

Masimo Corporation (Petitioner)  
V.  
Apple Inc. (Patent Owner)  
Patent Owner Demonstratives

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

Before Hon. Ken B. Barrett, Josiah C. Cocks, and Robert L. Kinder  
Administrative Patent Judges

**FISH**

# Petition's Challenges to Issued Claims

## Table of Contents

| Section                                                                                           | Slide |
|---------------------------------------------------------------------------------------------------|-------|
| Overview of the '257 Patent                                                                       | 4     |
| A POSITA Would Not Have Combined Chae And Narendra                                                | 7     |
| Overview of Mills (Grounds 1 & 2)                                                                 | 15    |
| Masimo's Inconsistent Mappings of Mills to the Claims                                             | 19    |
| Masimo's First Mapping of Mills to the '257 Patent Fails to Provide All Elements of Claim 1       | 28    |
| Masimo's Second Mapping of Mills to the '257 Patent Fails to Provide All Elements of Claim 1      | 30    |
| Masimo's Third Mapping of Mills to the '257 Patent Fails to Provide All Elements of Claim 1       | 39    |
| Masimo's Impermissible New Arguments                                                              | 44    |
| Masimo's Improper New Theory for the Petition's Second Mapping of Mills to the Claims Still Fails | 55    |
| Masimo's New Theories Fail Because the First Portion of the Enclosure Must be Conductive          | 58    |
| Masimo's New Theories Fail With Respect to Claim 2                                                | 64    |
| Masimo's New Theories Fail With Respect to Claims 3 & 4                                           | 67    |
| The Markel-Mills Combination (Ground 2) Fails to Provide All Elements of Claim 1                  | 69    |
| A POSITA Would Not Have Applied Mills to Markel in the Proposed Manner                            | 77    |



# Revised Contingent Motion to Amend Table of Contents

| <u>Section</u>                                                                                         | <u>Slide</u> |
|--------------------------------------------------------------------------------------------------------|--------------|
| Revised Contingent Motion To Amend                                                                     | 80           |
| Mills’ “metal-plating composition 14b” is not part of the enclosure separate from base metal layer 14a | 81           |
| Lyon’s and the Other Newly Cited References Are Incompatible with Mills and Markel                     | 84           |
| Kyoso Does Not Authenticate The User                                                                   | 87           |

# Overview of the '257 Patent

## Claim 1 of the '257 Patent

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.

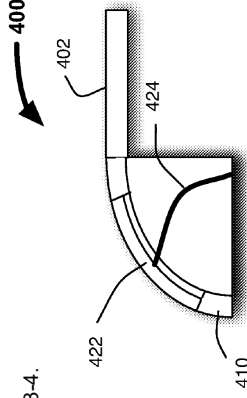
a first lead comprising a first pad that is embedded in a first portion of the enclosure, wherein an exterior surface of the enclosure comprises an exterior surface of the first portion, wherein the first pad is positioned underneath the exterior surface of the first portion, and wherein the first pad 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

# Overview of the '257 Patent

## The '257 Patent

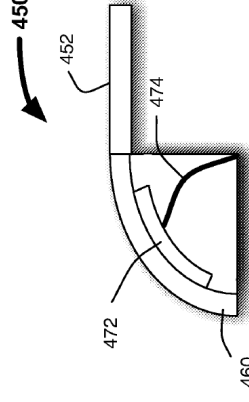
Heart sensor 112 can include any suitable sensor operative to detect a user's heartbeat, heart rate, or any other signal generated by the user's heart. In some embodiments, heart sensor 112 can serve as an EKG monitor. Heart sensor 112 can include one or more leads connected to the exterior of the electronic 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. The cardiac signals detected by the heart sensor leads can be coupled to a processor incorporated in heart sensor 112, or instead provided to processor 102. The processor may then analyze the received signals and generate, from the received signals, one or more characteristic quantities of the user's heartbeat or heart rate for authentication.

EX1001, 6:4-16; POR, 3-4.



EX1001, 9:45-57; POR, 3-4, 6.

Alternatively, 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. The short thickness of bezel 460 can allow 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 a processor using connector 474. In addition, if several leads are placed along different portions of bezel 460, the distance between adjacent leads can 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.



EX1001, FIGS. 4A, 4B; POR, 4.

## Plain and Ordinary Meaning of “embedded in”

## “embedded in”

Dr. Kenny:

31. In my opinion, the term “embedded in” should be given its plain and ordinary meaning, which does not require an explicit construction. A POSITA would have known what it means for a first material, structure, or component to be “embedded in” a second material, structure, or component based on both the plain and ordinary meaning of this term and the way in which this term is used in the '257 patent specification, which conforms with the plain and ordinary meaning. However, should it be necessary to define the parameters of the plain and ordinary meaning for this term, an express construction of the term “embedded in” that a POSITA would have recognized as consistent with the plain and ordinary meaning of this term is “at least partially set in or partially surrounded by a material.”

## “embedded in”

### The '257 Patent:

“one or more leads can be ***embedded in or*** adjacent to the housing”

EX1001, 10:24-29; POR, 5.

“Alternatively, 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.”

EX1001, 9:44-48; POR, 6.

“electronic device 300 can include additional lead 326 ***embedded in or*** behind display 302”

EX1001, 8:40-41; POR, 7.

“Leads 322 and 324, which can include conductive pads can be ***coupled to sides 312 and 314*** of bezel 310...leads 322 and 324 [are] ***embedded directly in*** bezel 310.”

EX1001, 8:20-9:1; POR, 7.

## “embedded in”

### The claims of the '257 Patent distinguish “embedded in” from “embedded with”:

#### Claim 1:

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

#### Claim 9:

a third lead embedded with the display, wherein the third lead is configured to detect a third electrical signal of the user's cardiac signal via the user's contact with at least one of the third lead and the display.

## “embedded in”

### Dr. Kenny (Apple’s Expert):

32. The ’257 patent uses the term “embedded” throughout, including in the title. The various uses of the term “embedded” also indicate that the claim term “embedded in” has a narrower meaning than the term “embedded” on its own as used in the specification. This is demonstrated by several examples from

APPLE-2003, ¶32; POR, 5-6.

### Mr. Oslan (Masimo’s Expert):

“embedded in” is narrower than “embedded.”

EX1065, ¶1212; Sur-Rep., 2.

So I have no opinion on -- of these definitions, which is correct.

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APPLE-2011, 28:21-29:8; Sur-Rep., 3-4.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

## “embedded in”

### Mr. Oslan (Masimo's Expert):

Q. You stated that the term "embedded in" is narrower than the term "embedded," but you haven't actually thought about what the difference between the two terms is; is that correct?

MR. EVERTON: Objection to form.

THE WITNESS: So the analysis that I did in my declarations was to show that under any of the definitions of "embedded" or "embedded in" that the claims in the '257 patent are unpatentable.

BY MR. BISENIUS:

Q. And what I'm asking you is if you can provide any examples to show the distinction between the term "embedded in" and the term "embedded," such that a component would be embedded but not embedded in?

MR. EVERTON: Objection to form.

THE WITNESS: So I did not do that analysis in my declarations. My analysis was to show that under any of the definitions of "embedded" or "embedded in" that the claims in the '257 were unpatentable.

## “embedded in”

### Plain and ordinary meaning of “embedded in” according to dictionary definitions:

**embedded** That which has been incorporated into a surrounding mass or enclosure. For example, an embedded electronic component or device. Also, that which has been included within a larger entity.

APPLE-2005, 3; POR, 9-10.

**em-bed** *also* **im-bed** \im-'bed\ *vb* **em-bed-ded** *also* **im-bed-ded**: **em-bed-ding** *also* **im-bed-ding** *vt* (ca. 1794) **1 a** : to enclose closely in or as if in a matrix <fossils *embedded* in stone> **b** : to make something an integral part of <the prejudices *embedded* in our language> **c** : to prepare (a microscopy specimen) for sectioning by infiltrating with and enclosing in a supporting substance **2** : to surround closely <a sweet pulp *embeds* the plum seed> *vi* : to become embedded — **em-bed-ment** \-'bed-mənt\ *n*

APPLE-2006, 3; POR, 10.

**em-bed** (em bed'), *v.*, **-bed-ded**, **-bed-ding**. —*v.t.* **1.** to fix into a surrounding mass: to embed stones in cement. **2.** to envelop or enclose. **3.** to contain or implant as an essential or characteristic part. **4.** to insert (a grammatical construction, as a phrase or clause) into a larger construction, as a clause or sentence. —*v.i.* **5.** to be fixed or incorporated into a surrounding mass. [1770–80] —**em-bed'/ment**, *n.*

APPLE-2007, 3; POR, 10.

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

## “embedded in”

### Masimo’s district court construction for “embedded in”:

#### 1. “embedded in” (’257 Patent, Claim 1)<sup>14</sup>

##### a) Apple’s Opening Position

| Apple’s Proposed Construction<br>plain and ordinary meaning | Masimo’s Proposed Construction<br>set firmly into and surrounded by material |
|-------------------------------------------------------------|------------------------------------------------------------------------------|
|-------------------------------------------------------------|------------------------------------------------------------------------------|

APPLE-2004, 57; POR, 10-11.

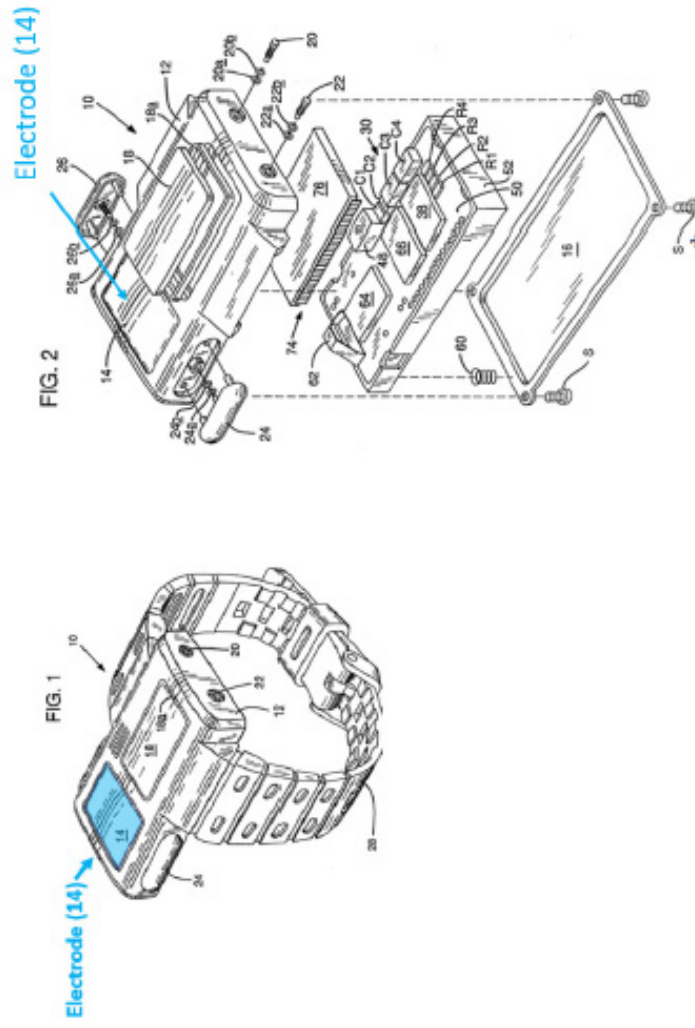
Apple’s definition would encompass embodiments the specification contrasts with “embedded in,” such as “behind,” “embedded along,” and “adjacent to.” ’257 patent at 8:40-41, 9:22-24, 10:28-29.

APPLE-2004, 61; POR, 10-11.

## Overview of Mills (Grounds 1 & 2)

## Mills' Device

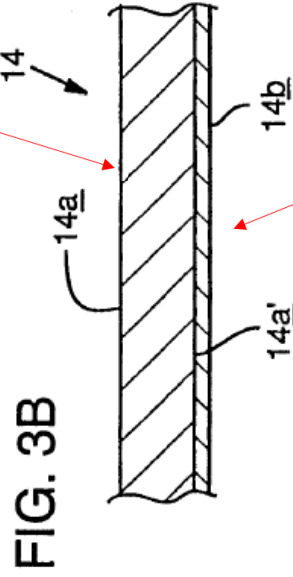
Mills:



## Mills' Device

Mills:

Base metal layer 14a



3-microns thick metal-plating layer 14b

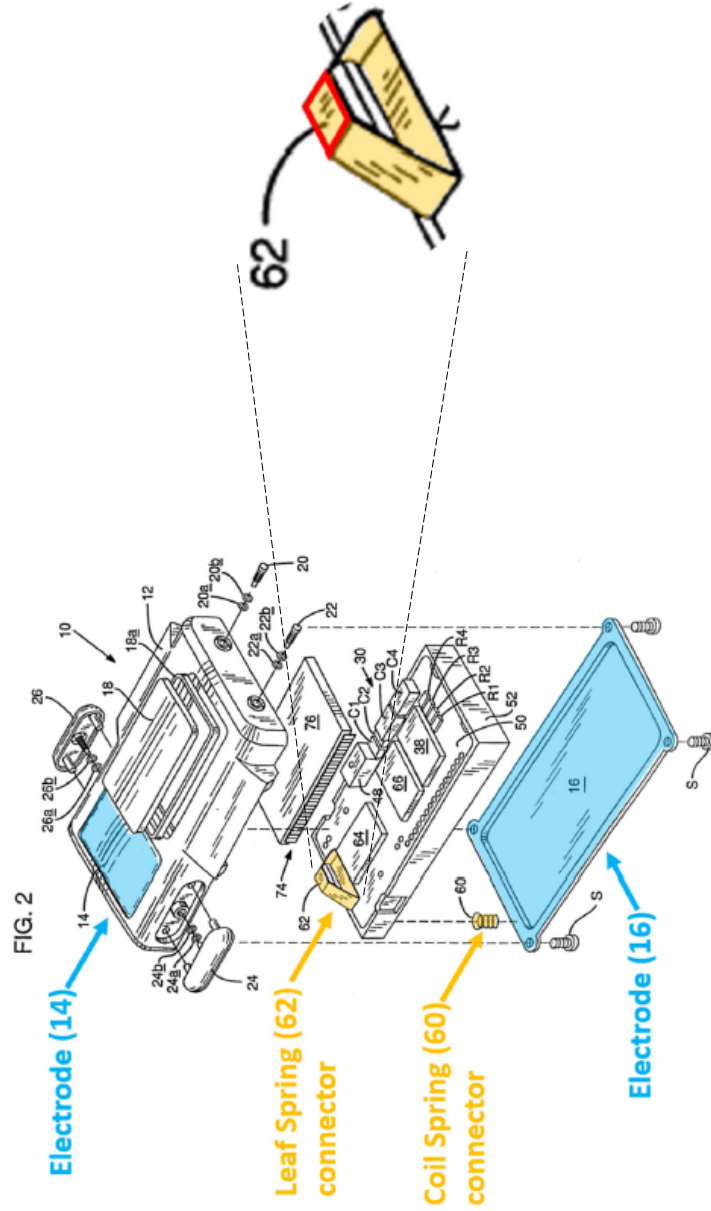
As illustrated in FIG. 3B, an electrode such as electrode 14 preferably comprises an expanse 14a formed of a base metal such as stainless steel, with expanse 14a being electrically connectable with such monitoring equipment, as illustrated in FIGS. 1 and 2. Plating an outer, skin-contactable region or surface 14a' of expanse 14a is a composition 14b (shown in greatly enlarged thickness in FIG. 3B relative to that of expanse 14a) including a first component of a preferably bio-compatible, conductive (e.g. metallic) element such as titanium, and at least a second component chosen from a group including nitrogen and carbon. It will be understood that electrode 16 of apparatus 10 is of identical material content and cross-sectional structure as electrode 14, but is of much greater surface area.

...

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.

# Mills' Device

Mills:



## Masimo's Inconsistent Mappings of Mills to the Claims

## Claim 1 of the '257 Patent

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 the first pad is

surface of the enclosure comprises an exterior sur-

face 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 embed-

ded 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 com-

prises a second connector coupled to the second pad

and configured to provide the second electrical signal

detected by the second pad to the processor.

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EX1001 ('257 Patent), Claim 1.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

## Masimo's Burden

“It is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that *the initial petition identify ‘with particularity’* the ‘evidence that supports the grounds for the challenge to each claim.’” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016)

POR, 16

“In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016)

POR, 16

# Masimo's First Mapping of Mills to the Claims

## Petition:

Accordingly, Mills discloses a first pad - electrode 14.

Pet., 19; Sur-Rep., 5-6; POR, 15-17.

ii. Limitation 1[b(ii)]: “embedded in a first portion of the enclosure”

Fig. 1 of Mills discloses its electrode 14 (first pad) is “integrally molded” (*i.e.*, embedded) into the housing. EX1006, Fig. 1; 3:8-9; EX1003, ¶59.

Pet., 19; Sur-Rep., 6; POR, 15-17, 19.

10” – a wrist-worn cardiac data monitor. EX1006, 3:62-67. A POSITA would understand from this disclosure the electrode 14 (pad) of Mills is configured to detect

Pet., 26; Sur-Rep., 6; POR, 17-18.

EX1006 at 4:67 – 5:3; *see also* 4:1-3. Accordingly, leaf spring 62 is a first connector coupling electrode 14 (first pad) to the processor of Mills. EX1003, ¶¶60, 65.

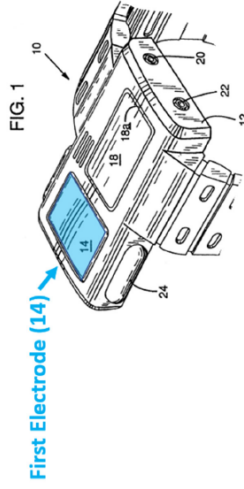
Pet., 31; Sur-Rep., 6; POR, 17-18.

# Masimo's First Mapping of Mills to the Claims

## Petition:

- i. Limitation 1[b(i)]: “a first lead comprising a first pad”

Electrode 14 of Mills (Fig. 1, partially reproduced below) is a pad that forms part of the first lead of Mills. EX1006, 7:16-18; EX1003, ¶59.



Pet., 18; POR, 16-17.

## Mr. Oslan (Masimo's expert):

I associate the first pad/electrode 14 with the first lead of the claim and the second pad/electrode 16 with second lead of the claims.

EX1003, ¶59; Sur-Rep., 6.

Electrodes 14 and 16 are both on the outer surface of the device housing and therefore are the pads described in the '257 patent. Fig. 1 of Mills shows a first pad 14 “integrally molded” (*i.e.*, embedded) into the housing. EX1006, Fig. 1; 3:48-49.

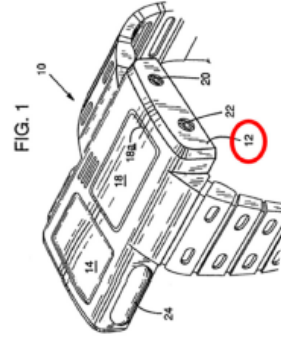
EX1003, ¶59; Sur-Rep., 6.

# Masimo's First Mapping of Mills to the Claims

## Petition:

### a. Limitation 1[a]: “an enclosure”

Fig. 1 of Mills (partially reproduced below) discloses an electronic device 10 for detecting a user's cardiac signal. EX1006, Fig. 1; 3:7-8. The device 10 includes a housing or enclosure 12. *Id.*; EX1003, ¶57.



EX1003, ¶59; Sur-Rep., 6.

Pet., 16-17; POR, 18-19, 22-23.

## Masimo's Second Mapping of Mills to the Claims

### Petition:

Thus, 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; POR, 18-20.

Thus, Mills teaches and a POSITA would understand that this first pad, electrode 14a, is configured to detect an electrical cardiac signal via the user's skin's contact with the exterior surface 14b of the first portion of the enclosure. EX1003, ¶59.

Pet., 22; POR, 18-20.

- iv. Limitation 1[b(iv)]: "the first pad is positioned underneath the exterior surface of the first portion"

As discussed above with regard to Fig. 3B of Mills, embedded lead 14a is underneath or covered by the exterior surface 14b. Mills at Fig. 3B, EX1006, 4:43-47; EX1003, ¶60.

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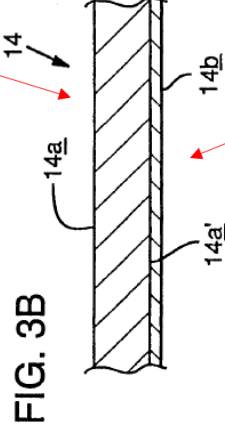
Pet., 24; POR, 19-20.

**DEMONSTRATIVE EXHIBIT – NOT EVIDENCE**

EX1006, FIG. 3B, 3:67-4:13, 4:32-39; Pet., 19-22; POR, 18-20.

25

Base metal layer 14a  
is the first pad

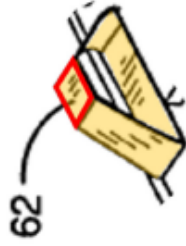


3-microns thick metal-  
plating layer 14b is the first  
portion of the enclosure

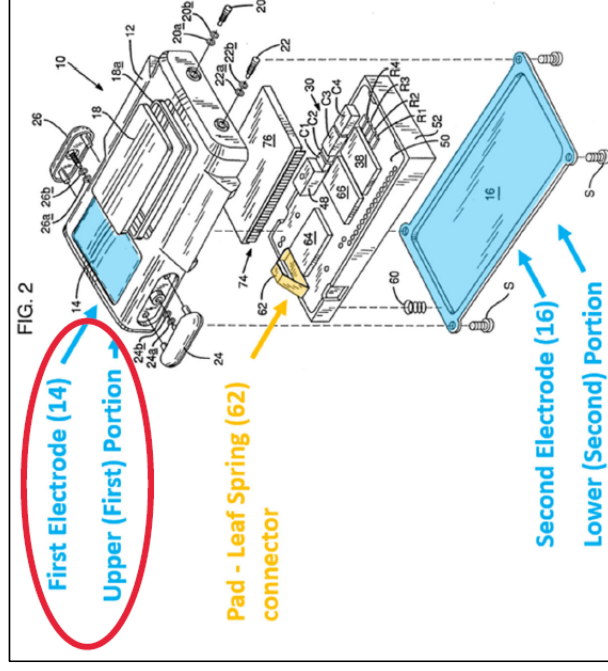
# Masimo's Third Mapping of Mills to the Claims

## Petition:

The top of the trapezoid-shaped leaf spring 62 is a pad.



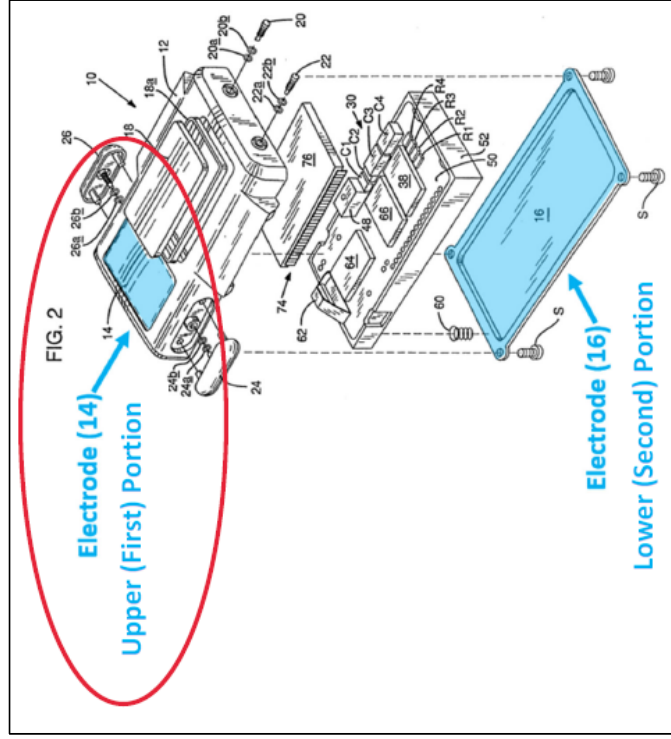
Pet., 23; POR, 20-21.



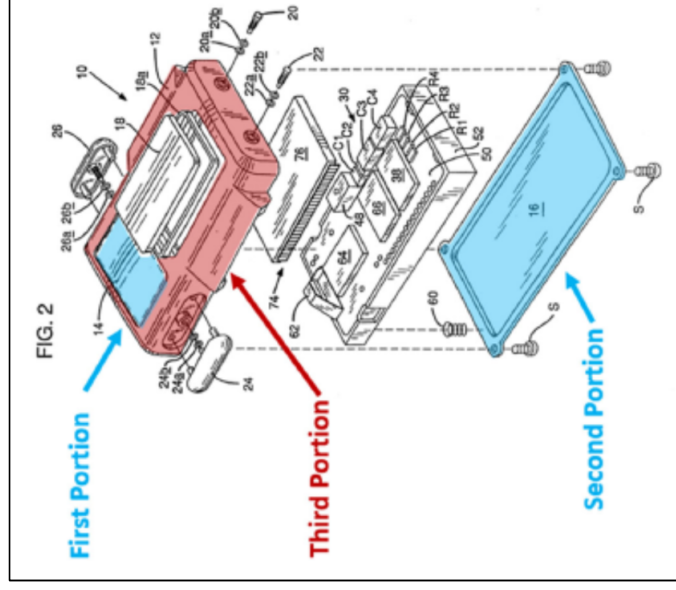
Pet., 25; POR, 21-22.

# Masimo's Third Mapping of Mills to the Claims

## Petition:



Pet., 34; Sur-Rep., 9; POR, 46.

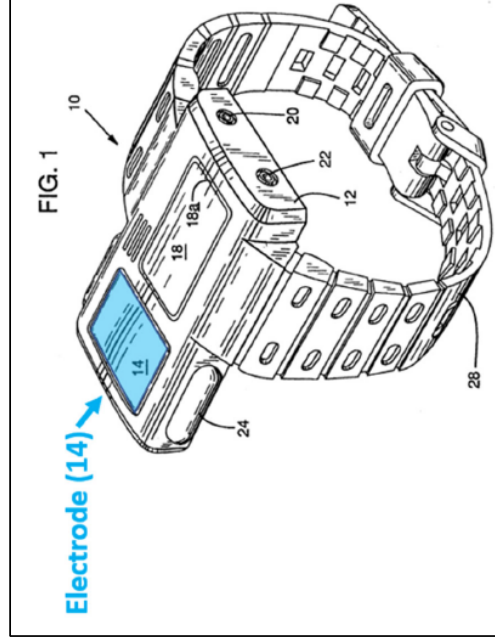


Pet., 37; Sur-Rep., 9-10.

## Masimo's First Mapping of Mills to the '257 Patent Fails to Provide All Elements of Claim 1

# The First Mapping of Mills to Claim 1 is Deficient

## Petition:



Pet., 19-20 (reproducing FIG. 1 of Mills); POR, 27-30.

## Claim 1:

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

EX1001 ('257 Patent), Claim 1.

## Dr. Kenny:

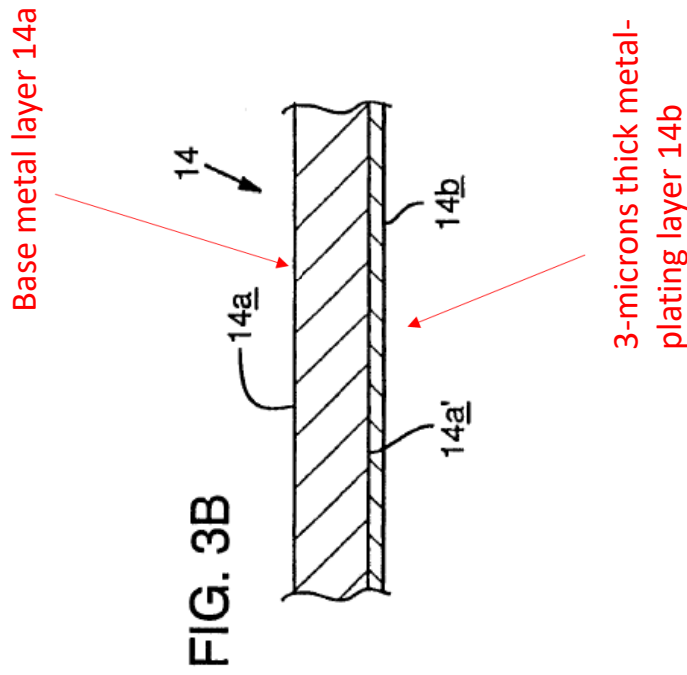
The failure of the electrode 14 to meet all requirements for the claimed

“first pad” is clear 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.

## Masimo's Second Mapping of Mills to the '257 Patent Fails to Provide All Elements of Claim 1

# The Second Mapping of Mills to Claim 1 is Deficient

## Mills:



As illustrated in FIG. 3B, an electrode such as electrode 14 preferably comprises an expanse 14a formed of a base metal such as stainless steel, with expanse 14a being electrically connectable with such monitoring equipment, as illustrated in FIGS. 1 and 2. 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) including a first component of a preferably bio-compatible, conductive (e.g. metallic) element such as titanium, and at least a second component chosen from a group including nitrogen and carbon. It will be understood that electrode 16 of apparatus 10 is of identical material content and cross-sectional structure as electrode 14, but is of much greater surface area.

...

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.

# The Second Mapping of Mills to Claim 1 is Deficient

## Mills:

## Dr. Kenny:

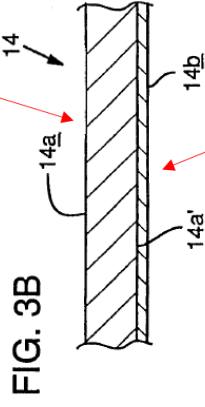
101. Turning to the first reason that Masimo's second mapping fails to disclose elements 1[b(ii)] and 1[b(iv)], the outer plating 14b of electrode 14 is not and cannot conceivably be considered a portion of the housing or enclosure of Mills' apparatus 10. As a POSITA would have recognized, the metal-plating composition 14b that forms a three-micron thick outer coating on the base metal layer 14a is not a separate component from the base layer 14a that can form a part of the enclosure, distinct from the base metal layer 14a.

APPLE-2003, ¶101; POR, 32-33.

102. The metal-plating composition 14b is not a portion of the housing/enclosure that the expense 14a is "embedded in" as required by the claims, but rather, the metal-plating composition 14b is a thin layer plated on the main body of electrode 14 ("expense 14a") using "known chemical or physical vapor deposition techniques." EX1006, 4:32-39. A POSITA would have readily

APPLE-2003, ¶102; POR, 32-33.

Base metal layer 14a



3-microns thick metal-plating layer 14b

EX1006, FIG. 3B, 3:67-4:13, 4:32-39; POR, 14-15, 30-37.

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

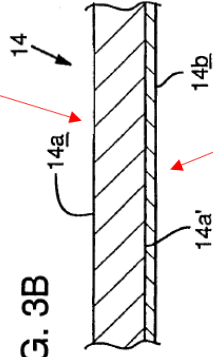
# The Second Mapping of Mills to Claim 1 is Deficient

Mills:

Dr. Kenny:

Base metal layer 14a

FIG. 3B



3-microns thick metal-plating layer 14b

106. Therefore, this second mapping fails at least because the 3 micron thick layer on the electrode is not a portion of the enclosure, and the pad cannot be positioned beneath this three micron film. There is no reasonable interpretation of Mills under which a POSITA would have considered the outer plating 14b of electrode 14 to be a portion of the enclosure distinct from the electrode 14a. A POSITA would have understood that Mills' coating 14b cannot stand alone to form a portion of the housing 12 in the absence of the main body of electrode 14. Indeed, Mills' disclosure is consistent with description provided by the '257 Patent, which also applies "a conductive coating" to its leads as opposed to the enclosure of the device. EX1001, 9:4-13.

APPLE-2003, ¶106; POR, 34.

EX1006, FIG. 3B, 3:67-4:13, 4:32-39; POR, 14-15, 30-37.

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

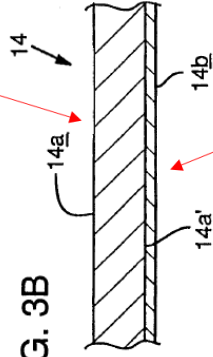
# The Second Mapping of Mills to Claim 1 is Deficient

Mills:

Dr. Kenny:

Base metal layer 14a

FIG. 3B



3-microns thick metal-plating layer 14b

107. Even ignoring the expressly disclosed thickness of Mills' outer plating 14b, interpreting claim 1's recitations of "an enclosure" and a distinct "first pad that is embedded in a first portion of the enclosure" to read on a multi-layered electrode (as Mr. Oslan and Masimo have done here) stretches the meaning of claim 1 beyond any reasonable interpretation. In my opinion, the claims mean what they say, the claimed electronic device includes "an enclosure" and a separate "first pad that is embedded in a first portion of the enclosure." Mills' multi-layered electrode 14 having a main expanse 14a and a three-micron thick "metal-plating composition 14b" is exactly what Mills describes it as: a multi-layered electrode, not an enclosure and separate first pad embedded in the enclosure.

APPLE-2003, ¶107; POR, 34-35.

EX1006, FIG. 3B, 3:67-4:13, 4:32-39; POR, 14-15, 30-37.

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

# The Second Mapping of Mills to Claim 1 is Deficient

Mills:

Dr. Kenny:

Base metal layer 14a

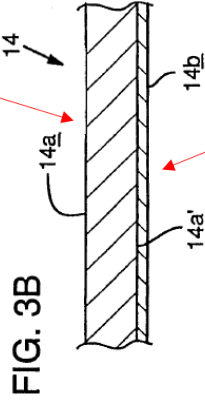


FIG. 3B

3-microns thick metal-plating layer 14b

Mills describes that the entire electrode 14 is integrally molded into the

housing and therefore it is either all part of the enclosure, or no part of the

electrode 14 is part of the enclosure.

116. To be clear, Mills contains no discussion indicating that the outer plating 14b is integrally molded in the housing 12 with the expanse 14a being a separate component, and indeed, Mills discloses the exact opposite. EX1006, 4:32-39. The actual disclosures of Mills simply do not support Masimo's second mapping because either the entire electrode 14 is part of the enclosure, or the entire electrode 14 is not part of the enclosure.

APPLE-2003, ¶¶115-116; POR, 38-39.

EX1006, FIG. 3B, 3:67-4:13, 4:32-39; POR, 14-15, 30-37.

**FISH**

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

## “embedded in”

Dr. Kenny:

31. In my opinion, the term “embedded in” should be given its plain and ordinary meaning, which does not require an explicit construction. A POSITA would have known what it means for a first material, structure, or component to be “embedded in” a second material, structure, or component based on both the plain and ordinary meaning of this term and the way in which this term is used in the '257 patent specification, which conforms with the plain and ordinary meaning. However, should it be necessary to define the parameters of the plain and ordinary meaning for this term, an express construction of the term “embedded in” that a POSITA would have recognized as consistent with the plain and ordinary meaning of this term is “at least partially set in or partially surrounded by a material.”

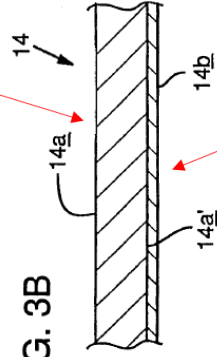
# The Second Mapping of Mills to Claim 1 is Deficient

Mills:

Dr. Kenny:

Base metal layer 14a

FIG. 3B



3-microns thick metal-plating layer 14b

110. As demonstrated by Figure 3B, the base metal layer 14a of electrode 14 is not “embedded in” the metal-plating composition 14b. Instead, Figure 3B shows that the two layers 14a and 14b are positioned parallel each other, with neither layer surrounding or encompassing the other, either in part or in whole.

APPLE-2003, ¶110; POR, 36-37.

EX1006, FIG. 3B, 3:67-4:13, 4:32-39; POR, 14-15, 30-37.

**FISH**

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

# The Second Mapping of Mills to Claim 1 is Deficient

## Mills:

## Dr. Kenny:

111. The specification of Mills further discloses that the base metal layer 14a and metal-plating composition 14b are parallel surfaces positioned such that the expanse 14a is in adjacent, parallel contact with the metal-plating composition 14b rather than embedded in the metal-plating composition 14b.

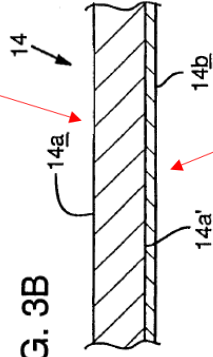
• • •

the base metal layer 14a is coated with a parallel layer 14b and not embedded in the layer 14b. Mr. Oslan agreed with this characterization of Mills, stating “I don’t see anything in Mills explicitly saying that 14a is embedded in 14b.”

APPLE-2008, 58:22-62:1.

Base metal layer 14a

FIG. 3B



3-microns thick metal-plating layer 14b

EX1006, FIG. 3B, 3:67-4:13, 4:32-39; POR, 14-15, 30-37.

**FISH**

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

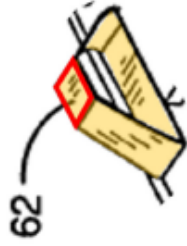
APPLE-2003, ¶111; POR, 36-37.

## Masimo's Third Mapping of Mills to the '257 Patent Fails to Provide All Elements of Claim 1

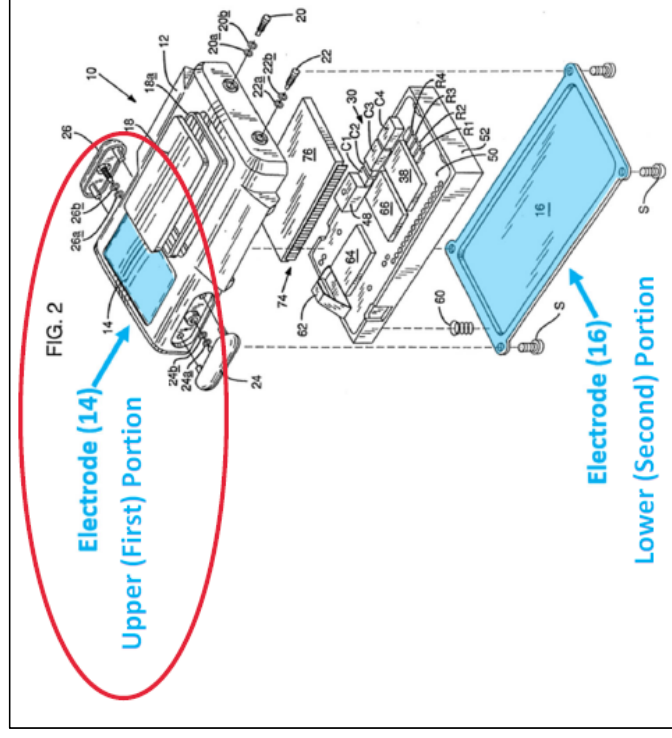
# Masimo's Third Mapping of Mills to Claim 1 is Deficient

## Petition:

The top of the trapezoid-shaped leaf spring 62 is a pad.



Pet., 23; POR, 20-21.



Pet., 34; Sur-Rep., 9; POR, 46.

# Masimo's Third Mapping of Mills to Claim 1 is Deficient

Dr. Kenny:

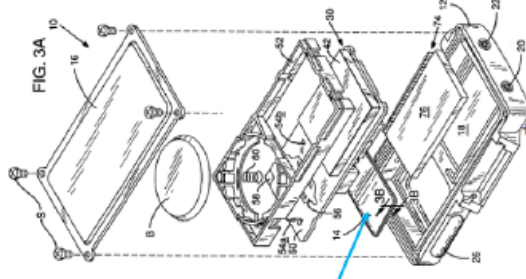
Figure 2 shows that the top of portion of the leaf spring 62 is flat:



EX1003, ¶60.

APPLE-2003, ¶120; POR, 42

121. The bottom surface of the electrode 14 is also flat:



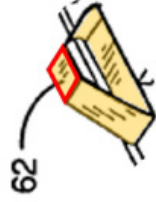
EX1006, FIG. 3A (annotated)

APPLE-2003, ¶121; POR, 42

# Masimo's Third Mapping of Mills to Claim 1 is Deficient

## Petition:

## Dr. Kenny:



The pad is pressed against the inner wall of electrode 14 in Mills

Pet., 23; POR, 42-43

Therefore, 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. Mr. Oslan confirms this arrangement of the

leaf spring 62 and the electrode 14, stating that the top of the leaf spring "is pressed against the inner wall of electrode 14." EX1003, ¶60 (page 31). This arrangement

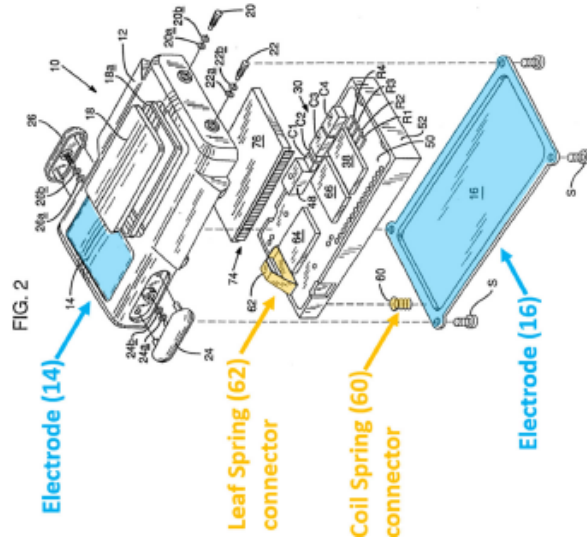
• • •

124. Under the description of the relationship between the top of the leaf spring 62 and the electrode 14 provided by both Mr. Oslan and Masimo that the top of the leaf spring "is pressed against the inner wall of electrode 14 in Mills," this third mapping of Mills to claim 1 fails to disclose all requirements for the first pad recited by claim 1 because the top of the leaf spring 62 being merely "pressed against" the electrode 14 such that the top of the leaf spring 62 is positioned adjacent to and in parallel contact with the electrode 14 does not constitute the leaf spring 62 being "embedded in" the electrode 14 by being partially surrounded by the electrode 14. Similarly, the top of the leaf spring 62 is not "set firmly into and

# Masimo's Third Mapping of Mills to Claim 1 is Deficient

Petition:

Dr. Kenny:



Pet., 31-32; POR, 44-45

APPLE-2003, ¶130; POR, 44-45

Masimo's third mapping of Mills to claim 1 therefore fails to the claimed "first connector" which is coupled to the first pad" because the same portion of leaf spring 62 cannot provide both the claimed first pad and the claimed first connector as these are two separate claim recitations. In analyzing Limitation 1[c], Mr. Oslan only addresses the first mapping (or at most the first and second mappings) in which the electrode provides the claimed first pad. Mr. Oslan therefore fails to demonstrate that the first pad in its third mapping is "coupled to" an electrical connector "configured to provide the first electrical signal detected by the first pad to the processor" in the device.

## Masimo's Impermissible New Arguments

## Masimo's Improper New Arguments Should Not Be Considered

“All arguments for the relief requested in a motion must be made in the motion. A reply may only respond to arguments raised in the corresponding opposition or patent owner response.’ 37 C.F.R. § 42.23(b). Once the Board identifies new issues presented for the first time in reply, neither this court nor the Board must parse the reply brief to determine which, if any, parts of that brief are responsive and which are improper. As the Board noted, ‘it will not attempt to sort proper from improper portions of the reply.’” *Intelligent Biosys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (citing Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,767 (Aug. 14, 2012)).

POR, 16: Sur-Reply, 1-2, 11

# Masimo's Improper New Arguments (First Mapping)

## Petitioner's Reply (Masimo's New Assertion):

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

Apple characterizes Masimo's "first mapping" as identifying the entire electrode 14 as the first pad. POR, 27. Apple then argues electrode 14 is exposed, and, thus, not embedded in and underneath the first portion. *Id.*, 27-28. However, Masimo identified pad 14a as the "first pad" and plating 14b and part of housing 12 as the "first portion." *Supra*, III.A.1; Pet., 21-22, 24, 25, 30. Thus, Masimo did not identify entire electrode 14 as both the first pad and first portion, as Apple contends. *Id.*; POR, 29.

Pet. Rep., 15-16; Sur-Rep., 5-6.

# Masimo's Original Theory

## Petition:

Accordingly, Mills discloses a first pad - electrode 14.

Pet., 19; Sur-Rep., 5-6; POR, 15-17.

ii. Limitation 1[b(ii)]: “embedded in a first portion of the enclosure”

Fig. 1 of Mills discloses its electrode 14 (first pad) is “integrally molded” (i.e., embedded) into the housing. EX1006, Fig. 1; 3:8-9; EX1003, ¶59.

Pet., 19; Sur-Rep., 6; POR, 15-17, 19.

10” – a wrist-worn cardiac data monitor. EX1006, 3:62-67. A POSITA would understand from this disclosure the electrode 14 (pad) of Mills is configured to detect

Pet., 26; Sur-Rep., 6; POR, 17-18.

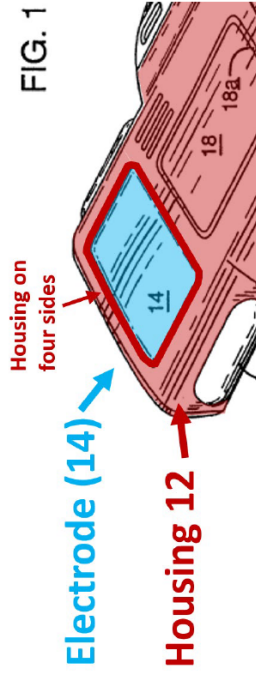
EX1006 at 4:67 – 5:3; see also 4:1-3. Accordingly, leaf spring 62 is a first connector coupling electrode 14 (first pad) to the processor of Mills. EX1003, ¶¶60, 65.

Pet., 31; Sur-Rep., 6; POR, 17-18.

## Masimo's Improper New Arguments (Second Mapping)

### Petitioner's Reply (Masimo's New Assertion):

surrounded by, and, thus, "embedded in," the first portion (upper portion of housing 12 and plating 14b). POR, 5; EX1052, 186:18-187:6, 191:11-14. EX1065, ¶227.



Pet. Rep., 8; Sur-Rep., 6.

Apple's arguments regarding plating 14b being parallel to pad 14a do not fully address Masimo's identification of the first portion, which also includes part of housing 12. *Supra*, III.A.1. Moreover, Kenny admitted pad 14a is embedded in the enclosure. *Id.* EX1065, ¶259.

# Masimo's Original Theory

## Petition:

Thus, 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; POR, 18-20; Sur-Rep., 7.

Thus, Mills teaches and a POSITA would understand that this first pad, electrode 14a, is configured to detect an electrical cardiac signal via the user's skin's contact with the exterior surface 14b of the first portion of the enclosure. EX1003, ¶59.

Pet., 22; POR, 18-20; Sur-Rep., 7.

iv. Limitation 1[b(iv)]: "the first pad is positioned underneath the exterior surface of the first portion"

As discussed above with regard to Fig. 3B of Mills, embedded lead 14a is underneath or covered by the exterior surface 14b. Mills at Fig. 3B, EX1006, 4:43-47; EX1003, ¶60.

**FISH**

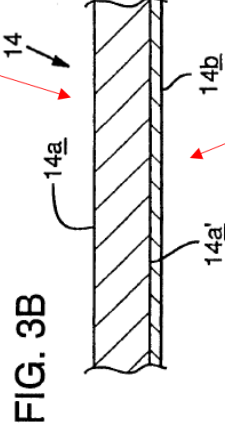
Pet., 24; POR, 19-20; Sur-Rep., 7.

**DEMONSTRATIVE EXHIBIT – NOT EVIDENCE**

EX1006, FIG. 3B, 3:67-4:13, 4:32-39; Pet., 19-22; POR, 18-20.

49

Base metal layer 14a is the first pad



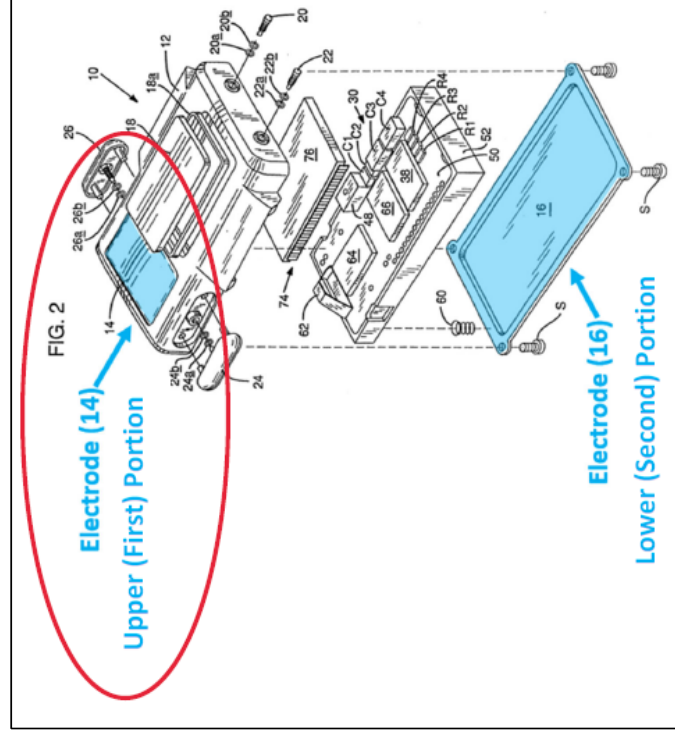
3-microns thick metal-plating layer 14b is the first portion of the enclosure

# Masimo's Original Theory

## Petition:

Alternatively, the pad of leaf spring 62 is positioned underneath the electrodes/first portion 410b which forms an exterior surface of Markel. EX1006, Fig. 2; EX1003, ¶60.

Pet. 24; Sur-Rep., 7.



Pet., 34; Sur-Rep., 9; POR, 46.

## Masimo's Improper New Arguments (Third Mapping)

### Petitioner's Reply (Masimo's New Assertion):

Masimo also identified (1) the top of Mills' 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." Pet., 22-24.

Pet. Rep., 5-6; Sur-Rep., 6-7.

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.*, 42. But Masimo's second theory identified an upper part of housing 12 and the electrode as the "first portion." *Supra*, III.A.2. The leaf-spring pad's being pressed against the electrode

# Masimo's Original Theory

## Petition:

Further, electrode 14

(first portion) has an exterior surface 14b shown in Fig. 3B, below right. *Id.* at 2:16-

Pet. 24; Sur-Rep., 7.

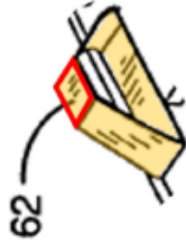
Alternatively, the pad of leaf spring 62 is positioned underneath the electrodes/first portion 410b which forms an exterior surface of Markel. EX1006, Fig. 2; EX1003, ¶60.

Pet. 24; Sur-Rep., 7.

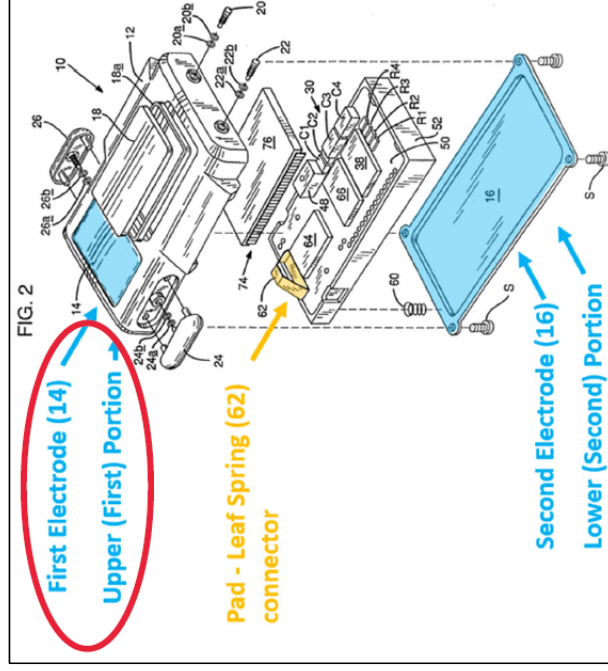
# Masimo's Original Theory

## Petition:

The top of the trapezoid-shaped leaf spring 62 is a pad.



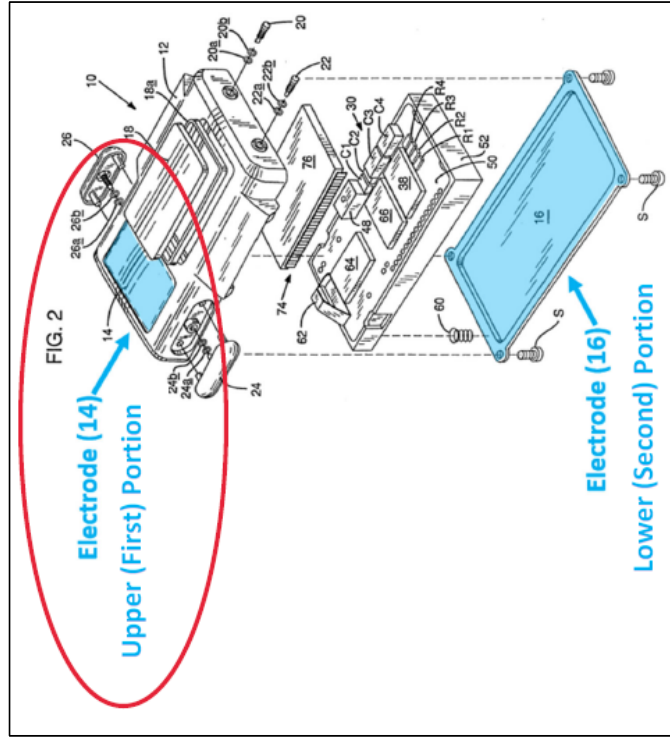
Pet., 23; POR, 20-21.



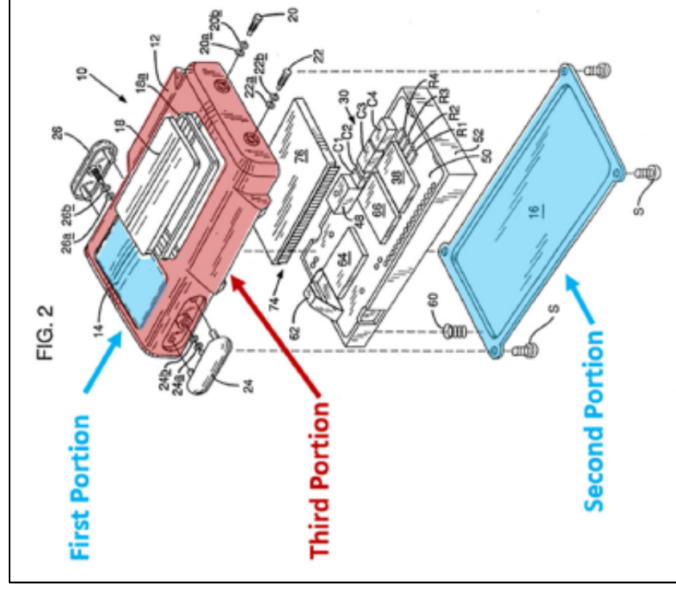
Pet., 25; POR, 21-22.

# Masimo's Original Theory

Petition:



Pet., 34; Sur-Rep., 9; POR, 46.



Pet., 37; Sur-Rep., 9-10.

**FISH**

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

## Masimo's Improper New Theory for the Petition's Second Mapping of Mills to the Claims Still Fails

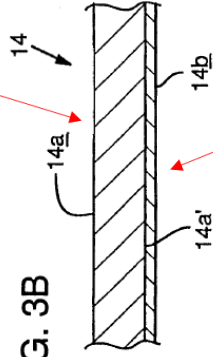
# Masimo's New Argument Doesn't Correct the Fault in the Petition

Mills:

Dr. Kenny:

Base metal layer 14a

FIG. 3B



3-microns thick metal-plating layer 14b

106. Therefore, this second mapping fails at least because the 3 micron thick layer on the electrode is not a portion of the enclosure, and the pad cannot be positioned beneath this three micron film. There is no reasonable interpretation of Mills under which a POSITA would have considered the outer plating 14b of electrode 14 to be a portion of the enclosure distinct from the electrode 14a. A POSITA would have understood that Mills' coating 14b cannot stand alone to form a portion of the housing 12 in the absence of the main body of electrode 14. Indeed, Mills' disclosure is consistent with description provided by the '257 Patent, which also applies "a conductive coating" to its leads as opposed to the enclosure of the device. EX1001, 9:4-13.

APPLE-2003, ¶106; POR, 34.

EX1006, FIG. 3B, 3:67-4:13, 4:32-39; POR, 14-15, 30-37.

**FISH**

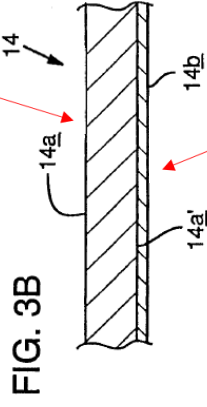
DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

# Masimo's New Argument Doesn't Correct the Fault in the Petition

Mills:

Dr. Kenny:

Base metal layer 14a



3-microns thick metal-plating layer 14b

107. Even ignoring the expressly disclosed thickness of Mills' outer plating 14b, interpreting claim 1's recitations of "an enclosure" and a distinct "first pad that is embedded in a first portion of the enclosure" to read on a multi-layered electrode (as Mr. Oslan and Masimo have done here) stretches the meaning of claim 1 beyond any reasonable interpretation. In my opinion, the claims mean what they say, the claimed electronic device includes "an enclosure" and a separate "first pad that is embedded in a first portion of the enclosure." Mills' multi-layered electrode 14 having a main expanse 14a and a three-micron thick "metal-plating composition 14b" is exactly what Mills describes it as: a multi-layered electrode, not an enclosure and separate first pad embedded in the enclosure.

APPLE-2003, ¶107; POR, 34-35.

EX1006, FIG. 3B, 3:67-4:13, 4:32-39; POR, 14-15, 30-37.

**FISH**

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Masimo's New Theories Fail Because the First  
Portion of the Enclosure Must be Conductive

## The '257 Patent Requires that the First Portion of the Enclosure is Conductive

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

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.

**FISH** 

EX1001 ('257 Patent), Claim 1; Sur-Rep, 11.

59

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

## The '257 Patent Requires that the First Portion of the Enclosure is Conductive

Dr. Kenny:

However, the housing 12 in Mills is formed from a non-conductive plastic. EX1006, 6:40-45. Therefore, 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" in this mapping because the housing 12 is non-conductive. Mr. Oslan agreed during his deposition that contact with the

housing alone was insufficient for Mills' device to detect the user's cardiac signal.

APPLE-2008, 65:8-67:7.

APPLE-2003, ¶98; POR, 30; Sur-Rep., 12

24. Indeed, such a configuration is distinct from the claimed device of the '257 patent which requires a conductive first portion of the enclosure to allow for electrical connectivity between the user contact and the first pad positioned underneath the exterior surface of the first portion of the enclosure such that the first pad can 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. The claimed features of the '257 patent rely on conductive contact through a portion of the enclosure, and would not function if the contact was a capacitive contact through a relatively thick portion of the enclosure.

**FISH**

APPLE-2014, ¶24;  
Patent Owner's Rep. to Opp. to Rev. Mot. to Amend, 9

60

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

## The '257 Patent Requires that the First Portion of the Enclosure is Conductive

### The '257 Patent:

To provide an electrical signal from the user to the processing circuitry, the leads can be exposed such that the user may directly contact the leads, or may instead or in addition be coupled to an electrically conductive portion of the device enclosure (e.g., a metallic bezel or housing forming the exterior of the device).

EX1001 (the '257 patent), 2:44-50; Sur-Rep., 13-14

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. The short thickness of bezel 460 can allow 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 a processor using connector 474.

EX1001 (the '257 patent), 9:46-52; Sur-Rep., 13-14

In some embodiments, if the electrical conductivity of portions of the electronic device enclosure and the leads are suitably selected and designed, the leads can be positioned underneath the exterior surface of the enclosure while providing sufficient conductivity for detecting cardiac electrical signals and avoiding shorting or interference between adjacent leads. For example, the sensor leads can be constructed from a silver based compound having high electrical conductivity, while the electronic device enclosure can be constructed from steel and aluminum, both having lower electrical conductivity. By placing several leads at substantially larger distances apart along the electronic device enclosure than the thickness of the enclosure, electronic signals can be transmitted through the steel or aluminum enclosure to a silver based lead underneath the enclosure, but not along the surface of the enclosure to cause adjacent leads to short.

EX1001 (the '257 patent), 2:64-3:13; Sur-Rep., 13-14

## Mill's Housing 12 cannot be the First Portion of the Enclosure

Mr. Oslan (Masimo's expert):

68. Mills discloses a housing 12 which separates its two electrodes 14, 15.

EX1005, Fig. 2. Mills discloses its housing 12 may be molded plastic, such as

acrylonitrile-butadiene-styrene (ABS). EX1006, 6:40-43. Plastics, in general, are

well-known electrical insulators and ABS plastic is an electrical insulator.

EX1003, ¶¶8; Sur-Rep., 12

THE WITNESS: So in Mills the user  
would have to contact electrode 14 at least to  
get an ECG signal.

APPLE-2008, ¶¶6:3-5; Sur-Rep., 12

## Mill's Housing 12 cannot be the First Portion of the Enclosure

Dr. Kenny:

However, the housing 12 in Mills is formed from a non-conductive plastic. EX1006, 6:40-45. Therefore, 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" in this mapping because the housing 12 is non-conductive. Mr. Oslan agreed during his deposition that contact with the housing alone was insufficient for Mills' device to detect the user's cardiac signal. APPLE-2008, 65:8-67:7.

APPLE-2003, ¶¶98; POR, 30; Sur-Rep., 12

## Masimo's New Theories Fail With Respect to Claim 2

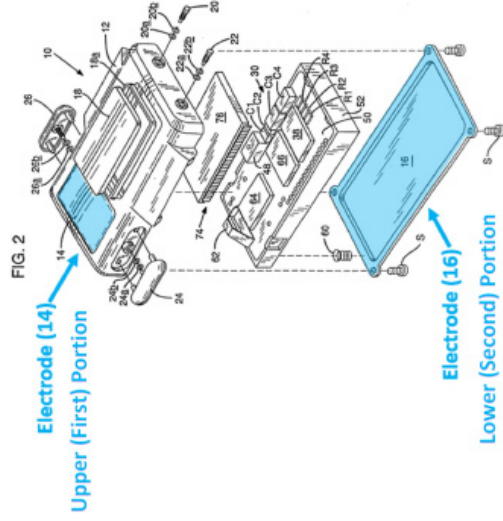
## Masimo Fails to Demonstrate How Claim 2 is Met by Its New Theory

### Claim 2:

2. The electronic device of claim 1, wherein the first portion and the second portion are located on opposite sides of the electronic device.

### Masimo's Original Theory (Petition):

Fig. 2 of Mills (reproduced below with annotations) shows these electrodes, 14 and 16, which are located on different portions of the enclosure.



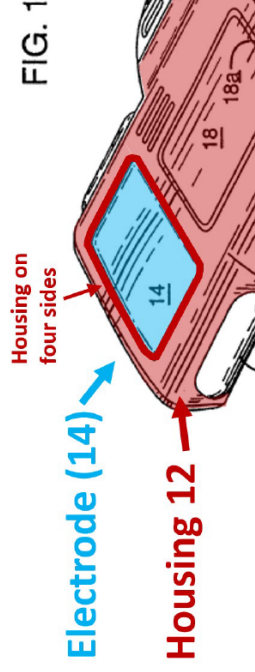
## Masimo Fails to Demonstrate How Claim 2 is Met by Its New Theory

### Claim 2:

2. The electronic device of claim 1, wherein the first portion and the second portion are located on opposite sides of the electronic device.

### Masimo's New Theory (Petitioner's Reply):

surrounded by, and, thus, "embedded in," the first portion (upper portion of housing 12 and plating 14b). POR, 5; EX1052, 186:18-187:6, 191:11-14. EX1065, ¶227.



Pet. Rep., 8; Sur-Rep., 15.

Masimo's New Theories Fail With Respect to Claims 3 & 4

# Masimo Fails to Demonstrate How Claims 3 & 4 are Met by Its New Theory

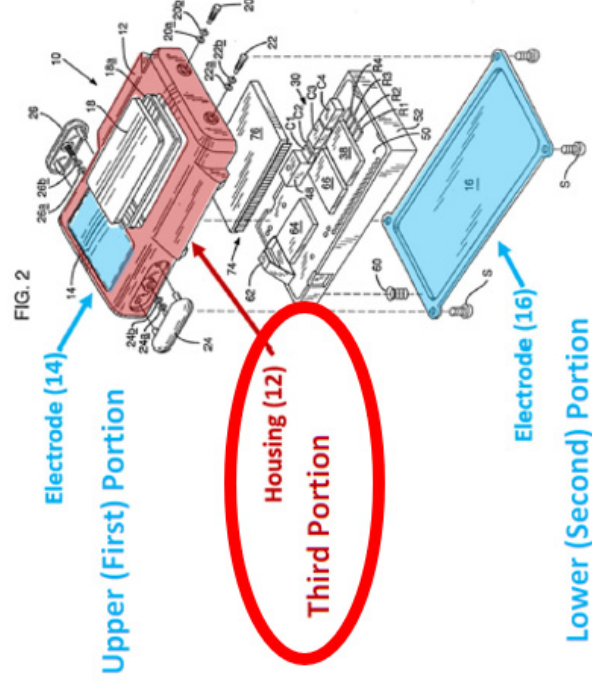
## Claim 3:

3. The electronic device of claim 1, wherein the first portion is electrically isolated from the second portion.

## Claim 4:

4. The electronic device of claim 1, wherein:  
the first portion is separated from the second portion by a third portion of the enclosure;  
at least the third portion is constructed from a material having a first conductivity; and  
the first conductivity is insufficient to transmit the first electrical signal from the first pad to the second pad via the third portion.

## Masimo's Original Theory (Petition):



Pet., 35; Sur-Rep., 15-16.

## The Market-Mills Combination (Ground 2) Fails to Provide All Elements of Claim 1

## Claim 1 of the '257 Patent

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.

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

# Markel's Electrodes cannot be the First Pad

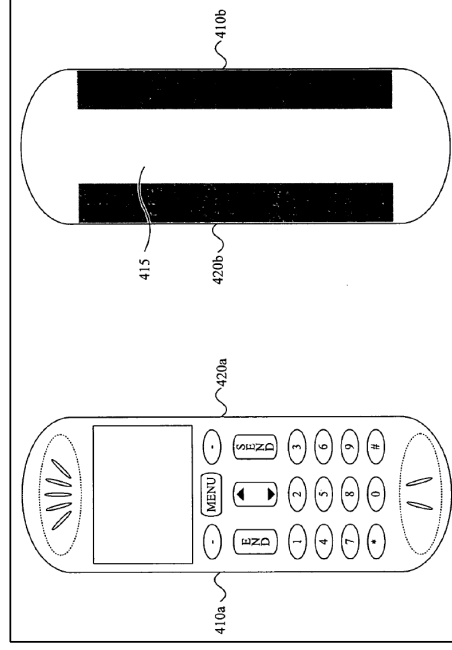
## Markel:

[0043] Also for example, an electrode (or other sensor) may be placed on a main body portion 110 of the MCD 100. For example, such a main body portion 110 may comprise the portion of the MCD 100 that is generally held in the hand during normal use of the MCD 100. As will be shown in later figures, one or more electrodes may be placed on side or rear portions of the main body portion 100. Such placement may, for example, provide for electrode contact with a user's hand during use of the MCD 100.

EX1005, [0043]; POR, 54

[0045] A plurality of electrodes (or other sensors) may be disposed in any of a variety of locations, non-limiting examples of dual-electrode placement will now be presented. For example, first and second electrodes may be disposed on a main body portion 110 of the MCD 100.

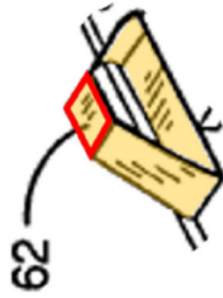
EX1005, [0045]; POR, 54



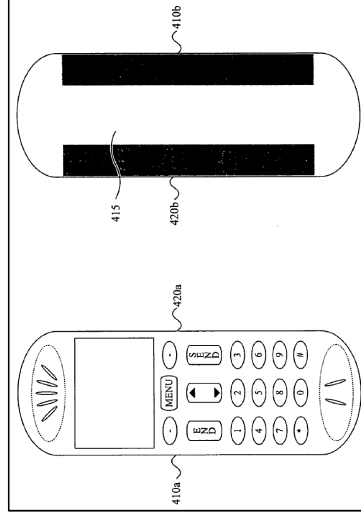
EX1005, FIG. 4; POR, 54

# Mills' Trapezoid Leaf-Spring is not "embedded in" Markel's Electrode in the Proposed Combination

Petition:



+



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.

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. 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. A POSITA would be led to the claimed invention based on the teachings of Markel and Mills. EX1003, ¶87.

# Mills' Trapezoid Leaf-Spring is not "embedded in" Markel's Electrode in the Proposed Combination

## Petition:

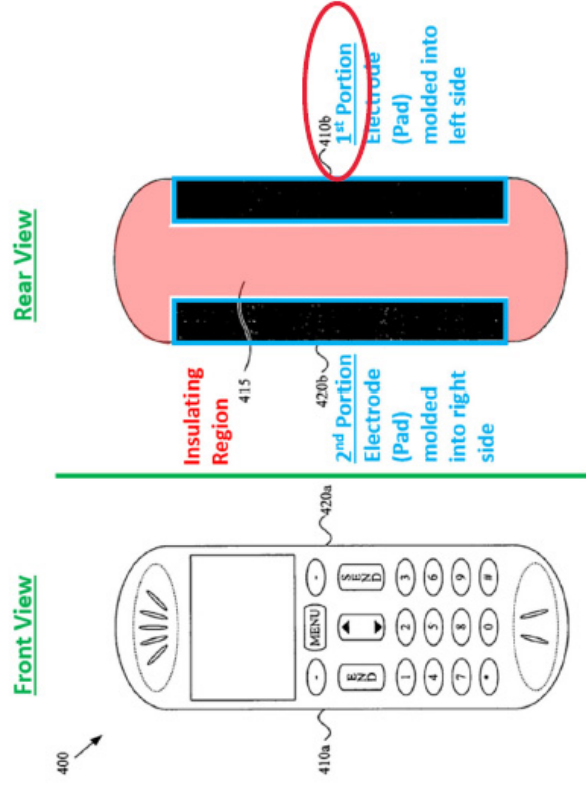


Figure 4

Pet., 43; POR, Sur-Rep., 21-22; POR, 52

**FISH**

As is shown in Fig. 4 of Markel illustrated below: the pad at region 410b is a first portion of the exterior surface of the enclosure of device 400. EX1005, Fig. 4,

Pet., 48; POR, Sur-Rep., 21; POR, 52-53

The combined device of Markel and Mills as discussed above would include the pad of leaf spring 62 positioned underneath the electrodes/first portion 410b exterior surface of Markel.

Pet., 49; POR, Sur-Rep., 21; POR, 52-53

places Mills' leaf spring inside Markel's device. Accordingly, Markel in combination with Mills as discussed above with respect to Claim 1 includes an interior surface with the first pad (leaf spring 62 of Mills) positioned on the interior surface of the first portion (region 410b of Markel). EX1003, ¶¶106-109.

Pet., 63-64; POR, Sur-Rep., 21

## Mills' Trapezoid Leaf-Spring is not "embedded in" Markel's Electrode in the Proposed Combination

Dr. Kenny:

157. In describing the proposed combination of Markel and Mills, Mr. Oslan states that the "top pad portion" of the leaf spring 62 of Mills "is placed underneath an exterior surface material and *against an inner wall* of the exterior surface material." EX1003, ¶87. But it is not sufficient that the top of Mills leaf spring 62 be merely "placed...against" the first portion of the enclosure. Instead, Claim 1 requires that the "first pad...*is embedded in* a first portion of the enclosure."

APPLE-2003, ¶1157; POR, 56

## Mills' Trapezoid Leaf-Spring is not "embedded in" Markel's Electrode in the Proposed Combination

Dr. Kenny:

162. The configuration described in the Petition and by Mr. Oslan of including the leaf spring of 62 in Markel's device such that the flat upper portion of the leaf spring 62 is "placed...against" and parallel to an inner surface of electrode 410b (Pet., 48) simply does not satisfy the requirements of claim 1. This is because two flat surfaces being placed in parallel contact with each other does not constitute the leaf spring 62 being "embedded in" the electrode 410b.

Furthermore, as I discussed in my analysis of Ground 1, above, there is no disclosure in Mills of the leaf spring 62 being "embedded in" an electrode or any other component. There is simply no disclosure or suggestion in either Markel or Mills of a pad being "embedded in" the electrode 410b.

APPLE-2003, ¶162; POR, 57

**FISH**

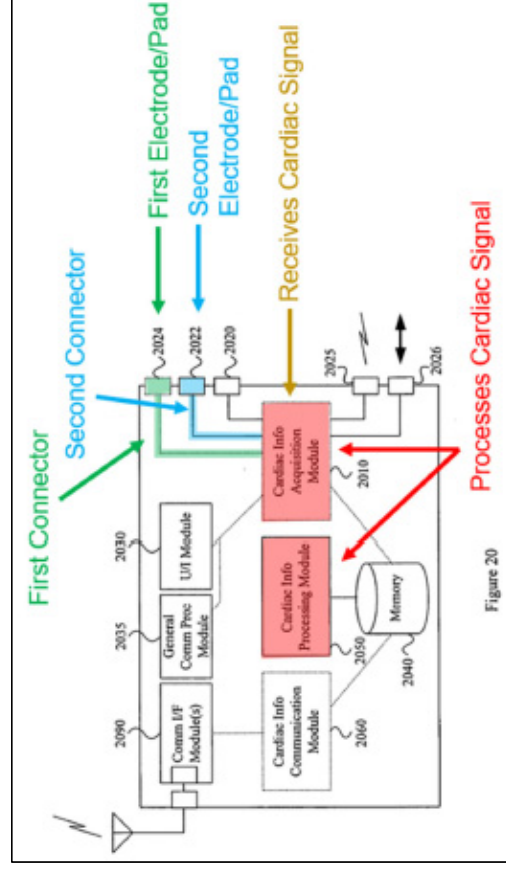
DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

# The Petition Fails to Demonstrate How The Markel-Mills Combination Provides Element 1[c]

## Petition:

Markel discloses a first and second lead configured as a first and second pad, respectively, on a portion of the exterior housing, and the first and second pads each connected to a processor, as shown in annotated Figs. 4 and 20<sup>5</sup> below. EX1005, Figs. 4 and 20. Accordingly, Markel teaches a first lead with a first connector coupled to a first pad that provides a first electrical signal from the first pad to the processor, and a second lead with a second connector coupled to a second pad that provides a second electrical signal from the second pad to the processor. EX1003,

¶91.

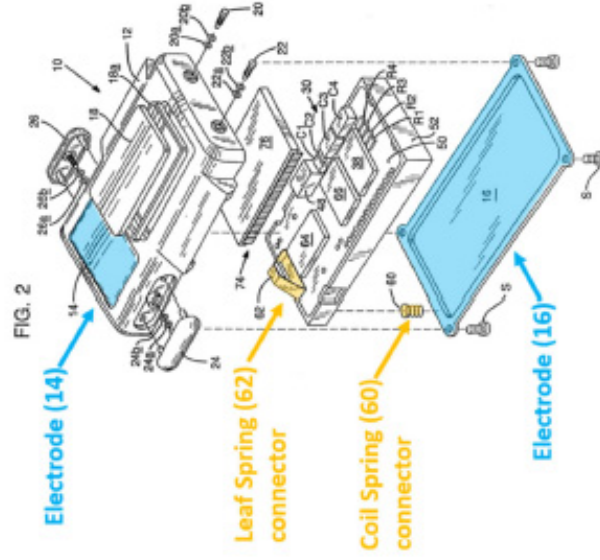


A POSITA Would Not Have Applied Mills to Market  
in the Proposed Manner

# The Markel-Mills Combination is More Than a Mere Rearrangement of Known Mechanical Components

Dr. Kenny:

213. As illustrated in Figure 2 of Mills, the two electrodes 14 and 16 are located on opposite sides of a frontal plane of housing 12, and PCB 50 is oriented parallel to the frontal plane as well as the planes of the two electrodes. Markel's Figure 4, however, shows a substantially different configuration than the configuration described in Mills. For instance, Mills shows that a "first electrode [is] placed on the left side portion 410..., and a second electrode [is] placed on the right side portion 420." EX-1005, [0045]. Thus, contrary to the argument provided in the Petition, more than "a mere rearrangement of known mechanical components in known ways in a complementary device" would be required to use "the leaf spring 62 taught by Mills to connect the electrodes 410b, 420b of Markel to internal processing components taught by Markel." Petition, 47-48.



# The Markel-Mills Combination is More Than a Mere Rearrangement of Known Mechanical Components

Dr. Kenny:

the POSITA would have also placed the PCB in *parallel to the two electrodes* to supposedly connect the electrodes to the PCB by leaf springs similar in one Masimo cited from Mills' configuration. However, in such a modified configuration of Markel, the PCB would be in parallel to—not perpendicular to—the width side of Markel's device 400. But this kind of configuration would deviate from Mills' configuration, which shows that the PCB plane is positioned perpendicular to the width side of Mills' device.

216. Additionally, the above-described orientation of the PCB plane in the proposed modified Markel device would necessitate a width dimension increase in Markel's device to enable enclosure of the PCB between the front and the rear surfaces of the device. However, this would result in the "cumbersome and inconvenient" bulky device that Markel trying to avoid. See EX-1005, [0002].

## Revised Contingent Motion To Amend

Mills' "metal-plating composition 14b" is not part of the enclosure separate from base metal layer 14a

## Mills' Plating 14b is not a Part of the Enclosure Distinct from Layer 14a

### Mills:

### Dr. Kenny:

101. Turning to the first reason that Masimo's second mapping fails to disclose elements 1[b(ii)] and 1[b(iv)], the outer plating 14b of electrode 14 is not and cannot conceivably be considered a portion of the housing or enclosure of Mills' apparatus 10. As a POSITA would have recognized, the metal-plating composition 14b that forms a three-micron thick outer coating on the base metal layer 14a is not a separate component from the base layer 14a that can form a part of the enclosure, distinct from the base metal layer 14a.

APPLE-2003, ¶101; POR, 32-33; Reply to Opp. to Rev. Mot. to Amend, 3-4

102. The metal-plating composition 14b is not a portion of the housing/enclosure that the expanse 14a is "embedded in" as required by the claims, but rather, the metal-plating composition 14b is a thin layer plated on the main body of electrode 14 ("expanse 14a") using "known chemical or physical vapor deposition techniques." EX1006, 4:32-39. A POSITA would have readily

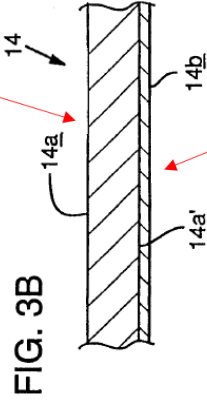
EX1006, FIG. 3B, 3:67-4:13, 4:32-39; POR, 14-15, 30-37.

**FISH**

APPLE-2003, ¶102; POR, 32-33; Reply to Opp. to Rev. Mot. to Amend, 3-4

**DEMONSTRATIVE EXHIBIT – NOT EVIDENCE**

Base metal layer 14a



3-microns thick metal-plating layer 14b

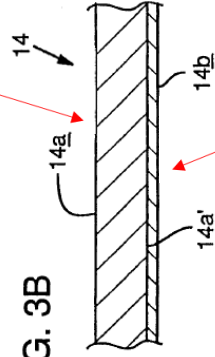
# Mills' Plating 14b is not a Part of the Enclosure Distinct from Layer 14a

Mills:

Dr. Kenny:

Base metal layer 14a

FIG. 3B



3-microns thick metal-plating layer 14b

106. Therefore, this second mapping fails at least because the 3 micron thick layer on the electrode is not a portion of the enclosure, and the pad cannot be positioned beneath this three micron film. There is no reasonable interpretation of Mills under which a POSITA would have considered the outer plating 14b of electrode 14 to be a portion of the enclosure distinct from the electrode 14a. A POSITA would have understood that Mills' coating 14b cannot stand alone to form a portion of the housing 12 in the absence of the main body of electrode 14. Indeed, Mills' disclosure is consistent with description provided by the '257 Patent, which also applies "a conductive coating" to its leads as opposed to the enclosure of the device. EX1001, 9:4-13.

APPLE-2003, ¶106; POR, 32-33; Reply to Opp. to Rev. Mot. to Amend, 3-4

EX1006, FIG. 3B, 3:67-4:13, 4:32-39; POR, 14-15, 30-37.

**FISH**

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

## Lyon's and the Other Newly Cited References Are Incompatible with Mills and Markel

# The Additional References Disclose Capacitive Sensors

## Dr. Kenny:

In exemplary embodiments, the sensor comprises a flex or capacitive sensor. The flex sensor is located beneath a plastic or metal bezel making it a robust, reliable and stylish replacement for the mechanical buttons common in prior watch devices.” EX1068, [0018]. In other words, the sensor pads described by Lyons simply detect when a user has touched the bezel and the location of the touch.

APPLE-2014, ¶15; Rep. to Opp. to Rev. Mot. to Amend, 8-9

- The capacitive sensor pad of Lyons is energized with an oscillating voltage, whereas a pad capable of detecting a user’s cardiac signal would be energized with a constant voltage bias.
- The capacitance change detected in Lyons arises from the generic passive dielectric properties of a finger, whereas the signals detected by a heart signal detection device arise from the unique electrical signals reflecting the cardiac activity of the user.

**FISH**

APPLE-2014, ¶17; Rep. to Opp. to Rev. Mot. to Amend, 8-9

The electrodes disclosed in Larsen provide a means for

capacitive sensing of ECG signals, which is distinct from the conductive electrodes of Markel and Mills (and the ’257 patent). A POSITA would understand that capacitive electrodes could generally be used for detection of ECG signals, but a POSITA would also understand that Markel and Mills rely exclusively and explicitly on conductive ECG electrodes positioned on the outer surface of the disclosed embodiments. There is nothing in Mills or Markel that teaches a POSITA to consider replacing the conductive electrodes with capacitive electrodes, or to relocate electrodes from the surface to locations within the structure. There is no motivation for consideration of such a substantial modification away from all of the details disclosed in Mills and Markel.

APPLE-2014, ¶18; Rep. to Opp. to Rev. Mot. to Amend, 8-9

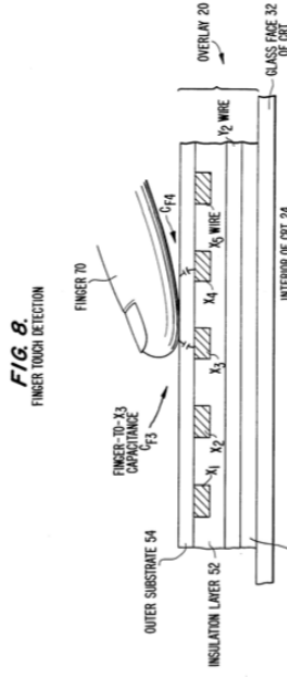
# The Additional References Disclose Capacitive Sensors

**Dr. Kenny:**

22. There is no teaching in Mills or Markel of a thin dielectric material formed on the surface of metallic structures to form a capacitive electrode. The use of such a film would add significant complexity to the structures, circuits and signal processing of the devices disclosed by Mills and Markel, and would discard some of the claimed benefits of the teaching of Mills and Markel.
23. Rather than provide any motivation for consideration of capacitive ECG electrodes, Mills and Markel consistently focus on the characteristics of conductive electrodes.

APPLE-2014, ¶¶22-23; Rep. to Opp. to Rev. Mot. to Amend, 8-9

8. Figure 8 of Greanius shows the configuration of the capacitive touch sensor, wherein the capacitance of an electrode X3 positioned beneath the outer



- substrate is increased when a finger is present on the nearby surface due to the “Finger to X3 capacitance” labeled  $C_{F3}$  in figure 8. APPLE-2013, 7:46-8:7.
9. The use of capacitive sense electrodes for detecting the proximity of external objects, such as the fingers of a user has been well established. For example, the “Studsensor” product has been available since at least 1994 when I began using this product example of capacitive sensing in my Stanford University course titled “ME220 Introduction to Sensors”.

APPLE-2014, ¶¶8-9; Rep. to Opp. to Rev. Mot. to Amend, 8-9

Kyoso Does Not Authenticate The User

# Kyoso's Device Does Not Authenticate The User

Dr. Kenny:

*Abstract* – The purpose of this paper is to present a new identification engine for an ECG identification system. The system identifies subjects based on a comparison of a patient's ECG with previously registered ECG feature parameters. These feature parameters are sampled from the intervals and durations of the electrocardiographic waves extracted using characteristic points appearing on the waveform of the second order derivative and are identified using discriminant analysis. Suitable combinations of feature parameters are selected and the accuracy of the proposed technique verified using ECGs from nine normal subjects.

EX1070, 1; Rep. to Opp. to Rev. Mot. to Amend, 12

Dr. Kenny:

37. Finally, Masimo and Mr. Oslan introduce the Kyoso reference, describing an ECG Identification System. EX1069, ¶367. This reference describes an initial experimental implementation of a software package that can be used to process captured ECG signals, identify some features of the ECG signals, and distinguish some users from other users with modest reliability. EX1070, 1-3. There is nothing in Kyoso that requires particular electrode structures or configurations. There is merely a suggestion that some software processing of signals may provide somewhat reliable determination of one user out of nine in a limited experiment. *Id.* A POSITA would find Kyoso to be somewhat encouraging, but far short of a useful method for improving on the devices described by Mills or Markel. For starters, while Kyoso discusses some initial success of differentiating between a small sample set of users based on measured ECG data, there is no discussion of using such information to authenticate a user, as recited by substitute claim 27.

APPLE-2014, ¶37; Rep. to Opp. to Rev. Mot. to Amend, 12

**FISH**

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

THANK YOU