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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. 2023-00734
Patent No. 10,942,491

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 10,942,491**

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<i>In re Bond</i> , 910 F.2d 831 (Fed. Cir. 1990)	15, 17, 72
<i>Epizyme, Inc. v. GlaxoSmithKline LLC</i> , Case No. IPR2020-01577, 2021 WL 841118 (PTAB Mar. 5, 2021)	13
<i>In re Harza</i> , 274 F.2d 669, 124 USPQ 378 (CCPA 1960).....	64, 69, 73
<i>KSR Int’l v. Teleflex Inc.</i> , 550 U.S. 398 (2007).....	29, 46, 55, 79
<i>Leapfrog Enters., Inc. v. Fisher-Price, Inc.</i> , 485 F.3d 1157 (Fed. Cir. 2007)	93
<i>Mueller Sys., LLC v. Rein Tech, Inc.</i> , Case No. IPR2020-00100, 2020 WL 2478524 (PTAB May 12, 2020)	13
<i>In re Nilssen</i> , 851 F.2d 1401 (Fed. Cir. 1988)	12
<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)	94
<i>Unwired Planet, LLC v. Google Inc.</i> , 841 F.3d 995 (Fed. Cir. 2016)	12

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EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 10,942,491 ('491 Patent)
1002	File History of the '491 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")
1010	U.S. Provisional Patent App. No. 61/976,388 ("Fei")
1011	PCT Publication No. WO 2015/034149 A1 ("Choi PCT")
1012	U.S. Patent Pub. No. 20150214749 A1 ("Park")
1013	Reserved
1014	US 20120221254 A1 (Kateraas)
1015	U.S. Provisional Patent Application No. 61/932258 ("Park Provisional")
1016	US20140135594 ("Yuen")
1017	U.S. Patent No. 10,090,712 ("Jabori")
1018–1019	Reserved
1020	PCT Patent Pub. WO 2015150199 A1 ("Coppola PCT")
1021	Reserved
1022	U.S. Patent No. 4,129,124 ("Thalmann")
1023	Korean Patent Application No: 10-2013-0107833 ("Choi")

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Exhibit No.	Description
1024	Reserved
1025	U.S. Patent No. 4,163,447 (“Orr”)
1026	U.S. Patent No. 4,224,948 (“Cramer”)
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

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Exhibit No.	Description
	https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_distprofile0930.2022.pdf

CLAIM LISTING

Limitation	Claim Language
1a	An electronic watch comprising:
1b	a housing formed from a metal material and defining a rear opening along a rear portion of the housing;
1c	a touch-sensitive display positioned at least partially within the housing;
1d	a band coupled to the housing and configured to couple the electronic watch to a user;
1e	a cover formed from a dielectric material and forming a seal along the rear opening of the housing;
1f	an optical sensor positioned within the housing and configured to transmit an optical signal through the dielectric material of the cover;
1g	a charging coil positioned within the housing and configured to receive wireless power through the dielectric material of the cover;
1h	a first electrode positioned along a rear surface of the electronic watch; and a second electrode positioned along the rear surface of the electronic watch, wherein:
1i	the electronic watch is configured to measure a heart rate using the optical sensor, and
1j	the electronic watch is configured to measure an electrocardiogram using the first electrode and the second electrode.
2	The electronic watch of claim 1, wherein: the cover defines at least one window for the optical sensor; and the cover protrudes outward from a rear housing surface of the housing.

Limitation	Claim Language
3	The electronic watch of claim 1, wherein: the cover is formed from a transparent substrate; and the transparent substrate comprises one or more of a glass or a sapphire material.
4	The electronic watch of claim 1, wherein: the electronic watch further comprises a first magnet positioned within the housing; the first magnet is configured to couple to a second magnet positioned within a charging dock; and the first and second magnets are configured to maintain alignment of the electronic watch with respect to the charging dock.
5	The electronic watch of claim 1, wherein: the electronic watch further comprises a near-field communication system; and the near-field communication system is configured to transmit signals through one or more of the housing or the cover.
6a	The electronic watch of claim 1, wherein: the cover defines a convex exterior profile; and
6b	the convex exterior profile facilitates alignment between the cover and a mating surface of an external wireless charging device.
7a	A wearable electronic device comprising:
7b	a housing formed from a conductive material and defining a first opening opposite to a second opening;
7c	a band attached to the housing and configured to secure the wearable electronic device to a user;
7d	a display positioned in the first opening;
7e	a cover comprising a non-conductive material and positioned over the second opening, the cover forming a portion of an exterior surface of the wearable electronic device;

Limitation	Claim Language
7f	a biosensor module positioned below the cover configured to pass an optical signal through a window defined within the non-conductive material of the cover; and
7g	a wireless charging receive coil aligned with the second opening and below the cover, the wireless charging receive coil configured to inductively couple to an external wireless charging device through the non-conductive material of the cover.
8	The wearable electronic device of claim 7, wherein: the window is a first window; the cover defines a second window; and the biosensor module comprises: a light source configured to emit light toward a region of skin of the user through the first window: and a detector configured to receive light reflected from the region of the skin through the second window.
9	The wearable electronic device of claim 7, wherein: the biosensor module comprises: at least one light source; and a set of detectors; and the at least one light source and the set of detectors are configured to operate as a photoplethysmogram (PPG) sensor.
10	The wearable electronic device of claim 7, wherein: the cover protrudes outward from a rear surface of the housing; the cover defines a convex exterior profile; and the convex exterior profile facilitates alignment between the cover and a mating surface of the external wireless charging device.
11	The wearable electronic device of claim 10, wherein: the cover forms a waterproof seal with the housing along a perimeter of the cover.

Limitation	Claim Language
12	The wearable electronic device of claim 7, wherein: the wearable electronic device further comprises a first magnet positioned within the housing and below the cover; the external wireless charging device comprises a second magnet; and the first and second magnets are configured to maintain alignment between the wearable electronic device and the external wireless charging device during a charging operation.
13	The wearable electronic device of claim 7, wherein: the wearable electronic device further comprises: 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 the wearable electronic device is configured to measure an electrocardiographic characteristic using the first and second electrodes.
14a	An electronic device, comprising: a housing defining a first opening and a second opening;
14b	a display positioned at least partially within the first opening;
14c	a biosensor module aligned with the second opening;
14d	a wireless charging receive coil positioned within the housing and aligned with the second opening;
14e	a battery operably coupled to the wireless charging receive coil; and
14f	a cover formed from an optically transparent material and disposed over the biosensor module and the wireless charging receive coil, wherein:
14g	the electronic device is configured to receive wireless power through the optically transparent material of the cover using the wireless charging receive coil; and

Limitation	Claim Language
14h	the electronic device is configured to measure a heart rate of a user through the optically transparent material of the cover using the biosensor module.
15	The electronic device of claim 14, wherein: the biosensor module includes an array of optical components; and the cover defines an array of windows, each window of the array of windows aligned with a respective optical component of the array of optical components.
16a	The electronic device of claim 14, wherein: the biosensor module comprises: a light source; and a detector;
16b	the light source and the detector are configured to measure changes in light absorption by a region of skin of the user;
16c	the electronic device is configured to compute the heart rate using the measured changes in light absorption; and
16d	the display is configured to display information associated with the heart rate.
17	17. The electronic device of claim 14, wherein: the electronic device further comprises: a first electrode disposed along an exterior of the electronic device; and a second electrode disposed along the exterior of the electronic device; and the first and second electrodes are configured to measure an electrocardiographic characteristic of the user.
18	The electronic device of claim 14, wherein: the electronic device further comprises a magnet that is configured to magnetically couple the electronic device to an external inductive power transmitter dock through the cover.

Limitation	Claim Language
19	The electronic device of claim 14, wherein the cover protrudes outward from a rear surface of the housing to facilitate alignment between the cover and a mating surface of an external wireless charging device.

Grounds Listing

GROUND 1	Claims 7, 11, 14, and 16 are unpatentable as obvious in view of Kotanagi and Honda
GROUND 2	Claims 1–3, 5, 13, and 17 are unpatentable as obvious in view of Kotanagi, Honda, and Choi
GROUND 3	Claims 8 and 15 are unpatentable as obvious in view of Kotanagi, Honda, and Fraser
GROUND 4	Claim 9 is unpatentable as obvious in view of Kotanagi, Honda, and Orr
GROUND 5	Claims 12 and 18 are unpatentable as obvious in view of Kotanagi, Honda, and Park
GROUND 6	Claim 4 is unpatentable as obvious in view of Kotanagi, Honda, Choi, and Park
GROUND 7	Claims 10 and 19 are unpatentable as obvious in view of Kotanagi, Honda, and Jabori
GROUND 8	Claim 6 is unpatentable as obvious in view of Kotanagi, Honda, Choi, and Jabori

Masimo Corporation (“Petitioner” or “Masimo”) requests *inter partes* review of Claims 1–19 of U.S. Patent No. 10,942,491 (“the ’491 Patent”).

I. MANDATORY NOTICES; FEES; STANDING

A. Mandatory Notices

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

Masimo Corporation is the real party-in-interest.

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

Apple has asserted the ’491 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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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 Masimo-491@knobbe.com.

B. Payment of Fees

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

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

Petitioner hereby certifies that the '491 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 revealed 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 ¶¶61–106.

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1978 Fig. 1 EX1022	1980 FIG. 2 FIG. 3 EX1026	1983 Fig.1 EX1029
2001 FIG. 1 EX1007	2001 FIG. 1 EX1006	2005 EX1005
2012 Fig. 1A Fig. 1B EX1008	2012 FIG. 1 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 ¶¶61–106, e.g., discussing EX1022–EX1031, and EX1033–EX1035) suggest the rich history of this crowded field.

A. Reliance on Expert Analysis and Testimony

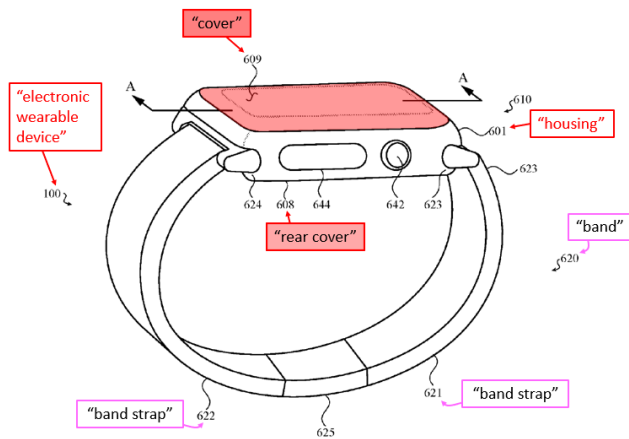
As with most patentability challenges, technical issues are highly relevant to this petition, including to show what would have been known or understood by a person of ordinary skill in the art (“POSITA”) at the time of invention. Accordingly, this Petition largely adopts the expert analysis and testimony of R. James Duckworth, Ph.D. EX1003 ¶¶ 1–326.²

B. Overview of the ’491 Patent

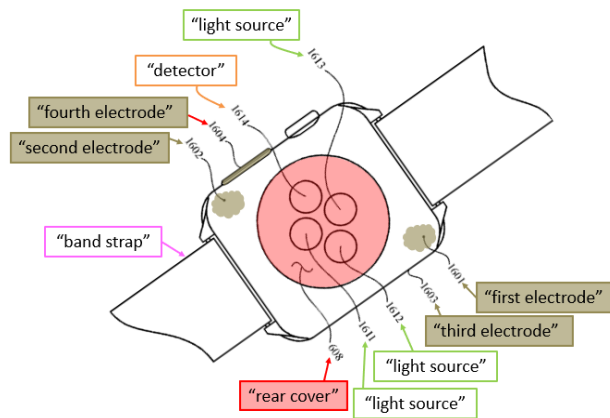
Apple’s ’491 patent alleges improvements to health-monitoring smart watches, but the challenged claims (Claims 1–19 of the ’491 Patent) merely recite features that were well known prior to that Patent, and their combinations in the claims provided no unexpected results or benefits. The following compares ’491 patent figures to those from a 2005 patent publication by Kotanagi (EX1005):

² In general, a single citation to Dr. Duckworth’s expert declaration is provided at the end of each paragraph that is supported by Dr. Duckworth’s testimony. However, additional citations may also be included.

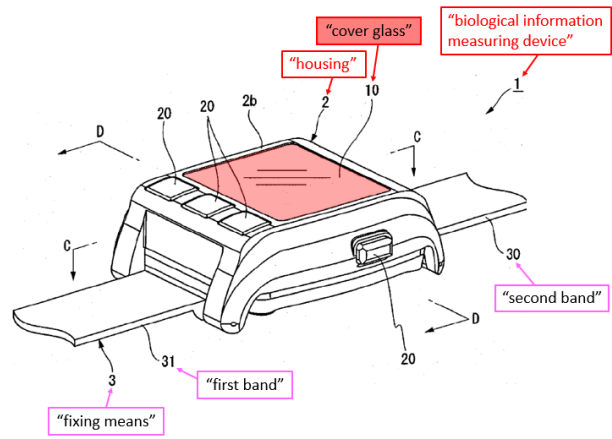
'491 Patent



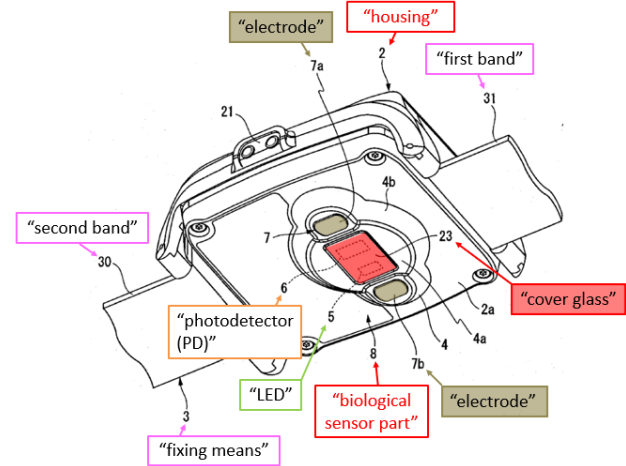
'491 Patent



Prior Art – Kotanagi



Prior Art - Kotanagi



See³ EX1001 at 12, 22 (Figs. 6 and 16); see EX1005 at 25–26 (Figs. 4 and 5).

³ In this petition, color feature labels and color shadings are added for convenience and do not come from the cited patent drawings themselves.

C. Prosecution History

The Examiner rejected Claims 21–40 in a Non-Final Rejection on May 13, 2020. EX1002 at 1119–1131. Applicant thereafter amended the independent claims on August 13, 2020 to recite that wireless power is sent “through” a sensor cover that is “dielectric” (Claim 21, issued Claim 1), “non-conductive” (Claim 28, issued Claim 7), and “optically transparent” (Claim 35, issued Claim 14). *Id.* at 595–599. Applicant emphasized these amendments in an interview, then summarized as follows: “the cited references do not disclose or suggest an electronic watch that includes an optical sensor and a charging coil that are configured to pass both optical signals and wireless power signals through dielectric material of a single cover.” *Id.* at 601–603. A similar summary was provided for independent claims 28 (issued Claim 7) and 35 (issued claim 14), but substituting the words “non-conductive” and “transparent” for “dielectric.” *Id.* In response to these amendments and arguments, the Examiner allowed the claims on November 4, 2020. *Id.* at 468–473.

Importantly, the ’491 prosecution history shows Examiner did not consider, and Applicant did not cite, any of the references that that Petitioner relies on in the grounds of this Petition. *See generally* EX1002. These references teach what the Applicant said was missing from the prior art: a watch with an optical sensor and

charging coil, both configured to pass their signals through a single glass cover.

See EX1005 ¶55; EX1006 15:47–49.

D. Priority

The '491 patent was filed March 20, 2020, which is a continuation of U.S. Application No. 15/261,912, filed on September 10, 2016, U.S. Application No. 15/261,914, filed on September 10, 2016, U.S. Application No. 15/261,917, filed on September 10, 2016, and U.S. Application No. 14/842,617, filed on September 1, 2015. U.S. Application No. 14/842,617 claims priority to provisional application 62/044,974, filed on September 2, 2014—the earliest alleged priority date of the '491 Patent. EX1001 at 1; EX1002 at 1478–1479.

E. Level of Ordinary Skill in the Art

A POSITA of the '491 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.

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 Constructions of a few example terms and phrases are also discussed here for convenience.

1. “non-conductive cover material”

Claim 1 recites “a cover formed from a dielectric material.” EX1001 58:5. Claim 3 further specifies that the cover is formed from “a transparent substrate; and the transparent substrate comprises one or more of a glass or a sapphire material.” *Id.* 58:28–30. EX1003 ¶45. Claim 7 recites “a cover comprising a non-conductive material.” EX1001 58:56. The prior art references used in this petition confirm that glass is electrically non-conductive. *See* EX1006 15:62 (“insulating body (glass, for example)”); *Id.* 16:14–15 (“glasses 211 and 111 may be replaced with other insulating materials”). Accordingly a POSITA would have understood that glass and sapphire are electrically non-conductive, dielectric and optically transparent materials. EX1003 ¶46.

⁴ Any positions asserted in this petition regarding the scope of the claims should not be taken as assertions 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 or context differs.

2. “defines at least one window” and “window defined”

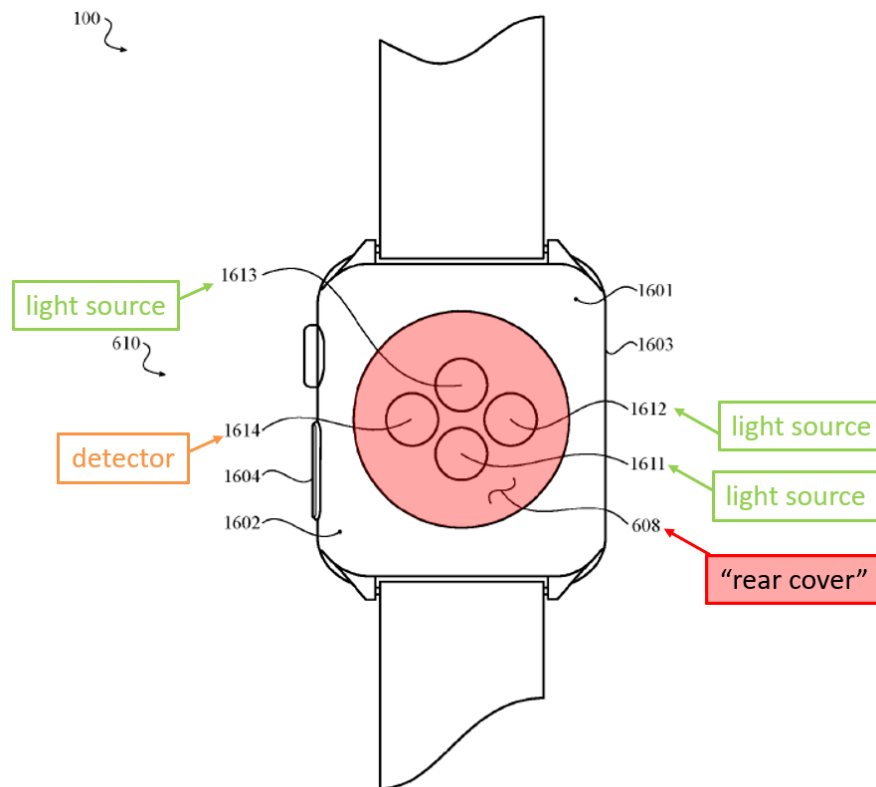
Claims 2, 7, and 8 recite that a window is “defined” in the cover. The ’491 patent does not provide an explanation of what a “window” is, although the ’491 patent often recites “windows or apertures.” EX1001 28:38–29.⁵ The ’491 patent describes the windows as follows:

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 rear cover 608 may be formed from a sapphire sheet, zirconia, or alumina material [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 26:12–19 (emphasis added). *Id.* 40:46–67. EX1003 ¶¶47–48.

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

Accordingly, the '491 patent describes a single sheet of material positioned within a single opening in a housing. This sheet defines one or more windows or apertures, where sensors are positioned immediately behind that sheet. *Id.* 40:46–67.



See EX1001 at 22. Thus, to “define” an opening simply means to allow passage of light to a relevant component through an opening. In the '491 patent, the single rear cover 608 “defines” multiple openings by allowing passage of light through the round portions labeled 1611–1614 in Fig. 16. EX1003 ¶¶47–48.

III. STATEMENT OF PRECISE RELIEF REQUESTED

A. Statutory Grounds for Cancellation

Petitioner requests that the Board cancel claims 1–19 of the '491 patent under post-AIA 35 U.S.C. § 103 because they would have been obvious to a POSITA before their effective filing date.

B. Status of References as Prior Art

The following references are prior art for the following reasons:

Exhibit No.	Description	Prior Art Basis
1001	'491 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
1011	Choi	Post-AIA 35 U.S.C. §102(a)(2) – effectively filed September 9, 2013 (see EX1023)
1012	Park	Post-AIA 35 U.S.C. §102(a)(2) – effectively filed February 22, 2014 (see EX1015)
1017	Jabori	Post-AIA 35 U.S.C. §102(a)(2) – effectively filed January 30, 2014
1025	Orr	Post-AIA 35 U.S.C. §102(a)(1) – published August 7, 1979
1041	Fraser	Post-AIA 35 U.S.C. §102(a)(2) – effectively filed June 5, 2014

These references constitute analogous art because they are from the same field of endeavor as the '491 patent, e.g. biosensing watches and wireless charging of 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., biosensors and wireless charging through the rear cover of biosensing watches. A POSITA is presumed to have been aware of such analogous references. *In re Nilssen*, 851 F.2d 1401, 1403 (Fed. Cir. 1988). The significantly overlapping features between the references listed above and the '491 patent provides further evidence that these references are analogous art and highly relevant for a POSITA. For example, the figures in *supra* § II(B) show many similarities between the '491 patent and Kotanagi. These and similar figures throughout support the obviousness combinations generally and show these references are analogous. As set forth below, a POSITA would have been motivated to combine these references prior to the filing of the '491 patent for many additional reasons. EX1003 ¶¶107–323.

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

Park (EX1012) was published July 30, 2015 and is prior art under post-AIA 35 U.S.C. § 102(a)(2) because it claims priority to U.S. provisional 61/932,258 (“Park Provisional” EX1015) filed January 28, 2014, which is before September 2, 2014, the earliest effective filing date of the '491 patent. EX1012 at 1.

The Park Provisional provides the same relevant disclosure as Park, and parallel citations to EX1012 and EX1015 are provided herein. Figure sets in these exhibits are identical. EX1012 at 2–14; EX1015 at 53–65. The Park Provisional provides support⁶ for at least Park’s Claim 1. *See* EX1012 at 25; paragraph spanning EX1015 at 5–6. Thus, Park is entitled to the provisional’s priority date of January 28, 2014. EX1003 ¶¶116–121.

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

Jabori is a PCT publication designating the United States. 35 U.S.C. § 374. Effectively filed January 30, 2014, it predates the earliest priority of the ’491 patent and is therefore prior art. 35 U.S.C. § 102(d)(1).

⁶ A showing that the Park Provisional supports one of Park’s claims is not necessary under USPTO guidance indicating that *Dynamic Drinkware* does not apply to post-AIA cases. *See* EX1047 at 3. Nevertheless, Masimo makes such a showing out of an abundance of caution in view of post-AIA Board cases that apply it. *See, e.g., 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).

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

PCT. Pub. No. WO 2015/034149 (“Choi PCT”, EX1011) published March 12, 2015 and is prior art under 35 U.S.C. § 102(a)(2) because it designates⁷ the U.S. with an effective filing date before the ’491 patent’s earliest effective filing date. EX1011 at 1. Choi PCT claims priority to KR10-2013-0107833 (“Choi”, EX1023) filed September 9, 2013. EX1011 at 1; EX1023 at 2.

Choi PCT has literal support from the Korean filing of September 9, 2013, and Choi provides support for every limitation relied upon in this petition. Choi PCT’s Figures 1–8 are identical to Choi. Compare EX1011 at 24–30 and EX1023 at 28–33. Further, every limitation relied upon in this petition provides pincites to both Choi and Choi PCT. EX1003 at ¶¶123–128.

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

Fraser (EX1041) is a U.S. patent publication. Filed August 19, 2014, it predates the ’491 patent’s earliest priority and is therefore prior art. 35 U.S.C. § 102(d)(1).

⁷ See 35 U.S.C. § 374 “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).”

IV. SPECIFIC PROPOSED GROUNDS FOR UNPATENTABILITY

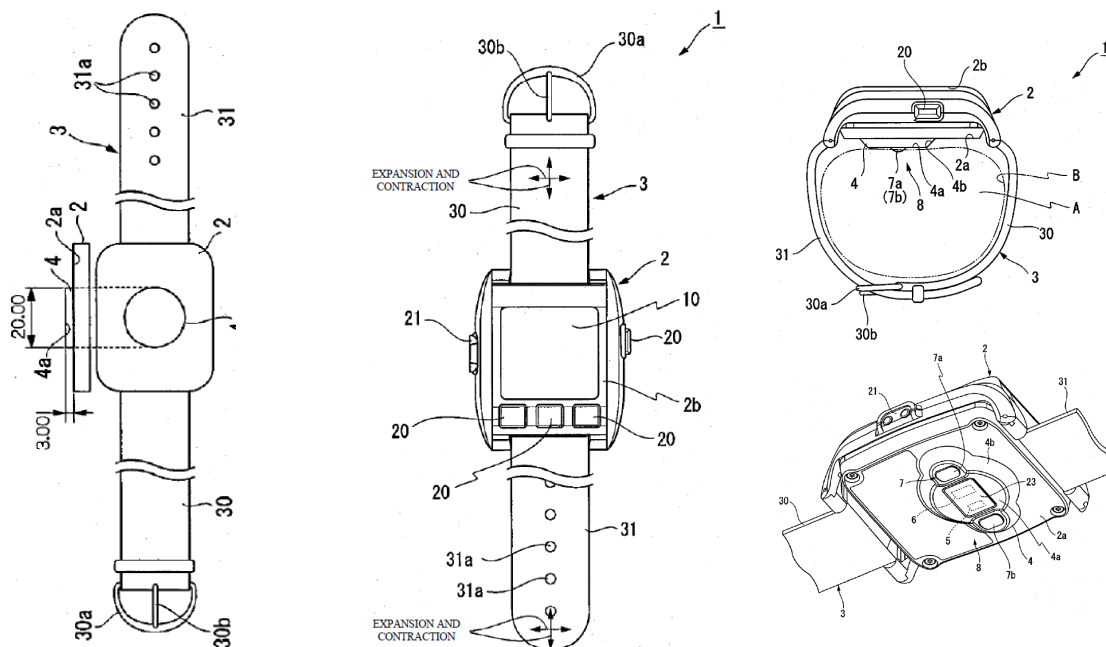
As explained below, claims 1–19 of the '491 patent would have been obvious to a POSITA in view of the prior art at the relevant time. The cited references teach every claim limitation, though not always using identical terminology. *See In re Bond*, 910 F.2d 831, 832 (Fed. Cir. 1990) (disclosure need not be *ipsissimis verbis*).

A. Ground 1: Claims 7, 11, 14, and 16 are unpatentable because they would have been obvious over Kotanagi in view of Honda.

1. Independent Claim 7

a. [7a] “A wearable electronic device comprising:”

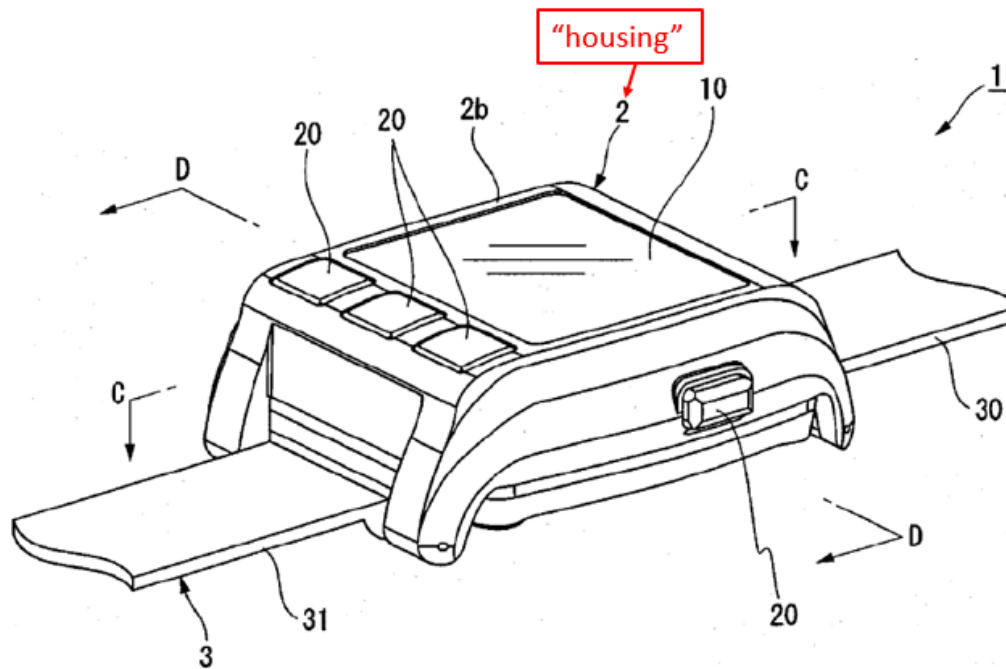
Kotanagi describes a “wristwatch-type device which detects pulse rate as a type of biological information while mounted to the wrist.” EX1005 ¶44.



Id. at 23, 24, 26, 28 (Figs. 1, 2, 5, 8). EX1003 ¶131.

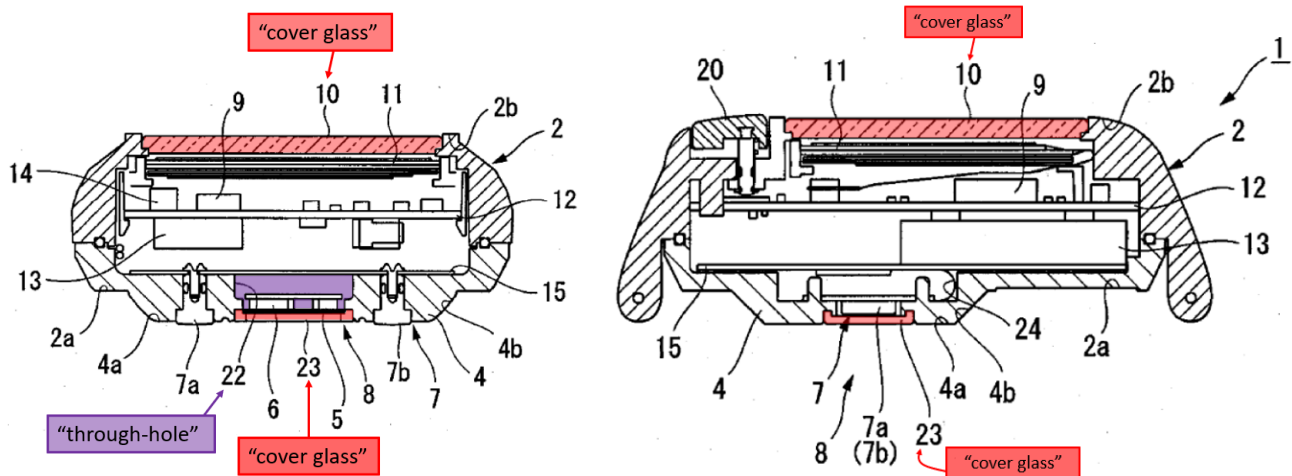
b. **[7b] “a housing formed from a conductive material and defining a first opening opposite to a second opening;”**

Kotanagi teaches “The housing 2 . . . is made of plastic or a metal material such as aluminum.” EX1005 ¶48.



EX1005 at 25 (Fig. 4). A POSITA would have understood that aluminum is strongly conductive (EX1003 ¶133), thus, Kotanagi teaches a conductive housing. Moreover, Honda explicitly describes its metal housing as “conductive.” EX1006 13:22–32. EX1003 ¶133.

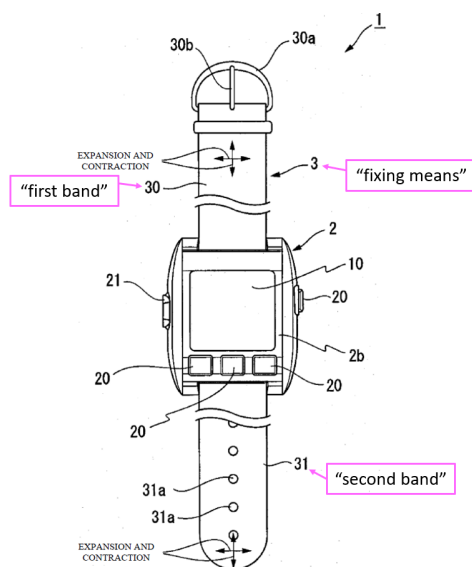
Kotanagi’s housing has a “first opening” at the top and a “second opening” (“through-hole 22”) at the bottom, both shown in the cross-sections below. The cover glass 10 and the cover glass 23 span these openings, and both have been shaded here:



EX1005 at 27 (Figs. 7, 6). EX1003 ¶134.

c. **[7c] “a band attached to the housing and configured to secure the wearable electronic device to a user;”**

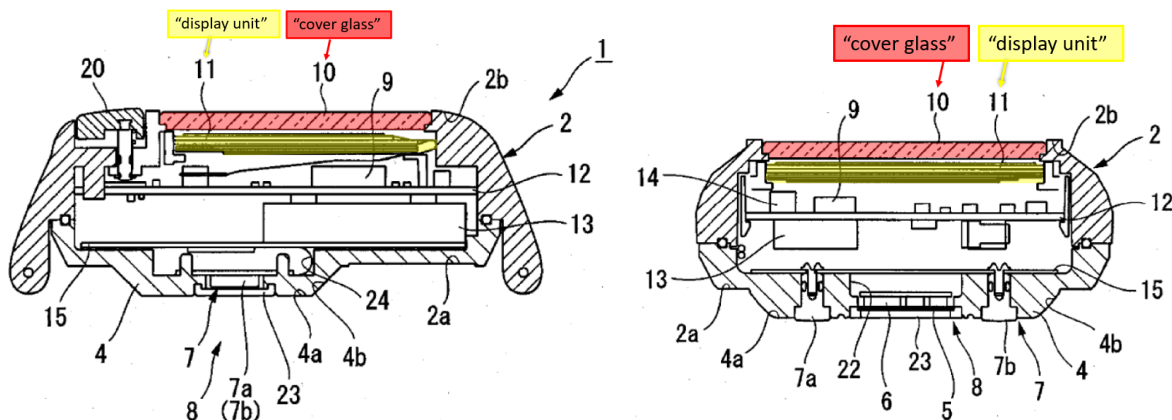
Kotanagi has a “means for fixing” the device “to an arm” (*id.*, Abstract) and explains: “The fixing means 3 has a first band 30 and a second band 31 having base end sides that are attached to the housing 2 to enable mounting to the wrist.” (*id.* ¶60).



See *id.* at 23 (Fig. 1). EX1003 ¶135.

d. [7d] “a display positioned in the first opening;”

Kotanagi teaches that “a display part 11 for displaying . . . pulse rate . . . and various other information is disposed inside the cover glass 10.” EX1005 ¶48.

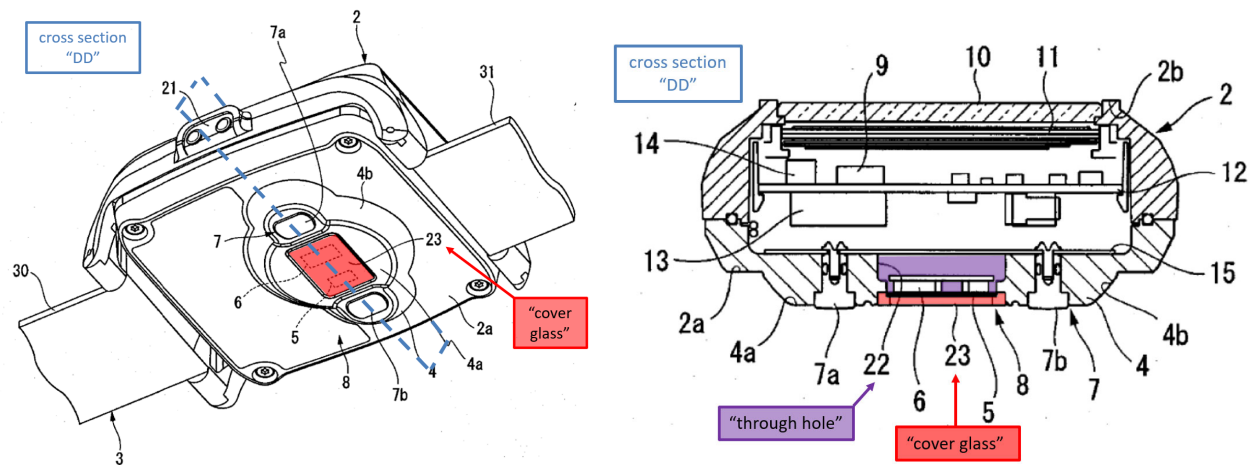


See EX1005 at 27 (Figs. 6, 7). EX1003 ¶136.

e. [7e] “a cover comprising a non-conductive material and positioned over the second opening, the cover forming a portion of an exterior surface of the wearable electronic device”

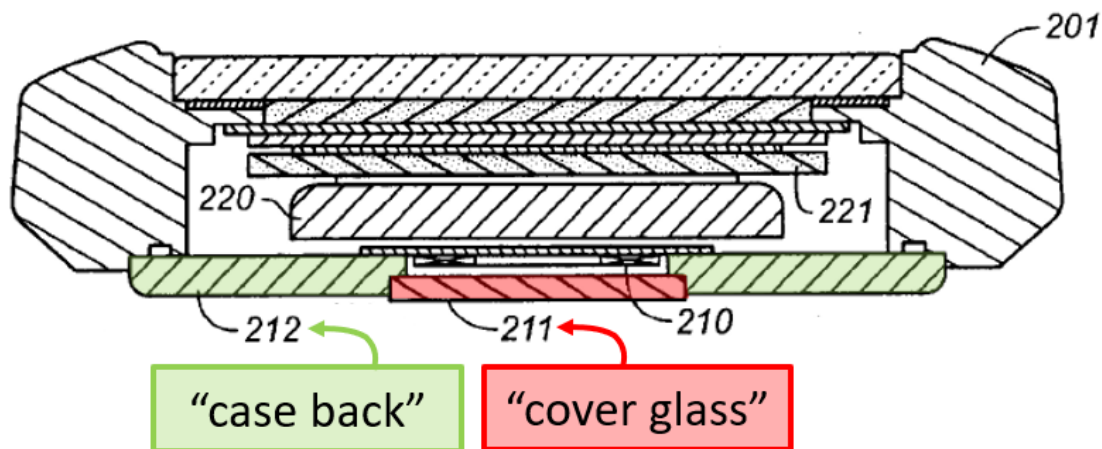
Kotanagi teaches that “cover glass 23 is fixed to the housing 2 so as to block the through-hole 22.” EX1005 ¶55. A POSITA would have known that glass is a non-conductive material.⁸ Kotanagi’s cover glass is positioned as claimed and forms a portion of the exterior surface, as shown in the figures below:

8 Honda teaches this. EX1006 15:62 (“insulating body (glass, for example)”). Dependent Claim 3 states that the “dielectric” cover of Claim 1 is glass or sapphire, confirming that the Applicant considered glass non-conductive.



See EX1005 at 26, 27 (Figs. 5, 7). EX1003 ¶¶137.

Moreover, **Honda**, which issued in 2001, discloses a biosensing watch with a metal case back and a non-conductive glass cover, as shown in this cross-section:



See EX1006 at 3 (Fig. 2). EX1003 ¶138.

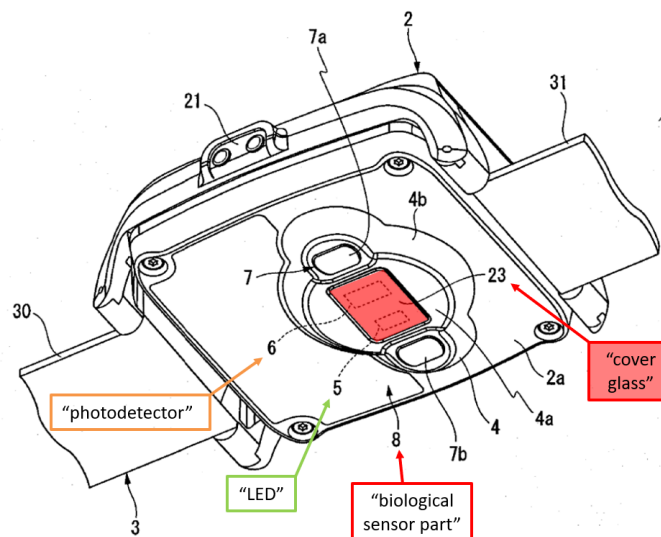
Honda teaches “In the first embodiment, the case back 212 (typically made of a metal) and the cover glass 211 are arranged as shown in FIG. 2.” EX1006 15:47–49. Honda additionally teaches that “the cover glasses 211 and 111 may be replaced with other insulating materials.” *Id.* 16:14–15. EX1003 ¶139.

- f. [7f] “a biosensor module positioned below the cover configured to pass an optical signal through a window defined within the non-conductive material of the cover; and”

Kotanagi teaches the following biosensor module “disposed on the lower surface 4a of the protruding part 4”:

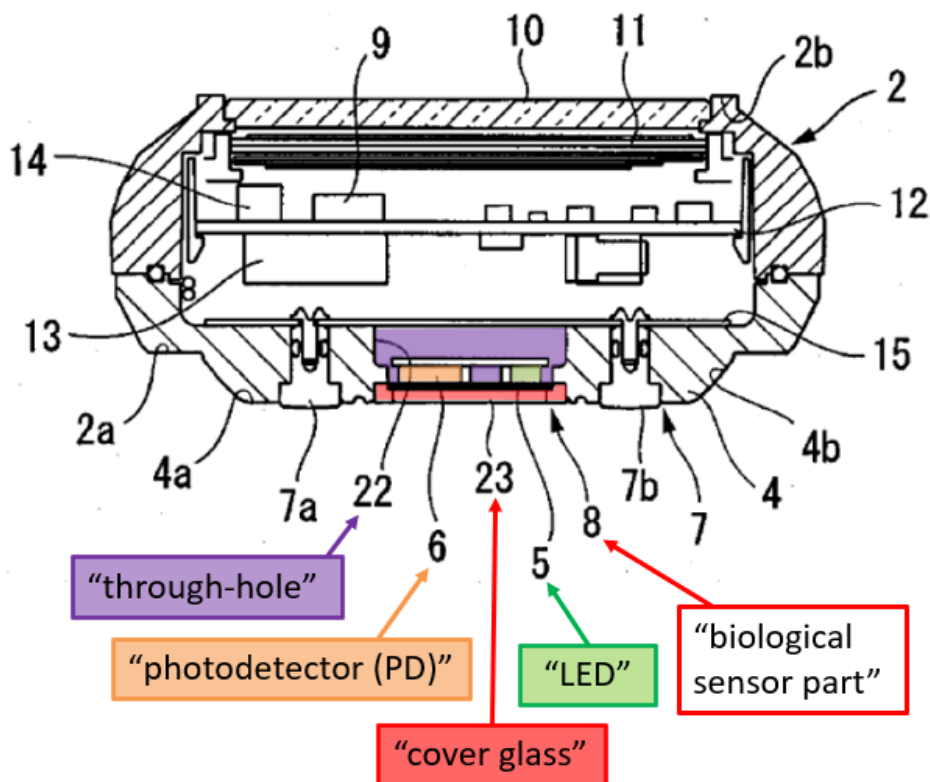
A biological sensor part 8, which includes an LED (Light Emitting Diode) (light-emitting part) 5 for emitting light toward the living body while in contact with the living body surface B side, a PD (Photodetector) (light-receiving part) 6 for receiving reflected light from the living body out of the light emitted by the LED 5 and generating a pulse signal (biological information signal) corresponding to the amount of received light ...

EX1005 ¶46. These features are illustrated below (behind) the cover glass 23, as shown with dashed lines in Kotanagi’s Figure 5:



See EX1005 at 26 (Fig. 5). EX1003 ¶140–141.

Kotanagi further explains that its “cover glass 23” covers optical components of its biosensor module: “a cover glass 23 is fixed to the housing 2 so as to block the through-hole 22. The LED 5 and the PD 6 are disposed adjacent to one another . . . so as to touch the inside of the glass cover 23.” *Id.* ¶55.



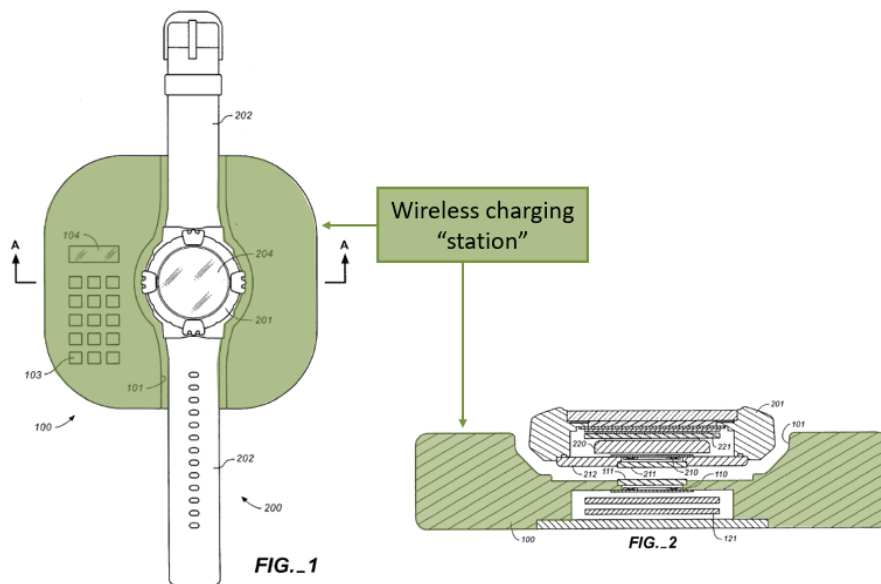
See id. at 27 (Fig. 7). EX1003 ¶142.

A POSITA would have understood from this context that because Kotanagi’s “cover glass 23 is fixed to the housing 2 so as to block the through-hole 22” (EX1005 ¶55), its LED and photodetector work by passing optical signals through the cover glass. Thus, Kotanagi’s cover glass passes optical signals to and from the LED and photodetector, satisfying this limitation. EX1003 ¶143.

- g. [7g] “a wireless charging receive coil aligned with the second opening and below the cover, the wireless charging receive coil configured to inductively couple to an external wireless charging device through the non-conductive material of the cover.”

Kotanagi teaches that “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 (emphasis added). A POSITA would have known at the time of the '491 Patent's disclosure that transformers use coils and that such contactless charging involves a wireless charging receive coil. EX1003 ¶144.

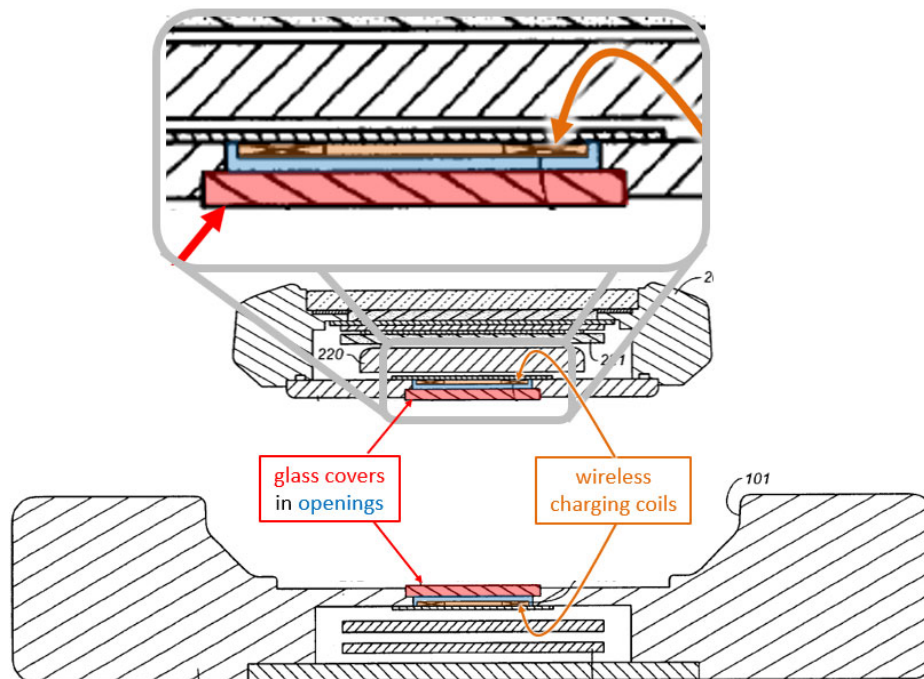
Honda, which issued in 2001, discloses such a contactless charging system for a biosensing wristwatch. Honda's figures show plan and cross-section views:



See EX1006 at 2–3 (Figs. 1, 2). EX1003 ¶145.

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 6:17–19. Like Kotanagi, the Honda watch has a “cover glass” over an opening in the bottom face of the watch. *Id.* at 6:24–25. These similarities increase a POSITA’s expectation of a successful combination. EX1003 ¶146.

Behind Honda’s cover glass is a charging coil: “[A] watch-side coil 210 for the data transmission and the battery charging is arranged in a case back 212 of the watch body 201 and is covered with a cover glass 211.” *Id.* 6:22–25. Honda thus teaches a “wireless charging receive coil” “aligned with” the opening, and “below the cover,” as claimed:

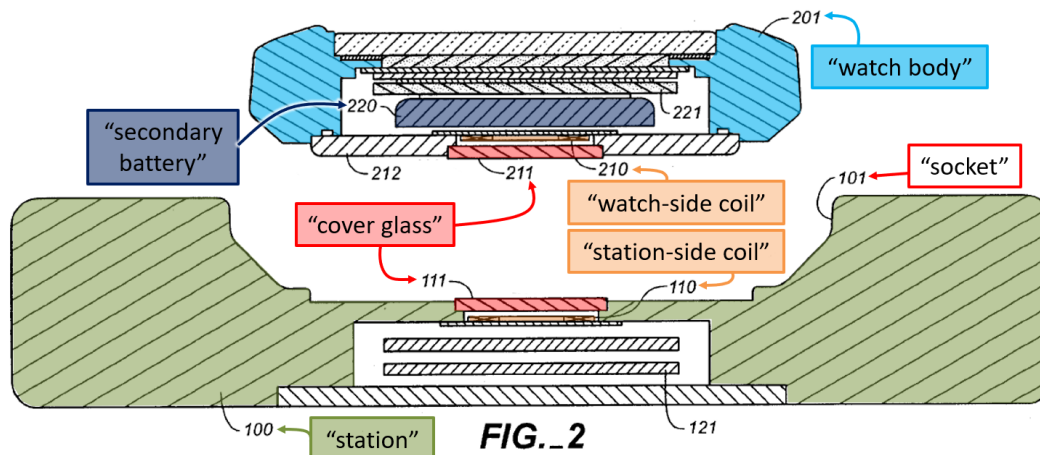


See EX1006 at 3 (Fig. 2). EX1003 ¶147.

Honda further teaches inductive coupling of the charging station coil and the 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.

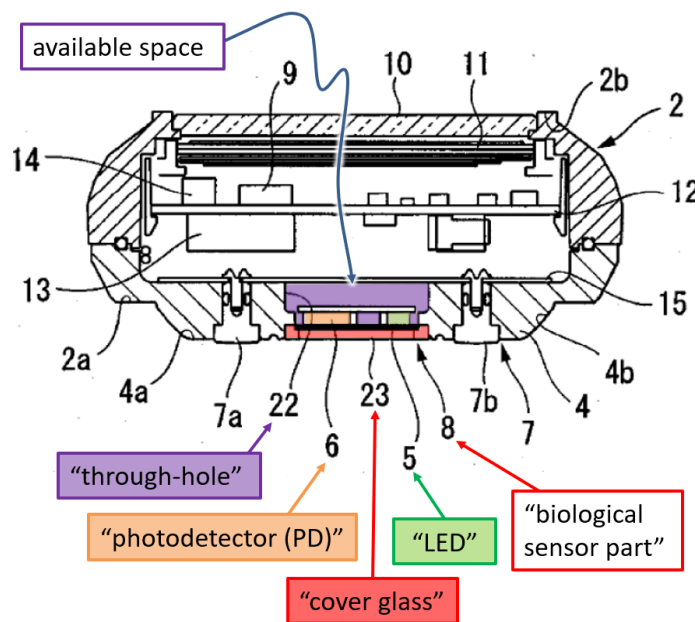
EX1006 6:36–40.



See *id.* at 3 (Fig. 2). EX1003 ¶148.

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

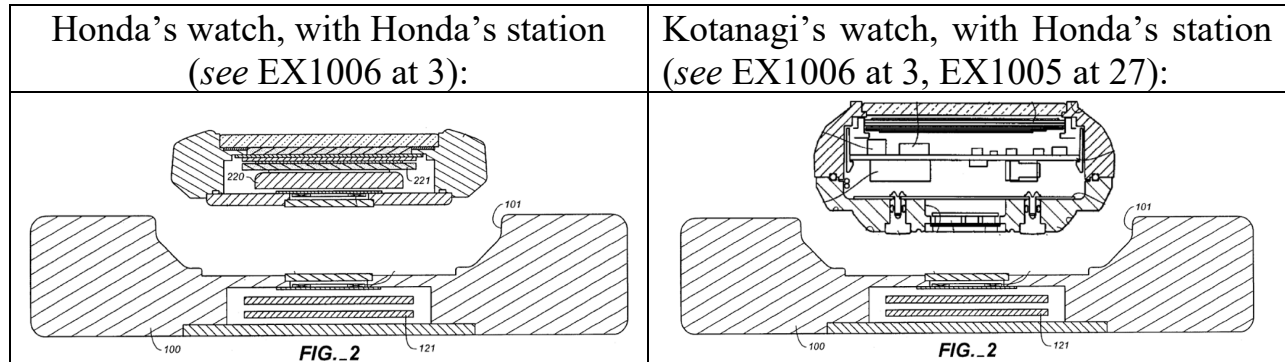
case, the resulting magnetic flux would pass through the cover glass, as taught by Honda. The purple shading in the figure below shows that space was already available in Kotanagi's "through-hole" behind and around the outside of the other listed components, making the modification from Honda simple and feasible, with a high expectation of success:



See EX1005 at 27 (Fig. 7). EX1003 ¶142.

Honda teaches using its wireless receive coil cooperatively with an "external wireless charging device," through a nonconductive cover material, as claimed. A POSITA would have known that Kotanagi's transformer for recharging in a "contactless state" (EX1005 ¶53) involves such a charging device. Consistent with Honda's teaching to align by seating a watch in a station "socket" (EX1006 6:7), a

POSITA would have readily used Honda’s charging station (or something similar), with Kotanagi’s watch, as shown in the figures below. EX1003 ¶150.



After addressing any potential scale differences, a POSITA would have readily combined Kotanagi’s watch with Honda’s charging station at least because the figures suggest complementary shapes. Thus, Honda and Kotanagi teach that aligning and positioning the coil within Kotanagi’s watch as described above also configures the coil “to inductively couple to an external wireless charging device through the non-conductive material of the cover” as claimed. EX1003 ¶151.

Moreover, Honda’s Figure 15 and related text (see below) teach metal covers are inferior for power transmission due to, e.g., eddy currents. EX1006 at 14; *id.* at 2:48–50 (“eddy currents take place in the electrically conductive metal material, weakening the electromagnetic coupling”). A POSITA would have known from Honda’s disclosure to wirelessly charge through a non-conductive material as “the use of the conductive member is not appropriate for a high-efficiency transmission.” EX1006 13:30–32. Honda’s experiments show wireless

charging through a glass surface is orders of magnitude more efficient than charging through stainless steel:

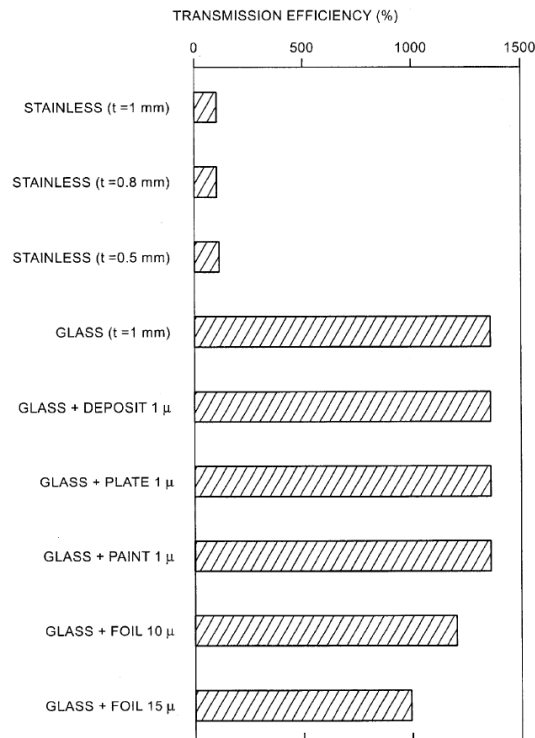


FIG. 15

EX1006 at 14. Thus, a POSITA would have aligned Honda's coil with Kotanagi's opening such that inductive coupling occurs "through the non-conductive material of the cover," as claimed. EX1003 ¶155.

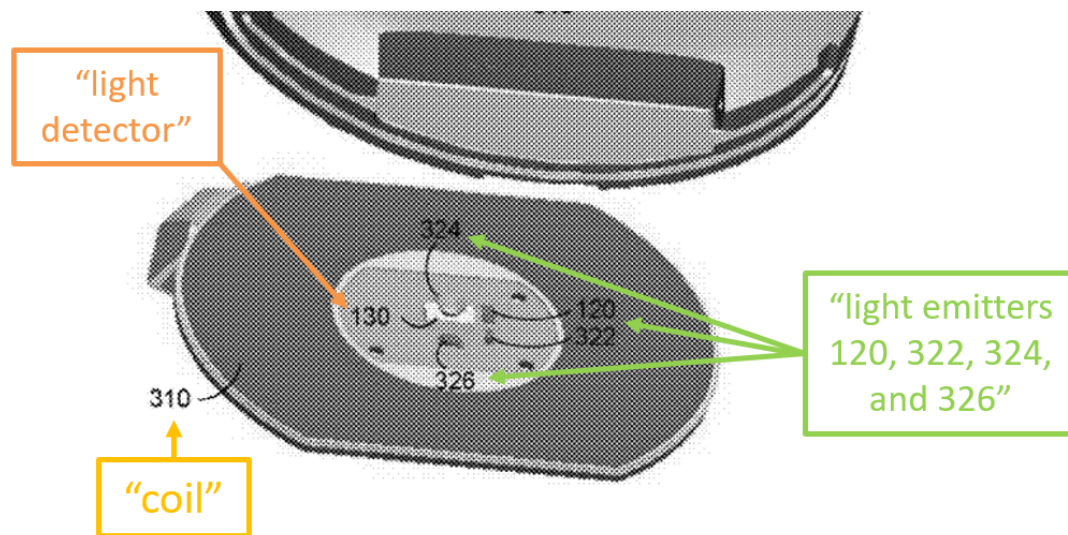
h. Motivation to Combine Kotanagi and Honda

Kotanagi and Honda were both assigned to Seiko companies. *See* EX1005 at 1, EX1006 at 1. Thus, a POSITA having Kotanagi would have also had access to Honda and readily combined teachings from the two references. 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 “familiar elements” that do “no more than yield predictable results” (*KSR Int’l v. Teleflex Inc.*, 550 U.S. 398, 401 (2007)). Honda teaches wireless watch charging and sensors for measuring pulse/heart rate of the body (EX1006 6:14–20; 8:40–42), motivating a POSITA to look to Kotanagi to “implement a predictable variation” (*KSR* at 401). Thus, there is an express motivation in both references that the subject matter in each should be combined with the other. *See id.* (noting that such a teaching, suggestion, or motivation (TSM) is helpful to show obviousness). EX1003 ¶155.

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. As explained above, e.g., in § IV(A)(1)(g), components from Honda would have readily fit within or otherwise combined with Kotanagi’s embodiments. For example, a POSITA would have readily implemented Kotanagi’s teachings using structures for contactless or wireless charging from Honda. EX1003 ¶156.

Although Fraser is not cited in Ground 1, Fraser provides evidence that it would have been feasible to make the second modification option discussed above: to enlarge Kotanagi’s opening and cover glass to make room for a coil behind the cover glass, surrounding the LED and PD. Fraser teaches a biosensing watch with a wireless “charging coil 310 surrounding the light emitters 120, 322, 324, and 326 and the light detector 130.” EX1041 [0026]:



EX1041 at 4. Fraser teaches that “[t]he light emitters 120, 322, 324, and 326 and the light detector 130 can be placed in the middle of the charging coil 310 to reduce the thickness of the apparatus.” EX1041 [0026]. Fraser thus provides evidence of both the feasibility of such a modification, as well as a motivation for this approach (e.g., to reduce apparatus thickness). EX1003 ¶¶157–158.

For these reasons and those explained above, a POSITA would have been motivated to combine Honda and Kotanagi. These motivations to combine also

apply to the other Ground 1 combinations and dependents from Claim 7. Further motivations to combine are provided throughout this petition and Dr. Duckworth’s declaration. EX1003 ¶159.

2. Dependent Claim 11

Claim 11 depends from Claim 7 and further adds, “**wherein: the cover forms a waterproof seal with the housing along a perimeter of the cover.**”

Kotanagi teaches covering its wired charging terminal to protect the terminal from “water droplets, dust, or the like.” EX1005 ¶53. Kotanagi then suggests replacing the terminal and instead “recharg[ing] the rechargeable battery 13 in a contactless state.” *Id.* Thus, Kotanagi recognizes contactless charging as a solution for preventing “water droplets, dust, or the like” from penetrating the device.

Similarly, Honda teaches the benefits of stronger “waterproofness”:

If the charging and the signal transmission are performed through electrical contacts in such a system, the contacts are exposed and the apparatus is **weak in terms of waterproofness. For this reason**, the charging and the signal transmission are preferably performed in a non-contact fashion, through the electromagnetic coupling between coils respectively arranged in the station and the portable electronic apparatus.

EX1006 1:24–31 (emphasis added). Honda teaches that by “arranging a high-rigidity glass on the surface to which the primary coil and the secondary coil face,

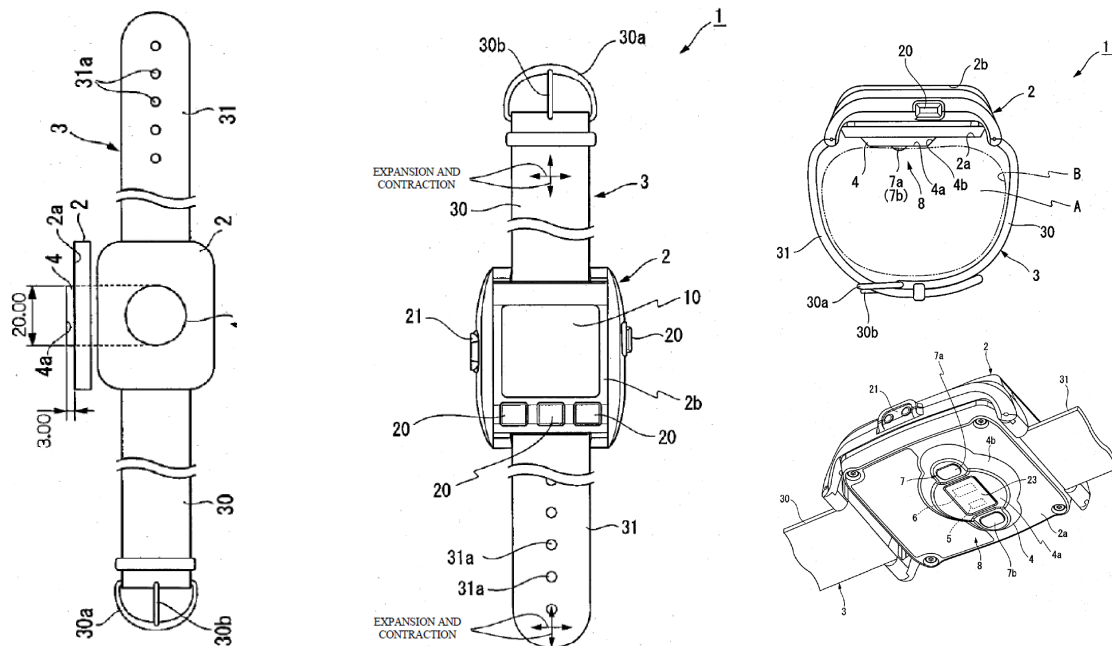
a compact and **waterproof electronic apparatus** is provided.” EX1006 15:36–38 (emphasis added). Honda teaches a watch that is waterproof up to five atmospheres. *Id.* 13:22–25. EX1003 ¶¶161–163.

From the above, a POSITA would have recognized the water droplet problem from Kotanagi and that Honda’s “cover forms a waterproof seal with the housing along a perimeter of the cover” as claimed. A POSITA would have expected to successfully achieve a water-tight seal (and be motivated to establish such a seal) in Kotanagi not only because of Honda’s success, but also based on the general knowledge of watches successfully using sealants, rubber gaskets, etc. to prevent moisture from harming internal electrical components, allowing watch wearers to wash hands, swim, and dive. Thus, a POSITA would have found it obvious to employ a rear cover that forms a waterproof seal with the housing. EX1003 ¶164.

3. Independent Claim 14

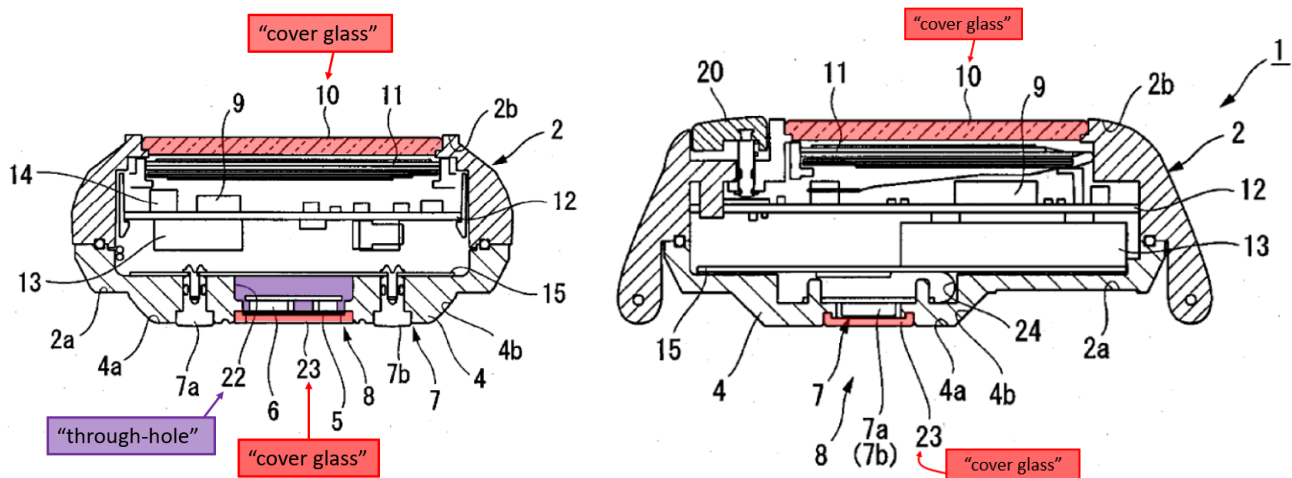
a. [14a] “An electronic device comprising: a housing defining a first opening and a second opening;”

Kotanagi teaches an electronic device as shown below:



Id. at 23, 24, 26, 28 (Figs. 1, 2, 8, 5). EX1003 ¶165.

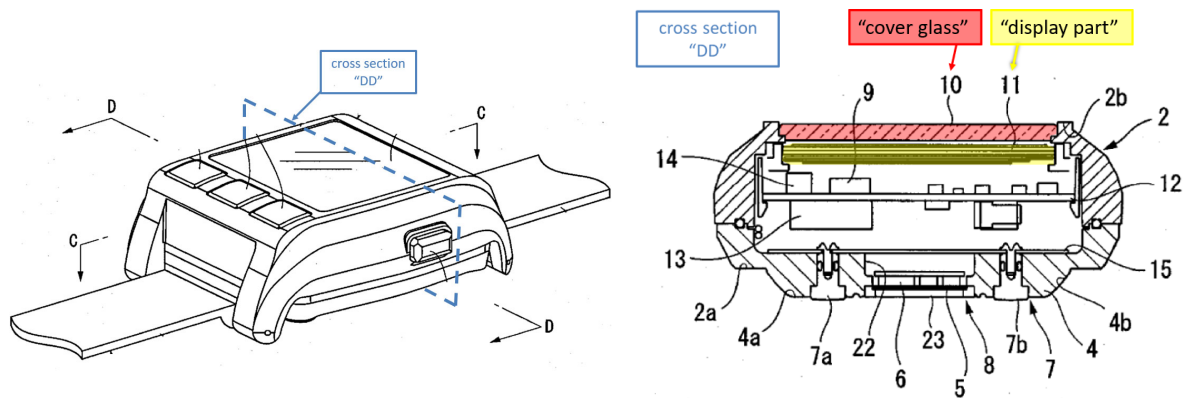
Kotanagi’s housing has a “first opening” at the top and a “second opening” (“through-hole 22”) at the bottom, both shown in the cross-sections below. The cover glass 10 and the cover glass 23 span these openings:



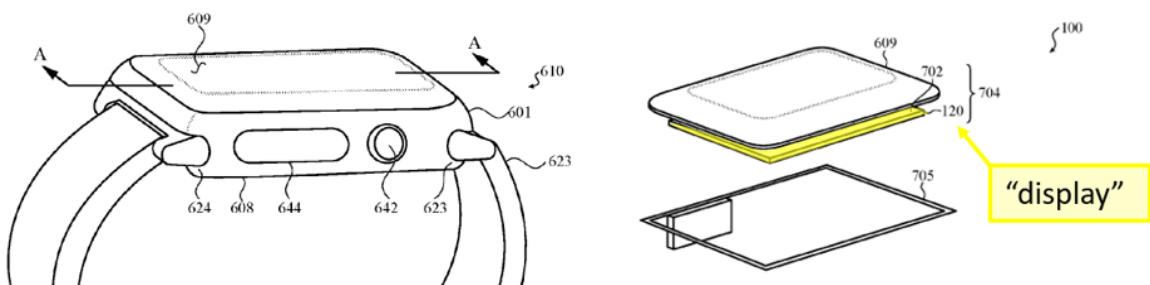
EX1005 at 27 (Figs. 7, 6). EX1003 ¶¶166.

b. **[14b] “a display positioned at least partially within the first opening;”**

Kotanagi teaches “A cover glass 10 . . . is fitted into the central portion of the upper surface 2b of the housing 2, and a display part 11 . . . is disposed inside the cover glass 10.” Ex 1005 ¶48.



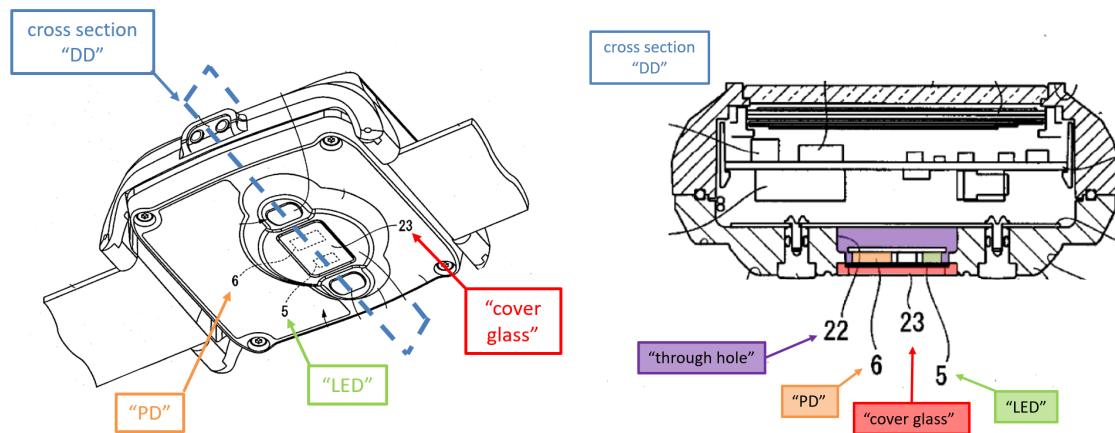
See id. at 25, 27 (Figs 5, 7). This is consistent with the '491 patent's display, which is also under a cover glass in the opening.



See EX1001 at 12–13 (Figs. 6, 7). Accordingly, Kotanagi teaches this limitation. EX1003 ¶¶167–168.

c. **[14c] “a biosensor module aligned with the second opening;”**

Kotanagi teaches a “biological sensor part” aligned with the opening:



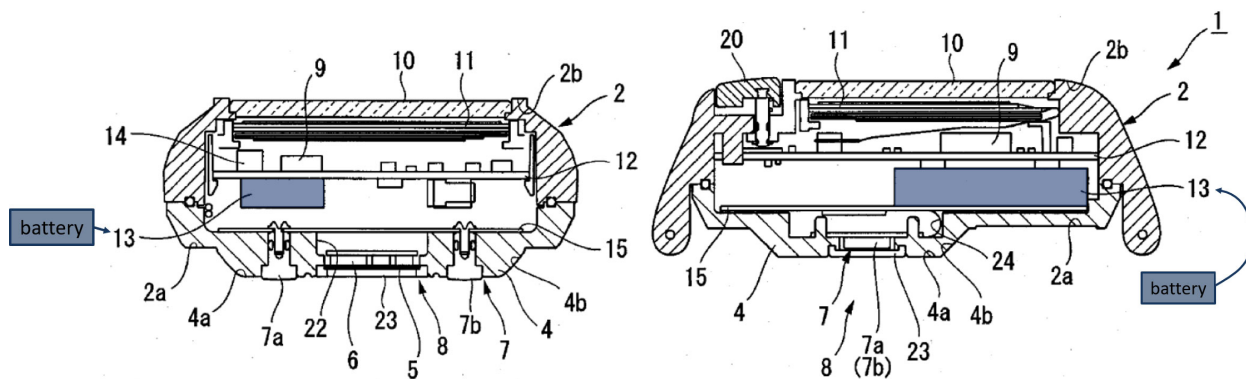
See EX1005 at 26, 27 (Figs. 5, 7). “The LED 5 and the PD 6 are disposed adjacent to one another ... so as to touch the inside of the glass cover 23.” EX1005 ¶55. EX1003 ¶¶169–170.

d. **[14d] “a wireless charging receive coil positioned within the housing and aligned with the second opening;”**

These features are obvious in view of Honda and Kotanagi, as explained for limitation 7g. The evidence and analysis above showing the coil is “below the cover” also shows it is “positioned within the housing.” EX1003 ¶¶171–176.

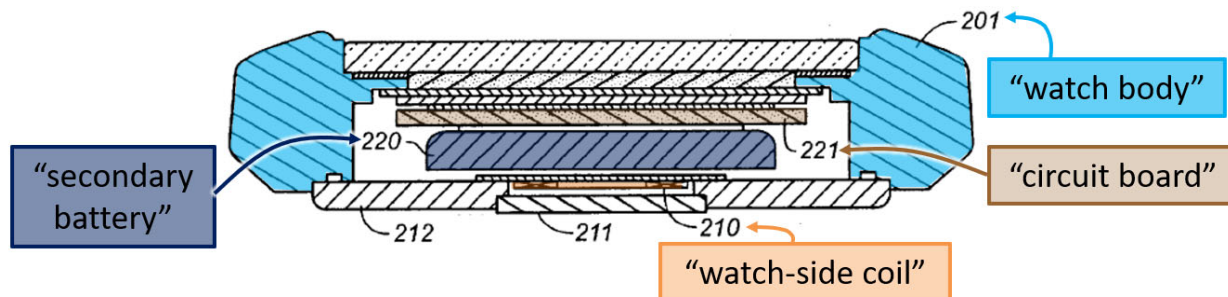
e. **[14e] “a battery operably coupled to the wireless charging receive coil; and”**

Kotanagi teaches a “rechargeable battery 13,” which can be connected for “contactless,” or wireless, charging. EX1005 ¶53. The battery is illustrated in the cross-sections of Kotanagi’s Figures 6 and 7:



See EX1005 at 27 (Figs. 6, 7). EX1003 ¶177.

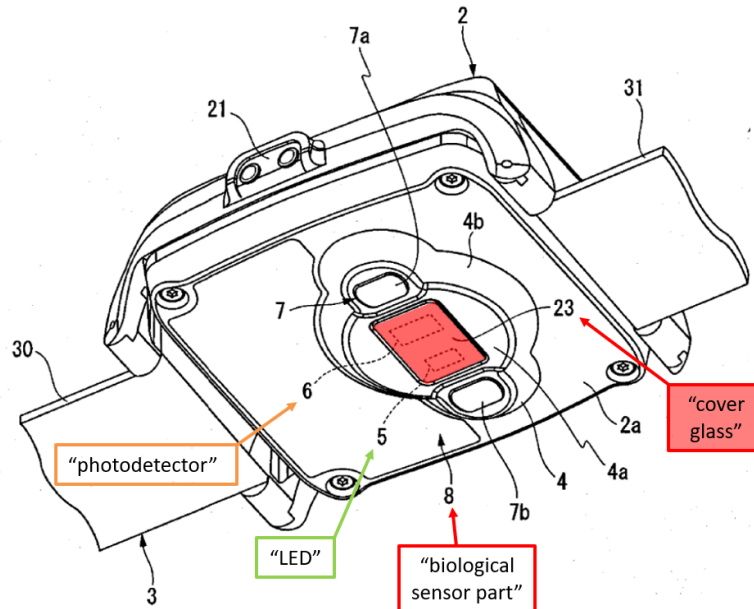
Honda specifically teaches a rechargeable battery coupled to a wireless charging coil: “The watch body 201 includes a circuit board 221, connected to a secondary battery 220 and a watch-side coil 210.” EX1006 6:25–27.



See id. at 3 (Fig. 2). To obtain power, a POSITA would have included a coil in the Kotanagi device and connected it to Kotanagi's battery, as taught by Honda's battery connection from coil to battery. EX1003 ¶¶178–179.

- f. **[14f] “a cover formed from an optically transparent material and disposed over the biosensor module and the wireless charging receive coil, wherein:”**

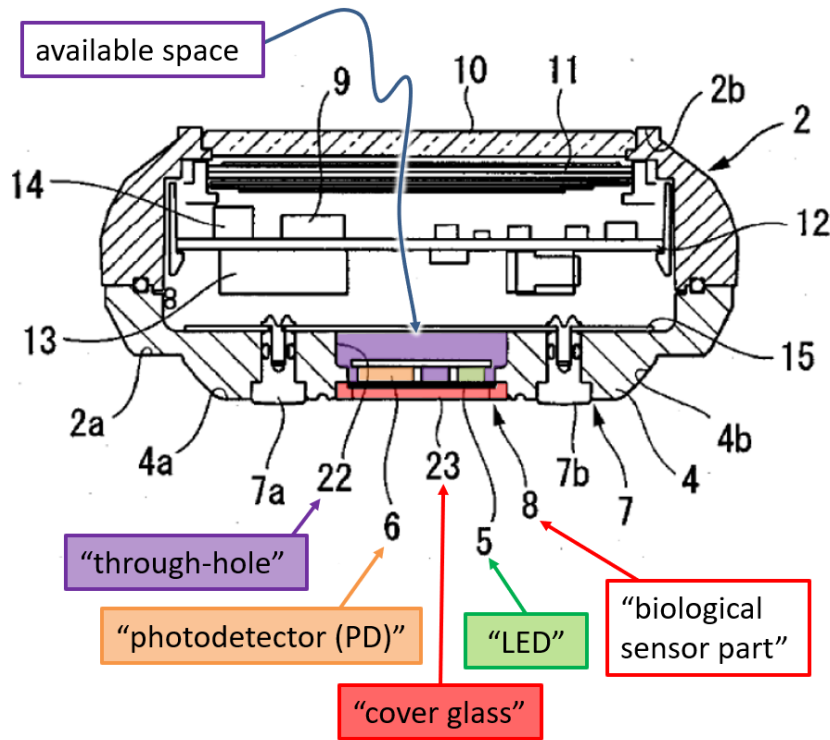
Kotanagi illustrates its photodetector 6 and LED 5 with dashed lines to indicate they lie behind the cover glass 23, forming an optical “biosensor module”:



See EX1005 at 26 (Fig. 5). Kotanagi’s cover glass is optically transparent, because from their positions behind this cover the “data processing part 9 emits light from the LED 5 toward the living body” and the “[t]he PD 6 receives ... reflected light.” EX1005 ¶¶65. EX1003 ¶¶180–181.

Honda’s cover glass is also optically transparent: “since the glass member is typically transparent, the internal coil and electronic components are seen through the glass cover from the outside.” EX1006 13:53–55. EX1003 ¶182.

The discussions of limitations **14d** and **7g** above explain why it would have been obvious to position Honda’s coil within the housing aligned with the second opening (e.g., in the available space illustrated below).



See EX1005 at 27 (Fig. 7). This same positioning and alignment would have disposed the cover “over the biosensor module and the wireless charging receive coil,” as claimed here. EX1003 ¶¶183–185.

- g. [14g] “the electronic device is configured to receive wireless power through the optically transparent material of the cover using the wireless charging receive coil; and”

The discussion of limitation 7g above explains why Kotanagi and Honda teach a wireless charging receive coil configured to “inductively couple” to an external charging device. This inductive coupling is how a device receives wireless power, and the same analysis applies here. To summarize, Kotanagi teaches “contactless” charging. EX1005 ¶53, ¶55. Honda provides further details, explaining how magnetic flux forms between two coils, traversing the cover glass:

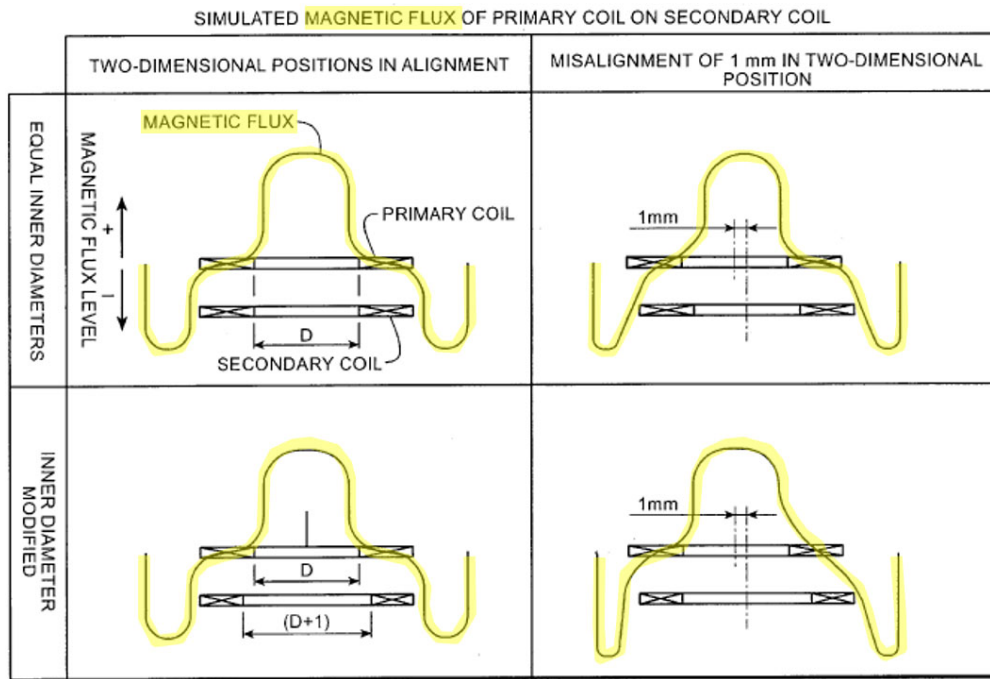
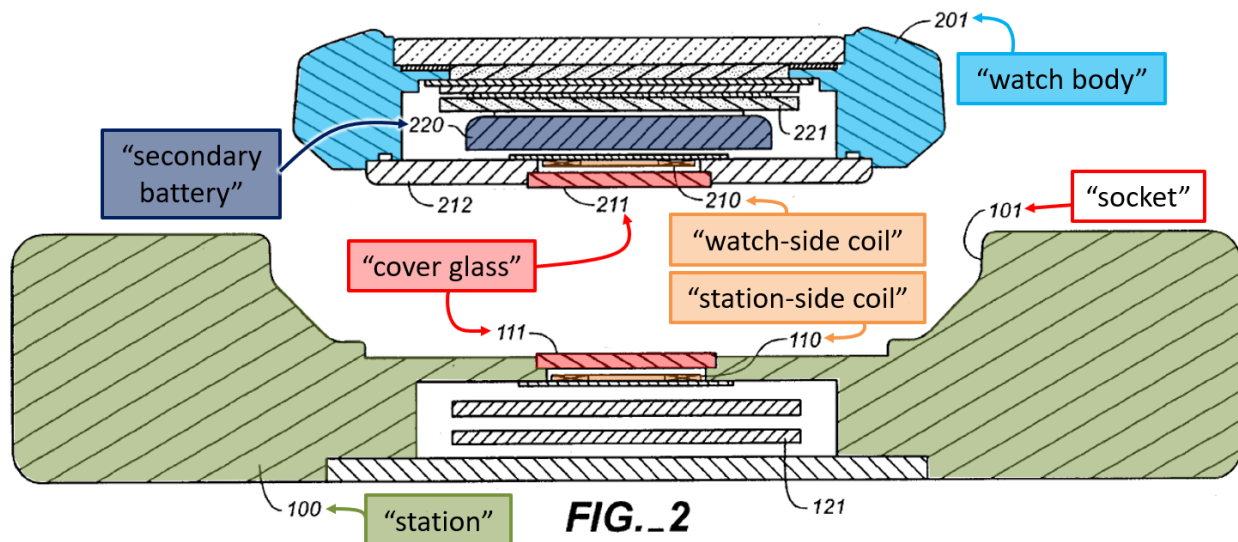
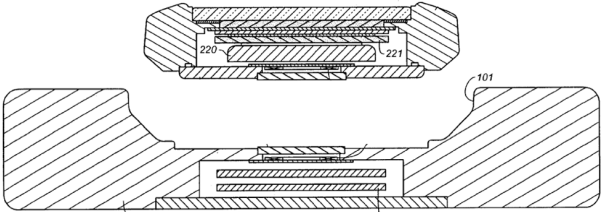
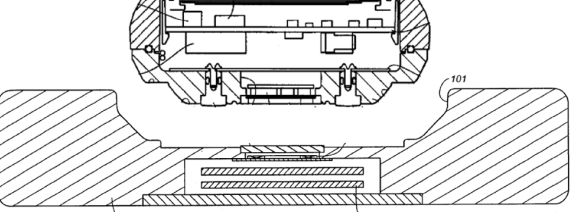


FIG. 10

EX1006 at 9 (Fig. 10); *see* EX1006 6:28–35. A POSITA would have understood (from Honda and/or general knowledge) that this magnetic flux sends wireless power through the cover to charge the watch battery, in an arrangement like this:



See id. 1006 at 3 (Fig. 2). Because the Kotanagi and Honda watch devices are so similar, Kotanagi’s device as modified would fit within (and interact similarly with) at least a scaled version of Honda’s charging station.

Honda’s watch, with Honda’s station (<i>see</i> EX1006 at 3):	Kotanagi’s watch, with Honda’s station (<i>see</i> EX1006 at 3, EX1005 at 27):
	

Accordingly, Kotanagi and Honda teach an electronic device configured to “receive wireless power through the optically transparent material of the cover using the wireless charging receive coil,” as claimed. EX1003 ¶¶186–192.

h. [14h] “the electronic device is configured to measure a heart rate of a user through the optically transparent material of the cover using the biosensor module.”

As explained for limitation 7f, Kotanagi teaches passing an optical signal through the material of the cover. Kotanagi also teaches measuring a “pulse signal” from reflected light that is transmitted through cover glass: “A portion of the emitted light is absorbed, for example, by hemoglobin in blood vessels, and another portion of the light is reflected by biological tissue. The PD 6 receives this reflected light, generates a pulse signal (biological information signal) corresponding to the amount of received light.” EX1005 ¶65. Kotanagi’s data

processing part 9 converts the pulse signal into a “pulse rate.” EX1005 ¶66. A POSITA would have known that pulse rate is a function of and directly correlated with heart rate, as pulsing fluctuations in blood flow result from and have the same cadence as heart contractions. Honda also teaches that its watch may detect “pulse rate or heart rate of the body through an unshown sensor.” EX1006 6:17–20; 8:40–42. For at least these reasons, these limitations are taught by the combination of Kotanagi and Honda. EX1003 ¶193.

i. Motivation to Combine Kotanagi and Honda

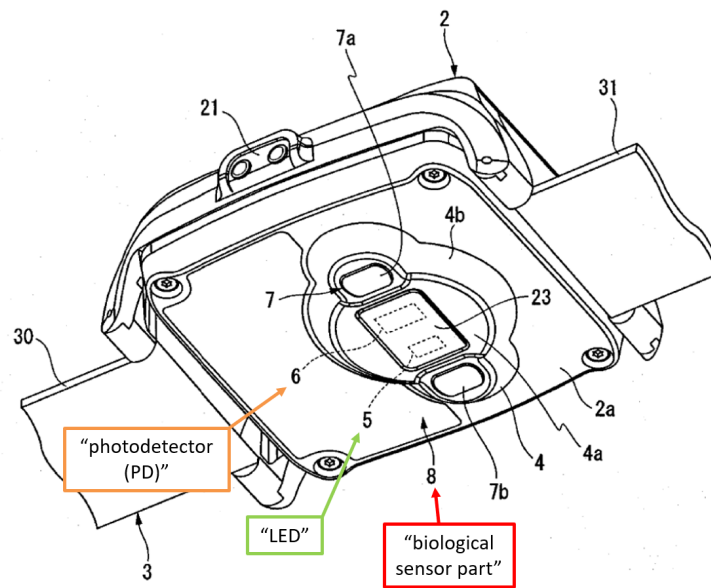
Prior to September 2014, a POSITA would have been motivated to combine Kotanagi and Honda at least for the reasons provided for Claim 7. *See supra* § IV(A)(1)(h). EX1003 ¶194–196.

4. Dependent Claim 16

Claim 16 depends from claim 14 and further adds:

a. [16a] “wherein: the biosensor module comprises: a light source; and a detector;”

Kotanagi teaches the claimed module through its “biological sensor part” comprising an LED (5) and a detector (PD 6):



See EX1005 at 26 (Fig. 5). EX1003 ¶198.

- b. **[16b] “the light source and the detector are configured to measure changes in light absorption by a region of skin of the user;”**

Kotanagi teaches these limitations: “since the amount of reflected light out of the light emitted from the LED 5 varies depending on fluctuations in blood flow within arteries and arterioles in the wrist ... the PD 6 can generate a pulse signal.” EX1005 ¶65. Thus, Kotanagi’s features are configured as claimed. EX1003 ¶199.

- c. **[16c] “the electronic device is configured to compute the heart rate using the measured changes in light absorption; and”**

Kotanagi’s device “extracts a pulse signal corresponding to the pulse from the reflected signal, and calculates the pulse rate.” EX1005 ¶3. A POSITA would have known that pulse rate corresponds to heart rate, as pulsing fluctuations in blood flow result from and have the same cadence as heart contractions. Honda

also teaches that its watch may detect “pulse rate or heart rate of the body” using a sensor. EX1006 6:17–20; 8:40–42. EX1003 ¶¶200–203.

d. **[16d] “the display is configured to display information associated with the heart rate.”**

Kotanagi teaches “wherein a display part for displaying detected biological information is provided on an upper surface of the main body.” EX1005 at 21. Kotanagi teaches “a display part 11 for displaying the . . . pulse rate.” *Id.* ¶48. EX1003 ¶¶204–209.

B. **Ground 2: Claims 1–3, 5, 13, and 17 are unpatentable because they would have been obvious over Kotanagi in view of Honda and further in view of Choi.**

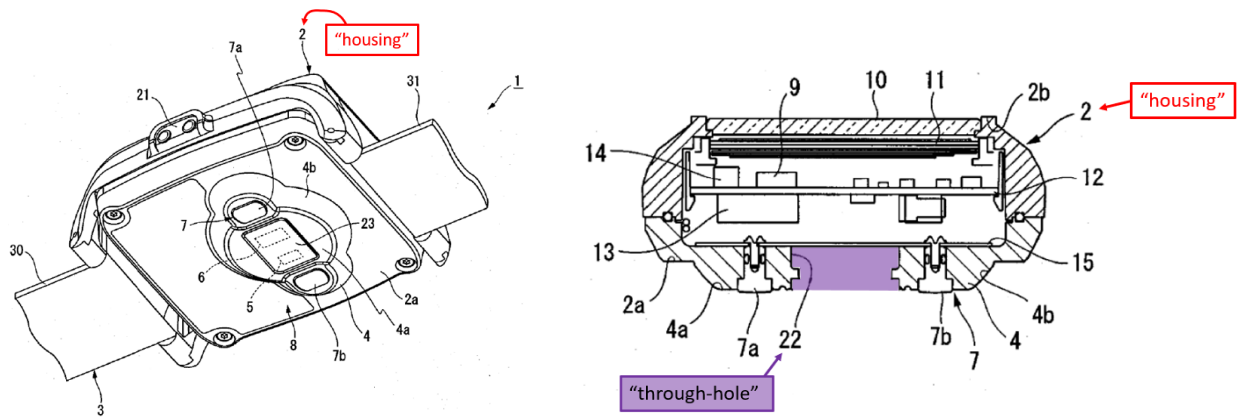
1. **Independent Claim 1**

a. **[1a] “An electronic watch comprising:”**

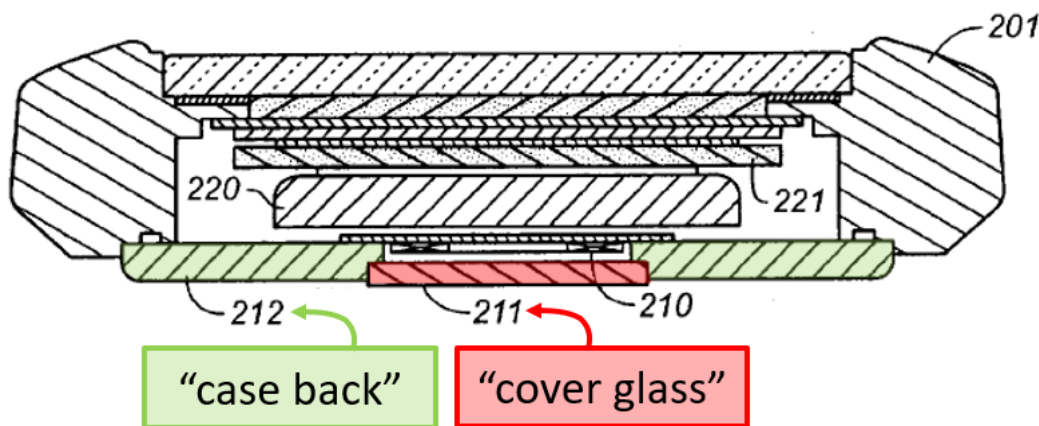
Kotanagi teaches a “wristwatch-type device which detects pulse rate as a type of biological information while mounted to the wrist.” EX1005 ¶44. EX1003 ¶210.

b. **[1b] “a housing formed from a metal material and defining a rear opening along a rear portion of the housing;”**

These limitations are obvious based on the analysis for limitation 7b. To summarize, Kotanagi’s housing 2 can be made of “a metal material such as aluminum.” EX1005 ¶48. A “through-hole 22” is formed in the center of the lower surface” (*id.* ¶55):



See EX1005 at 26, 27 (Figs. 5, 7) (biosensor module removed). Similarly, Honda teaches a case back 212 “typically made of a metal” and a cover glass 211 spanning a rear opening (EX1006 15:47–49):

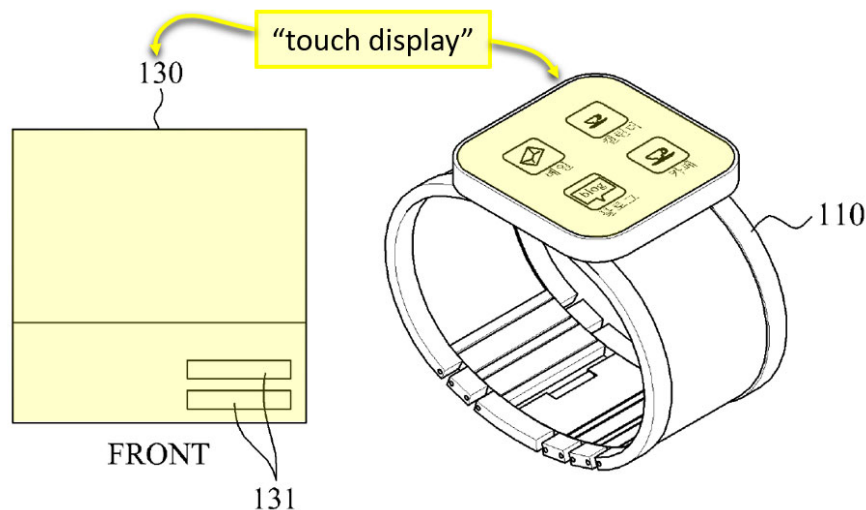


See *id.* at 3 (Fig. 2). Thus, Kotanagi and Honda teach these features. EX1003 ¶¶211–213.

c. **[1c] “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 at 11.

In the same field of endeavor, Choi teaches a biosensing watch. A “surface” of this device has “a display visible to the user, for example, a touch display” that it describes as “a front 130” (EX1023 [32]; EX1011 [43]):



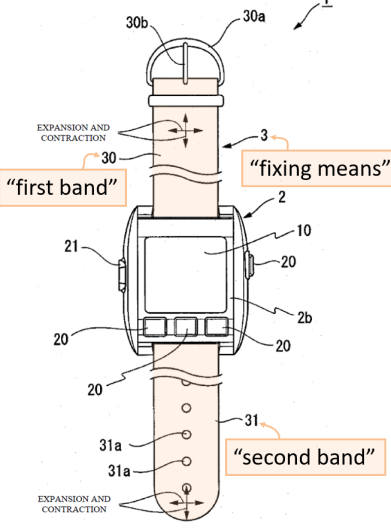
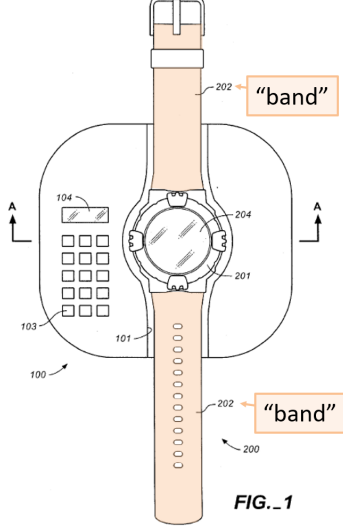
See EX1023 at 28 (Fig. 1); EX1011 at 24 (Fig. 1). EX1003 ¶214.

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. Incorporating a touchscreen would 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 changing screen can provide context to reduce a need for user training).

Further, touchscreens were known in the art,⁹ and this combination provides “familiar elements” that do “nothing more than yield predictable results.” *See KSR*, 550 U.S. at 416. EX1003 ¶215–216.

d. [1d] “a band coupled to the housing and configured to couple the electronic watch to a user;”

These features are taught by Kotanagi, as shown for limitation 7c. A band configured to “secure” the “device” to a user is also configured to “couple” the “watch” to a user. Honda and Choi also have such bands:

Kotanagi	Honda	Choi
 See EX1005 at 23 (Fig. 1).	 See EX1006 at 2 (Fig. 1).	 See EX1023 at 3, 28 (Fig. 1); EX1011 at 24 (Fig. 1).

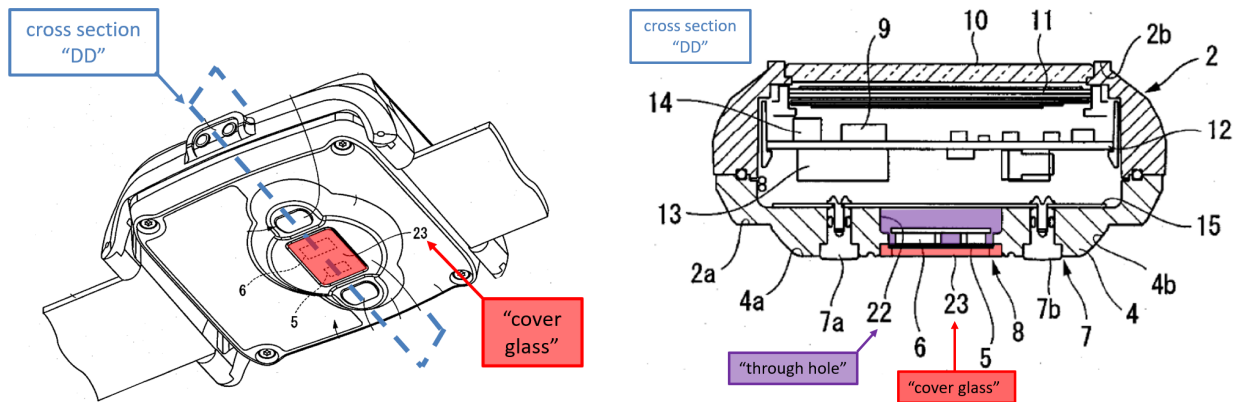
EX1003 ¶217.

⁹ See EX1041 [0020] (biosensing watch with a “touch screen display”); EX1016 [0046] (biosensing watch with “touch sensitive screen inputs”); EX1020 5:5 (“touch screen” for a biosensing watch).

e. **[1e] “a cover formed from a dielectric material and forming a seal along the rear opening of the housing;”**

Kotanagi teaches a “a cover glass 23 is fixed to the housing 2.” EX1005 at

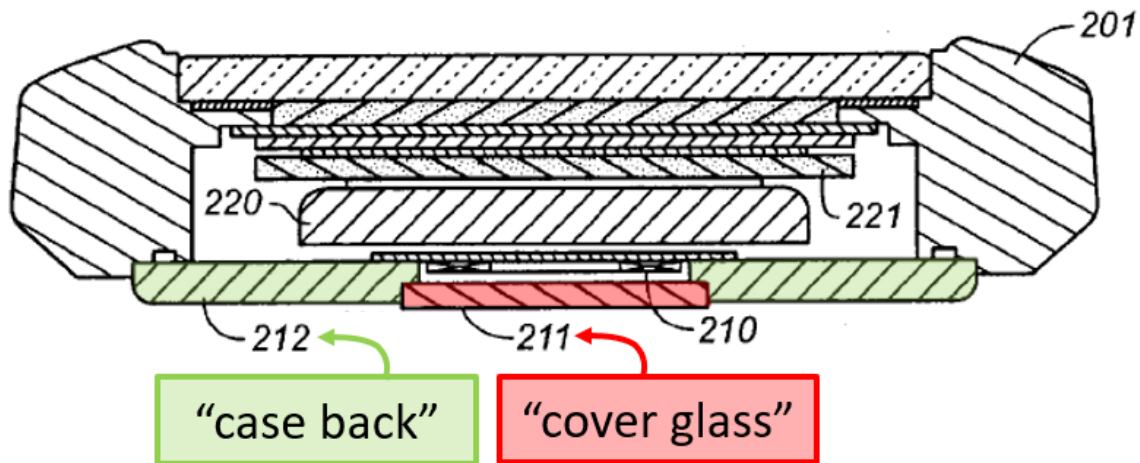
12. This forms a seal over the through-hole in the rear opening:



See EX1005 at 26, 27 (Figs. 5, 7). EX1003 ¶218.

A POSITA would have known that Glass is a non-conductive material, and Honda teaches this. EX1006 15:62 (“insulating body (glass, for example)”). Dependent Claim 3 (analyzed in Ground 2 below) states that the ’491 cover is glass or sapphire, confirming that the applicant considered glass a dielectric. Thus, a POSITA would have understood Kotanagi’s “cover glass 23” teaches this limitation. EX1003 ¶219.

Moreover, Honda teaches a cover glass 211 that forms a seal around Honda’s rear opening:

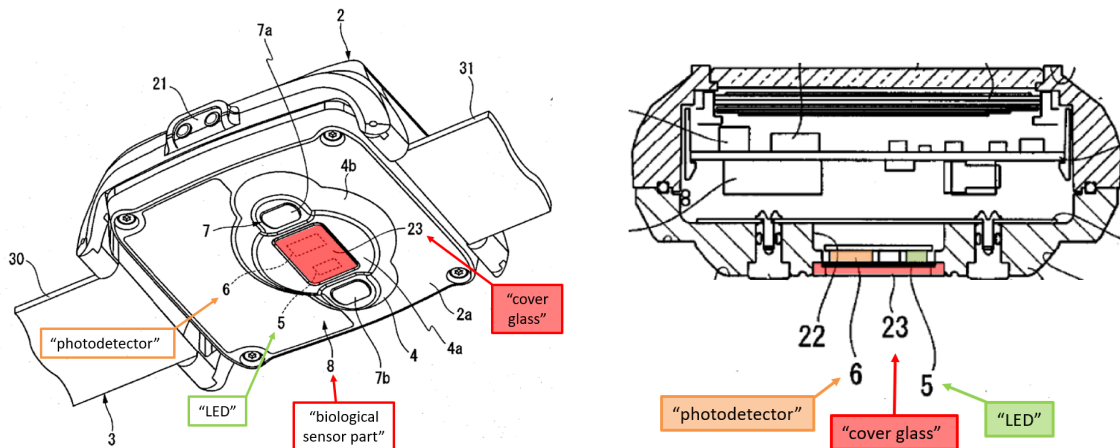


See EX1006 at 3 (Fig. 2). Honda teaches that its cover glass “may be replaced with other insulating materials.” *Id.* 16:14–15. EX1003 ¶¶220–221.

As shown for Claim 11 (*supra* § IV(A)(2)), Kotanagi is concerned with protecting from “water droplets” (EX1005 ¶53) and Honda teaches “waterproofness” (EX1006 1:24–31; 15:36–38) up to five atmospheres (*id.* 13:22–25). Thus, a POSITA would have understood from these references that insulating dielectric materials may be used to both cover and seal the rear opening of a watch. EX1003 ¶¶222–223.

f. **[1f] “an optical sensor positioned within the housing and configured to transmit an optical signal through the dielectric material of the cover;”**

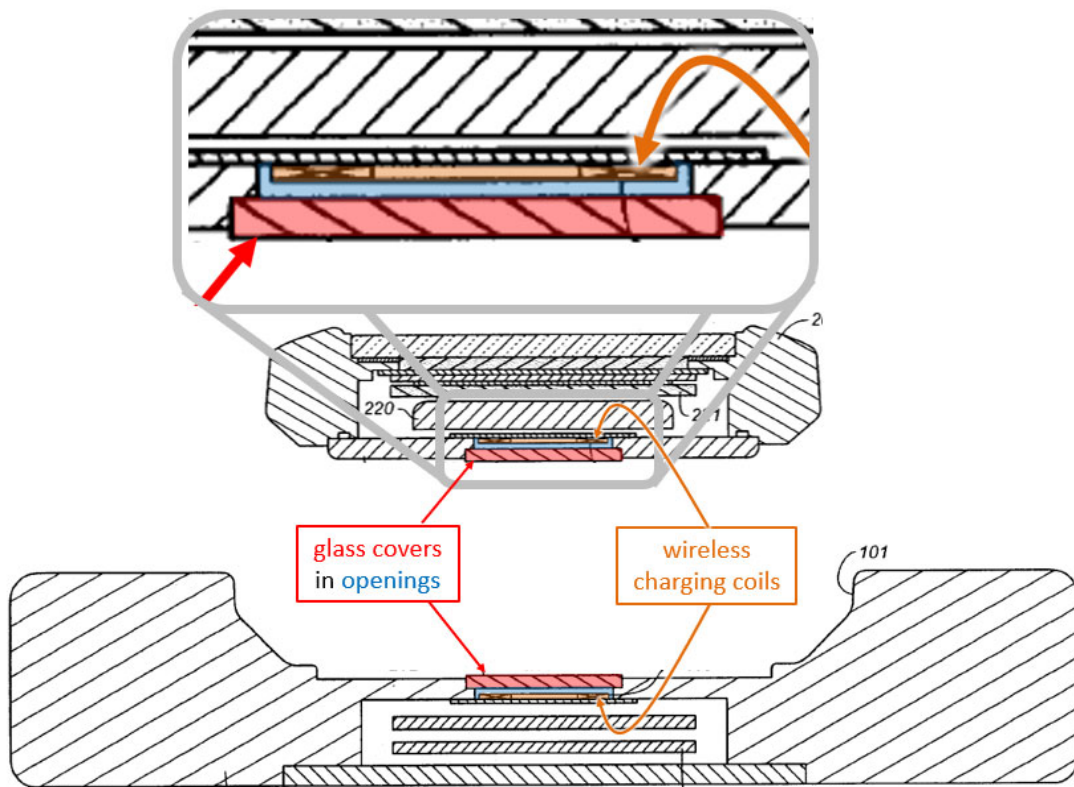
Kotanagi teaches an LED “for emitting light toward the living body” and a photodetector “for receiving reflected light from the living body.” EX1005 ¶46. Both are positioned within the housing immediately behind the cover glass:



See EX1005 at 26, 27 (Figs. 5, 7). A POSITA would have understood that because Kotanagi’s cover glass 23 “block[s] the through-hole 22” (EX1005 ¶55), its LED and photodetector transmit and receive optical signals *through* the cover glass. Thus, Kotanagi’s teachings satisfy this limitation. EX1003 ¶224–225.

g. [1g] “a charging coil positioned within the housing and configured to receive wireless power through the dielectric material of the cover;”

The discussion of limitation 7g above explains why Kotanagi and Honda teach a charging coil “aligned with the second opening and below the cover”; this is also “within the housing” as claimed here. That discussion also explains how Kotanagi and Honda teach a coil configured to “inductively couple” (transferring power) through a “non-conductive” (dielectric) cover. Accordingly, the 7g analysis also shows how the present limitations are obvious. To summarize, Kotanagi teaches “contactless” recharging (EX1005 ¶53) and Honda shows how to do this (EX1006 4:36) with charging coils through a cover glass:

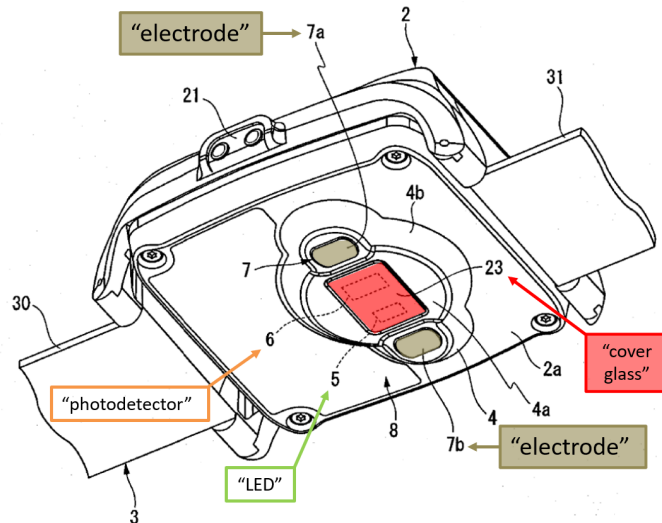


See EX1006 at 3 (Fig. 2). A POSITA would have known to wirelessly charge through dielectric or non-conductive material because Honda teaches that “the use of the conductive member is not appropriate for a high-efficiency transmission.” EX1006 13:30–31; *see id.* at 14 (Fig. 15). EX1003 ¶226–227.

A POSITA would also have known to pass power through the glass based on general knowledge of electrical shielding, teaching that complete metal enclosures prevent electromagnetic charge from penetrating. This is confirmed by Honda’s transmission experiments. EX1006 13:33–63. Thus, to achieve the wireless charging goal expressed in Kotanagi, a POSITA would have naturally positioned the coil near the glass-covered opening for power reception. EX1003 ¶¶228–229.

h. **[1h] “a first electrode positioned along a rear surface of the electronic watch; and a second electrode positioned along the rear surface of the electronic watch, wherein:”**

Kotanagi teaches a pair, or plurality, of electrodes that measures a “potential difference” between them. EX1005 ¶¶59, 86.



See *id.* at 26 (Fig. 5). EX1003 ¶230.

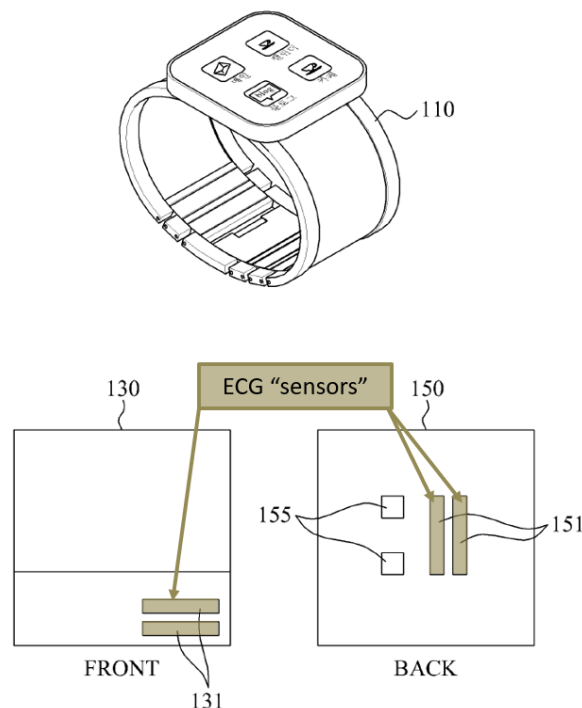
i. **[1i] “the electronic watch is configured to measure a heart rate using the optical sensor, and”**

As explained for limitation 14h, Kotanagi teaches measuring a heart rate using the biosensor module (which includes the optical sensor). Kotanagi’s watch “generates a pulse signal (biological information signal) corresponding to the amount of received light” reflected from blood vessels. EX1005 ¶65. Honda’s watch also “detects biological information including the pulse rate or the heart rate of the body.” EX1006 6:17–19. Accordingly, the claimed combination of Kotanagi and Honda satisfies this limitation. EX1003 ¶231.

- j. **[1j] “the electronic watch is configured to measure an electrocardiogram using the first electrode and the second electrode.”**

Kotanagi’s rear electrodes interact with the optical sensor to achieve pulse measurement. In the same field of endeavor, Choi uses electrodes to directly obtain an electrocardiogram: “To detect the ECG signal . . . , a signal detected in at least two different portions of the body of the user may be needed, and thus, the sensors 131 and 151 are provided on the front 130 and on the back 150, respectively” (EX1023 [45]; EX1011 [52]):

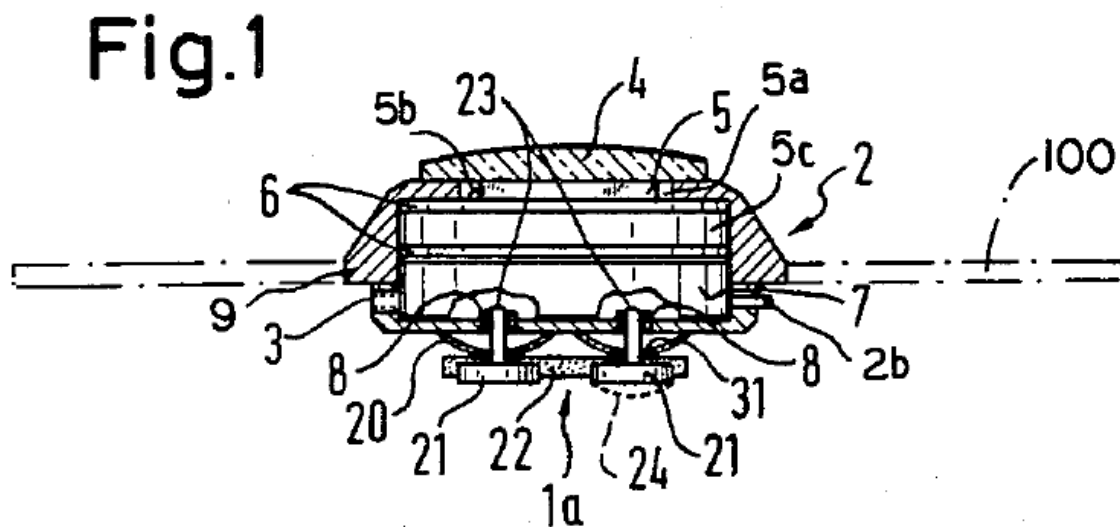
[Fig. 1]



See EX1023 at 28 (Fig. 1); EX1011 at 24 (Fig. 1). EX1003 ¶232.

In view of Kotanagi’s alternative teachings—e.g., the electrodes “need not be a pair, and a plurality of electrodes, for example, may be provided” (EX1005

¶14, *see* ¶86) and Choi’s teaching that front and back sensors may not be needed (EX1023 [45]; EX1011 [52])—a POSITA would have considered alternative electrode arrangements for ECG measurement. A POSITA would have known by September 2, 2014 (given its availability in at least 1980), that a pair of ECG electrodes can be spaced as close as 4–5 mm on the back of a watch (EX1029 3:7–15), as well as for surgical applications, and remain accurate (*id.* 4:34–45).



E.g., EX1029 at 2 (Fig. 1). EX1003 ¶233.

In view of this knowledge, a POSITA would have used Kotanagi’s existing electrodes and Choi’s teachings to either: (1) use signals from Kotanagi’s existing electrodes to obtain an ECG; or (2) add one or more additional electrodes to Kotanagi (as taught by Choi) and use both it and the existing electrodes to obtain an ECG. Limitation 1j does not require that the first and second electrodes are the

only electrodes used to measure the ECG. Thus, under either of these scenarios, Kotanagi, Honda, and Choi render obvious limitation 1j. EX1003 ¶233.

k. Motivation to Combine Kotanagi, Honda, and Choi

The reasons to combine Kotanagi and Honda provided above (e.g., *supra* § IV(A)(1)(h)) also apply here. These include the teachings of both Kotanagi and Honda—e.g., for wireless charging. Both were owned by Seiko companies, suggesting that they would have both been available to a POSITA having one or the other. This and their underlying similarities (wrist-watch shapes, biosensors toward the wrist, similar cover glass, available space for a coil, etc.) would have caused a POSITA to expect success in combining them. EX1003 ¶234.

A POSITA would have also been motivated before the effective filing date to expect success in combining the teachings of Kotanagi and Choi, because they both teach a watch with both optical and electrode biosensors. Kotanagi teaches “a plurality of electrodes” to detect electrical potential of skin contact. EX1005 ¶¶14,86. Choi teaches similar electrodes, but obtains an ECG or obtains an “impedance signal,” which is analogous to the electrical potential taught in Kotanagi. EX1023 [56]; EX1011 [50]. Because Kotanagi already has multiple electrodes, any further modification from Choi (e.g., to process electrode signals differently or to add an electrode) would have involved mere combinations of

familiar elements according to known methods to yield predictable results.¹⁰ *See KSR*, 550 U.S. at 416. EX1003 ¶¶235–241.

Moreover, because Kotanagi’s rear electrodes are similarly spaced and positioned (accounting for scale differences) to those of Choi and known 2-electrode devices (*see* EX1029 at 2), configuring them to measure an ECG would thus have been an application of 1980-era technology, with an expectation of success, resulting in a watch with improved biosensing. EX1003 ¶235.

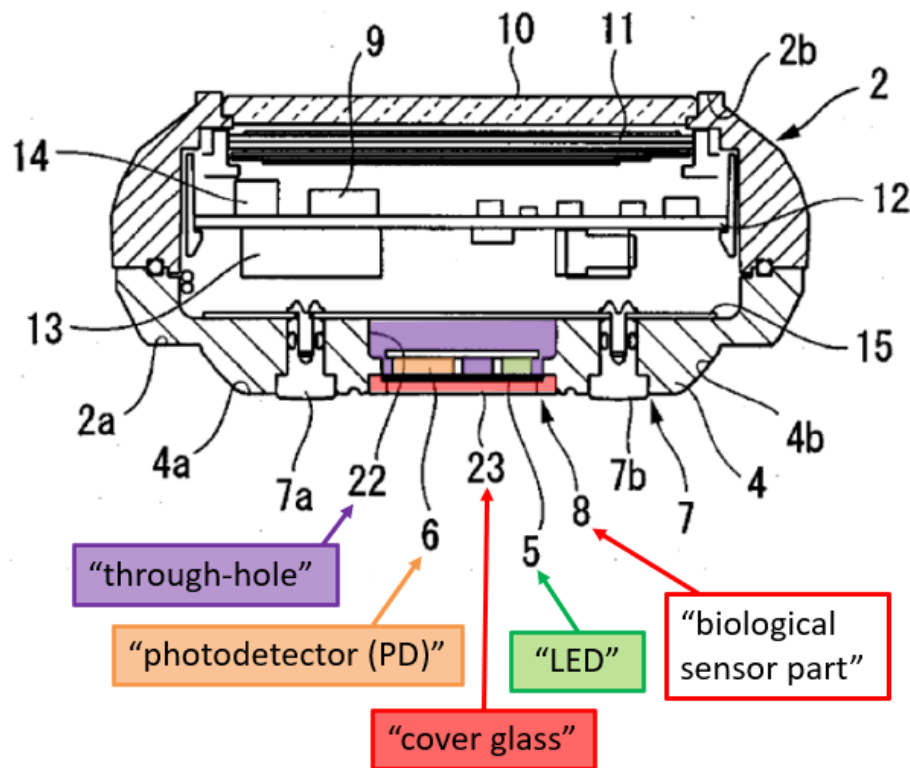
For these reasons and those explained above, a POSITA would have been motivated to combine Choi with Kotanagi as modified by Honda. These motivations also apply to the other Ground 2 combinations and dependents from Claim 1. Further motivations to combine are provided throughout this petition and Dr. Duckworth’s declaration. EX1003 ¶241.

2. Dependent Claim 2

Claim 2 depends from Claim 1 and adds **“the cover defines at least one window for the optical sensor; and the cover protrudes outward from a rear housing surface of the housing.”**

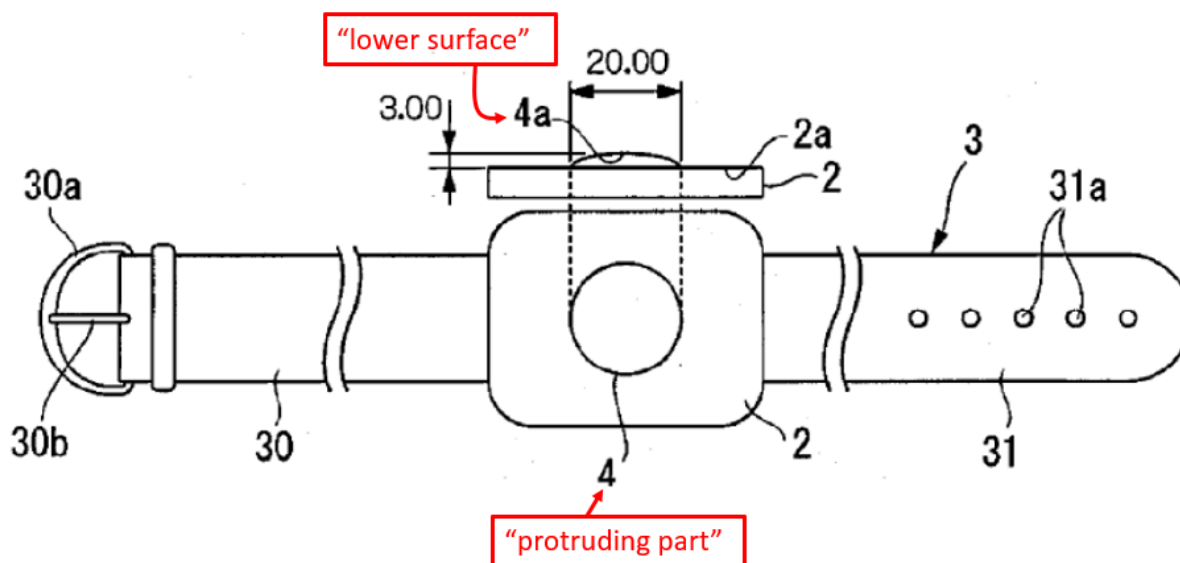
¹⁰ Biosensing watches in various prior art references (e.g., EX1029, EX1027, EX1030, EX1031, EX1033, EX1034, EX1035, EX1008) have ECG measurement capabilities. EX1003 ¶240.

Kotanagi teaches a single opening in its base, with a cover glass, and an LED and a photodetector both positioned in that opening immediately behind the cover glass:



See EX1005 at 27 (Fig. 7). Kotanagi’s cover glass 23 covers the opening of through-hole 22, thereby spanning the areas shown for both the LED and photodetector and defining at least one window for them. EX1003 ¶243.

Kotanagi’s Figure 10 also shows a disk-shaped protruding part with a curved shape that protrudes away from the housing: “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 *id.* at 28 (Fig. 8). EX1003 ¶¶244–245.

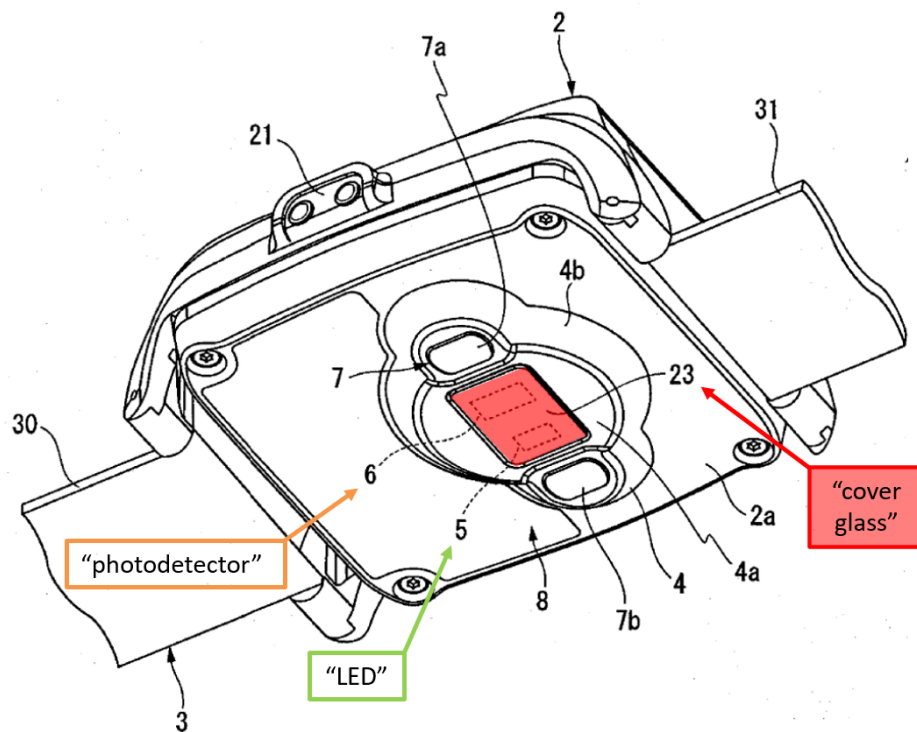
Kotanagi elsewhere includes a cover glass within a “protruding part 4” EX1005 ¶55. Figure 10 does not show a separate cover glass 23, but for Kotanagi’s optical detection to function properly, the protruding part 4 must be transparent. Thus, a POSITA would have understood from Kotanagi’s Figure 10 that the entire protruding part can form a curved “cover glass” that spans the through-hole 22. *Id.* at 28. Accordingly, a POSITA would have understood that Kotanagi teaches the limitations of Claim 2. EX1003 ¶246.

3. Dependent Claim 3

Claim 3 depends from Claim 1 and adds **“the cover is formed from a transparent substrate; and the transparent substrate comprises one or more of a glass or a sapphire material.”**

Kotanagi teaches a “cover glass 23” that allows light to pass through from “LED 5” and is “reflected” from skin such that “PD 6 receives this reflected light.”

EX1005 ¶65.



See EX1005 at 26 (Fig. 5). Thus, Kotanagi teaches a cover glass that is transparent to light, as the light is transmitted through and reflected back through the cover glass. Honda also uses a cover glass on the rear portion of its watch and teaches that “since the glass member is typically transparent, the internal coil and electronic components are seen through from the outside.” EX1006 13:53–55. Accordingly, both references teach that a transparent glass member may be used in an opening on the rear side of a watch, and a POSITA would have understood that

Kotanagi in view of Honda teaches the limitations of Claim 3. EX1003 ¶¶248–249.

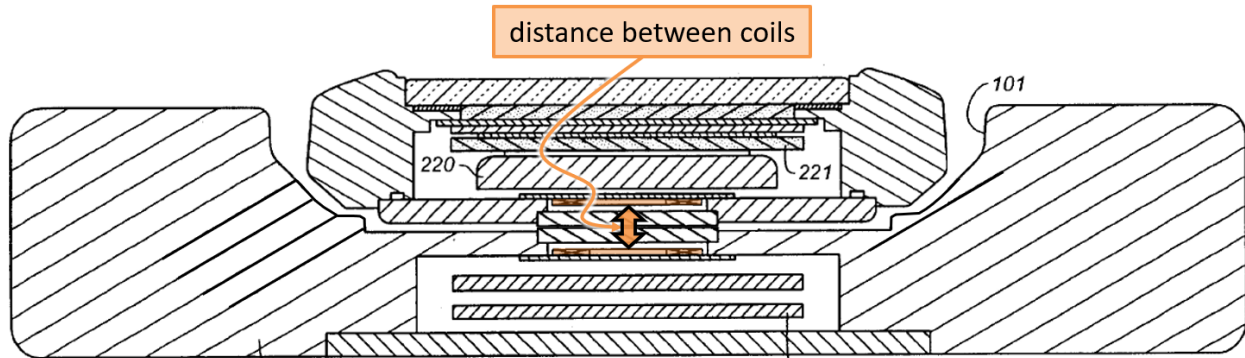
4. Dependent Claim 5

Claim 5 depends from Claim 1 and adds **“wherein: the electronic watch further comprises a near-field communication system; and the near-field communication system is configured to transmit signals through one or more of the housing or the cover.”**

Kotanagi teaches that its watch may have “a wireless communication means,” e.g., for sending pulse rate and other data to and from a memory; this can be through “wireless communication such as Bluetooth.” EX1005 ¶88. A POSITA would have also considered other common wireless protocols such as “near-field communication” (“NFC”) based on this teaching. In the prosecution history of the ’491 patent, the U.S. Patent Examiner interpreted “near-field communication” broadly: “[prior art reference Hong] includes a near-field communication system (I.e. Bluetooth) configured to transmit signals.” EX1002 at 1124. Thus, under the Examiner’s construction, Kotanagi’s Bluetooth satisfies the near-field communication limitation. EX1003 ¶251.

Honda also teaches that its wireless charging coils may facilitate near-field data transfer to the charging station: “Through the electromagnetic coupling between the two coils, a signal can be transmitted in a two-way communication in

a non-contact fashion from the station to the portable electronic apparatus or from the portable electronic apparatus to the station.” EX1006 1:38–42.



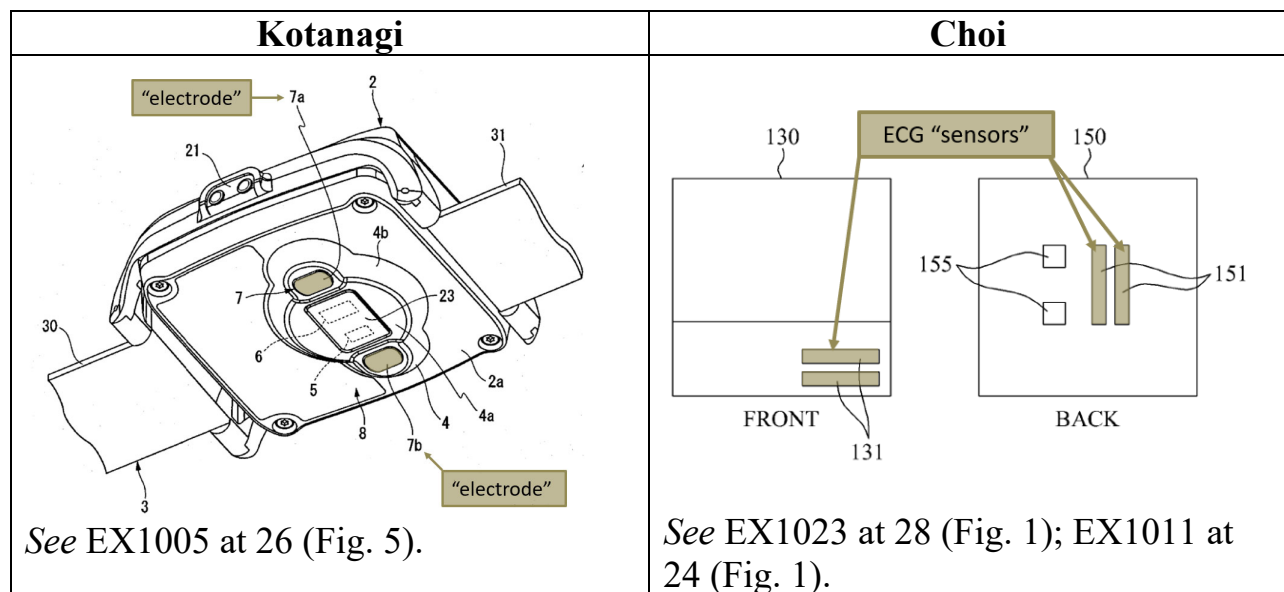
See EX1006 at 3 (Fig. 2). Given that Honda teaches nesting a device almost completely within a socket 101 as shown above, when combining Honda with Kotanagi, a POSITA would have considered “near-field” communication as an example of both Honda’s “two-way communication” (EX1006 1:39–40) and Kotanagi’s “wireless communication” (EX1005 ¶88). Thus, a POSITA would have found Kotanagi and Honda to teach the Claim 5 limitations. EX1003 ¶¶252–253.

5. Dependent Claim 13

Claim 13 depends from Claim 7 and further adds **“wherein: the wearable electronic device further comprises: 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 the wearable**

electronic device is configured to measure an electrocardiographic characteristic using the first and second electrodes.”

The discussions of limitations **1h** and **1j** above explain why Kotanagi (“pair of electrodes,” EX1005 ¶¶14, 86) and Choi (“sensors” for “ECG signal,” EX1023 [45]; EX1011 [52]) teach these limitations. The following figures from these references summarize these teachings:



Thus, a POSITA would have understood that Kotanagi in view of Choi teaches the limitations of Claim 13. EX1003 ¶256.

6. Dependent Claim 17

Claim 17 depends from claim 14 and further adds: **“wherein: the electronic device further comprises: a first electrode disposed along an exterior of the electronic device; and a second electrode disposed along the exterior of the**

electronic device; and the first and second electrodes are configured to measure an electrocardiographic characteristic of the user.”

As discussed for limitations **1h** and **1j**, and Claim 13, Kotanagi and Choi teach exterior first and second electrodes and Choi teaches measuring an electrocardiographic characteristic. EX1003 ¶258.

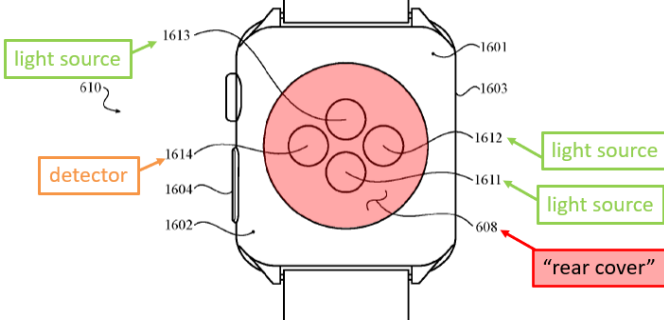
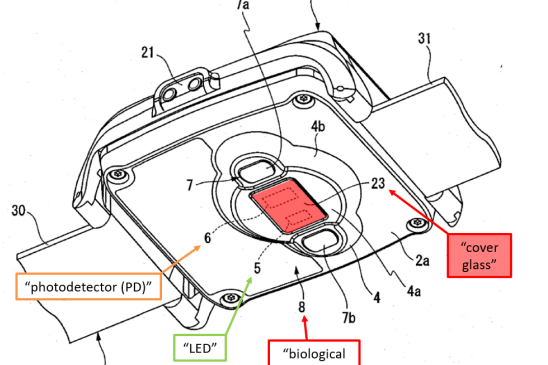
C. Ground 3: Claims 8 and 15 are unpatentable because they would have been obvious over Kotanagi and Honda and further in view of Fraser.

1. Dependent Claim 8

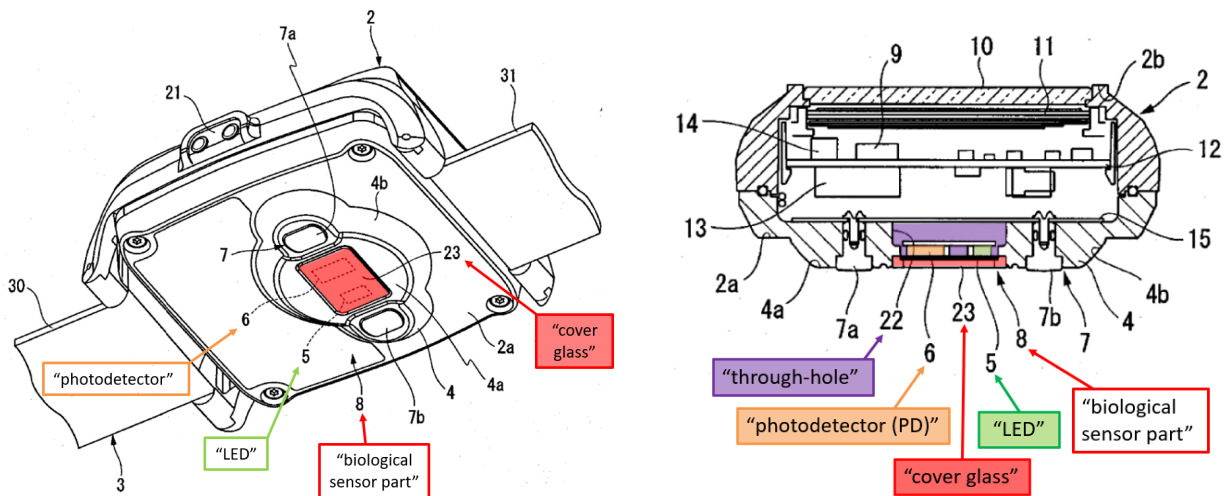
Claim 8 depends from Claim 7 and further adds, “**wherein: the window is a first window; the cover defines a second window; and the biosensor module comprises: a light source configured to emit light toward a region of skin of the user through the first window: and a detector configured to receive light reflected from the region of the skin through the second window.**”¹¹

Similar to the ’491 patent and consistent with the claim construction provided in § II(F)(2) above, Kotanagi teaches a single opening in its base spanned by a single cover glass:

¹¹ The second colon in Claim 8 appears to be a typo and is being interpreted as a semicolon.

'491 Patent	Kotanagi
 See EX1001 at 22 (Fig. 16).	 See EX1005 at 26 (Fig. 5).

Kotanagi teaches an LED and a photodetector, both positioned in that opening immediately behind the cover glass such that light can travel through the cover glass to and from these features:

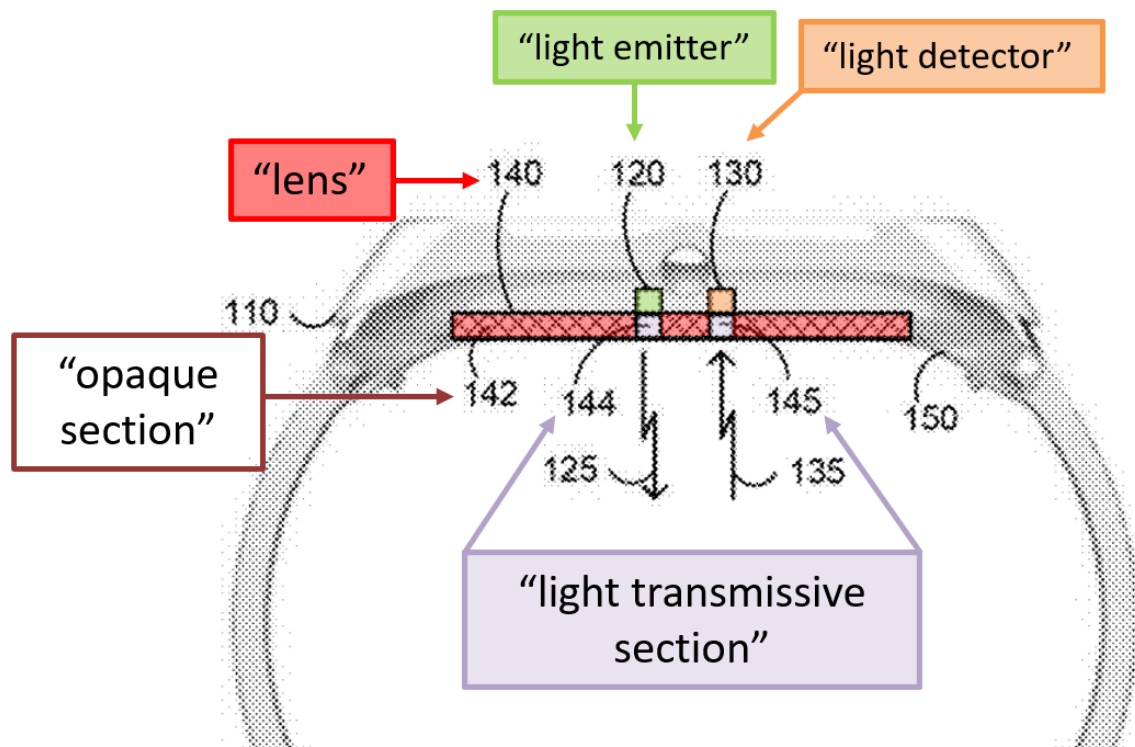


See EX1005 at 26, 27 (Figs. 5, 7). This arrangement provides operational access to both of these features by allowing light to pass through. Kotanagi's cover glass therefore defines both the first and second windows as claimed. EX1003 ¶¶260–261.

If this claim is interpreted such that there must be two *separate* apertures, the two areas surrounded by dashed lines in Kotanagi’s Figure 5 would suggest to a POSITA that two separate windows could be used in those areas. Kotanagi’s larger opening is functionally equivalent to the claimed two openings, because it is large enough to accommodate both the transmission and reception of light; creation of two openings instead of one would create no new and unexpected result.¹² EX1003 ¶263.

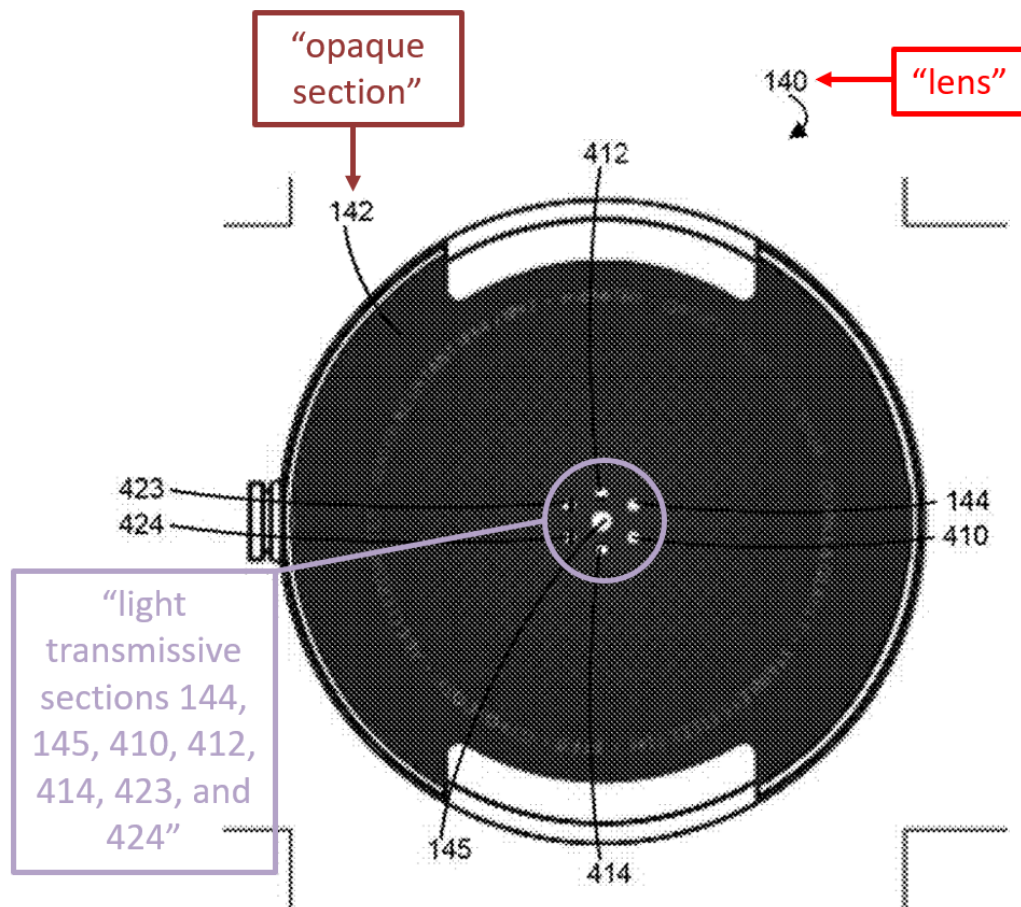
Additionally, Fraser teaches that the back cover of a biosensing watch may be used for “photoplethysmography, pulse oximetry, and other biometric sensing” and that a single cover glass may define openings with light transmissive sections. Fraser’s array of “light transmissive sections 144 . . . ” can “transmit light from the light emitters 120.” EX1041 [0016], [0027]. In this figure, arrow 125 shows light emission:

¹² See *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960) (mere duplication of parts has no patentable significance unless a new and unexpected result is produced.).



See id. at 2 (detail of Fig. 1). EX1003 ¶264.

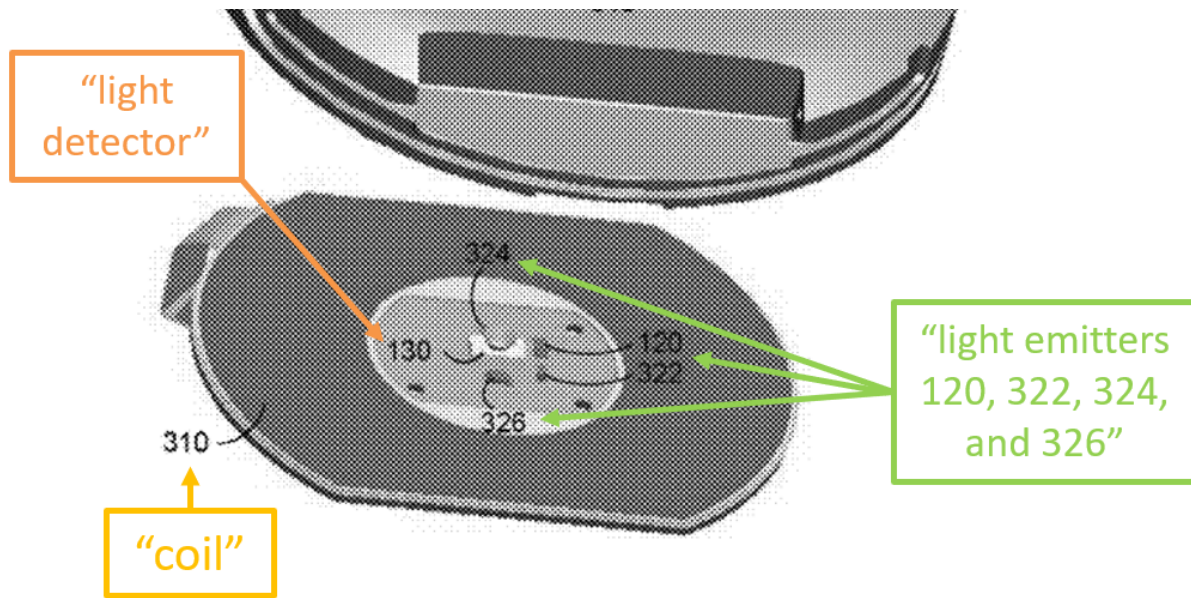
Fraser also teaches that “light transmissive section 145 can transmit light reflected from a user to the light detector 130 of FIG. 3.” *Id.* [0027]. In the figure above, light reflected back is shown with arrow 135. Fraser’s “light transmissive sections” can be “etched, molded, drilled, [or] laser cut” into—forming “apertures” in—an opaque lens (*id.* [0018]):



See id. at 5 (Fig. 4). Thus, Fraser also teaches the claimed cover windows for light transmission (emission and reception). EX1003 ¶265.

a. Motivation to Combine Kotanagi, Honda, and Fraser

The reasons to combine Kotanagi and Honda provided elsewhere in this petition (e.g., *supra* § IV(A)(1)(h)) also apply here. It would have further been obvious to a POSITA to add Fraser to Kotanagi (as modified by Honda) for various reasons. For example, both teach optical biosensing and contactless / wireless charging. EX1005 ¶53, EX1041 [0026]. Fraser's light emitters are surrounded by a wireless charging coil:



EX1041 at 4 (detail of Fig. 3). Thus, Fraser is analogous to Kotanagi as modified by Honda, and Fraser would have confirmed a POSITA's expectation of success in adding a wireless charging coil to Kotanagi. EX1003 ¶¶266–267.

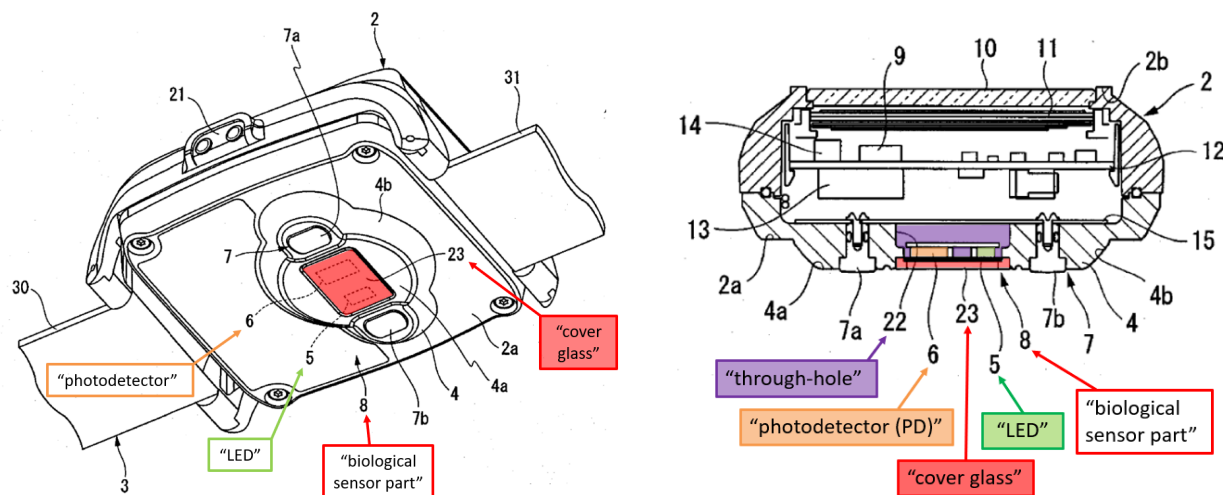
Moreover, Fraser teaches "light transmissive sections to focus emitted and received light." EX1041 [0029]. Because Kotanagi's watch is intended to emit and receive light for the same purpose, a POSITA would have looked to Fraser for how to focus or guide the light and would have modified Kotanagi's structure (e.g., to surround light transmissive sections with opaque sections) with a reasonable expectation of success. EX1003 ¶268.

These motivations to combine also apply to the other Ground 3 combinations, shown below. Further motivations to combine are provided throughout this petition and Dr. Duckworth's declaration. EX1003 ¶269.

2. Dependent Claim 15

Claim 15 depends from Claim 14 and adds: **“wherein: the biosensor module includes an array of optical components; and the cover defines an array of windows, each window of the array of windows aligned with a respective optical component of the array of optical components.”**

As explained above for Claim 8, Kotanagi’s LED and photodetector are positioned immediately behind its the cover glass for operational access:

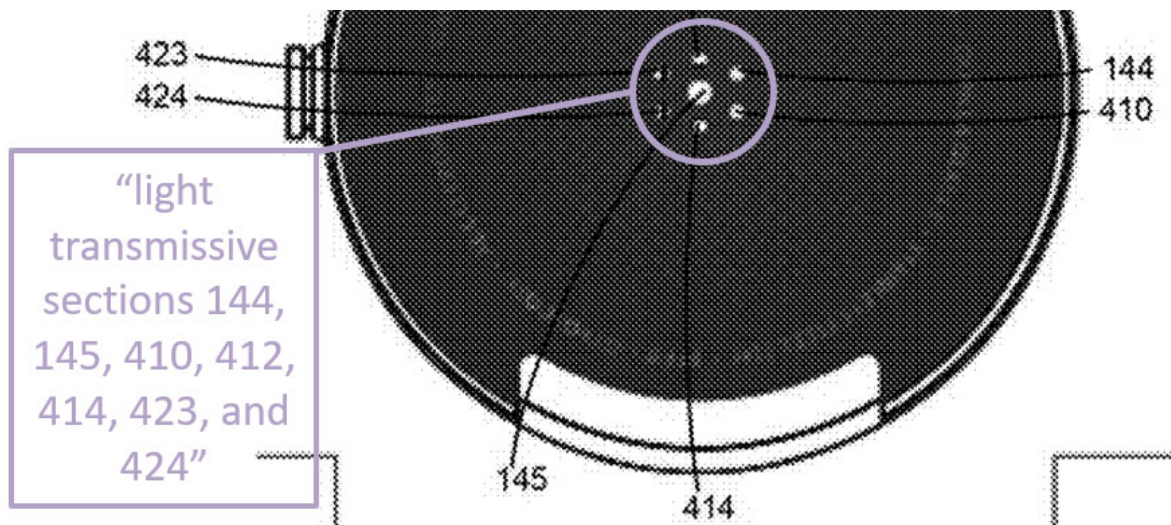


See EX1005 at 26, 27 (Figs. 5, 7). EX1003 ¶271.

Kotanagi’s LED and PD teach the claimed “array of optical components.” Because Kotanagi’s cover glass provides sufficient space for simultaneous optical access to both components (see the separate dashed outlines on cover glass 23 in Fig. 5 above), Kotanagi teaches an array of windows “aligned with” respective optical components in the array. Even if this claim is interpreted to require separate and individual windows, at a minimum, the two areas surrounded by

dashed lines in Kotanagi’s Figure 5 would have suggested to a POSITA to provide windows in those aligned positions. Kotanagi’s larger window is functionally equivalent to the claimed two windows, because it is large enough to accommodate both the transmission and reception of light to the two optical components; creation of two smaller windows instead of one larger one would create no new and unexpected result.¹³ EX1003 ¶272.

Moreover, Fraser teaches an array of “light transmissive sections” that can be “etched, molded, drilled, [or] laser cut” into—forming separate windows in—an opaque lens. EX1041 [0016], [0027], [0018].



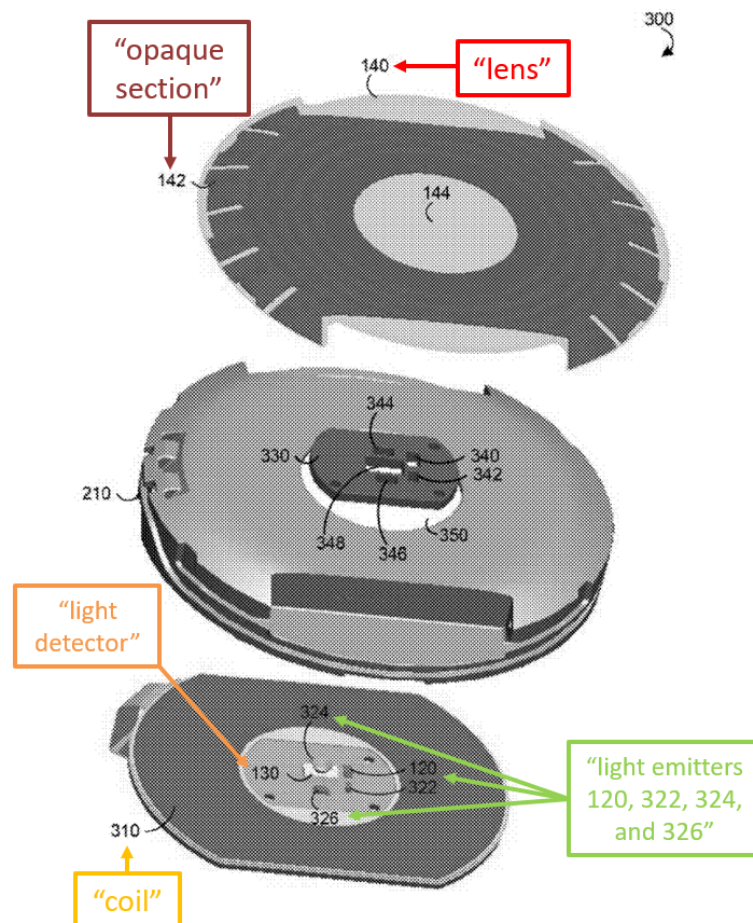
See EX1041 at 5 (detail of Fig. 4). EX1003 ¶273.

¹³ *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960), *see supra* note 12.

Fraser specifies that its windows are both separated from each other and aligned with optical components:

[t]he light transmissive sections 144, 145, 410, 412, 414, 423, and 424 can be separate and distinct from each other in the opaque section 142. The light transmissive sections 144, 410, 412, 414, 423, and 424 can transmit light from the light emitters 120, 322, 324, 326 of FIG.3 and other light emitters.

EX1041 [0027].



See EX1041 at 4. Thus, Fraser teaches a biosensor module with an array of windows aligned with an array of optical components, as claimed. EX1003 ¶274–275.

D. Ground 4: Claim 9 is unpatentable because it would have been obvious over Kotanagi and Honda and further in view of Orr.

1. Dependent Claim 9

Claim 9 depends from Claim 7 and adds: “**wherein: the biosensor module comprises: at least one light source; and a set of detectors; and the at least one light source and the set of detectors are configured to operate as a photoplethysmogram (PPG) sensor.**”

Kotanagi teaches a biological sensor with an LED, photodetector, and two electrodes (contact detection means 7) for detecting skin contact:

A biological sensor part 8, which includes an LED (Light 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 out of the light emitted by the LED 5 and generating a pulse signal (biological information signal) corresponding to the amount of received light, 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. Together, these features operate as a PPG sensor—a device that uses a light source and a photodetector at the surface of skin to measure the volumetric variations of blood circulation. *See* EX1041 [0016] (“light detector 130 [] can detect light 135 reflected from the wrist of the user” for “photoplethysmography.”). EX1003 ¶277.

Specifically, Kotanagi teaches optically measuring the pulsation of arteries in the wrist:

The PD 6 . . . generates a pulse signal (biological information signal) corresponding to the amount of received light, and outputs the signal to the data processing part 9. That is, since the amount of reflected light out of the light emitted from the LED 5 varies depending on fluctuations in blood flow within arteries and arterioles in the wrist A (living body), the PD 6 can receive reflected light corresponding to the pulsation of arteries - that is, pulse waves. As a result, the PD 6 can generate a pulse signal.

EX1005 ¶(0065).¹⁴ EX1003 ¶279.

Thus, Kotanagi teaches a photoplethysmogram (PPG) sensor comprising a light source and a set of detectors (a photodetector and two contact detection

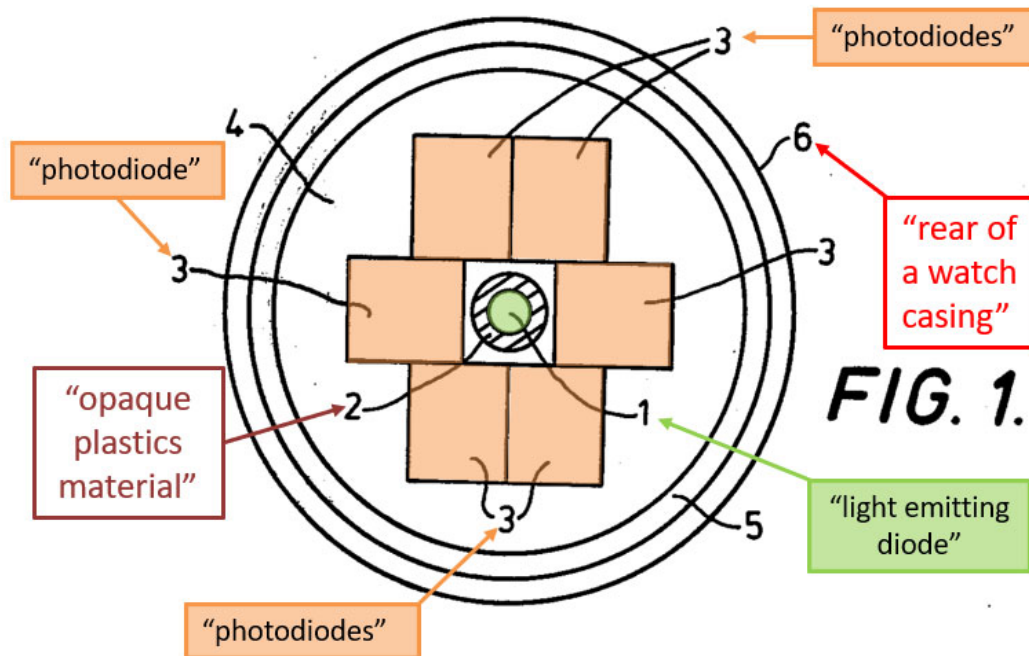
¹⁴ Kotanagi is not required to use the word “photoplethysmogram” to read on this limitation. *See In re Bond*, 910 F.2d 831, 832 (Fed. Cir. 1990) (disclosure need not be *ipsissimis verbis*).

means) for performing a PPG measurement, as Kotanagi teaches optical measurement occurs upon contact detection. EX1005 ¶59. If the claim is interpreted as requiring two different photodetectors, such a configuration would have been obvious as a mere duplication of parts, as shown with respect to Orr below.¹⁵ EX1003 ¶280.

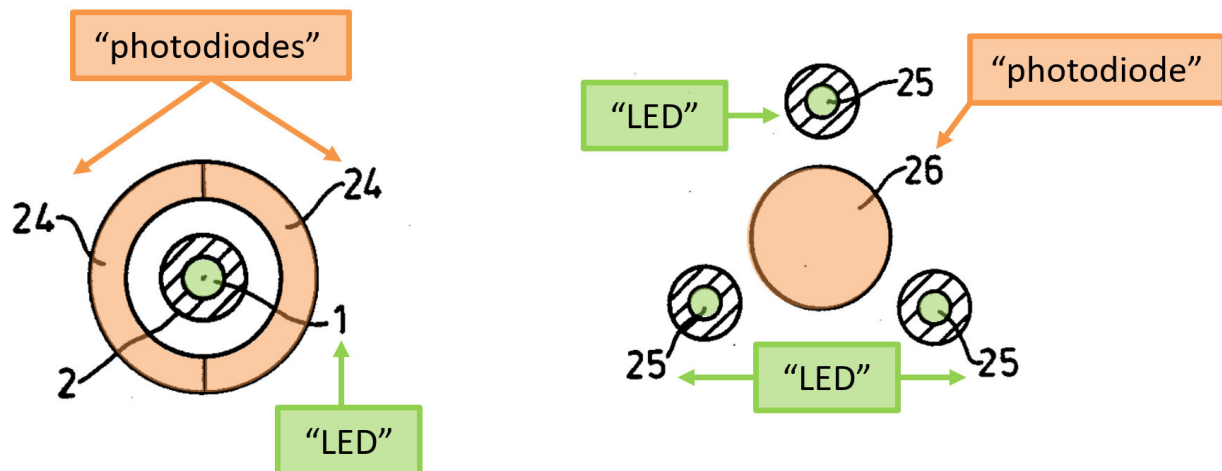
Based on the above, Claim 9 would have been obvious in view of Kotanagi and Honda. Moreover, Claim 9 would have been obvious in view of Kotanagi, Honda, and Orr. EX1003 ¶281.

Orr, which was published in 1979, teaches a “light emitting diode 1 and [] photodiodes 3 disposed on the rear surface of a wristwatch casing 6.” EX1025 3:34–35. Orr explains that a photodiode is a “semiconductor detector for detecting variations in the light reflected from the skin.” *Id.* 1:42–45, 6:19–21. Orr’s LED is surrounded by “opaque plastics material 2” and the whole back surface is set in “transparent plastics material 4.” EX1025 2:17–22. Orr’s multiple photodiodes are shown here:

¹⁵ See *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960) see *supra* note 12.



See EX1025 at 2. Thus, Orr teaches a light source and set of multiple optical detectors operating as a PPG sensor. Orr’s Figures 4 and 5 show alternative arrangements:



See EX1022 at 3. It would have been a simple matter to combine Kotanagi and Orr because there is room within Kotanagi’s cover glass 23 for an additional

detector, leading a POSITA to expect success when combining them. EX1003 ¶¶282–283.

Therefore, a POSITA would have found the arrangement and number of photodiodes on the back side of a biosensing wristwatch obvious in view of Orr. EX1003 ¶284.

As stated above, a photoplethysmogram (PPG) uses a light source and a photodetector at the surface of skin to measure the volumetric variations of blood circulation. Thus, Kotanagi and Orr teach a PPG measurement. *See* EX1003 ¶285.

a. Motivation to Combine Kotanagi, Honda, and Orr

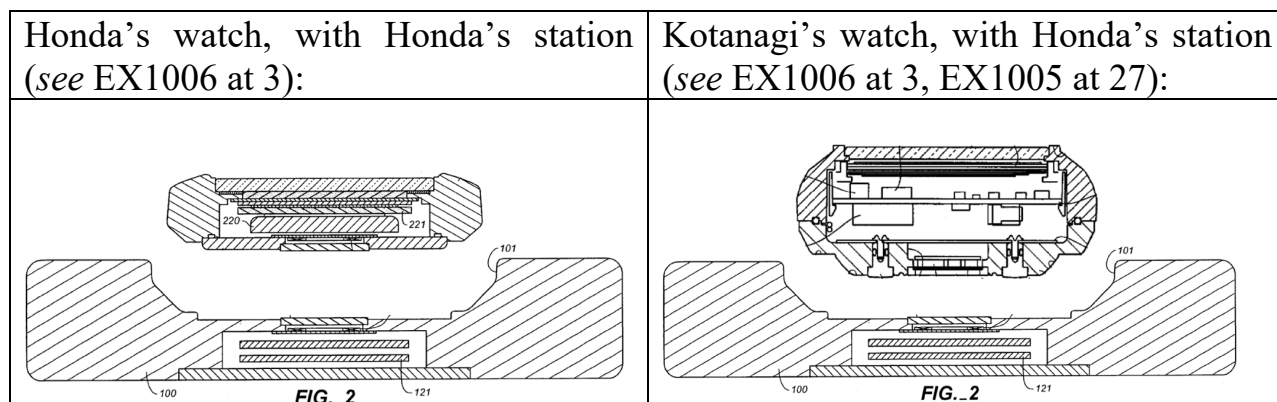
The reasons to combine Kotanagi and Honda provided elsewhere in this petition (e.g., *supra* § IV(A)(1)(h)) also apply here. It would have further been obvious to a POSITA to add Orr for various reasons. For example, Orr teaches that multiple detectors can work together to provide higher current output (EX1025 3:22–25) and can help capture signals reflecting in unknown or multiple directions (*see id.* 2:19–21, 3:31–32). Moreover, additional detectors can provide a failsafe and backup function in case a single detector stops working. EX1003 ¶286.

E. Ground 5: Claim 12 and 18 are unpatentable because they would have been obvious over Kotanagi in view of Honda and further in view of Park.

1. Dependent Claim 12

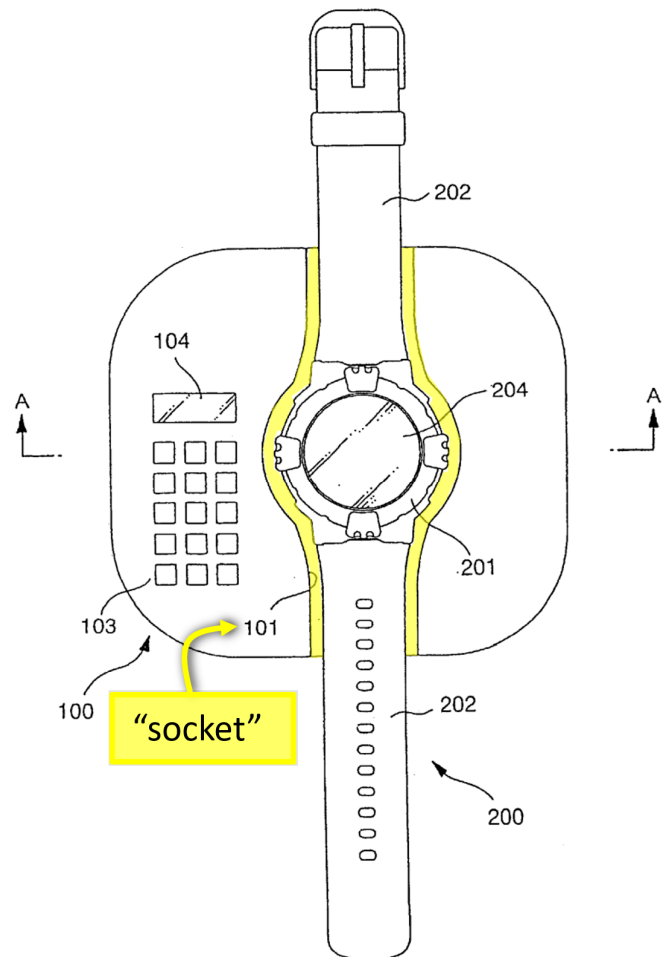
Claim 12 depends from Claim 7 and adds: “**wherein: the wearable electronic device further comprises a first magnet positioned within the housing and below the cover; the external wireless charging device comprises a second magnet; and the first and second magnets are configured to maintain alignment between the wearable electronic device and the external wireless charging device during a charging operation.**”

Because the Kotanagi and Honda watch devices are so similar, Kotanagi’s device as modified by Honda (to include a wireless charging receive coil) would fit within (and interact similarly with) at least a scaled version of Honda’s charging station.



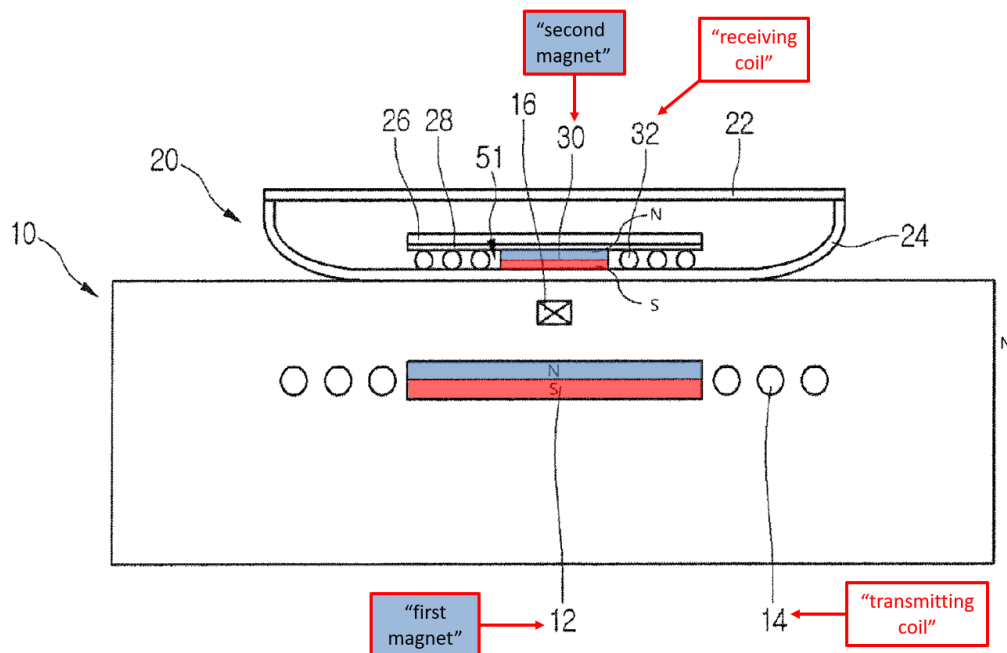
Honda facilitates alignment of its wireless charging coils via a socket.

EX1006 at 2 (Fig. 1). However, even this socket may not achieve Honda’s preferred positioning of wireless charging coils within at least 1 mm of alignment with each other: “Placing the two coils into alignment by simply seating the portable electronic apparatus into the station is difficult because the positions of the coils attached in the station and the



portable electronic apparatus are required to be accurate.” EX1006 at 2 (Fig.1); 1:53–56; . EX1003 ¶¶288–289.

Honda’s teaching of this difficulty would have motivated a POSITA to look for additional ways to align for charging. Park teaches wireless charging alignment via a first magnet in a wireless charging station and a second magnet within the housing of an electronic device, as illustrated below:



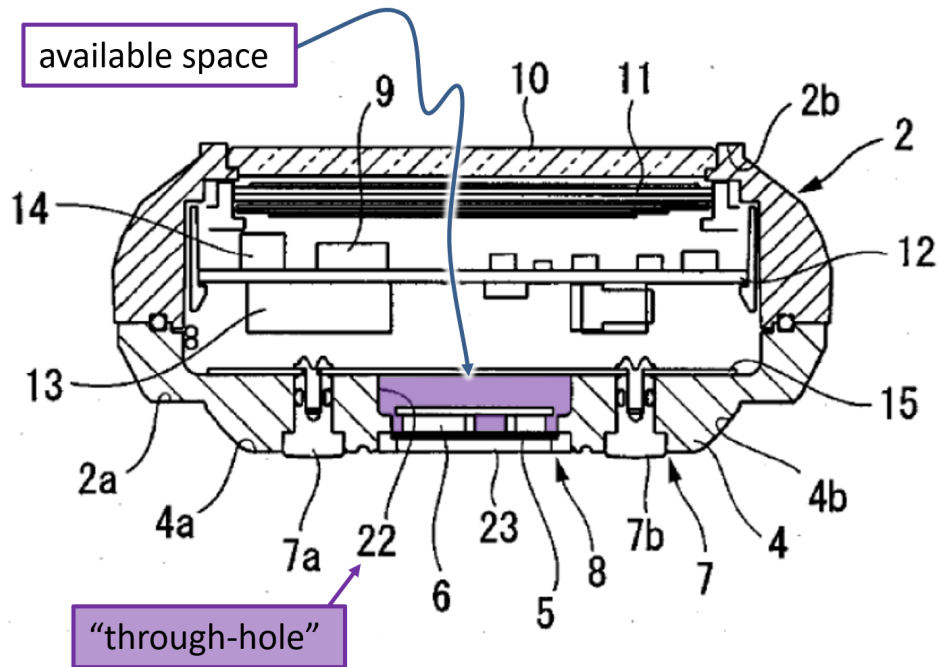
See EX1015 at 64; EX1012 at 11. Park teaches that these magnets reduce the distance between the transmitting coil and the receiving coil, thus “improving wireless power transfer efficiency.” EX1015 at 44; EX1012 [0192]. A POSITA would have used Park’s teachings of magnetic alignment to insert magnets into the modified watch device of Kotanagi and the charging station of Honda (e.g., using Honda’s socket for gross alignment and Park’s magnets for fine or final alignment). Thus, a POSITA would have found the limitations of Claim 12 obvious in view of Kotanagi, Honda, and Park. EX1003 ¶¶290–291.

a. Motivation to Combine Kotanagi, Honda, and Park

The reasons to combine Kotanagi and Honda provided elsewhere in this petition (e.g., *supra* § IV(A)(1)(h)) also apply here. Kotanagi and Honda were both assigned to Seiko companies. See EX1005 at 1, EX1006 at 1. Thus, a

POSITA having Kotanagi would have also had access to Honda and readily combined teachings from the two references. EX1003 ¶292.

A POSITA would have been further motivated before the effective filing date to combine the teachings of Honda and Park as they both teach the need for alignment in wireless charging. Honda provides alignment via a socket/recess, but acknowledges that fully accurate alignment is “difficult” to achieve. EX1006 1:53–59. Park provides alignment via permanent magnets. EX1006 at 2; EX1015 at 42–43; EX1012 at 11. Given the similarity of the Honda and Park charging stations (e.g., both designed to use inductive coupling from coils in the station and device), and given the known properties of permanent magnets, inserting permanent magnets into station and device would have merely combined familiar elements according to known methods to yield predictable results. *See KSR*, 550 U.S. at 419. Moreover, the available space in Kotanagi’s device could fit, or readily be adjusted to fit, both a charging receive coil (Honda and Park) and a permanent magnet (Park). This indicates a POSITA would have expected the combination would be successful.



See EX1005 at 27 (Fig. 7). EX1003 ¶293.

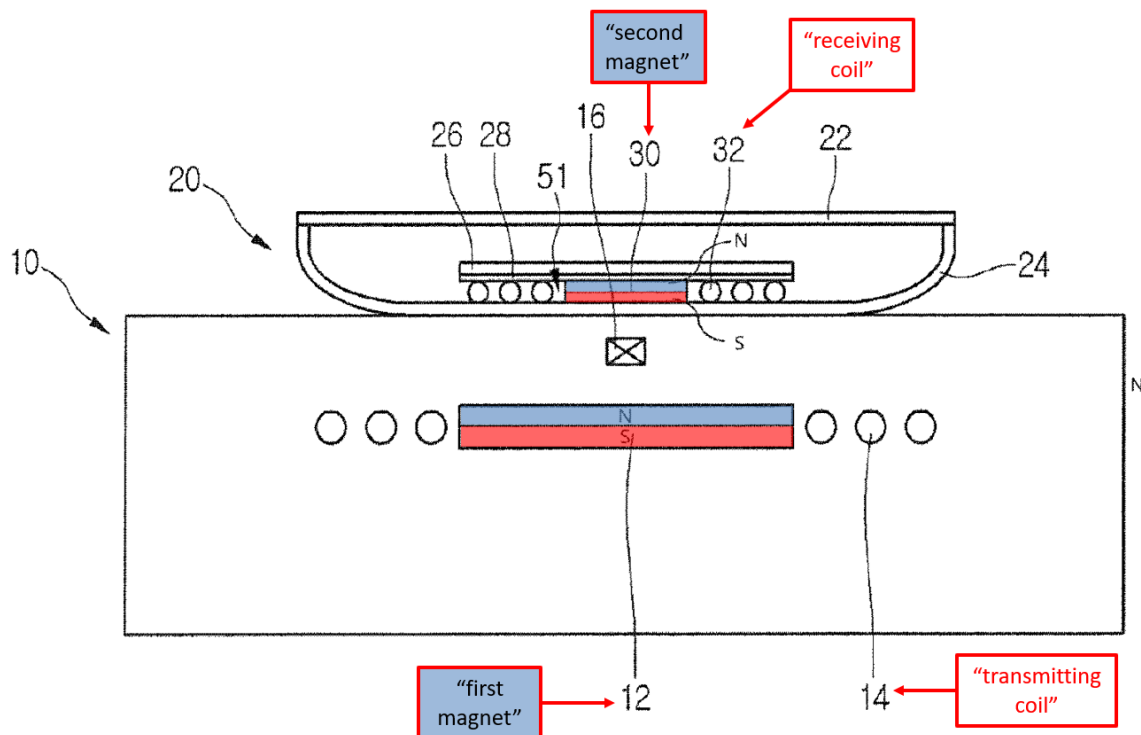
This motivation to combine also applies to other claims rejected under this ground (Ground 5), and Ground 6 (discussed below).

2. Dependent Claim 18

Claim 18 depends from Claim 14 and adds: “**wherein: the electronic device further comprises a magnet that is configured to magnetically couple the electronic device to an external inductive power transmitter dock through the cover.**”

The analysis for Claim 12 also applies here (where the “wireless charging device” of Claim 12 is analogous to the “inductive power transmitter dock” of Claim 18). To summarize, both Honda’s charging station and Park’s docking station cradle teach the claimed “external inductive power transmitter dock.”

Honda teaches that with its socket approach, “[s]ince the station-side coil 110 and the watch-side coil 210 face each other as shown in FIG. 2 and FIG. 3, both coils are electromagnetically coupled.” EX1006 9:41–43. Park teaches a permanent magnet that magnetically couples to a docking station cradle through the back side of an electronic device:



See EX1015 at 64; EX1012 at 11. Park further explains that when the first magnet and second magnet are close enough, a change in the flux density is sensed, indicating that the magnets are “coupled” to each other. EX1012 [0191]–[0192]; EX1015 at 44. EX1003 ¶296.

Thus, as explained with respect to Claim 12, a POSITA would have found it obvious to incorporate permanent magnets to align the device for magnetic

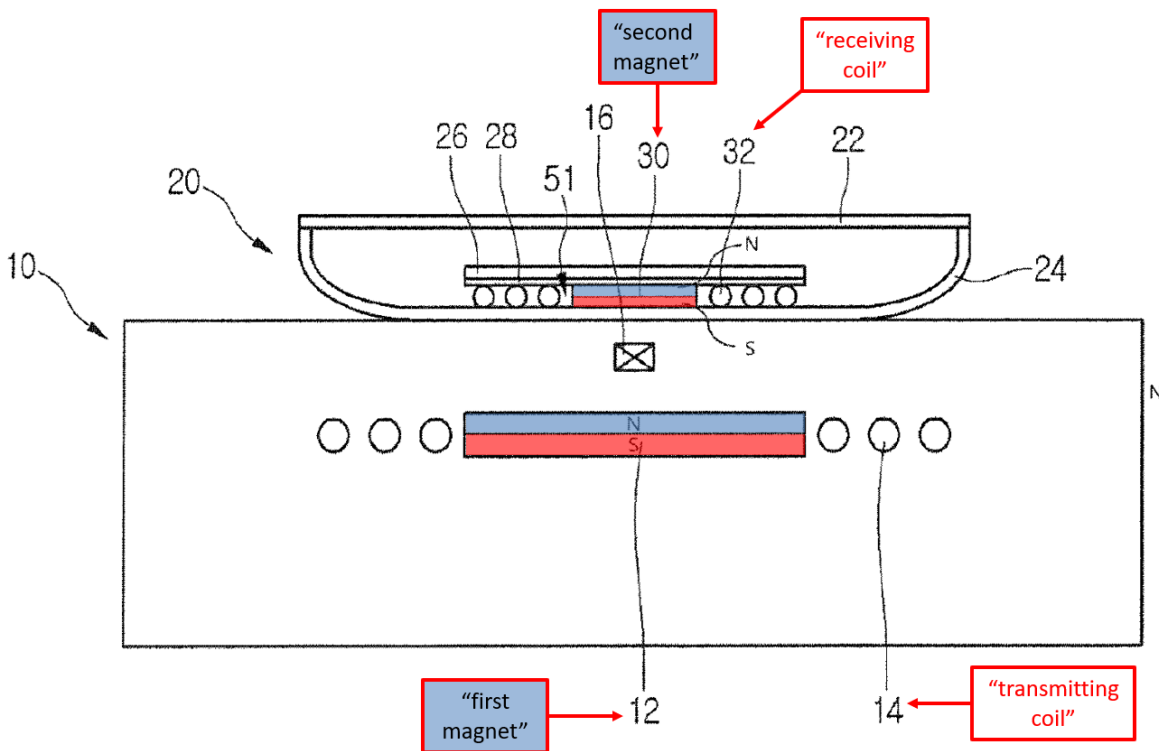
coupling and wireless charging through the cover. Honda teaches that electromagnetic fields are felt most strongly through a non-conductive material (EX1006 13:33–63, Fig. 15), such as through the glass cover of Kotanagi’s biosensor module. Honda has a similar cover glass that allows coupling and charging. Park also allows charging through the cover of its device. Thus, a POSITA would have found the limitations of Claim 18 obvious in view of these references. EX1003 ¶297.

F. Ground 6: Claim 4 is unpatentable because it would have been obvious over Kotanagi in view of Honda and Choi and further in view of Park.

1. Dependent Claim 4

Claim 4 depends from claim 1 and further adds “**wherein: the electronic watch further comprises a first magnet positioned within the housing; the first magnet is configured to couple to a second magnet positioned within a charging dock; and the first and second magnets are configured to maintain alignment of the electronic watch with respect to the charging dock.**”

The analyses of Claims 12 and 18 also apply here. For example, Honda uses a socket for at least gross alignment (EX1006 at 2, Fig. 1), but acknowledges difficulty, suggesting a need for more precision (EX1006 1:53–54). Park teaches an electronic device comprising a first magnet and second magnet in a dock for more precise alignment during charging:



See EX1015 at 64; EX1012 at 11. It would have been obvious to a POSITA to combine the teachings of Kotanagi with Honda and Park for at least the reasons stated above with regard to Claims 12 and 18. EX1003 ¶¶299–301.

a. Motivation to Combine Kotanagi, Honda, Choi, and Park

It would have been obvious to a POSITA to combine Kotanagi, Honda, Choi, and Park for various reasons. The reasons to combine Kotanagi and Honda provided elsewhere in this petition (e.g., *supra* § IV(A)(1)(h)) also apply here. Similarly, the reasons to add Choi (e.g., *supra* § IV(B)(1)(k)) and to add Park (e.g., *supra* § IV(E)(1)(a)) also apply here. To summarize, Kotanagi teaches wireless charging and has space for Honda’s wireless receive coil and Park’s alignment

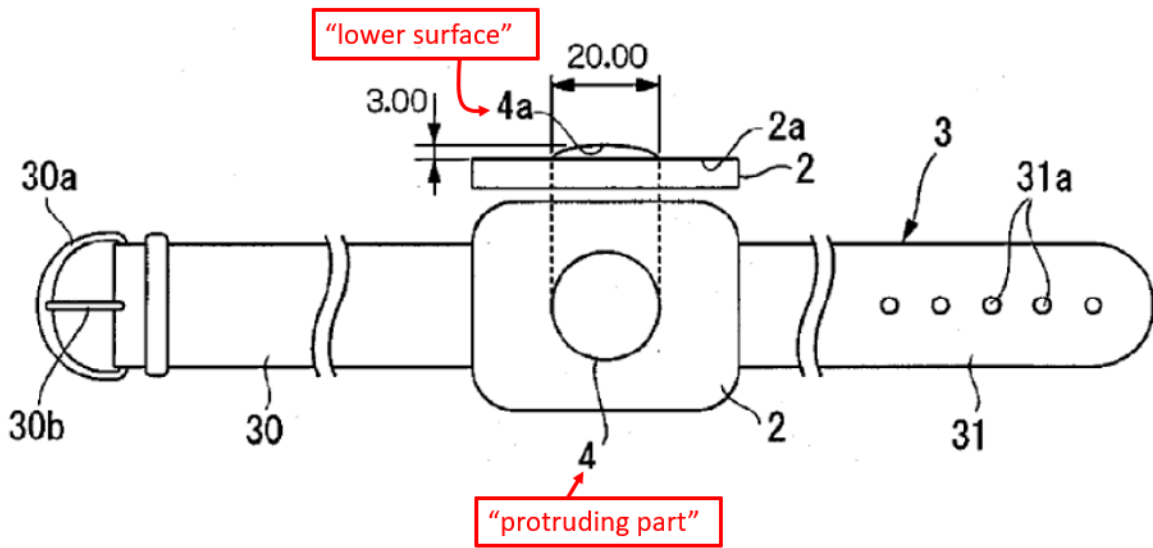
magnet. Kotanagi's display and electrodes indicate a likelihood of success when adding Choi's touch-sensitive display and ECG electrode function. For these and the reasons explained elsewhere herein, a POSITA would have found the limitations of Claim 4 obvious in view of these references. EX1003 ¶301.

G. Ground 7: Claims 10 and 19 are unpatentable because they would have been obvious over Kotanagi and Honda, and further in view of Jabori.

1. Dependent Claim 10

Claim 10 depends from Claim 7 and further adds **“wherein: the cover protrudes outward from a rear surface of the housing; the cover defines a convex exterior profile; and the convex exterior profile facilitates alignment between the cover and a mating surface of the external wireless charging device.”**

The analysis provided above for Claim 2 shows that Kotanagi teaches a cover protruding outward from the rear of the housing. Kotanagi teaches this can form a convex exterior profile: “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).

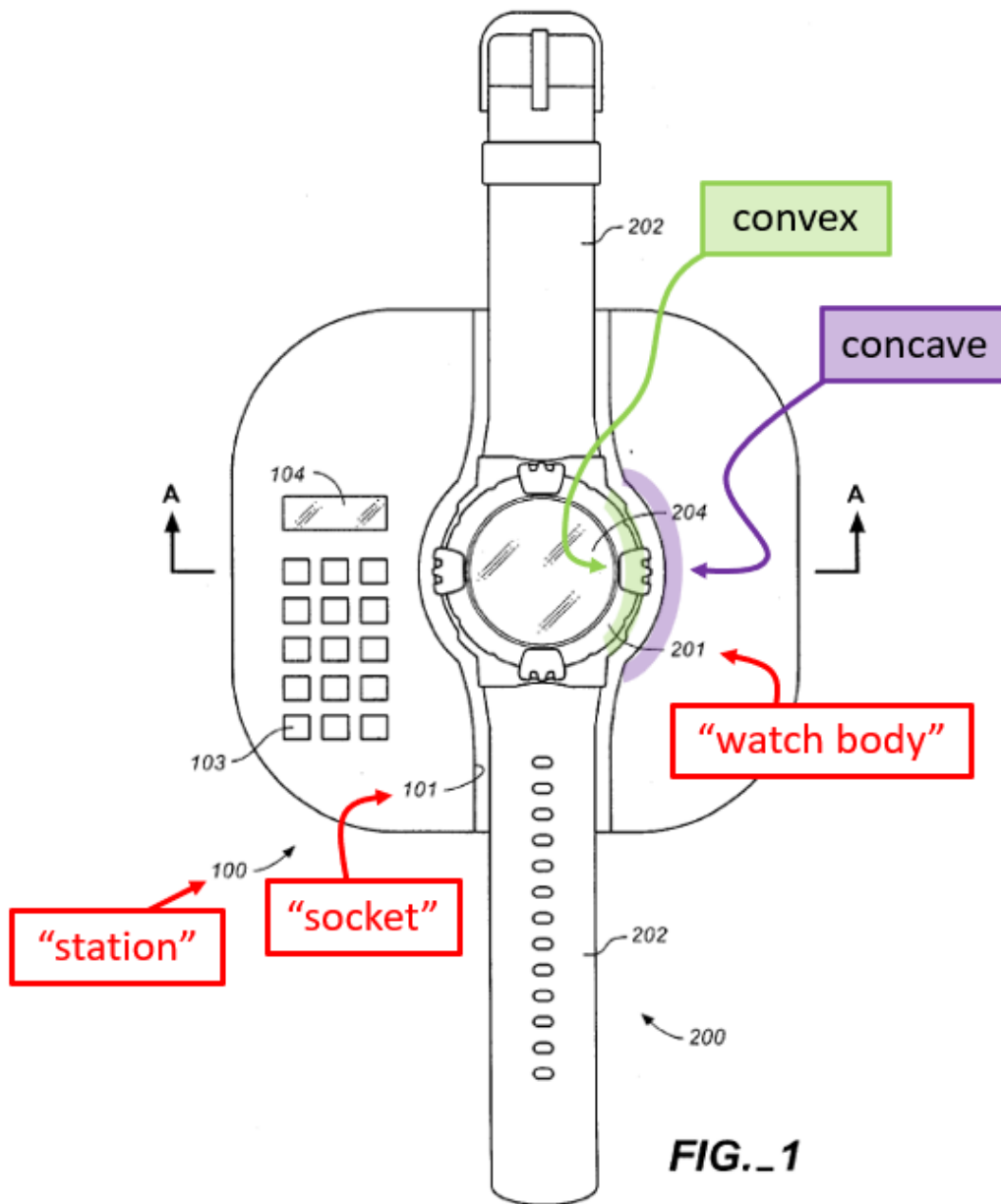


See EX1006 at 28 (Fig. 8). A POSITA would have understood from Kotanagi’s Figure 10 that the entire protruding part can form a convex “cover glass” that spans the through-hole 22. *Id.* at 28. As noted above, Kotanagi also teaches wireless charging, or charging “in a contactless state” (EX1005 ¶(0053)). This would have motivated a POSITA to look to Honda for modifications to make for such wireless charging. EX1003 ¶¶303–304.

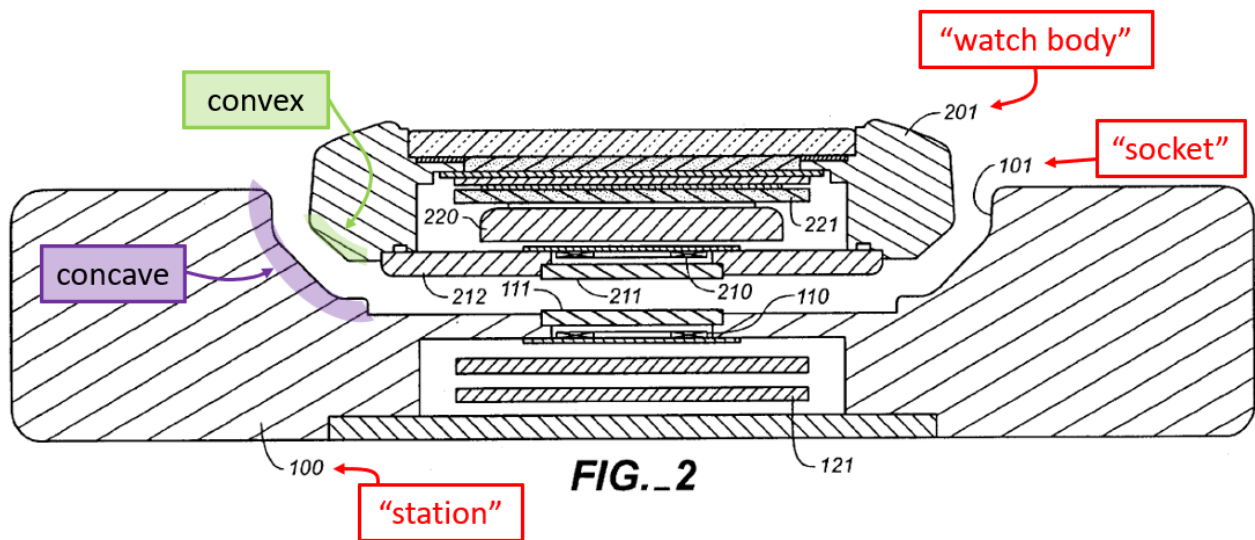
Honda teaches an external inductive power transmitter dock which it terms a “station” having a “socket” to facilitate alignment. EX1006 at 2 (Fig. 1). Honda also teaches using complementary shapes, with a “slightly larger” socket shape to assist with alignment for charging:

[In] FIG. 1 an electronic watch 200 is seated in a socket 101 of a station 100 Since the socket 101 is shaped to be slightly larger than a body 201 of and a band 202 of the electronic watch 200, the watch body 201 is seated in alignment in the station 100.

EX1006 6:4–11. EX1003 ¶305.



See Id. at 2 (Fig. 1). Similar to the complementary concavity shown above, Honda’s cross section view shows complementary convex and concave surfaces to facilitate alignment in a charging station:



See *id.* at 3 (Fig. 2). EX1003 ¶306.

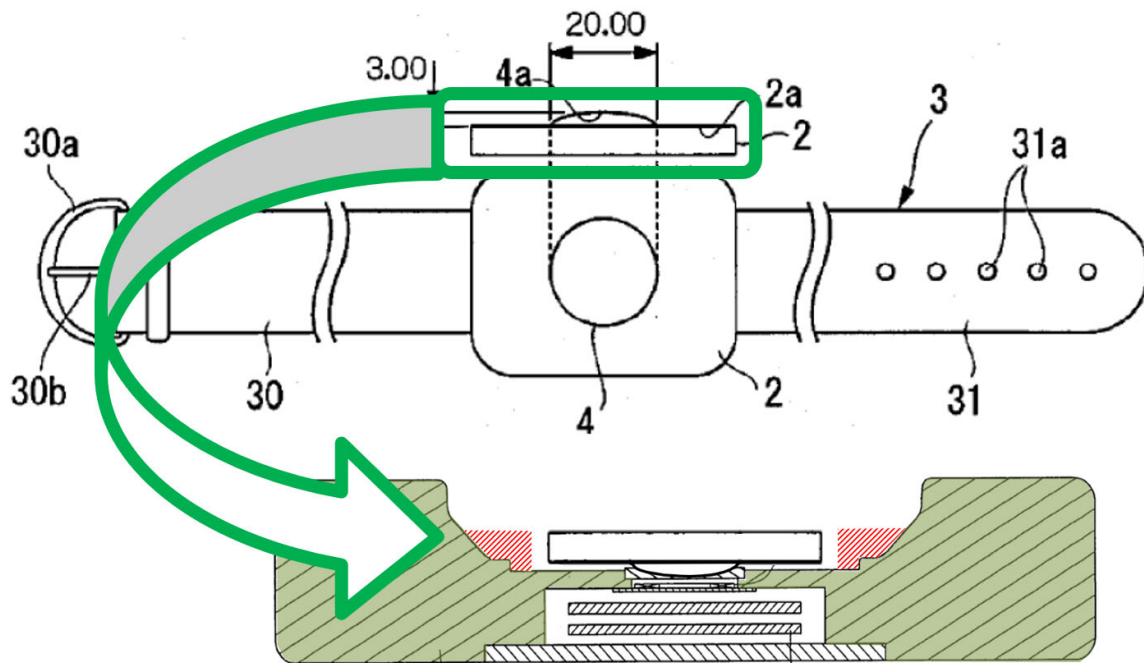
Honda's socket can already accommodate the shape of some Kotanagi embodiments quite well:

Honda's watch, with Honda's station (see EX1006 at 3):	Kotanagi's watch, with Honda's station (see EX1006 at 3, EX1005 at 27):
FIG. 2	FIG. 2

However, a POSITA using Kotanagi's Figure 10 embodiment would have known to make a slight modification to Honda's socket, based on Honda's teachings, to provide a complementary concavity in the charging station, so the

socket can be “shaped to be slightly larger than” the device being charged.

EX1006 6:9.



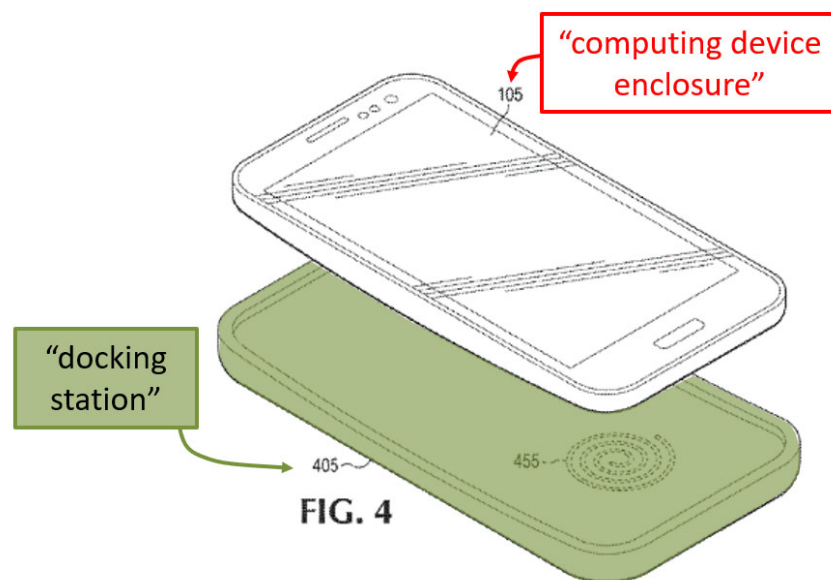
See EX1005 at 28 (Fig. 8), EX1006 at 3 (Fig. 2) (annotation of Kotanagi’s watch in a modified version of Honda’s station). EX1003 ¶308.

A POSITA would have known from Honda to preferably maintain a distance between transmitter-side and receiver-side coils of approximately 10 mm or less (see Honda’s discussion of Fig. 14 showing transmission efficiency as a function of distance—EX1006 13:3–32), and therefore provided a concavity for the convex protrusion if the receive-side coil is located behind it. EX1003 ¶310.

Further, **Jabori** teaches in a similar context that convex / concave shapes promote alignment for wireless power transmission:

Fig. 4-5 are a computing device and wireless power transmitter according to example implementation. In some examples the enclosure 105 and a docking station 405 may have a **shape that promotes the alignment** caused by the haptic modules to align the wireless power transmitter 455 with the wireless power module 130. One example of such a shape is the computing device enclosure 105 has a **convex** shape and the docking station 405 includes **concave** shape.

EX1017 [0017] (emphasis added).



See EX1017 at 16. In view of these teachings, a POSITA would have found Claim 10 obvious over Kotanagi, Honda, and Jabori. EX1003 ¶311.

a. Motivation to Combine Kotanagi, Honda, and Jabori.

The reasons to combine Kotanagi and Honda provided elsewhere in this petition also apply here. Kotanagi and Honda were both assigned to Seiko

companies. *See* EX1005 at 1, EX1006 at 1. Thus, a POSITA having Kotanagi would have also had access to Honda and readily combined teachings from both. Such a person would have expected success because the devices they teach are so similar: both teach wireless charging and biosensing of a pulse signal. EX1003 ¶313.

A POSITA would have expected success in adding Jabori because it also teaches wireless or contactless charging. Honda teaches that alignment of the wireless charging coils is “required to be accurate” and that misalignment of the wireless charging coils reduces or modifies the magnetic flux of the wireless charging field. EX1006 1:56; *see id.* at 9 (Fig. 10). To achieve such accuracy, a POSITA would have looked to Jabori because it uses a nested approach to more accurately align wireless charging devices, and a POSITA would have found Jabori’s teachings on convex/concave as a complementary enhancement to Honda’s teachings. EX1003 ¶314.

This motivation applies as well to other claims rejected using Jabori, including under Grounds 7 and 8. Further motivations to combine are provided throughout this petition and Dr. Duckworth’s declaration. EX1003 ¶¶315–317.

2. Dependent Claim 19

Claim 19 depends from claim 14 and adds **“wherein the cover protrudes outward from a rear surface of the housing to facilitate alignment between the cover and a mating surface of an external wireless charging device.”**

The analysis of Claim 10 applies here to show obviousness over Kotanagi, Honda and Jabori, including the reasons to combine discussed above. Claim 19 does not require a “convex” protrusion, but it is otherwise analogous to Claim 10. EX1003 ¶319.

H. Ground 8: Claim 6 is unpatentable because it would have been obvious over Kotanagi in view of Honda and Choi and further in view of Jabori.

1. Dependent Claim 6

Claim 6 depends from Claim 1 and further adds **“wherein: the cover defines a convex exterior profile; and the convex exterior profile facilitates alignment between the cover and a mating surface of an external wireless charging device.”**

The analysis of Claim 10 applies here to show obviousness of these additional limitations over Kotanagi, Honda and Jabori, including the reasons to combine discussed above. The analysis of Claim 1 applies as well. To summarize, Kotanagi teaches many of the claim limitations, Honda teaches a watch biosensing device as well as specific structures for wireless charging, and Choi teaches a

watch biosensing device as well as a touch-sensitive display and using electrodes for ECG measurement. Although Kotanagi's Figure 10 already teaches a convex exterior profile and Honda teaches mating and alignment, Jabori's specific teaching of a convex/concave mating arrangement (EX1017 at [0017] shows that a POSITA would have found Claim 6 obvious in view of these references. EX1003 ¶321.

As discussed with regard to Ground 8, a POSITA would have found obvious a cover with an exterior profile that facilitates alignment with the cover and a mating surface of an external wireless charging device in view of the disclosure in Park and Jabori. EX1003 ¶322.

a. Motivation to Combine Kotanagi, Honda, Choi, and Jabori

A POSITA would have been motivated to combine these references for at least the reasons provided under Ground 2 (Claim 1) and 7 (Claims 10 and 19). For example, nothing about the addition of Choi would frustrate the purpose of—or teach away from—the Jabori teachings or modifications discussed above. Although Ground 7 did not include Choi, neither Choi's touch-screen display nor Choi's processing of electrode data for ECG purposes would have been contrary to Jabori's nested (convex/concave) approach to device alignment for wireless charging. EX1003 ¶323.

V. SECONDARY CONSIDERATIONS

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

VI. DISCRETIONARY FACTORS FAVOR INSTITUTION

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 five 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 '491 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 wireless charging, a transparent or dielectric or non-conductive cover, electrodes, and other features. Therefore, this Petition presents new prior art and new patentability arguments that have never previously been before the Office.

VII. CONCLUSION

Petitioner respectfully requests that the Board institute an IPR and cancel claims 1–19 of the '491 patent.

Masimo v. Apple
IPR Petition – U.S. Patent No. 10,942,491

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: March 20, 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. 10,942,491, exclusive of the parts exempted as provided in 37 C.F.R. § 42.24(a), contains 13,594 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: March 20, 2023

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Masimo v. Apple
IPR Petition – U.S. Patent No. 10,942,491

CERTIFICATE OF SERVICE

I hereby certify that true and correct copies of the foregoing **PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 10,942,491** and **EXHIBITS 1001–1012, 1014–1017, 1020, 1022–1023, 1025–1031, 1033–1039, 1041, 1047–1048** are being served on March 20, 2023, via Federal Express overnight delivery on counsel of record for U.S. Patent No. 10,942,491 as addressed below:

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