's combination with Mills, by incorporating Mills's leaf spring. Therefore, a POSITA would have understood that the pad on the top of the leaf spring is not "exposed." *See* EX1005 at [0040] (Markel's electrodes may be "substantially concealed (or hidden) from a user"). A POSITA would understand that one or more Mills's leaf springs would be provided behind Markel's 410b or 420b as shown below:



See EX1006 at Fig. 2; EX1005 at Fig. 4 (leaf springs provided behind Markel's 410b/420b).

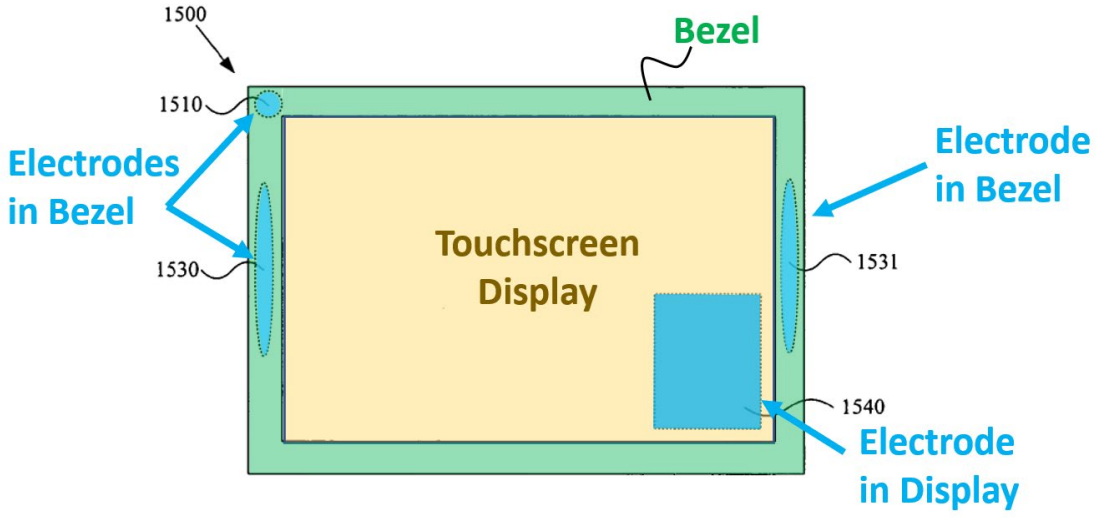
5. Claim 12

297. Claim 12 depends on Claim 1 and only adds that the first portion is a bezel. Apple alleges that Masimo somehow abandoned its Claim 1 analysis that referenced Figure 1 and engaged in a "slight [sic] of hand" by identifying a different "first portion" for Claim 12 than for Claim 1. POR at 63. But the POR narrowly reads the Petition, which proposes simply placing the same embedded electrodes discussed for Claim 1 in a bezel, such as shown in Markel's Figure 15. Pet. at 62.

The POR does not allege placing those electrodes in a bezel would not have been obvious.

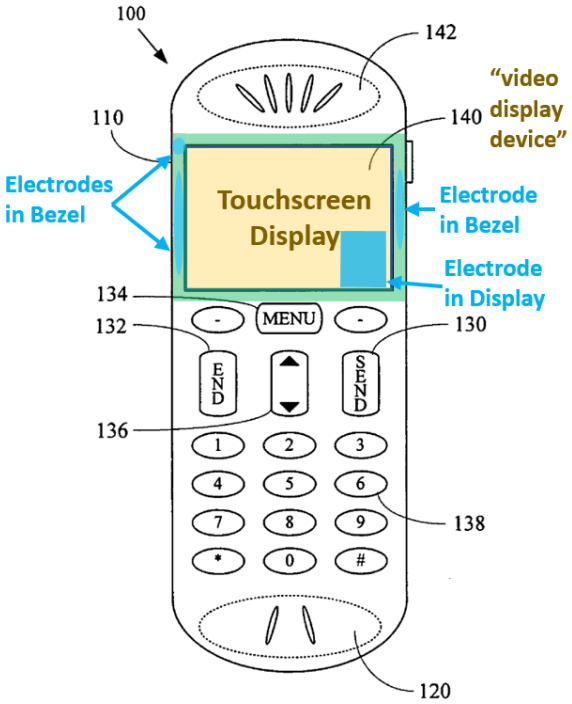
298. Markel teaches that an electrode may be embedded in a touch screen of display 140 (shown in Figures 1 and 4–8) ***and*** in the touchscreen of display device 1500 of Figure 15. EX1005, [0044], [0078]. Apple argues that the Petition does not explain how Figure 4 and 15 "would be combined" (POR at 63), but, consistent with the Board's findings, Figure 4 discloses generally the same embodiment as that shown in Figure 15 and has interchangeable features. Inst. Dec. at 43.

299. Figure 15 illustrates an electrode integrated into the touchscreen (1540) and electrodes embedded in the border of the device (1510, 1530, 1531). EX1005, [0078].



EX1005 at Fig. 15.

300. Similarly, Markel teaches these electrode locations in Figure 4: "an electrode may be disposed on a video display device 140 (e.g., a border of the display or integrated into a touch screen)." EX1005 at [0044]. Thus, by applying Markel's direct teaching, the display device may contain the electrodes shown below:



301. Additionally, Apple's arguments ignore that a POSITA is a person of ordinary creativity, not an automaton. Markel confirms this creativity of the POSITA and teaches that "electrodes (or other sensors) *may be disposed in any of a variety of locations."* EX1005 at [0045]. Markel shows the wide variety of devices and locations where electrodes may be placed. For example, Markel teaches embedding electrodes in pushbuttons (Figures 2 and 3), mobile devices (Figures 4, 5 & 9), audio ports (Figure 6), auxiliary devices (Figure 7, 8), desktop keyboard keys, touchpads,

and keyboard bezels (Figure 13), a desktop mouse (Figure 14), and in the bezel and the display screen of a tablet (Figure 15). EX1005 at Figs. 1-15. These demonstrate that the teachings of Markel are not constrained to any particular embodiment or form factor, and a POSITA would have understood that the teachings of the Figures 1, 4 and 15 embodiments are compatible with each other.

302. Consistent with the knowledge and abilities of a POSITA, it would have been obvious to add Mills's embedded pads (either base metal 14a or leaf spring 62) under Markel's bezel.

6. Claim 13

303. The POR's Claim 13 arguments are the same as the Claim 12 arguments and should be rejected for the same reasons as explained above for Claim 12. POR at 65.

7. Claim 15

304. The POR incorrectly argues that the Petition used Markel's Figure 1 embodiment for most limitations but switched to Figure 15 for the display-screen-embedded lead. POR at 66. To the contrary, as explained above with reference to Claim 12, the Petition showed the Figure 1 embodiment ***itself*** has a display-screen-embedded electrode. Pet. at 75 (citing EX1005, [0044]). Masimo did not need to add anything from Figure 15 but cited it because it illustrates a display-screen-embedded electrode. Pet. at 75. Markel's disclosure of a phone with a display-

screen-embedded electrode counteracts Apple's argument that a phone's small display would have deterred that configuration. EX1005 at [0044]. Further, the Board found Figure 4 discloses generally the same embodiment as Figure 15. Inst. Dec. at 43.

8. Claim 19

305. The Markel/Mills combination renders obvious "the first portion … comprises a bezel" for the same reasons set forth above for Claim 12. For the electrical-isolation limitation, Apple does not contend that Markel fails to teach an insulator for electrically isolating leads with regard to Figure 2 but contends that the Petition did not explain how to integrate the insulator into Markel's other embodiments. POR at 67. However, Masimo did not propose putting the exact structure of Figure 2 into another figure (bodily incorporation). Rather, the petition cited Markel as suggesting that electrically isolating leads are necessary to properly measure ECG. Pet. at 80-81. In view of that suggestion, a POSITA would have easily included an insulator to electrically isolate the leads.

9. Claim 20

306. Apple repeats its Claim 10 argument that Markel's leads, such as 410b, are exposed and a user would touch the electrodes, not the first portion. POR at 68-69. This is an incorrect reading of the combination of Markel and Mills, as discussed with regard to Ground 2, Claim 10. Apple disregards the fact that Ground 2 is a

combination of the teachings of Markel and Mills, and the limitations of Claim 20 would have been obvious based on the combination of these references. *See also* EX1005, [0045] (electrodes "placed on or molded into" regions), [0040] (electrodes are "hidden").

307. Apple also repeats its argument that Mills's leaf spring 62 is not "embedded in" but rather placed against an inner surface of electrode 410b. But as discussed above, Mills's leaf spring pad is embedded in a first portion of the enclosure under Apple's own construction.

VIII. CONCLUSION

308. For these reasons, it is my opinion that each of Claims 1–4 and 8–22 is unpatentable.

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