

On behalf of **Masimo Corporation**

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MASIMO CORPORATION
Petitioner,

v.

APPLE INC.
Patent Owner.

Case No. IPR2024-00071
U.S. Patent No. 10,076,257

**PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 10,076,257**

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OTHER AUTHORITIES

35 U.S.C. § 314	83
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EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 10,076,257 (“the ’257 patent”)
1002	File history of the ’257 patent
1003	Declaration of Alan L. Oslan
1004	<i>Curriculum Vitae</i> of Alan L. Oslan
1005	U.S. Pat. Pub. No. 2007/0021677, published January 25, 2007 (“Markel”)
1006	U.S. Pat. No. 5,351,695, issued Oct. 4, 1994 (“Mills”)
1007	Reserved
1008	Leslie Cromwell et al., <u>Biomedical Instrumentation and Measurements</u> (1973)
1009	Reserved
1010	Reserved
1011	Stejskal et al., <u>Electrically Anisotropic Materials: Polyaniline Particles Organized in a Polyurethane Network</u> (1997) (“Stejskal”)
1012	Reserved
1013	Reserved
1014	Reserved
1015	Carl R. Nave, <i>Conductors and Insulators</i> , HYPERPHYSICS (last visited March 13, 2023), http://hyperphysics.phy-astr.gsu.edu/hbase/electric/conins.html#c1
1016	<u>Merriam-Webster’s Collegiate Dictionary</u> (11 th ed. 2004)
1017	<u>Random House Unabridged Dictionary</u> (2 nd ed. 1993)

Masimo Corporation v. Apple Inc.
IPR Petition – U.S. Patent No. 7,506,977

Exhibit No.	Description
1018	<u>The American Heritage Dictionary of the English Language</u> (4 th ed. 2000)
1019	Steven M. Kaplan, <u>Wiley Electrical and Electronics Engineering Dictionary</u> (2004)
1020	<u>Stedman’s Medical Dictionary</u> (28 th ed. 2006)
1021	District of Delaware Time to Trial Statistics – Oct. 2023
1022	U.S. Patent No. 5,678,545, issued Oct. 21, 1997 (“Stratbucker”)
1023	Reserved
1024	U.S. Patent Pub. No. US 2005/0239493 A1, published Oct. 27, 2005 (“Batkin”)
1025	U.S. Patent No. 4,230,127, issued Oct. 28, 1980 (“Larson”)
1026	Miller, H. A. et al., <u>Biomedical Electrode Technology Theory & Practice</u> , Academic Press Inc., 1974, pp. 5-93 (“Miller”)
1027	U.S. Patent No. 3,568,662, issued Mar. 9, 1971 (“Everett”)
1028	Carl R. Nave, <i>Capacitors</i> , Hyperphysics (last visited October 17, 2023), http://hyperphysics.phy-astr.gsu.edu/hbase/electric/pplate.html#c1
1029	Minute Entry for Motion to Stay Pending IPR, <i>MQ Gaming, LLC et al v. LEGO Systems, Inc. et al</i> 1-19-cv-00905 (D. De.), Mar. 17, 2021.
1030	Minute Entry for Motion to Stay Pending IPR, <i>MicroSurgical Technology, Inc., et al v. New World Medical, Inc.</i> 1-20-cv-00754 (D. De.), Aug. 12, 2021.
1031	Transcript re Motion to Stay Pending IPR, <i>Microsurgical Technology, Inc., et al., v. New world Medical, Inc.</i> , 1:20-cv-00754-MN (D. De.), Aug. 12, 2021.

Masimo Corporation v. Apple Inc.
IPR Petition – U.S. Patent No. 7,506,977

Exhibit No.	Description
1032	Joint Claim Construction Brief, <i>Apple Inc., v. Masimo Corporation and Sound United, LLC</i> , 1:22-cv-01378-MN-JLH (D. De.), Aug. 31, 2023

GROUND LISTING

GROUND 1	Claims 6-7 are unpatentable as obvious over Batkin in view of Larson
GROUND 2	Claims 6-7 are unpatentable as obvious over Markel in view of Mills, Stratbucker, and Stejskal

Masimo Corporation (“Petitioner”) requests *inter partes* review of Claims 6-7 of U.S. Patent No. 10,076,257 (“the ’257 patent”).

I. MANDATORY NOTICES; FEES; STANDING

A. Mandatory Notices

1. Real Party-In-Interest (37 C.F.R. § 42.8(b)(1))

Masimo Corporation is a real party-in-interest.

2. Related Matters (37 C.F.R. § 42.8(b)(2))

Apple has asserted the ’257 patent against Petitioner in *Apple Inc. v. Masimo Corporation and Sound United, LLC*, U.S. District Court for the District of Delaware, Case No. 1:22-cv-01378-MN (“the Delaware Litigation”).

Masimo has previously petitioned for Inter Partes Review of claims 1-4 and 8-22 of the ’257 patent; IPR2023-00745.

AliveCor, Inc. has also previously petitioned for Inter Partes Review of claims 1-22 of the ’257 patent; IPR2023-00950.

3. Lead and Backup Counsel (37 C.F.R. § 42.8(b)(3))

Petitioner provides the following designation of counsel:

Lead Counsel	Back-up Counsel
Jarom Kesler (Reg. No. 57,046) 2jzk@knobbe.com BoxCDMI@knobbe.com <u>Postal and Hand-Delivery Address:</u> Knobbe, Martens, Olson & Bear, LLP 2040 Main St., 14th Fl. Irvine, CA 92614 Telephone: (949) 760-0404 Facsimile: (949) 760-9502	Ted M. Cannon (Reg. No. 55,036) Knobbe, Martens, Olson, & Bear, LLP 2tmc@knobbe.com <u>Postal and Hand-Delivery Address:</u> Same as lead counsel Philip M. Nelson (Reg. No. 62,676) Knobbe, Martens, Olson, & Bear, LLP 2pmn@knobbe.com <u>Postal and Hand-Delivery Address:</u> Same as lead counsel

Pursuant to 37 C.F.R. § 42.10(b), a Power of Attorney accompanies this petition. The above-identified lead and backup counsel are registered practitioners associated with Customer No. 20,995 listed in that Power of Attorney.

4. Service Information (37 C.F.R. § 42.8(b)(4))

Service information above. Petitioner consents to electronic service by email to MasimoIPR-257@knobbe.com.

B. Payment of Fees

The fee set forth in 37 C.F.R. § 42.15(a) has been paid. The undersigned further authorizes payment for any additional fees that may be due in connection with this petition to be charged to Deposit Account 11-1410.

C. Grounds for Standing

Petitioner certifies that the '257 patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR. As discussed further in section VI

below, Masimo is not estopped from challenging claims 6-7 as these claims were not challenged in IPR2023-00745 and these claims were not asserted by the Patent Owner until after the submission of IPR2023-00745. Estoppel does not attach to unchallenged claims. *See Intuitive Surgical, Inc. v. Ethicon LLC*, 25 F.4th 1035, 1042 (Fed. Cir. 2022) (“A petitioner may also file multiple petitions where each petition focuses on a separate, manageable subset of the claims to be challenged . . . as § 315(e)(1) estoppel applies on a claim-by-claim basis.”). Petitioner believes the Board should not exercise discretionary denial as explained below in Section VI.

II. BACKGROUND

A. Reliance on Expert Analysis and Testimony

The predominant issues in this Petition, as in most patentability challenges, are technical issues for which expert analysis is relevant, particularly with respect to what would have been known or understood by a person of ordinary skill in the art (“POSITA”). Accordingly, this Petition largely adopts the expert analysis and testimony of Mr. Alan L. Oslan EX1003, ¶¶ 1-160; EX1004.¹

¹ In general, herein, a single citation to Mr. Oslan’s expert declaration is provided at the end of each paragraph that is supported by Mr. Oslan’s testimony.

B. Overview of the '257 Patent

The '257 patent is directed to an electronic device, such as a mobile phone, that includes “a heart sensor having several leads for detecting a user’s cardiac signals.” EX1001, Abstract. Fig. 3 (reproduced below)² depicts a mobile phone 300 including a bezel 310, leads 322, 324 and embedded lead 326. EX1003, ¶39.

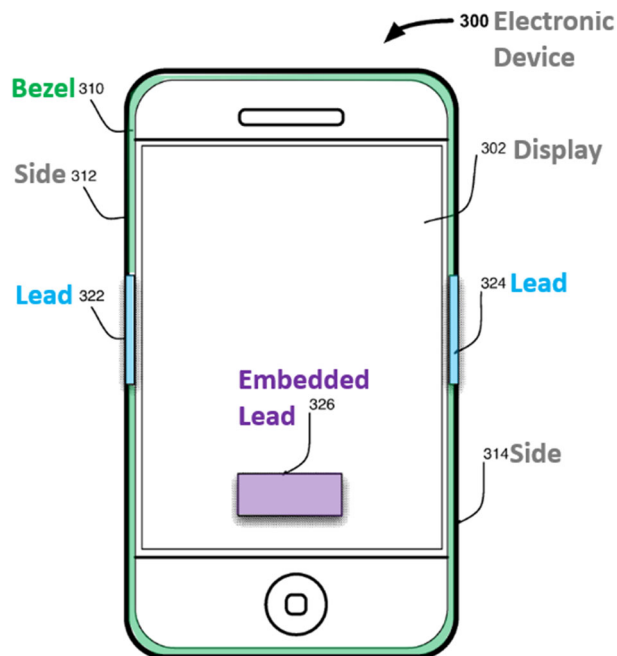


FIG. 3

The '257 patent admits electronic devices incorporating leads for detecting cardiac signals are not innovative. The '257 patent explains existing electronic devices can detect a user’s cardiac signals by providing “at least two leads that the user contacts.” EX1001 at 1:57-58. Instead, the '257 patent alleges novelty in the

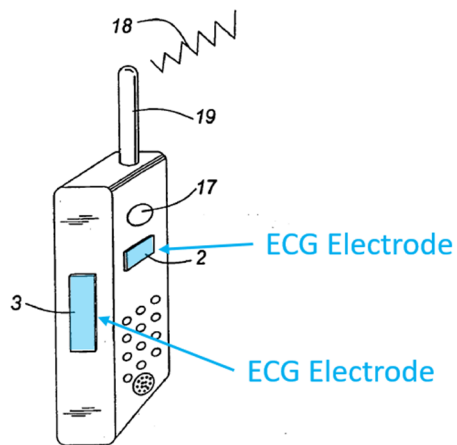
² All reproduced figures herein are annotated unless otherwise stated.

improvement of the *aesthetic qualities* of the electronic device with respect to the positioning of the leads. As stated in the background section, the approach of prior art devices placing “the leads ... on the exterior surface” of the housing (or enclosure) of the electronic device “is not aesthetically pleasing.” *Id.* at 1:58-63. EX1003, ¶40.

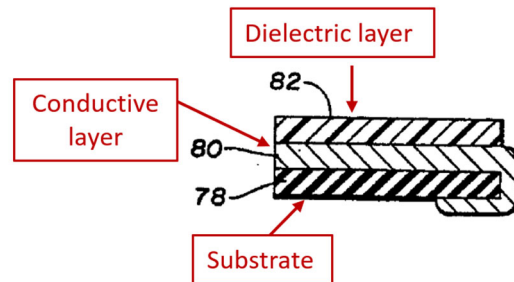
By their own admission, the inventors of the ‘257 patent did not invent a heart sensor having leads for detecting a user’s cardiac signals nor incorporation of a heart sensor into an electronic device. EX1001 at 1:57-58. They did not invent incorporation of a heart sensor into an electronic device. *Id.* Rather, the inventors merely expressed an opinion that embedding the leads in an enclosure allegedly results in aesthetically pleasing qualities. *Id.* at 1:58-63; EX1003, ¶40. Such embedding, however, is also not inventive. As evidenced herein, multiple prior art references recognized and expressly teach concealing leads by embedding them into the enclosure of an electronic device.

For example, Batkin and Larson both teach the incorporation of capacitive electrodes in an electronic device. EX1024, [0044]; EX1025, 3:38-44. With such a capacitive electrode, the conductive layer is not present on the surface of the device. Rather, the conductive layer is embedded beneath an insulating “dielectric layer,” such that the conductive layer of the electrode may be entirely concealed. EX1025, Figs. 4A-4C.

Batkins



Larson



EX1024, Fig. 1B; EX1025, Fig. 4C.

Additionally, prior art references such as Markel and Mills disclose embedded ECG leads in electronic devices with aesthetic considerations:

Markel

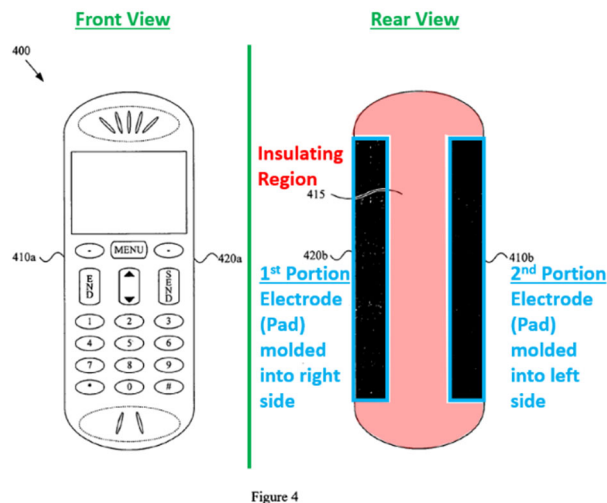
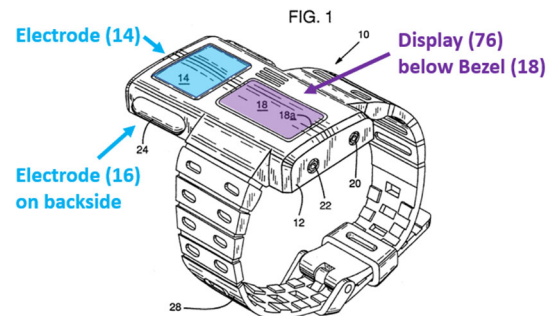


Figure 4

Mills



EX1005, Fig. 4; EX1006, Fig. 1.

Markel teaches electrodes that are “integrated into various molded components” of the device and “substantially concealed (or hidden) from a user ... with little or no visible indication of the electrode presence.” EX1005, [0040]. Similarly, Mills teaches electrodes 14 and 16 are formed as an “integral part” of housing 12. EX1006, 3:47-51. Mills provides a metal-plating composition to its electrodes for “aesthetic reasons.” *Id.*, 4:37-40.

C. Prosecution History of the ‘257 Patent

The examiner rejected the claims several times before allowing them after Patent Owner made several narrowing amendments to the independent claims. In Patent Owner’s final amendment of the claims, Patent Owner added that the embedded leads comprise an embedded “first pad” and “second pad” in pending claim 29 (issued claim 1), pending claim 34 (issued claim 6), and pending claim 35 (issued claim 7). EX1002 at 77–79. Patent Owner also argued that the cited art does not teach “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.” EX1002 at 87–89, 51. Thereafter the claims were allowed, and the Examiner provided no reason for allowance of the claims. EX1002 at 33-35. Ultimately Patent Owner did not submit, and the examiner did not

consider, any of the prior art references that Petitioner relies on in this Petition. *See generally* EX1002.

D. Priority of the ‘257 Patent

The ’257 patent is a continuation of U.S. App. No. 12/358,905, filed January 23, 2009 (now U.S. Pat. No. 8,615,290), which in turn claims priority to U.S. Prov. App. No. 61/111,498, filed November 5, 2008. Thus, its earliest possible priority date is November 5, 2008. EX1001, cover.

E. Level of Ordinary Skill in the Art

A POSITA of the ’257 patent would have at least a B.S. degree in electrical or biomedical engineering or a related field, with at least two years of experience designing patient monitoring or similar systems. A higher level of education may compensate for less work experience and vice versa. EX1003, ¶38.

F. Claim Construction³

1. Embedded

Independent Claim 1 recites “embedded” first and second pads of respective first and second leads.

³ The parties have submitted a joint claim construction brief in co-pending litigation in Delaware. *See* EX1032 (without exhibits due to its voluminous nature; Petitioner will file EX1032 with all exhibits if the Board requests). For purposes of this

The ‘257 patent discloses two examples of leads 422, 472 “embedded” into portions of the housing or enclosure 410, 460. EX1001 at 9:19-20, 22-24. Figure 4A (below) shows embedded lead 422 “along the outer surface of the bezel 410” and “exposed to the user during use.” *Id.* at 9:22-24. In contrast, Fig. 4B (below) shows embedded lead 472 “positioned against the back surface of the bezel 460” *Id.* at 9:34-45. EX1003, ¶44.

Petition, Petitioner Masimo provides the constructions herein believed to be sufficient to resolve the patentability issues presented in the Petition. The Delaware litigation involves additional issues which require the court to resolve additional claim-construction issues that are not presented in the Petition. For example, Petitioner Masimo has asserted in the District Court proceedings that Claims 6 and 7 of the ‘257 patent are indefinite. *Id.* at 63-65. Patent Owner Apple has asserted these claims are “straightforward” but did not provide any constructions. *Id.* at 62-64. Petitioner Masimo reserves the right to maintain or advance its indefiniteness and other claim construction arguments in different proceedings.

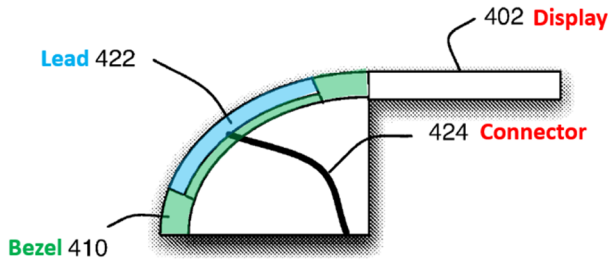


FIG. 4A

"[A] bezel with an embedded heart sensor lead" Ex. 1001 at 9:19-20.

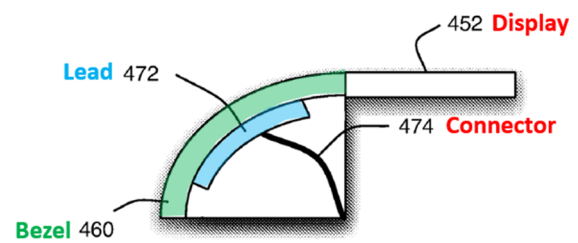


FIG. 4B

"[A]another ... bezel with an embedded heart sensor lead" Ex. 1001 at 9:37-38.

The '257 patent also explains that a lead can be embedded if it is "placed within the thickness of bezel . . . but underneath the outer surface of the bezel." EX1001, 9:45-48, EX1003, ¶44.

Appropriate dictionary definitions of embedded, as that term is used in the '257 patent, include "to make something an integral part of" (EX1016, 406); "to be or become fixed or incorporated, as into a surrounding mass" (EX1017, 635); "to cause to be an integral part of a surrounding whole" (EX1018, 583). EX1003, ¶45.

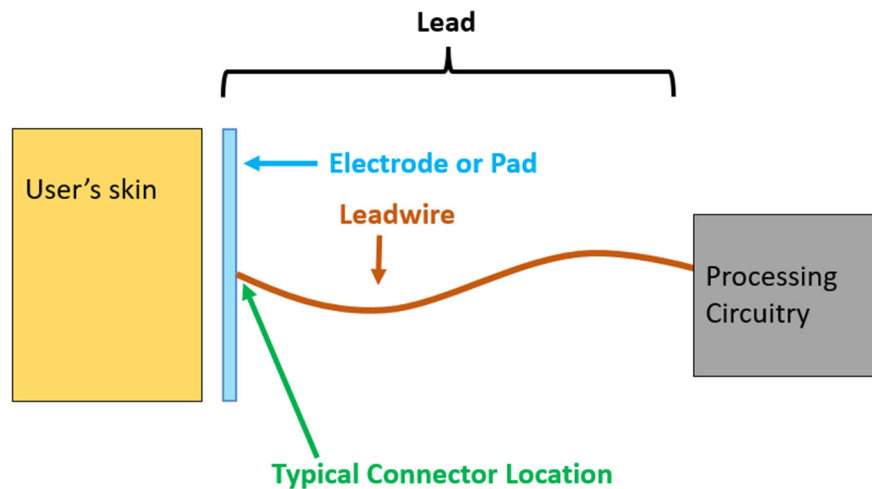
Accordingly, for purposes of this Petition, the claim term "embedded" should be construed to mean "*an integral part of*" such as, by "*being placed in the thickness of a surrounding material including forming an outer and/or inner surface*" or "*placed underneath an exterior surface and against an inner surface.*" EX1003, ¶46; EX1001, 9:34-48.

2. Lead

A POSITA would have understood that a common definition of a lead is a “conductor, usually a wire, by which circuit elements or points are connected to components, devices, equipment, systems, points or materials. Also called a lead wire.” EX1019, 414. Another technical dictionary defines a lead as an “electrocardiographic cable with connections within the electronics of the machine designated for an electrode placed at a particular point on the body surface.” EX1020, 10162; EX1003, ¶47.

A POSITA would understand a common basic electrocardiogram (ECG)⁴ system to include a number of “leads” typically formed from “electrodes” in contact with the user’s skin (sometimes referred to as a “pad”) and may include a “lead wire”, one or more connectors, and other components to electrically couple a body electrical signal at the electrode to processing circuitry. For example, a typical ECG lead can be graphically illustrated as follows:

⁴ Electrocardiogram is commonly abbreviated as either ECG or EKG. EX1008, 31.



Electric potentials measured by each lead are compared to other leads to determine a voltage (*e.g.*, a difference between two electrical potentials). The measured voltage is the ECG signal. EX1003, ¶48.

The '257 describes an electronic device with a sensor such that “electrical signals generated by the user can be transmitted from the user's skin through the electronic device housing to the leads.” EX1001, Abstract. Accordingly, this device is a type of electrocardiogram (ECG). In the context of an ECG system, an “electrode” is a well-known term of art that a POSITA understands to mean a structure, such as a pad, that contacts the user’s skin to detect the user’s ECG. EX1003, ¶49.

The '257 patent does not explicitly use the term “electrode,” but does describe a structure a POSITA would understand to mean an electrode, including a “pad” or “lead.” EX1001, 6:28-33. For example, the '257 patent explains: “to detect a user's

heartbeat or heart rhythm, however, the electronic device must provide at least two leads that the user contacts to detect the user's cardiac signals” and “contact is made between the user (e.g., the user's hand or finger) and the leads for cardiac signals to be detected.” EX1001, 1:56-58, 6:27-28; EX1003, ¶50.

The '257 patent states that 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, 2:44-50. Consistent with its ordinary meaning as shown in dictionary definitions and based on the claims and disclosure of the '257 patent, for purposes of this Petition, a “**lead**” in context of the '257 patent to should be construed to mean “*one or more conductive components that form at least a part of an electrical path from the user's skin to the processor.*” EX1003, ¶51.

3. Pad

The term “pad” is recited in independent Claim 1 as well as each of claims 6-7. The '257 patent states that a “lead can include a pad ... placed on the outer or inner surface of an electronic device bezel or housing [which] can then be coupled to a wire or other connector for providing cardiac signals to a processor for processing.” EX1001, 6:28-33. An electrode is often a conductive pad. The dictionary meaning of pad is “a thin flat mat or cushion.” EX1016, 890. The '257

patent states a “pad” as “an extended area placed on the outer or inner surface of an electronic device bezel or housing” and which can then be “coupled to a wire or other connector for providing cardiac signals to a processor for processing.” EX1001, 6:29-33. Consistent with its ordinary meaning to a POSITA and for purposes of this Petition, a “**pad**” in the context of the ‘257 patent should be construed to mean “*a thin mat that may be part of the electrical path of a lead, such as an electrode or a connection that is part of the lead.*” EX1003, ¶52.

4. Positioned Apart

Claim 7 recites “wherein the first pad and the second pad are positioned apart from one another at a distance larger than the thickness of the second portion by material having the second conductivity.” EX1001, 13:15-18. The ‘257 patent specification does not explicitly define this term, nor are there any drawings that illustrate what is meant by being “positioned apart . . . by material having the second conductivity.” Claim 7 depends from claim 6 which recites that “the second conductivity is defined such that the second electrical signal is not able to be transmitted through material having the second conductivity over a distance larger than the thickness of the second portion.” *Id.* 13:11-14. Claim 6 depends from Claim 4, which recites separation of the first portion and the second portion by a third material with a first conductivity “insufficient to transmit the first electrical signal from the first pad to the second pad via the third portion.” EX1001, 12:55-62. The

‘257 claims do not recite that the first conductivity and the second conductivity are required to be in two different materials. The claims also do not require the first and second conductivity to be in the same material. Rather, the claims define the first conductivity and second conductivity through different directional properties (such as in the direction “from the first pad to the second pad” and in the direction through a portion “over a distance larger than the thickness of the second portion”). EX1003, ¶¶53-54.

The ’257 patent specification does not refer to the use of an isolating layer in conjunction with a bezel having a second conductivity. Instead, the ‘257 patent states that “if the material of bezel 410 is not conductive, or insufficiently conductive to cause several distinct leads 422 positioned on bezel 410 from shorting, no isolating layer may be necessary.” EX1001, 32-35. Thus, the ‘257 patent does not require any embodiment incorporating two separate materials, one with a first conductivity and one with a second conductivity. EX1003, ¶55.

When discussing Figure 4B, having a lead 472 below the bezel 460, the specification states that the electrical conductivity of the bezel is “adapted such that the signal can be transmitted along short distances in bezel 460.” EX1001, 9:40-44. Further, the specification states that “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, 9:53-57. EX1003, ¶56.

Using this description of Figure 4B, “positioned apart from one another . . . by material having the second conductivity” should be interpreted for purposes of this Petition *as an electrical separation between two pads such that they “cannot detect the same electrical signal.”* EX1001, 9:53-57. This electrical separation may be accomplished by a material having the first conductivity and the second conductivity or by two or more materials, where a first material has the first conductivity and the second material has the second conductivity. EX1003, ¶57.

III. STATEMENT OF PRECISE RELIEF REQUESTED

A. Statutory Grounds for Cancellation

Ground 1: Petitioner requests that the Board cancel claims 6-7 as unpatentable under pre-AIA 35 U.S.C. § 103 because they are obvious in view of Batkin and Larson.

Ground 2: Petitioner requests that the Board cancel claims 6-7 as unpatentable under pre-AIA 35 U.S.C. § 103 because they are obvious in view of Markel in combination with Mills, Stratbucker, and Stejskal.

B. Status of References as Prior Art

The following references are prior art for the following reasons:

Exhibit No.	Description	Prior Art Basis
1001	'257 patent (background section)	Admitted Prior Art
1005	Markel	Pre-AIA 102(b) – published January 25, 2007
1006	Mills	Pre-AIA 102(b) – published October 4, 1994
1011	Stejskal	Pre-AIA 102(b) – published Mar. 26, 1999
1022	Stratbucker	Pre-AIA 102(b) – published Oct. 21, 1997
1024	Batkin	Pre-AIA 102(b) – published Oct. 27, 2005
1025	Larson	Pre-AIA 102(b) – published Oct. 28, 1980

These references constitute analogous art because they are from the same field of endeavor as the '257 patent, *e.g.*, devices for detecting cardiac signals via user contact and/or materials useful for measuring such cardiac signals. *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1000 (Fed. Cir. 2016). They are also reasonably pertinent to a particular problem with which the inventor was involved, *e.g.*, materials and configurations for detecting cardiac signals via a device exterior while maintaining an aesthetically pleasing design. *See In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004) (discussing the two-part test of “whether the art is from the same field of endeavor” and “whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved”). Even if any of the references could be considered to be in a different field of endeavor they are

reasonably pertinent because they “logically would have commended itself to an inventor's attention in considering his problem.” *In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992). For example, Markel, Mills, Batkin, and Larson would have logically commended themselves to the inventor’s problem as they all teach the incorporation and configuration of electrodes in an electronic device, such as a watch or a phone. *See generally* EX1005, EX1006, EX1024, EX1025. Moreover, Stratbucker and Stejskal would have logically commended themselves to the inventor’s problem as they teach material properties useful for measuring electrical signals where multiple sensors are used, such as in an ECG measurement. EX1011, abstract; EX1022, abstract. As these references are analogous art, a POSITA is presumed to have been aware of them. *In re Nilssen*, 851 F.2d 1401, 1403 (Fed. Cir. 1988).

IV. SPECIFIC PROPOSED GROUNDS FOR UNPATENTABILITY

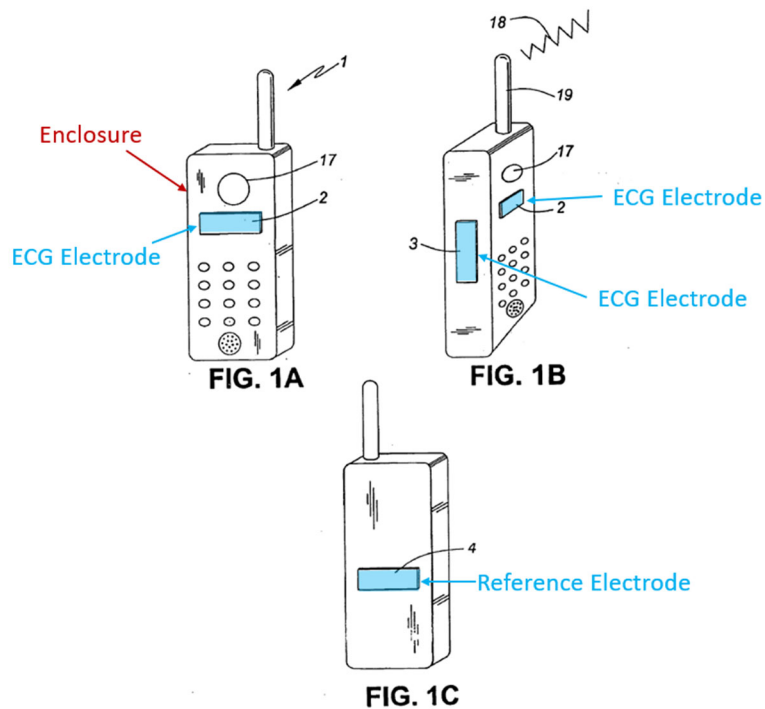
As explained below, claims 6-7 of the ’257 patent would have been obvious in view of the prior art identified below.

A. Overview of Key Prior Art

1. Batkin

Batkin published on October 27, 2005, as U.S. Patent Pub. No. 2005/0239493 A1. EX1024. Batkin discloses a bio-monitor built into a telephone handset or cellphone where sensors are configured to obtain bio-signals while the cell phone is in the position for normal use. EX1024, abstract. The sensors may be ECG capacitive

sensors with forward facing and side or rear-facing electrodes. EX1024, [0044]. Batkin explains that the prior art fails to provide a phone with bio-signal monitoring during “normal speaking or communications over a phone handset.” EX1024, [0010]. Thus, Batkin provides “electrode placement . . . for bio-signal pickup during the course of normal communications.” EX1024, [0034]. EX1003, ¶58.

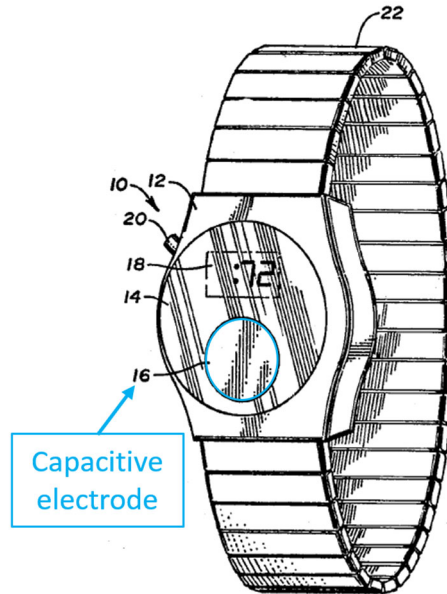


EX1024, Fig. 1A-1C.

2. Larson

Larson published on October 28, 1980 as U.S. Patent No. 4,230,127. EX1025. Larson discloses a wristwatch size cardiac monitoring apparatus that is worn on the wrist of the user. EX1025, abstract. The cardiac monitoring apparatus contains a capacitive sensor on the face of the device having a metal layer on which is placed

a dielectric material such that when the finger is placed on top of the dielectric material, a capacitor is formed and the electric (EKG) signal on the finger is transferred through the dielectric layer to the metal layer. *Id*; see also *id.* 3:38-57. EX1003, ¶59.



EX1025, Fig. 1.

3. Markel

Markel published on January 25, 2007, as U.S. Patent Publication No. 2007/0021677. EX1005. Markel discloses a device that comprises one or more electrodes that are “adapted to detect cardiac activity of a user” of the device. EX1005, [0035]. In Fig. 4 of Markel (below), a mobile communication device 400 includes electrodes placed on or molded into regions 410b, 420b, that are “substantially concealed (or hidden) from a user.” EX1005, Fig. 4 (reproduced below with annotations), [0039], [0040], [0045]. Markel provides an example,

disclosing that “an electrode may comprise molded conductive plastic with little or no visible indication of the electrode presence.” *Id.*, [0040]; EX1003, ¶61.

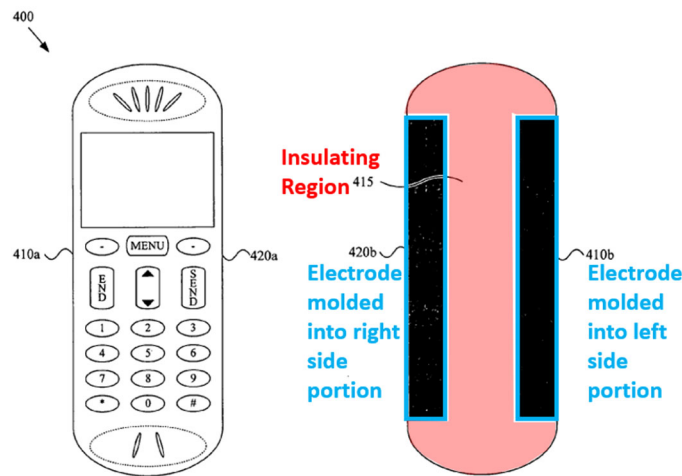
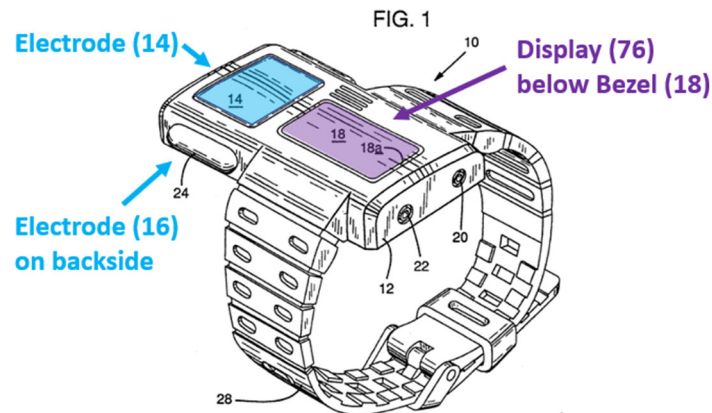


Figure 4

4. Mills

Mills published on October 4, 1994, as U.S. Patent No. 5,351,695. EX1006. Mills discloses a “cardiac and data event monitor having dry skin electrodes integral with the monitor’s housing.” EX1006, Abstract. As shown in Fig. 1 (reproduced with annotations below), a wrist-worn ECG monitor 10 includes a first electrode 14 incorporated within housing 12 and a second electrode 16. According to Mills, an “object [of the invention] is to provide such a monitor that reliably detects and records ECG signals without the use of external electrodes or messy gels.” EX1006, 1:39-42. Mills also states that “an object of the invention [is] to provide an improved dry skin electrode system that is an integral part of the housing of such a monitor.” *Id.*, 1:43-45; EX1003, ¶60.



5. Stratbucker

Stratbucker published on October 21, 1997, as U.S. Patent No. 5,678,545.

EX1022. The reference discloses a bioelectric interface “which demonstrates electrode isolating anisotropic electrical specific impedance properties simultaneous with isotropic pliability and adhesion mechanical properties” that can be used in ECG systems. EX1022, abstract. During measurement its electrodes are “in a desired spacially [sic] separated pattern, such that in use said electrodes are essentially fixed in location with respect to one another.” EX1022, 5:50-52. As explained by Stratbucker, electrical anisotropy is desirable because it “allows use of higher resolution electrode geometry . . . because lateral current flow [from one electrode to another] is limited.” EX1022, 8:30-32. In particular, Stratbucker teaches that due to the anisotropic properties of the material the “the specific

impedance across the sheet is significantly different from that laterally along said sheet.”⁵ EX1022, 5:62-63. EX1003, ¶62.

6. Stejskal

Stejskal, a non-patent reference, was published in 1997. EX1011. Stejskal teaches a method of manufacturing conductive polyurethane (plastic) which has anisotropic characteristics. Anisotropic characteristics allow for “electrical conductivity several times higher in the direction of the orientation [e.g., thickness] than in the perpendicular one [e.g, lateral].” EX1011 at 287. Stejskal teaches that a polyaniline is distributed in a polyurethane network and solidified (petrified) following polymerization of the polyurethane medium. EX1011 at 287. EX1003, ¶63.

B. Ground 1: Dependent Claims 6-7 are unpatentable as obvious over Batkin in view of Larson.

1. Claim 1

“An electronic device for detecting a user’s cardiac signal, comprising”

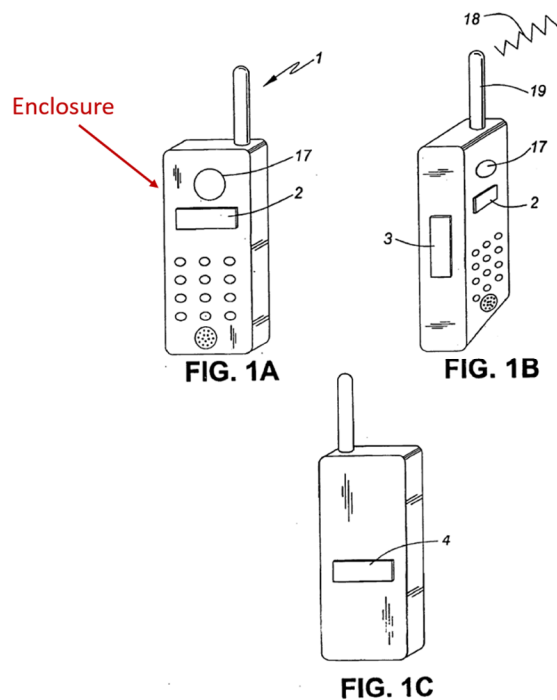
Batkin discloses a “Remote Monitoring of Cardiac Electrical Activity Using A Cell Phone Device.” *See* EX1024, Title; EX1003, ¶64.

⁵ Specific impedance, which is sometimes used herein, is also referred to as resistivity, and the inverse of resistivity is conductivity. EX1003, n.8.

a. Limitation 1[a]

“an enclosure”

Batkin discloses a “cell phone 1” which a POSITA would understand from at least Fig. 1A-C includes an enclosure as shown below. EX1024, [0044].



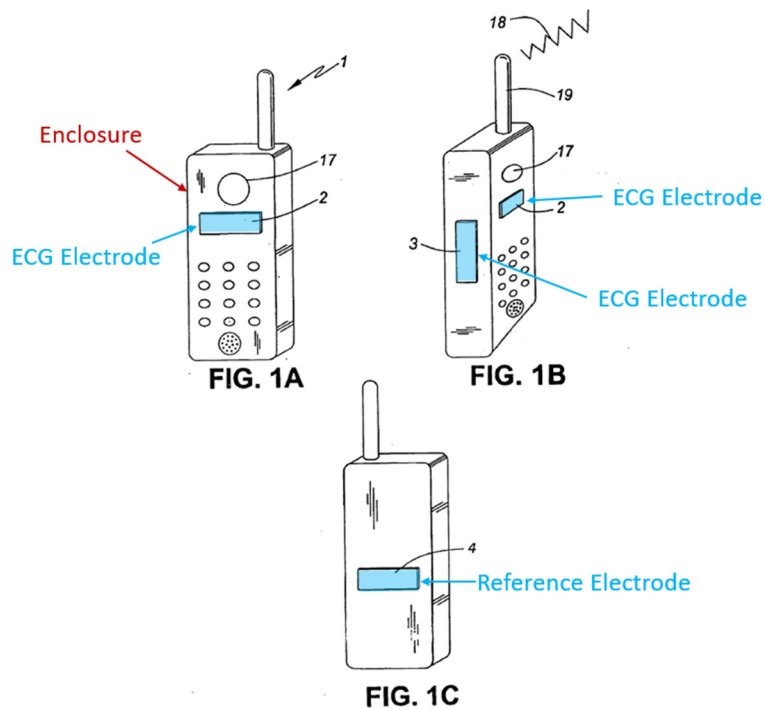
Batkin further explains that its “FIG. 6 illustrates a functional block diagram of the invention removed from the interior of a cell phone, or case.” EX1024; [0049]; EX1003, ¶65.

b. Limitation 1[b]

“a heart sensor configured to detect the user's cardiac signal”

Batkin teaches its “cell phone 1” is equipped with “a cardiac monitoring device.” EX1024, [0044]. Batkin’s cardiac monitoring device is equipped such that

“cardiac signals such as human heart rate, electrocardiogram (ECG) and other vital signs may be acquired.” EX1024, [0001]. This monitoring device structure includes a forward facing “head-contacting sensor 2,” a second “side or rear-facing, hand-contacting sensor 3,” and a “reference electrode 4,” as shown in the annotated figures below. EX1024, [0044], Fig. 1A-1C. EX1003, ¶67.

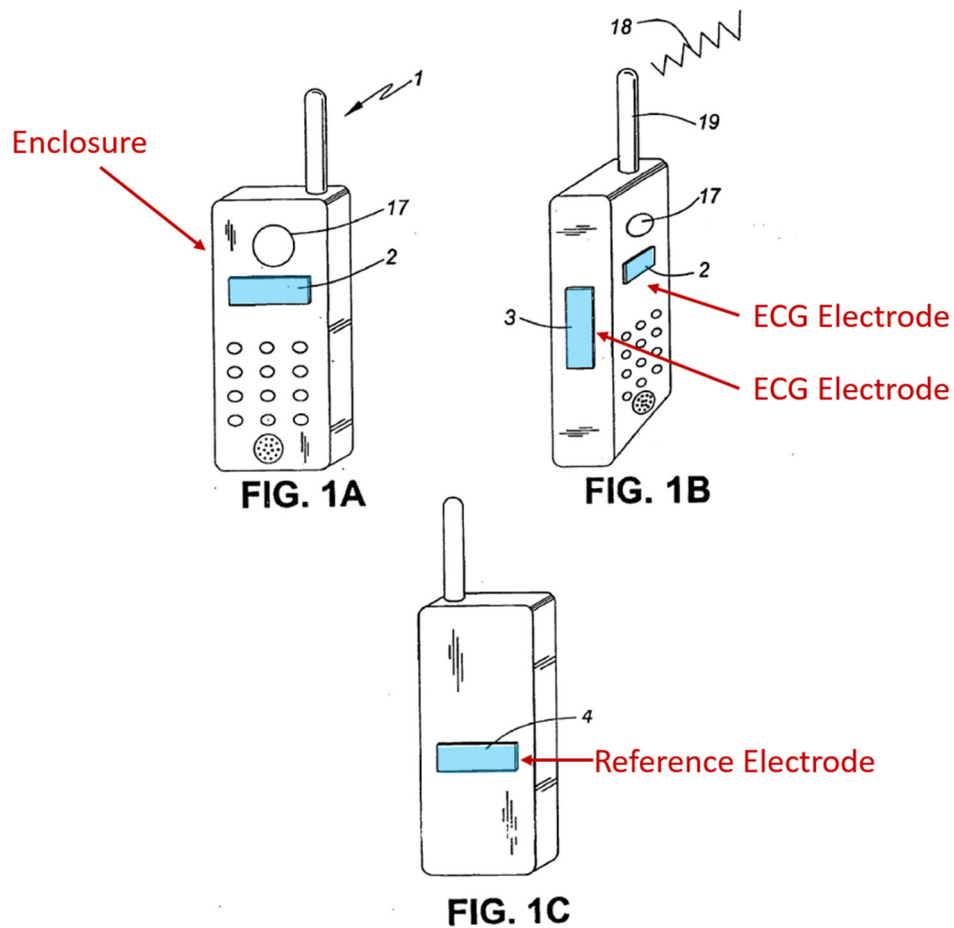


c. Limitation 1[b(i)]

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

Batkin illustrates its electrodes, for example, electrode 2 in Figs. 1A-1C, as integrated in its enclosure. EX1024, Figs. 1A-1C. Further, Batkin teaches two electrodes (ohmic or capacitive electrodes) in addition to its preferred (but not

required) ohmic reference electrode. EX1024, [0030], [0044]. Batkin does not provide details of its electrode structure, other than that they can be capacitive or ohmic, but it does illustrate them as rectangular pads on the surface of its enclosure:



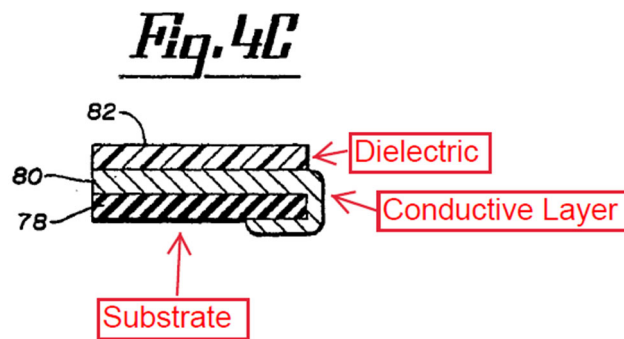
EX1024, Fig. 1A-1C. EX1003, ¶¶68-69.

A person of skill in the art (POSITA) looking to implement Batkin would have been motivated to look to other references that teach ohmic⁶ and/or capacitive electrode structures, as explicitly suggested by Batkin. For example, a POSITA would have looked to Larson for its teaching of capacitive electrodes in a portable electronic device and would have understood that Larson’s capacitive electrode structure could be used with Batkin’s cell phone device. Further, a POSITA would have also looked to Larson’s teachings of capacitive electrodes for their superior qualities as explained in more detail below. EX1003, ¶70.

Larson teaches the internal structure of capacitive electrodes in an electronic watch for the detection of “electrocardiac (EKG) signal[s].” EX1025, 1:19-22.

⁶ Although Batkin suggests in one portion that an ohmic *reference* electrode is preferred, Batkin’s teachings nevertheless would have suggested to a person of skill that a capacitive reference electrode can be used as a known equivalent. EX1024, [0044]. See *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 800 (Fed. Cir. 2021) (“It’s not necessary to show that a combination is ‘the *best* option, only that it be a *suitable* option.’” (quoting *PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1197–98 (Fed. Cir. 2014)); *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006) (“[A] given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.”)).

Larson provides several configurations of its capacitive electrode, each with an insulating, dielectric layer on the surface (where a finger may be placed), a middle conductive layer of a conductive material such as silver, and a supporting substrate on the bottom. EX1025, Figs. 4A-4C, 4:59-5:34. For example, Figure 4C illustrated below contains an uppermost dielectric layer 82 (where a finger may be placed), a middle conductive layer 80, and support substrate 78 on the bottom. EX1025, 5:24-34. EX1003, ¶71.



Accordingly, a POSITA would have applied the capacitive electrode structure of Larson to Batkin, which results in a first conductive “pad” that is “embedded” (placed underneath and against) the exterior surface of the enclosure of Larson. The electrode structure in Larson resembles capacitive electrode structures in the prior art, and a POSITA would have appreciated that Larson teaches a typical capacitive electrode structure. EX1003, ¶¶72, 104.

A POSITA would have also been motivated to use the capacitive electrode structure of Larson in the system of Batkin for many reasons beyond the explicit

teaching in Batkin to use capacitive electrodes. Capacitive electrodes are known to have many benefits that would have let a POSITA to use capacitive electrodes in the system of Batkin. Larson (EX1025 at 2:1-12) cites to the 1974 edition of the book “Biomedical Electrode Technology Theory and Practice” by Miller et al. (EX1026), which explains some of the benefits of capacitive electrodes compared to ohmic/conductive electrodes. Miller explains that capacitive electrodes 1) “yield good quality ECG signals” 2) “can be made quite small” 3) “provides no DC offset voltage at its output;” and 4) where two capacitive electrodes are used, the two capacitive electrodes of “identical design will have closely matched voltage transfer functions” which Miller goes on to explain simplifies implementation of electrodes. EX1026 at 11-17. Further, beyond the clear advantages of capacitive electrodes explained in Miller, a POSITA also would have appreciated that Batkin as modified by Larson’s capacitive electrode design would be aesthetically pleasing, providing a flush surface. EX1025, Fig. 1-2. EX1003, ¶74.

Finally, a POSITA would have seen the many benefits of capacitive electrodes at least because 1) they provide an inert surface in contact with the users skin which reduces noise and skin disturbances, 2) they are more efficient than direct contact electrodes as they don’t dissipate energy in the frequency range of biological signals, 3) no contact artifacts or movement artifacts are produced as is typical in the case of direct contact electrodes 4) the inert surface is not affected by

changes to the skin surface, such as by perspiration 5) they do not produce movement artifacts that can occur when contact electrodes have a change in applied pressure. *See* EX1003, ¶75 (discussing the benefits stated in EX1027).

Thus, a POSITA would have been motivated to implement the capacitive electrode structure in Larson at least because Batkin explicitly teaches that capacitive electrodes can be used and, separately, because there are many advantages of capacitive electrodes, as explained in the prior art. EX1003, ¶77.

d. Limitation 1[b(ii)]

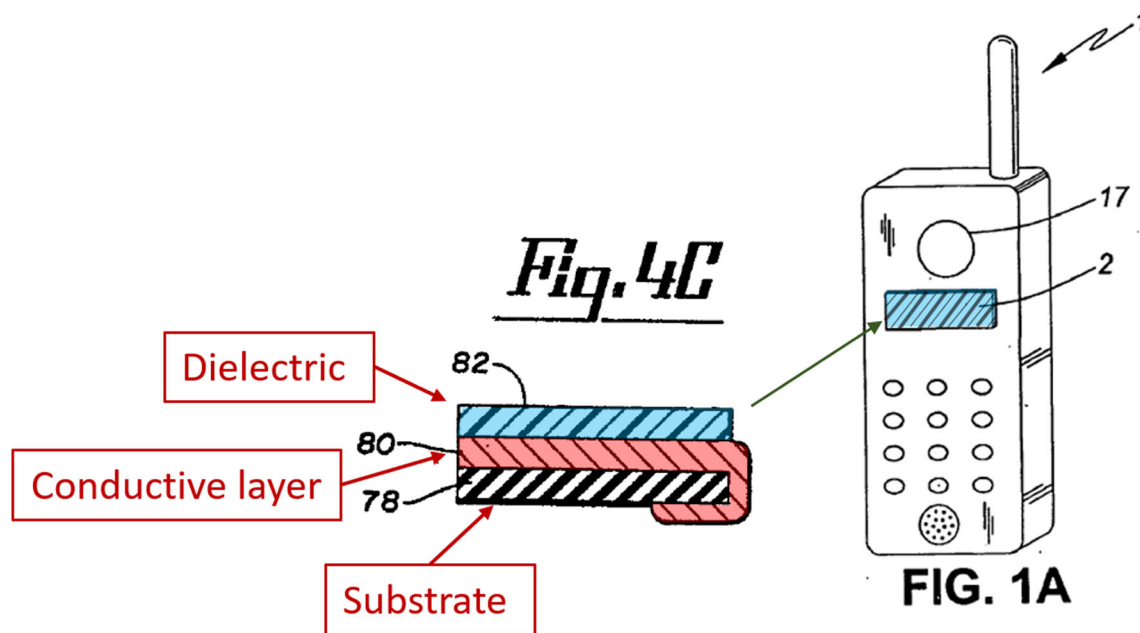
“an exterior surface of the enclosure comprises an exterior surface of the first portion”

As described above, the electrode 2 of Batkin as modified by Larson places the dielectric on the exterior surface of the first portion of Batkin. Batkin’s sensors have a first portion on an exterior surface as Batkin teaches that the sensors obtain signals when they “contact the user's head,” “contact the left hand or thumb of the user,” or “contact the face or ear of the user.” EX1024, [0044]. Thus, a POSITA would have known the exterior surface of the enclosure comprises a first portion for cardiac measurements. EX1003, ¶78.

e. **Limitation 1[b(iii)]**

“the first pad is positioned underneath the exterior surface of the first portion”

As described above, the electrode of Batkin as modified by Larson places the dielectric on the exterior surface of the first portion of Batkin and the first pad (conductive layer 80 of Larson) underneath the exterior surface. This is illustrated below. EX1024, Fig. 1A; EX1025, Fig. 4C. EX1003, ¶79.



f. Limitation 1[b(iv)]

“the first pad detects 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”

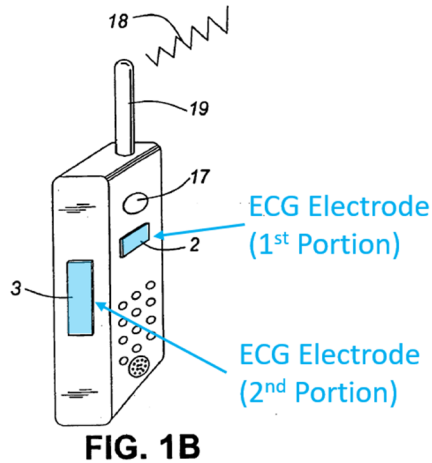
Batkin explains that its capacitive sensors obtain signals when they “contact the user's head,” “contact the left hand or thumb of the user,” or “contact the face or ear of the user.” EX1024, [0044]. EX1003, ¶80.

Larson likewise explains that its capacitive electrode detects electrical signals from a user’s touch. EX1025, 5:1-7. Larson teaches that when a finger is placed on top of the dielectric layer (e.g., layer 82 in Larson), a capacitor is formed with the conductive layer (e.g., conductive layer 80). EX1025, 3:50-57 and 5:1-7. The conductive layer acts as one plate of the capacitor and the finger acts as a second plate of the capacitor. *Id.* The “voltage on the skin of the finger is transferred through the dielectric material to the other plate of the capacitor” (the conductive layer) and the signal is transferred from there to “electrical components of the circuit, where the heart rate is determined.” *Id.*, 3:50-57, 5:1-7, 5:24-34. EX1003, ¶81.

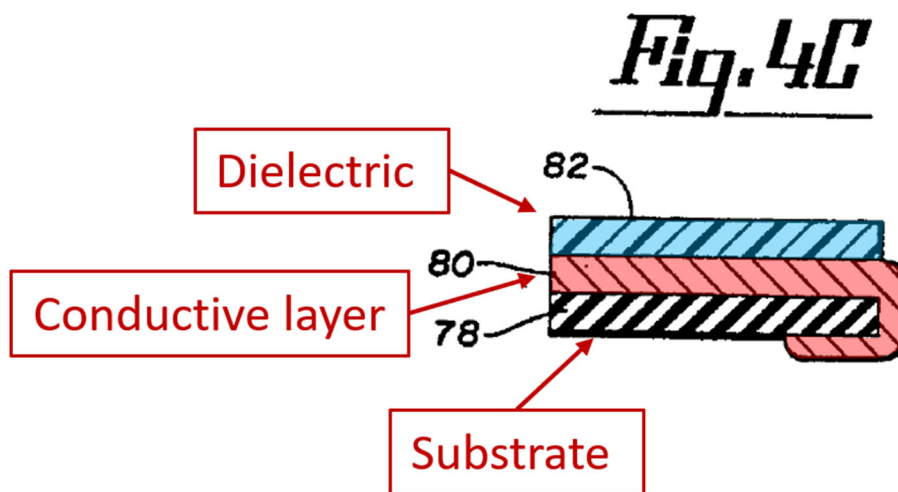
g. Limitation 1[b(v)]

“a second lead comprises a second pad that is embedded in a second portion of the enclosure”

Batkin teaches a second electrode, electrode 3 of Fig. 1B of Batkin, which is embedded in a second portion of its enclosure, illustrated below. EX1024, Fig. 1B. EX1003, ¶82.



Further, as discussed above with regard to section 1[b(i)], Batkin teaches that electrode 3 may be a capacitive electrode, and would have included or been modified to include the capacitive electrode structure of Larson. EX1024, [0043] (“The electrodes may be ohmic or capacitive”). As discussed above, Larson teaches that its capacitive electrode structure comprises an uppermost dielectric layer (e.g. 82), a middle conductive layer (e.g., 80), and support substrate (e.g., 78) on the bottom, as shown in Fig. 4C. EX1025, 5:24-34, Fig. 4C. EX1003, ¶83.



Accordingly, applying the capacitive electrode of Larson, the conductive layer of Larson constitutes a “second pad” which is embedded (placed underneath and against the outer dielectric surface) of Electrode 3 of Batkin. A person having ordinary skill in the art would have been motivated to embed the conductive layer in this way and combine the teachings of Batkin and Larson at least for the reasons discussed in 1[b(i)]. EX1003, ¶84.

h. Limitation 1[b(vi)]

“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”

Batkin explains that its capacitive sensors obtain signals when they “contact the user's head,” “contact the left hand or thumb of the user,” or “contact the face or ear of the user.” EX1024, [0044]. EX1003, ¶85.

Similarly, Larson explains that its capacitive electrode detects electrical signals from a user’s touch. Larson explains that when a finger (user’s skin) is placed on top of the dielectric layer (e.g., layer 82 in Larson), a capacitor is formed with the conductive layer (e.g., conductive layer 80). The conductive layer acts as one plate and the finger acts as a second plate. The electric signals from the heart appearing on the skin of the finger are transferred through the dielectric material to the conductive layer. EX1025, 5:1-7, Fig. 4C. Accordingly, Batkin in view of Larson meets this limitation. EX1003, ¶86.

i. Limitation 1[c]

“a processor coupled to the heart sensor 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”

Batkin teaches that its electrodes are connected to a processor (analyzer circuit

15 of Fig. 6 of Batkin). EX1003, ¶87. Batkin illustrates this in Fig. 6:

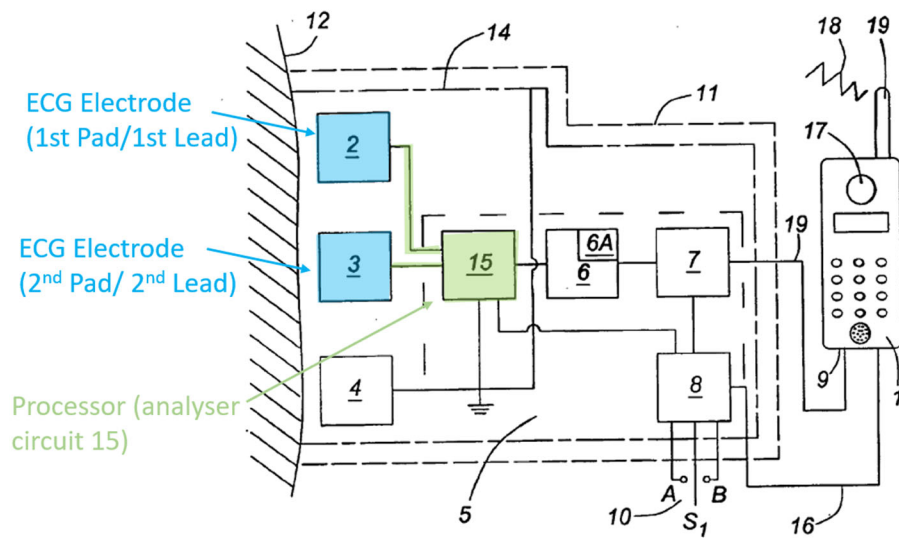


FIG. 6

A POSITA would understand that Fig. 6 shows a first and second “connector” between the electrodes (sensors 2 and 3)⁷ and the analyser circuit 15. Batkin teaches that its analyser circuit 15 derives key parameters from the bio-signal:

FIG. 6 illustrates a functional block diagram of the invention removed from the interior of a cell phone, or case for clarity. The outputs from the first sensor 1, the second sensor 2, and the reference electrode 3, are connected to the conditioning circuit 5. Circuit 5 may include analyser means 15 to *partially analyse the bio-signal*. For the purpose of ECG pickup, the analyser circuit 15 preferably includes a differential amplifier. The analyser circuit 15 may also include means to *derive key parameters from the bio-signal*, provide band-pass filters, interference filters and produce outputs based on the correlation of multiple bio-signals.

EX1024, [0049] (emphasis added); EX1003, ¶88.

⁷ A POSITA would have readily understood that Batkin has a typographical error and refers to sensors 2, 3, and 4 in Fig. 6 as sensors 1, 2, and 3, respectively in the description at [0049]. EX1003, n.3.

Relatedly, Batkin shows the resistors, capacitors, amplifiers, and connections associated with the signal reception and transmission from its electrodes, illustrated below. EX1024, Fig. 5. EX1003, ¶89.

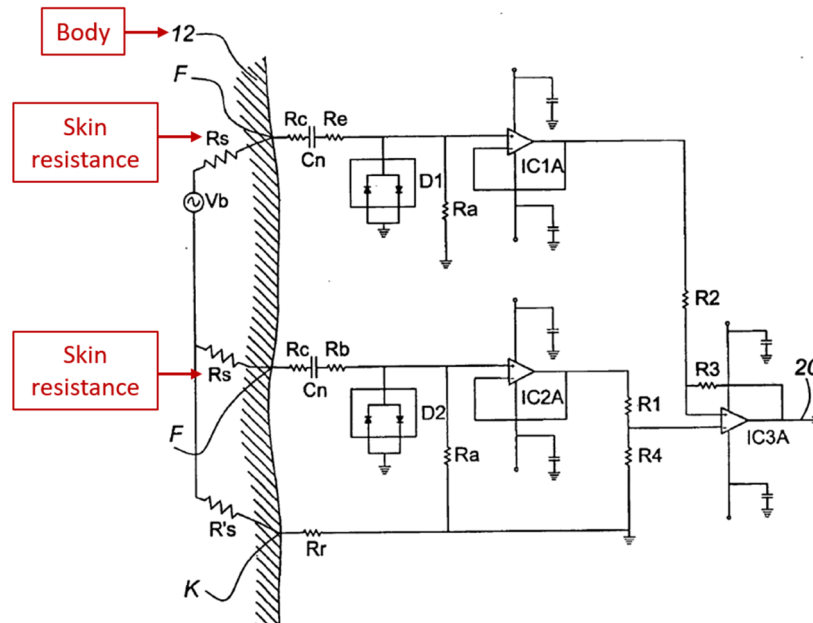


FIG. 5

Moreover, Batkin explains that the “handling of bio-signals, once acquired . . . can be performed by known technology in a number of ways.” EX1024, [0017]. Thus, a POSITA would have found the processing and handling of bio-signals as obvious and known in art. EX1003, ¶90.

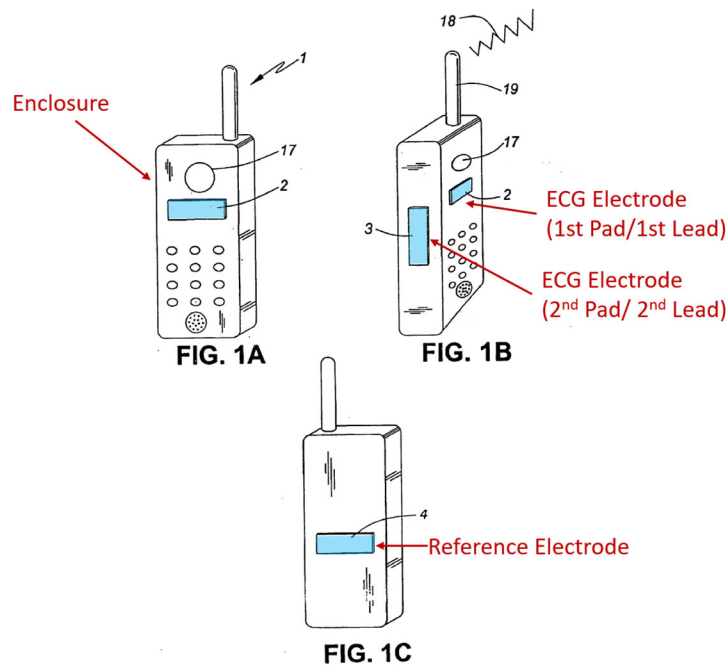
Finally, Larson teaches that its capacitive electrodes are configured where an “electrical connection is provided between the conductive material and the electronic components within housing 12.” EX1025, 3:48-50. Larson specifically notes that the “voltage on the skin of the finger is transferred through the dielectric material to the

other plate of the capacitor and from there to the electrical components of the circuit, where the heart rate is determined and displayed on display 18.” EX1025, 3:53-57; *see also* 9:12-22 (showing a formula for calculating and displaying heartbeats). A POSITA would have found it obvious to incorporate the processor of Larson into Batkin in order to provide a heart rate that can be monitored on the display of Batkin. Accordingly, limitation 1[c] is met by both teachings in Batkin and Larson. EX1003, ¶91.

2. Claim 4

“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”

Batkin illustrates its cell phone as having a case (white) with embedded ECG electrodes (blue) shown below in Figs. 1A-1C. EX1024, Figs. 1A-1C. A person of skill would have understood that the case of Batkin would have a conductivity insufficient to transmit the first electrical signal from the first pad to the second pad via the third portion. A person of skill would understand that this is required prevent signals from one electrode being picked up by the other electrode(s). EX1003, ¶92.



Larson teaches that its capacitive electrode (16) is surrounded by and disposed in mineral glass (14). EX1025, 3:61-68. Glass is an insulator with a conductivity on the order of 10^{-12} S/m. EX1015 at 2. A POSITA would have recognized that the glass in Larson is nonconducting at least because a hole (30) is drilled in the glass “in order that electrical contact may be made with the conductive layer of electrode 16 and the remainder of the electronic circuitry.” EX1025, 3:68 to 4:3. Thus, a POSITA would have known that embedding a capacitive electrode in a non-conducting material would have been desirable to isolate the conductive layer of the capacitive electrode from other conducting parts of the electronic device. EX1003, ¶93.

3. Claim 6

a. Limitation 6(a)

“The electronic device of claim 4, wherein: the exterior surface of the enclosure further comprises an exterior surface of the second portion;

As described above, with regard to 1[b(v)] the electrode 3 of Batkin as modified by Larson places the dielectric layer of the capacitive electrode on the exterior surface of the first portion of Batkin. EX1003, ¶94.

b. Limitation 6(b)

“the second pad is configured to detect the second electrical signal of the user's cardiac signal via the user's contact with the exterior surface of the second portion;”

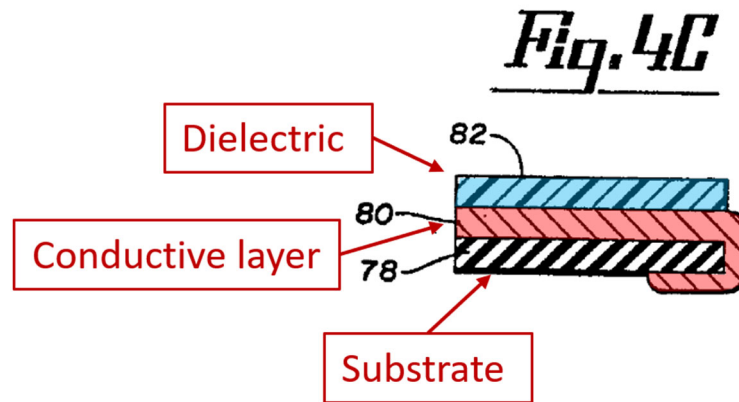
As discussed above, Batkin explains that its capacitive sensors obtain signals when they “contact the user's head,” “contact the left hand or thumb of the user,” or “contact the face or ear of the user.” EX1024, [0044]. Batkins electrodes are configured such that “cardiac signals such as human heart rate, electrocardiogram (ECG) and other vital signs may be acquired.” EX1024, [0001]. Accordingly, the limitations of 6(b) are met by Batkin. EX1003, ¶95.

c. Limitation 6(c)

“the second pad is positioned from the exterior surface of the second portion by a thickness of the second portion;”

As explained above, Batkin as modified by Larson teaches a pad (conductive layer 80) underneath the dielectric layer 82. Thus, the pad is positioned from the

exterior surface of the second portion (the exterior surface of electrode 3) by a thickness of the second portion (dielectric 82). *See* EX1025, Fig. 4C. EX1003, ¶96.



d. Limitation 6(d)

“at least the thickness of the second portion is constructed from material having a second conductivity; and”

As explained above for 1[b(v)], Larson teaches an outermost layer composed of a dielectric material pad (dielectric 82) that, when incorporated in electrode 3 of Batkin, constitutes a “second portion.” Necessarily the pad (conductive layer 80), as shown in Figure 4C above, is positioned from the exterior surface of the second portion by a thickness of the dielectric layer. The dielectric 82 of Larson has a second conductivity, as it is an insulating dielectric. EX1024, 4:65-66. A POSITA would have appreciated that the second conductivity of dielectric material is important to the operation of the capacitive electrode as it provides the dielectric material by which capacitance can be achieved. EX1028 at 2 (showing the equation for capacitance); EX1003, ¶97.

e. **Limitation 6(e)**

“the second conductivity is defined such that the second electrical signal is not able to be transmitted through material having the second conductivity over a distance larger than the thickness of the second portion”

Batkin shows in Figure 5, for example, an ECG measurement schematic diagram that would be used to determine the requirements of the capacitive electrode materials in order to transmit the signal of each electrode across the dielectric material while isolating the signals from each other. Figure 5 is reproduced below, showing various parameters that may be optimized in order to have a desired electrical reading over a prescribed thickness. EX1024, Fig. 5. EX1003, ¶98.

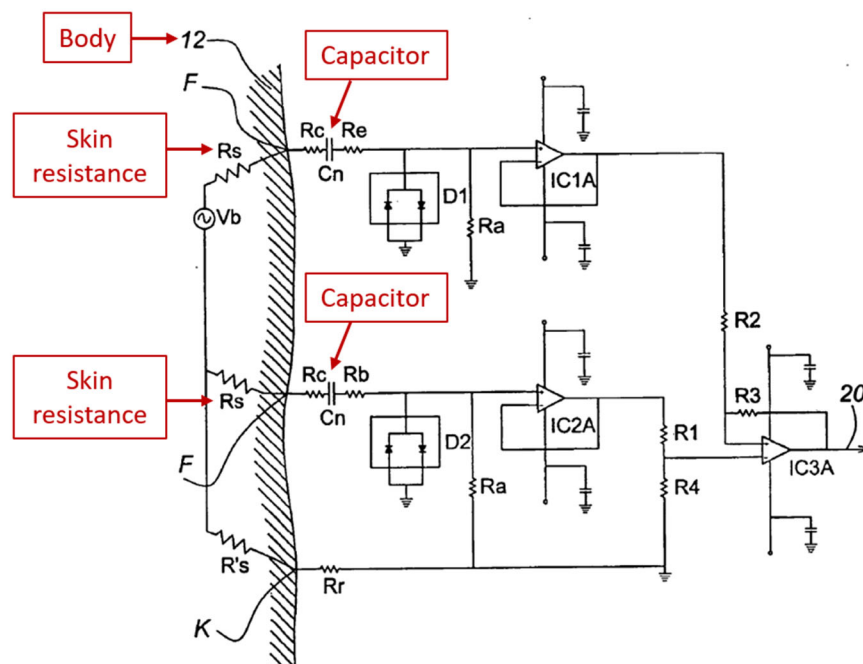


FIG. 5

As explained above, Batkin as modified by Larson teaches a pad (conductive layer 80) is positioned from the exterior surface of the second portion by a thickness

of the second portion (dielectric 82). The dielectric 82 of Larson has a second conductivity. Dielectrics (insulators) are commonly understood by a POSITA to have a very low conductivity which will not transmit electrical signals over a meaningful distance. However, Larson notes that the “voltage on the skin of the finger is transferred through the dielectric material to the other plate of the capacitor.” EX1025, 3:53-55. Thus, even though an insulating dielectric is used as the skin-facing layer in a capacitive electrode, it is able to transfer signals through its own thickness and possesses insulating characteristics that prevent transmission of signals “over a distance larger than the thickness of the second portion.”⁸ EX1003, ¶99.

Consistent with the teachings of Larson, the capacitive effect allows the signal to be passed from the exterior surface through the dielectric to the underlying conductive layer (layer 80 of Larson). EX1025, 3:53-55. At the same time, the insulating properties of the dielectric layer (82) would be understood by a POSITA to have a conductivity that will not transmit a signal over any meaningful distance, such as “over a distance larger than the thickness of the second portion.”

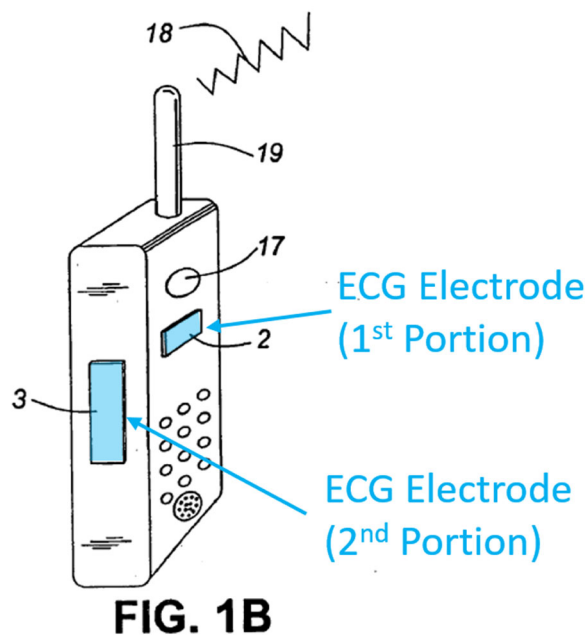
⁸ Petitioner notes that this limitation is ambiguous and likely indefinite, and petitioner reserves the right to contest its validity on these grounds in other proceedings. *See* EX1003, n.5; ¶98.

Accordingly, a POSITA would understand that the capacitive electrode taught by Larson satisfies the limitations of 6(c). A POSITA would have been motivated to combine the teachings of Batkin and Larson at least because they both teach capacitive electrodes and for other reasons provided in 1[b(i)] above. EX1003, ¶100.

4. Claim 7:

“The electronic device of claim 6, wherein the first pad and the second pad are positioned apart from one another at a distance larger than the thickness of the second portion by material having the second conductivity”

Batkin as modified by Larson has electrode 2 (first portion with an underlying first pad) and electrode 3 (second portion with an underlying second pad) which are separated by a distance and positioned on separate sides of the electronic device, illustrated in Figs. 1B below. EX1024, Fig. 1B. EX1003, ¶101.



Batkin states that its device (shown above in 1B) is a hand-held device and that “bio-signals are acquired from the same user posture as in ordinary telephonic use.” EX1024, [0020], [0047]. Thus, Batkin’s device has dimensions spanning at least 4-6 cm, the minimum physiological size of a hand-held device. Accordingly, Batkin’s electrodes (with underlying electrode pads from Larson) are physically separated by at least several centimeters. EX1003, ¶102.

Regarding the thickness of the thickness of the “second portion,” a POSITA would understand the thickness of the dielectric of Larson to be very small, on the order of micrometers. For example, Miller (referenced in Larson as discussed above) describes formation of the dielectric layer by a sputtering technique with a resultant thickness of between 5000 (5,000 Angstroms equals 0.5 micrometers) and 50,000 Angstroms (50,000 Angstroms equals 5 micrometers). EX1026, pg. 18. A POSITA would understand that the physical distance between electrodes 2 and 3 of Batkin would be on the order of several centimeters and the “thickness of the second portion” (dielectric layer 82 of Larson) would be on the order of 10^{-4} centimeter. Accordingly, Batkin as modified by Larson would have the first pad/electrode and the second pad/electrode positioned apart from one another at a distance larger than the thickness of the second portion (thickness of capacitive dielectric) by material having the second conductivity. *See* EX1003, ¶¶103-105 (discussing the thickness of additional capacitive electrodes).

Claim 4, discussed above, states that “the first portion is separated from the second portion by a third portion of the enclosure” and that “at least the third portion is constructed from a material having a first conductivity.” Thus, the first portion and second portion are separated by a material having a first conductivity. Claim 7 additionally recites that “first pad and the second pad are positioned apart from one another . . . by material having the second conductivity.” In the combination of Batkin and Larson, the first portion and the second portion are themselves “constructed from material having a second conductivity,” which is dielectric layer 82. Thus, the “pads” underneath the first portion and second portion are electrically separated “apart” from each other by “a material having the second conductivity” (dielectric layer 82).⁹ EX1003, ¶106.

A POSITA would have found it desirable to physically separate the electrodes, as illustrated in Batkin, so that sensors are in the appropriate physiological positions and can “obtain bio-signals while the . . . phone is in the position for normal speaking use.” EX1024 at abstract. Further, a POSITA would have found it desirable to electrically separate the electrodes “apart” from each other to reduce noise and extraneous cross-coupling of signals that would unintentionally

⁹ Petitioner reserves the right to challenge the validity of this claim under 35 U.S.C. 112(a) in other parallel proceedings.

travel from one electrode to another. Therefore, a POSITA would understand that Batkin in view of Larson meets the limitations of Claim 7. EX1003, ¶107.

C. Ground 2: Dependent Claims 6-7 are unpatentable as obvious in view of Markel in combination with Mills, Stratbucker, and Stejskal.

1. Claim 1

“An electronic device for detecting a user’s cardiac signal, comprising”

Markel discloses “electronic devices with cardiovascular monitoring capability.” See EX1005, Abstract; [0035]; EX1003, ¶108.

a. Limitation 1[a]

“an enclosure”

Markel discloses that the mobile communication device MCD 100 (also referred to as “device 100”) includes a main body portion 110 as shown, for example, in Fig. 1. EX1005, [0034], Fig. 1. EX1003, ¶109.

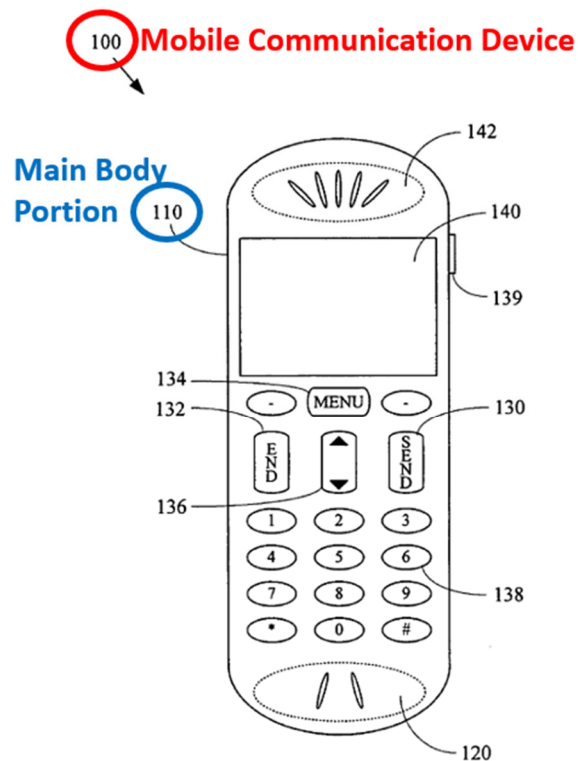


Figure 1

According to Markel, the 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.” EX1005, [0043], [0064]. Furthermore, Markel states that the device “may comprise a primary casing or housing for the user interface device.” EX1005, [0064]. A POSITA would understand from this disclosure that Markel discloses an enclosure comprising a main body, a screen 140, and various buttons (130, 132, 134, 136, etc.). EX1003, ¶110.

b. Limitation 1[b]

“a heart sensor configured to detect the user's cardiac signal”

Markel discloses that the MCD 100 may comprise at least one cardiac sensor “that is adapted to detect cardiac activity of a user of the MCD 100” with the user being “conductively coupled to the electrodes (*e.g.*, by touching the electrodes).” EX1005, [0035]; [0058]; [0082]; [0103]; EX1003, ¶111.

c. Limitation 1[b(i)]

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

Markel explains that its electrodes for detecting the cardiac signals “may be disposed in any of a variety of locations” on its device including being “generally concealed from a user” such that they are “substantially concealed (or hidden) from a user.” EX1005, [0045], [0039]-[0040]. Such electrodes may be “exposed for user contact” or “may be integrated into various molded components.” *Id.*, [0037]; EX1003, ¶112.

Markel discloses an example device 400 in Fig. 4. EX1005, [0045]. A first electrode is “placed on or molded into the region 410b” which is located on the rear side of the phone. *Id.* As such, a POSITA would understand that Markel describes an electrode of conductive plastic (region 410b under a first mapping) embedded in a first portion of the enclosure. *Id.*; EX1003, ¶113.

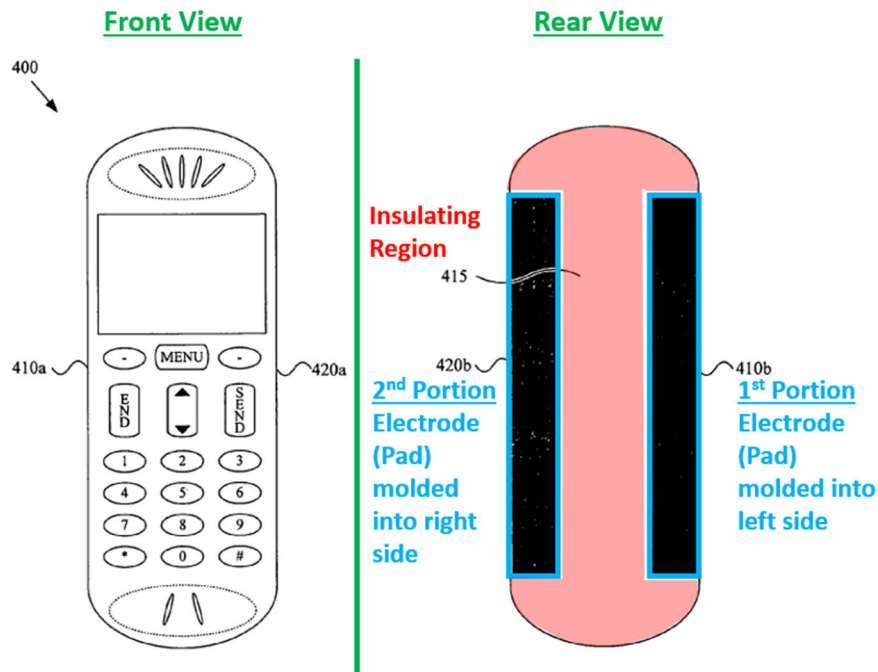
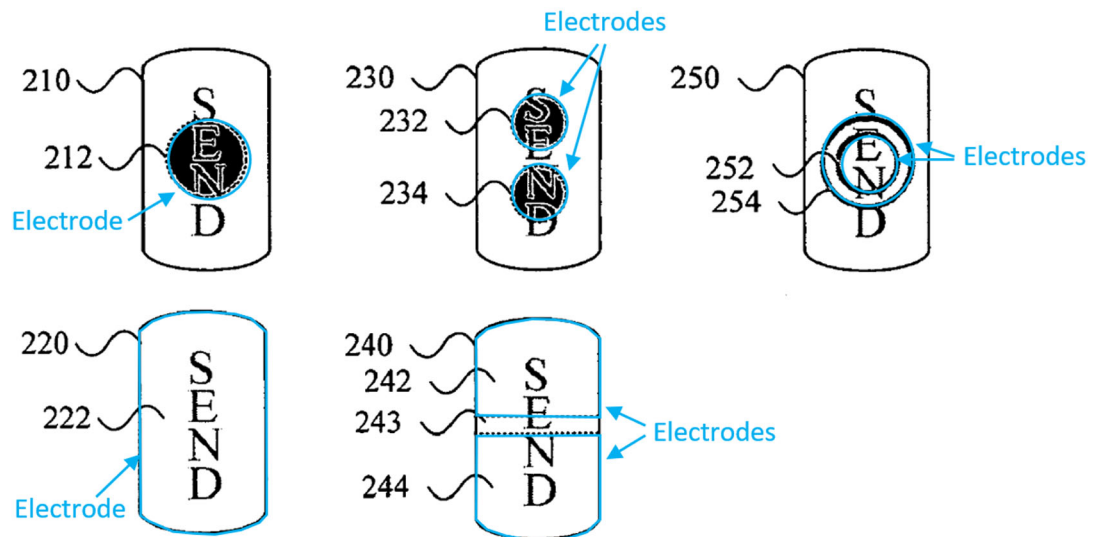


Figure 4

EX1005, Fig. 4, a first mapping of the claims.

In other embodiments, Markel teaches that a pushbutton may incorporate one or more ECG electrodes. EX1005, [0047]. Each pushbutton may have a single electrode, such as with pushbutton 210 and 220 reproduced below, or each pushbutton may have more than one electrode, such as with pushbutton 230, 240, and 250 shown below. EX1003, ¶114.



EX1005, Fig. 2, a second mapping of the claims.

Similar to the embodiment shown in Figure 4, the pushbutton may be molded from conductive plastic. EX1005, [0047] (teaching conductive plastic pushbutton regions). As such, a POSITA would understand that Markel describes a first electrode (such as 242, 232, 252 under a first mapping) of conductive plastic embedded in a first portion of the enclosure. EX1003, ¶115.

d. Limitation 1[b(ii)]

“an exterior surface of the enclosure comprises an exterior surface of the first portion”

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, [0037]. Markel explains that “first and second electrodes may be disposed on a main body portion 110 of the MCD 100” and “an electrode (or all electrodes) or other

sensor may be substantially concealed (or hidden) from a user . . . an electrode may comprise molded conductive plastic with little or no visible indication of the electrode presence.” EX1005, [0040], [0045]. EX1003, ¶116.

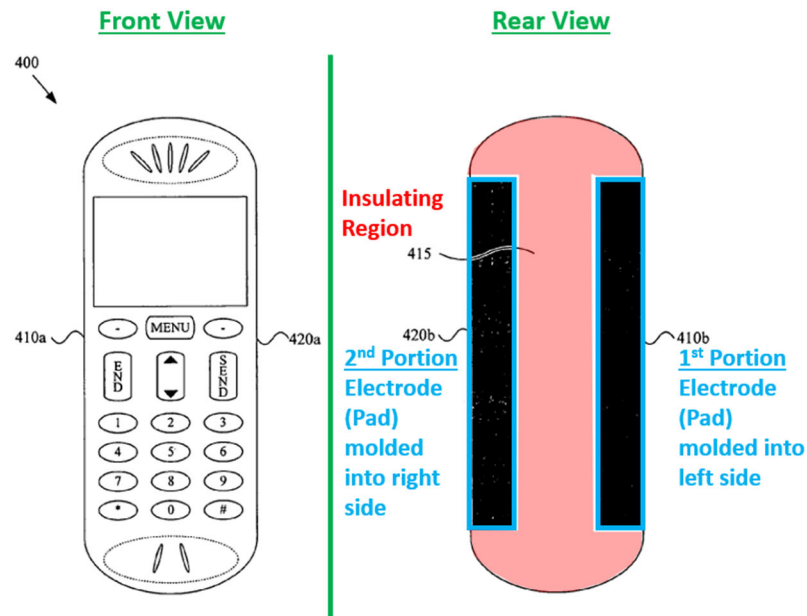
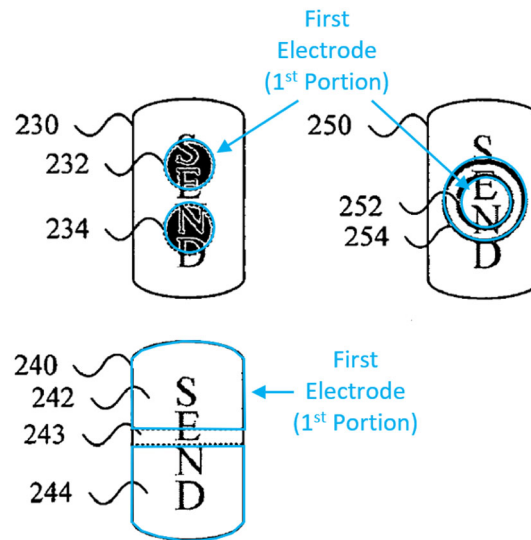


Figure 4

Similarly, under a second mapping of the claims, pushbutton electrodes constitute a portion of an exterior surface of the enclosure and contain a “first portion.” EX1003, ¶116.



EX1005, Fig. 2.

e. **Limitation 1[b(iii)]**

“the first pad is positioned underneath the exterior surface of the first portion”

Markel discloses, as shown in Fig. 10 below, “a cardiac information acquisition module 1010 that is coupled to the first and second electrodes 1020, 1022 and utilizes the first and second electrodes 1020, 1022 to detect and acquire various cardiac (i.e., heart-related) signals from a user.” EX1005, [0058], Fig. 10. A POSITA would understand electrodes 1020, 1022 correspond to electrodes 410b and 420b or to pushbutton 210, 220, 230, 240, and 250. EX1003, ¶118.

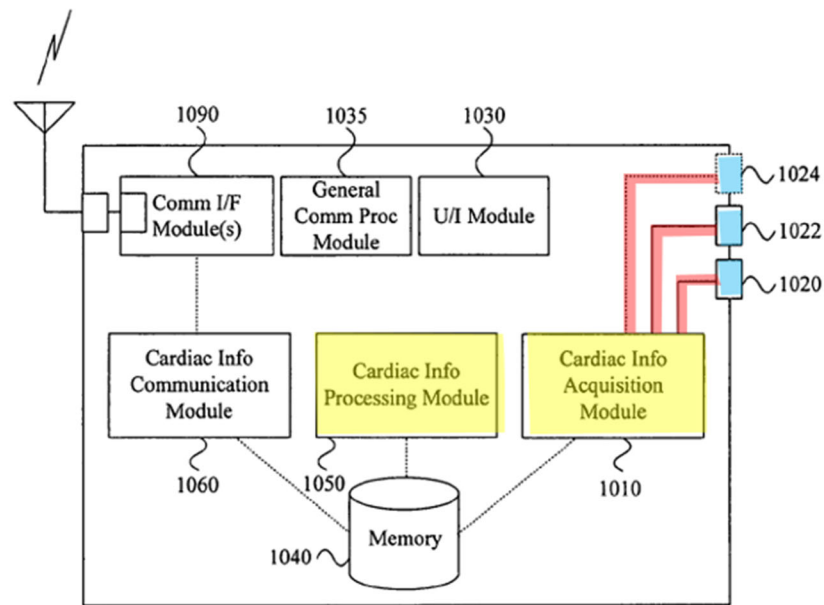
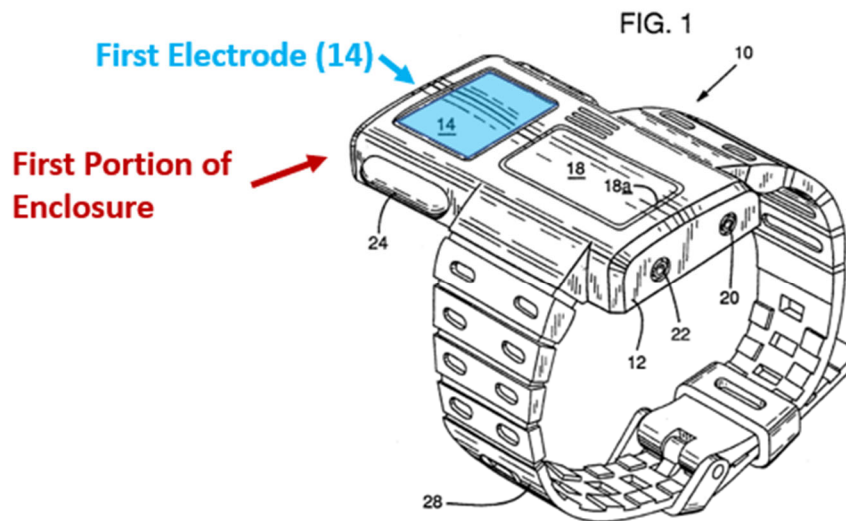
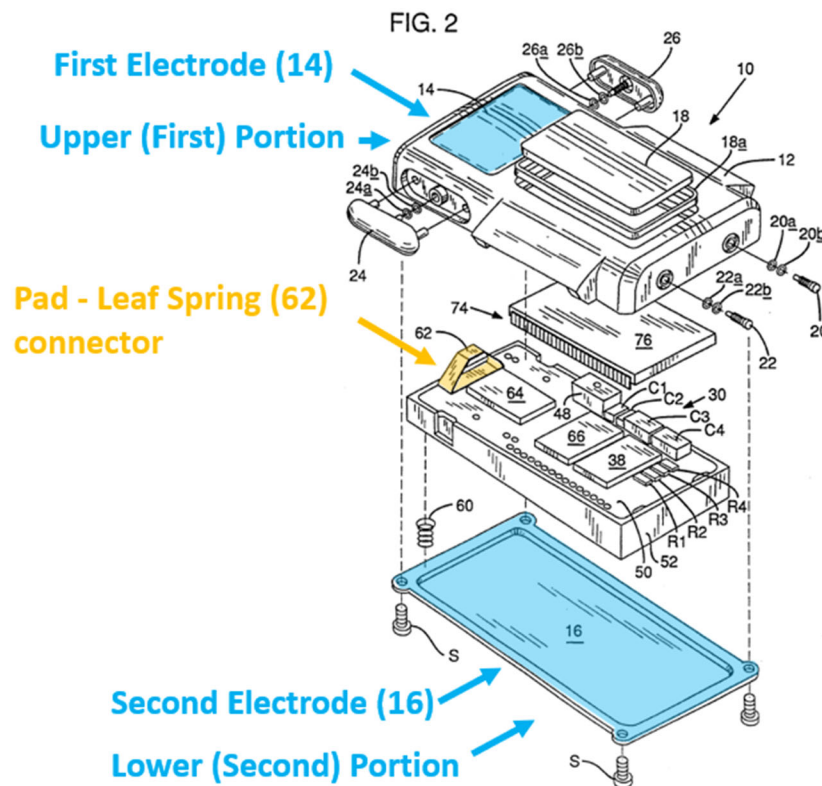


Figure 10

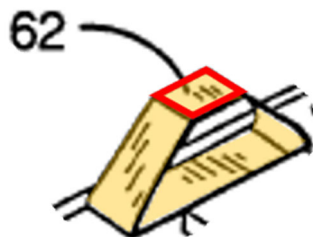
Markel does not provide the exact details of the internal components of its device or the underside of its electrodes. A POSITA looking to implement Markel would have looked to other references in the same field of disclosure for information on internal components and structures to implement the device of Markel. Mills (EX1006) is one such reference. Mills, for example, discloses an enclosure (housing 12) which includes a first skin electrode 14 “unitarily connected” with the housing of an electronic watch. EX1006, Fig. 1, 3:8-13. Thus, Mills’ electrodes are similar to Markel’s electrodes 410b, 420b. EX1003, ¶119.



Mills specifies that the electrode 14 is “integrally” connected with the housing 12 by being molded therein, again similar to Markel’s disclosure. EX1006, 3:47-51; EX1005, [0045]. Thus, Mill’s electrode is integrated with the housing and outer surface of the watch. Mills further discloses that the underside of electrode 14 is physically and electrically connected to processing circuitry by a leaf spring 62 as shown in Fig. 2 (reproduced below with annotations). EX1006, 4:67-5:3; EX1003, ¶120.

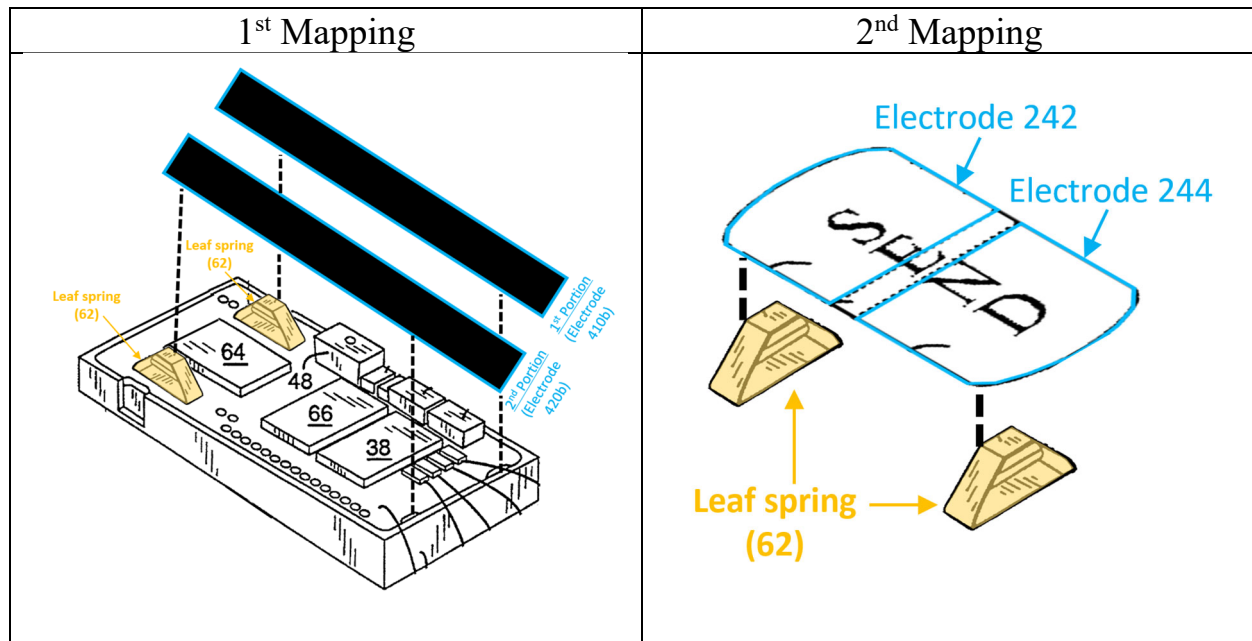


Mills teaches that “electrode 14 is connected to the ... signal input terminal of ECG amplifier 32 via a generally trapezoid-shaped, split and thus slidably yielding, leaf spring 62 connected to a circuit pad formed on the top side of PCB 50.” EX1006, 4:67-5:3. A person having ordinary skill in the art would appreciate that at least the top of the trapezoid-shaped leaf spring 62 constitutes a “pad.” EX1003, ¶121.



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. EX1006, Fig. 2. The pad is underneath the exterior surface, and the pad is configured to detect an ECG signal of the user via its contact with electrode 14 located on the exterior surface. EX1003, ¶122.

The potential alignment of a leaf spring with one or more electrodes is shown below in an exploded view showing different arrangements of the leaf spring of Mills aligned with electrodes in Figure 2 and Figure 4 of Markel. EX1005, Fig. 2, 4; EX1003, ¶123.



It would have been obvious to incorporate the pad (leaf spring 62) of Mills into the device of Markel for many reasons. For example, a person of ordinary skill in the art would have looked to Mills as both references teach the integral molding

of an ECG electrode. A person of ordinary skill in the art would have also looked to Mills because Mills teaches that its configuration provides 1) a biological monitor with “an extremely compact, integral housing” 2) “a monitor that reliably detects and records ECG signals” 3) a biological monitor that is lightweight and compact and 4) a “monitor easily manufactured and maintained, and cost effective.” EX1006, 1:36-59; EX1003, ¶124.

Additionally, a person of ordinary skill in the art would have been motivated to look to Mills to provide details of internal physical connections on which Markel is silent. Markel teaches that its “electrodes may be incorporated into the MCD 100 in any of a variety of manners,” which would include using a pad underneath the exterior surface of its electrodes. EX1005, [0035]. A POSITA would have used a leaf spring as taught by Mills because leaf springs are well known electrical connectors commonly used in the art. Further, a leaf spring would have been desirable to a POSITA as leaf springs are commonly employed as electrical connectors because they provide good electromechanical contact between two components. Leaf springs are often placed between two components as an electrical connector (or bridge) and mechanical pressure is applied such that the leaf spring pushes against both components to maintain good contact pressure. Leaf springs are also used because they solve manufacturing and assembling complexities by, for example, eliminating the need to solder a wire between the electrode and a circuit

board to electrically connect the two together. A leaf spring would have been desirable to POSITA in view of Markel, as conductive plastic is not suited for soldering. Thus, for all of the reasons discussed above, a POSITA would utilize the leaf spring 62 taught by Mills to connect electrodes (410b, 420b, 210, 220, 230, 240, or 250) of Markel to internal processing components taught by Markel as a mere rearrangement of familiar mechanical components in known ways in a complementary device. *See KSR Int'l Co. v. Teleflex Inc.*, 127 U.S. 1727, 1731 (2007). EX1003, ¶¶125-127.

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 been led to the claimed invention based on the teachings of Markel and Mills for all of the reasons stated above. EX1003, ¶127.

f. Limitation 1[b(iv)]

“the first pad detects 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”

Markel discloses its device detects and acquires “various cardiac (i.e. heart-related) signals” from a user’s finger or hand in contact with the electrodes (such as electrode 410b, 242, 244) on the exterior of Markel’s housing. EX1005, [0049] and

[0058]. Markel additionally discloses that the electrodes can detect cardiac activity of a user “that is conductively coupled to the electrodes (*e.g.*, by touching the electrodes).” *Id.*, [0035], [0068]. Accordingly, this limitation would have been obvious in view of Markel. EX1003, ¶128.

g. Limitation 1[b(v)]

“a second lead comprises a second pad that is embedded in a second portion of the enclosure”

Markel teaches that its device is “adapted to detect cardiac activity of a user that is conductively coupled to at least two of a first, second and third (or N) electrodes.” EX1005, [0051]. In one embodiment, Markel discloses a second electrode or region 420b forming a second portion of the enclosure. EX1005, [0045]. Markel states that the second electrode may be molded into the region 420b, which includes conductive plastic. *Id.*, Fig. 4; EX1003, ¶129.

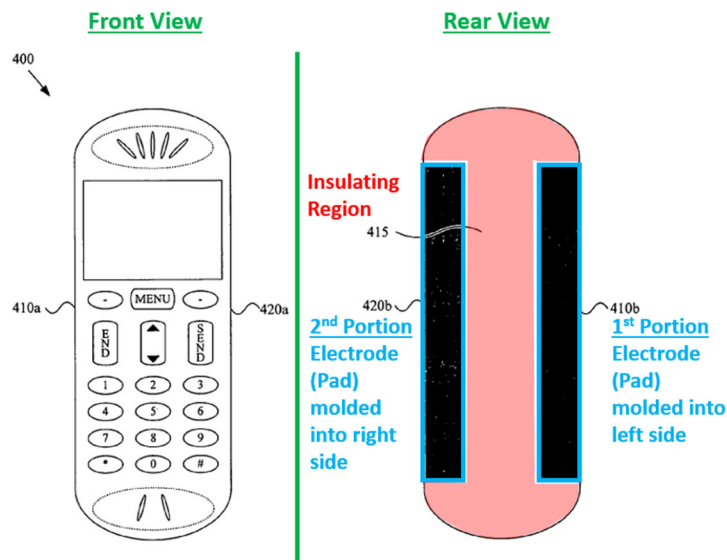
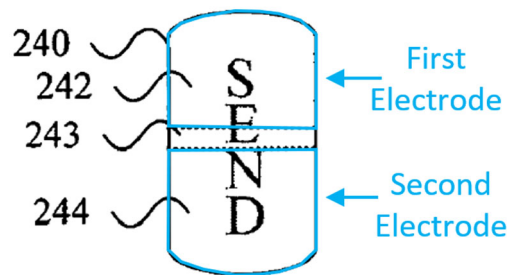


Figure 4

As discussed above, in other embodiments Markel discloses pushbutton regions formed of conductive plastic that constitute a second portion (244 for example) of the enclosure. Pushbutton 240 contains a first (240) and second (244) electrode on the pushbutton, as shown from Figure 2 below. EX1003, ¶130.

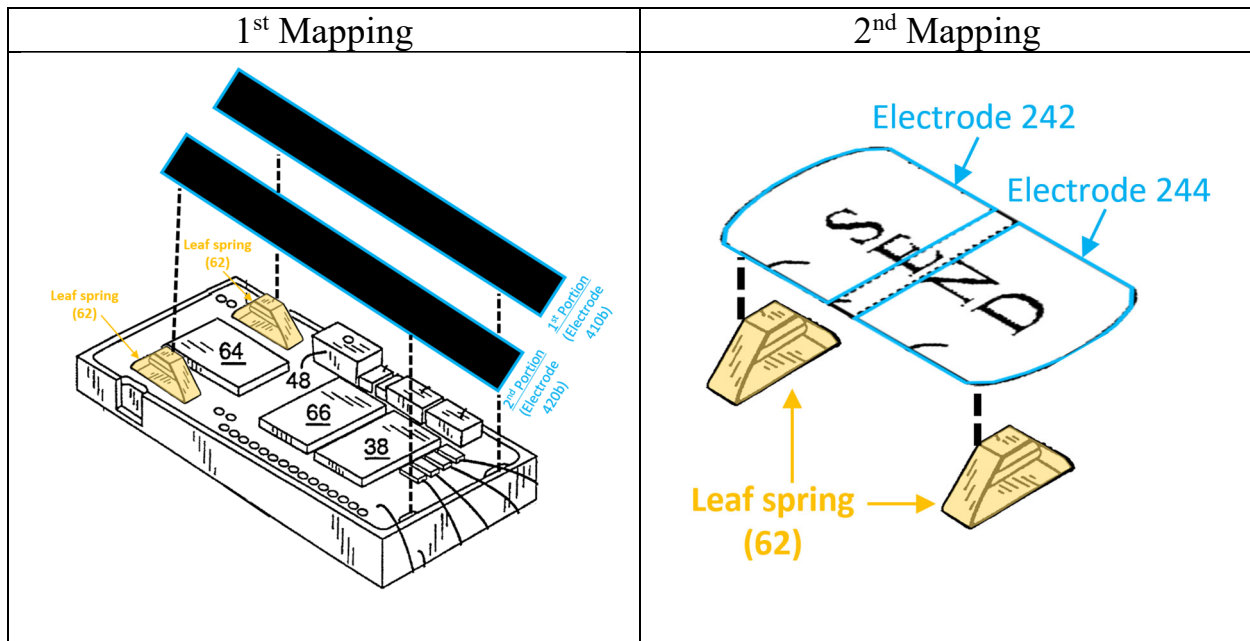


As discussed above with regard to limitation 1[b(iii)], Mills provides details for internal electrical connections including the use of a leaf spring with a top pad portion. As with a first electrode, a POSITA would have found it obvious to use the leaf spring of Mills to connect a second electrode of Markel to internal processing arrangements. A POSITA implementing Markel would have found it obvious to use two¹⁰ leaf springs for all of the reasons discussed above. In addition, at least because Markel's electrodes (410b/420b or 242/244) are on the same side of the device of Markel instead of opposite sides as shown in Mills a POSITA would have used the same type of electrical connections for consistency. Further, leaf springs are one of

¹⁰ It is "well settled" that duplication of parts is, by itself, not patentably significant.

In re Harza, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

a limited number of commonly used electrical connectors and a person would have found it obvious to use a leaf spring as a known equivalent to other types of electrical connectors, including a wire spring. Thus, a person having ordinary skill in the art would have used the leaf spring of Mills as an application of a known technique to improve a similar device in the same way. A modified implementation of two leaf springs contacting Markel's electrodes (410b/420b or 242/244) is shown in an exploded view below. EX1005, Fig. 2, 4; EX. 1003 ¶131.



h. Limitation 1[b(vi)]

“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”

As discussed in section 1[b(iv)] above, Markel’s device is “adapted to detect cardiac activity of a user that is conductively coupled to the electrodes (e.g., by touching the electrodes).” EX1005, [0035]. For example, by holding the phone (MCD) a user would contact first portion 410b and second portion 420b “during normal use of the MCD”. EX1005, [0043]. Further, in a second mapping at least where “electrodes may be disposed on a same pushbutton” (such as pushbutton 240 having electrode 242 and 244) a user would “contact both electrodes while operating the pushbutton.” EX1005, [0047]. Thus, a person having ordinary skill in the art would have understood that Markel meets this limitation. EX1003, ¶¶132-133.

i. Limitation 1[c]

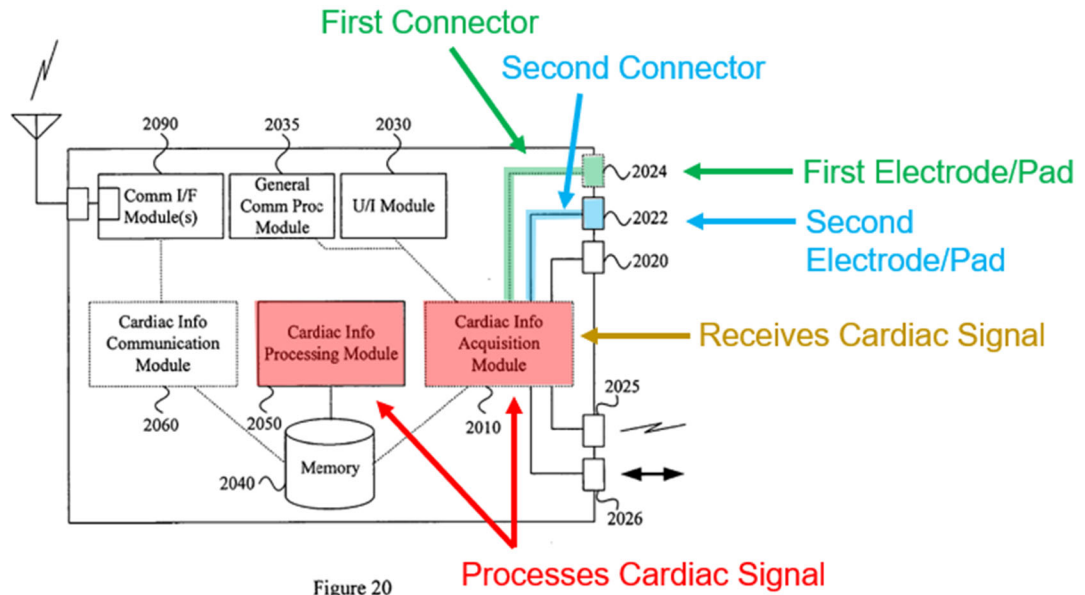
“a processor coupled to the heart sensor to receive and process the detected cardiac signal wherein the first lead further comprises a first connector coupled to the first pad and configured to provide the first electrical signal detected by the first pad to the processor, and wherein the second lead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

Markel discloses “electronic devices” with “cardiovascular monitoring capability” that may “comprise a cardiac sensor (e.g., electrodes)” that may also “acquire, analyze and/or communicate user health-related information” such as

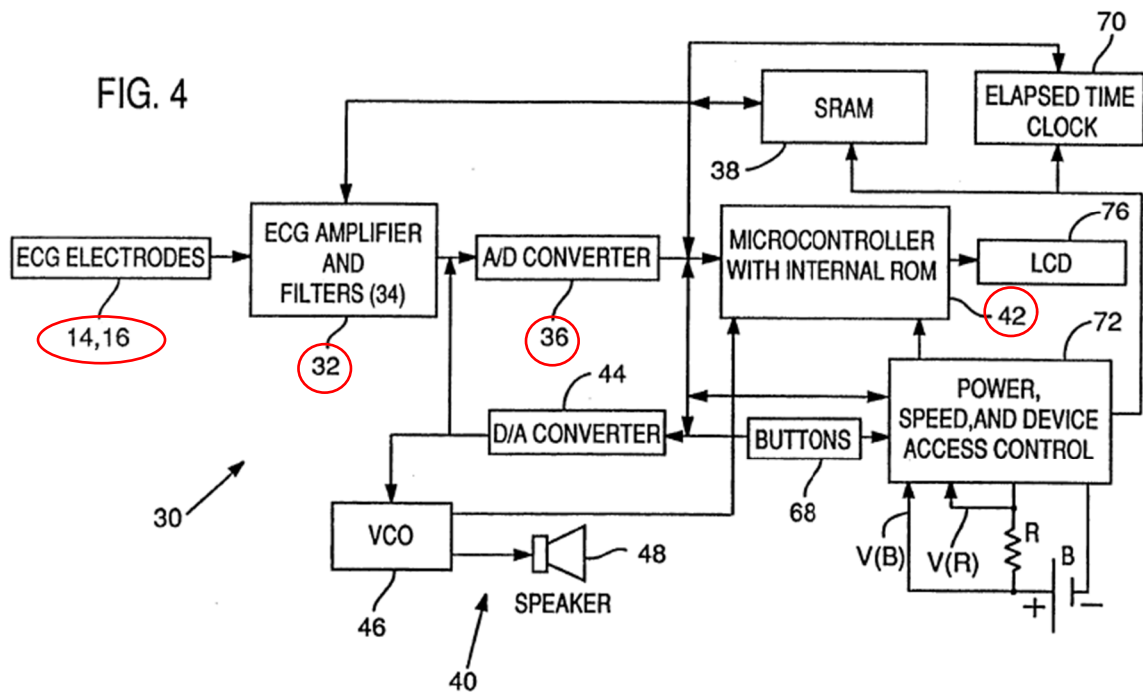
derived from electrodes (410b, 420b, 242, 244). EX1005, Abstract. A POSITA would understand from this disclosure that Markel teaches processing elements coupled to a heart sensor that acquire, analyze, and/or communicate heart sensor information. Markel discloses the processor in its disclosure can be any of a number of hardware components including an integrated circuit, processor chip and controller chip. EX1005, [0178]; EX1003, ¶134.

In various embodiments Markel discloses a first and second lead configured as a first and second pad, respectively, on a portion of the housing, and the first and second pads each connected to a processor, as shown in annotated Figs. 4 and 20¹¹ 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, ¶135.

¹¹ Markel Fig. 20 is a block diagram applicable to any of Markel's Figs. 1-19. EX1005, [0108].



Mills also discloses its electrodes 14 and 16 are electrically connected to processing circuitry (ECG amplifier 32, A/D converter 36 and microcontroller 42), as shown in annotated Fig. 4 below. EX1006, 4:64-5:3, Fig. 4. As an alternative to the processing disclosed in Markel, it would have been obvious to use the internal componentry of Mills as a substitute as Mills provides complimentary implementation details to those taught in Markel. EX1003, ¶136.



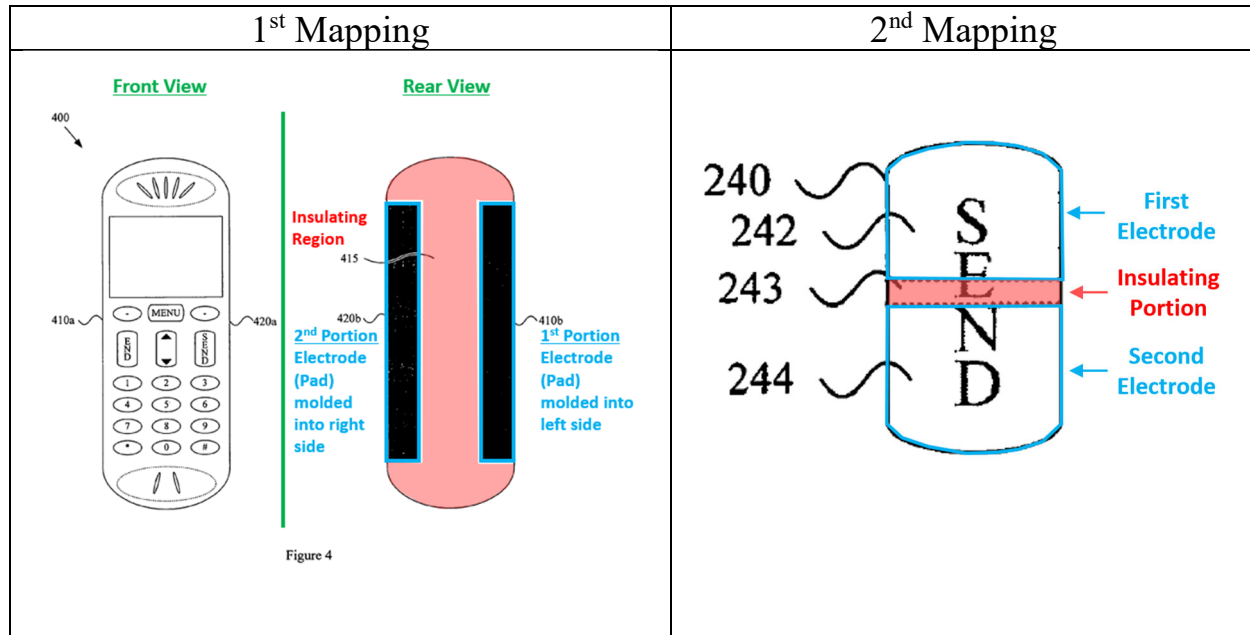
2. Claim 4

“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”

In one embodiment Markel discloses region 410b (first portion) and the region 420b (second portion) may include conductive plastic. EX1005, [0045]. Markel further discloses an “insulating region 415” that electrically isolates the region 410b from the region 420b, as shown in a first mapping with Fig. 4 below. *Id.*; EX1003, ¶137.

In another embodiment, Markel discloses a pushbutton 240 where “a first electrode 242 (e.g., a first conductive plastic region) and a second electrode 244

(e.g., a second conductive plastic region) [are] separated by an insulating portion 243 (e.g., non-conductive plastic).” This is shown in the second mapping showing a pushbutton from Figure 2. EX1005, Fig. 2, [0047]. EX1003, ¶138.



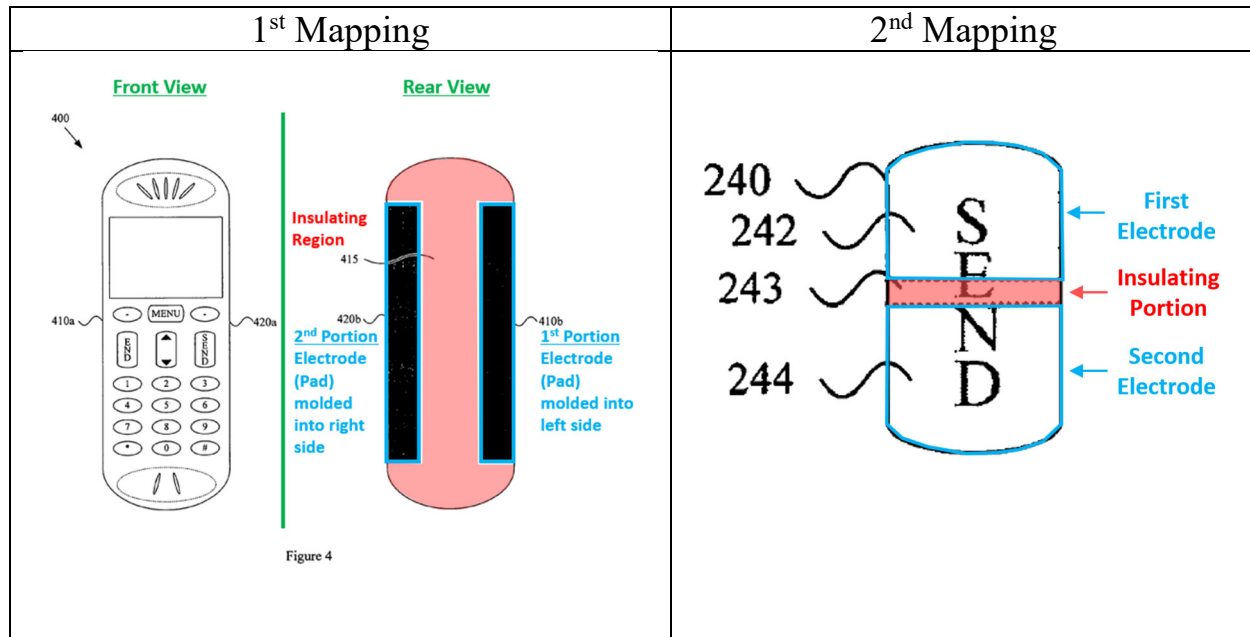
A POSITA would have understood that an insulating region, such as the insulating regions discussed above in Markel, is a third portion formed of a material having a first conductivity insufficient to transmit the first electrical signal from the first pad to the second pad via the third portion. EX1003, ¶139.

3. Claim 6

a. Limitation 6(a)

“The electronic device of claim 4, wherein: the exterior surface of the enclosure further comprises an exterior surface of the second portion;”

As is shown in Fig. 4 and Fig. 2 of Markel illustrated below, the pushbutton second electrode 244, or in an alternative mapping, the pad at region 420b are each a second portion of the exterior surface of the enclosure of device 400. EX1005, Figs. 2 and 4, [0037]. Markel explains that “first and second electrodes may be disposed on a main body portion 110 of the MCD 100” and “an electrode (or all electrodes) or other sensor may be substantially concealed (or hidden) from a user an electrode may comprise molded conductive plastic with little or no visible indication of the electrode presence.” EX1005, [0040], [0045]. Thus, a POSITA would understand that electrode 244 and region 420b each constitute a second portion, meeting the limitation of 6(a). EX1003, ¶¶140-141.



EX1005, Fig. 2, 4.

b. Limitation 6(b)

“the second pad is configured to detect the second electrical signal of the user’s cardiac signal via the user’s contact with the exterior surface of the second portion;”

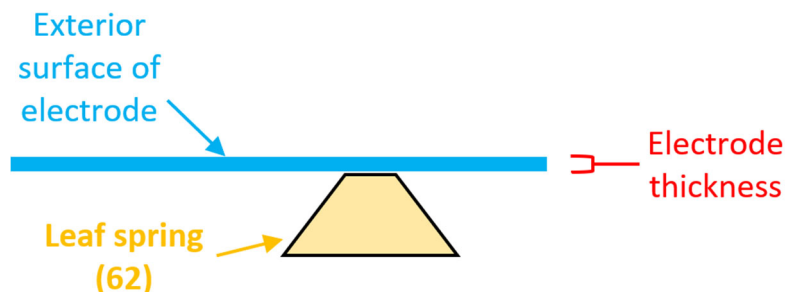
Markel discloses that electrodes (such as 420b or 244 shown above) detect and acquire various cardiac signals from a user’s skin contact with the electrodes on the exterior of Markel’s housing. EX1005, [0042]-[0043]. As discussed with section 1[b(iv)] above, Markel’s device is “adapted to detect cardiac activity of a user that is conductively coupled to the electrodes (e.g., by touching the electrodes).” EX1005, [0035], [0068]. Using the leaf spring of Mills as discussed above, the electrical signal is then carried from the electrodes (420b or 244) through the leaf spring via the leaf spring’s top pad to a processor, such as processing module 1050

in Markel or microcontroller chip 42 of Mills. EX1005, [0059] (“processing module 1050 that processes acquired cardiac information”); EX1006, 4:55-60, 4:68-5:3; EX1005, [0178]-[0179]. Accordingly, this limitation would have been obvious in view of Markel and Mills. EX1003, ¶142.

c. Limitation 6(c)

“the second pad is positioned from the exterior surface of the second portion by a thickness of the second portion;”

As discussed above in 1[b(v)], the combined Markel and Mills combination would include a leaf spring of Mills pressed against the inside of the electrodes 420b or 244 of Markel. Accordingly, the second pad (the leaf spring connector as taught by Mills) is positioned against an inside surface of electrodes 244 or 420b which is a distance from the exterior surface of the second portion (outside surface of electrode 420b or 244) equivalent to a thickness of the second portion. The second pad (leaf spring) would be spaced from the exterior surface of the second portion by the thickness of the second portion, since the leaf spring abuts the back side of the conductive plastic of the first electrode and the second electrode, as illustrated in a side view below. EX1003, ¶143.



d. Limitation 6(d)

“at least the thickness of the second portion is constructed from material having a second conductivity; and”

The exterior surface at region 420b of Markel is an electrode comprising “molded conductive plastic with little or no visible indication of the electrode presence.” EX1005, [0040], [0045] (“420b include[s] conductive plastic”). Additionally, Markel’s pushbutton is molded from conductive plastic. EX1005, [0047] (“second electrode 244 (e.g., a second conductive plastic region)”). A POSITA would understand that the conductive plastic would have a second conductivity that is different than the conductivity of insulating portions, such as “insulating region 415” and “insulating portion 243 (e.g., non-conductive plastic)”. EX1005, [0045], [0047]. EX1003, ¶144.

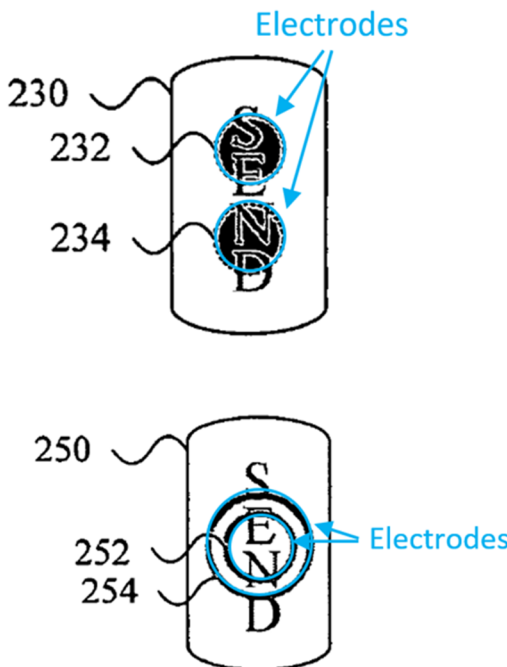
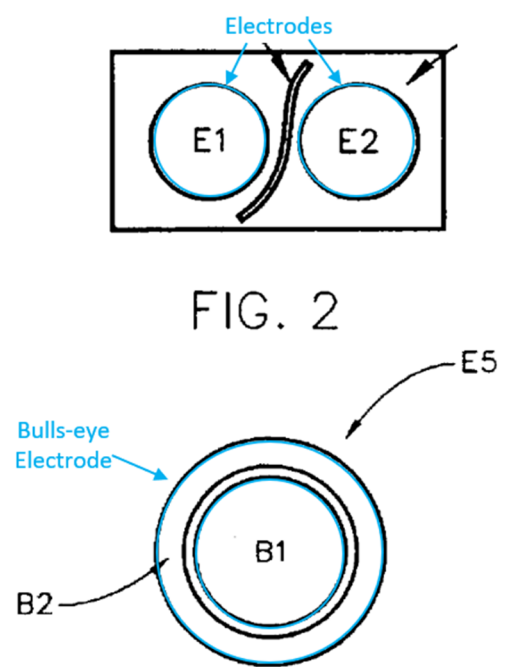
e. Limitation 6(e)

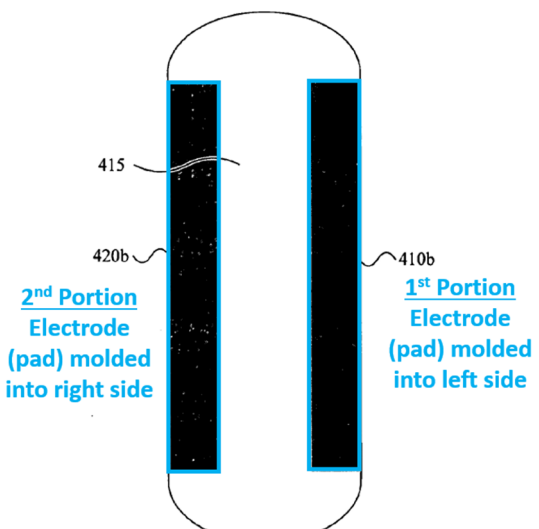
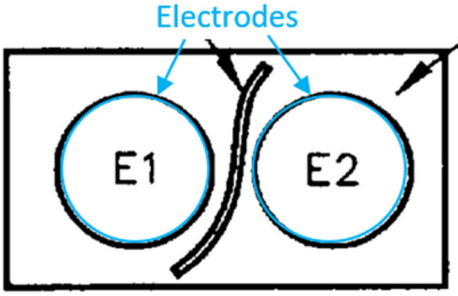
“the second conductivity is defined such that the second electrical signal is not able to be transmitted through material having the second conductivity over a distance larger than the thickness of the second portion”

As explained above, Markel teaches electrodes such as 420b and 244 comprising molded conductive plastic. EX1005, [0045]. A person of skill would look to other references to learn how to make molded conductive plastic and specific properties that would be desirable for ECG electrodes in a device similar to Markel. For example, a person of skill would have looked to Stratbucker (EX1022) and

Stejskal (EX1011, “Electrically Anisotropic Materials: Polyaniline particles organized in a Polyurethane Network”). EX1003, ¶145.

Stratbucker teaches the general principle that anisotropic electrical properties are desirable when two ECG electrodes are “held in essentially constant spacial [sic] separation configurations,” similar to the configuration of Markel’s Figures 2 and 4. EX1022, 1:6-14. A side by side comparison of sample electrode configurations in Stratbucker and Markel is shown below. EX1005, Fig. 2 and 4; EX1022, Fig. 2 and 5. EX1003, ¶146.

Electrode Configurations in Markel (EX1005, Fig. 2)	Electrode Configurations in Stratbucker (EX1022, Fig. 2 and 5)
	 FIG. 2 FIG. 5

Electrode Configurations in Markel (EX1005, Fig. 4)	Electrode Configurations in Stratbucker (EX1022, Fig. 2)
<u>Rear View</u> 	 FIG. 2

Stratbucker teaches that with its anisotropic polymer “the specific impedance across the sheet is significantly different from that laterally along said sheet, but the mechanical properties . . . are essentially consistent.” EX1022, 5:61-65. Anisotropic electrical properties, as explained in Stratbucker, allow the electrical signal to propagate through a depth, but not laterally. EX1022, 7:65-8:4. On the other hand, with an isotropic sheet “signals which should be present in one electrode in a bioelectric interface, will to some extent be present in other electrodes as well, as a result of lateral current flow,” producing “artifact[s] to (ECG) data.” EX1022, 8:23-29. Thus, an anisotropic material is desirable as it “allows use of higher resolution electrode geometry . . . because lateral current flow is limited.” EX1022, 8:30-32. This also prevents electrical shorting between the electrodes. Finally, Stratbucker

teaches that anisotropic materials are particularly useful where the dimensions of the electrodes are smaller. EX1022, 5:31-64; 9:21-24; EX1003, ¶147.

Stratbucker teaches the general application of anisotropic materials to ECG electrodes in the form of an adhesive sheet. EX1022 at 283 (abstract). However, Stejskal teaches a process for making a solid polyaniline conductive polymer with anisotropic properties. EX1011, abstract. The solid structure is composed of polyaniline distributed in a polyurethane network and solidified (petrified) following polymerization of the polyurethane medium. EX1011 at 287 (conclusion). Polyurethane is a plastic (polymer), thus a POSITA would readily understand that Stejskal teaches a process for making solid anisotropic conductive plastic, which is directly applicable to the conductive plastic of Markel and the anisotropic properties of Stratbucker. EX1003, ¶148.

Stejskal teaches that its conductive plastic has a higher conductivity in one direction and much lower conductivity in directions perpendicular to the first direction. EX1011 at 287, 283 (“The conductivity in the direction parallel to the orientation was several times higher than that in the perpendicular one.”). Thus, a person having ordinary skill would have appreciated that Stejskal and Stratbucker teach a material that limits lateral transmission of an electrical signal while at the same time is configured to transmit an electrical signal vertically, such as through the thickness of electrodes 410b/420b or 242/244 in Markel. EX1003, ¶149.

A POSITA would have been motivated by the teachings of Stejskal and Stratbucker to use conductive plastics with anisotropic electrical properties at least because Markel and Stejskal both teach conductive plastics and are in the same field of endeavor. The POSITA would have been further motivated to use an anisotropic material taught by Stejskal in the system of Markel 1) to prevent “artifacts” (noise) from being transmitted in ECG measurements (EX1022, 8:20-29); 2) to increase the accuracy of monitored ECG signals where the electrodes are close together, such as with a pushbutton or a Bulls-eye electrode configuration (EX1022; 3:49-58, 9:21-25); 3) to provide “higher resolution electrode geometry . . . because lateral current flow is limited” (EX1022, 8:30-32); and 4) in order to reduce the use of mechanical features that prevent lateral current flow, such as slits (EX1022, 8:17-20 with “anisotropic electrical specific impedance properties, said slit (S) typically becomes unnecessary”). Accordingly, Limitation 6(e) would have been obvious to a POSITA in view of Markel’s teachings of the use of conductive plastics in combination with Stejskal’s general teaching of anisotropic conductive plastic and Stratbucker’s teachings of the desirability of using anisotropic electrical properties in an ECG electrical configuration where two electrodes are collocated on the same substrate as is shown in Markel. EX1003, ¶¶150-151.

4. Claim 7:

“The electronic device of claim 6, wherein the first pad and the second pad are positioned apart from one another at a distance

larger than the thickness of the second portion by material having the second conductivity”

A person having ordinary skill in the art would have known that electrical signals propagating from one electrode to another electrode would result in inaccuracies in the signal, potentially decreasing the signal to noise ratio. EX1003, ¶152.

Markel discloses several insulating regions, “insulating region 415” and “insulating portion 243” in order to prevent the shortcutting of electrical signals from one electrode to another. EX1005, [0045] and [0047]. Stratbucker similarly utilizes an anisotropic material in order to provide “specific impedance properties” between electrodes. Stratbucker specifically notes that the position of its electrodes may be arranged with respect to each other to ensure that the impedance (resistance) between adjacent electrodes is high and the impedance vertically through the electrodes is lower:

Said electrodes (E1) and (E2) are affixed to said adhesive sheet in a manner such that their relative positions with respect to one another are essentially fixed, and such that the *specific impedance from each electrode directly through said adhesive sheet[] is less than that between any said electrodes through said adhesive sheet (AS)*.

EX1022, 7:65-8:4 (emphasis added); *see also* EX1022, claims 1, 11, 22, 25, 8:65-9:2. EX1003, ¶153.

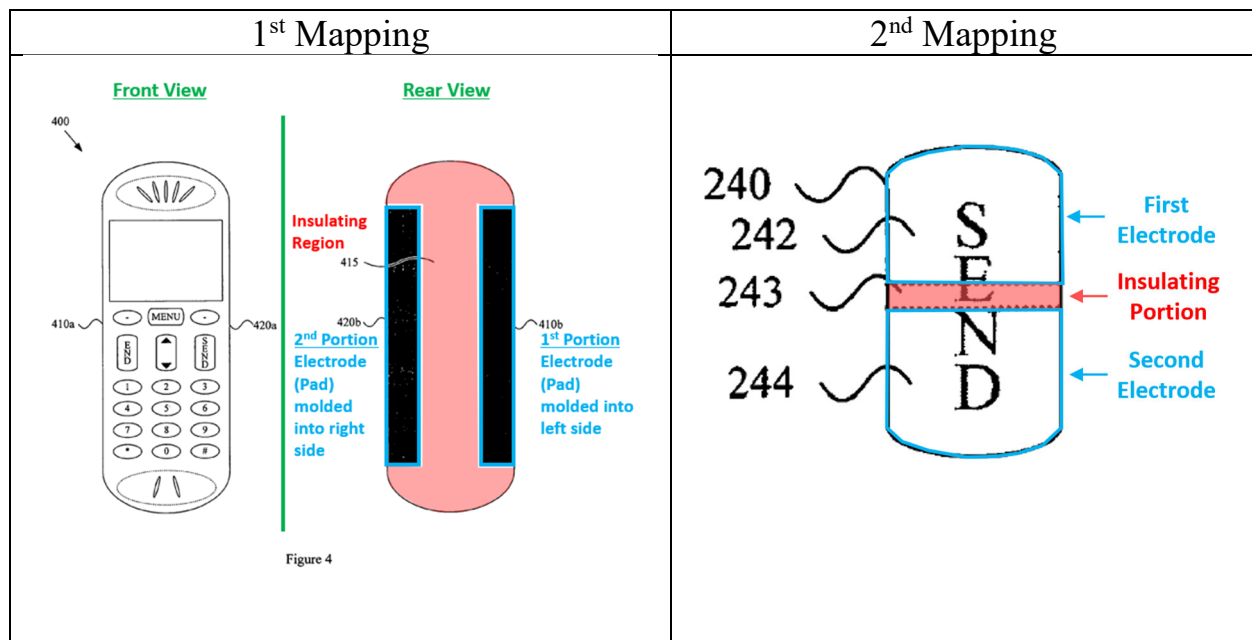
Thus, a person having ordinary skill in the art would have found it obvious to distance the electrodes (and the electrode pads beneath the electrodes) such that the impedance between the electrodes is high to prevent short circuiting or noise of the ECG signal in the anisotropic material. Therefore, the electrodes are positioned such that they are electrically isolated “apart” by a “material having [a] second conductivity” (anisotropic material).¹² EX1003, ¶154.

Further, with respect to Figure 4 of Markel, a person having ordinary skill in the art would have known that a mobile phone housing would be on the order of millimeters in thickness and the distance between the 1st portion 410b and the 2nd portion 420b would be on the order of centimeters, an order of magnitude difference. EX1003, ¶155. Thus, where the conductive plastic of Markel is replaced with an anisotropic conductive plastic of Stratbucker and Stejskal, the electrodes would be physically distanced from one another at a distance larger than the thickness of the housing of the phone and be separated apart by an anisotropic material having a second conductivity. As discussed above with regard to limitation 6(e) a POSITA would have been motivated to use an anisotropic material for many reasons, many

¹² Petitioner reserves the right to challenge the validity of this claim under 35 U.S.C. § 112(a) in other parallel proceedings.

of which are provided in Stratbucker. EX1022, 8:20-29; 3:49-58, 9:21-25; 8:30-32; 8:17-20. EX1003, ¶155.

With respect to Figure 2 of Markel, a person having ordinary skill in the art would have found it desirable to electrically isolate the two electrodes (242 and 244 for example) at a prescribed distance in order to prevent cross-signal artifacts. Therefore, a POSITA would have made the insulating region 243 wider than a thickness of the material of the pushbutton in order to provide a signal free of artifacts. EX1003, ¶156.



EX1005, Fig. 2, 4.

A person having ordinary skill in the art would have been motivated to physically and electrically separate the first and second pads “apart” from one another at least for the reasons discussed above, such as to prevent short circuiting

or noise of the ECG signal in the anisotropic material. Accordingly, Claim 7 would have been obvious to a POSITA in view of Markel, Mills, Stratbucker, and Stejskal. EX1003, ¶157.

V. SECONDARY CONSIDERATIONS

Secondary considerations should be considered but do not control an obviousness conclusion, particularly where, as here, a strong *prima facie* showing of obviousness exists. *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007). Petitioner is unaware of evidence of secondary considerations, and any such evidence could not outweigh the strong *prima facie* case of obviousness. Petitioner reserves the right to respond to any evidence of secondary considerations.

VI. DISCRETIONARY FACTORS FAVOR INSTITUTION

35 U.S.C. § 325(d)

The *General Plastic* factors weigh in favor of institution. *Gen. Plastic Indus. Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 (Sept. 6, 2017) (precedential) (“*General Plastic*”). Factors 1 and 5 weigh in favor of institution. This IPR challenges only claims 6 and 7 of the ‘257 patent, which were not challenged in Petitioner’s earlier-filed petition, IPR2023-00745, which recently was instituted. Thus, this is not a follow-on petition under factors 1 and 5 because it is not “directed to the *same claims* of the same patent.” *General Plastic* at 9 (emphasis

added). Moreover, this IPR is warranted because Apple first asserted claims 6 and 7 of the ‘257 patent against Masimo on May 25, 2023—after Masimo had filed the prior IPR2023-00745 petition in March 2023. *See Mercedes-Benz USA, LLC v. Carucel Investments, L.P.*, IPR2019-01644, Paper 9 at 10-11, 15 (Mar. 26, 2020) (agreeing “a second petition is necessitated here due to Patent Owner’s assertion of claims in the district court infringement action that were not being asserted when the [earlier] petition was filed.”); *see also id.* at 12 (finding petition was not a “follow-on” because it addressed different claims than prior petition). Indeed, Apple’s assertion of claims 6 and 7 came as a surprise to Petitioner because the accused products in the Delaware Litigation do not contain any material that satisfies the specific conductivity properties required by claims 6 and 7. Thus, at the time Petitioner filed IPR2023-00745, claims 6 and 7 were not asserted against Petitioner and there was no expectation that they would be asserted later.

Factors 2 and 4 are neutral. Petitioner relies on new references, Batkin, Larson, Stratbucker, and Stejskal, to challenge claims 6 and 7. Petitioner was not aware of these references at the time IPR2023-00745 was filed. After Patent Owner asserted those claims for the first time in May 2023, Petitioner diligently searched for art that taught claims 6 and 7 and filed this petition shortly thereafter.

Factor 3 is also neutral. Factor 3 concerns the petitioner’s “potential benefit from receiving and having the opportunity to study Patent Owner’s Preliminary

Response” and the potential for abuse raised by “[m]ultiple, staggered petitions challenging the same patent and same claims.” *General Plastic* at 17. While Patent Owner filed a preliminary response in IPR2023-00745, those concerns are absent because this IPR addresses different claims. Indeed, while this Petition addresses claims 1 and 4 from which challenged claims 6 and 7 depend, Patent Owner is not requesting the cancellation of claims 1 and 4 based on any arguments presented in this Petition. Moreover, the Ground 2 arguments directed to base claims 1 and 4 are substantially identical to the arguments presented in IPR2023-00745, while the Ground 1 arguments are based on entirely new art. Thus, Petitioner has not benefitted from the fact that a preliminary response was filed in the prior IPR.

Factors 6 and 7 also weigh in favor of institution or are at worst, neutral. Because this IPR challenges only two claims, this IPR should not negatively impact the finite resources of the Board or prevent a final determination within the one-year statutory deadline. Indeed, the Board’s decision in IPR2023-00745 with respect to the base claims 1 and 4 is likely to streamline and guide the Board’s decision with respect to dependent claims 6 and 7. Moreover, instituting this petition would promote efficiency because, in combination with IPR2023-00745, the Board can address all of the challenged claims of the ‘257 patent. Otherwise, the invalidity of most claims would be decided by the Board while the invalidity of claims 6 and 7

would be decided by the district court, risking inefficiency and inconsistent results. And as explained below, Patent Owner has provided a *Sotera* stipulation.

With respect to the *Advanced Bionics* factors, none of the references the Petition relies on were considered during examination. *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 (Feb. 13, 2020) (precedential) (“*Advanced Bionics*”). Further, the references presented herein are materially different and better than the references considered during examination. Further, the newly cited prior art, Batkin, Larson, Stratbucker, and Stejskal are materially different than any prior art cited in the file history or in earlier prior art because in combination they teach capacitive electrodes and conductive plastics which have the exact electrical properties claimed by Apple in the ‘257 patent. No similar reference were considered during examination. *See generally* EX1002. Moreover, this Petition does not present “substantially the same arguments previously presented to the Office” because this Petition challenges different claims than the prior IPR2023-00745 petition.

35 U.S.C. § 314(a)

Fintiv factors 2, 4, and 6 favor institution of this IPR and factors 1, 3 and 5 are neutral. Regarding factor 2, the final written decision in this IPR is expected before trial in the Delaware Litigation. Apple filed its complaint in the Delaware Litigation on October 20, 2022, and the most recent published statistics indicate that

the median time to trial for a civil action in the District of Delaware is almost three years. EX1021.

Regarding factor 4, **Petitioner hereby stipulates that, if the Board institutes this IPR, Petitioner will not pursue, in the Delaware Litigation, the specific invalidity grounds for the challenged claims raised in this Petition or that reasonably could have been raised in this Petition.** This stipulation “mitigates any concerns of duplicative efforts between the district court and the Board,” and, thus, factor 4 “weighs strongly in favor of not exercising discretion to deny institution.” *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 at 19 (PTAB Dec. 1, 2020) (precedential as to § II.A); *see also Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation*, issued June 21, 2022 at 7 (“[T]he PTAB will not discretionarily deny institution of an IPR ... where a petitioner stipulates not to pursue in a parallel district court proceeding the same grounds as in the petition or any grounds that could have reasonably been raised in the petition.”).

Regarding factor 6, this Petition presents a compelling case of unpatentability of the challenged claims. Further, this IPR focuses solely on dependent Claims 6 and 7 of the ‘257 which were not previously challenged by Petitioner. Since the prior IPR2023-00745 petition has been instituted, if this Petition were not to be instituted it would create a wasteful and inefficient situation where the Board considers the

invalidity of most of the ‘257 patent claims while the district court would also need to consider the invalidity of the last two claims, 6 and 7. That could also result in inconsistent outcomes between the Board and the district court because the district court would also need to consider the invalidity of base claims 1 and 4 in order to evaluate dependent claims 6 and 7. Part of the purpose of the compelling merits analysis is to avoid “potentially conflicting outcomes” and “wasteful parallel proceedings.” *Commscope Techs., Inc. v. Dali Wireless, Inc.*, IPR2022-01242, Paper 23 at 4 (Feb. 27, 2023) (precedential). Thus, factor 6 weighs in favor of institution.

Regarding factor 1, Petitioner has not moved for a stay of the Delaware Litigation but may do so upon institution of this IPR. Judge Noreika, who is presiding over the Delaware Litigation, has previously granted motions to stay litigation pending IPR. *See* EX1029; EX1030; EX1031 at 11-15. Regarding factors 3 and 5, Petitioner Masimo is a defendant in the Delaware Litigation. While the parties are engaged in discovery in the Delaware Litigation, many of the patent infringement claims have also been stayed pending a concurrent ITC investigation. Thus, factors 1, 3, and 5 are neutral. In view of all circumstances, the undesirable judicial and administrative efficiency considerations underlying *Fintiv* are not implicated here. Therefore, the Board should institute this IPR.

VII. CONCLUSION

Petitioner respectfully requests that the Board institute an IPR and cancel claims 6–7 of the '257 patent.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: October 19, 2023

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that foregoing
**PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO.
10,076,257**, exclusive of the parts exempted as provided in 37 C.F.R. § 42.24(a),
contains 13,608 words and therefore complies with the type-volume limitations of
37 C.F.R. § 42.24(a).

Dated: October 19, 2023

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Jarom Kesler (Reg. No. 57,046)
Customer No. 20,995
Attorneys for Petitioner
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CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing **PETITION FOR
INTER PARTES REVIEW OF U.S. PATENT NO. US 10,076,257** and
EXHIBITS 1001-1006, 1008, 1011, 1015-1022, AND 1024-1032 are being served
on October 19, 2023, via Federal Express overnight delivery on counsel of record
for U.S. Patent No. US 10,076,257 as addressed below:

62579 - APPLE INC./BROWNSTEIN
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Denver, CO 80202

Dated: October 19, 2023

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