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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. IPR2023-00807
Patent No. 11,474,483

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 11,474,483**

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<i>Phillips v. AWH Corp.</i> , 415 F.3d 1303 (Fed. Cir. 2005)	8
<i>Sotera Wireless, Inc. v. Masimo Corp.</i> , IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020)	81
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35 U.S.C. § 374	13

EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 11,474,483 ('483 Patent)
1002	File History of the '483 Patent
1003	Declaration of Professor R. James Duckworth, Ph.D.
1004	<i>Curriculum Vitae</i> of Professor R. James Duckworth, Ph.D.
1005	PCT Publication No. WO 2005/092182 ("Kotanagi")
1006	U.S. Patent No. 6,265,789 to Honda ("Honda")
1007	U.S. Publication No. 2001/0056243 ("Ohsaki")
1008	PCT Publication No. WO 2012/140559 A1 ("Shmueli")
1009	European Patent App. No. EP14163114 ("Coppola EP")
1010	U.S. Provisional Patent App. No. 61/976,388 ("Fei")
1011	PCT Publication No. WO 2015/034149 A1 ("Choi PCT")
1012–1013	Reserved
1014	US 20120221254 A1 (Kateraas)
1015	Reserved
1016	US20140135594 ("Yuen")
1017–1019	Reserved
1020	PCT Patent Pub. WO 2015150199 A1 ("Coppola")
1021	Reserved
1022	U.S. Patent No. 4,129,124 ("Thalmann")
1023	Korean Patent No: 10-2136836 ("Choi")
1024	Reserved
1025	U.S. Patent No. 4,163,447 ("Orr")
1026	U.S. Patent No. 4,224,948 ("Cramer")

Masimo v. Apple
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Exhibit No.	Description
1027	U.S. Patent No. 4,248,244 (“Charnitski”)
1028	PCT Publication No. WO 1982000088 A1 (“Steuer”)
1029	U.S. Patent No. 4,375,219 (“Schmid”)
1030	U.S. Patent No. 5,316,008 (“Suga”)
1031	U.S. Patent No. 5,738,104 (“Lo”)
1032	Reserved
1033	US 20050116820 A1 (“Goldreich”)
1034	US 20070276270 A1 (“Tran”)
1035	US 20080208009 A1 (“Shklarski”)
1036	U.S. Patent No. 6,091,530 (“Duckworth”)
1037	U.S. Patent 6,075,755 (“Zarchan”)
1038	Y. Mendelson, “A Wearable Reflectance Pulse Oximeter for Remote Physiological Monitoring,” Proceedings of the 28th IEEE (2006)
1039	Y. Mendelson, “Wearable Wireless Pulse Oximetry for Physiological Monitoring,” PPL Workshop (2008)
1040	Reserved
1041	US 20150355604 A1 (“Fraser”)
1042–1046	Reserved
1047	USPTO Memo of April 5, 2018 regarding <i>Dynamic Drinkware</i> and <i>Amgen</i> cases
1048	District of Delaware Statistics, downloaded on February 21, 2023 from https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_distprofile0930.2022.pdf
1049	US Patent No. 8,624,836 (“Miller”)

CLAIM LISTING

Limitation	Claim Language
1a	A wearable electronic device comprising:
1b	a housing defining a first opening and a second opening;
1c	a display positioned at least partially within the first opening;
1d	a front cover positioned over the display and defining at least a portion of a front exterior surface of the wearable electronic device;
1e	a biosensor module comprising:
1f	a rear cover positioned at least partially within the second opening and defining an optically transparent window;
1g	and a protruding convex surface;
1h	an optical sensor aligned with the optically transparent window;
1i	a first electrode positioned along a rear surface of the wearable electronic device; and a second electrode positioned along the rear surface of the wearable electronic device; and
1j	a third electrode positioned along a side of the wearable electronic device, wherein:
1k	the wearable electronic device is configured to measure a first physiological parameter of a wearer using the optical sensor; and
1l	the wearable electronic device is configured to measure a second physiological parameter using the first electrode, the second electrode, and the third electrode.
2a	The wearable electronic device of claim 1, wherein: the wearable electronic device further includes a watch band coupled to the housing and configured to couple the wearable electronic device to a wearer;

Limitation	Claim Language
2b	the optical sensor is a heart-rate sensor;
2c	the first electrode is an electrode of an electrocardiograph sensing system; and
2d	the second physiological parameter is an electrocardiogram.
3	The wearable electronic device of claim 1, further comprising an input device positioned along a side of the housing and configured to receive at least one of a rotational input or a translational input.
4	The wearable electronic device of claim 1, wherein the second physiological parameter is a galvanic skin response.
5	The wearable electronic device of claim 1, further comprising an input device positioned along a side of the housing and configured to receive at least one of a rotational input or a translational input.
6	The wearable electronic device of claim 1, wherein the optical sensor comprises: an optical emitter configured to emit an optical signal; and an optical receiver configured to receive a reflected portion of the optical signal.
7	The wearable electronic device of claim 6, wherein: the optical emitter is a first optical emitter configured to emit light having a first wavelength; and the optical sensor further comprises a second optical emitter configured to emit light having a second wavelength different from the first wavelength.
8	The wearable electronic device of claim 1, further comprising an input device positioned along a side of the housing and configured to receive a rotational input and a translational input.
9	The wearable electronic device of claim 1, further comprising a wireless charging system configured to receive power wirelessly, from an external charging dock, through the rear exterior surface of the wearable electronic device.

Limitation	Claim Language
10a	An electronic watch comprising:
10b	a display;
10c	a housing at least partially enclosing the display;
10d	a front cover positioned over the display and defining at least a portion of a front exterior surface of the electronic watch;
10e	a biosensor module defining at least a portion of a rear exterior surface of the electronic watch opposite the front exterior surface, the biosensor module comprising:
10f	a rear cover defining an optically transparent window;
10g	an optical sensor positioned below the optically transparent window;
10h	a first electrode positioned along the rear exterior surface of the electronic watch; and a second electrode positioned along the rear exterior surface of the electronic watch; and
10i	a third electrode positioned along a side of the electronic watch, wherein:
10j	the electronic watch is configured to measure a first physiological parameter of a wearer using the optical sensor; and
10k	the electronic watch is configured to measure a second physiological parameter using the first electrode, the second electrode, and the third electrode.
11	The electronic watch of claim 10, wherein the rear cover defines a convex exterior surface.
12	The electronic watch of claim 11, wherein the optically transparent window is located within a portion of the rear cover that defines the convex exterior surface.

Limitation	Claim Language
13	The electronic watch of claim 10, wherein the first electrode, the second electrode, and the third electrode are part of an electrocardiograph sensing system.
14	The electronic watch of claim 10, wherein the first physiological parameter is a heart rate.
15	The electronic watch of claim 10, wherein the rear cover comprises sapphire.
16a	A wearable electronic device comprising: a housing; a band attached to the housing and configured to couple the wearable electronic device to a user;
16b	a touch-sensitive display positioned at least partially within the housing;
16c	a rear cover positioned at least partially within a rear opening defined along a rear portion of the housing, the rear cover defining at least a portion of a rear exterior surface of the wearable electronic device and having an optically transparent portion;
16d	an optical sensor positioned within the housing and configured to emit an optical signal through the optically transparent portion;
16e	a first electrode positioned along the rear exterior surface of the wearable electronic device; a second electrode positioned along the rear exterior surface of the wearable electronic device; and
16f	a third electrode positioned along a side of the wearable electronic device, wherein:
16g	the wearable electronic device is configured to measure a first physiological parameter using the optical sensor; and
16h	the wearable electronic device is configured to measure a second physiological parameter using the first electrode, the second electrode, and the third electrode.

Limitation	Claim Language
17	The wearable electronic device of claim 16, wherein: the first electrode, the second electrode, and the third electrode are part of an electrocardiograph sensing system; and the second physiological parameter is an electrocardiogram.
18	The wearable electronic device of claim 16, further comprising an input device positioned along a side of the housing and configured to receive at least one of a rotational input or a translational input.
19	The wearable electronic device of claim 16, wherein the rear cover defines a convex exterior surface.
20	The wearable electronic device of claim 16, wherein the optical sensor comprises: an optical emitter configured to emit the optical signal through the optically transparent portion; and an optical receiver configured to receive a reflected portion of the optical signal through the rear cover.

Grounds Listing

GROUND 1	Claims 1–3, 5–6, 8, 10–14, and 16–20 are unpatentable as obvious under 35 U.S.C. § 103 in view of Kotanagi and Coppola
GROUND 2	Claims 1–3, 5–6, and 10–14 are unpatentable as obvious under 35 U.S.C. § 103 in view of Kotanagi and Schmid
GROUND 3	Claim 4 is unpatentable as obvious under 35 U.S.C. § 103 in view of Kotanagi, Coppola, and Tran
GROUND 4	Claim 15 is unpatentable as obvious under 35 U.S.C. § 103 in view of Kotanagi, Coppola, and Kateraas
GROUND 5	Claim 7 is unpatentable as obvious under 35 U.S.C. § 103 in view of Kotanagi, Coppola or Schmid, and Fraser
GROUND 6	Claim 9 is unpatentable as obvious under 35 U.S.C. § 103 in view of Kotanagi, Coppola or Schmid, and Honda
GROUND 7	Claim 8 is unpatentable as obvious under 35 U.S.C. § 103 in view of Kotanagi, Coppola or Schmid, and Miller

Pursuant to 35 U.S.C. §§ 311–319 and 37 C.F.R. § 42.100 *et seq.*, Masimo Corporation (“Petitioner” or “Masimo”) requests *inter partes* review of Claims 1–20 of U.S. Patent No. 11,474,483 (“the ’483 Patent”).

I. MANDATORY NOTICES

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

Masimo Corporation is the real party-in-interest.

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

Apple has asserted the ’483 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”).

3. Lead and Back-up Counsel (37 C.F.R. § 42.8(b)(3))

Petitioner provides the following designation of counsel:

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

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. 64,735 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-483@knobbe.com.

A. 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.

B. Grounds for Standing (37 C.F.R. § 42.104(A))

Petitioner hereby certifies that the '483 Patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR.

II. BACKGROUND

Wearable electronic devices have taken the form of smart watches for decades, and these have long included health monitoring features. When Apple released its first smart watches in 2015, the company joined a long tradition. The chart¹ below shows some biosensor smartwatch patent figures through the decades:

¹ These references are discussed further in EX1003 ¶¶56–101.

1978 Fig. 1 EX1022	1980 FIG. 2 EX1026	1983 Fig. 1 EX1029
2001 FIG. 1 EX1007	2001 EX1006	2005 EX1005
2012 Fig. 1A EX1008	2012 EX1014	2014 EX1020
2014 EX1041	2014 FIG. 3B EX1016	2014 EX1010

Not all of these references are used as a substantive basis for this petition. However, the figures above (and the overview of developments in earlier decades, EX1003 ¶¶56–101, e.g., discussing EX1022–EX1031, and EX1033–EX1035) suggest the rich history of this crowded field.

A. Reliance on Expert Analysis and Testimony

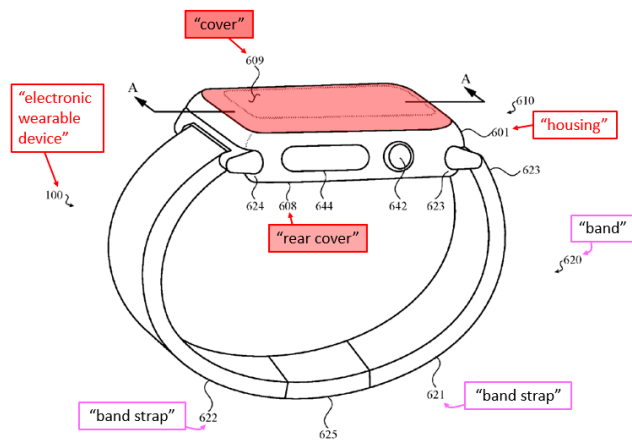
As with most patentability challenges, technical issues are highly relevant to this petition, including to show what would have been known or understood by a person of ordinary skill in the art prior to the time the application was filed (“POSITA”). Accordingly, this Petition largely adopts the expert analysis and testimony of R. James Duckworth, Ph.D. EX1003 ¶¶ 1–286.²

B. Overview of the ’483 Patent

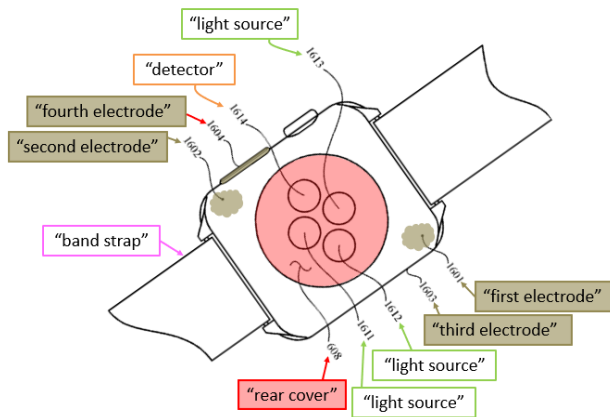
Apple’s ’483 patent alleges improvements to health-monitoring smart watches, but the challenged claims (Claims 1–20 of the ’483 Patent) merely recite features that were well known prior to that Patent, and their combinations in the claims provided no unexpected results or benefits. The following compares ’483 patent figures to those from a 2005 patent publication by Kotanagi (EX1005):

² In general, herein, a single citation to Dr. Duckworth’s expert declaration is provided at the end of each paragraph or section that is supported by Dr. Duckworth’s testimony.

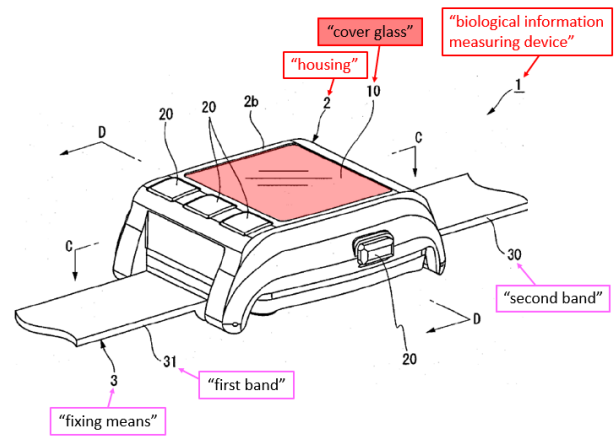
'483 Patent



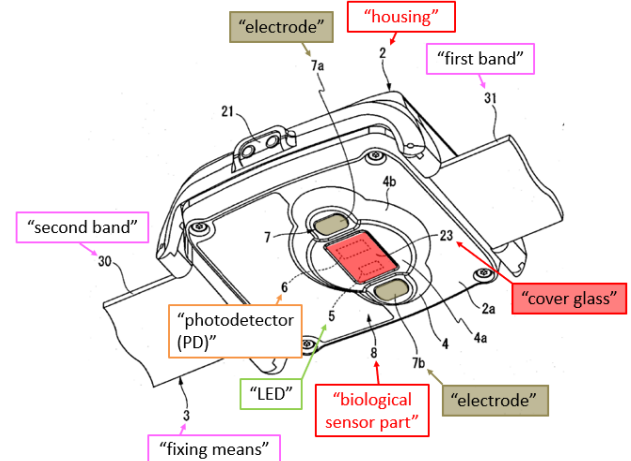
'483 Patent



Prior Art – Kotanagi



Prior Art - Kotanagi



See³ EX1001 at 13, 23 (Figs. 6 and 16); see EX1005 at 25–26 (Figs. 4 and 5).

EX1003 ¶45.

³

In this petition, color feature labels and color shadings are added for convenience and do not come from the cited patent drawings themselves.

Failing to cite Kotanagi was a material oversight in the examination of the '483 patent. For example, for allowance Apple relied on claims reciting two electrodes on the watch's rear exterior surface. EX1002 at 138–142. However Kotanagi teaches two such rear electrodes, 7a and 7b. These and other limitations were known in the prior art. EX1003 ¶¶46–48.

C. Prosecution History

The Examiner rejected all pending Claims 21–40 in a Non-Final Rejection. EX1002 at 700–702. The rejection gave little weight to locations of electrodes:

Hong et al. teaches that skin conductance electrodes may be mounted on the strap. However, this difference merely pertains to the location of the electrode sensors, not to the function. The function of the sensors is independent of [sic] location, whether in the housing or on the band the sensors would function in the same manner and provide the same data. Thus, the location of the sensor, as long as it contacts the skin, does not affect or influence the operation of the sensor and presents little critical structure.

EX1002 at 704–705. EX1003 ¶51.

However, Apple responded by emphasizing electrode locations: “skin-contacting electrodes[] cannot simply be moved to another location without incurring significant engineering challenges.” EX1002 at 144. Consistent with this

emphasis, Apple amended the claims to recite the positions of the three electrodes.

Id. at 138–142. The Examiner thereafter issued a Notice of Allowance, stating “the prior art fails to describe the configuration of the electrodes as presently recited *with respect to the locations on the housing.*” EX1002 at 40 (emphasis added). EX1003 ¶¶52–54.

The ’483 prosecution history shows that the Examiner did not consider, and Applicant did not cite, any of the references that Petitioner relies on in the grounds of this Petition. *See generally* EX1002. These references teach what the Applicant alleged was missing from the prior art: a biosensing watch with ECG electrodes on the back, front, and side of the watch housing. EX1009 16:21–23; EX1020 14:14–16. EX1003 ¶53.

D. Priority

The ’483 patent was filed February 15, 2022. It is a continuation of U.S. Application No. 17/188,966, filed on March 1, 2021 and of U.S. Application No. 17/188,995, filed on March 1, 2021, both of which are continuations of U.S. Application No. 16,826,130, filed on March 20, 2020. The ’130 application Claims priority to U.S. Application Nos. 15/261,912, 15/261,914, and 15/261,917, all filed on September 10, 2016. EX1002 at 900–903. These three applications are all continuations of U.S. Application No. 14/842,617, filed September 1, 2015, which Claims priority to provisional application 62/044,974, filed September 2,

2014. EX1002 at 900–903. Thus, the earliest alleged priority date of the '483 Patent is September 2, 2014. EX1001 at 2.

E. Level of Ordinary Skill in the Art

A POSITA of the '483 patent would have had at least a bachelor's degree in a discipline related to biomechanical devices, such as Mechanical Engineering, Biomedical Engineering, Electrical Engineering, Physics, Industrial Design, or an equivalent discipline, and at least three years of experience working with or developing electronic medical or consumer devices. EX1003 ¶¶33–36.

F. Claim Construction

Numerous claim terms are construed—based on their ordinary meanings or otherwise—in the context of the invalidity analysis in this petition, consistent with *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005).⁴ Construction of an example phrase is also discussed here for convenience. EX1003 ¶¶37–38.

⁴ Petitioner's position regarding the scope of the claims should not be taken as an assertion regarding the appropriate claim scope in other adjudicative forums where a different standard of claim construction and/or claim interpretation may apply, or where the claim language and context differs.

1. “defining an optically transparent window”

Claims 1 and 10 recite that a cover “defines” an optically transparent window. The ’483 patent does not provide a special definition for “window,” although the ’483 patent often recites “windows or apertures.” EX1001 28:38–29.⁵

The ’483 patent refers to windows in the following context:

The device 100 may also include a rear cover 608 located on the rear-facing surface of the housing 601 of the device body 610 [T]he biosensors are disposed relative to or attached to a rear cover 608 that is formed from an optically transparent material and is configured to be positioned with the opening of the housing 601 .

* * *

The convex curved area of the rear cover 608 may include one or more windows or apertures that provide operational access to one or more internal components located within the housing. For example, the rear cover 608 may include an array of windows, each window including an aperture or opening for a respective light source 1611–1613 and/or the detector 1614.

EX1001 27:46–48, 42:28–49. EX1003 ¶39.

⁵ Citations containing a colon (“:”) are to columns and lines, where available, or to bates-numbered pages and lines, where lines are numbered. Citations to documents having square brackets “[]” for paragraph numbering use brackets instead of paragraph symbols “¶”.

Accordingly, the '483 patent describes a single sheet of material (rear cover 608) positioned within a single opening in a housing (opening 601). In Figure 16, this sheet defines multiple windows or apertures, where the detector and light sources are positioned immediately behind that sheet.

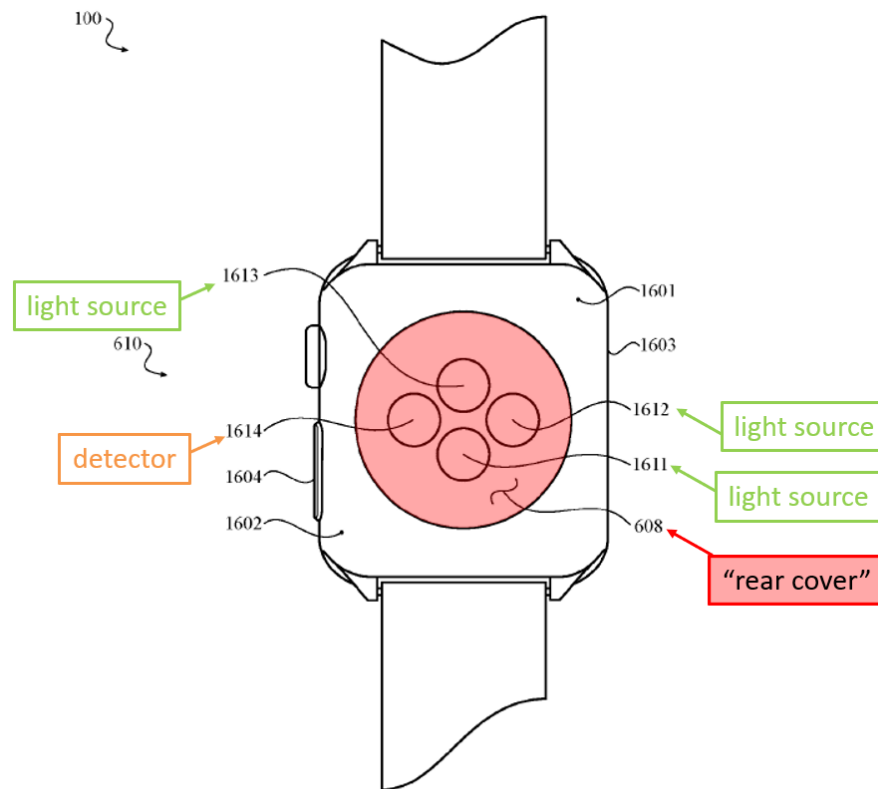


FIG. 16

See EX1001 at 23. Thus, for a cover to “define” an optically transparent window simply means to allow passage of light to a relevant component through the cover. In the '483 patent, the single rear cover 608 “defines” multiple optically transparent windows by allowing passage of light through the round portions labeled 1611–1614 in Fig. 16. EX1003 ¶¶40–41.

II. STATEMENT OF PRECISE RELIEF REQUESTED

A. Statutory Grounds for Cancellation

Masimo Corporation hereby certifies that the '483 Patent is available for *inter partes* review and that Masimo Corporation is not barred or estopped from requesting *inter partes* review challenging the patent Claims on the grounds identified herein.

G. Status of the References as Prior Art

The following references are prior art to the '483 patent (earliest alleged priority of September 2, 2014) for the following reasons:

Exhibit No.	Description	Prior Art Basis
1001	'483 patent (background section)	Admitted Prior Art
1005	Kotanagi	Post-AIA 35 U.S.C. §102(a)(1) – published October 6, 2005
1006	Honda	Post-AIA 35 U.S.C. §102(a)(1) – issued July 24, 2001
1014	Kateraas	Post-AIA 35 U.S.C. §102(a)(1) – published August 30, 2012
1020	Coppola	Post-AIA 35 U.S.C. §102(a)(2) – effectively filed April 2, 2014 (see EX1009)
1029	Schmid	Post-AIA 35 U.S.C. §102(a)(1) – published March 1, 1983

Exhibit No.	Description	Prior Art Basis
1034	Tran	Post-AIA 35 U.S.C. §102(a)(1) – published November 29, 2007
1041	Fraser	Post-AIA 35 U.S.C. §102(a)(2) – effectively filed June 5, 2014
1049	Miller	Post-AIA 35 U.S.C. §102(a)(1) – issued January 7, 2014

These references constitute analogous art because they are from the same field of endeavor as the '483 patent, e.g., biosensing watches and personal electronic devices. *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., arrangement of optical and electrical biosensors on such devices. 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). The volume and character of the overlapping features between the references listed above and the subject patent provides further evidence that these references are analogous art and highly relevant for a POSITA. For example, the side-by-side figures in § II(B) titled “Overview of the '483 Patent” show many similarities between the patent and the Kotanagi reference. These figures and similar figures throughout this document support the 35 U.S.C. § 103 (or obviousness) combinations generally, and also support the conclusion that these references are

analogous art. Accordingly, a POSITA is presumed to have been aware of them.

Id. As set forth in detail below in the context of the invalidity analysis, a POSITA would have been motivated to combine these references prior to the filing of the '483 patent for many additional reasons. EX1003 ¶¶111–112.

a. Fraser 35 U.S.C. § 102(a)(2) Analysis

Fraser (EX1041) is a U.S. patent publication. Filed August 19, 2014, it predates the earliest priority of the '483 patent and is therefore prior art. 35 U.S.C. § 102(d)(1). EX1003 ¶113.

b. Coppola 35 U.S.C. § 102(a)(2) analysis

PCT Pub. No. WO 2015150199 (“Coppola” EX1020) was published on October 8, 2015 and is prior art under post-AIA 35 U.S.C. § 102(a)(2) because it designates⁶ the United States and Claims an effective filing date that predates the earliest effective filing date of the '483 patent. Specifically, WO 2015150199 Claims priority to EP14163114.3, filed April 2, 2014 (“Coppola EP,” EX1009).

⁶ See 35 U.S.C. § 374 stating “The publication under the treaty defined in section 351(a), of an international application designating the United States shall be deemed a publication under section 122(b), except as provided in section 154(d)”

Coppola is literally supported by the filing in Europe of Coppola EP. Coppola EP's Figures 1–8 are identical to the published figures in Coppola. EX1020 at 24–28; EX1009 at 27–30. Coppola EP provides support⁷ for every limitation relied upon in this petition, as shown by parallel pinpoint citations in this

⁷ *Dynamic Drinkware, LLC, v. National Graphics, Inc.*, 800 F.3d 1375, 1381 (Fed. Cir. 2015) held that a reference patent alleged to be prior art under pre-AIA 35 U.S.C. § 102(e) “is only entitled to claim the benefit of the filing date of its provisional application if the disclosure of the provisional application provides support for the claims in the reference patent in compliance with § 112, ¶ 1.” To the extent *Amgen v. Sanofi*, 872 F.3d 1367, 1380 (Fed. Cir. 2017) or other cases may extend this requirement to Masimo's use of *Coppola* (a PCT publication claiming priority to an earlier European patent application, in a post-AIA context), Masimo makes such a showing, e.g., in EX1003 ¶¶116–120. *See Mueller Sys., LLC v. Rein Tech, Inc.*, Case No. IPR2020-00100, 2020 WL 2478524, at *10 (PTAB May 12, 2020); *Epizyme, Inc. v. GlaxoSmithKline LLC*, Case No. IPR2020-01577, 2021 WL 841118, at *10–11 (PTAB Mar. 5, 2021). USPTO guidance calls into question whether *Dynamic Drinkware* and *Amgen* apply to post-AIA patents. EX1047 at 3.

petition to both Coppola and the earliest effective filing disclosure, Coppola EP.
EX1003 ¶¶114–120.

III. SPECIFIC PROPOSED GROUNDS FOR UNPATENTABILITY

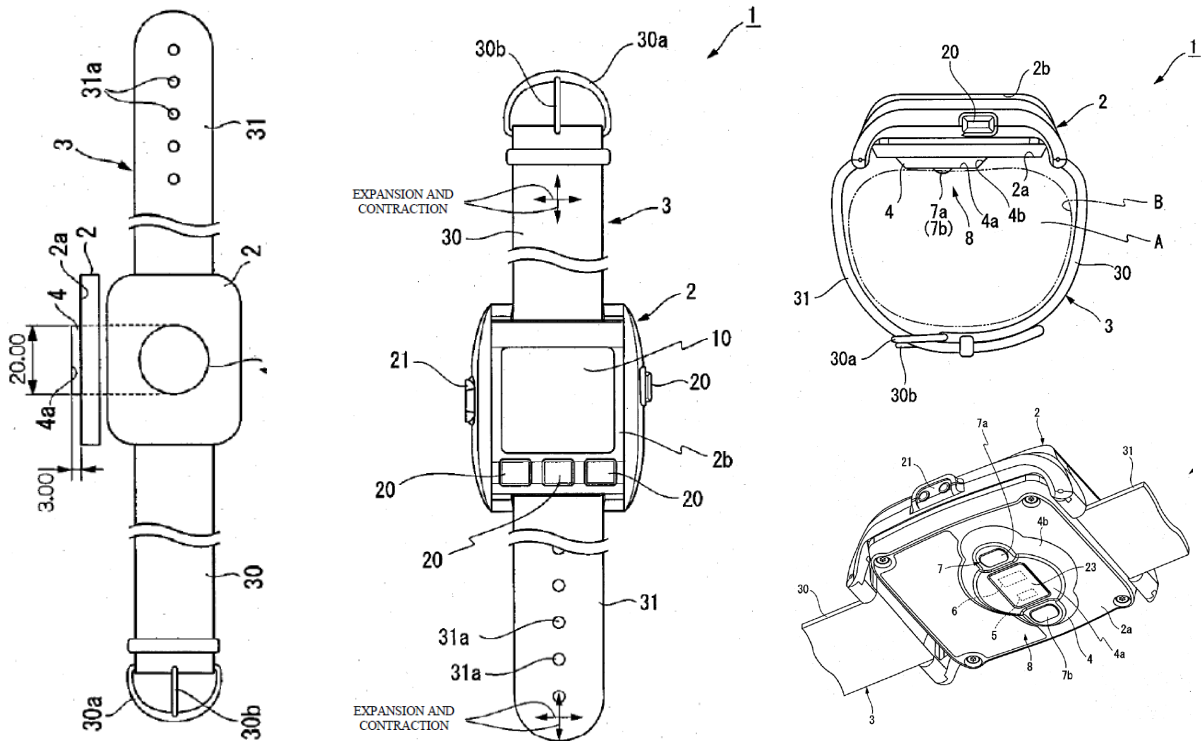
As explained below, Claims 1–20 of the ’483 patent would have been obvious under 35 U.S.C. § 103 in view of the prior art identified below. The cited references teach every claim limitation, though not always using identical terminology. *See In re Bond*, 910 F.2d 831, 832 (Fed. Cir. 1990) (disclosure need not be *ipsissimis verbis*). EX1003 ¶121.

H. Ground 1: Claims 1–3, 5–6, 10–14, and 16–20 are unpatentable because they would have been obvious over Kotanagi in view of Coppola.

1. Independent Claim 1

a. [1a] “A wearable electronic device comprising:”

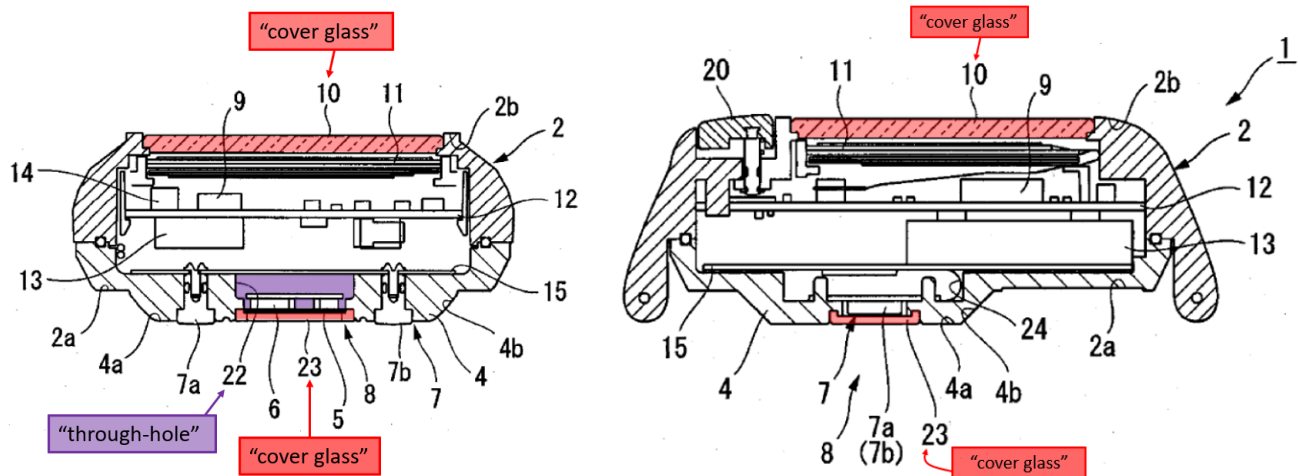
Kotanagi describes a “wristwatch-type device which detects pulse rate as a type of biological information while mounted to the wrist.” EX1005 ¶44. EX1003 ¶122.



EX1005 at 23, 24, 26, 28 (Figs. 1, 2, 5, 8).

b. [1b] “a housing defining a first opening and a second opening;”

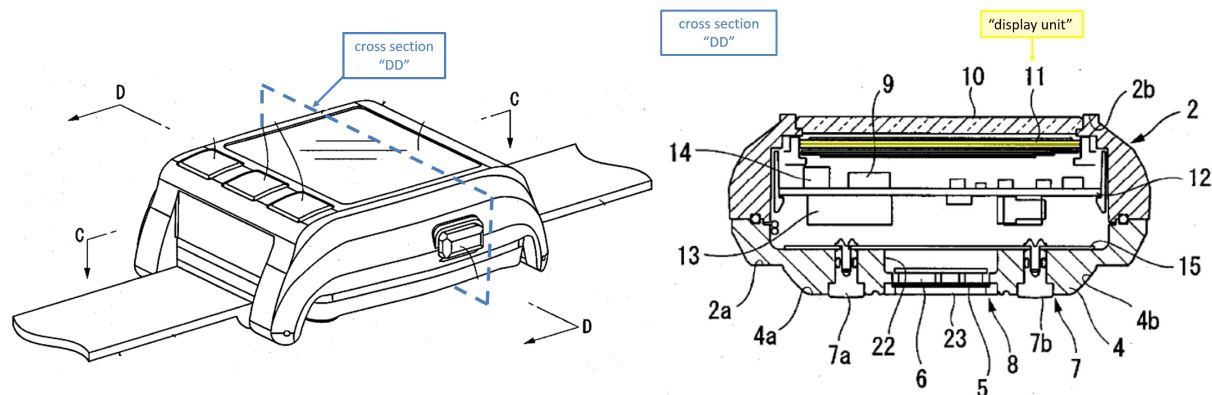
Kotanagi teaches a “housing 2 . . . made of plastic or a metal material such as aluminum.” EX1005 ¶48. Kotanagi’s housing has a “first opening” at the top and a “second opening” (“through-hole 22”) at the bottom, both shown in the cross-sections below. The cover glass 10 and the cover glass 23 span these openings:



EX1005 at 27 (Figs. 7, 6). EX1003 ¶123.

c. [1c] “a display positioned at least partially within the first opening;”

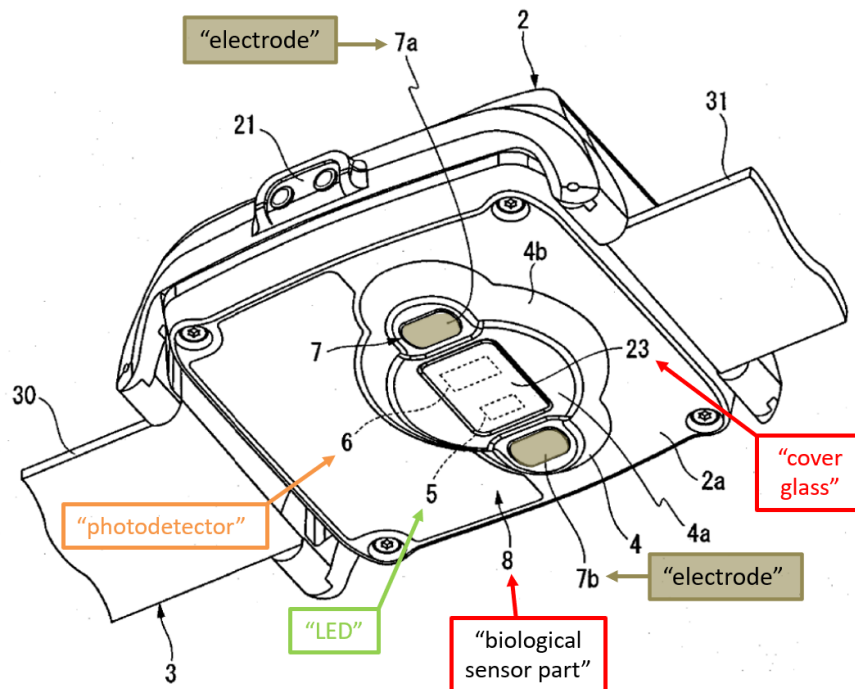
In Kotanagi, a “cover glass 10 with a substantially square shape is fitted into the central portion of the upper surface 2b of the housing 2, and a display part 11 for displaying the aforementioned pulse rate that is detected and various other information is disposed inside the cover glass 10.” EX1005 ¶48.

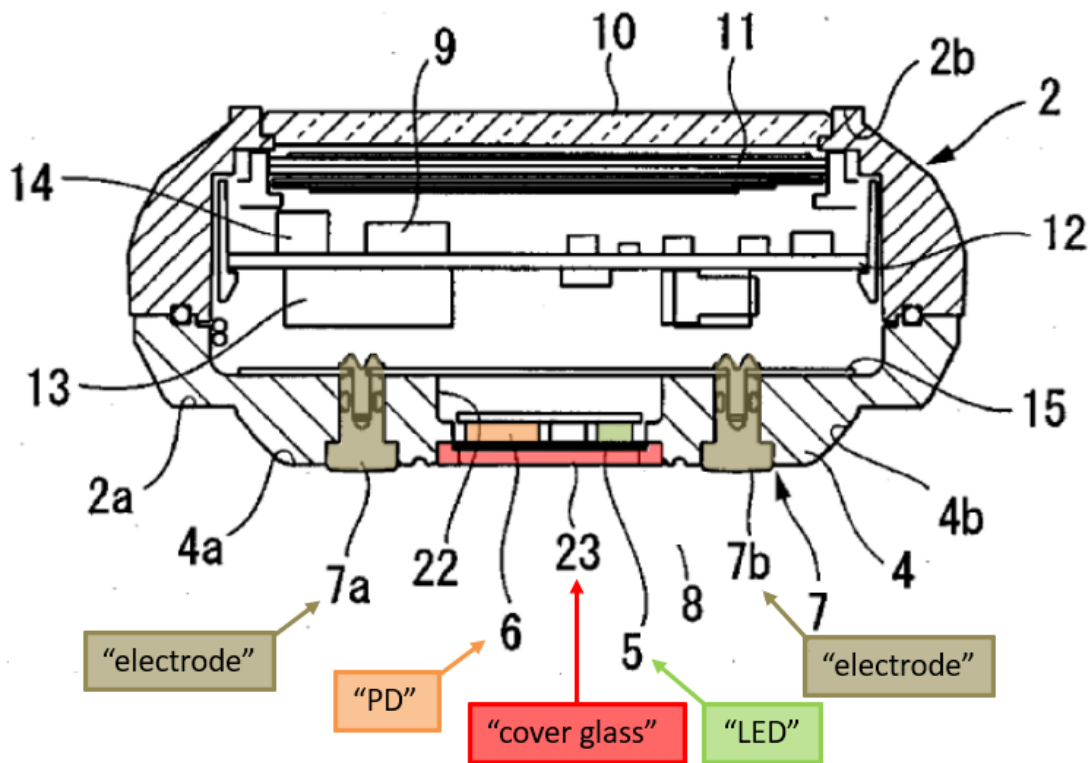


Emitting Diode) (light-emitting part) 5 for emitting light toward the living body while in contact with the living body surface B side, a PD (Photodetector) (light-receiving part) 6 for receiving reflected light from the living body... and a contact detection means 7 for detecting whether the LED 5 and the PD 6 are in contact with the living body surface B, is disposed on the lower surface 4a of the protruding part 4.

EX1005 ¶46.

Kotanagi teaches such a module, which also satisfies subsequent limitations stating that it comprises: [1f] a rear cover (cover glass 23); [1g] an optical sensor (photodetector 6 and LED 5); and [1h] electrodes (electrodes 7a/7b). This biosensor module is located at the rear of Kotanagi's device, as illustrated below:

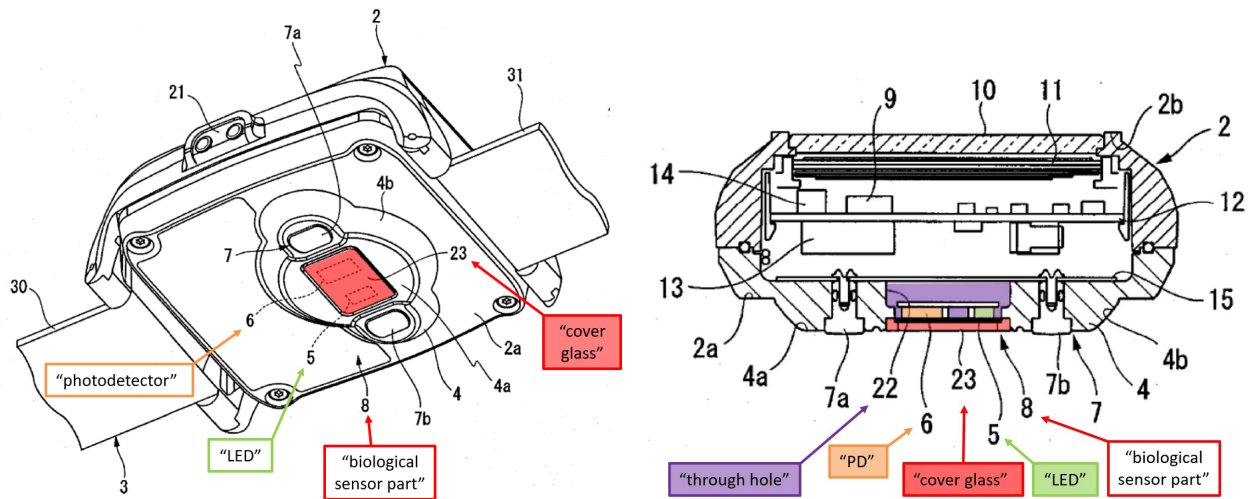




See *id.* at 26, 27 (Figs. 5, 7). EX1003 ¶¶126–127.

- f. [1f] “a rear cover positioned at least partially within the second opening and defining an optically transparent window”

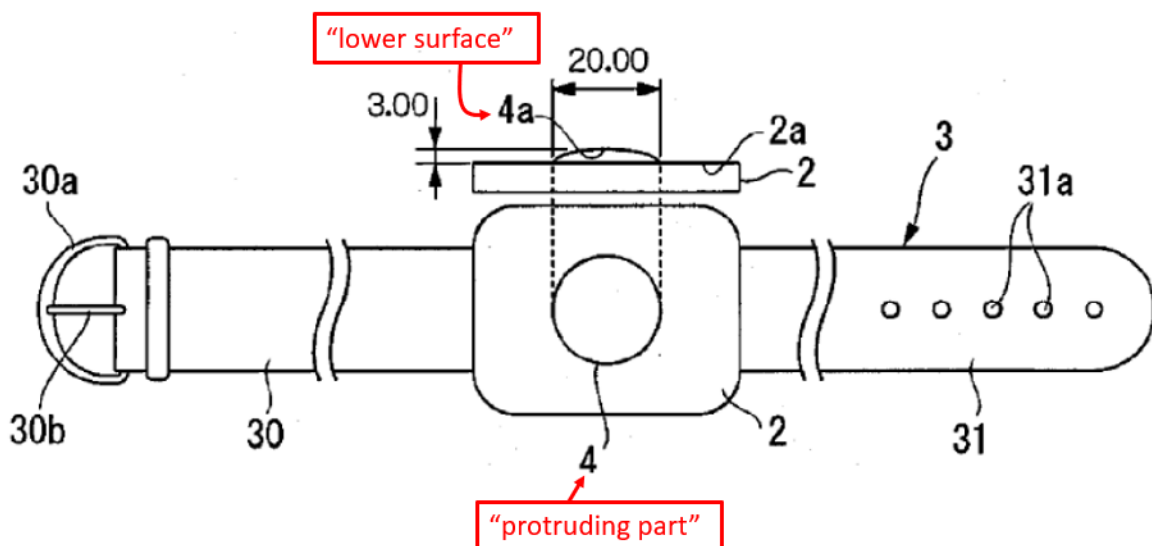
Kotanagi has a cover glass 23 “fixed to the housing 2 so as to block the through-hole 22.” EX1005 ¶55. It is thus positioned within the second opening. It is also optically transparent because it allows the LED 5 to emit light toward the living body, and through it, the photodetector 6 receives “reflected light corresponding to the pulsation of arteries.” *Id.* ¶65.



See EX1005 at 26, 27 (Figs. 5, 7). EX1003 ¶128.

g. [1g] “and a protruding convex surface;”

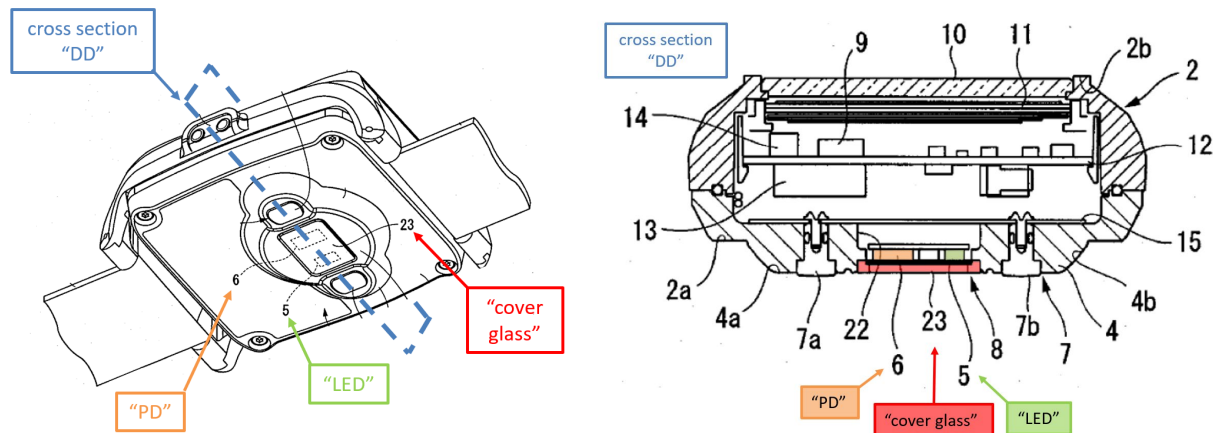
Kotanagi teaches the cover can form, or comprise part of, a convex protrusion: “Further, a curved surface may be formed from the center toward the outer edge of the lower surface 4a of the protruding part 4, as illustrated in FIG. 10.” EX1005 ¶(0080).



See EX1005 at 28 (Fig. 10). A POSITA would have understood from Kotanagi's Figure 10 that the protruding part can form a convex "cover glass" that spans the through-hole 22. *Id.* at 28. Kotanagi states that its protruding part causes the body to "deform[] smoothly," which "enhances the adherence." EX1005 ¶¶35, 80. EX1003 ¶¶129–130.

h. [1h] "an optical sensor aligned with the optically transparent window;"

Kotanagi's "LED 5 and the PD 6 are disposed adjacent to one another . . . so as to touch the inside of the glass cover 23." EX1005 ¶55. Thus, Kotanagi has an optical sensor aligned with the optically transparent window.

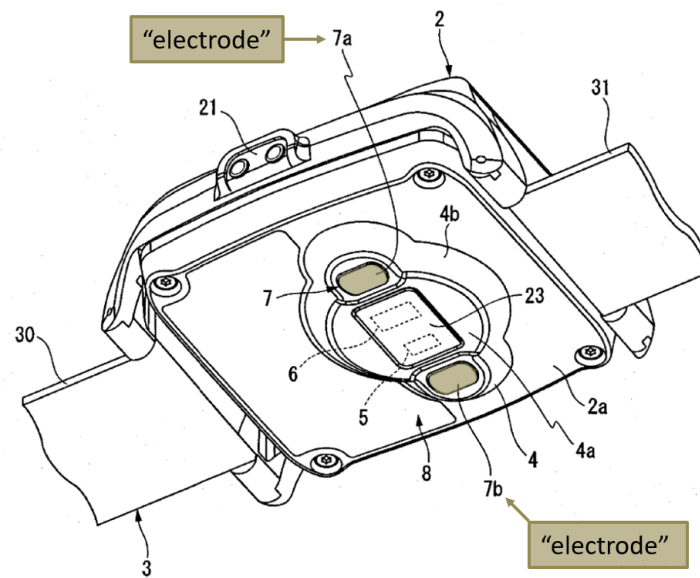


See EX1005 at 26, 27 (Figs. 5, 7). EX1003 ¶131.

i. [1i] "a first electrode positioned along a rear surface of the wearable electronic device; and a second electrode

positioned along the rear surface of the wearable electronic device; and”

Kotanagi’s rear electrodes 7a and 7b are intended for detecting whether there is contact with a living body surface. EX1005 ¶59:



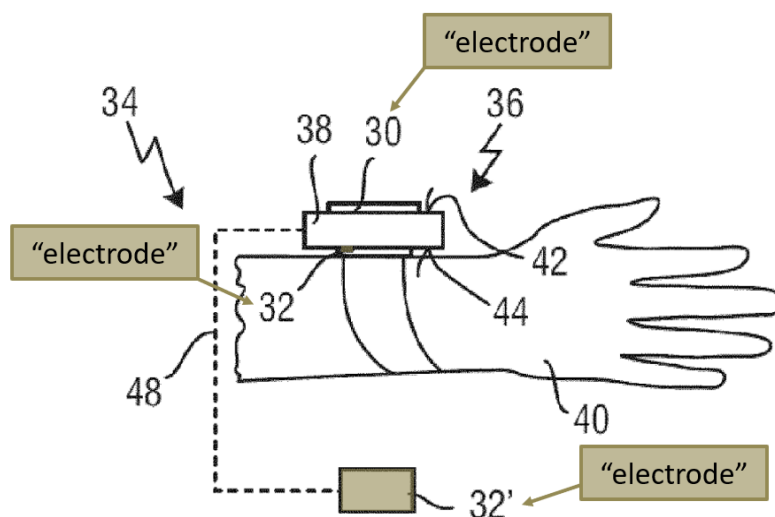
See id. at 26 (Fig. 5). As shown, they are positioned as claimed. EX1003 ¶132.

j. [1j] “a third electrode positioned along a side of the wearable electronic device, wherein:”

Kotanagi teaches that “the electrodes need not be a pair, and a plurality of electrodes, for example, may be provided” for detecting a potential difference. EX1005 ¶14; *see Id.* ¶86 (plurality of electrodes). Thus Kotanagi itself teaches or suggests a third electrode, which can also be used to measure skin contact. Alternatively, the third electrode could be added (e.g., to a different area of

Kotanagi's watch) to provide an ECG measurement as is well known in the art. A POSITA would have considered this option based on Kotanagi's teaching of additional electrodes and the known benefits of electrocardiography. EX1003 ¶133.

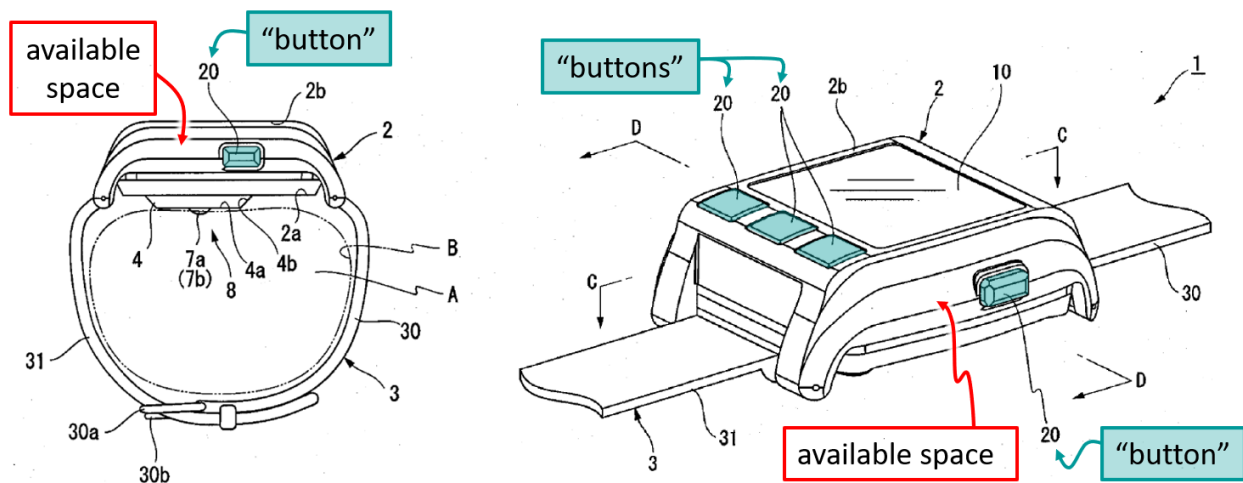
A POSITA would have looked to other similar devices with multiple electrodes in the same field of endeavor, such as Coppola. This reference also teaches a biosensing watch with multiple electrodes:



See EX1009 at 28; EX1020 at 25 (Fig. 3). Coppola explains how dangerous conditions such as atrial fibrillation (AF) and their causes are detected by electrocardiography (ECG)—especially when combined with optical sensors, e.g., photoplethysmograph (PPG) sensors. EX1020 2:22–31, 3:10–21; EX1009 4:22–32, 5:10–21. Given these life-saving benefits, a POSITA would have configured Kotanagi's multiple electrodes for ECG measurements to enhance its optical

measurements. EX1003 ¶¶134–135.

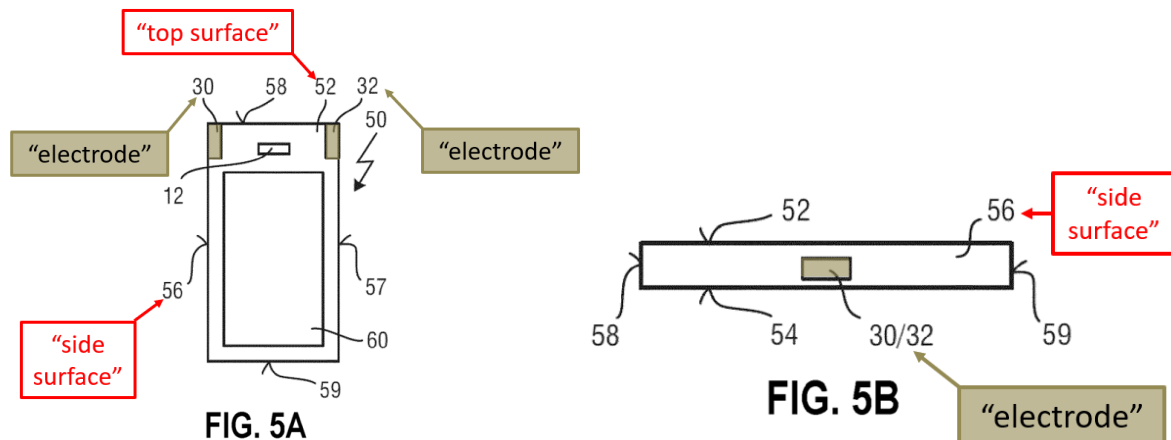
To accomplish this, Coppola teaches placing an electrode on the side or strap of a biosensing watch. EX1009 16:21–23; EX1020 14:14–16. Placing it on the side instead of the top also allows a GUI element to “cover the whole front side 42 of the watch.” *Id.* This is consistent with, in Kotanagi’s case, minimizing disruption of Kotanagi’s display and front buttons. Kotanagi has available space for a side electrode, so adding Coppola’s side electrode would have been feasible:



See EX1005 at 24, 25 (Figs. 2 and 4).

Coppola teaches exact electrode location is not critical, but “more than two electrodes” and placing electrodes on “different surfaces” is valuable: “at least one electrode 30, 32 may be arranged on a back surface 54 or a side surface.” EX1009 18:5–7 ; EX1020 15:32–16:1. EX1003 ¶¶136–137.

Coppola illustrates top and side electrodes in Figures 5A and 5B:



See EX1009 at 28; EX1020 at 26. Based on both Kotanagi's and Coppola's teachings of multiple electrodes, a POSITA would have known to add a third electrode⁸ and, by positioning it on the side (Kotanagi already has two in the rear), enabling ECG measurement while leaving room for a larger screen (and any existing buttons) on the front. EX1003 ¶138.

⁸ Many prior art watches have used three or more electrodes for ECG measurement. EX1008 Figs. 1A–2B, Claim 15 (electrodes 14, 15, 16, three configurations); EX1011 Fig. 1 and EX1023 Fig. 1 (contacts 131 and 151); EX1027 Fig. 2 (electrodes on top, bottom, and band); EX1029 at 5–13, Fig. 1 (electrodes N, A, A1 A2, 13, 32–34); EX1031 Fig. 1 (electrodes 14, 16, and 18); EX1033 Fig. 5 (conductive areas 560, 561, 515); EX1035 Figs. 2a, 2b and [0028] (electrodes 122, 124, 126).

- k. [1k] “the wearable electronic device is configured to measure a first physiological parameter of a wearer using the optical sensor; and”**

Kotanagi teaches that light reflected back to the PD 6 “varies depending on fluctuations in blood flow within arteries and arterioles in the wrist,” so the PD generates “a pulse signal.” EX1005 ¶65. This signal is measured by Kotanagi’s optical sensor and is a physiological parameter. EX1003 ¶139.

- l. [1l] “the wearable electronic device is configured to measure a second physiological parameter using the first electrode, the second electrode, and the third electrode.”**

Kotanagi’s electrodes 7a and 7b contact skin to detect a “potential difference.” EX1005 ¶59. A POSITA would have considered this potential difference a separate physiological parameter from the pulse signal because it involves a “discharge” through the skin. *Id.* ¶14 (“the pair of electrodes come into contact with the living body surface so that a discharge occurs through the living body surface”).

As discussed above, Kotanagi also teaches that the “electrodes need not be a pair” and a “plurality of electrodes” may be provided. *Id.* ¶¶14, 86. EX1003 ¶133. Coppola teaches a biosensing watch with “electrical sensing unit [that] comprises an electrocardiography ECG unit comprising at least a first and a second electrode,

the heartbeat-related electrical signal comprising an ECG signal. Advantageously, this embodiment exploits the well-established ECG technique which is able to provide deep insights into the cardiac cycle.” EX1009 8:23–27; EX1020 6:13–17. For such deep insights, a POSITA would have added Coppola’s ECG capability to Kotanagi—for example, by adding “even more than two electrodes.” EX1009 17:20–23; EX1020 15:12–16. EX1003 ¶¶140–141.

Adding ECG capability to Kotanagi would have been highly desirable—e.g., to help address atrial fibrillation problems, etc. as explained by Coppola (EX1020 2:22–31, 3:10–21; EX1009 4:22–32, 5:10–21)—and could be accomplished with relatively minor changes. Since Kotanagi teaches two electrodes on the bottom surface of the watch, a POSITA would have known from Coppola’s teaching that “at least two of all [the] electrodes” should be “arranged on two different surfaces” (EX1009 18:5–6; EX1020 15:32–33) and would have added a third electrode “on the side” of Kotanagi’s watch so that Kotanagi’s screen “can cover the whole front side 42 of the watch” (EX1009 16:21–23; EX1020 14:14–16). This allows the side electrode to be “touched by a finger of the other hand” for ECG measurement (EX1020 7:8; EX1009 9:18–19) so that the “electrodes are separately contacted or contactable to two body parts on sides lying opposite one another with respect to the heart of the user” (EX1020 6:22–23; EX1009 8:32–33). EX1003 ¶143.

Thus, in view of the teachings of Kotanagi and Coppola, a POSITA would

have configured Kotanagi’s device with a third, side electrode to measure ECG as a second physiological parameter. EX1003 ¶144.

m. Motivation to Combine Kotanagi and Coppola

Based on the teachings above, A POSITA would have been motivated prior to September 2014 to combine Kotanagi and Coppola. They are analogous art in the same field, both teaching a watch with optical and electrical biosensors. Kotanagi teaches an LED and PD to detect pulse rate and “a plurality of electrodes” to detect electrical potential. EX1005 ¶¶14, 46, 86. Coppola teaches a device that “advantageously combines an optical sensing unit such as a PPG unit and an electrical sensing unit such as an ECG unit within one system that can be particularly easily worn.” EX1020 7:8–10; EX1009 9:19–21. A POSITA would have wanted to include ECG functions in Kotanagi’s watch to better monitor heart health. EX1003 ¶145.

Kotanagi uses its rear electrodes to measure skin contact and electrical potential, teaching they “need not be a pair,” but rather a “plurality.” EX1005 ¶14; *see Id.* ¶86. Thus, a POSITA would have expected success in using Coppola to simply add a third electrode (e.g., to the side) and configure the electrodes for ECG measurement. Coppola uses electrodes according to “well-established ECG technique,” teaching the value of “even more than two electrodes.” EX1009 8:26, 17:22–23; EX1020 6:16, 15:15–16. EX1003 ¶146.

Coppola does not limit its electrodes to a specific location; they should be “arranged on two different surfaces” of the device. EX1009 18:5–7; EX1020 15:32–16:1. Coppola explains benefits for side positioning. EX1009 16:21–23; EX1020 14:14–16 (“the GUI element 46 can cover the whole front side 42 of the watch.”). Thus, a POSITA would have expected success in using Coppola to add a third, side electrode to Kotanagi, would have configured the electrodes for ECG measurement, and would have made the other modifications shown above to be obvious. EX1003 ¶147.

In view of Coppola and the many three-electrode biosensor watches (e.g., *supra* note 8), a POSITA would have also found it obvious to provide three electrodes in Kotanagi’s watch at least to: 1) gain insight into the cardiac cycle and address atrial fibrillation (*see* EX1020 2:22–31, 3:10–21, 6:13–17; EX1009 4:22–32, 5:10–21, 8:23–27); 2) improve signal to noise⁹ ratio with backup or duplicate measurements; 3) provide additional sensors as a failsafe if one stops working; 4) provide multiple contact points that are easier to access; 5) allow for different measurements (ECG and skin conductance) to enhance the features and information available to the user; 6) provide additional contact points for

⁹ EX1031 7:33–34 (“[t]he digital watch embodiment uses a three contact approach to help eliminate noise.”)

continuous¹⁰ skin contact during ECG measurements as the watch is bumped, shifted, or jostled (such as during exercise); 7) allow a user to take an ECG measurement from multiple areas “lying opposite one another with respect to the heart” (EX1009 17:21–22; EX1020 15:14–15); and/or 8) provide a reference electrode to measure the voltage between the two other conductive areas.¹¹ EX1003 ¶148.

Further, various permutations of biosensing watch electrodes were known¹² prior to the filing of the ’483 patent. When the Examiner initially minimized the

¹⁰ EX1031 3:25–26 (“loose contact between the electrodes and the skin . . . changes the impedance of this contact erratically”).

¹¹ EX1008 at 6 (“ECG signal” may be “extracted from the three conductive areas by using the signal of one conductive area as a reference and amplifying the differential voltage between the other two conductive areas”).

¹² See EX1008 at 19 (Claim 15, three configurations); EX1027 Fig. 2 (electrodes in top, bottom, band); EX1029 at Figs. 1, 5–13 (active (“A,” 21, 33) and neutral (“N,” 22, 32) electrodes); EX1030 Figs. 1, 2 (electrodes 4a and 4b); EX1031 Fig. 1 (electrodes 14, 16, and 18); EX1033 Fig. 5 (conductive areas 515, 560 and 561); EX1034 [0237] (electrode on band, back); EX1035 Figs. 2a, 2b

“location of the sensor” as not “critical” for a watch ECG (EX1002 at 705), the Applicant’s response did not provide contrary evidence. EX1002 at 144–145. The evidence from Coppola teaches benefits of ECG placement in various locations, including “the side of the watch or on the strap.” EX1020 14:14–16; EX1009 16:21–23. Thus, the claimed electrode arrangement is obvious. Coppola confirms that the placement of electrodes on various surfaces of a biosensing watch would have involved mere combinations of familiar elements according to known methods to yield predictable results. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. at 416 (2007). EX1003 ¶149.

This motivation applies equally to the other claims rejected under Ground 1. Further motivations are provided throughout this petition.

2. Dependent Claim 2

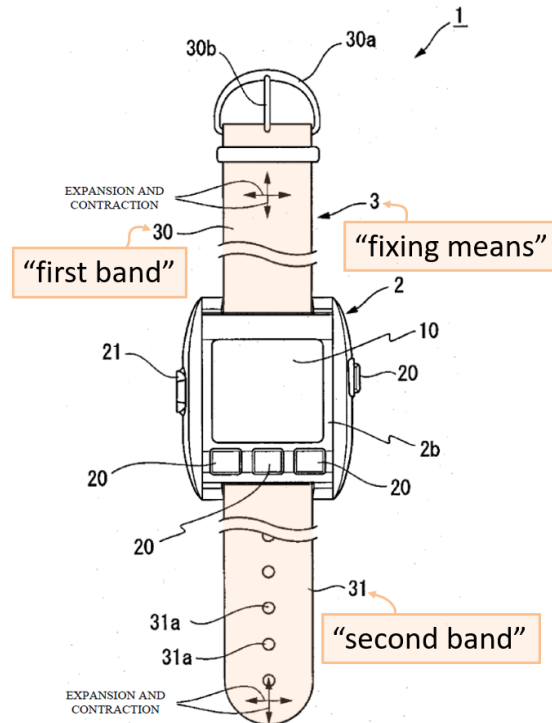
Claim 2 depends from Claim 1 and adds:

- a. [2a] “the wearable electronic device further includes a watch band coupled to the housing and configured to couple the wearable electronic device to a wearer”**

Kotanagi has a “means for fixing” the watch to an arm (EX1005 Abstract):

(electrodes 122 (front), 124 (back), and 126); EX1008 Figs. 1a, 1b (electrodes 16, 15).

“The fixing means 3 has a first band 30 and a second band 31 having base end sides that are attached to the housing 2 to enable mounting to the wrist.” (*See id.* ¶60).



See EX1005 at 23 (Fig. 1). EX1003 ¶152.

b. [2b] “the optical sensor is a heart-rate sensor;”

Kotanagi teaches that reflected light from the LED 5 “varies depending on fluctuations in blood flow within arteries and arterioles in the wrist” and because it “can receive reflected light ... the PD 6 can generate a pulse signal.” EX1005 ¶65. EX1003 ¶153.

Kotanagi’s watch measures heart rate in the same location as the ’483 patent, in the wrist. A POSITA would have considered a “pulse signal” to teach a “hear-

rate” at least because they are directly correlated, the pulse manifests the rate, and pulse has the same cadence as heart contractions. EX1003 ¶154.

c. [2c] “the first electrode is an electrode of an electrocardiograph sensing system; and”

As discussed for limitation [11], Kotanagi in view of Coppola teaches an ECG measurement with a first, second, and third electrode. Using Kotanagi’s existing electrodes to allow for different measurements (both ECG and skin conductance) would have enhanced the features and information available to the user, without removing their existing function taught by Kotanagi. Thus, the first electrode would be an electrode of an electrocardiograph sensing system, as it participates in the measurement of an ECG. EX1003 ¶155.

d. [2d] “the second physiological parameter is an electrocardiogram.”

As discussed for limitation [11], Kotanagi in view of Coppola teaches an ECG measurement, consistent with this claim limitation. EX1003 ¶156.

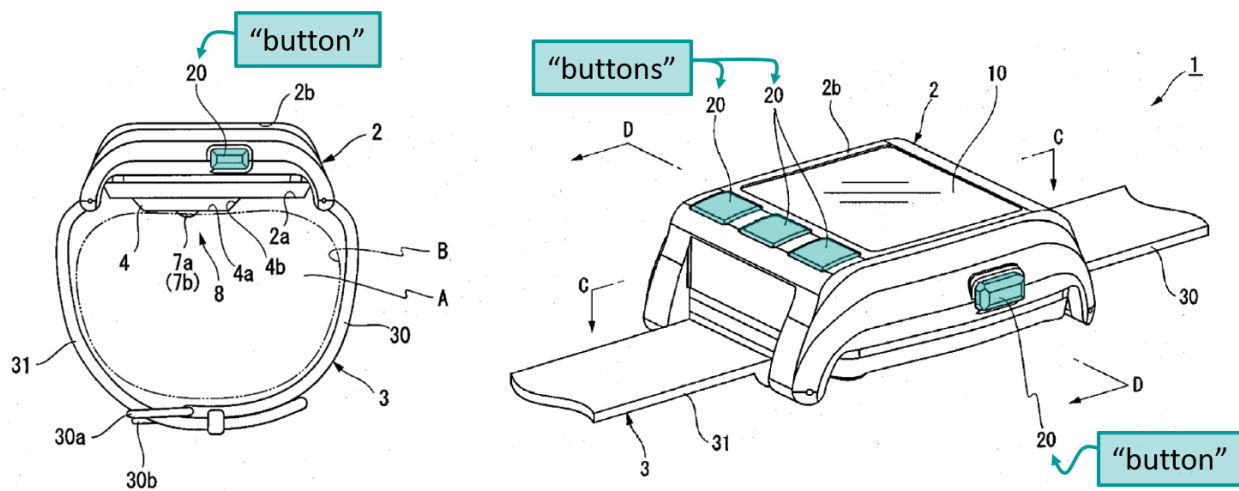
3. Dependent Claims 3 and 5

Claims 3 and 5 have identical scope.¹³ Both depend from Claim 1 and add

¹³ Dependent Claims 3 and 5 are verbatim copies of each other and depend from the same independent claim.

“further comprising an input device positioned along a side of the housing and configured to receive at least one of a rotational input or a translational input.”

Kotanagi teaches: buttons on the top of the housing; “one button 2[0] disposed on the side surface of the housing 2”; and that “[v]arious operations can be performed by pressing each of these buttons 20.” EX1005 ¶52.



See EX1005 at 24, 25 (Figs. 2 and 4). EX1003 ¶158.

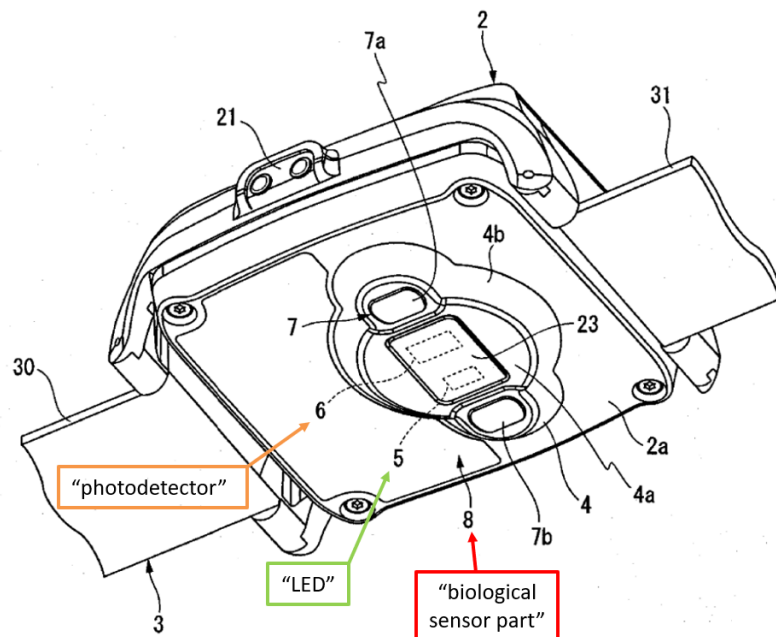
Pressing a button “translates” it inward, so Kotanagi teaches the claimed input device. This is consistent with how the ’483 patent describes button movement: it “may be configured to translate along an axis when pressed or pulled by the user.” EX1001 53:1–2. EX1003 ¶158.

4. Dependent Claim 6

Claim 6 depends from Claim 1 and further adds **“wherein the optical**

sensor comprises: an optical emitter configured to emit an optical signal; and an optical receiver configured to receive a reflected portion of the optical signal.”

Kotanagi’s optical sensor described with respect to limitation [1h] includes both the claimed emitter (“LED 5”) and receiver (“a PD (Photodetector) (light-receiving part) 6 for receiving reflected light from the living body out of the light emitted by the LED 5.”). EX1005 ¶46.

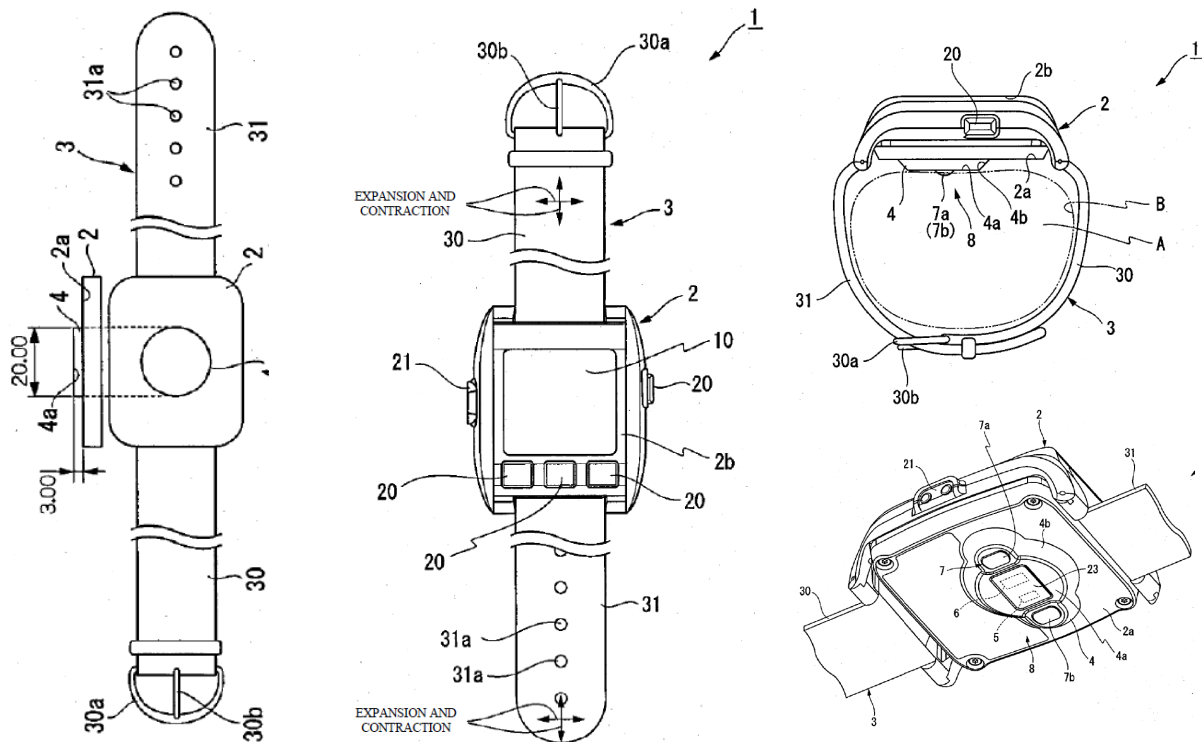


See EX1005 at 26 (Fig. 5). EX1003 ¶160.

5. Independent Claim 10

a. [10a] “An electronic watch comprising:”

Kotanagi describes a “wristwatch-type device which detects pulse rate as a type of biological information while mounted to the wrist.” EX1005 ¶44.

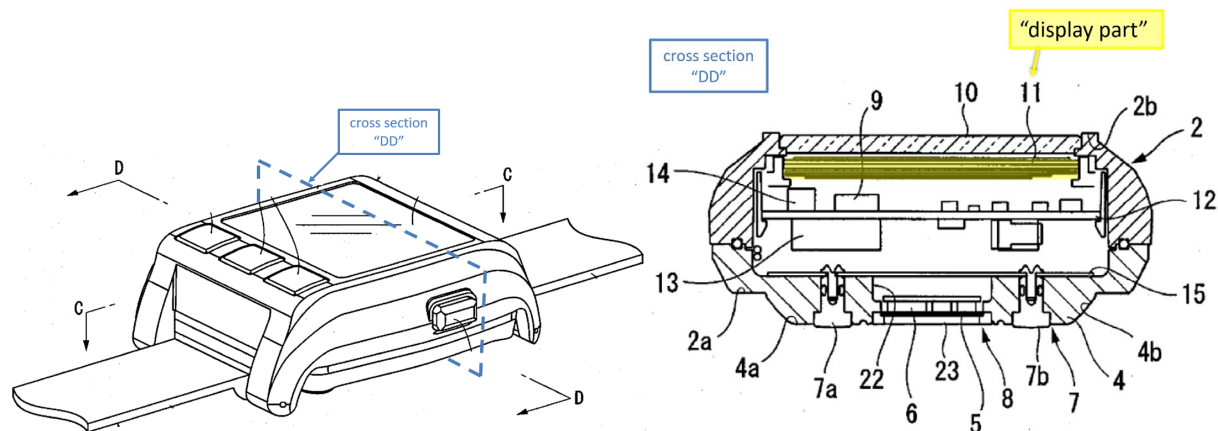


Id. at 23, 24, 26, 28 (Figs. 1, 2, 5, 8).

b. [10b] “a display;”

Kotanagi’s watch has “a display part 11 for displaying . . . pulse rate that is detected and various other information is disposed inside the cover glass 10.”

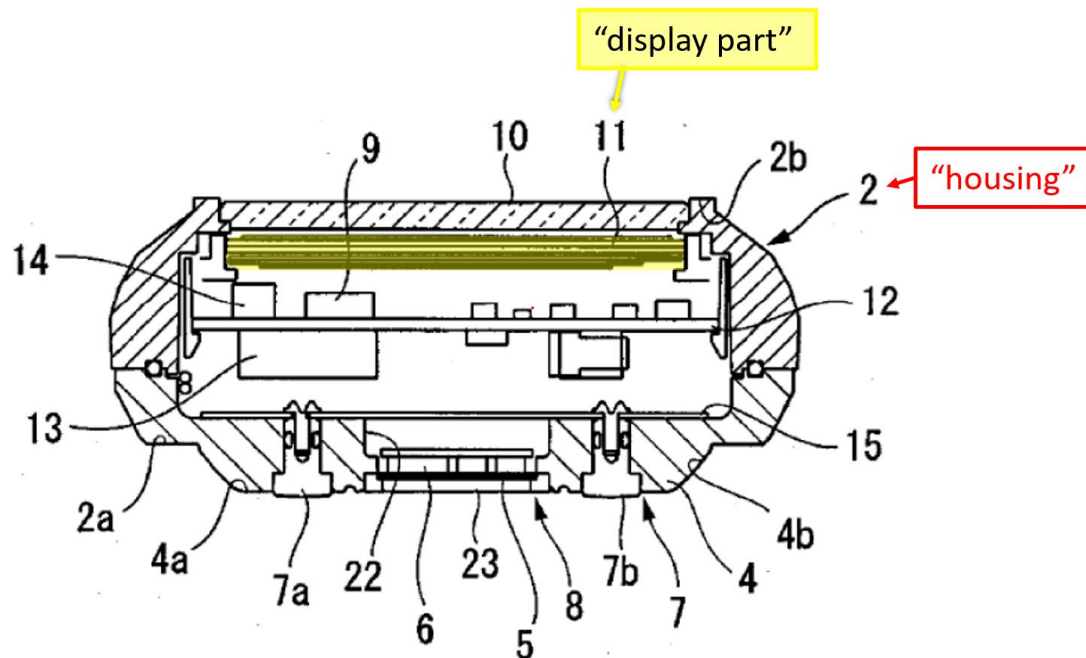
EX1005 ¶48.



See id. at 25, 27 (Figs. 4, 7). EX1003 ¶162.

c. [10c] “a housing at least partially enclosing the display;”

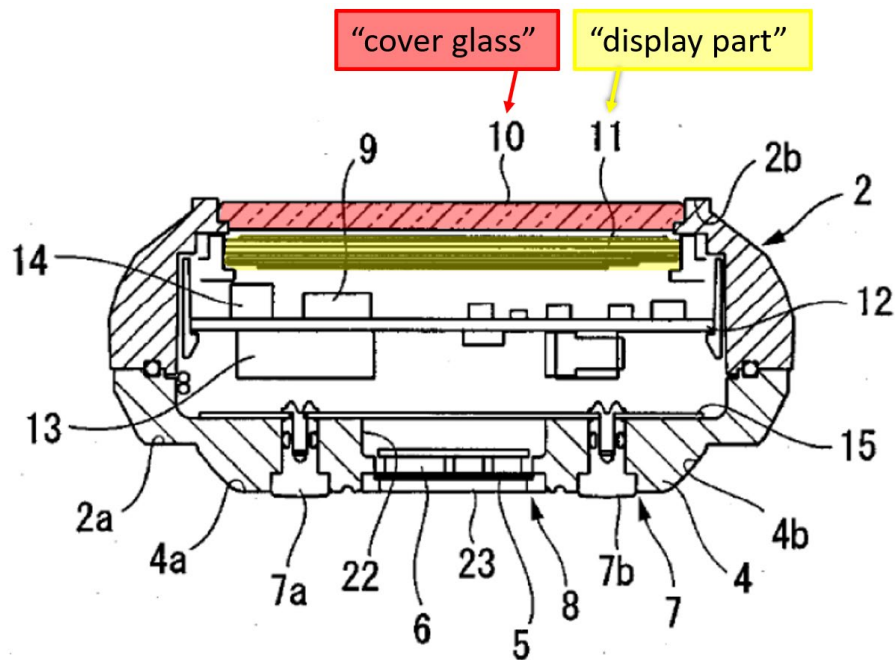
Kotanagi’s cover glass 10 is “fitted into the central portion of the upper surface 2b of the housing 2,” and the display part 11 is “disposed inside the cover glass 10.” EX1005 ¶48. Thus, the housing at least partially encloses the display:



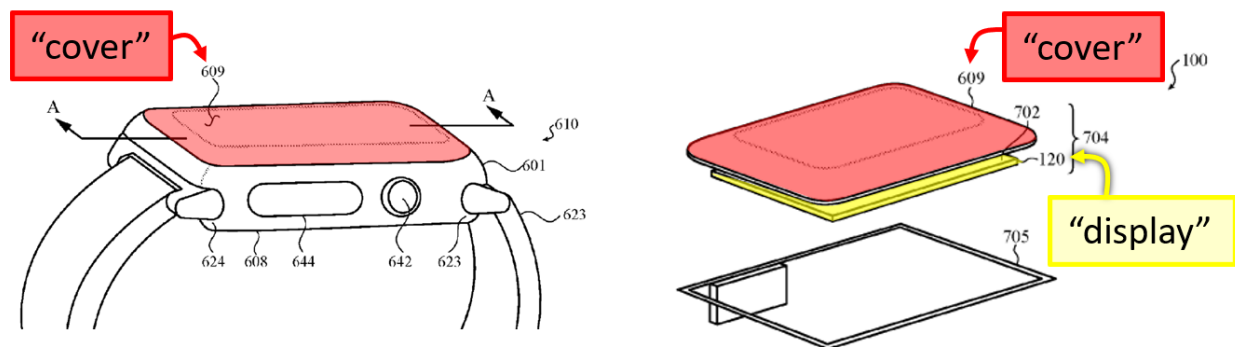
See EX1005 at 27 (Fig. 7). EX1003 ¶163.

d. [10d] “a front cover positioned over the display and defining at least a portion of a front exterior surface of the electronic watch;”

Kotanagi’s “cover glass 10” is part of the front exterior surface:



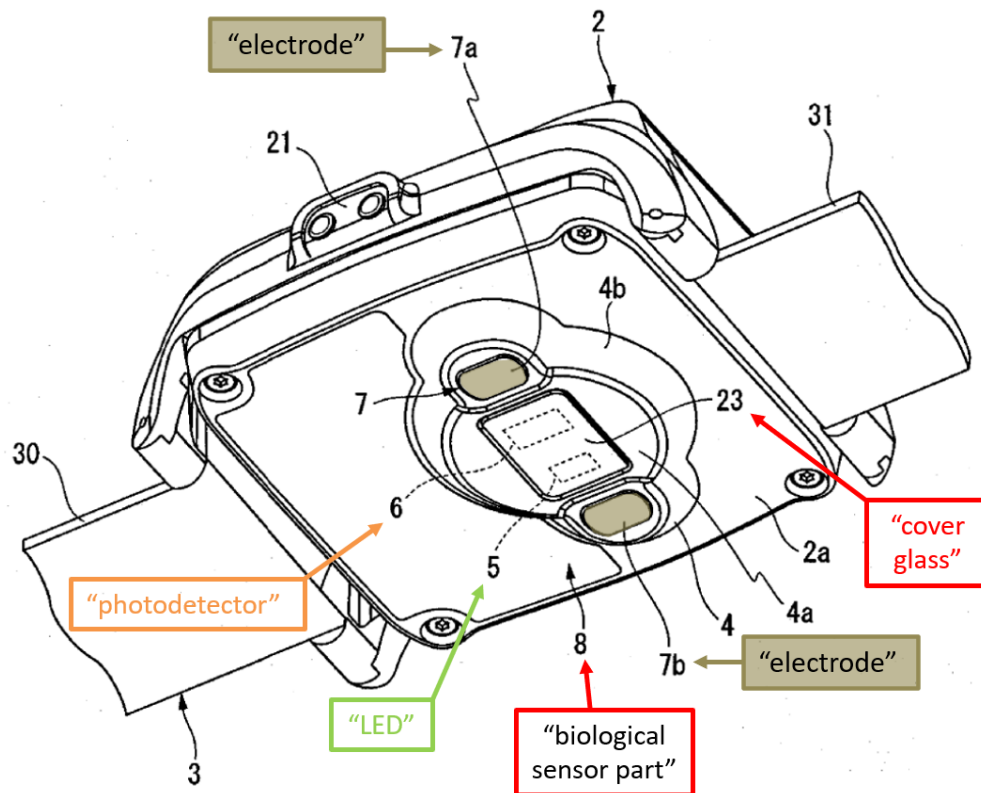
See EX1005 at 27 (Fig. 7). The cover glass 10 is positioned “over” the display 11 in Kotanagi’s figure above. This is consistent with the ’483 patent’s display, which is also under a cover glass in the opening:



See EX1001 at 13–14 (Figs. 6, 7). Accordingly, Kotanagi teaches this limitation.
 EX1003 ¶¶164–165.

- e. [10e] “a biosensor module defining at least a portion of a rear exterior surface of the electronic watch opposite the front exterior surface, the biosensor module comprising:”

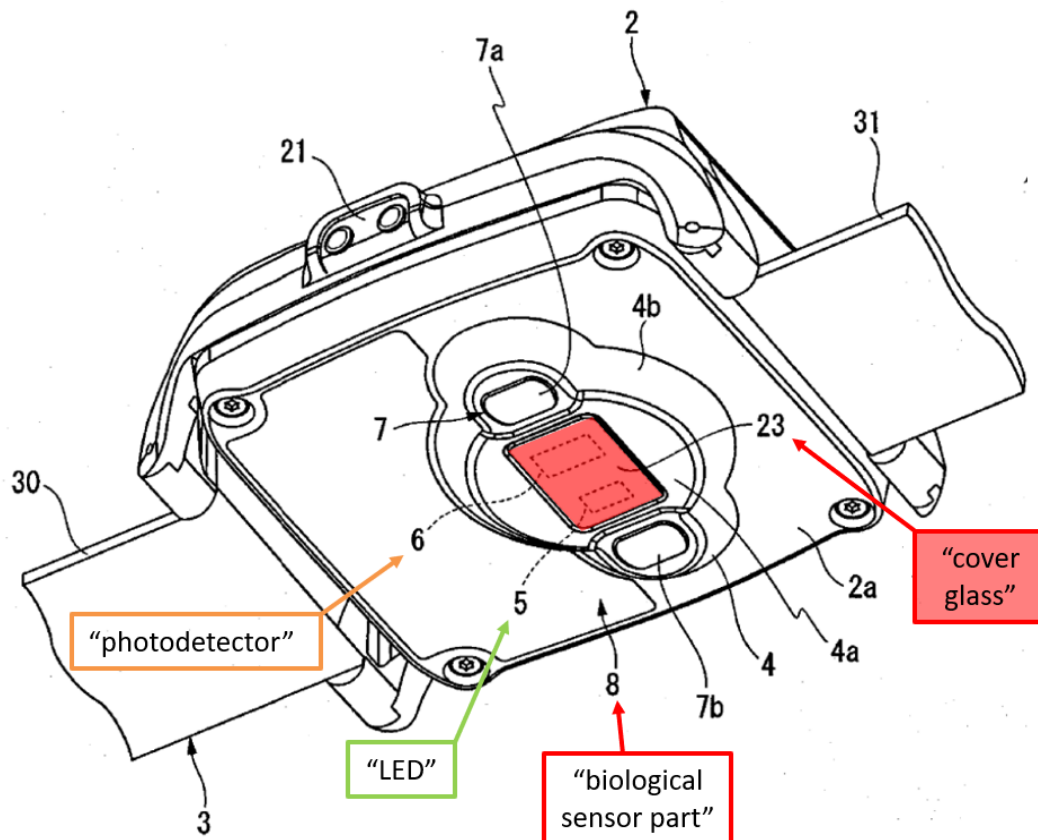
Claim limitations [10e]–[10i] specify that the '483 biosensor module comprises a rear cover, an optical sensor, and electrodes. Kotanagi's biological sensor includes a rear cover glass 23, optical components (photodetector 6 and LED 5), and electrodes 7a and 7b. This biosensor module is located on, and helps define, the rear exterior surface of Kotanagi's device:



EX1005 at 26 (Fig. 5). EX1003 ¶166.

f. [10f] “a rear cover defining an optically transparent window;”

Consistent with the construction in § I(F)(1) above, Kotanagi teaches a rear “glass cover 23” that operates as an optically transparent window for the biological sensor: “LED 5 and the PD 6 are disposed adjacent to one another . . . so as to touch the inside of the glass cover 23.” EX1005 ¶55. The cover is optically transparent because the LED emits light through it and “PD 6 can receive reflected light corresponding to the pulsation of arteries.” *Id.* ¶65.

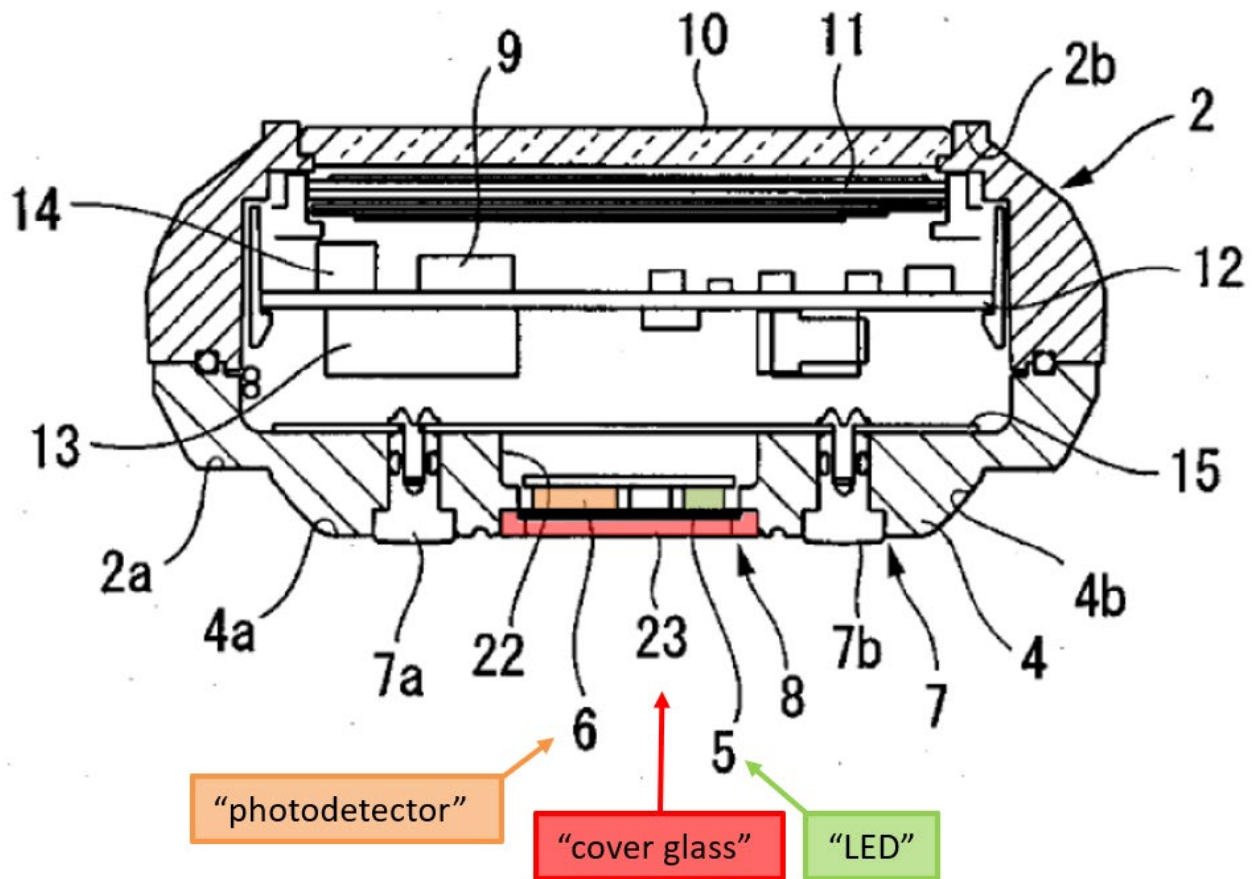


See *id.* at 26 (Fig. 5). EX1003 ¶167.

g. [10g] “an optical sensor positioned below the optically transparent window;”

As noted for limitation **[10f]**, Kotanagi’s “LED 5 and the PD 6 are disposed adjacent to one another . . . so as to touch the inside of the glass cover 23.”

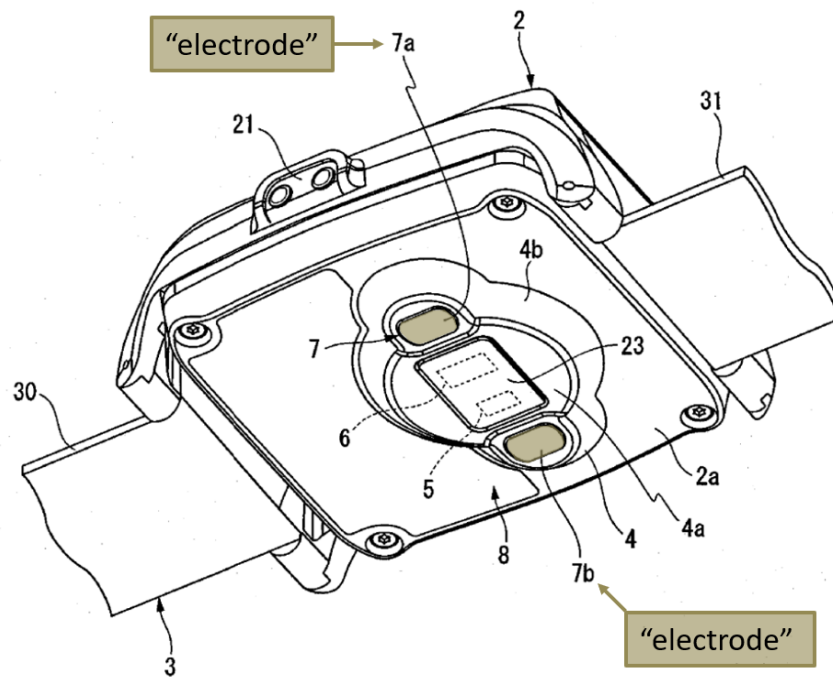
EX1005 ¶55. Thus, the LED and PD are positioned “below” the cover glass 23.



See EX1005 at 27 (Fig. 7). EX1003 ¶168.

- h. [10h] “a first electrode positioned along the rear exterior surface of the electronic watch; and a second electrode positioned along the rear exterior surface of the electronic watch; and”**

Kotanagi teaches a pair of rear surface electrodes. EX1005 ¶¶59, 86.



See id. at 26 (Fig. 5). EX1003 ¶169.

- i. [10i] “a third electrode positioned along a side of the electronic watch, wherein:”**

As noted for limitation [1j], the combination of Kotanagi and Coppola teaches a third electrode positioned along a side of the biosensing watch. EX1003 ¶¶170–177.

- j. [10j] “the electronic watch is configured to measure a first physiological parameter of a wearer using the optical sensor; and”

As noted for limitation [1k], Kotanagi teaches measuring a first physiological parameter (e.g., pulse rate), with its optical sensor. EX1003 ¶¶178–179.

- k. [10k] “the electronic watch is configured to measure a second physiological parameter using the first electrode, the second electrode, and the third electrode.”

As shown for limitations [1l], [2c] and [2d], Kotanagi in view of Coppola teaches the measurement of an ECG with a first, second and third electrode. *See also supra* note 8 (Many watches have used three or more electrodes for ECG measurement). EX1003 ¶¶180–185.

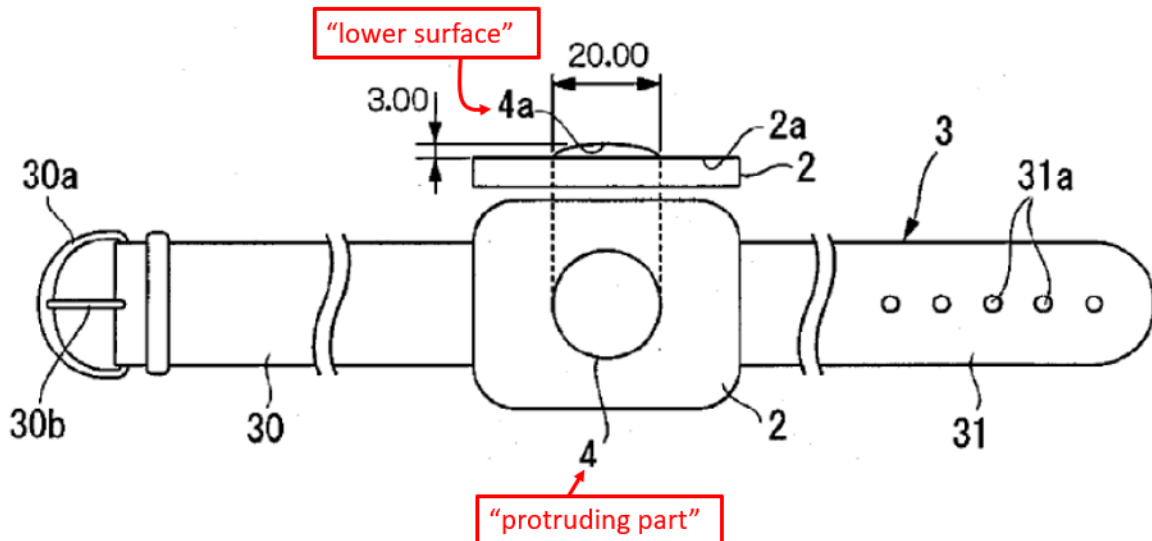
l. Motivation to Combine Kotanagi and Coppola

A POSITA would have been motivated to combine the teachings of Kotanagi and Coppola at least for the reasons in § IV(A)(1)(m). Further motivations to combine are provided throughout this petition. EX1003 ¶186.

6. Dependent Claim 11

Claim 11 depends from Claim 10 and adds “**wherein the rear cover defines a convex exterior surface.**”

As noted for limitation [1g], Kotanagi teaches the cover can form or comprise part of a convex protrusion: “Further, a curved surface may be formed from the center toward the outer edge of the lower surface 4a of the protruding part 4, as illustrated in FIG. 10.” EX1005 ¶¶80.

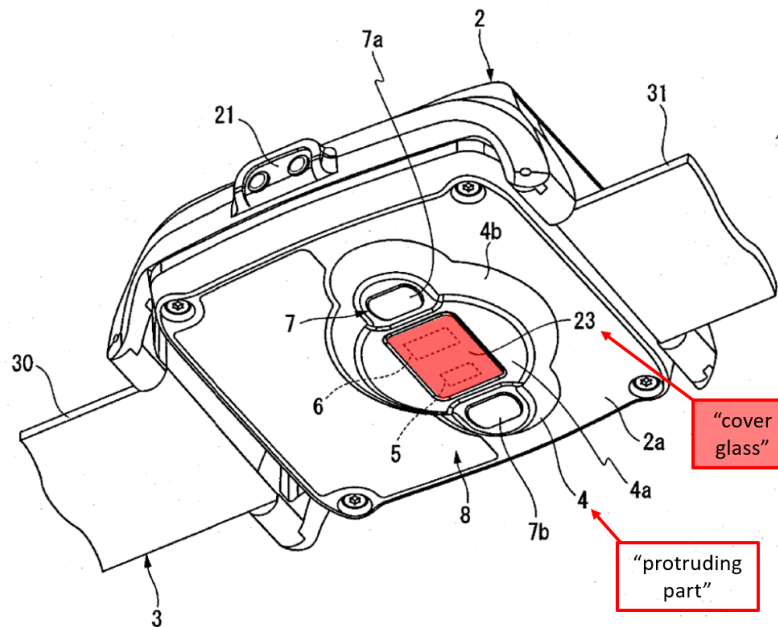


See EX1005 at 28 (Fig. 10). A POSITA would have understood from Kotanagi’s Figure 10 that the protruding part can form a convex “cover glass” that spans the through-hole 22. *Id.* at 28. Kotanagi states that its protruding part causes the body to “deform[] smoothly,” which “enhances the adherence.” EX1005 ¶¶35, 80. EX1003 ¶¶187–189.

7. Dependent Claim 12

Claim 12 depends from Claim 10 and adds “**wherein the optically transparent window is located within a portion of the rear cover that defines the convex exterior surface.**”

As discussed and illustrated above with regard to Claim 11, Kotanagi teaches a convex exterior surface. A POSITA would have understood from Figure 10 that the “protruding part 4” of Figure 10 is formed from Kotanagi’s cover glass 23. In a different embodiment, Kotanagi shows a window in protruding part 4:



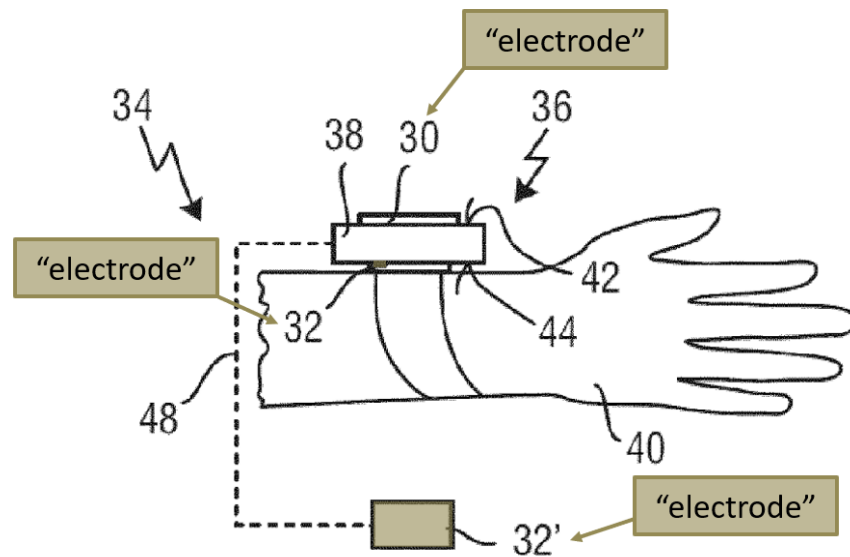
See EX1005 at 26 (Fig. 5). Moreover, Kotanagi teaches that the “biological sensor part” (which includes cover glass 23) “is disposed on a lower surface of the protruding part.” EX1005 ¶7. As Kotanagi’s Figure 10 illustrates, this “lower surface” can be convex. Thus, Kotanagi teaches these limitations. EX1003 ¶¶190–192.

8. Dependent Claim 13

Claim 13 depends from Claim 10 and adds “**wherein the first electrode, the second electrode, and the third electrode are part of an electrocardiograph**

sensing system.”

As discussed for limitations [10i]–[10k] (referencing [1j]–[1l], [2c]–[2d]), Kotanagi in view of Coppola teaches an ECG measurement with a first, second, and third electrode.



See EX1009 at 28; EX1020 at 25 (Fig. 3). See EX1009 8:23–25; EX1020 6:13–15 (“electrocardiography ECG unit comprising at least a first and a second electrode.”) Thus, the electrodes would all be part of the claimed electrocardiograph sensing system. EX1003 ¶194.

Consistent with discussion of limitations [1j]–[1l], [2c]–[2d], and the motivations provided in § IV(A)(1)(m), a POSITA would have combined Kotanagi and Coppola to use three electrodes for ECG measurement, not only based on the teachings of Kotanagi and Coppola—e.g., to gain “deep insights into the cardiac

cycle” EX1009 8:26–27; EX1020 6:16–17—but also to provide multi-functionality, reliability (e.g., through redundancy), improved signal strength, and an ergonomic design (a side electrode is convenient to touch). EX1003 ¶195.

9. Dependent Claim 14

Claim 14 depends from Claim 10 and adds “**wherein the first physiological parameter is a heart rate.**”

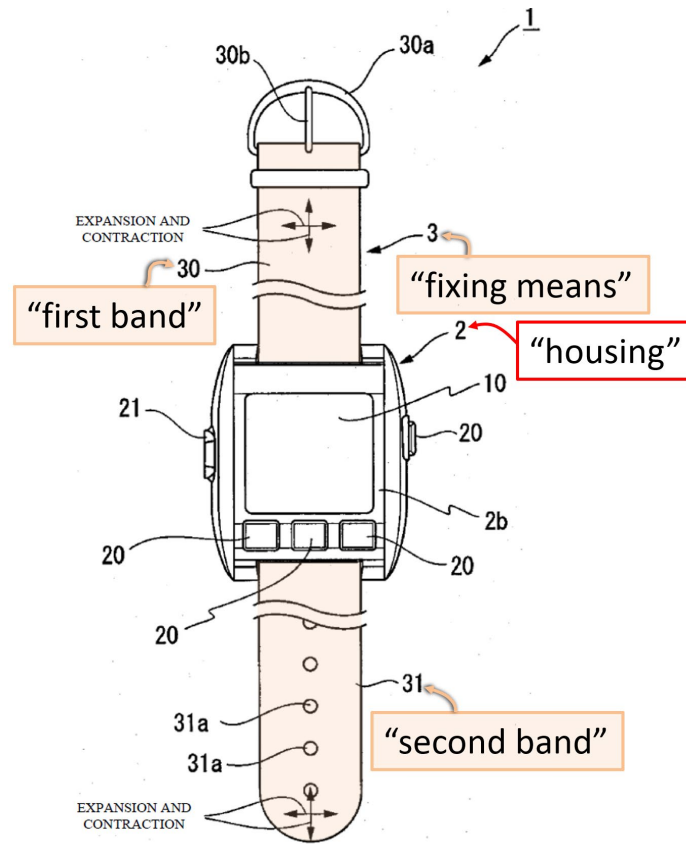
As noted for limitations [1k] and [10j] Kotanagi teaches measuring a first physiological parameter with its optical sensor, as light is emitted from the LED 5, partially absorbed by hemoglobin in blood vessels, and partially reflected back to the PD 6, which “generates a pulse signal.” EX1005 ¶65. Data processing part 9 converts the pulse signal into a “pulse rate.” *Id.* ¶66. A POSITA would have known that pulse rate is the same as heart rate in this context, as pulsing fluctuations in blood flow result from and are a manifestation of heart contractions. EX1003 ¶¶196–197.

10. Independent Claim 16

- a. [16a] “A wearable electronic device comprising: a housing;
a band attached to the housing and configured to couple the
wearable electronic device to a user;”**

Kotanagi describes a “biological information measuring device 1 [that] includes a housing (main body) 2 . . . and a fixing means 3 for mounting the

housing 2 to the wrist.” EX1005 ¶45. “The fixing means 3 has a first band 30 and a second band 31 having base end sides that are attached to the housing 2 to enable mounting to the wrist.” (*id.* ¶60).



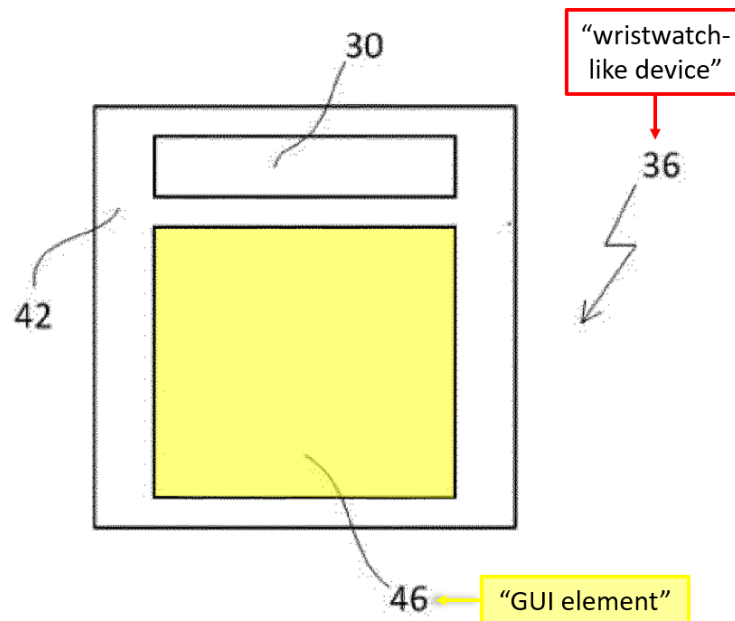
See *id.* at 23 (Fig. 1). EX1003 ¶198.

b. [16b] “a touch-sensitive display positioned at least partially within the housing;”

Kotanagi teaches a “liquid crystal display device” that may display information based on “input from each button 20.” EX1005 ¶¶50–51.

In the same field of endeavor, Coppola teaches that its wristwatch-like device 36 has “a graphic user interface (GUI) element 46, which enables an

interaction between the system 34 and the user.” EX1009 16:6–7; EX1020 13:33–34.



See EX1009 at 28; EX1020 at 25 (Fig. 4A). This can be “in the form of a **touch screen**, which enables easy device-user-interaction.” EX1009 8:14–15; EX1020 6:4–5 (emphasis added). The GUI element enables use “as a smart watch” to display the “internet, SMS (Short Message Service)” or other services. EX1020 14:7–10; EX1009 16:14–17. EX1003 ¶¶199–201.

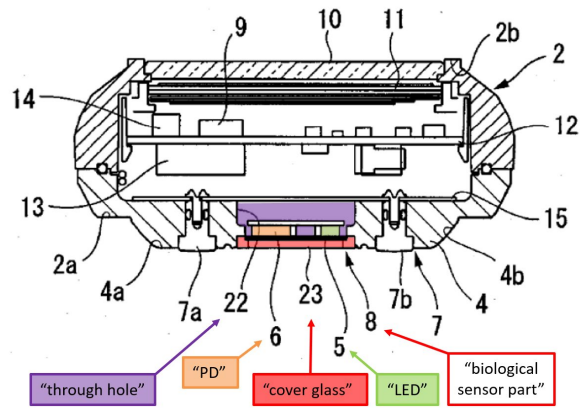
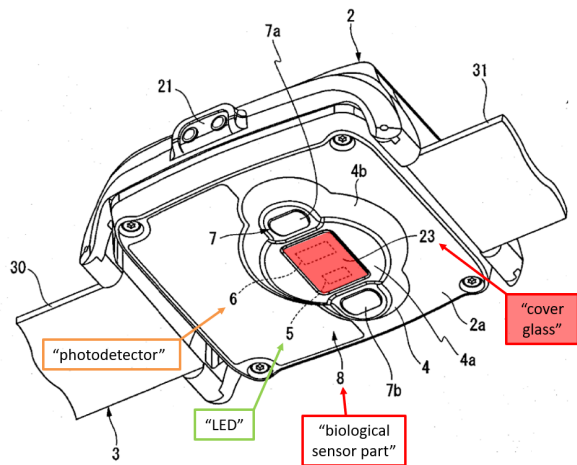
A POSITA would have been motivated to incorporate a touchscreen in Kotanagi as it reduces the need to provide buttons on the front side of Kotanagi’s device, increase the size of Kotanagi’s screen (without expanding device size), reduce the number of separate components and moving parts in Kotanagi’s device

(reducing mechanical failure risk), and provide additional functionality not enabled by hardware buttons alone (a touchscreen or virtual “buttons” can be programmed for varying situations and functions, while the larger screen can provide context for these situations and functions). Further, touchscreens were known in the art,¹⁴ and this combination provides “familiar elements” that do “nothing more than yield predictable results.” *See KSR*, 550 U.S. at 416. EX1003 ¶202.

- c. **[16c] “a rear cover positioned at least partially within a rear opening defined along a rear portion of the housing, the rear cover defining at least a portion of a rear exterior surface of the wearable electronic device and having an optically transparent portion;”**

Consistent with the discussion of limitation [1f], Kotanagi teaches a rear cover glass 23 within and closing off “through-hole 22” to define a portion of the rear exterior surface:

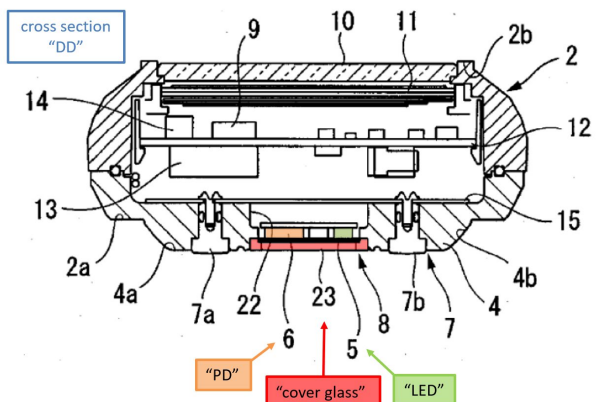
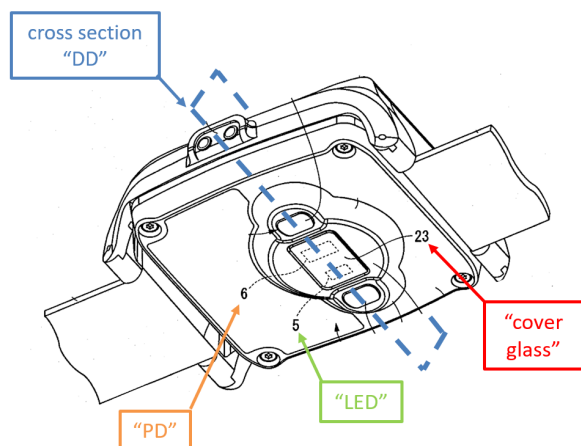
¹⁴ *See* EX1041 [0020] (biosensing watch with a “touch screen display”); EX1016 [0046] (biosensing watch with “touch sensitive screen inputs”); EX1011 [43]–[44] (biosensing watch with a “touch display”).



See EX1005 at 26, 27 (Figs. 5 and 7). Kotanagi’s cover glass 23 is optically transparent because it allows the LED 5 to emit light toward the living body, and through it, the photodetector 6 receives “reflected light corresponding to the pulsation of arteries.” *Id.* ¶65. EX1003 ¶¶203–204.

- d. [16d] “an optical sensor positioned within the housing and configured to emit an optical signal through the optically transparent portion;”

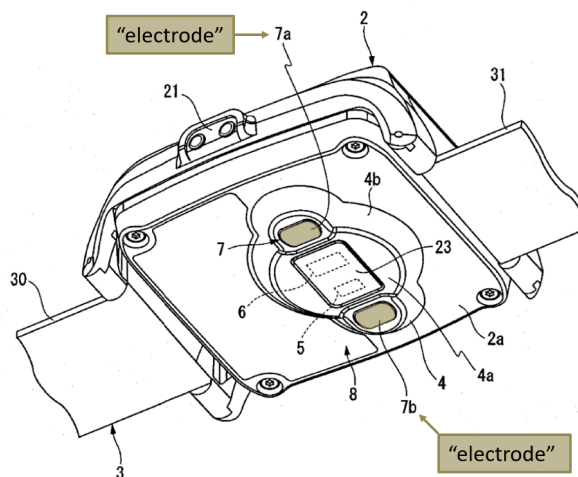
Kotanagi’s LED “touch[es] the inside of the glass cover 23.” EX1005 ¶55.



See EX1005 at 26, 27 (Figs. 5 and 7). Consistent with the explanation of limitation [1h] and dependent Claim 6, this LED emits through the cover glass. See EX1005 ¶46. EX1003 ¶¶205–206.

- e. [16e] “a first electrode positioned along the rear exterior surface of the wearable electronic device; a second electrode positioned along the rear exterior surface of the wearable electronic device; and”

As noted for limitation [1i], Kotanagi’s rear electrodes 7a and 7b detect skin contact using a “potential difference” between them. EX1005 ¶59.



See *id.* at 26 (Fig. 5). EX1003 ¶207.

- f. [16f] “a third electrode positioned along a side of the wearable electronic device, wherein:”

As shown for limitation [1j], Kotanagi in view of Coppola teaches a third

electrode on the side of the wearable device. EX1003 ¶¶208–214.

- g. [16g] “the wearable electronic device is configured to measure a first physiological parameter using the optical sensor; and”**

As shown for limitation [1k], Kotanagi teaches a pulse rate measurement with its optical sensor. EX1003 ¶215.

- h. [16h] “the wearable electronic device is configured to measure a second physiological parameter using the first electrode, the second electrode, and the third electrode.”**

As shown for limitation [1l], Kotanagi in view of Coppola teaches an ECG measurement with a first, second, and third electrode. Thus, a POSITA would have found it obvious to measure a second physiological parameter, such as an ECG, with a first, second, and third electrode. EX1003 ¶216.

i. Motivation to Combine Kotanagi and Coppola

A POSITA would have been motivated to combine Kotanagi and Coppola, and expected success, for the reasons stated above in § IV(A)(1)(m). Further motivations are provided throughout this petition. EX1003 ¶217.

11. Dependent Claim 17

Claim 17 depends from Claim 16 and adds **“the first electrode, the second electrode, and the third electrode are part of an electrocardiograph sensing**

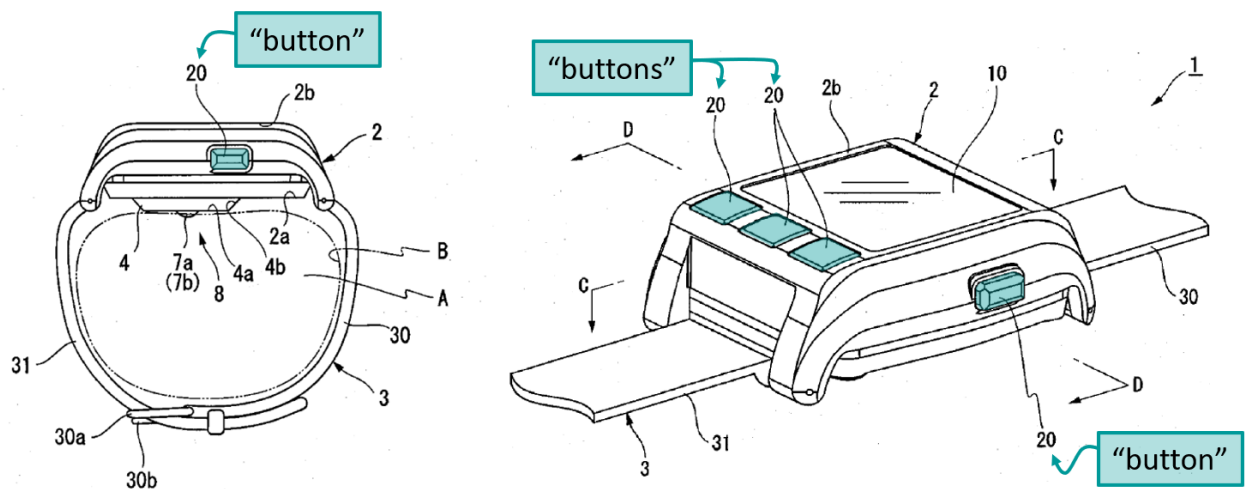
system; and the second physiological parameter is an electrocardiogram.”

These limitations are obvious based on the analysis for limitations [11], [2c] and [2d], as Kotanagi in view of Coppola teaches the measurement of an electrocardiogram with a first, second, and third electrode. An electrocardiogram is measured with an electrocardiographic sensing system. Thus, a POSITA would have found that Kotanagi in view of Coppola teaches these limitations. EX1003 ¶219.

12. Dependent Claim 18

Claim 18 depends from Claim 16 and adds **“further comprising an input device positioned along a side of the housing and configured to receive at least one of a rotational input or a translational input.”**

As shown for Claims 3 and 5 above, Kotanagi teaches a translational input device (button 20) on the side of the housing. EX1005 ¶52.



See EX1005 at 24, 25 (Figs. 2 and 4). EX1003 ¶221–223.

13. Dependent Claim 19

Claim 19 depends from Claim 16 and adds **“wherein the rear cover defines a convex exterior surface.”**

As shown for Claim 11, Kotanagi teaches a rear cover that defines a convex exterior surface. EX1003 ¶225.

14. Dependent Claim 20

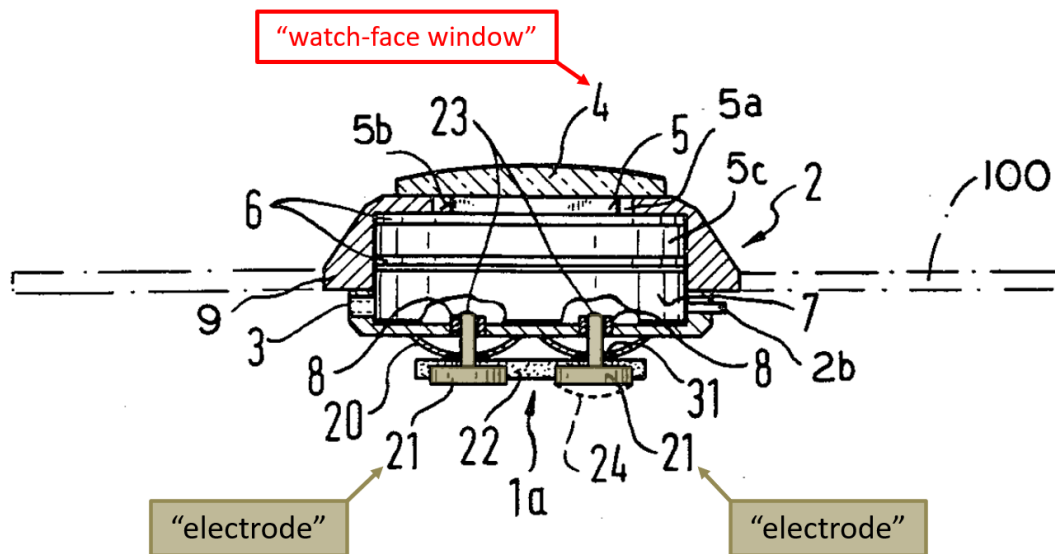
Claim 20 depends from Claim 16 and adds **“wherein the optical sensor comprises: an optical emitter configured to emit the optical signal through the optically transparent portion; and an optical receiver configured to receive a reflected portion of the optical signal through the rear cover.”**

These limitations are obvious based on the analysis for Claim 6, including the figure (elements positioned to transmit through cover glass 23). EX1003 ¶227.

I. Ground 2: Claims 1–3, 5–6 and 10–14 are unpatentable because they would have been obvious over Kotanagi in view of Schmid.

This Ground applies Kotanagi identically to the analysis provided above in Ground 1 for Claims 1–3, 5–6 and 10–14, except that Schmid is used to teach a third electrode (limitations [1j], [10i]) in order to measure a second physiological parameter (limitations [1l], [10k]), namely an electrocardiogram (e.g., claims 2, 13). EX1003 ¶228.

Schmid, which was published in 1983, teaches a “heart-frequency measuring assembly” in a “wristwatch housing or case and which contains the electrodes in an electrode set or a plurality of such electrode sets.” EX1029 5:3–7.



See EX1029 at 2 (Fig. 1). Schmid teaches significant benefits for EKG measurements using such a device. These include analyzing and diagnosing heart conditions, and monitoring cardiac activity. EX1029 1:14–16, 2:5–9. A POSITA would have found it obvious to enhance Kotanagi’s biosensing features with EKG measurements to provided the added benefits explained in Schmid. EX1003 ¶¶229–230.

Schmid teaches that two closely-spaced electrodes and a third, reference electrode can be used for EKG measurement:

According to the invention as described, two electrodes

(measurement or input electrodes) and the neutral or reference electrode can be disposed in close proximity with measurement results which nevertheless are at least as precise as the electrodes heretofore used for EKG measurements inspite [sic] of the many times greater spacing employed with the conventional electrodes.

EX1029 4:15–22.

Schmid further shows in figures 5–13 that active electrodes (“A” or “33” and “34”) and a neutral (ground) electrode (“N” or “32”) may be arranged in “various configurations” (EX1029 6:36), some of which are shown below:

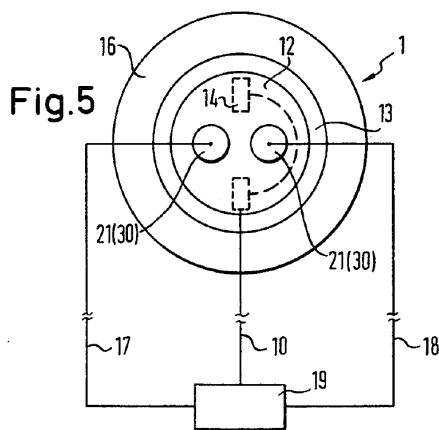


Fig. 5

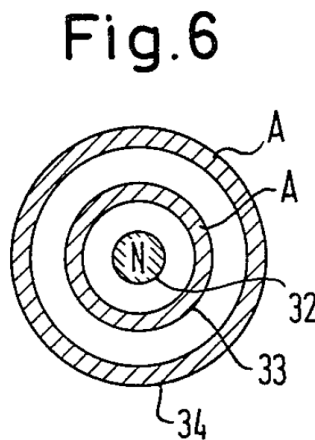


Fig. 6

Fig. 7

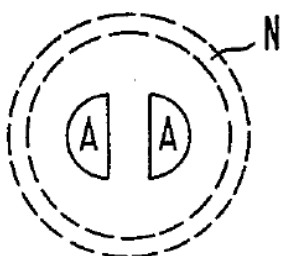


Fig. 9

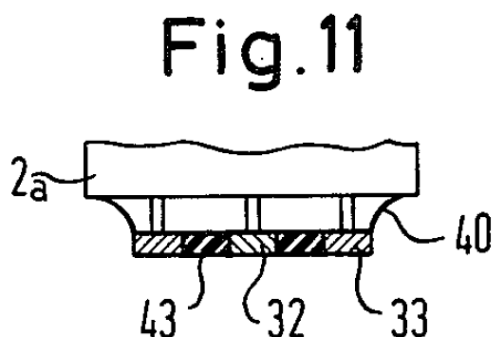
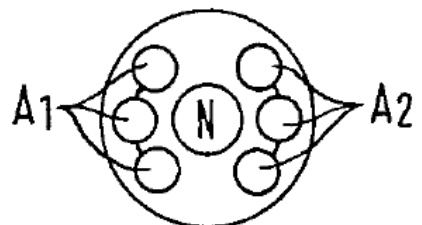


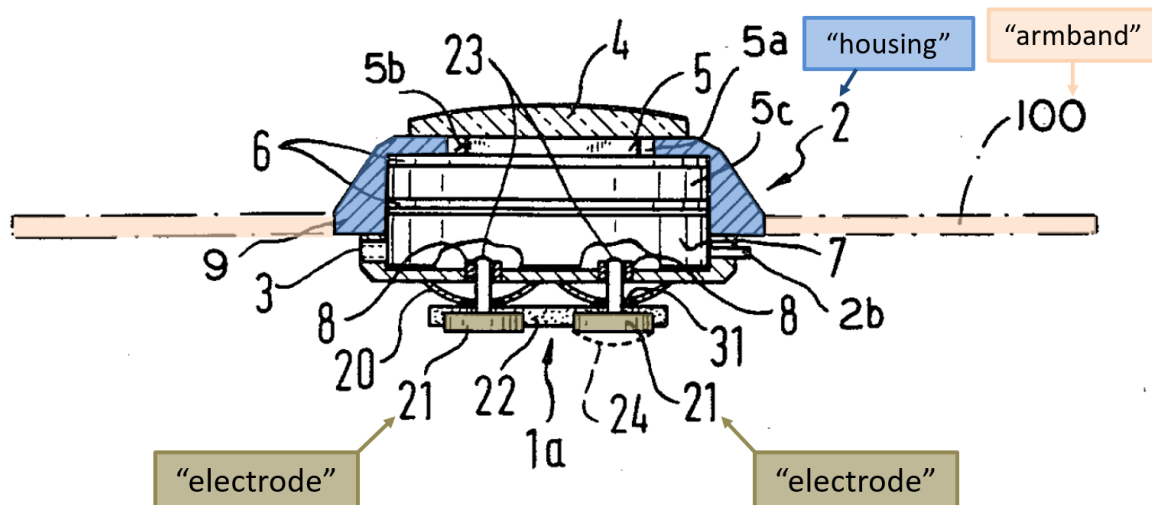
Fig. 11

Fig. 13



Id., Figs. 5, 6, 7, 9, 11, 13. EX1003 ¶¶231–232.

The reference electrode can be formed by “[t]he armband 100 and/or the housing 2” (EX1029 5:20–22), in which case “ring 13 can be ... dispensed with entirely.” EX1029 8:24–26. Because the housing forms the side of the watch, which connects to the armband, putting the reference electrode in either place locates a third electrode at the watch side, as claimed. The figure below shows how the housing 2 and armband 100 are located at the side of the watch.



See EX1029 at 2 (Fig. 1).

Thus, a POSITA would have found obvious an EKG measurement with three electrodes, including a third neutral or reference electrode on the side of the watch, in view of Kotanagi and Schmid. EX1003 ¶¶233–234.

a. Motivation to Combine Kotanagi and Schmid

Prior to September 2014, a POSITA would have been motivated to combine Kotanagi and Schmid as they are in the same field of endeavor of biosensing watches. This person would have expected to succeed in adding a third electrode because, for example, Kotanagi already teaches electrodes to measure an electrical potential and that “the electrodes need not be a pair, and a plurality of electrodes, for example, may be provided so that contact can be detected based on the potential difference between each of the electrodes.” EX1005 ¶14. *See Id.* ¶86 (plurality of electrodes).

In view of Schmid and the many three-electrode biosensor watches (e.g., *supra* note 8), a POSITA would have also expected success and found it obvious to provide three electrodes in Kotanagi’s watch at least to: 1) analyze and diagnose heart conditions and monitor cardiac activity (EX1029 1:14–16, 2:5–9); 2) improve signal to noise (e.g., *supra* note 9) ratio with backup or duplicate measurements; 3) provide additional sensors as a failsafe if one stops working; 4) provide multiple contact points that are easier to access; 5) allow for different measurements (EKG and skin conductance) to enhance the features and datatypes available to the user; 6) provide a reference electrode to measure the voltage between the two other

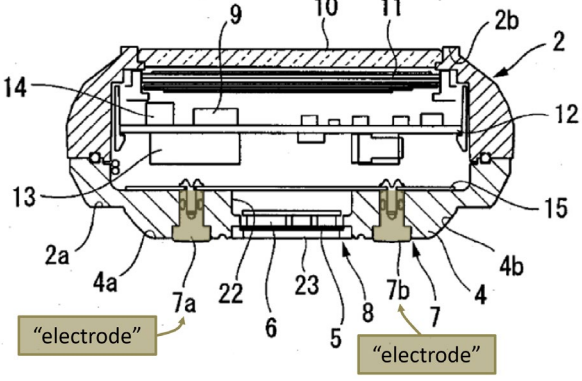
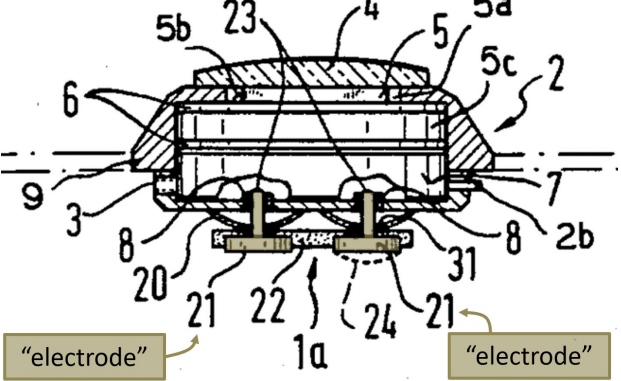
conductive areas; and/or 7) provide additional contact points for continuous¹⁵ skin contact during EKG measurements as the watch is bumped, shifted, or jostled (such as during exercise). A POSITA would have expected success in adding an electrode to the side based on many similar, known watch electrode arrangements.¹⁶ EX1003 ¶¶235–236.

Schmid teaches EKG measurement via electrodes disposed in “close proximity” and which “are at least as precise as the electrodes heretofore used for EKG measurements inspite [sic] of the many times greater spacing employed with the conventional electrodes.” EX1029 4:17–22. Thus, a POSITA would have been motivated to use Schmid to utilize a compact EKG configuration. EX1003 ¶237.

A POSITA would have expected success because the configurations of electrodes in Schmid and Kotanagi are very similar:

¹⁵ See *supra* n. 10.

¹⁶ See EX1008 at 19 (Claim 15, three configurations); EX1027 Fig. 2 (electrodes in top, bottom, band); EX1029 at Figs. 1, 5–13 (electrodes N, A, A1, A2, 13, 32–34); EX1030 Figs. 1, 2 (electrodes 4a and 4b); EX1031 Fig. 1 (electrodes 14, 16, and 18); EX1033 Fig. 5 (conductive areas 515, 560 and 561); EX1034 [0237] (electrode on band, back); EX1035 Figs. 2a, 2b (electrodes 122, 124, 126); EX1008 Figs. 1a, 1b (electrodes 16, 15).

Kotanagi	Schmid
 See EX1005 at 27 (Fig. 7).	 See EX1029 at 2 (Fig. 1).

Both have two skin-contact (measurement) electrodes on the rear watch surface. A POSITA would have found it simple and feasible to embed an electrode in the existing housing or armband of Kotanagi. EX1003 ¶¶238–239.

This motivation applies equally to all the claims rejected under Ground 2, as Schmid is applied instead of Coppola to teach a third electrode on the side of the watch for an ECG measurement in claims 1–6, 8, and 10–14. Further motivations are provided throughout this petition. EX1003 ¶240.

J. Ground 3: Claim 4 is unpatentable because it would have been obvious over Kotanagi in view of Coppola and Tran

15. Dependent Claim 4

Claim 4 depends from Claim 1 and further adds **“wherein the second physiological parameter is a galvanic skin response.”**

Kotanagi’s “pair of electrodes 7a and 7b” use a current to measure whether

the watch is in contact with the user's skin based upon a "potential difference" (or voltage, V) between the electrodes. EX1005 ¶59.

Tran teaches that a two-electrode skin measurement also provides skin conductance, or galvanic skin response ("GSR"), based on a simple calculation using a known value. EX1034 [0034], [0280]. Tran is highly analogous to Kotanagi, teaching a housing with "bioelectric contacts," e.g., for a "wristwatch." *Id.*

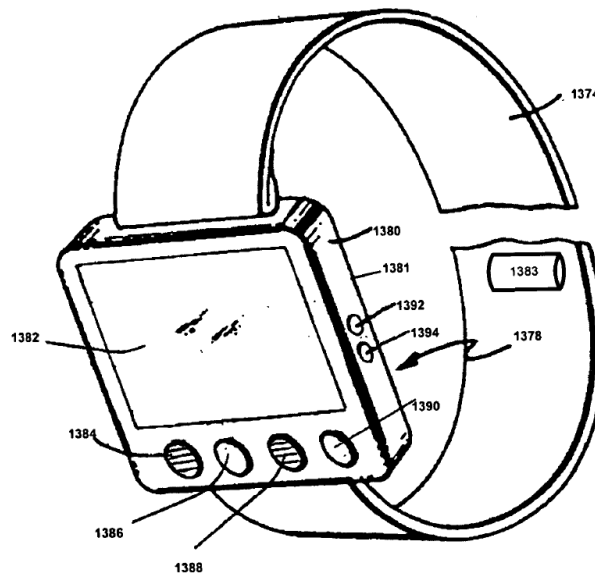


FIG. 6A

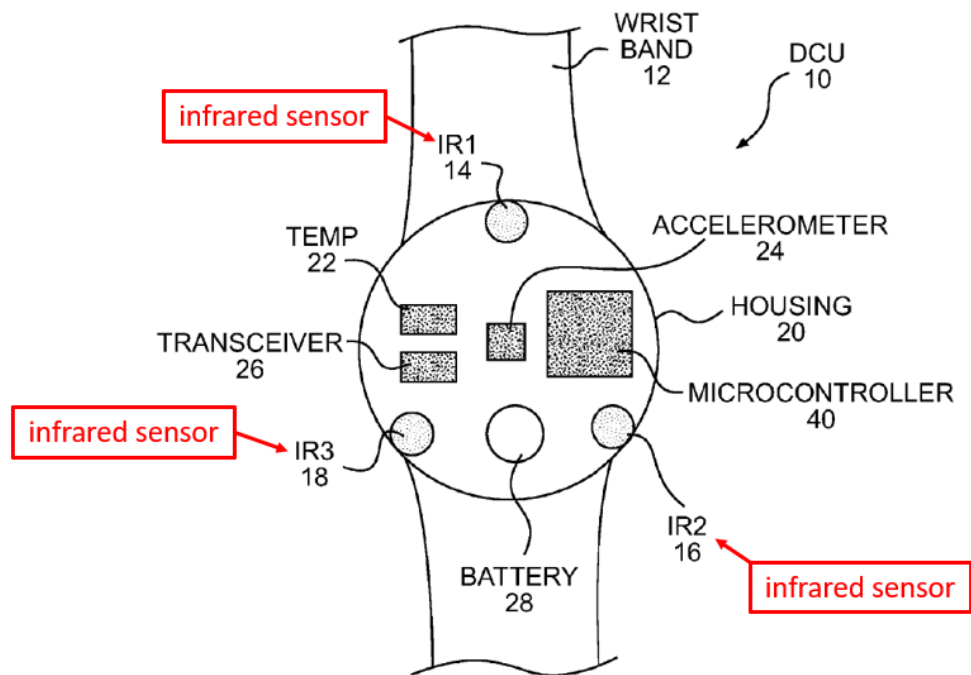
EX1034 at 5. Like Kotanagi, Tran teaches "two electrodes on the wrist watch" to measure a "voltage signal from the surface of the body," but it does so "in terms of impedance." *Id.* [0260]. Tran teaches that one or more Galvanic Skin Response (GSR) sensors use electrodes to measure and "calculate the skin resistance." EX1034 [0280]. EX1003 ¶¶242–244.

A POSITA would have known how impedance (resistance, or R , in a DC circuit) relates to voltage through Ohm's law, $I=V/R$, and this law is also stated in Tran: "Ohm's Law: current in a circuit is directly proportional to voltage and inversely proportional to resistance in a DC circuit." EX1034 [0259] Because Kotanagi's device measures voltage between its electrodes (EX1005 ¶59), a current (I) would have been known or readily discoverable. A POSITA would have understood from Tran that galvanic skin response simply measures skin conductance (measured using resistance), a simple measurement to make using Kotanagi's existing skin-electrode circuit. Thus, based on Tran, a POSITA would have simply divided Kotanagi's existing potential difference measurement (V) by the known current (I) to calculate the skin resistance, or GSR, between its two electrodes, without making any modifications to Kotanagi's existing two-electrode structure. EX1003 at ¶245.

K. Ground 4: Claim 15 is unpatentable because it would have been obvious over Kotanagi in view of Coppola and further in view of Kateraas.

Claim 15 depends from Claim 10 and adds **"wherein the rear cover comprises sapphire."**

Like Kotanagi, **Kateraas** (EX1014), which published in 2012, describes a biosensing wristwatch:



See EX1014 at 2 (Fig. 1).

Kateraas teaches that sapphire can form a “window” of “infrared transmissive or transparent material . . . to allow radiation emitted from infrared sensors 14, 16, and 18” to pass out of the device and “impinge upon the underside of the user’s wrist” and allow “infrared radiation reflected or emitted from the user’s skin” to pass into the device via the sapphire window. EX1014 [0059]. “Such infrared transmissive or transparent materials” for the window “may include, e.g., germanium, zinc selenide, **sapphire**, IR glass, IR polymer, barium fluoride, calcium fluoride, and combinations thereof.” *Id.* (emphasis added). EX1003 ¶247–248.

a. Motivation to Combine Kotanagi, Coppola, and Kateraas

The '483 patent explains that “cover glass” is a term of art and is often used generically, “regardless of the material.” EX1001 23:26–29. Accordingly, a POSITA would have considered various materials for the rear cover based on the '483 patent's use of this generic phrase. Because Kotanagi's optical sensor features are intended to emit and receive similar radiation, to the same anatomical portion (wrist), for the same pulse sensing purpose taught by Kateraas, a POSITA would have looked to Kateraas for useful window materials and expected success in using sapphire for the cover glass 23. EX1003 ¶249.

Prior to September 2014, a POSITA would have been motivated to provide a sapphire rear cover, and expected success, because Kotanagi and Kateraas both teach light emission and reflection on the underside of a watch to measure the pulse rate of a user. Kotanagi teaches LED 5 for generating light and PD (Photodetector) 6 for receiving a pulse signal. EX1005 ¶46. Kateraas likewise teaches that “infrared sensors 14, 16, or 18 may provide robust data from which accurate pulse readings may be determined.” EX1014 [0032]. Further, Kateraas teaches that the cover of a biosensing module may include “sapphire, IR glass, IR polymer...” EX1014 [0059]. Since Kotanagi teaches cover glass 23 as a covering for a biosensor module, a POSITA would have found glass and sapphire obviously substitutable in view of the list of materials in Kateraas. Such a substitution would

have been a mere combination of familiar elements according to known methods that do no more than yield predictable results. *See KSR* at 416. EX1003 ¶250.

L. Ground 5: Claim 7 is unpatentable because it would have been obvious over Kotanagi in view of Coppola or Schmid and further in view of Fraser.

16. Dependent Claim 7

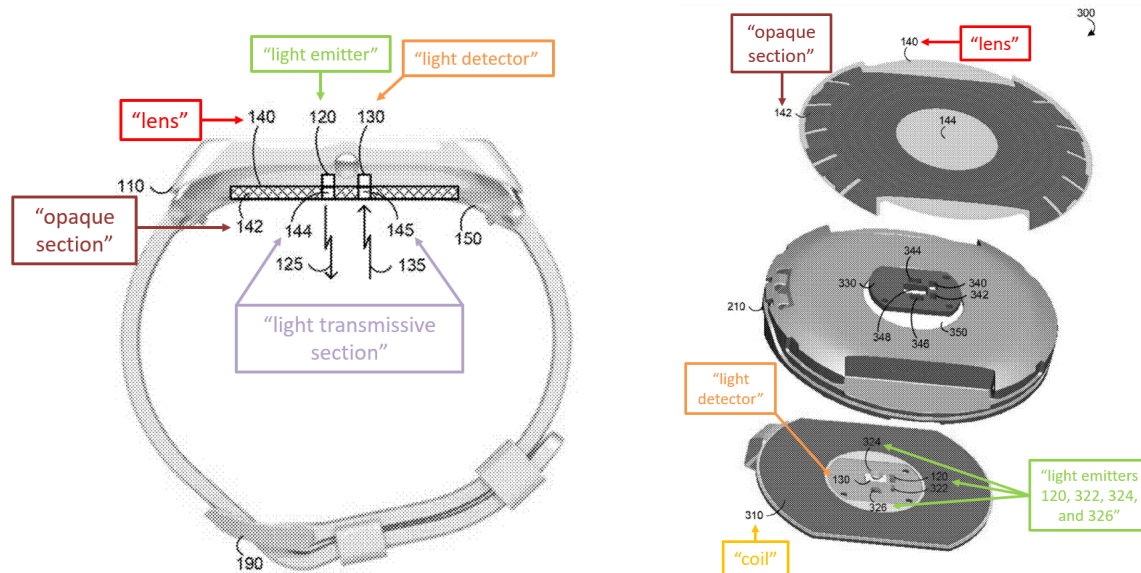
Claim 7 depends from Claim 1 and adds **“wherein: the optical emitter is a first optical emitter configured to emit light having a first wavelength; and the optical sensor further comprises a second optical emitter configured to emit light having a second wavelength different from the first wavelength.”**

Grounds 1 and 2 both use Kotanagi to demonstrate how Claim 1 is unpatentable, but for the third (ECG) electrode and related teachings, Ground 1 uses Coppola and Ground 2 uses Schmid.

This Ground applies Kotanagi, Coppola, and Schmid identically to the analyses provided above for Claim 1 under both Grounds 1 and 2. However, it adds the teachings of Fraser to Kotanagi for the further limitations of dependent Claim 7.

Kotanagi teaches an LED optical emitter, and in the same field of endeavor Fraser teaches that the skin-facing side of a biosensing watch may be used for

“photoplethysmography, pulse oximetry, and other biometric sensing” using an array of light emitters (120, 322, 324, 326). EX1041 [0016], [0027].



See EX1041 at 2, 4 (Figs. 1, 3).

Fraser teaches emitting different wavelengths via “a combination of red, infrared, and green light emitters.” EX1041 [0015]. Accordingly, Fraser teaches a red light emitter 120, an infrared light emitter 322, and two green light emitters 324 and 326. *Id.* [0024]. By using different wavelengths, the watch may probe different physiological parameters: “red and infrared light emitters can be used to detect blood oxygen saturation and a green light emitter can be used to detect heart rate.” *Id.* [0015]. At least by September 2014, based on Fraser’s disclosure, a POSITA would have been motivated to further modify Kotanagi (even after any modifications taught by Coppola or Schmid), to include a second optical emitter, to improve its optical sensing features (e.g., to determine blood oxygen saturation in

addition to pulse rate). Kotanagi already has a transparent cover facing the skin, with room to place additional small emitters near the existing optical components on the cover glass 23. EX1003 ¶¶252–255.

a. Motivation to Combine Kotanagi and Fraser

A POSITA would have wanted to combine Fraser with Kotanagi for various reasons. Both teach biosensing watches with similar shapes and rear biosensors. Kotanagi teaches the benefits of biosensing by determining pulse rate. Use of multiple wavelengths in a biosensing watch (as taught by Fraser) allows probing of additional physiological parameters. This is consistent with, and a natural extension of, Kotanagi's biosensing goals. A POSITA would have expected success because, like Kotanagi, Fraser teaches that its "wrist worn device" may be used to measure "heart rate" via a photoplethysmography measurement. EX1005 ¶1; EX1041 [0015]–[0016]. By September 2014, a POSITA would have known that additional biometric data (e.g., how well the lungs are working to insert blood into the blood stream) is much more helpful than simply knowing how quickly the heart is beating—especially if the blood it is circulating does not have sufficient oxygen. Gaining this significant medical information would have been a strong reason to add one or more new emitters (e.g., red and green, as taught by Fraser.) EX1041 [0015]. Thus, a POSITA would have been motivated in September 2014 to add at least one LED, or use the color emitters of Fraser, to additionally measure

blood oxygen saturation. Further, multiple emitters can aim or emit differently, they can work together to increase signal strength, etc. A POSITA would have found multiple emitters desirable for all these reasons. EX1003 ¶256.

Fraser also teaches, like Kotanagi, that its biosensing watch may be charged in a “contactless” or wireless manner. EX1005 ¶53, EX1041 [0026]. This similarity would have added to the expectation of success by a POSITA in combining them. For example, Fraser shows how wireless charging structures can be coiled around optical elements and provide desired functionality despite being closely adjacent to the optical elements. EX1003 ¶257.

b. Motivation to Combine Coppola with Kotanagi and Fraser

Ground 1 provides reasons for combining Kotanagi and Coppola. Any modifications to Kotanagi in this process (e.g., adding a side ECG electrode), would not have interfered with placing one or more different-wavelength LEDs in the rear as taught by Fraser. Indeed, the same motivation—improving sensing capabilities—would animate both modifications and they are fully compatible. EX1003 ¶258.

c. Motivation to Combine Schmid with Kotanagi and Fraser

Ground 2 provides reasons for combining Kotanagi and Schmid. Any modifications to Kotanagi in this process (e.g., adding a side ECG electrode), would not have interfered with placing one or more different-wavelength LEDs in

the rear as taught by Fraser. Indeed, the same motivation—improving sensing capabilities—would animate both modifications and they are fully compatible.

Thus, a POSITA would have found obvious the combination of Kotanagi’s LED and Fraser’s multiple-wavelength light emitters in view of the teachings above. EX1003 ¶¶259–260.

M. Ground 6: Claim 9 is unpatentable because it would have been obvious over Kotanagi, Coppola or Schmid, and further in view of Honda.

Claim 9 depends from Claim 1 and adds **“further comprising a wireless charging system configured to receive power wirelessly, from an external charging dock, through the rear exterior surface of the wearable electronic device.”**

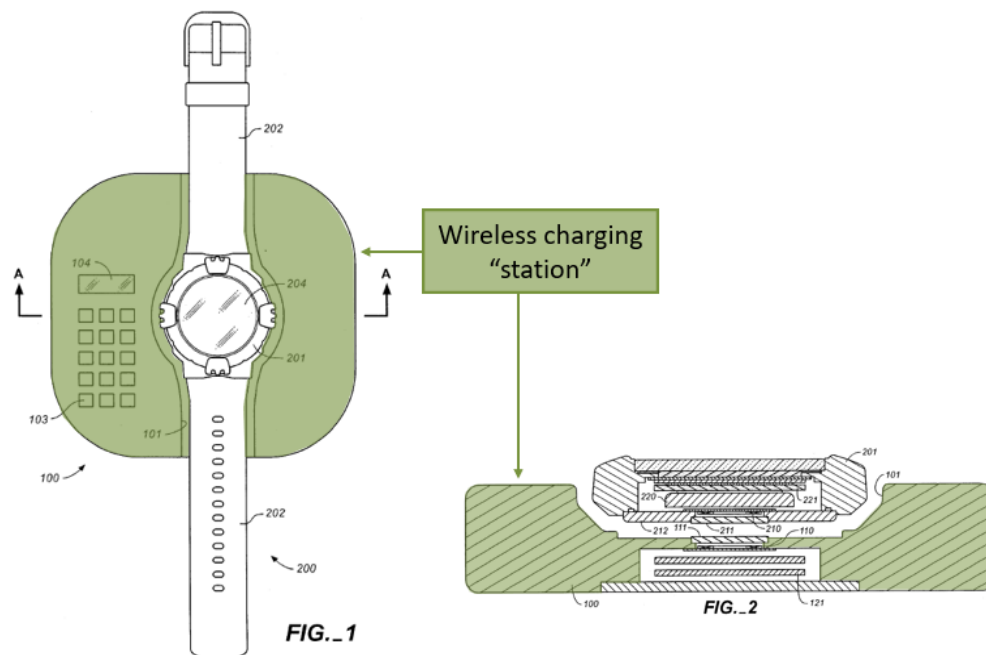
Grounds 1 and 2 both use Kotanagi to demonstrate how Claim 1 is unpatentable, but for the third (ECG) electrode and related teachings, Ground 1 uses Coppola and Ground 2 uses Schmid.

This Ground applies Kotanagi, Coppola, and Schmid identically to the analyses provided above for Claim 1 under both Grounds 1 and 2. However, it adds the teachings of Honda to Kotanagi for the further limitations of dependent Claim 9.

Kotanagi teaches that instead of a wired connection terminal for charging, “a transformer or the like for supplying power to a recharger and to the inside of the

housing 2 may be provided so as to recharge the rechargeable battery 13 in a contactless state.” EX1005 ¶53. A POSITA would have known at the time of the ’483 Patent’s filing that such a transformer for contactless charging typically takes the form of an external charging dock. EX1003 ¶¶262–264.

Honda, which issued in 2001, discloses such a charging dock (or station) for a biosensing wristwatch. Honda’s figures show plan and cross-section views:

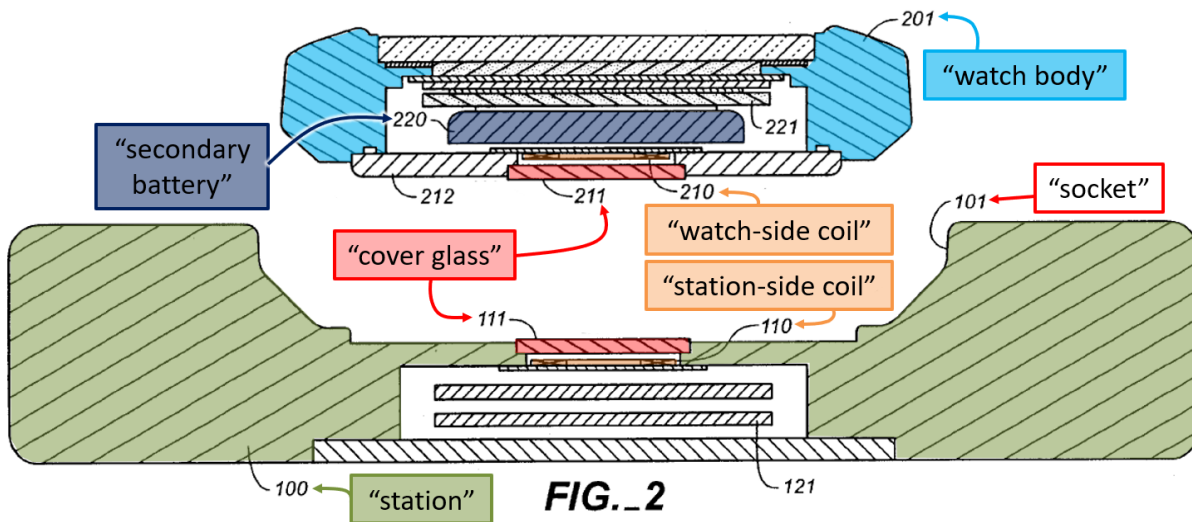


See EX1006 at 2–3 (Figs. 1, 2). Like Kotanagi, Honda teaches a biosensor: “the electronic watch 200 detects biological information including the pulse rate or the heart rate of the body.” EX1006 6:17–20. Like Kotanagi, the Honda watch has a “cover glass” over an opening in the bottom face of the watch. *Id.* 6:24–25. These similarities increase a POSITA’s expectation of a successful combination. EX1003 ¶¶265–266.

Honda teaches inductive coupling of a charging station coil and a watch coil:

When the electronic watch 200 is placed onto the station 100, the station-side coil 110 and the watch-side coil 210 are physically out of contact with each other, but magnetically coupled with each other because the surfaces of coil winding of both coils are generally in parallel to each other.

EX1006 6:36–40.



See id. at 3 (Fig. 2). This creates magnetic flux that induces current in the watch-side coil and charges the watch battery. EX1003 ¶267.

Given Honda's teaching of a wireless receive coil near a rear opening similar to that taught in Kotanagi (where both Honda's and Kotanagi's openings have a cover glass), a POSITA would have used Honda's teachings to either: 1) modify Kotanagi to position a wireless charging coil behind Kotanagi's cover glass, LED, and PD; or 2) enlarge Kotanagi's opening and cover glass to make room for a coil behind the cover glass, surrounding the LED and PD. In either

case, the result would be a wireless charging system configured “to receive power wirelessly, from an external charging dock, through the rear exterior surface of the wearable electronic device,” as claimed. EX1003 ¶268.

a. Motivation to Combine Kotanagi and Honda

Kotanagi and Honda are both assigned to Seiko companies. *See* EX1005 at 1, EX1006 at 1. Thus, a POSITA having Kotanagi would have also readily identified Honda and considered the two references together. Prior to September 2014, a POSITA would have been motivated to make the modifications explained above based on teachings of both Kotanagi and Honda and would have had a reasonable expectation of success in doing so. Kotanagi teaches a pulse rate biosensor watch that may be charged in a “contactless state” (EX1005 ¶53), motivating a POSITA to look to Honda for what modifications to include to achieve this kind of charging. Honda teaches wireless watch charging and sensors for measuring pulse/heart rate of the body (EX1006 6:14–20, 8:40–42), showing Honda’s compatibility with Kotanagi. Thus, there is an express teaching in both references that the subject matter in each may be combined with the other. *See KSR* at 4. EX1003 ¶269.

Moreover, existing similarities between the main watch embodiments of Kotanagi and Honda would have caused a POSITA to expect success when combining features or inserting components from one into the other. Both have a

watch shape, both have biosensors, and both have a cover glass over an opening in the bottom face of the watch. For these reasons and those explained above, a POSITA would have been motivated to combine Honda and Kotanagi. EX1003 ¶270.

b. Motivation to Combine Coppola with Kotanagi and Honda

Ground 1 provides reasons for combining Kotanagi and Coppola. Any modifications to Kotanagi in this process (e.g., adding a side ECG electrode), would not have interfered with modifications to enable wireless charging as taught by Honda. Indeed, Honda itself teaches optical biosensors and wireless charging, in a similar-shaped watch device, so these three references are fully compatible. EX1003 ¶271.

c. Motivation to Combine Schmid with Kotanagi and Honda

Ground 2 provides reasons for combining Kotanagi and Schmid. Any modifications to Kotanagi in this process (e.g., adding a side ECG electrode), would not have interfered with modifications to enable wireless charging as taught by Honda. Indeed, Honda itself teaches optical biosensors and wireless charging, in a similar-shaped watch device, so these three references are fully compatible.

Thus, a POSITA would have combined Kotanagi's biometric watch with Honda's wireless charging structures in view of the teachings above. EX1003 ¶¶272–273.

N. Ground 7: Claim 8 is unpatentable because it would have been obvious over Kotanagi in view of Coppola or Schmid and further in view of Miller.

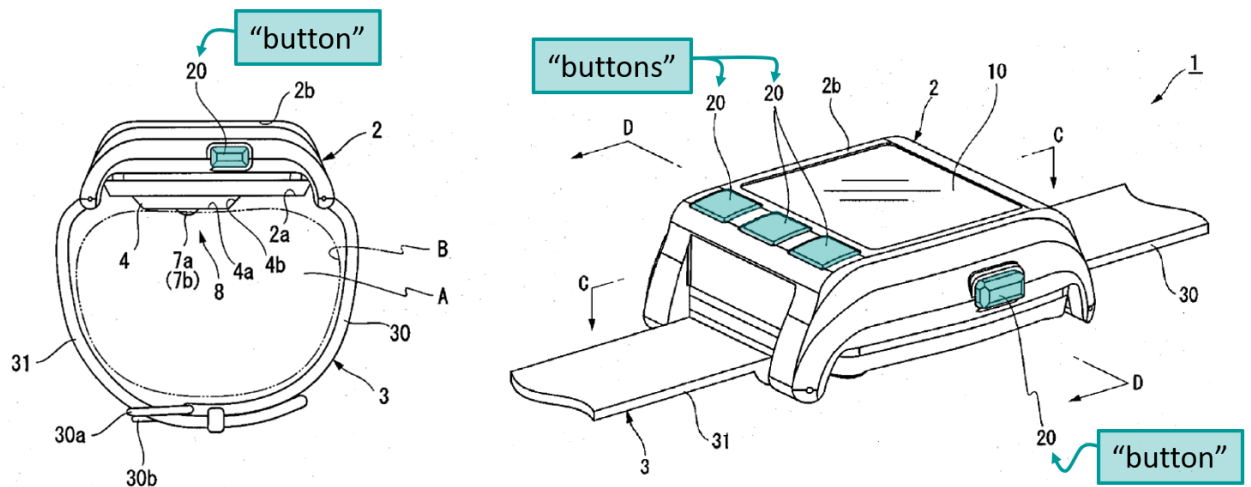
17. Dependent Claim 8

Claim 8 depends from Claim 1 and adds **“further comprising an input device positioned along a side of the housing and configured to receive a rotational input and a translational input.”**

Grounds 1 and 2 both use Kotanagi to demonstrate how Claim 1 is unpatentable, but for the third (ECG) electrode and related teachings, Ground 1 uses Coppola and Ground 2 uses Schmid.

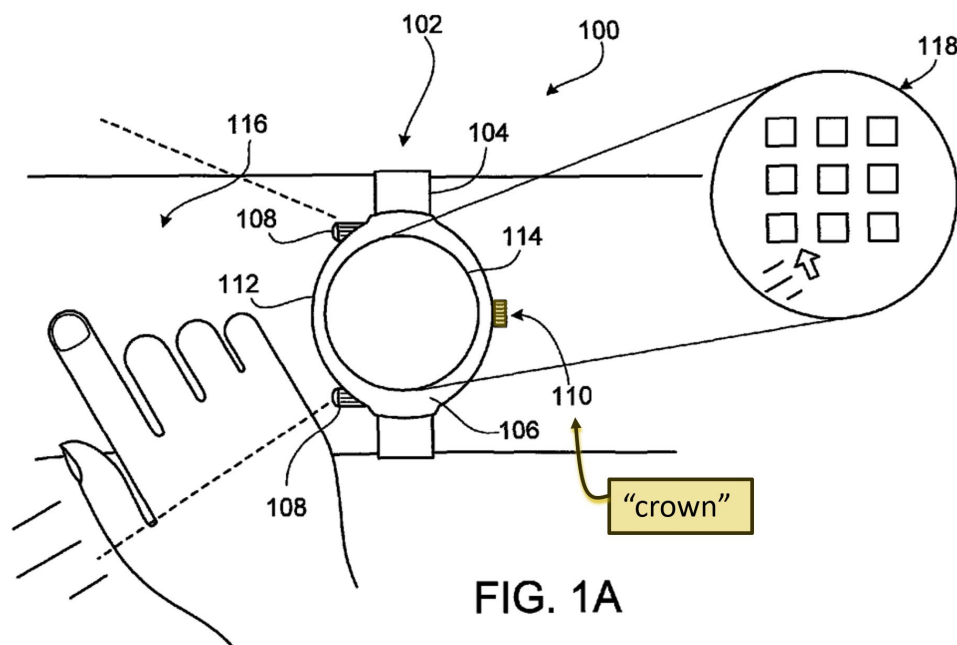
This Ground applies Kotanagi, Coppola, and Schmid identically to the analyses provided above for Claim 1 under both Grounds 1 and 2. However, it adds the teachings of Miller to Kotanagi for the further limitation of dependent Claim 8.

As discussed with respect to Claims 3 and 5 above, Kotanagi teaches buttons (20) including a push-button on the side of the watch that is “translated” (pushed).



See EX1005 at 24, 25 (Figs. 2 and 4). EX1003 ¶277.

Like Kotanagi, Miller teaches a watch with an input device (“crown 110”) on the side:



See EX1049 at 3. This crown is configured for rotational input (twisting) and translational input (pressing and pulling) for manipulating its touchscreen GUI:

In some implementations, by *pressing* the crown 110, the user may toggle the computing device interface . . . In some implementations, the crown **110** may extend out from the device **102** and *swivel* about its axis . . . Sensors at the base of the crown 110 may be positioned to sense motion of the crown 110 in various directions, much like what occurs with a joystick input mechanism . . . a user may extend the crown **110** and *twist* it to move between GUI applications.

EX1049 4:37–51 (emphasis added). EX1003 ¶¶278–279.

a. Motivation to Combine Kotanagi and Miller

In view of Kotanagi’s use of side buttons (but with fewer movement modes) and the benefits described in Miller of both pressing and swiveling, a POSITA would have been motivated to combine Kotanagi and Miller to provide additional functionalities to its buttons, such as swiveling, twisting, toggling, or using the button like a joystick. EX1003 ¶280. Moreover, Miller’s translating, swiveling crown is one of a limited number of known input options for a watch device, and it would have been obvious to replace at least one button of Kotanagi with Miller’s crown. Such a substitution would have been a mere combination of familiar elements that do no more than yield predictable results. *See KSR* at 416.

b. Motivation to Combine Coppola with Kotanagi and Miller

Ground 1 provides reasons for combining Kotanagi and Coppola. Any modifications to Kotanagi in this process (e.g., adding a side ECG electrode), would not have interfered with modifications to enable rotating and translating buttons as taught by Miller. Indeed, by adding more movement modes to Kotanagi's side buttons, fewer such buttons are needed, leaving more room for the side electrode taught by Coppola. These three references are fully compatible. EX1003 ¶281.

c. Motivation to Combine Schmid with Kotanagi and Miller

Ground 2 provides reasons for combining Kotanagi and Schmid. Any modifications to Kotanagi in this process (e.g., adding a side ECG electrode), would not have interfered with modifications to enable rotating and translating buttons as taught by Miller. Indeed, by adding more movement modes to Kotanagi's side buttons, fewer such buttons are needed, leaving more room for the side electrode taught by Schmid. These three references are fully compatible.

For the reasons above, a POSITA would have added Miller's translating and rotating crown to Kotanagi's biometric watch, as modified by Coppola or Schmid to include a third ECG electrode on the side. EX1003 ¶¶282–283.

**IV. SECONDARY CONSIDERATIONS, EVEN IF CONSIDERED, FAIL
TO OVERCOME THE PRIMA FACIE EVIDENCE OF OBVIOUSNESS**

Secondary considerations should be considered but do not control an obviousness conclusion under 35 U.S.C. § 103, 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.

V. DISCRETIONARY FACTORS FAVOR INSTITUTION

With respect to 35 U.S.C. § 314(a), Fintiv factors 2, 3, 4, and 6 strongly favor institution of this IPR, and factors 1 and 5 are neutral. With respect to factor 2, the final written decision in this IPR is expected long before trial in the Delaware Litigation. Apple filed its complaint in the Delaware Litigation less than six months ago, 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. EX1048.

For factor 3, the parties and the court have made little investment in the Delaware Litigation. No infringement or invalidity contentions have been exchanged, claim construction briefing has not started, and initial written discovery is in its early stages.

For factor 4, Petitioner 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).

For factor 6, this Petition presents a compelling case of unpatentability of the challenged claims. For factor 1, Petitioner has not moved for a stay of the Delaware Litigation but may do so upon institution of an IPR. For factor 5, Petitioner Masimo is a defendant in the Delaware Litigation. In view of all circumstances, the judicial and administrative efficiency considerations underlying *Fintiv* are not implicated here. Therefore, the Board should institute this IPR.

With respect to Section 325(d), this Petition presents the first *inter partes* challenge to the '483 patent and none of the references the Petition relies on in the Grounds were considered during examination. Further, the references relied on herein are materially better than the references considered during examination because, as shown above, they disclose every limitation of the independent claims, including ECG electrodes on various surfaces of a biosensing watch, a touchscreen display, a rear sapphire cover, wireless charging, and other features. Therefore, this Petition presents new prior art and new patentability arguments that have never previously been before the Office.

VI. CONCLUSION

Petitioner respectfully requests that the Board institute an IPR and cancel claims 1–20 of the '483 patent under 35 U.S.C. § 103.

Masimo v. Apple
IPR Petition – U.S. Patent No. 11,474,483

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: April 4, 2023

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CERTIFICATE OF TYPE-VOLUME LIMITATIONS
UNDER 37 C.F.R. § 42.24

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing **PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,474,483**, exclusive of the parts exempted as provided in 37 C.F.R. § 42.24(a), contains 12,232 words and therefore complies with the type-volume limitations of 37 C.F.R. § 42.24(a).

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: April 4, 2023

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Masimo v. Apple
IPR Petition – U.S. Patent No. 11,474,483

CERTIFICATE OF SERVICE

I hereby certify that true and correct copies of the foregoing **PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,474,483** and **EXHIBITS 1001–1012, 1014, 1016, 1020, 1022–1023. 1025–1031, 1033–1039, 1041, 1047–1049** are being served on April 4, 2023, via Federal Express overnight delivery on counsel of record for U.S. Patent No. 11,474,483 as addressed below:

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