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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MASIMO CORPORATION,
Petitioner

v.

APPLE INC.,
Patent Owner

Case No. IPR2023-00634
Patent No. 10,627,783

**PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 10,627,783**

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<i>Leapfrog Enters., Inc. v. Fisher-Price, Inc.</i> , 485 F.3d 1157 (Fed. Cir. 2007)	109
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EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 10,627,783 ('783 Patent)
1002	File History of the '783 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 A1 ("Kotanagi")
1006	U.S. Patent No. 6,265,789 ("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	Reserved
1012	U.S. Publication No. 20150214749 A1 ("Park")
1013	Reserved
1014	U.S. Publication No. US 20120221254 A1 (Kateraas)
1015	U.S. Provisional Patent Application No. 61/932258 ("Park Provisional")
1016	U.S. Publication No. US 20140135594 ("Yuen")
1017	PCT Publication No. WO 2015116111 A1 ("Jabori")
1018–1019	Reserved
1020	PCT Patent Pub. WO 2015150199 A1 ("Coppola PCT")
1021	Reserved
1022	U.S. Patent No. 4,129,124 ("Thalmann")

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Exhibit No.	Description
1023–1024	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	U.S. Publication No. 20050116820 A1 (“Goldreich”)
1034	U.S. Publication No. 20070276270 A1 (“Tran”)
1035	U.S. Publication No. 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 28 th IEEE (2006)
1039	Y. Mendelson, “Wearable Wireless Pulse Oximetry for Physiological Monitoring,” PPL Workshop (2008)
1040	Reserved
1041	U.S. Publication No. 20150355604 A1 (“Fraser”)
1042	J. Shackelford and R. Doremus, “Ceramic and Glass Materials Structure, Properties and Processing” (2008) – Excerpt
1043	F. Shi, “Ceramic Materials – Progress In Modern Ceramics” (2012) – Excerpt
1044	R. Loehman, “Characterization of Ceramics” (1993) – Excerpt

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Exhibit No.	Description
1045	F. Aldinger and V. Weberruss, “Advanced Ceramics and Future Materials: An Introduction to Structures, Properties, Technologies, Methods” (2010) – Excerpt
1046	W.D. Kingery et al., “Introduction to Ceramics: Second Edition” (1960) – Excerpt
1047	USPTO Memo of April 5, 2018 regarding <i>Dynamic Drinkware</i> and <i>Amgen</i> cases
1048	District of Delaware Statistics, downloaded on February 21, 2023 from https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_dist_profile0930.2022.pdf
1049	Declaration of Sylvia D. Hall-Ellis, Ph.D.

CLAIM LISTING

Limitation	Claim Language
1a	An electronic device, comprising: a housing defining a first opening opposite to a second opening; a band attached to the housing and configured to secure the electronic device to a user;
1b	a display positioned in the first opening;
1c	a ceramic cover disposed over the second opening and forming a portion of an exterior surface of the electronic device;
1d	a biosensor module disposed within the second opening below the ceramic cover; and
1e	a wireless charging receive coil aligned with the second opening and below the ceramic cover;
1f	wherein: the ceramic cover is configured to pass optical signals generated by the biosensor module; and
1g	the ceramic cover is configured to pass wireless power from an external wireless charging device to the wireless charging receive coil.
2	The electronic device of claim 1, wherein the biosensor module comprises: a light source configured to emit light toward a region of skin of the user; and a detector configured to receive light reflected from the region of skin.
3	The electronic device of claim 2, wherein: the ceramic cover defines a first opening to transmit the light from the light source; and the ceramic cover defines a second opening to receive the light reflected from the region of skin.

Limitation	Claim Language
4	The electronic device of claim 2, wherein: the light source and the detector are configured to measure changes in light absorption by the region of skin; the electronic device is configured to compute a health metric using the measured change in light absorption; and the display is configured to display information associated with the health metric.
5	The electronic device of claim 2, wherein the light source and the detectors are configured to operate as a photoplethysmogram (PPG) sensor.
6	The electronic device of claim 1, wherein: the ceramic cover is a disk having a disk diameter that is greater than an opening diameter of the second opening; and the ceramic cover forms a water-tight seal with the housing along a perimeter of the ceramic cover.
7	The electronic device of claim 1, wherein: the second opening has an opening diameter; the wireless charging receive coil has a coil diameter that is less than the opening diameter; and the wireless charging receive coil is configured to receive the wireless power through the second opening.
8	The electronic device of claim 1, wherein: the ceramic cover has a convex contoured shape that protrudes toward the user; and the convex contoured shape facilitates alignment between the ceramic cover and a mating surface of the external wireless charging device.
9a	A wearable electronic device, comprising: a housing comprising a bottom portion defining an opening;
9b	a biosensor module aligned with the opening;

Limitation	Claim Language
9c	a wireless charging receive coil positioned within the housing and aligned with the opening;
9d	a battery operably coupled to the wireless charging receive coil; and
9e	a cover disposed over the biosensor module; wherein: the cover is configured to pass optical signals to and from the biosensor module; and
9f	the cover is configured to pass wireless power to the wireless charging receive coil.
10	The wearable electronic device of claim 9, wherein: the housing is formed from a metal material; and the cover is formed from a non-metal material.
11	The wearable electronic device of claim 9, wherein: the wireless charging receive coil has a coil diameter that is less than a diameter of the biosensor module; and the wireless charging receive coil is configured to receive the wireless power through the biosensor module.
12	The wearable electronic device of claim 9, wherein: the cover is a disk having a convex shape that protrudes away from the housing; and the convex shape is configured to facilitate alignment with a concave surface of an external inductive power transmitter dock.
13	The wearable electronic device of claim 12, wherein: the wearable electronic device is magnetically coupled to the external inductive power transmitter dock through the cover and the biosensor module.
14	The wearable electronic device of claim 9, wherein: the biosensor module includes an array of optical components; and the cover includes an array of windows, each window aligned with a corresponding optical component of the array of optical components.

Limitation	Claim Language
15a	An electronic watch, comprising:
15b	a housing defining an interior cavity and a bottom portion having an opening;
15c	a band attached to the housing and configured to secure the electronic watch to a user;
15d	a biosensor module positioned along the bottom portion of the housing and configured to transmit optical signals and receive reflected optical signals through the opening of the housing; and
15e	a wireless charging receive coil positioned within the interior cavity and configured to receive wireless power through the opening of the housing.
16	The electronic watch of claim 15, wherein: the wireless charging receive coil is configured to receive power from an external inductive power transmitter dock; and the electronic watch is configured to magnetically couple with the external inductive power transmitter dock.
17	The electronic watch of claim 15, wherein: the wireless charging receive coil is configured to receive power from an external inductive power transmitter dock; the electronic watch defines a convex contoured surface along the bottom portion; and the convex contoured surface is configured to facilitate alignment with a concave contoured surface of the external inductive power transmitter dock.
18	The electronic watch of claim 17, wherein the convex contoured surface is configured to protrude toward a portion of skin of the user when the electronic watch is worn.

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Limitation	Claim Language
19	The electronic watch of claim 15, wherein: the electronic watch is configured to compute a health metric using the biosensor module; and the health metric is one or more of: a heart rate, a respiration rate, a blood oxygenation level, a blood volume estimate, or blood pressure.
20	The electronic watch of claim 19, wherein: the electronic watch includes a display; and the display is configured to display information associated with the health metric.

Grounds Listing

GROUND 1	Claims 9–11, 15, 19, and 20 are unpatentable as obvious in view of Kotanagi and Honda
GROUND 2	Claim 16 is unpatentable as obvious in view of Kotanagi and Honda, and optionally in further combination with Park
GROUND 3	Claims 1–7 and 14 are unpatentable as obvious in view of Kotanagi and Honda, and optionally in further combination with Kateraas
GROUND 4	Claims 12–13 and 17–18 are unpatentable as obvious in view of Kotanagi and Honda, Jabori, and optionally in further combination with Park
GROUND 5	Claims 3 and 14 are unpatentable as obvious in view of Kotanagi, Honda, Fraser, and optionally in further combination with Kateraas
GROUND 6	Claim 8 is unpatentable because it would have been obvious in view of Kotanagi and Honda, Jabori, and optionally in further combination with Kateraas and/or Park

Masimo Corporation (“Petitioner” or “Masimo”) requests *inter partes* review of Claims 1–20 of U.S. Patent No. 10,627,783 (“the ’783 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 ’783 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:

Lead Counsel	Back-up 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 MasimoIPR-783@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 '783 Patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR.

II. BACKGROUND

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

¹ These references are discussed further in EX1003 ¶¶65–100.

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

Not all of these references are used as a substantive basis for this petition. However, the figures above (and the overview of developments in earlier decades, EX1003 ¶¶65–100, e.g., discussing EX1022–EX1031, and EX1033–EX1035) suggest the rich history of this crowded field.

A. Reliance on Expert Analysis and Testimony

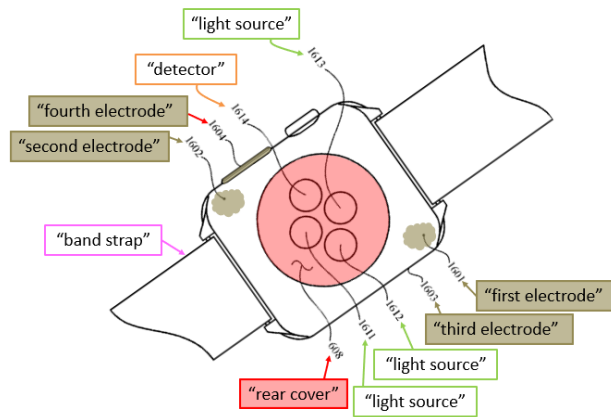
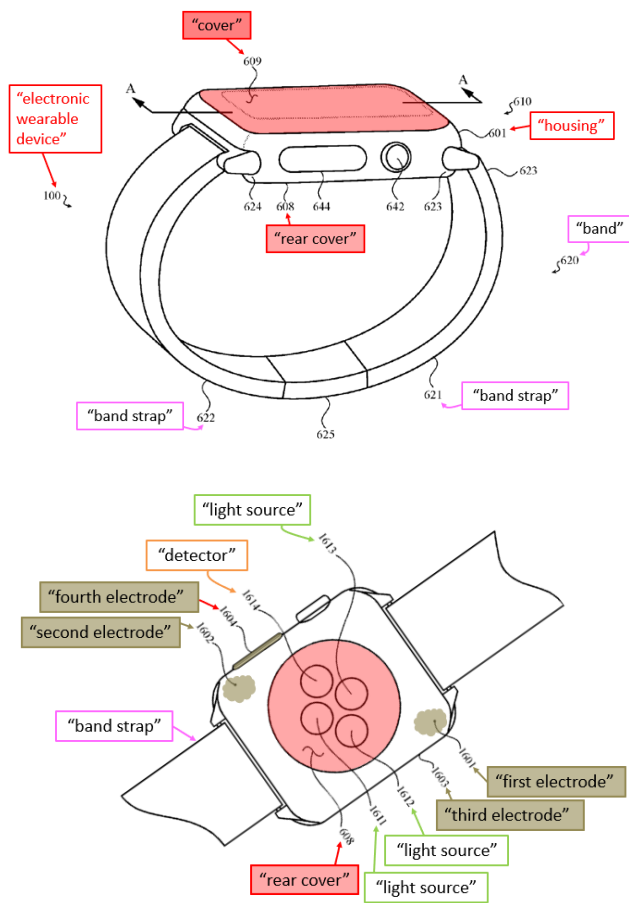
As with most patentability challenges, technical issues are highly relevant to this petition, including to show what would have been known or understood by a person of ordinary skill in the art (“POSITA”) at the time of invention. Accordingly, this Petition largely adopts the expert analysis and testimony of R. James Duckworth, Ph.D. EX1003 ¶¶1–301.²

B. Overview of the ’783 Patent

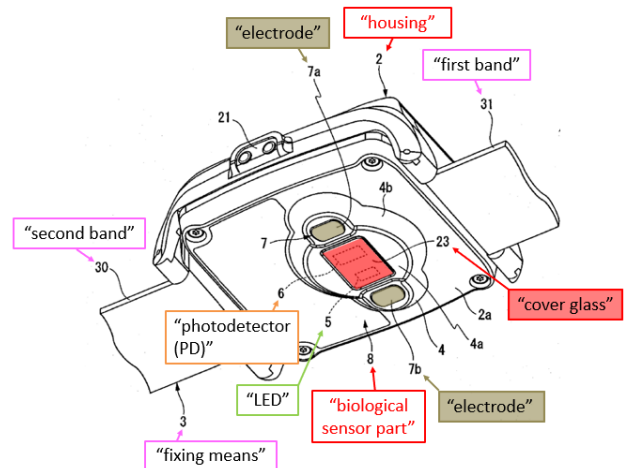
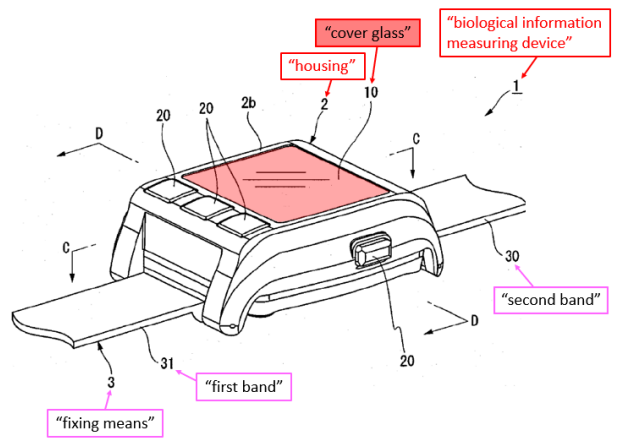
Apple’s ’783 patent purports to claim novel improvements to health-monitoring smart watches, but the Challenged Claims merely recite features that were well known prior to the ’783 Patent, and their combinations in the claims provide no unexpected results or benefits. The following compares ’783 Patent figures to those from a 2005 patent publication by Kotanagi (EX1005):

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

'783 Patent



Prior Art - Kotanagi



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

C. Prosecution History of the '783 Patent

The Examiner rejected Claims 1–34 on June 15, 2018. EX1002 at 1476–1504. Applicant proposed adding “structural features” for “wireless charging,”

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

including a “ceramic cover” “to overcome the prior art of record.” *Id.* at 1269. Applicant then presented wholly new Claims 35–54. *Id.* at 1275–78. These were allowed on December 19, 2018. *Id.* at 1005–1010. The reason: “the prior art fails to teach or suggest the specific arrangement and configuration of the claimed cover, opening in the housing, and wireless charging coil.” *Id.* at 387.

None of the prior art references that Petitioner relies on in this Petition were considered by the examiner during prosecution. *See generally* EX1002. EX1003 ¶¶62–63.

D. Priority

The ’783 patent, filed September 10, 2016, is a continuation of U.S. Application No. 14/842,617, filed September 1, 2015, which claims priority to provisional application 62/044,974, filed September 2, 2014—the earliest alleged priority date. EX1002 at 186, 1965. EX1003 ¶64.

E. Level of Ordinary Skill in the Art

A POSITA of the ’783 patent would have had at least a bachelor’s degree in a discipline related to electrical engineering, mechanical engineering, physics, industrial design, or equivalent, and at least three years of experience working with or developing electronic medical or consumer devices. EX1003 ¶¶39–42.

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

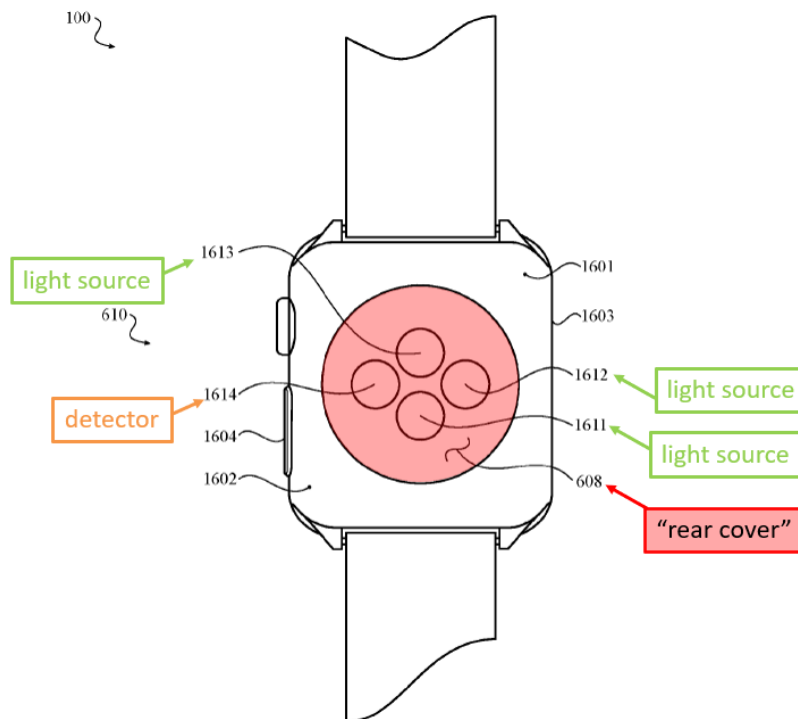
1. “a ceramic cover”

Claim 1 recites “a ceramic cover” over the second (or rear) opening. A POSITA would have understood “ceramic” in this context to mean a solid, nonmetallic, inorganic material such as glass or sapphire. Glass is included because it is “usually considered a subset of ceramics” (EX1044 at 11; *see* EX1045 at 12) and the ’783 patent explains that “cover glass” is a term of art and is often used generically, “regardless of the material.” EX1001 21:56–59. Sapphire is included because Sapphire (formed of alumina) is a well-known structural ceramic (EX1042 at 8, 10; EX1049 ¶¶ 34–40 (establishing public accessibility)) and the ’783 patent description specifies that its rear cover may be a sapphire sheet, zirconia, or alumina material. *See* EX1001 21:59–60; 26:16–19.⁴ Thus prior art having a rear cover of glass or sapphire or any other ceramic material satisfies this limitation. EX1003 ¶¶ 45–49.

⁴ Citations herein containing a colon (“:”) are to columns and lines, where available, or to pages and lines, where lines are numbered.

2. “biosensor module”

Claims 1, 9, 11, 13–15, and 19 refer to a “biosensor module,” a portion of the device that includes one or more sensors (e.g., the lights and detector of Fig. 16 in the ’783 patent).



See EX1001 at 22 (Fig. 16). The ’783 patent states the in some embodiments, the biosensor module “includes the rear cover 608.” *Id.* 28:9–10; *id.* at 13. Biosensors can be: “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.” *Id.* 40:47–48. Accordingly, a “biosensor module” is a portion of the device that includes one or more sensors and optionally includes a cover. EX1003 ¶¶50–53.

3. “ceramic cover defines a [first/second] opening to [transmit/receive] the light”

The “first opening” and “second opening” limitations of Claim 3 are different from the “first opening” and “second opening” of Claim 1. Claim 1 recites a first opening in the housing, where the display is positioned, and a second opening opposite to the first. EX1001 58:3. Claim 1 states that a ceramic cover is disposed over “the second opening” (making it a rear cover), and Claim 3 states that this rear cover “defines” its own, *separate* “first opening” and “second opening.” *Id.* 58:29–31.

The ’783 patent describes the rear cover this way:

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 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.

Id. 26:12–19 (emphases added); *id.* 40:46–67. EX1003 ¶54–55.

Accordingly, the '783 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 behind that sheet. EX10001 40:46–67.

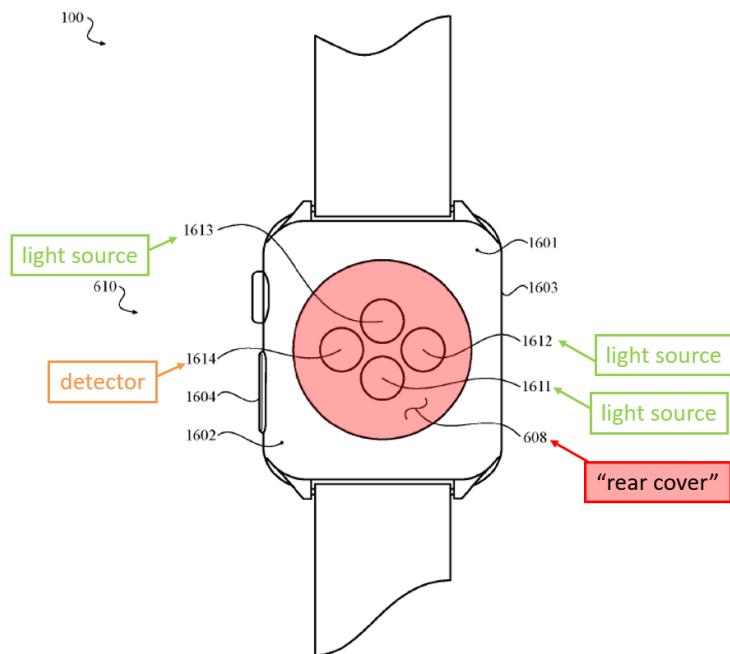


FIG. 16

See id. at 22 (Fig. 16). The rear cover defines these openings by allowing light to pass through for operational access to the internal optical components. In the '783 patent, the single rear cover 608 defines multiple openings by allowing passage of light through the cover at the round locations labeled 1611–1614 in Fig. 16. EX1003 ¶56. Thus, “ceramic cover defines a [first/second] opening to [transmit/receive] the light” should be construed as “ceramic cover that includes [first/second] locations that allow the passage of light.” EX1003 ¶56.

III. STATEMENT OF PRECISE RELIEF REQUESTED

A. Statutory Grounds for Cancellation

Petitioner requests that the Board cancel claims 1–20 of the '783 Patent under post-AIA 35 U.S.C. § 103 because they would have been obvious before their effective filing date to a POSITA.

B. Status of References as Prior Art

The references relied upon in the grounds herein are prior art for the following reasons:

Exhibit No.	Description	Prior Art Basis
1001	'783 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
1012	Park	Post-AIA 35 U.S.C. §102(a)(2) – effectively filed January 28, 2014 (see EX1015)
1014	Kateraas	Post-AIA 35 U.S.C. §102(a)(1) – published August 30, 2012
1016	Yuen	Post-AIA 35 U.S.C. §102(a)(1) – published May 15, 2014
1017	Jabori	Post-AIA 35 U.S.C. §102(a)(2) – filed January 30, 2014

Exhibit No.	Description	Prior Art Basis
1041	Fraser	Post-AIA 35 U.S.C. §102(a)(2) – filed August 19, 2014

These references constitute analogous art because they are from the same field of endeavor as the '783 patent, e.g., watches and wearable 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., wireless charging of biosensing watches. The volume and character of the overlapping features between the references listed above and the subject patent provides further evidence that these references are analogous art and highly relevant for a POSITA. For example, the side-by-side figures in the section above titled “Overview of the '783 Patent” show many similarities between the patent and the Kotanagi reference. These figures and similar figures throughout this document support the obviousness combinations generally and also support the conclusion that these references are analogous art. Accordingly, a POSITA is presumed to have been aware of these references. *In re Nilssen*, 851 F.2d 1401, 1403 (Fed. Cir. 1988). As set forth in detail below in the context of the invalidity analysis, a POSITA would have been motivated to combine these references prior to the filing of the '783 patent for many additional reasons. EX1003 ¶¶107–108.

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 ’783 patent. EX1012 at 1.

The Park Provisional provides the same relevant disclosure as Park, as shown with the parallel citations to EX1012 and EX1015 herein. Figure sets in these exhibits are identical. EX1012 at 2–14; EX1015 at 41–52. The Park Provisional provides support⁵ for at least Park’s Claim 1. *See* EX1012 at 25; EX1015 at 7. EX1003 ¶113. Thus, Park is entitled to the Park Provisional’s priority date of January 28, 2014. *See* EX1003 ¶114 for a claim chart

⁵ 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 Board cases applying *Dynamic Drinkware* to certain post-AIA cases. *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).

demonstrating this correspondence.

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

Jabori (EX1017) is a PCT publication designating the United States. 35 U.S.C. § 374. With an international filing date of January 30, 2014, it predates the earliest priority of the '783 patent and is therefore prior art. 35 U.S.C. § 102(d)(1).

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

Fraser (EX1041) is a U.S. patent publication. Filed August 19, 2014, it predates the earliest priority of the '783 patent and is therefore prior art. 35 U.S.C. § 102(d)(1).

IV. SPECIFIC PROPOSED GROUNDS FOR UNPATENTABILITY

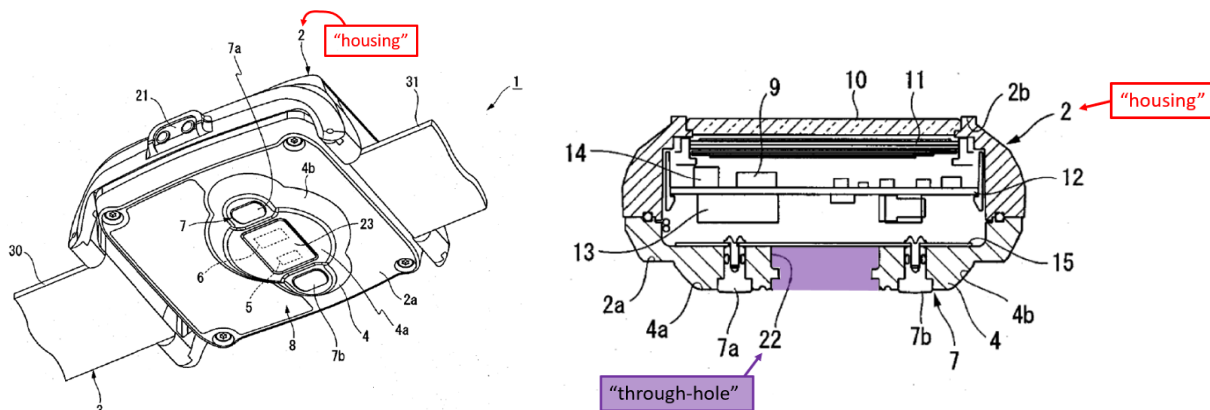
As explained below, claims 1–20 of the '783 patent would have been obvious to a POSITA in view of the prior art at the relevant time. The cited references teach every claim limitation, though not always using identical terminology. *See In re Bond*, 910 F.2d 831, 832 (Fed. Cir. 1990) (disclosure need not be *ipsissimis verbis*).

A. Ground 1: Claims 9–11, 15, 19, and 20 are unpatentable because they would have been obvious in view of Kotanagi and Honda.

1. Independent Claim 9

- a. “A wearable electronic device, comprising: a housing comprising a bottom portion defining an opening;”**

Kotanagi teaches a housing with an opening in the bottom:



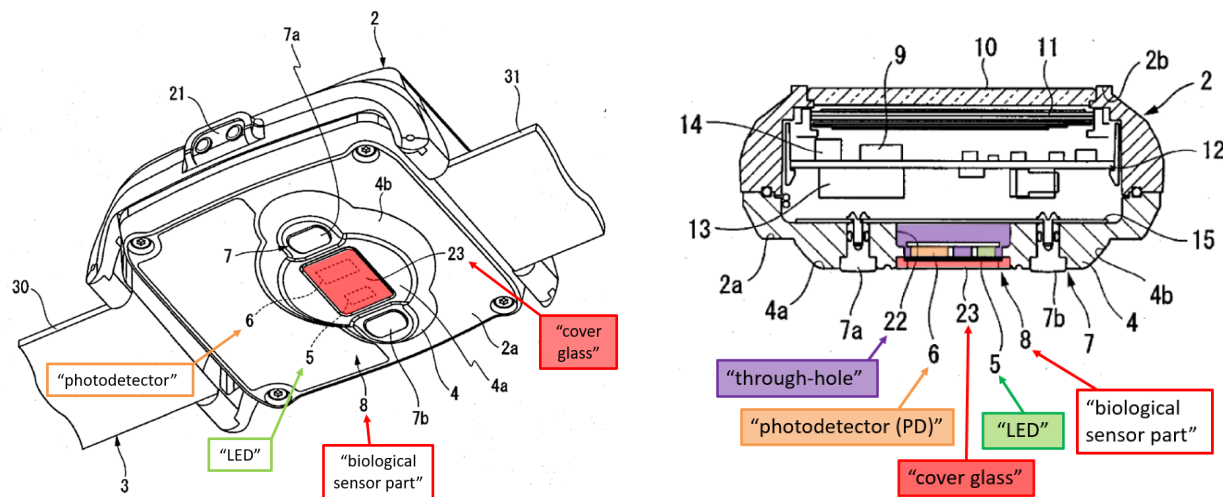
This biological information measuring device 1 includes a housing (main body) 2 [A] through-hole 22 passing through the outside and the inside of the housing 2 is formed in the center of the lower surface 4a of the protruding part 4

See EX1005 at 26, 27 (Figs. 5, 7) (biosensor module removed); *id.* ¶¶45, 55.

EX1003 ¶116.

b. “a biosensor module aligned with the opening;”

Consistent with the construction of “biosensor module” in § II(F)(2) above, Kotanagi teaches a “biological sensor part” aligned with the opening:



See *id.* 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 ¶(0055).

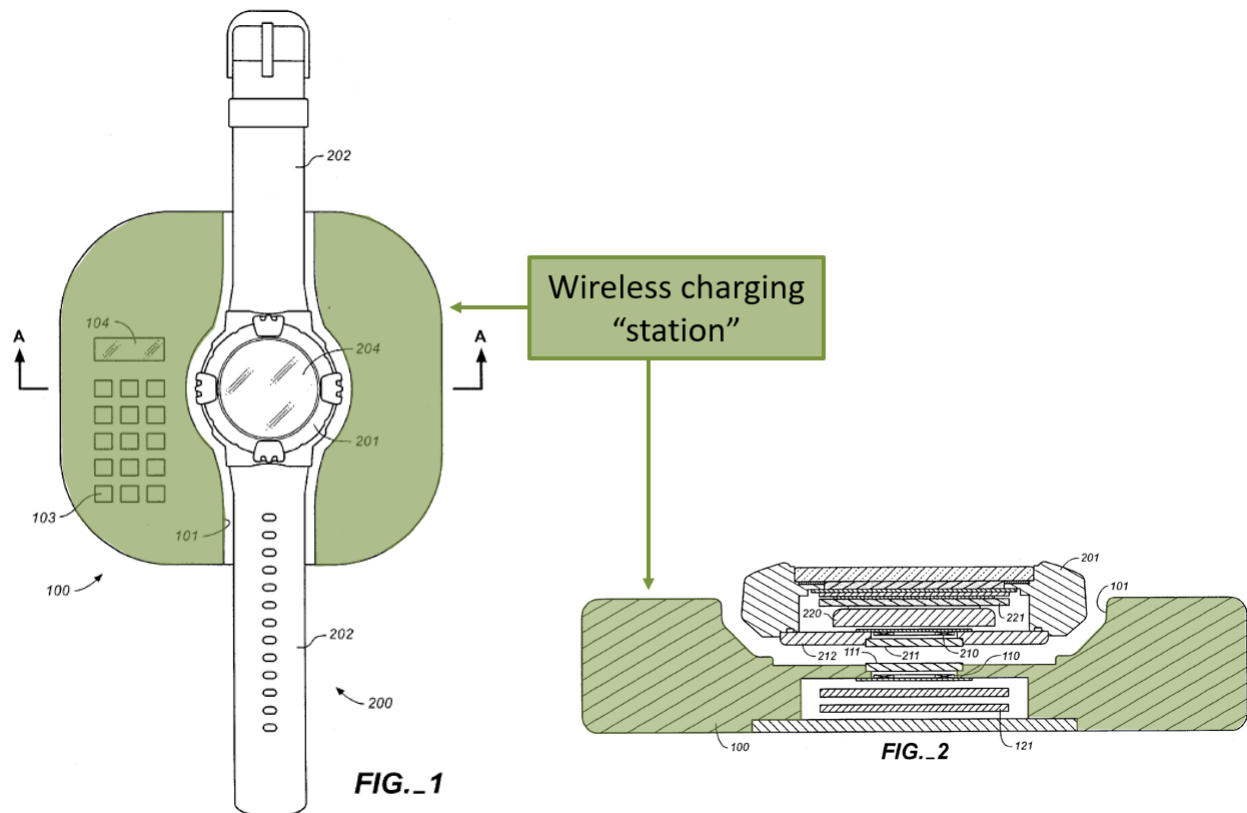
EX1003 ¶1117.

c. “a wireless charging receive coil positioned within the housing and aligned with the opening;”

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 ¶(0053) (emphasis added). A POSITA would have known at the time of the ’783 Patent’s invention

that transformers use coils and that contactless charging uses a wireless charging receive coil. EX1003 ¶118.

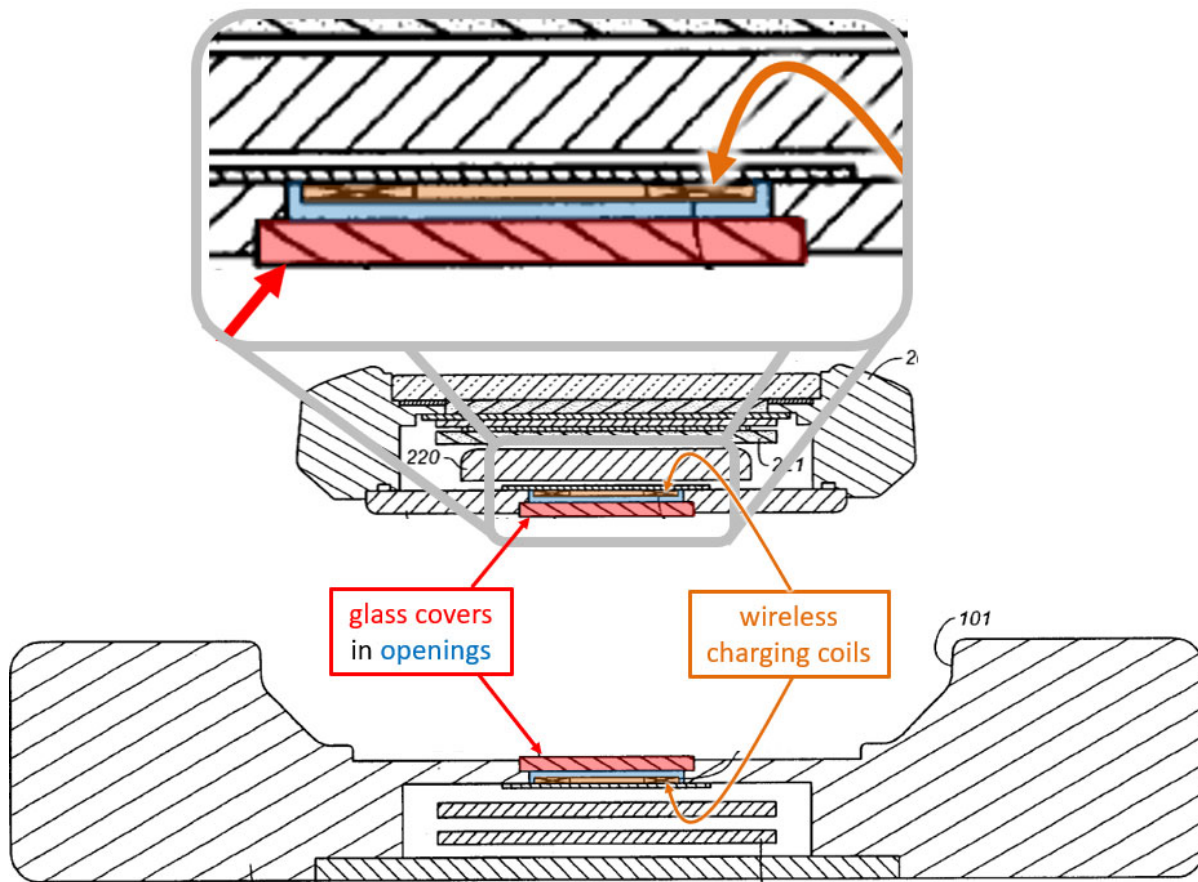
Honda, which issued in 2001, discloses such a contactless charging system for a biosensing wristwatch. EX1006 at 1. Honda’s Figure 1 shows a plan view of a watch in a charging station, with Figure 2 showing a cross-section of this arrangement:



See EX1006 at 2–3 (Figs. 1, 2).

Kotanagi and Honda assignees share the same Seiko parent company. 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 that spans an opening in the bottom surface of the watch. Within its housing and behind its cover glass, Honda illustrates a “wireless charging receive coil” “aligned with the opening,” as claimed:



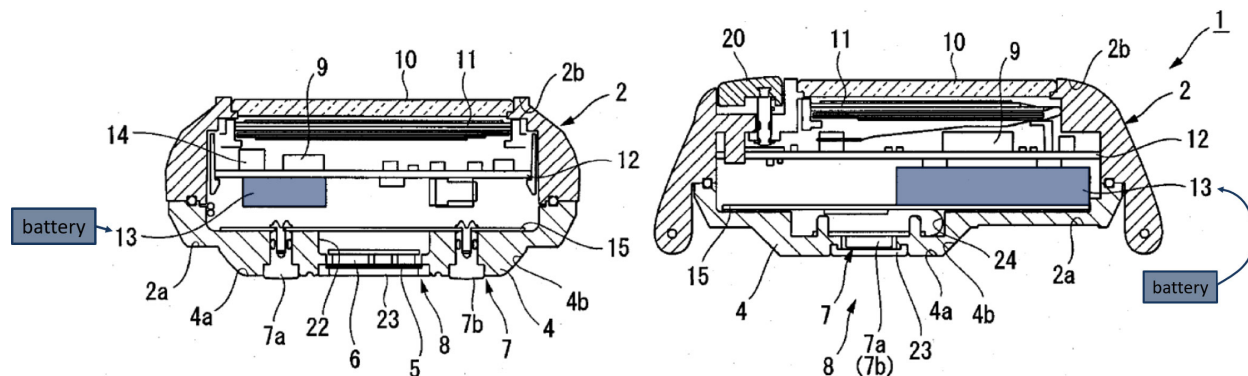
See EX1006 at 3 (Fig. 2).

A person of ordinary skill in the relevant field or “art” at the time of the ’783 patent (a “POSITA”) would have been motivated to combine Honda and Kotanagi (e.g., to apply Honda’s wireless charging teachings and structure to the Kotanagi device) based at least on Kotanagi’s own statement that its rechargeable battery

can be recharged “in a contactless state.” EX1005 ¶(0053). A POSITA seeking to charge this way would have looked to Honda—assigned to another subsidiary of the same Seiko parent company and providing compatible disclosure—to implement Kotanagi’s stated goal. Honda’s watch structure is similar in size and purpose to the watch of Kotanagi and Honda teaches incorporating a sensor for “pulse rate” or “heart rate”. EX1006 6:17–19. Thus, a POSITA would have had a reasonable expectation of success in fitting Honda’s wireless charging receive coil within Kotanagi’s housing (e.g., in its “through-hole 22”) for Kotanagi’s expressed purpose of contactless recharging. EX1003 ¶121.

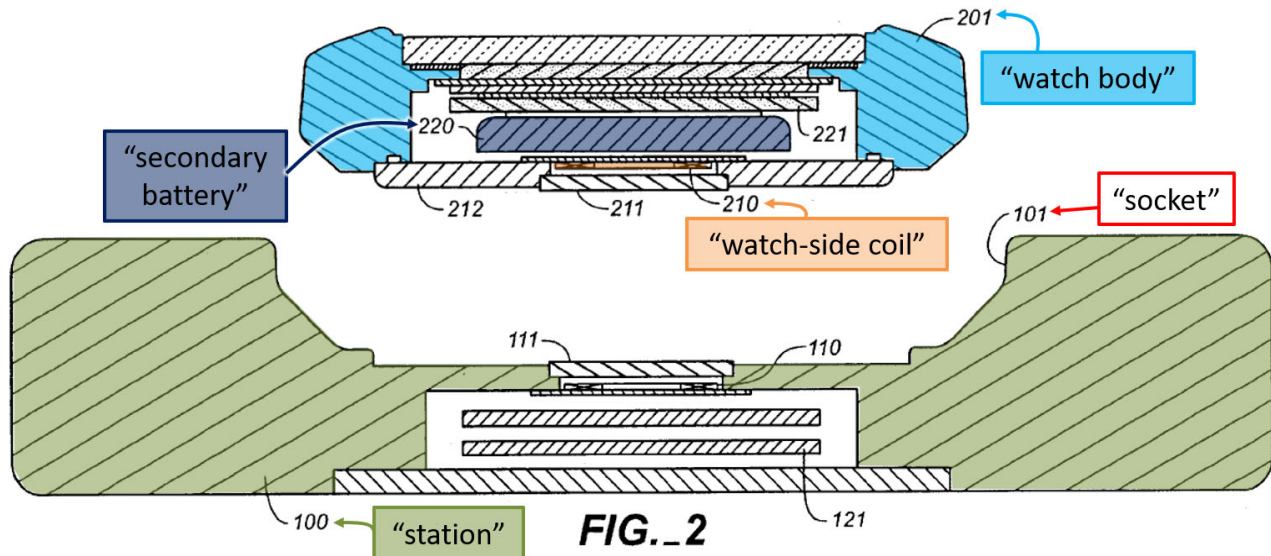
d. “a battery operably coupled to the wireless charging receive coil; and”

Kotanagi teaches a “rechargeable battery 13,” which can be connected for “contactless,” or wireless, charging. EX1005 ¶(0053). The battery is illustrated in the cross-sections of Kotanagi’s Figures 6 and 7:



See EX1005 at 27 (Figs. 6, 7).

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.

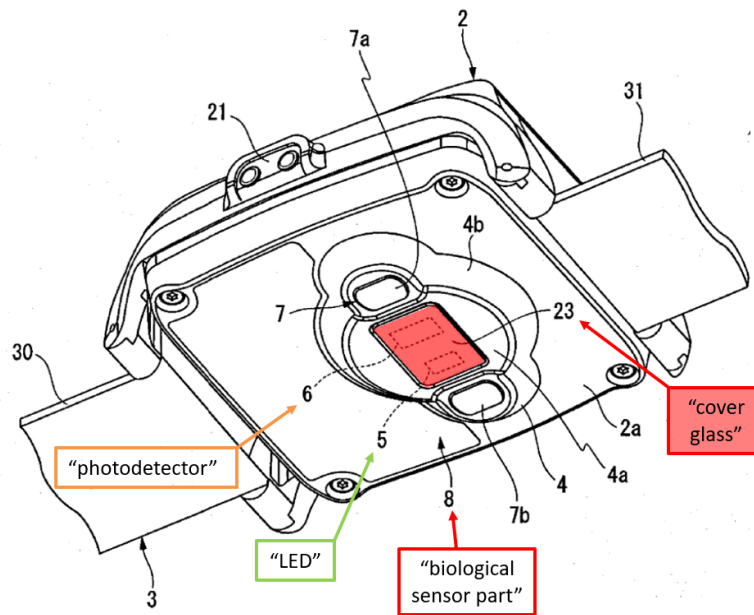


See *id.* at 3 (Fig. 2).

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 ¶122–123.

- e. **“a cover disposed over the biosensor module; wherein: the cover is configured to pass optical signals to and from the biosensor module; and”**

Kotanagi illustrates its photodetector 6 and LED 5 with dashed lines to indicate they lie behind the cover glass 23, forming a “biological sensor part” 8:



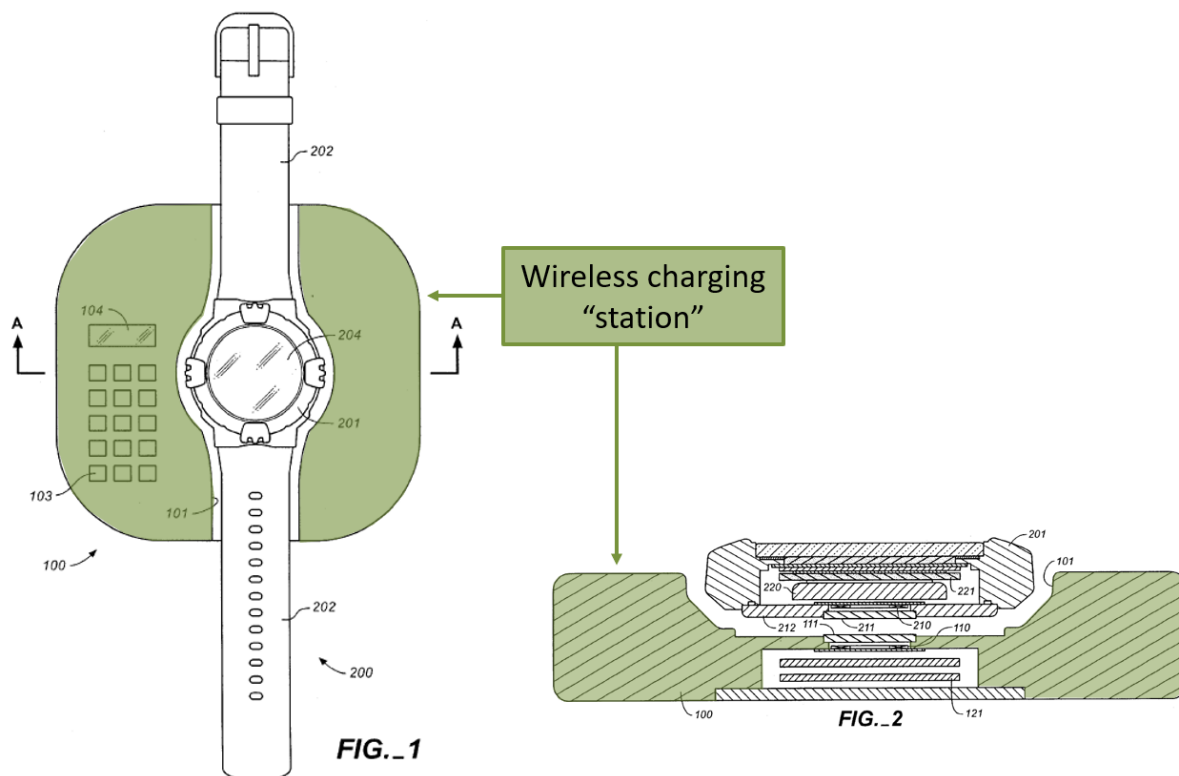
See EX1005 at 26 (Fig. 5). Kotanagi further explains:

[T]he data processing part 9 **emits light from the LED 5** toward the living body. 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, and outputs the signal to the data processing part 9.

Id. ¶(0065) (emphases added). 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 ¶(0055)), its LED and photodetector work by passing optical signals *through* the cover glass. Thus, Kotanagi’s cover glass already passes optical signals to and from the LED and photodetector, satisfying this limitation. EX1003 ¶125–126.

f. “the cover is configured to pass wireless power to the wireless charging receive coil.”

As noted above, Kotanagi teaches recharging its battery “in a contactless state” (EX1005 ¶(0053)) and Honda teaches wireless charging using receive coils. Honda also shows an external wireless charging device, which it terms a “station”:



See EX1006 at 2, 3 (Figs. 1, 2). This station passes wireless power to the receive coil through a rear cover glass (similar to that of Kotanagi), using the physics of induced currents and magnetic flux. Honda illustrates magnetic flux in its Figure 10:

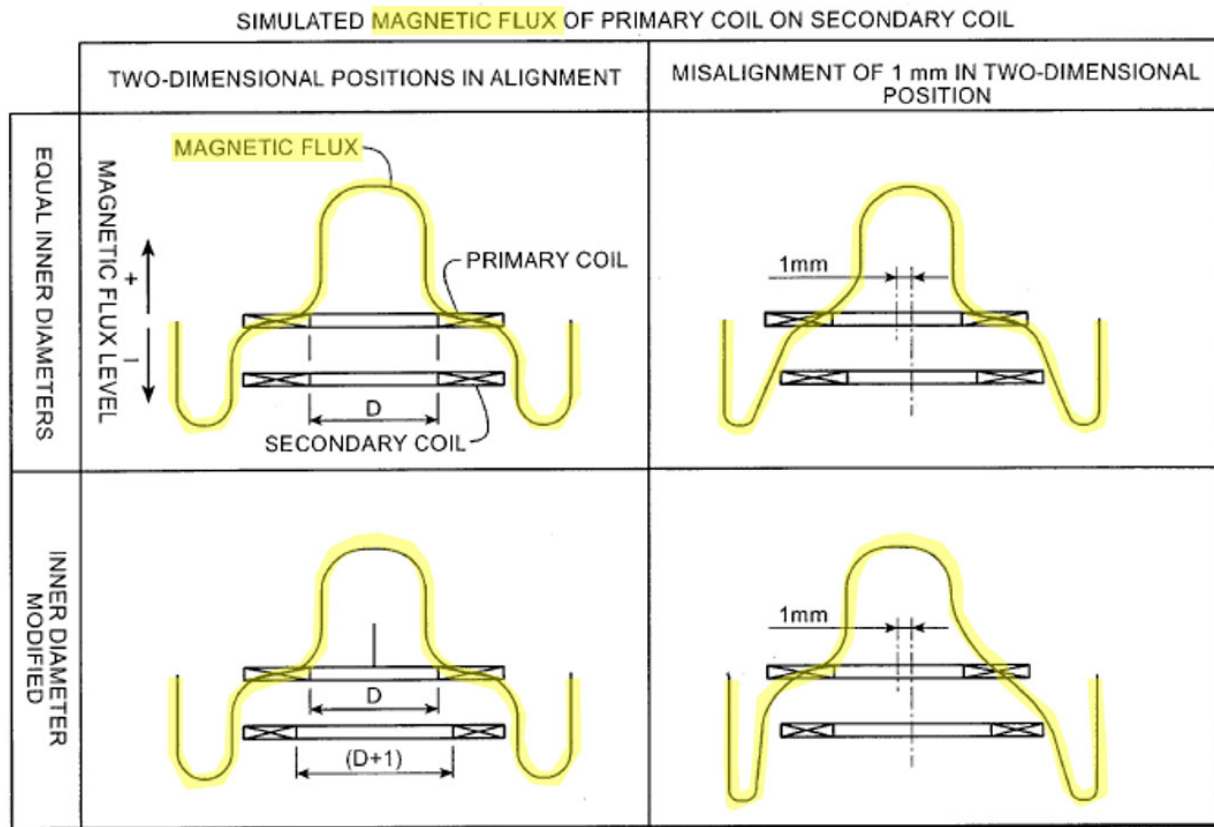
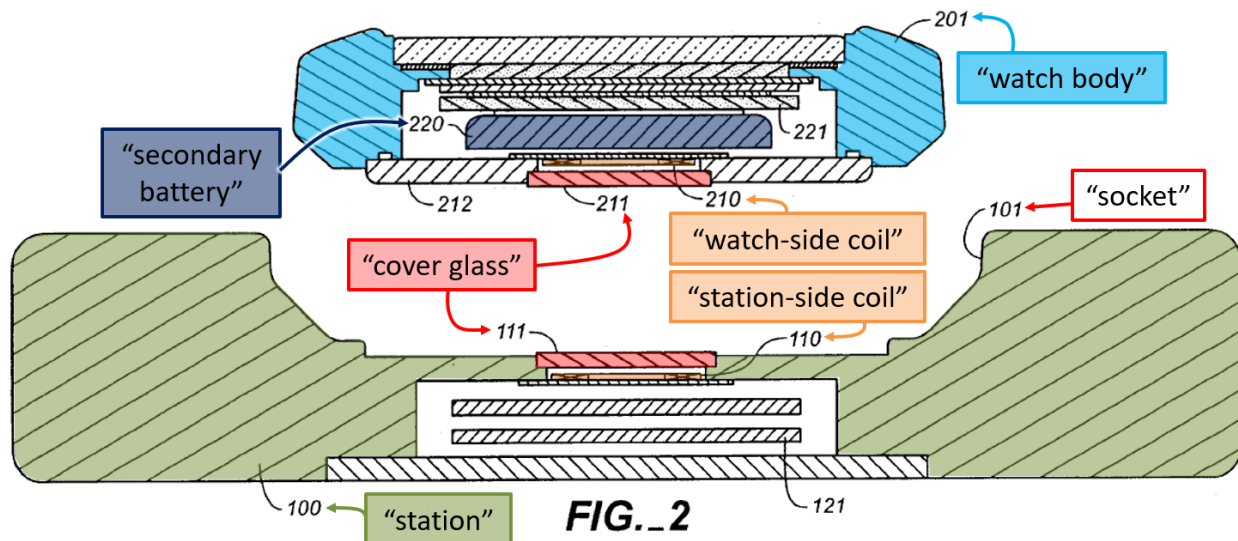


FIG. 10

See id. at 9 (Fig. 10). This charging effect occurs as wireless power traverses a cover glass:

A station-side coil 110 is arranged in the portion of the socket 101 of the station 100, facing the watch-side coil 210, and is covered with a cover glass 111 . . . 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.

Id. 6:28–40.



See id. 1006 at 3 (Fig. 2). Thus, a POSITA would have understood that charging coils in both the charging station and the watch body must be aligned and at an acceptable distance.

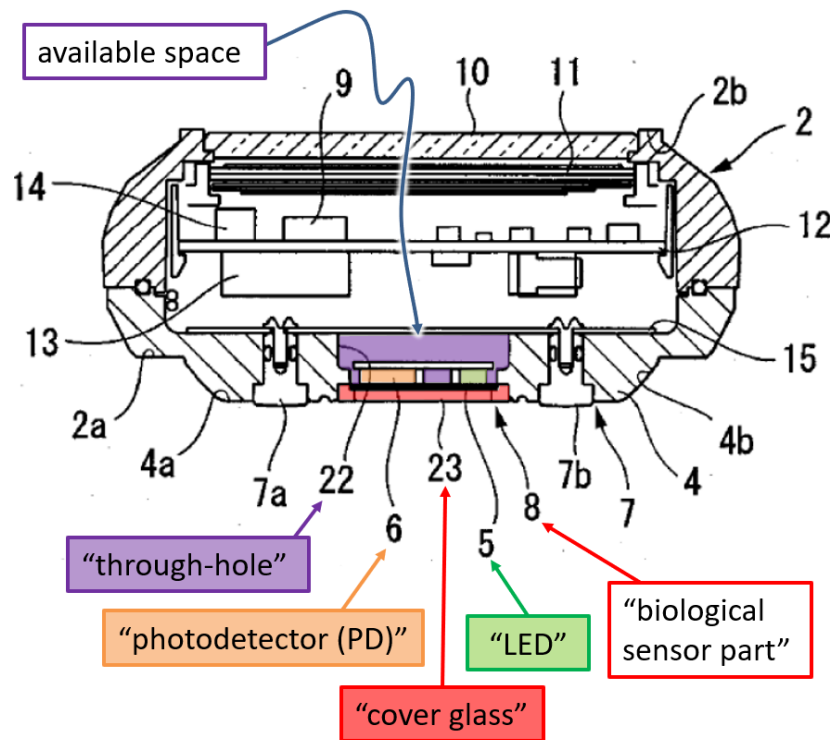
Kotanagi's cover glass is already centrally located at the base of the device consistent with Honda's wireless charging design. A POSITA would have known to modify Kotanagi's device based on Honda's teachings to align a charging receive coil behind this cover glass (in a similar position and with a similar size to that taught in Honda). With this straightforward modification (motivated, for example, by Kotanagi's own reference to "contactless" charging and Honda's teaching of how to do so in a watch-style device), the cover would be "configured to pass wireless power" in the claimed manner. Accordingly, Kotanagi and Honda teach the cover "configured to pass wireless power from an external wireless charging device to the wireless charging receive coil." EX1003 ¶127–129.

Based on the above, Claim 9 would have been obvious over Kotanagi and Honda prior to the filing of the '783 patent.

g. Motivation to Combine

A POSITA at the time of the invention would have been motivated to make the modifications based on teachings of both Kotanagi and Honda and would have had a reasonable expectation of success. Kotanagi teaches a pulse rate biosensor watch that may be charged in a “contactless state,” motivating a POSITA to look to Honda. EX1005 ¶(0053). Honda teaches wireless watch charging, but also refers to watch sensors for pulse/heart rate or heart rate of the body, motivating a POSITA to look to Kotanagi. EX1006 6:14–20; 8:40–42. EX1003 ¶130. Further, these two references are assigned to subsidiaries of the same Seiko parent company.

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 noticed the available space near Kotanagi’s opening and been motivated to use that space for such a coil, with a reasonable expectation of success. The figure below shows this available space:



See EX1005 at 27 (Fig. 7). EX1003 ¶131.

Moreover, Honda's Figure 15 and related text 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 thus have aligned Honda's coil with Kotanagi's opening such that power could pass through the cover. EX1003 ¶132.

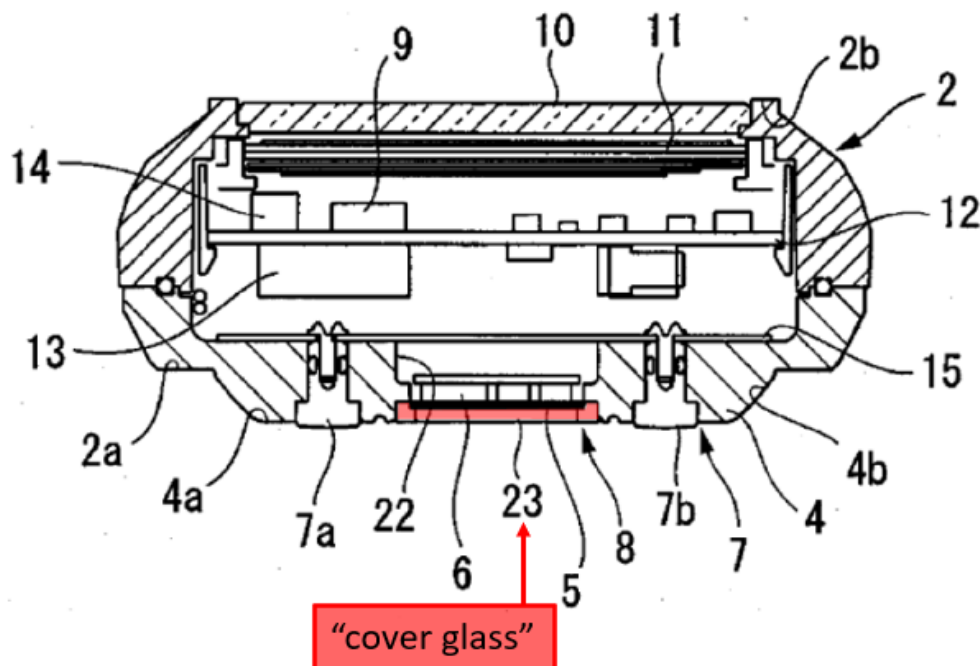
For at least the above reasons, one of ordinary skill would have been motivated to substitute Honda's charging components for those of Kotanagi in order to implement the express teachings of Kotanagi to implement a contactless or wireless charging system. EX1003 ¶133.

This motivation to combine also applies to the other Ground 1 combinations and dependents from Claim 9. EX1003 ¶134. Further motivations to combine are provided throughout this petition.

2. Dependent Claim 10

Claim 10 depends from Claim 9 and adds “**the housing is formed from a metal material; and the cover is formed from a non-metal material.**”

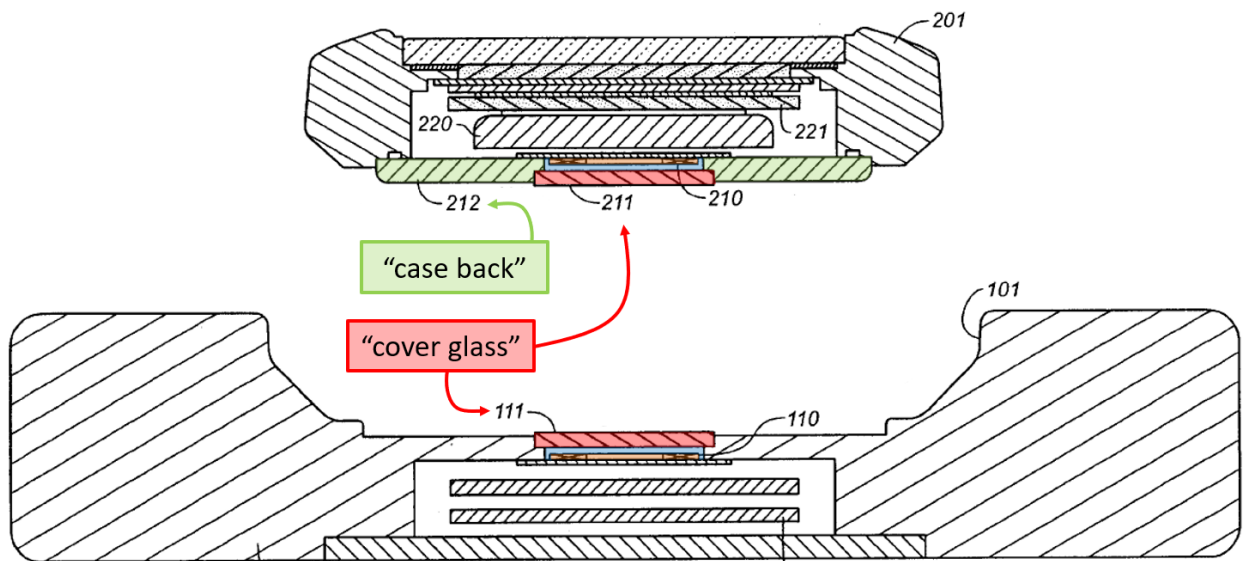
Kotanagi teaches metal for the housing: “The housing 2 described above is made of plastic **or a metal material** such as aluminum” EX1005 ¶(0048) (emphasis supplied). Kotanagi also teaches a cover glass 23 that passes optical signals from PD 5 and LED 6:



See id. at 27 (Fig. 7). Based on this figure and the related descriptions, Kotanagi

teaches using a different, non-metal material (such as ceramic, glass, etc.) for the cover glass. EX1003 ¶136.

Similarly, Honda teaches a metal case and a non-metal (glass) cover:



See EX1006 at 3 (Fig. 2). “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 teaches that “the cover glasses 211 and 111 may be replaced with other insulating materials.” *Id.* 16:14–15.

Honda also explains that non-metal covers are useful for transmitting power, using its Figure 15 to contrast poor transmission efficiency for different thicknesses of stainless steel with much higher transmission efficiencies of glass and glass combinations:

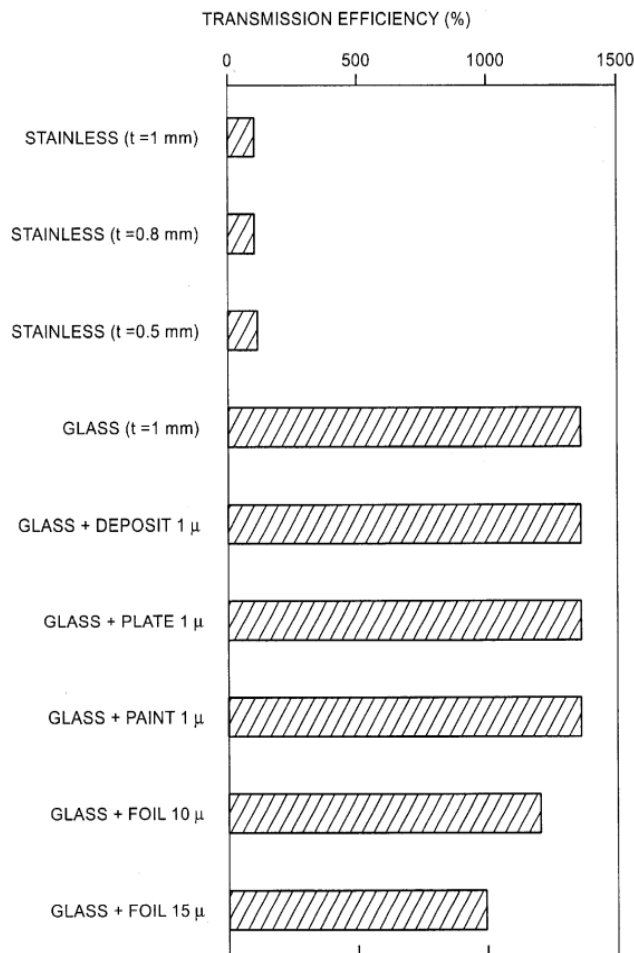


FIG. 15

Id. at 14 (Fig. 15); *see id.* 2:48–50

A POSITA would have been motivated to use the non-metal cover teachings of Kotanagi and Honda because the POSITA would have known from basic principles of electrical shielding that complete metal enclosures prevent electromagnetic charge from penetrating. This is confirmed by Honda's experiments in this setting. EX1006 13:33–63. Thus, to achieve the wireless charging goal expressed in Kotanagi, a POSITA would have naturally used a non-

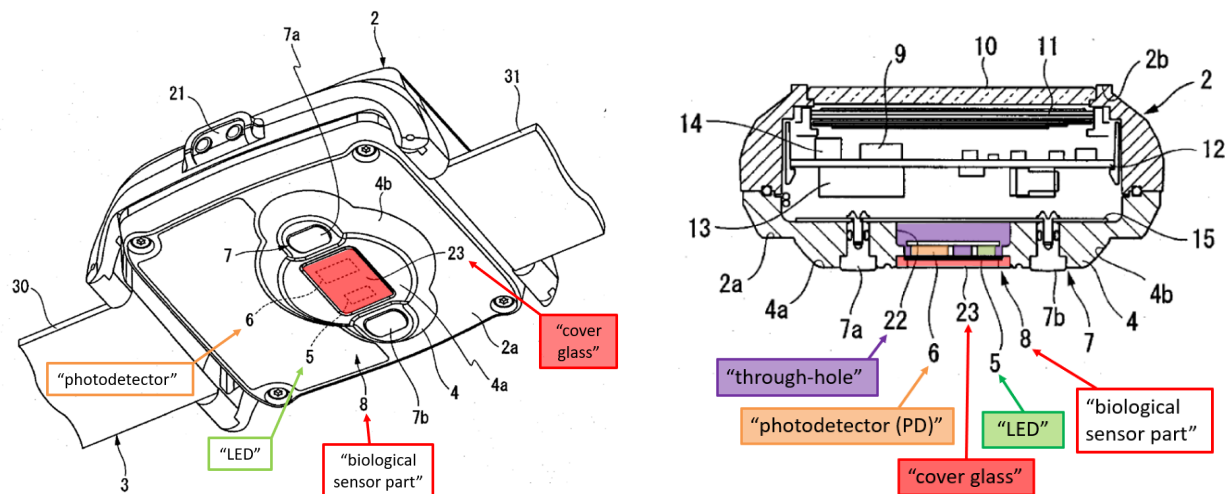
metal material as a cover for a wireless charging coil. EX1003 ¶139.

Based on the above, Claim 10 would have been obvious over Kotanagi and Honda.

3. Dependent Claim 11

Claim 11 depends from Claim 9 and adds “**the wireless charging receive coil has a coil diameter that is less than a diameter of the biosensor module; and the wireless charging receive coil is configured to receive the wireless power through the biosensor module.**”

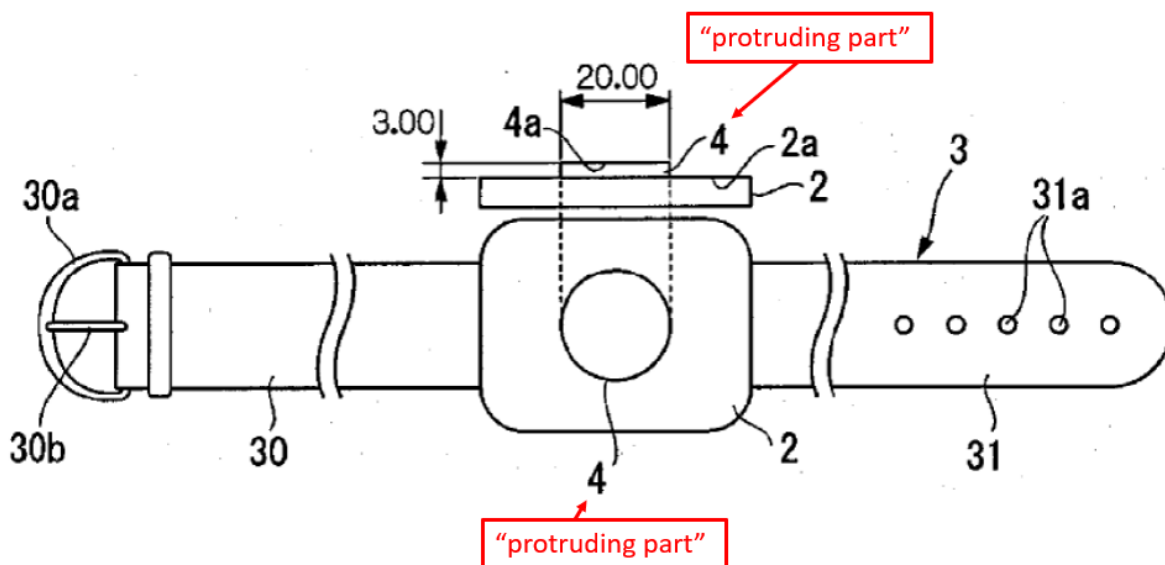
Consistent with the construction of “biosensor module” in § II(F)(2) above, Kotanagi teaches a biological sensor part: “[t]he LED 5 and the PD 6 are disposed adjacent to one another . . . so as to touch the inside of the glass cover 23.” EX1005 ¶(0055).



See id. at 26–27 (Figs. 5, 7). Because in the ’783 patent the “biosensor module” includes both biosensors and a cover glass, Kotanagi’s cover glass, LED 5, and PD

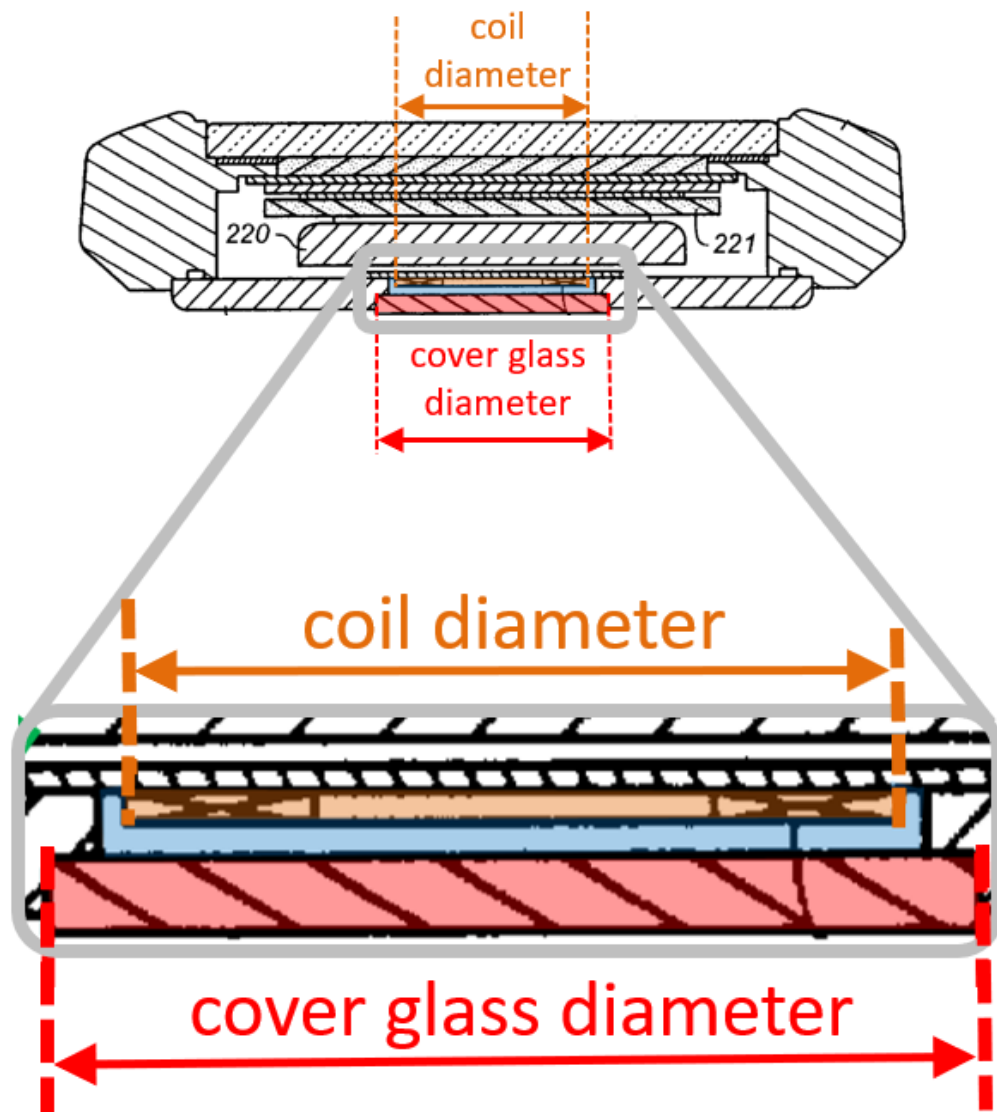
6 teach the claimed biosensor module. EX1003 ¶142.

Although the “cover glass” in Kotanagi’s Figure 5 is not circular, Kotanagi teaches a round disk in its Figure 8: “the protruding part 4 may be formed so that the outer periphery is circular” and Kotanagi describes its diameter: “the diameter of the protruding part 4 illustrated in FIG. 8 is set to 20 mm.” EX1005 ¶(0076).



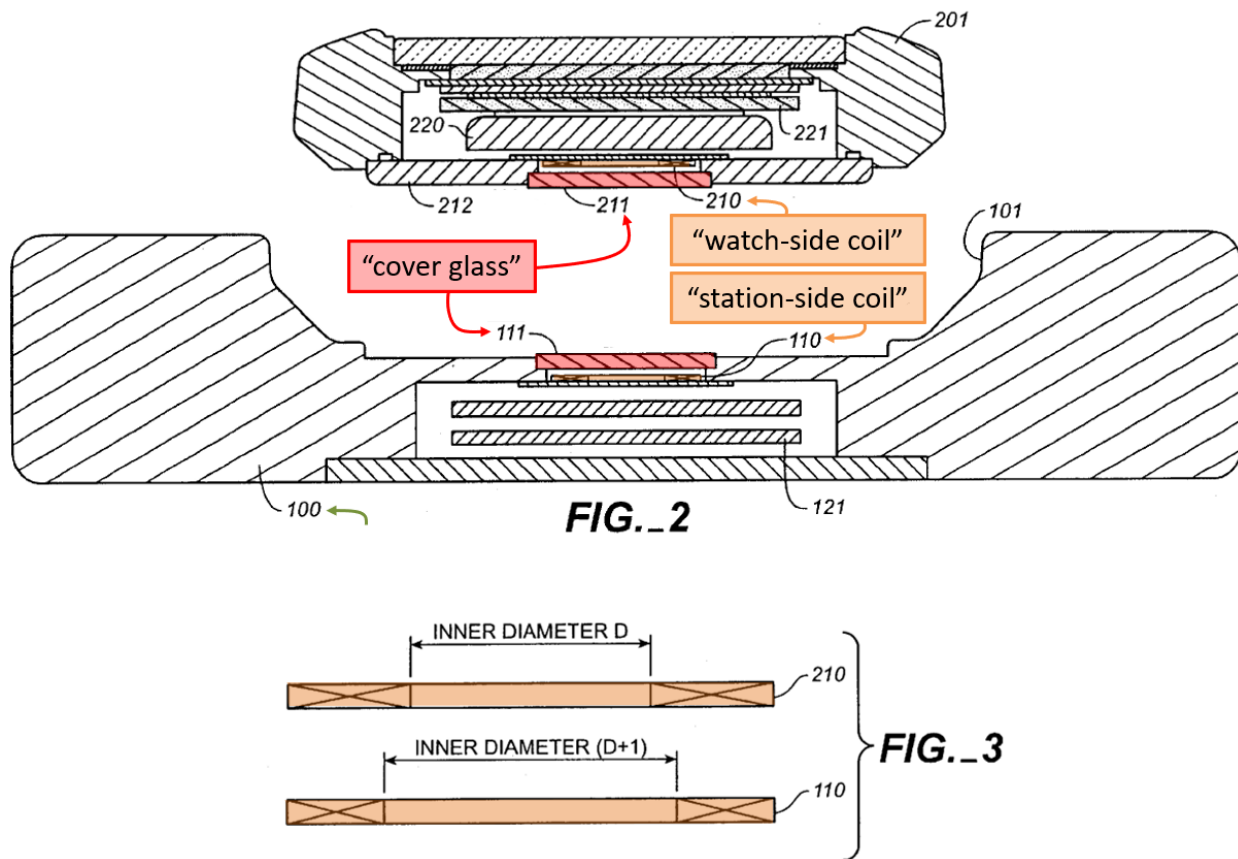
See id. at 28 (Fig. 8). Accordingly, a POSITA would have understood that Kotanagi’s biosensor module could be similarly round and therefore have a “diameter.”

In the same field of endeavor (e.g., biosensing watches), Honda teaches a wireless charging receive coil, located within a rear opening spanned by a cover glass. EX1006 at 3 (Fig. 2). Honda teaches that the wireless charging receive coil has a diameter smaller than that of its cover glass:



See EX1006 at 3 (Fig. 2).

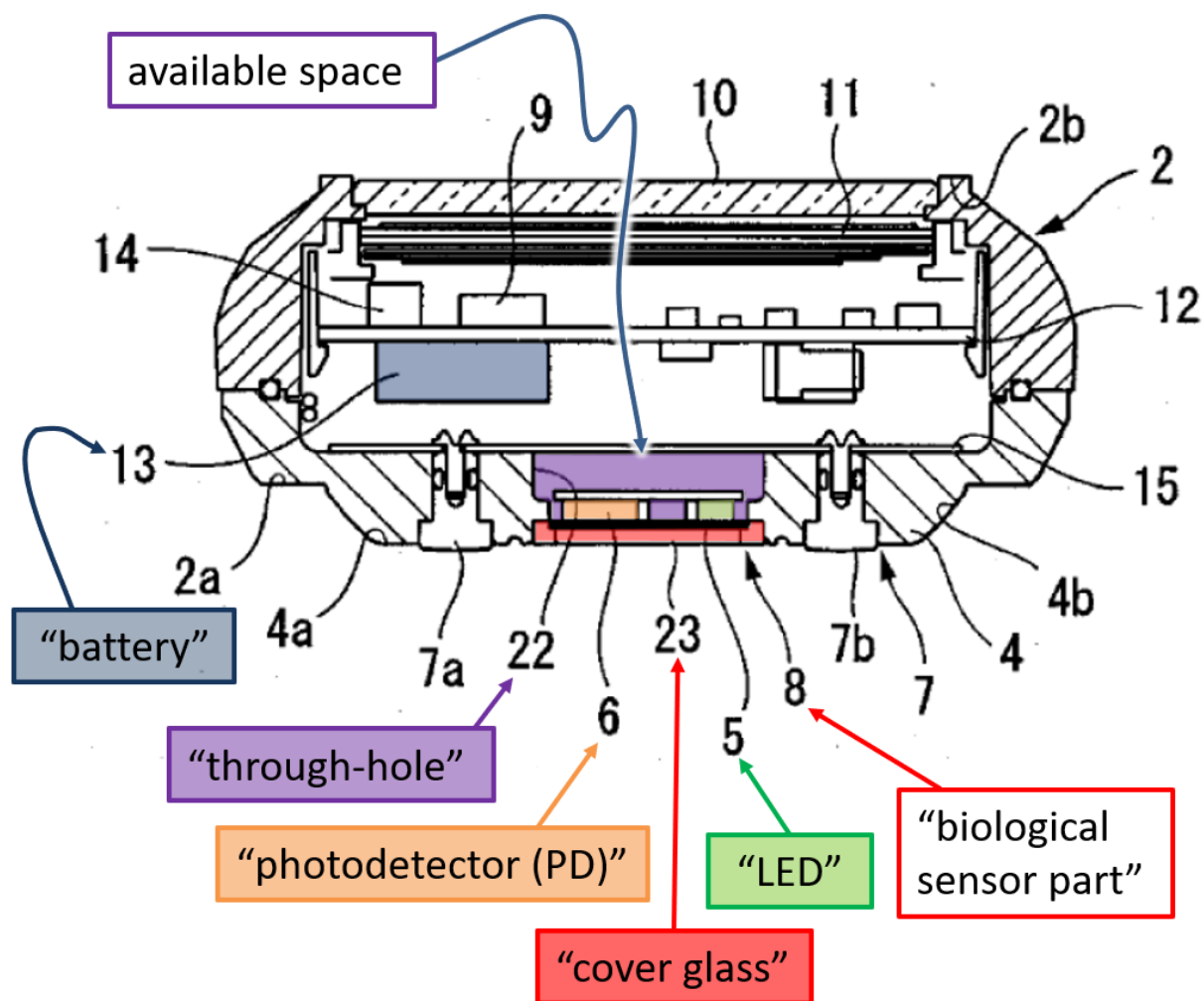
Honda's watch device is configured to receive wireless power through the cover glass by virtue of magnetic coupling of parallel coils. *Id.* 5:1–7.



See *id.* at 3 (Figs. 2, 3).

Given this and Kotanagi’s teaching of a “biological sensor part” with an LED and photodetector “disposed adjacent to one another . . . so as to touch the inside of the glass cover 23” (*see* EX1005 ¶(0055)), 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 biosensor module, including 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).

Moreover, in view of teachings such as that of Honda’s Figure 15 (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 that wireless charging occurs more effectively when a charging coil is exposed through a large enough opening, so that any metal housing does not create an electrical shielding effect that tends to prevent electromagnetic transmission. A POSITA would have also known (*e.g.*, from the experiments summarized in Honda’s Fig. 15, EX1006 at 14) that charging occurs most efficiently through an opening, not through a metal cover itself. EX1003 ¶146.

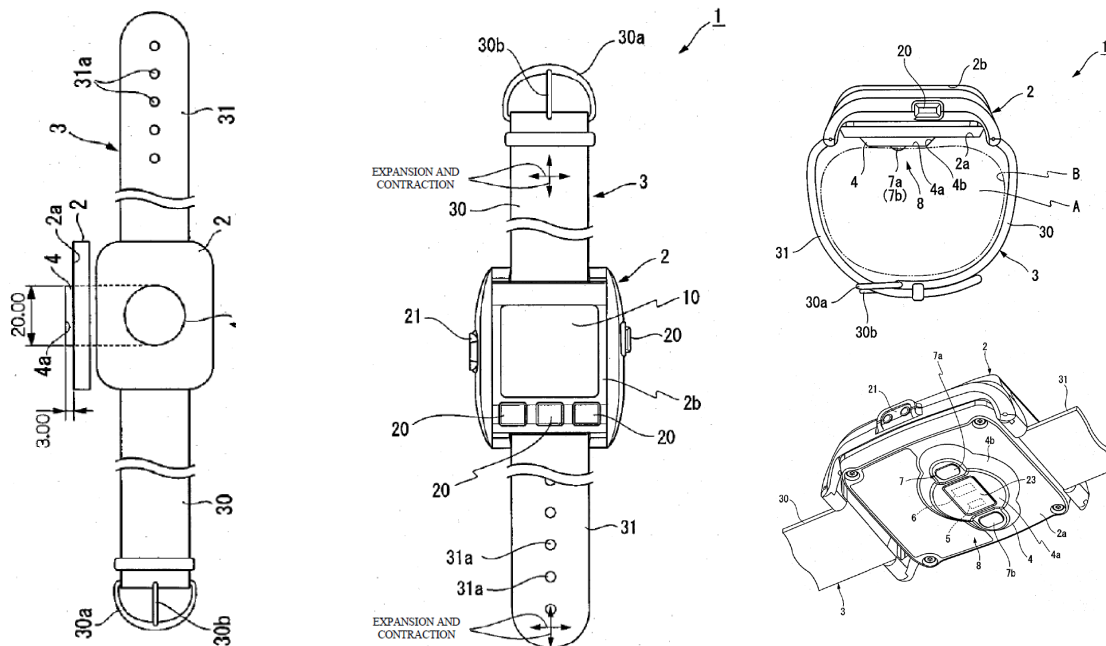
Accordingly, a POSITA would have expected success in modifying Kotanagi in view of Honda. This combination teaches the claimed “coil diameter that is less than a diameter of the biosensor module,” where the coil would be “configured to receive the wireless power through the biosensor module.” That is, power would be received through at least the cover glass that forms part of that biosensor module. EX1003 ¶147.

As shown above, Claim 11 would have been obvious over Kotanagi and Honda.

4. Independent Claim 15

a. “An electronic watch, comprising:

Kotanagi describes a “wristwatch-type device which detects pulse rate as a type of biological information while mounted to the wrist.” EX1005 ¶(0044).



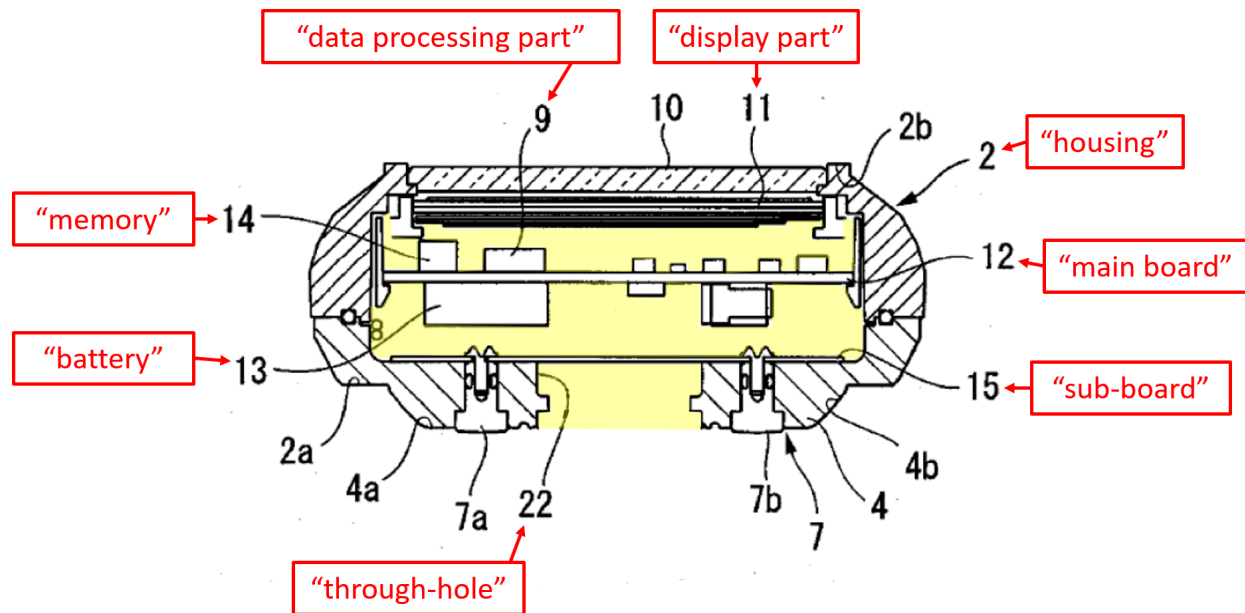
Id. at 23, 24, 26, 28 (Figs. 1, 2, 5, 8).

b. a housing defining an interior cavity and a bottom portion having an opening;

This wristwatch-type device described by Kotanagi has a “housing” with several components “inside,” demonstrating that it teaches the claimed “interior cavity”:

[A]s illustrated in FIGS. 6 and 7, a main board 12 is provided **inside the housing** 2, and the data processing part 9, the display part 11, a rechargeable battery 13 that can be recharged, a memory 14 for recording the pulse rate, a sub-board 15, and various other electronic parts are mounted on or electrically connected to the main board 12.

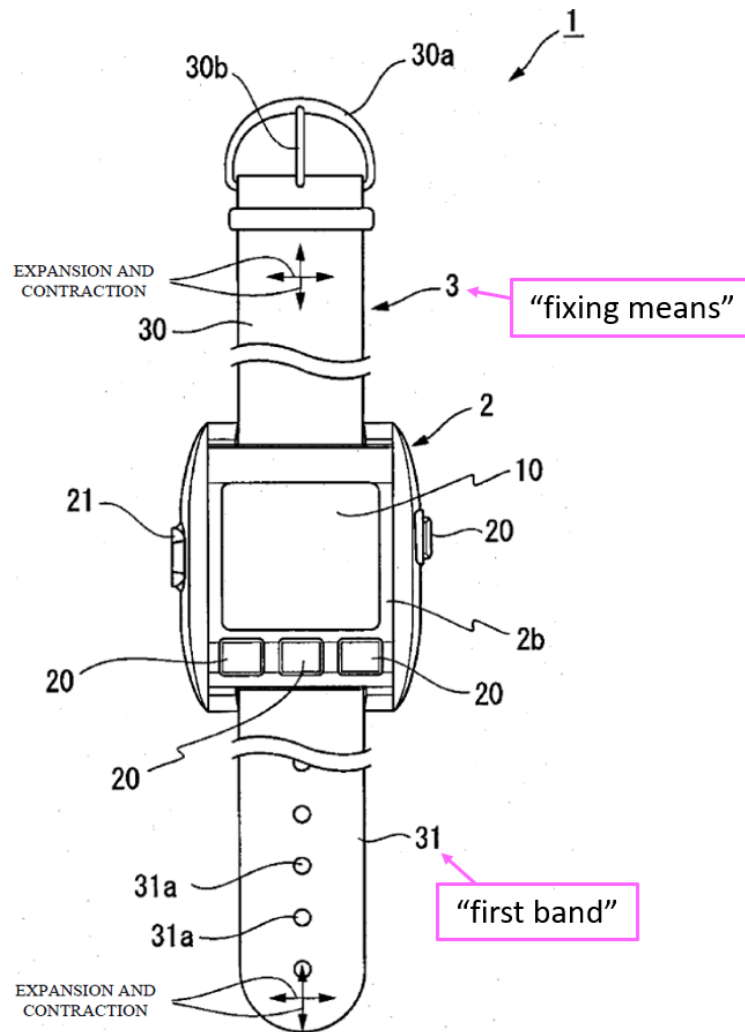
Id. ¶(0049).



See *id.* at 27 (Fig. 7) (biosensor module removed). Kotanagi also describes a “through-hole 22 passing through the outside and the inside of the housing 2” and “formed in the center of the lower surface 4a of the protruding part 4.” *Id.* ¶(0055). In the cross-section above, the interior cavity and the through-hole 22 are shaded in yellow.

c. a band attached to the housing and configured to secure the electronic watch to a user;

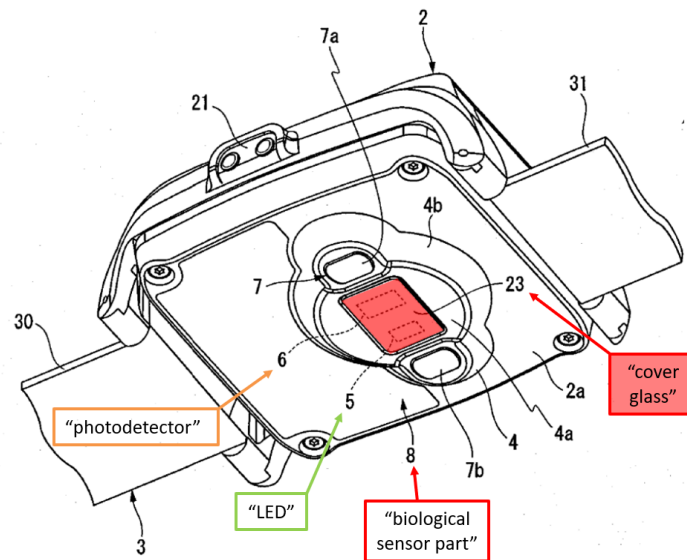
Kotanagi has a “means for fixing” the device “to an arm” (*id.*, Abstract) and explains: “The fixing means 3 has a first band 30 and a second band 31 having base end sides that are attached to the housing 2 to enable mounting to the wrist.” (*id.* at ¶(0060)).



See id. at 23 (Fig. 1).

- d. a biosensor module positioned along the bottom portion of the housing and configured to transmit optical signals and receive reflected optical signals through the opening of the housing; and

Consistent with the construction of “biosensor module” in § II(F)(2) above, Kotanagi teaches a biosensor module with a cover glass.

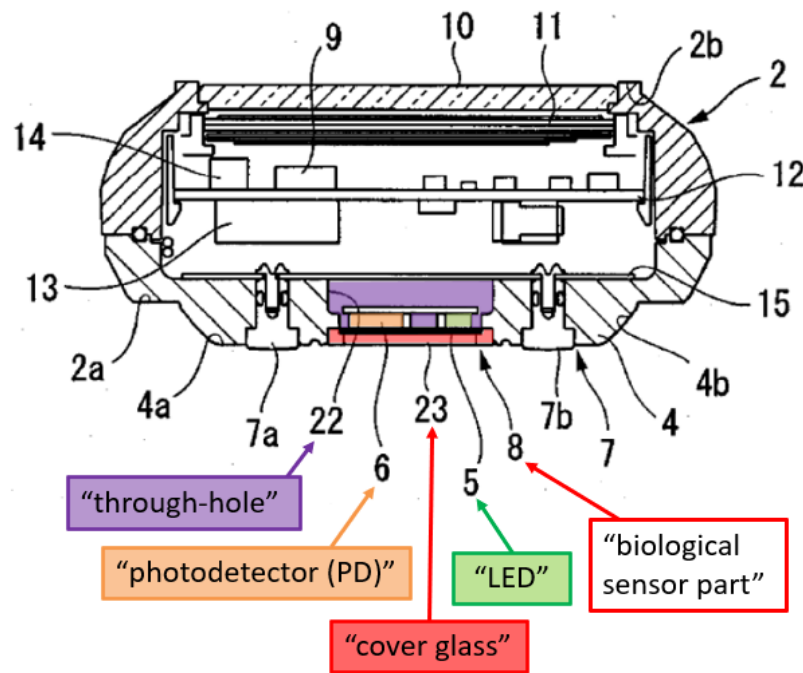


See EX1005 at 26 (Fig. 5).

Kotanagi further explains where the biosensor module is positioned, and how optical signals are transmitted through an opening in the bottom of its housing, in the context of Figure 7:

[A]s illustrated in FIG. 7, a through-hole 22 passing through the outside and the inside of the housing 2 is formed in the center of the lower surface 4a of the protruding part 4, and 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 in a direction orthogonal to the longitudinal direction of the housing so as to touch the inside of the glass cover 23. That is, the LED 5 and the PD 6 are configured so as to be dropped into the protruding part 4. As a result, the LED 5 and the PD 6 are as close to the living body surface B as possible.

EX1005 ¶(0055).



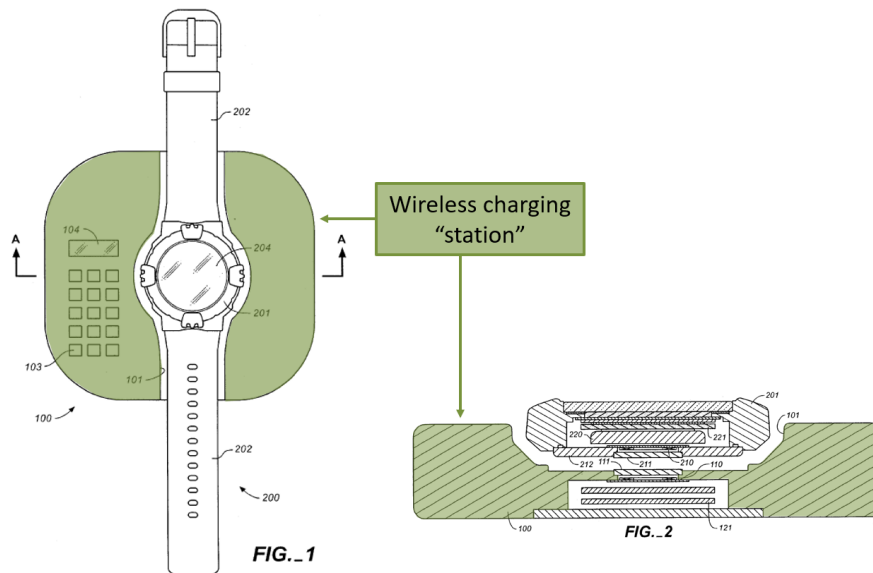
See EX1005 at 27 (Fig. 7).

- e. **a wireless charging receive coil positioned within the interior cavity and configured to receive wireless power through the opening of the housing.**

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 ¶(0053) (emphasis added). A POSITA would have known at the time of the ’783 Patent’s invention that transformers use coils, that such contactless charging involves a wireless charging receive coil, and that this coil would be positioned within the interior of the cavity (like the rechargeable battery 13). Kotanagi teaches its watch housing can be metal and a POSITA would have understood that wireless charging coils

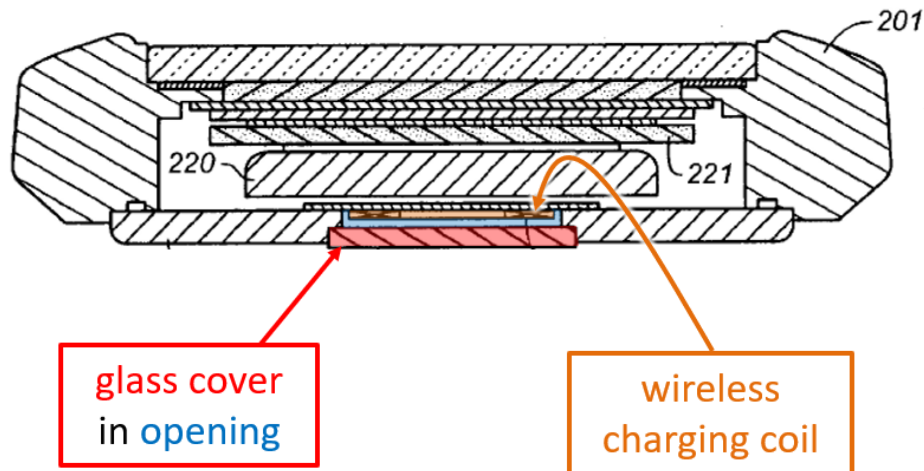
need to be positioned to allow charging through an opening in metal housing to avoid shielding effects and low transmission efficiency. Accordingly, Kotanagi teaches every limitation of this claim. However, to further support that this claim would have been obvious, Honda is discussed below. EX1003 ¶154.

Honda, which issued in 2001, discloses such a contactless charging system for a biosensing wristwatch. Honda's Figure 1 shows a plan view of the watch in a charging station, with Figure 2 showing a cross-section of this arrangement:



See EX1006 at 2–3 (Figs. 1, 2).

Like Kotanagi, Honda teaches a biosensor: “the electronic watch 200 detects biological information including the pulse rate or the heart rate of the body.” EX1006 6:17–19. Like Kotanagi, the Honda watch has a cover glass that spans an opening in the bottom face of the watch. Behind this cover, Honda illustrates a “wireless charging receive coil” “positioned within the interior cavity,” as claimed:



See id. at 3 (Fig. 2). Moreover, Honda’s coil is “configured to receive wireless power through the opening” and its cover glass through magnetic coupling of parallel coils. *Id.* 5:1–7.

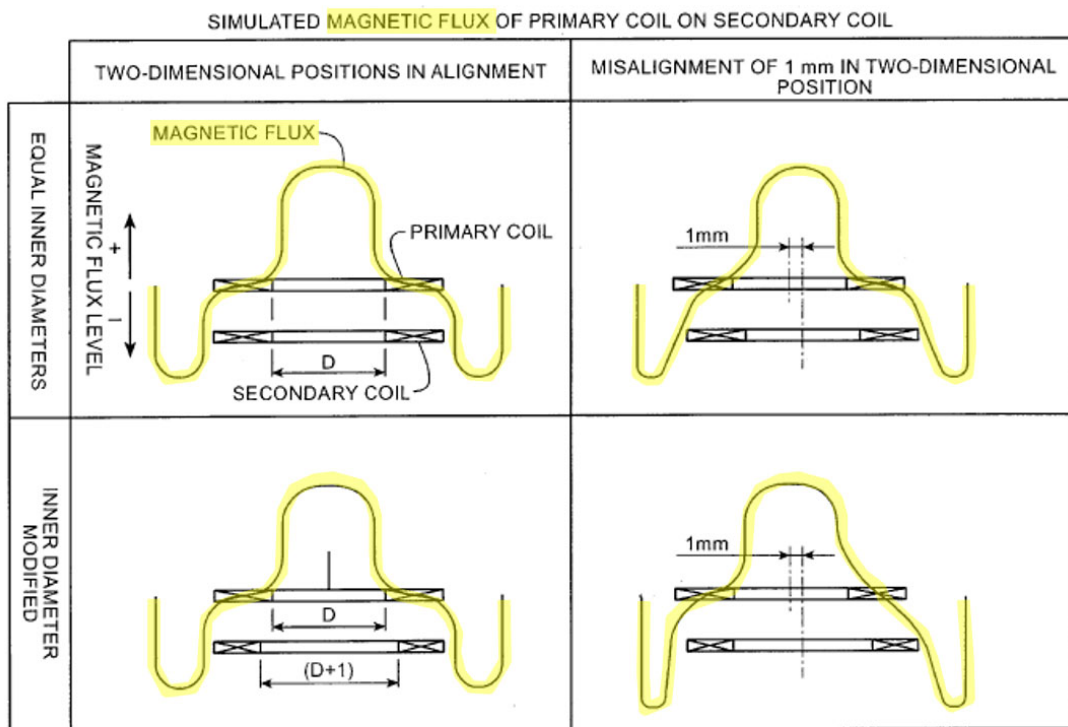
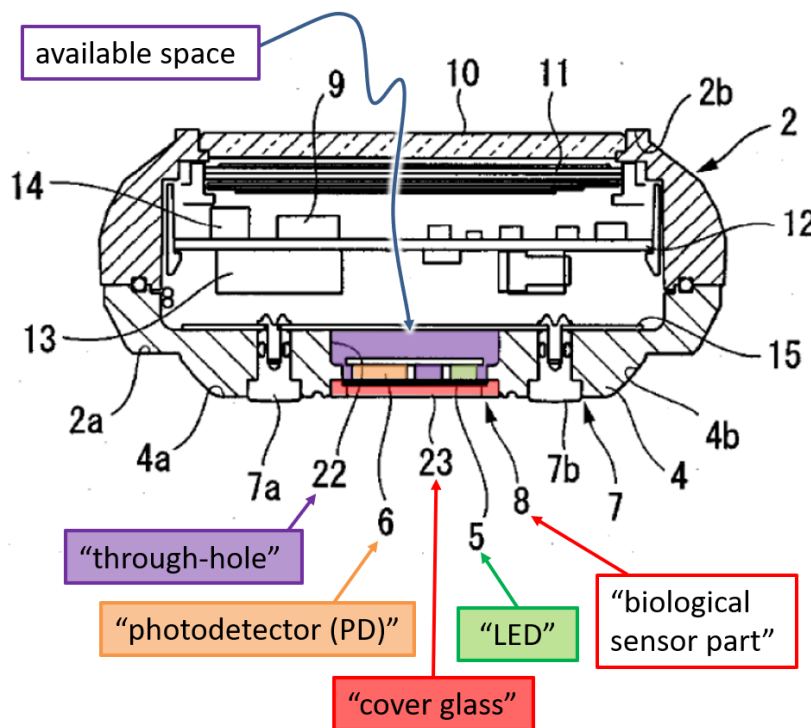


FIG._10

See id. at 9 (Fig. 10).

Accordingly, a POSITA would have used the wireless charging disclosure and goal of “contactless” charging expressed by Kotanagi (EX1005 ¶(0053)) as a motivation to combine with the teachings of Honda. Honda’s teachings further enable the wireless charging Kotanagi mentions as desirable. To do this, a POSITA would have (after adjusting for any scale differences) positioned a wireless charge coil in the available space of Kotanagi’s through-hole 22:



See EX1005 at 27 (Fig. 7). Thus, Kotanagi, modified by Honda, would include the claimed “wireless charging receive coil positioned within the interior cavity.” EX1003 ¶157.

Kotanagi’s cover glass is already centrally located at the rear, so a POSITA would have readily modified this device based on Honda’s teachings to include a

charging receive coil behind the cover glass (in a similar position and with a similar size to that taught in Honda). With this straightforward modification, (motivated, for example, by Kotanagi’s own reference to “contactless” charging and Honda’s teaching of how to do so in a watch-style device), the coil would be “configured to receive wireless power through the opening of the housing” as claimed. Accordingly, Kotanagi and Honda teach the claimed “wireless charging receive coil positioned within the interior cavity and configured to receive wireless power through the opening of the housing.” EX1003 ¶158.

A POSITA would have been motivated to combine, and expected success, in combining Kotanagi and Honda for at least the reasons provided above and in section IV(A)(1)(g). This expectation of success and motivation to combine also applies to the other Ground 1 combinations and dependents from Claim 15. EX1003 ¶159. Further motivations to combine are provided throughout this petition.

Thus, Claim 15 would have been obvious in view of Kotanagi and Honda.

5. Dependent Claim 19

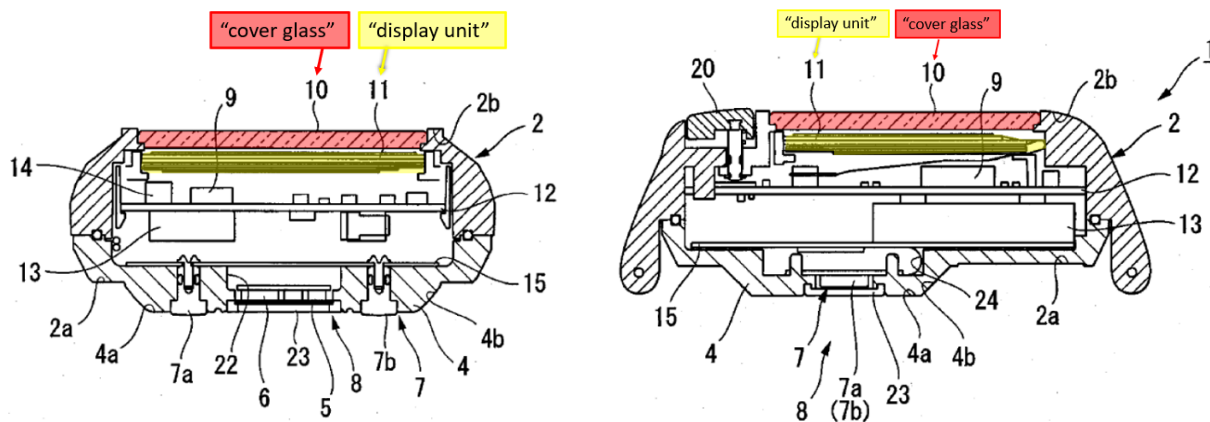
Claim 19 depends from Claim 15 and adds “**the electronic watch is configured to compute a health metric using the biosensor module; and the health metric is one or more of: a heart rate, a respiration rate, a blood oxygenation level, a blood volume estimate, or blood pressure.**”

Kotanagi's watch uses its LED and photodetector to generate a "pulse signal (biological information signal)" (EX1005 ¶(0046)), satisfying the claimed computation of a "health metric" and "heart rate." Likewise, Honda's watch "detects biological information including the pulse rate or the heart rate of the body." EX1006 6:17–19. Accordingly, the claimed combination of Kotanagi, as modified by Honda, would also satisfy these limitations without further modifications. Thus, Claim 19 would have been obvious in view of Kotanagi and Honda. EX1003 ¶¶161.

6. Dependent Claim 20

Claim 20 depends from Claim 19 and adds **"the electronic watch includes a display; and the display is configured to display information associated with the health metric."**

Kotanagi teaches a watch with a display.



See EX1005 at 27 (Figs. 7, 6).

After Kotanagi’s “data processing part” “analyzes the signal to detect the pulse rate,” it “displays the signal on the display part 11.” EX1005 ¶(0066). Its “display part 11” is “for displaying the aforementioned pulse rate.” *Id.* ¶(0048).

Moreover, it was common at the time to, if a health metric was calculated, at least display information “associated with” that metric. For example, Kateraas also teaches displaying the health metric (EX1014 [0043]⁶), and many other relevant references teach this. EX1003 ¶¶164–169. Accordingly, the claimed combination of Kotanagi, as modified by Honda, would also satisfy these limitations without further modifications. A POSITA would have understood Kotanagi as modified by Honda to teach these limitations prior to the filing of the ’783 patent (especially in view of the general knowledge at the time about displaying health metric information), rendering Claim 20 invalid. EX1003 ¶¶162–169.

⁶ In this petition, citations to documents having square brackets “[]” for paragraph numbering use brackets instead of paragraph symbols “¶.”

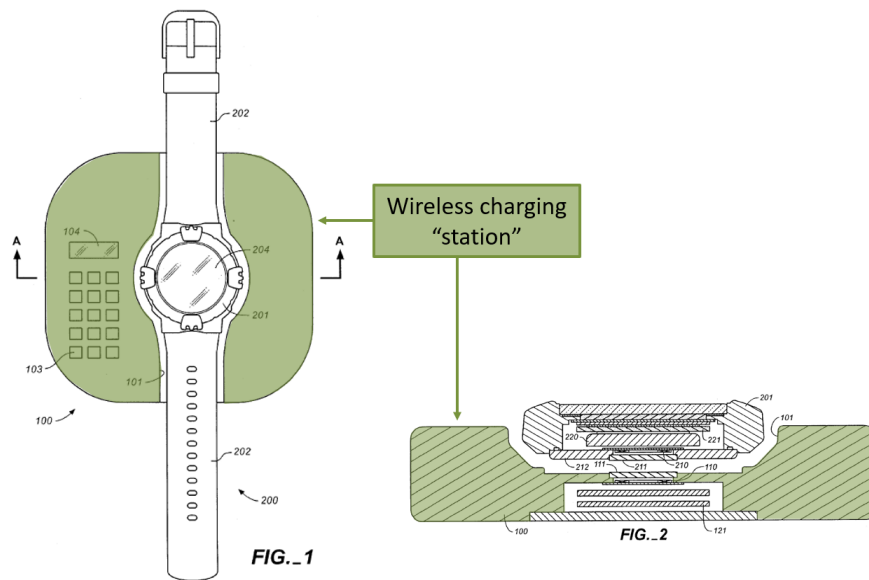
B. Ground 2: Claim 16 is unpatentable because it would have been obvious in view of Kotanagi, Honda, and optionally, in further combination with Park

1. Dependent Claim 16

Claim 16 depends from Claim 15 and adds “**the wireless charging receive coil is configured to receive power from an external inductive power transmitter dock; and the electronic watch is configured to magnetically couple with the external inductive power transmitter dock.**”

Kotanagi’s teaching of a “transformer or the like for supplying power to a recharger and to the inside of the housing” to “recharge the battery in a contactless state” (EX1005 ¶(0053)) would have been understood by a POSITA to teach a receive coil was configured to receive power from an external inductive power transmitter dock because contactless charging is known to use induction, and this always occurs from an external transmitter for contactless charging. EX1003 ¶172.

Honda, which issued in 2001, discloses an external transmitter (station 100). EX1006 6:28–35. Figure 2 shows a cross-section of this arrangement:



See EX1006 at 2–3 (Figs. 1, 2). Honda teaches that external and internal coils are “physically out of contact with each other, but magnetically coupled” EX1006 at 9 (Fig. 10); *id.* 6:38–39 (teaching “magnetically coupled with each other”). Honda schematically illustrates how its dock aligns coils (110, 210) for magnetic coupling:

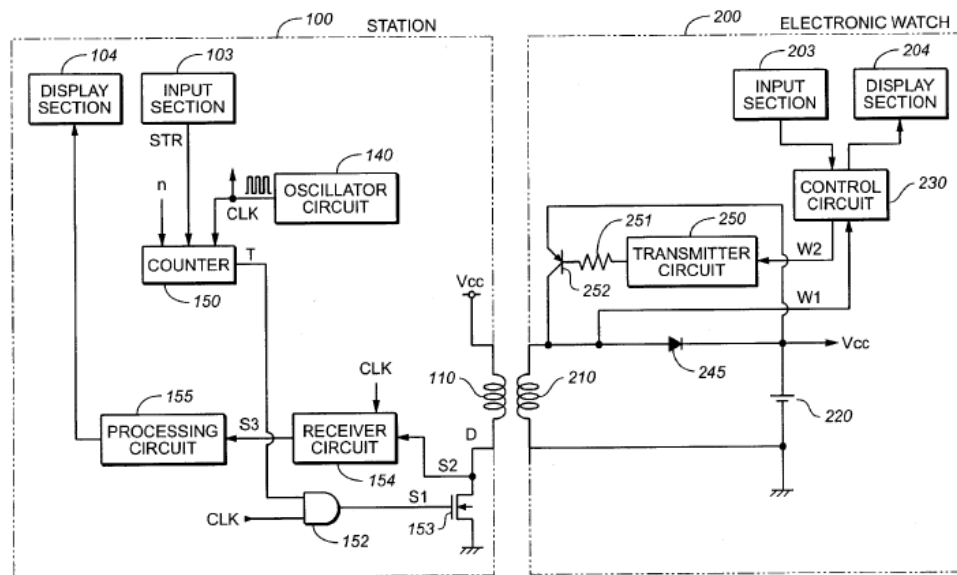
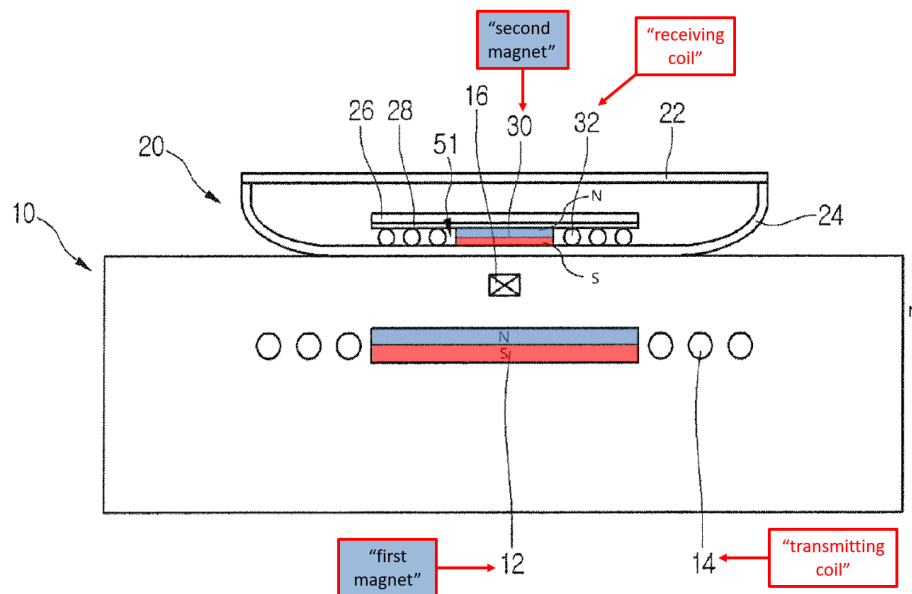


FIG._4

EX1006 at 4 (Fig. 4).

Thus, Claim 16 is obvious in view of Kotanagi and Honda.

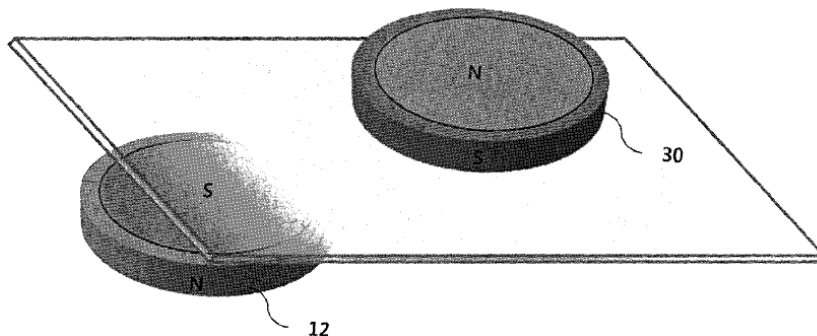
In addition to the magnetic coupling discussed above, the '783 specification also refers to magnetic alignment. EX1001 at EX1001 5:37–40; 43:36–41; 45:29–51 (e.g., discussing Fig. 19); *id.* at 25; EX1003 ¶¶175. Although Claim 16 does not refer to alignment, if “configured to magnetically couple” is construed to require, in addition to the magnetic coupling of induction, magnetic coupling for alignment, a POSITA would have been motivated by Honda (EX1006 1:48–59) to look to **Park**, which teaches using magnets to align devices in wireless charging stations:



See EX1015 at 50 (Fig. 14); EX1012 at 11 (Fig. 14). EX1003 ¶¶175.

Park explains that “attractive force may be generated between the first

magnet 12 and the second magnet 30” to optimize “wireless power transfer efficiency.” EX1015 at 34; EX1012 [0204].



EX1015 at 52 (Fig. 16); EX1012 at 13 (Fig. 16). EX1003 ¶¶176.

A POSITA would have been motivated to combine these based at least on Honda’s description of a “socket” where the watch body is “seated in alignment” in Honda’s station. EX1006 6:4–11. Understanding the value and feasibility of alignment from both Honda and Park, a POSITA would have expected success in modifying Honda to include Park’s permanent magnets. *Id.* at 1:48–58. Motivation also stems from Park, which teaches disadvantages of existing wireless charging schemes (“limited distance . . . efficiency is somewhat low.”) EX1012 [0008]; EX1015 at 5. A POSITA would have used Park’s solution: permanent magnets to reduce the distance, “thereby improving wireless power transfer efficiency.” EX1012 [0192]; EX1015 at 32. EX1003 ¶¶177–178.

Based on the above, Claim 16 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 16 would have been obvious in view of Kotanagi

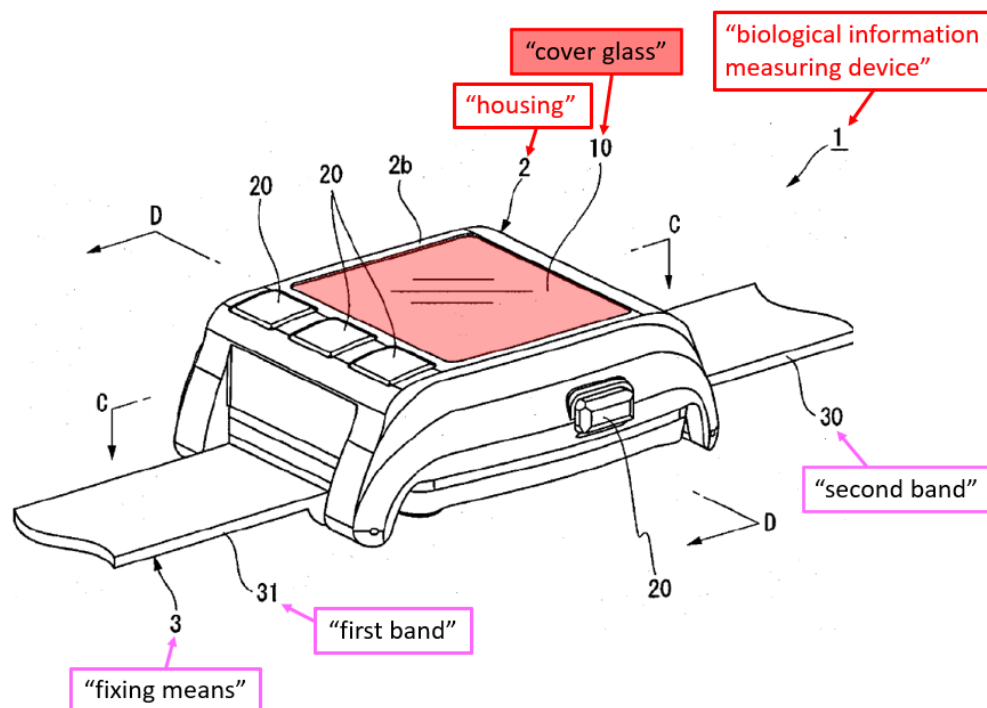
and Honda, combined with Park.

C. Ground 3: Claims 1–7 and 14 are unpatentable because they would have been obvious in view of Kotanagi, Honda, and optionally, in further combination with Kateraas

1. Independent Claim 1

- a. “An electronic device, comprising: a housing defining a first opening opposite to a second opening; a band attached to the housing and configured to secure the electronic device to a user;”

Kotanagi teaches these limitations.



See EX1005 at 25 (Fig. 4).

The “first opening” in Kotanagi’s housing can be seen in the cross-sections of Figures 6 and 7 (below). The cover glass 10 that fills this opening has been shaded here, along with the second opening (“through-hole 22”) and its cover glass

See id. at 27 (Figs. 7, 6).

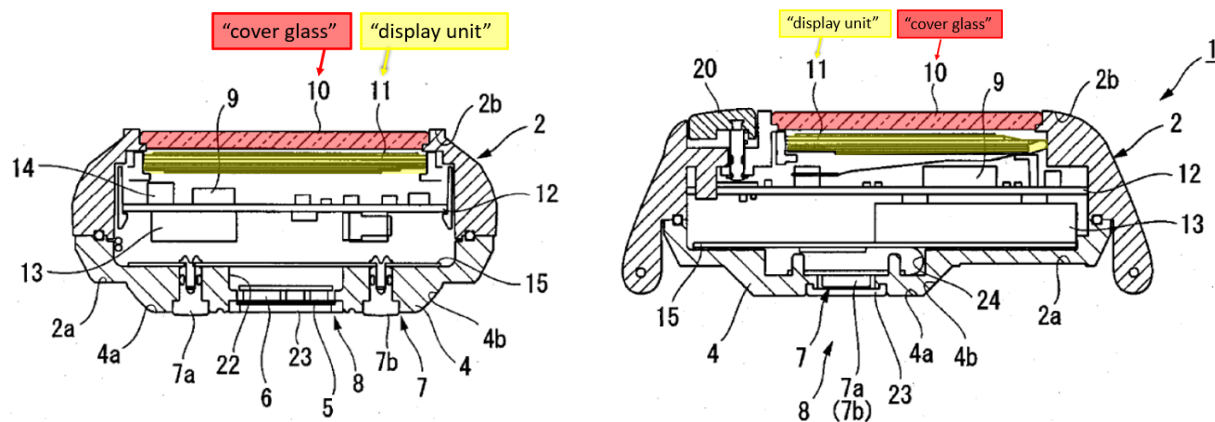
Kotanagi has a “means for fixing” the device “to an arm” (*id.*, Abstract)

termed a “band” that enables “mounting to the wrist A” (*id.* at ¶(0060)).

See id. at 23 (Fig. 1).

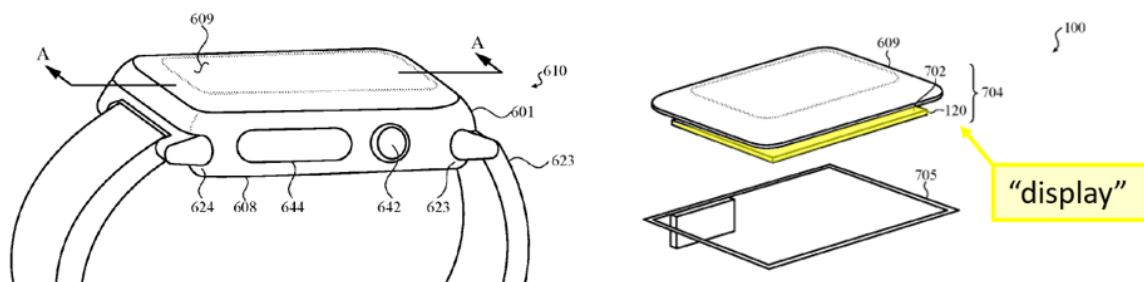
b. “a display positioned in the first opening;”

Kotanagi teaches “A cover glass 10 with a substantially square shape is fitted into the central portion of the upper surface 2b of the housing 2, and a display part 11 for displaying the aforementioned pulse rate that is detected and various other information is disposed inside the cover glass 10.” Ex 1005 at 11.



See EX1005 at 27 (Figs. 7, 6).

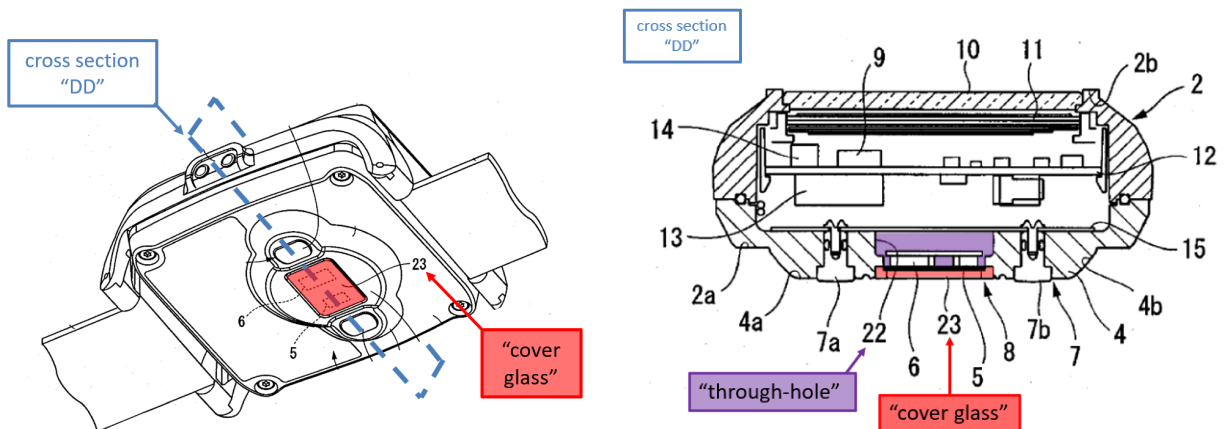
This is consistent with the '783 patent's display, which is also under a cover glass in the opening.



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

- c. “a ceramic cover disposed over the second opening and forming a portion of an exterior surface of the electronic device;”

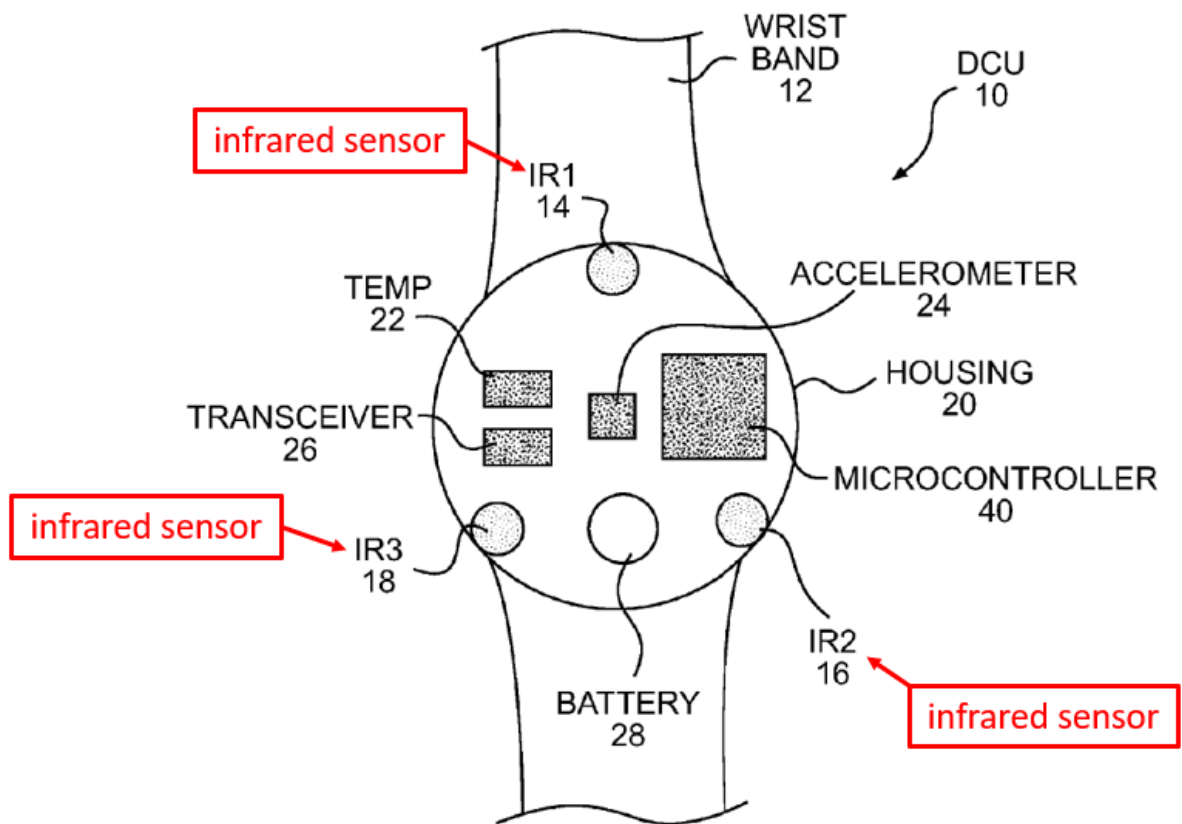
Kotanagi teaches “cover glass” forming a portion of its bottom surface and covering through-hole 22:



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

Based on the construction and evidence provided above in § II(F)(1) (e.g., glass is “usually considered a subset of ceramics.” EX1044 at 11; see EX1045 at 12), a POSITA would have understood the Kotanagi “cover glass 23” to satisfy this limitation. EX1003 ¶187.

Moreover, the evidence shows a POSITA would have considered glass and ceramic interchangeable. Like Kotanagi, **Kateraas** (EX1014), which published in 2012, describes a biosensing wristwatch:



See EX1014 at 2 (Fig. 1). It teaches that ceramic (which includes sapphire, EX1003 ¶46) can form a “window” of “infrared transmissive or transparent material . . . to allow radiation emitted from infrared sensors 14, 16, and 18” to pass out of the device and “impinge upon the underside of the user’s wrist” and allow “infrared radiation reflected or emitted from the user’s skin” to pass into the device via the ceramic window. EX1014 at [0059]. “Such infrared transmissive or transparent materials” for the window “may include, e.g., germanium, zinc selenide, **sapphire**, **IR glass**, IR polymer, barium fluoride, calcium fluoride, and combinations thereof . . .”*Id.* (emphasis added). EX1003 ¶189.

Like Kotanagi and Kateraas, **Yuen** (EX1016),⁷ which published in May 2014, describes a biosensing wristwatch (“a heart rate measuring system in the form of a wearable wrist attachable device,” *id.* at [0068]). It teaches continuous covers formed from glass or ceramic for optical sensing:

The heart rate measuring system includes a light source 181 and a reflected light detector 182. . . . **The heart rate monitor location 183 can include a cover** that enables light of the light source to pass while blocking substantially all light in a human visible spectrum. The **cover** can be . . . transparent or translucent **glass** or plastic or . . . **ceramic**.

Id. [0070] (emphases added).

⁷ It is not necessary to include Yuen in this combination to render obvious the present limitations. Rather, Yuen is cited here to confirm that a POSITA would have understood that ceramic and glass are interchangeable, and that ceramic covers can form a portion of an exterior surface of a device. In view of this, a POSITA would have understood that Kotanagi’s and Honda’s cover glass material would have readily formed part of an exterior surface, rendering Claim 1 obvious. EX1003 ¶190 n.5.

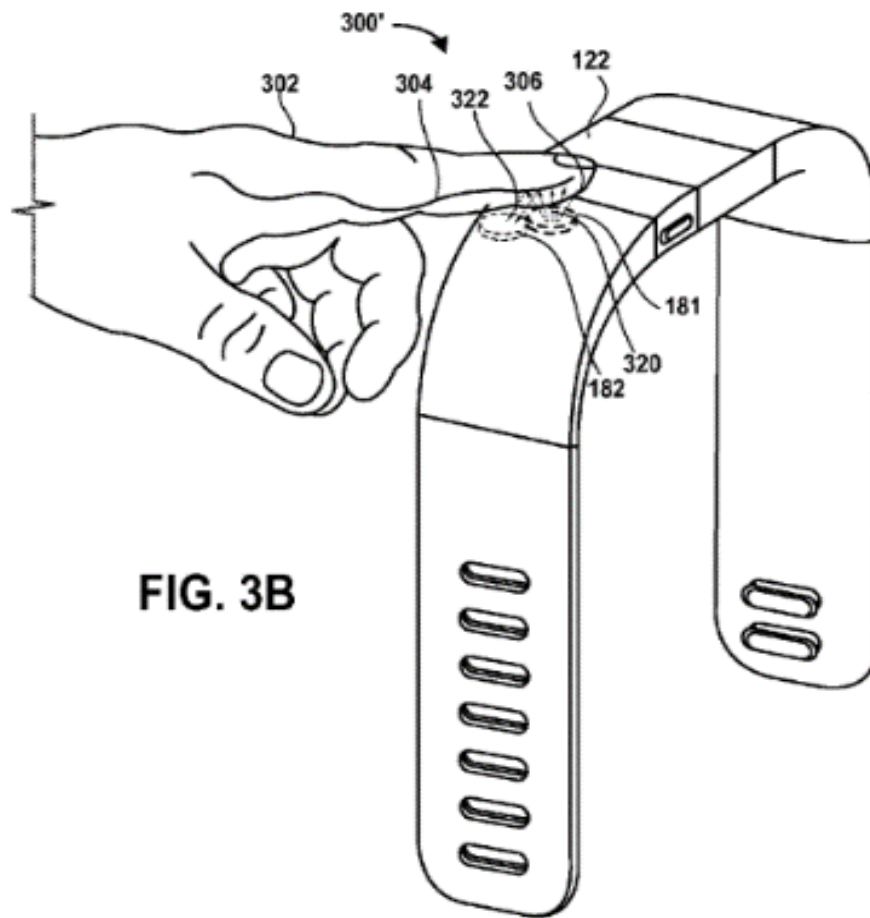


FIG. 3B

Id. at 6 (Fig. 3B).

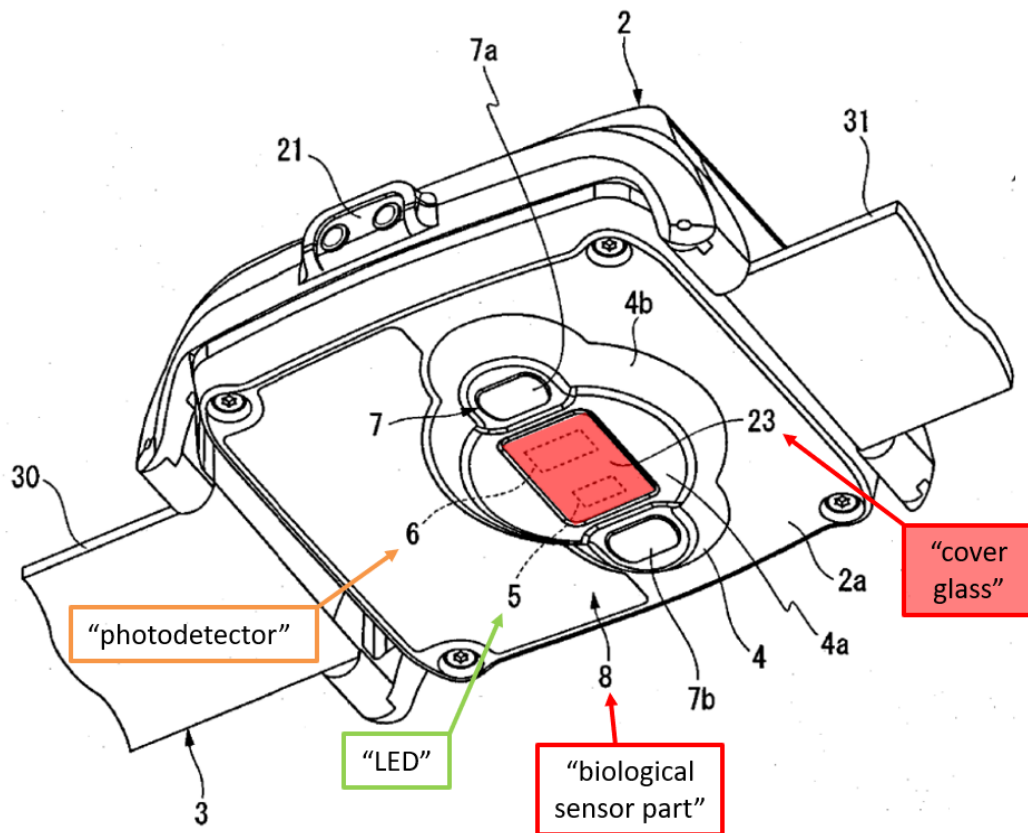
Ceramics literature teaches that ceramics are inorganic, non-metallic, solid materials. EX1043 at 9; EX1045 at 7; EX1044 at 13; EX1046 at 14; EX1049 ¶¶ 41–66 (establishing public accessibility). Sapphire is a ceramic (EX1042 at 13, 15), and glass is “usually considered a subset of ceramics.” EX1044 at 11; *see* EX1045 at 12. Based on all the above evidence, a POSITA would have known that glass is substitutable for another ceramic material, as they are closely related. EX1003 ¶¶ 45–49.

Thus, Kotanagi’s “cover glass” would have rendered obvious the “ceramic”

cover of Claim 1, in view of the teachings above and the knowledge of a POSITA.

- d. “a biosensor module disposed within the second opening below the ceramic cover; and”

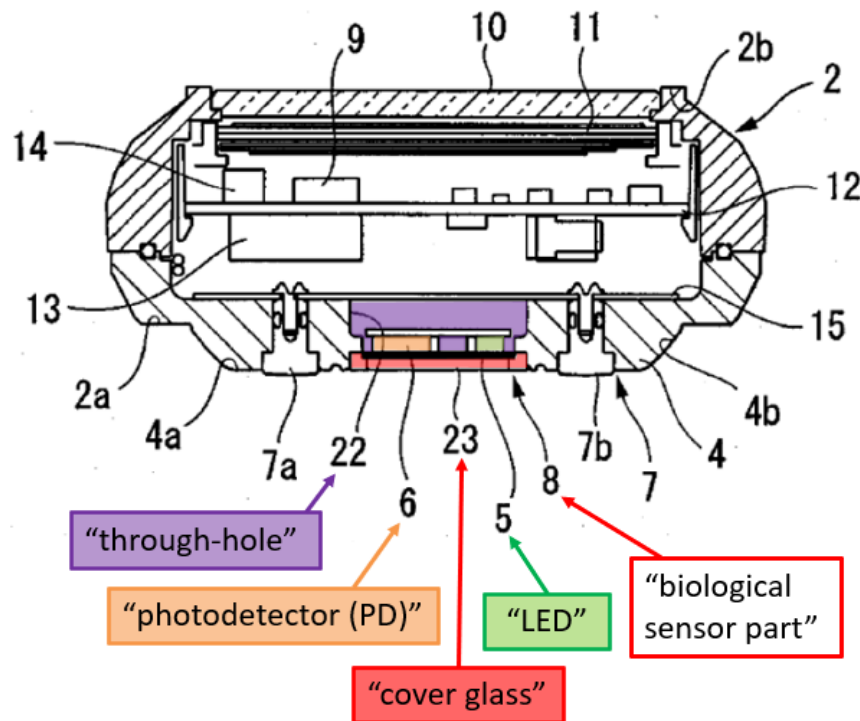
Kotanagi teaches a biosensor, as illustrated in its Figure 5:



See EX1005 at 26 (Fig. 5).

Kotanagi further explains its “cover glass 23” in the context of Figure 7:

“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.* ¶(0055) (emphasis added).

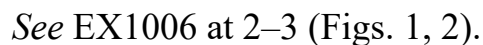


See id. at 27 (Fig. 7). From the above, a POSITA would have understood that Kotanagi teaches these claim limitations. EX1003 ¶194.

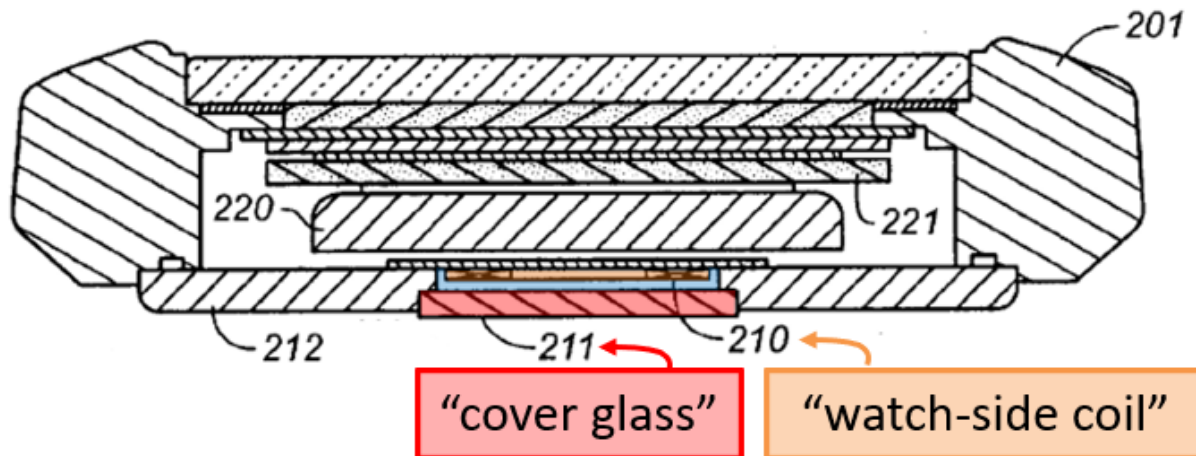
e. **“a wireless charging receive coil aligned with the second opening and below the ceramic cover;”**

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 at ¶(0053) (emphasis added). A POSITA would have known at the time of the ’783 Patent’s invention that transformers use coils and that such contactless charging involves a wireless charging receive coil. EX1003 ¶195.

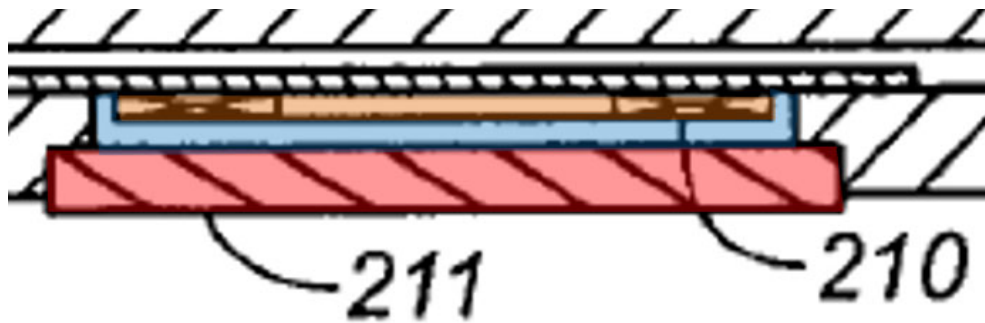
Honda, which issued in 2001, discloses such a contactless charging system



-66-



See EX1006 at 3 (Fig. 2). The following shows a close-up view confirming that Honda’s watch-side coil is “aligned with the opening,” as claimed:



See *id.*

- f. “wherein: the ceramic cover is configured to pass optical signals generated by the biosensor module; and

This limitation is obvious for the reasons provided in section IV(A)(1)(e). Moreover, Kateraas’ ceramic cover is configured to pass optical signals: “Such **infrared transmissive or transparent** materials for window 103 may include, e.g., germanium, zinc selenide, sapphire, IR glass, . . .”⁸ EX1014 [0059].

⁸ Yuen also teaches an optical transmissive cover, showing this was

Accordingly, Kotanagi alone, or Kotanagi as modified by Kateraas, teaches the “ceramic cover” “configured to pass optical signals generated by the biosensor module” as claimed.

- g. “the ceramic cover is configured to pass wireless power from an external wireless charging device to the wireless charging receive coil.”**

This limitation is obvious for the reasons provided in section IV(A)(1)(f). Based on the above, Claim 1 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 1 would have been obvious in view of Kotanagi and Honda, combined with Kateraas.

h. Motivation to Combine

As discussed above with respect to Ground 1, a POSITA would have been motivated before the effective filing date to combine the teachings of Kotanagi and Honda, and would have had a reasonable expectation of success in doing so. A POSITA would have been further motivated to combine Kateraas (in the same field of biosensing watches) because Kotanagi explains its goal that “light can be emitted and received efficiently, and biological information can be detected with high precision.” EX1005 ¶(0089). Kateraas helps fulfill this goal by teaching

common in the art prior to the filing of the ’783 patent. EX1016 [0070];

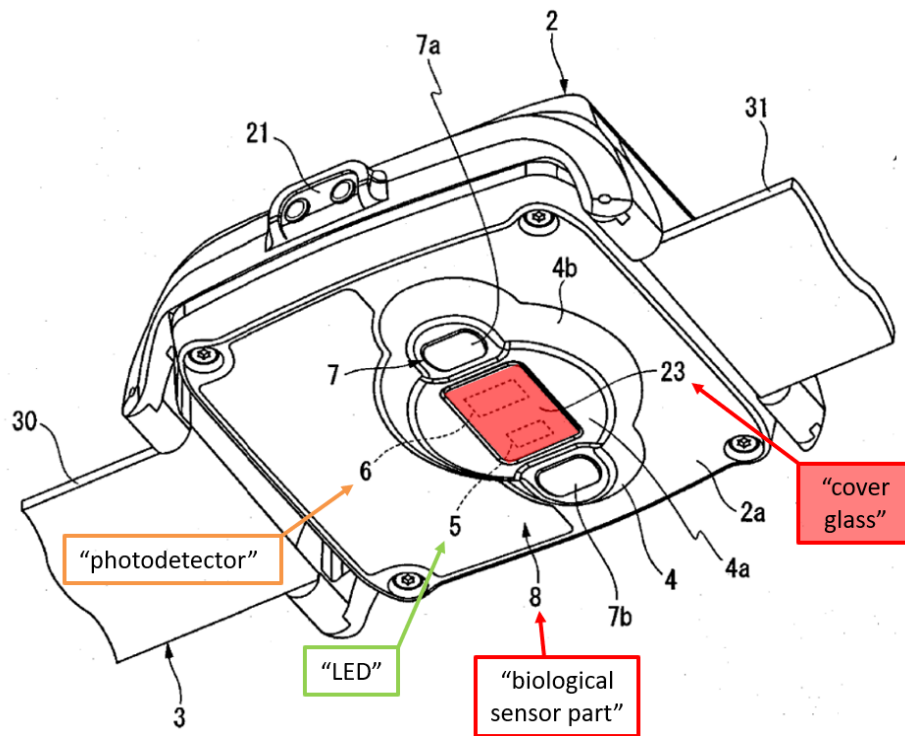
EX1003 ¶199 n.6.

specific window materials that are “infrared transmissive or transparent . . . to allow radiation emitted from infrared sensors 14, 16, and 18 to pass out of housing 101” and allow “infrared radiation reflected or emitted from the user’s skin to pass into housing 101 via window 103.” EX1014 [0059]. Thus, a POSITA would have found it obvious to substitute those specific window materials (e.g., sapphire, zinc selenide, germanium, barium fluoride, or calcium fluoride) for Kotanagi’s or Honda’s cover glass. EX1003 ¶204.

This motivation to combine also applies to the other Ground 3 combinations and dependents from Claim 1. EX1003 ¶205. Further motivations to combine are provided throughout this petition.

2. Dependent Claim 2

Claim 2 depends from Claim 1 and adds “**wherein the biosensor module comprises: a light source configured to emit light toward a region of skin of the user; and a detector configured to receive light reflected from the region of skin.**” Kotanagi teaches the limitations of Claim 2:



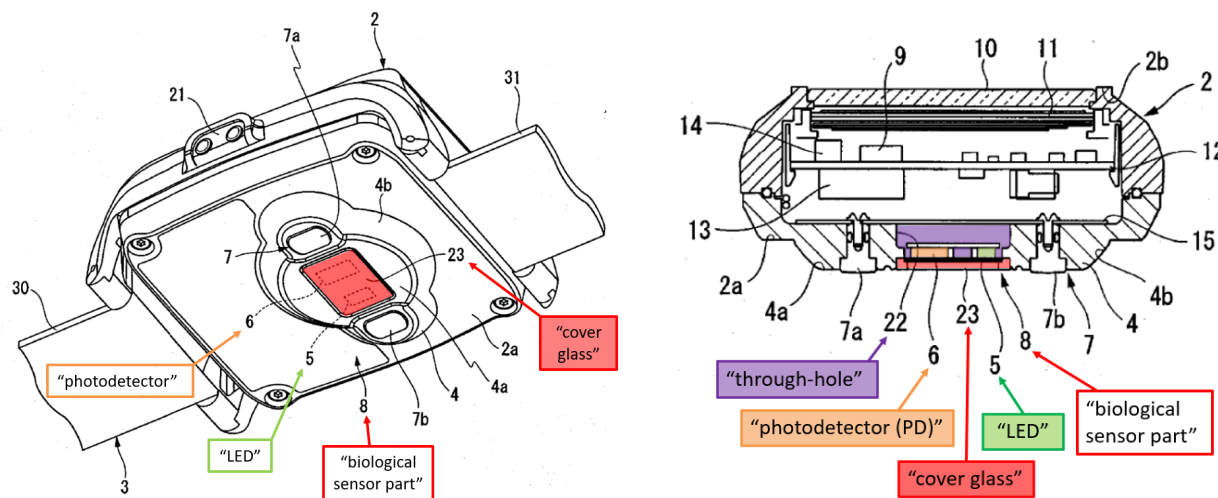
See EX1005 at 26 (Fig. 5). These features are “configured” in the claimed manner because both are positioned in a protrusion at the base of the device, for contacting a user’s wrist: “LED (Light Emitting Diode) (light-emitting part) 5 for emitting light toward the living body” and “PD (Photodetector) (light-receiving part) 6 for receiving reflected light from the living body.” EX1005 ¶(0046). EX.1003 ¶¶210–211.

Based on the above, Claim 2 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 2 would have been obvious in view of Kotanagi and Honda, combined with Kateraas.

3. Dependent Claim 3

Claim 3 depends from Claim 1 and adds “**the ceramic cover defines a first opening to transmit the light from the light source; and the ceramic cover defines a second opening to receive the light reflected from the region of skin.**”

Similar to the '783 patent and consistent with the claim construction provided in § II(F)(3) above, Kotanagi teaches a single opening in its base spanned by a single cover glass, with 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:



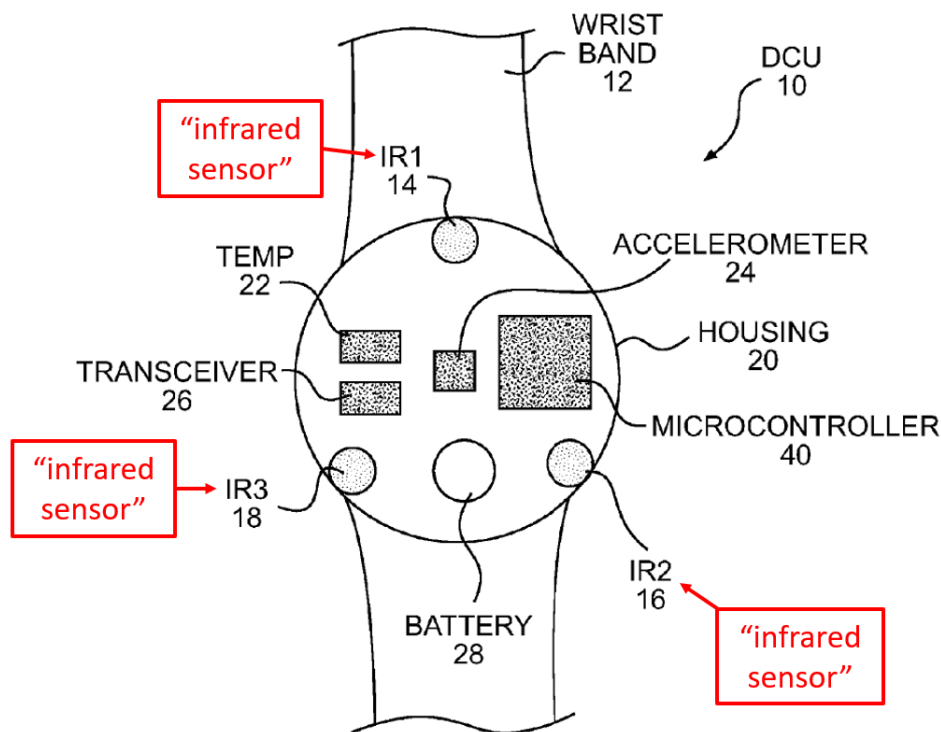
See EX1005 at 26, 27 (Figs. 5, 7).

Kotanagi’s cover glass covers the rear opening, thereby spanning more than the surface areas shown for both the LED and photodetector and providing operational access to them by allowing light to pass through. Kotanagi’s cover glass therefore defines the openings as claimed.

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.⁹ EX1003 ¶211.

Moreover, Kateraas teaches an “array” of separate sensors. EX1014 [0012] (“infrared sensors 14, 16, and 18; and/or temperature sensor 22 (and any combinations thereof) may be integrated together to form a sensor array”).

⁹ 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 EX1014 at 2 (Fig. 1).

The sensors in the array can be “embedded directly into” the material of a window, thus establishing a specific opening or window for each sensor. EX1014 [0058]–[0059] (“one or more of infrared sensors 14, 16, and/or 18 may be embedded directly into the material”). EX1003 ¶213.

Thus, a POSITA would have understood, either from Kotanagi alone or from Kotanagi and Kateraas, the limitations of Claim 3.

Based on the above, Claim 3 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 3 would have been obvious in view of Kotanagi and Honda, combined with Kateraas.

4. Dependent Claim 4

Claim 4 depends from Claim 2 and adds **“the light source and the detector are configured to measure changes in light absorption by the region of skin; the electronic device is configured to compute a health metric using the measured change in light absorption; and the display is configured to display information associated with the health metric.”**

Kotanagi teaches this. The watch of Kotanagi:

...emits light from the LED 5 toward the living body. 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, and outputs the signal to the data processing part 9.

EX1005 ¶(0065). A POSITA would have understood from Kotanagi that reduction of local hemoglobin increases relative amounts of reflection (because other biological tissue does not absorb as much). EX1003 ¶217. This teaches the claimed measurement of “changes in light absorption by the region of skin.” Kotanagi expressly teaches that this generates a “pulse signal (biological information signal),” satisfying the claimed computation of a “health metric.” EX1005 ¶(0046). After Kotanagi’s “data processing part” “analyzes the signal to detect the pulse rate,” it “displays the signal on the display part 11.” *Id.* at ¶(0066).

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

EX1005 ¶(0048) (emphasis added). This teaches the claimed “display” that is “configured to display information associated with the health metric.” EX1003 ¶217.

Kateraas also teaches the limitations of dependent Claim 4, while expressly disclosing the ceramic cover of independent Claim 1. It teaches the light source and detector for health metric output:

In the exemplary embodiment shown in FIG.1, data collection unit 10 includes three infrared sensors 14, 16, 18. . . . Each infrared sensor may be configured as a transmitter/receiver capable of monitoring the oxygen content of blood passing through nearby blood vessels.

EX1014 [0043]. As discussed above (e.g., in § IV(A)(6)), Kateraas teaches displaying a health metric. *Id.* Moreover, as noted with respect to Claim 1 above, Kateraas expressly teaches using a ceramic window:

Housing 101 may include a window 103, fabricated from an infrared transmissive or transparent material, for example, to allow radiation emitted from infrared sensors 14, 16, and 18 to pass out of housing 101 and impinge upon the underside of the user's wrist. In turn, window 103 also allows infrared radiation reflected or emitted

from the user's skin to pass into housing 101 via window 103. Such infrared transmissive or transparent materials for window 103 may include, e.g., germanium, zinc selenide, sapphire, IR glass, IR polymer, barium fluoride, calcium fluoride, and combinations thereof.

...

EX1014 [0059]. EX1003 ¶218.

Based on the above, Claim 4 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 4 would have been obvious in view of Kotanagi and Honda, combined with Kateraas.

5. Dependent Claim 5

Claim 5 depends from Claim 2 and adds “**wherein the light source and the detectors are configured to operate as a photoplethysmogram (PPG) sensor.**”

The term “detectors” (plural) appears to be a typo in Claim 5 because Claims 1 and 2 both refer to a single “detector.” Accordingly, Claim 5 is limited to a single detector. Moreover, adding more than one detector would not affect patentability because multi-detector devices are well known (see, e.g., the three infrared sensors 14, 16, and 18 in Kateraas, EX1014 [0014], Fig. 1).

A plethysmograph measures changes in volume within an organ or body, typically from air or blood fluctuations. A photoplethysmogram (PPG) sensor uses a light source and a photodetector at the surface of skin to measure the volumetric variations of blood circulation. *See* EX1003 ¶¶222. Thus, a PPG sensor measures

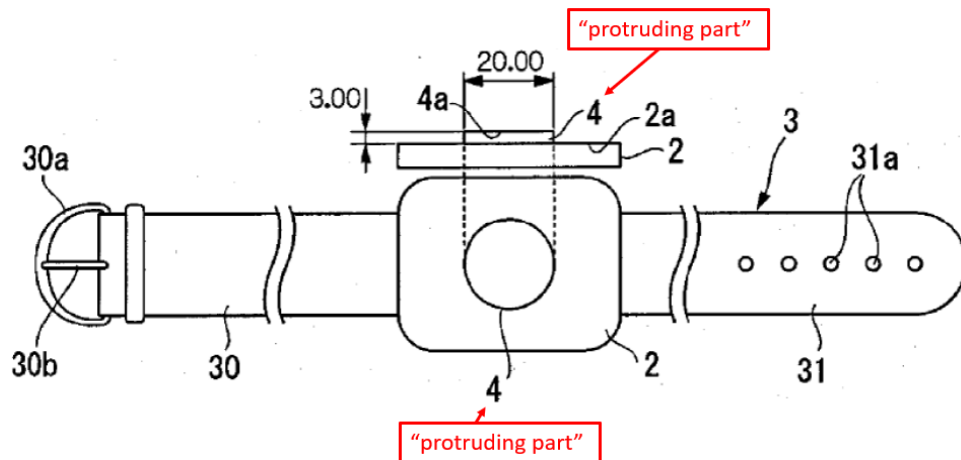
changes in light absorption by a skin region that are specifically caused by volumetric variations of blood circulation. A typical PPG relies on this same biological principle: hemoglobin in blood absorbs certain wavelengths, and that is how the Kotanagi and Kateraas optical sensors operate to determine pulse rate, etc. EX1005 ¶(0065); EX1014 [0016]. EX1003 ¶222.

Accordingly, the evidence provided above for dependent Claim 4 also applies to Claim 5.

Based on the above, Claim 5 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 5 would have been obvious in view of Kotanagi and Honda, combined with Kateraas.

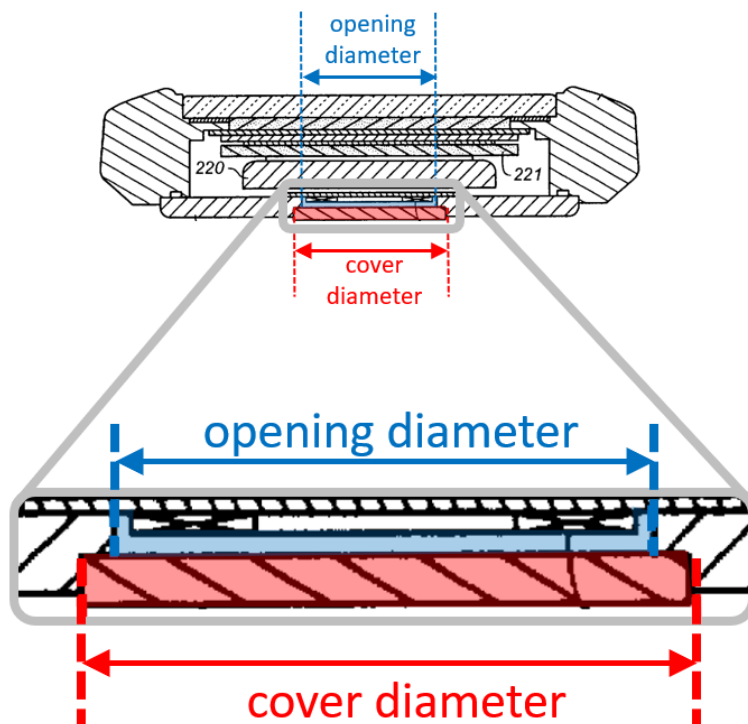
6. Dependent Claim 6.

Claim 6 depends from Claim 1 and adds “**wherein: the ceramic cover is a disk having a disk diameter that is greater than an opening diameter of the second opening; and the ceramic cover forms a water-tight seal with the housing along a perimeter of the ceramic cover.**” Kotanagi teaches a protruding disk in its Figure 8, for example: “For example, as illustrated in FIG. 8, the protruding part 4 may be formed so that the outer periphery is circular.” See EX1005 ¶(0076) .

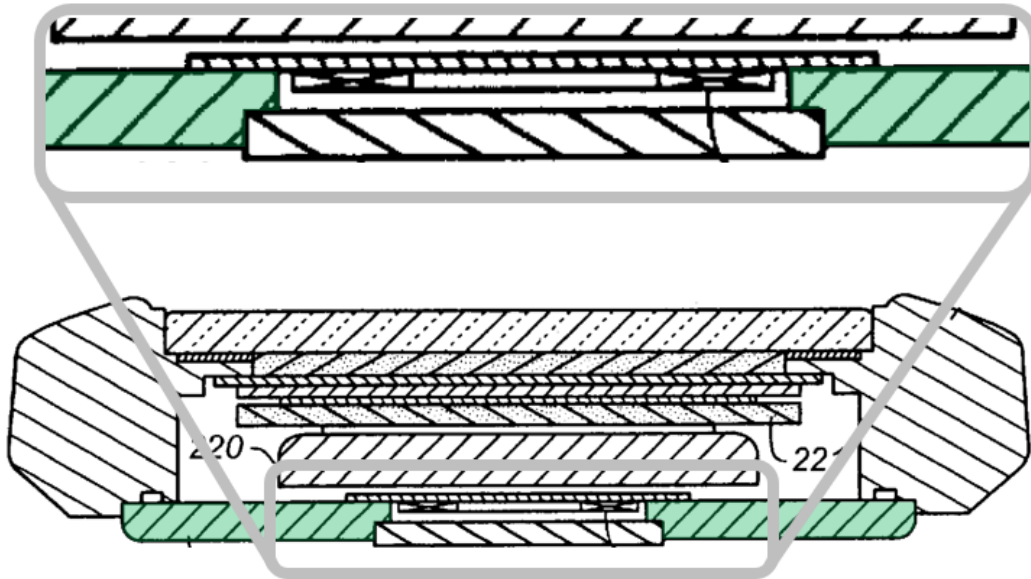


Id. at 16 (Fig. 8). This disk covers the opening and therefore has at least the same diameter, if not a larger diameter, than the opening. However, Kotanagi does not specifically state that this disk is a ceramic cover forming a water-tight seal.

In the same field of endeavor Honda teaches a cover with a diameter that is “greater than an opening diameter of the second opening”:



See EX1006 at 3 (Fig. 2). The claimed diameter differences are also demonstrated by the notch in the housing for seating the window, as highlighted here:



See *id.*

One of the reasons motivating Honda's wireless charging invention is a need for 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. Honda additionally teaches, "**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.” *Id.* at 15:36–38

(emphases added). Honda further teaches its watch is waterproof up to five atmospheres. *Id.* 13:22–25.

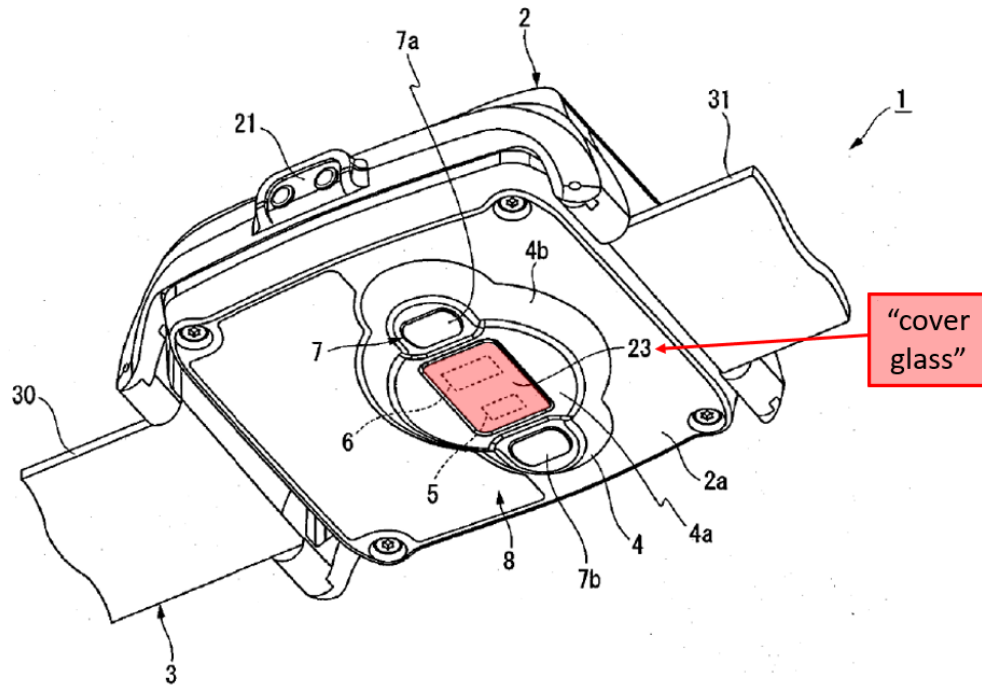
From the above, the relative sizes of the opening and disk, and the notched arrangement shown above, a POSITA would have understood that the Honda cover forms “a water-tight seal with the housing along a perimeter of the ceramic cover” as claimed. A POSITA would expect to successfully achieve a water-tight seal (and be motivated to establish such a seal) 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, etc.

Based on the above, Claim 6 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 6 would have been obvious in view of Kotanagi and Honda, combined with Kateraas.

7. Dependent Claim 7

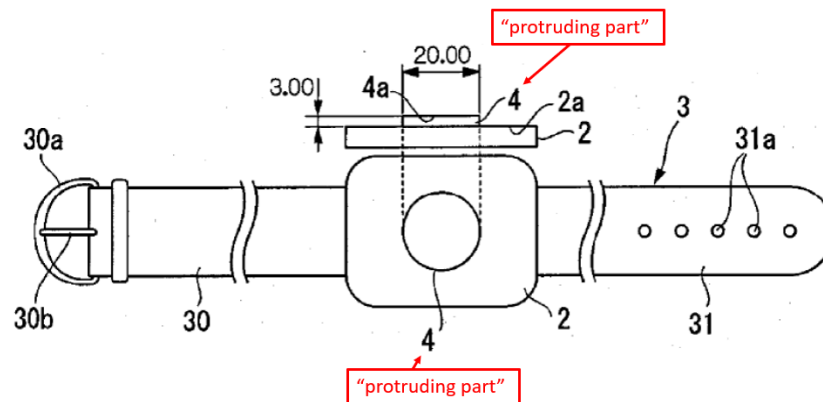
Claim 7 depends from Claim 1 and adds “**wherein: the second opening has an opening diameter; the wireless charging receive coil has a coil diameter that is less than the opening diameter; and the wireless charging receive coil is configured to receive the wireless power through the second opening.”**

As noted above, Kotanagi teaches a second opening with a cover glass. In some figures, Kotanagi illustrates the opening and cover with a roughly rectangular shape, with rounded corners.



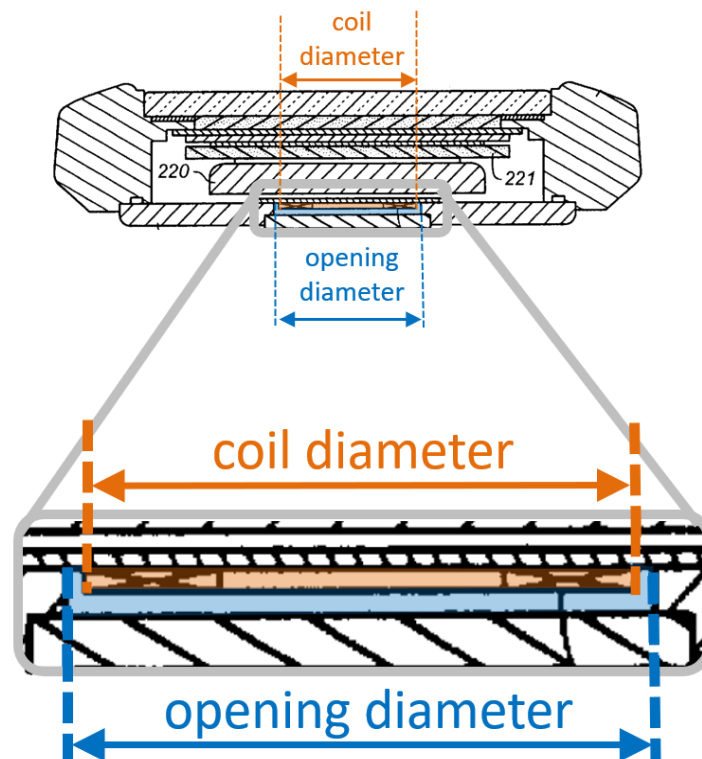
See EX1005 at 26 (Fig. 5).

Although the “cover glass” in the Kotanagi figures above is not circular, Kotanagi also teaches a protruding disk in its Figure 8: “the protruding part 4 may be formed so that the outer periphery is circular” and Kotanagi describes its diameter: “the diameter of the protruding part 4 illustrated in FIG. 8 is set to 20 mm.” EX1005 ¶(0076).

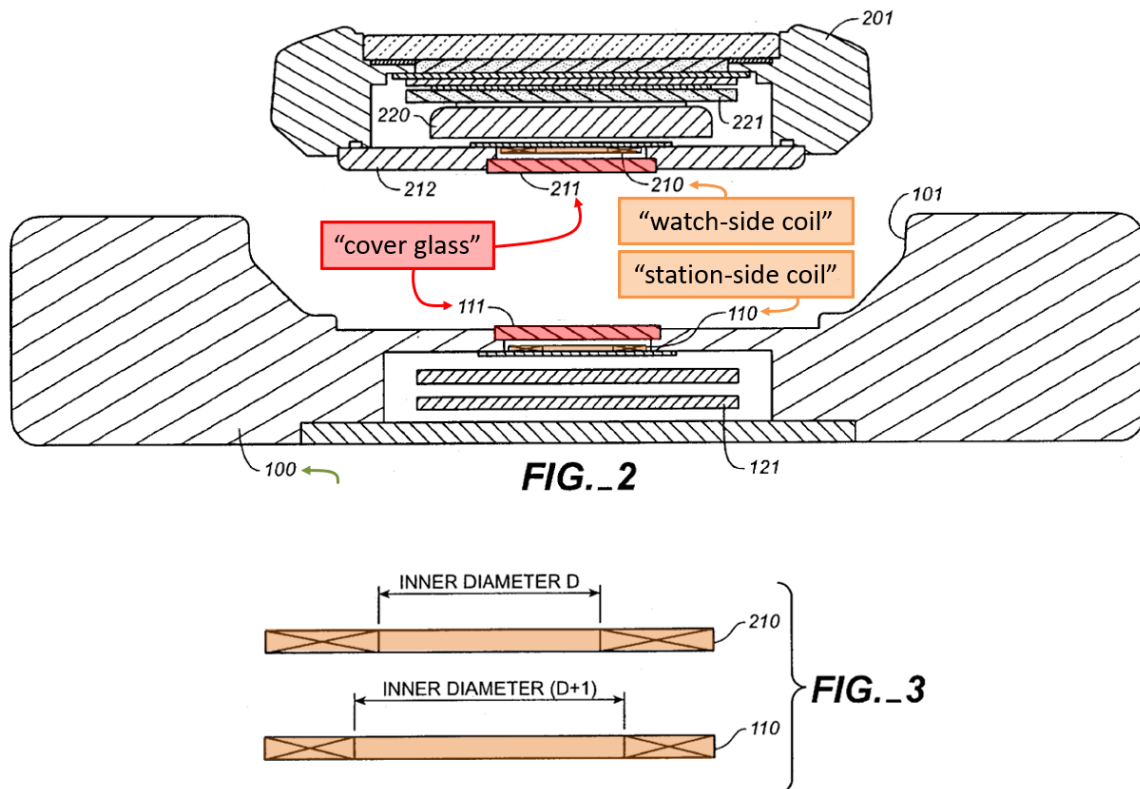


See id. at 28 (Fig. 8). A POSITA would have understood from the figure above that the underlying opening also has an “opening diameter.” EX1003 ¶232.

In the same field of endeavor Honda teaches a wireless charging coil that is aligned with and fits within (thus having a smaller diameter than) a second opening:



See EX1006 at 3 (Fig. 2). Honda thus teaches that the wireless charging receive coil is configured to receive wireless power through the second opening. In Honda, this power comes from a “station-side coil 110” (*id.* at 6:28):



See *id.* at 3 (Figs. 2, 3).

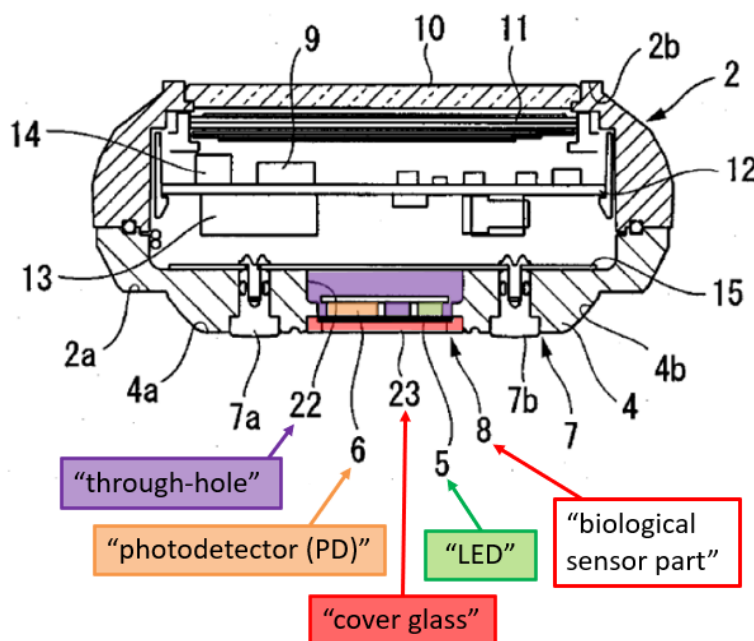
Based on the above, Claim 7 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 7 would have been obvious in view of Kotanagi and Honda, combined with Kateraas.

8. Dependent Claim 14

Claim 14 depends from Claim 9 and adds “**the biosensor module includes an array of optical components; and the cover includes an array of windows,**

each window aligned with a corresponding optical component of the array of optical components.”

As discussed herein with respect to Claim 3, Kotanagi teaches a single opening in its base, with a single cover glass, and an LED and a photodetector both positioned in that opening immediately behind the cover glass:

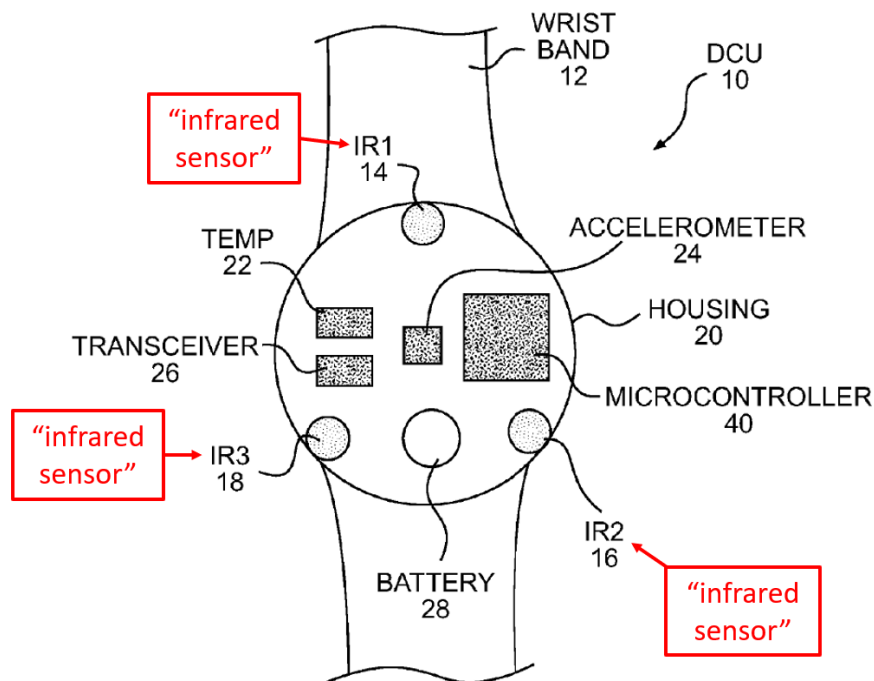


See EX1005 at 27 (Fig. 7).

Kotanagi’s cover glass fills the single large opening, thereby spanning more than the surface areas shown for both the LED and photodetector and providing operational access to them. Thus, Kotanagi teaches an “array” of two optical components, and a window “aligned with” the corresponding optical components in the array. The two areas surrounded by dashed lines in Kotanagi’s Figure 5 would suggest to such 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 to the two optical components; creation of two openings instead of one would create no new and unexpected result.¹⁰ EX1003 ¶238.

Moreover, Kateraas teaches an "array" of separate sensors. EX1014 [0012]. ("[I]nfrared sensors 14, 16, and 18; and/or temperature sensor 22 (and any combinations thereof) may be integrated together to form a sensor array"). *Id.* at [0058].



See EX1014 at 2 (Fig. 1).

¹⁰ *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960), *see supra* note 4.

The sensors in the array can be “embedded directly into” the material of a window, thus establishing a specific opening or window for each sensor. EX1014 [0058]–[0059] (“one or more of infrared sensors 14, 16, and/or 18 may be embedded directly into the material”).

Based on the figure above showing three different sensors, embedding these directly into a window material, as taught by Kateraas, specifically aligns each of the sensors with its own separate, corresponding specific opening or window of the window material.

This would not affect charging because, just as in the '783 patent (“the outer surface of the rear cover defines one or more windows” for “operational access to . . . optical components”, EX1001 2:65–67), the windows of Kotanagi and Kateraas are likewise defined by a rear cover. EX1005 at 26 (Fig. 5) (dashed lines within cover 23); EX1014 [0059] (“one or more of infrared sensors 14, 16, and/or 18 may be embedded directly into the material of window 103.”).

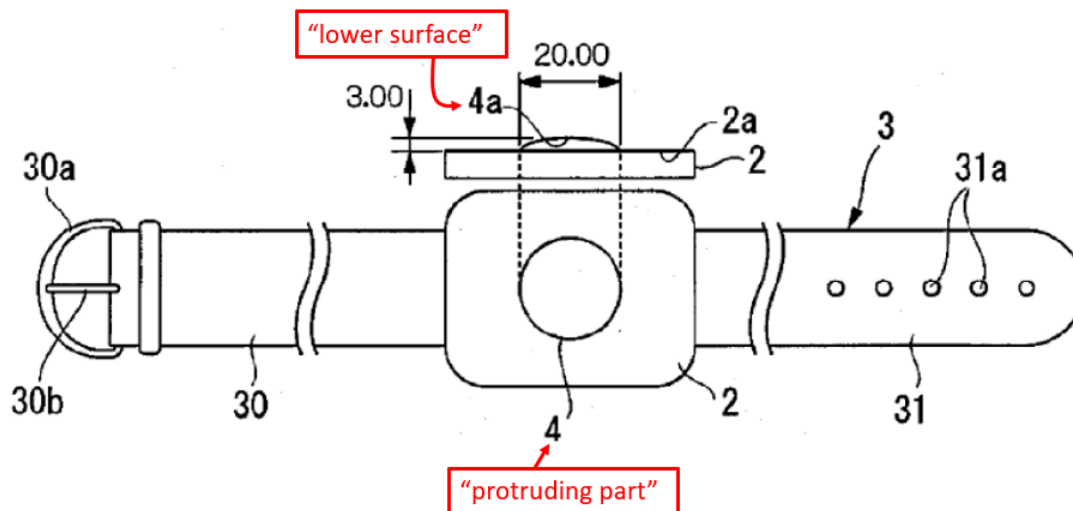
Based on the above, Claim 14 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 14 would have been obvious in view of Kotanagi and Honda, combined with Kateraas.

D. Ground 4: Claims 12–13 and 17–18 are unpatentable because they would have been obvious in view of Kotanagi, Honda, Jabori, and optionally, in further combination with Park

1. Dependent Claim 12

Claim 12 depends from Claim 9 and adds “**the cover is a disk having a convex shape that protrudes away from the housing; and the convex shape is configured to facilitate alignment with a concave surface of an external inductive power transmitter dock.**” Claim 9 states that the cover is “disposed over the biosensor module” and passes optical signals.

Kotanagi’s Figure 10 shows a disk-shaped protruding part with a convex 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 ¶(0080).



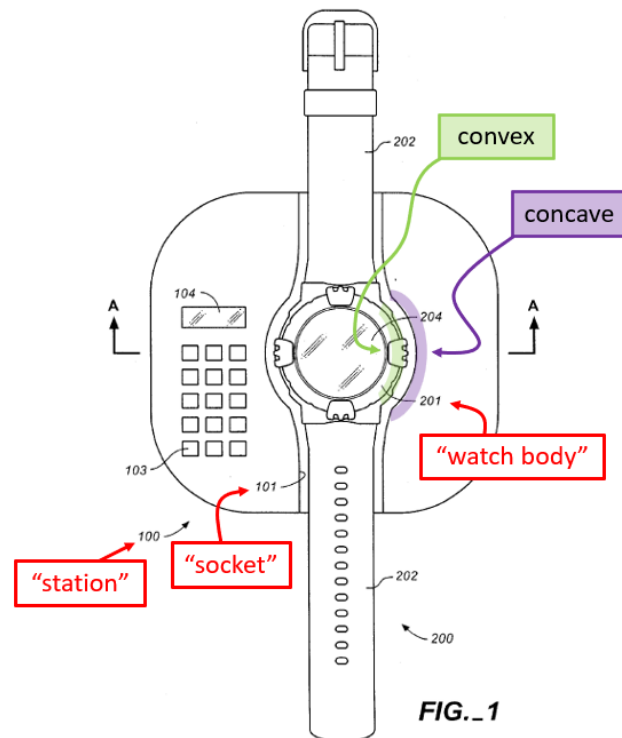
See id. at 28 (Fig. 8). Kotanagi elsewhere includes a cover glass within a

“protruding part 4.” EX1005 ¶(0055). 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 ¶244.

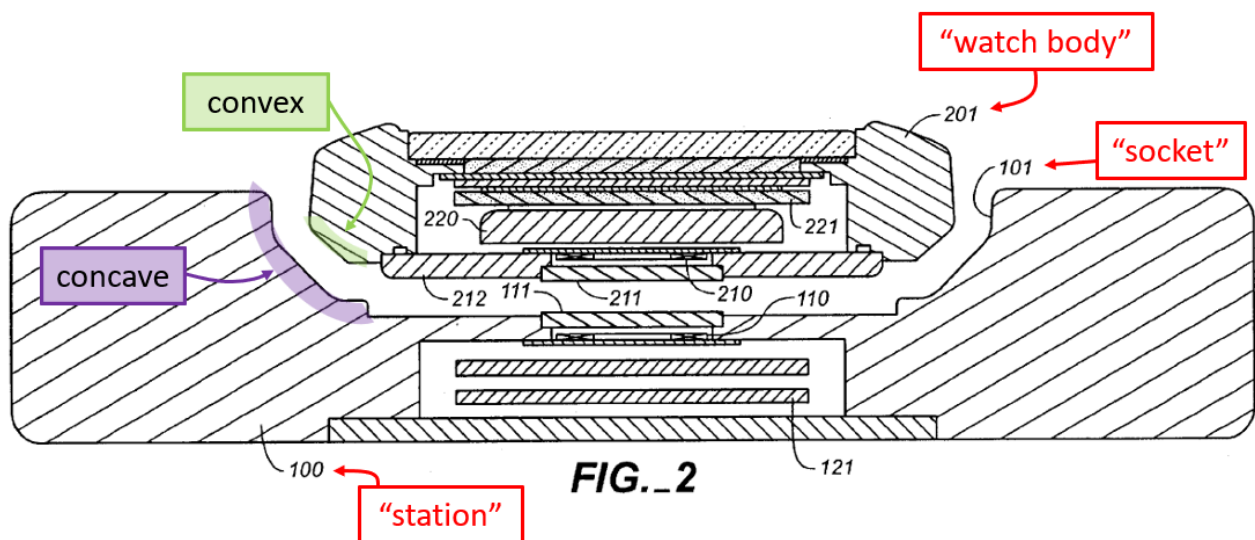
Honda teaches an external inductive power transmitter dock which it terms a “station.” EX1006 *passim*. Honda also teaches using complementary shapes to facilitate alignment for charging. EX1006 at 2–3. Thus, a POSITA would have known from Honda to accommodate Kotanagi’s convex protrusion in a slightly modified version of Honda’s wireless charging station. This modification would have been relatively simple, since Honda’s station already demonstrates the concept of using concave surfaces to accommodate convex surfaces of a device to be charged. Honda explains how socket shape can be “slightly larger” to assist with alignment for charging:

FIG. 1 is a plan view . . . [A]n 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.

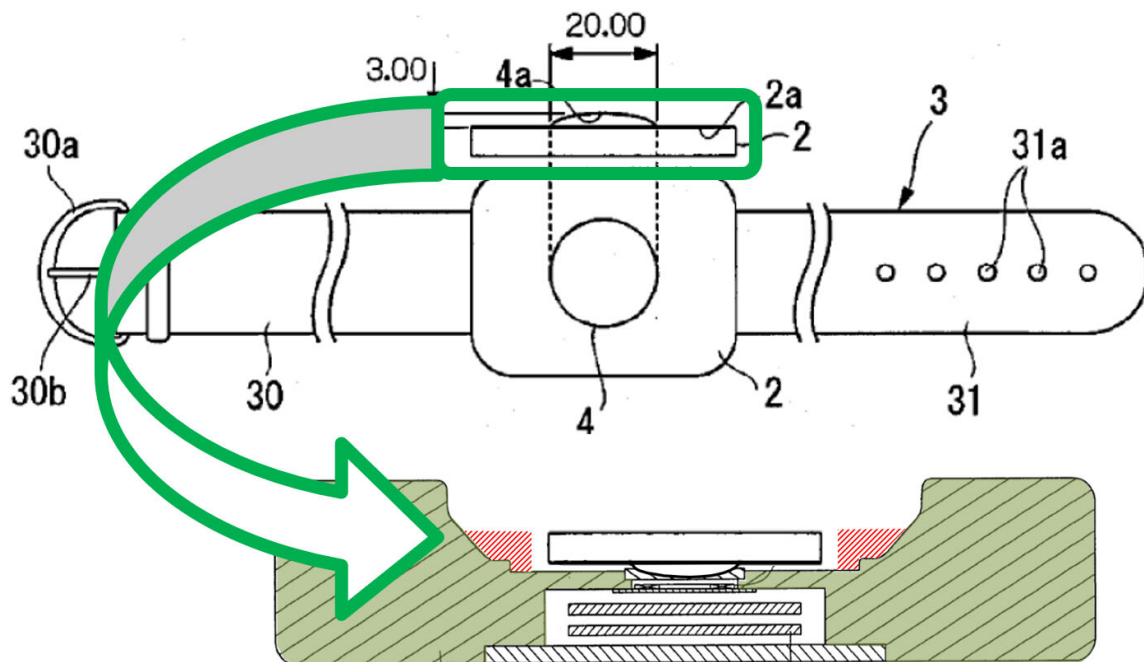


Id. at 2 (Fig. 1). Similar to the complementary concavity shown above, Honda's cross section view shows complementary convex and concave surfaces to facilitate alignment in a charging station:



See id. at 3 (Fig. 2). A POSITA would have understood from these teachings that

the Kotanagi embodiment having a convex protruding cover should be provided a complementary concavity in the charging station, so the socket can be “shaped to be slightly larger than” the device being charged. *Id.* at 6:9. EX1003 ¶245. This is illustrated below:



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

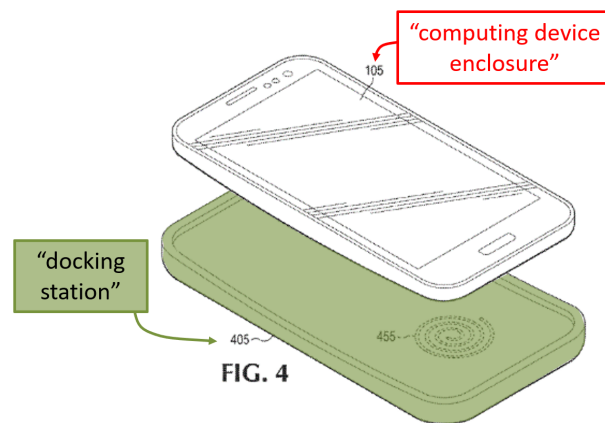
A POSITA would have readily made these modifications based on the teachings of Kotanagi and Honda. For example, a POSITA would have known from Honda to maintain a distance between transmitter-side and receiver-side coils of approximately 3 to 5 mm (or less) (see Honda’s discussion of Fig. 14 showing 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 ¶246.

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

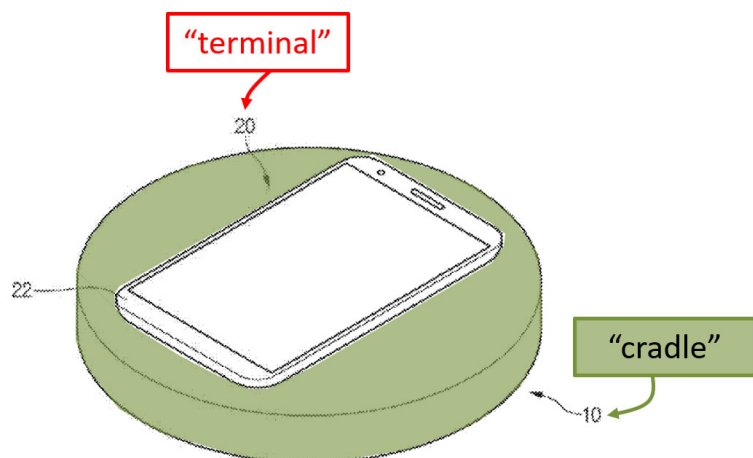
FIG. 4-5 are a computing device and wireless power transmitter according to example implementation. In some examples the enclosure 105 and a docking station 405 may have a **shape that**

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]; *see id.* at [0013].

Moreover, **Park** teaches that for wireless charging stations (where a cradle can hold and charge a wireless power receiving apparatus, or



“terminal”), “At least a portion of the top of the cradle 10 may have the same shape as the back of the terminal 20.” EX1012 [0102]; EX1015 at 18; *see* EX1012 at 4; EX1015 at 43. A POSITA would have considered this teaching to support the modifications illustrated above for alignment and charging when the device has a convex cover. EX1003 ¶¶248–249.

Based on the above, Claim 12 would have been obvious over Kotanagi, Honda, and Jabori. Alternatively, Claim 12 would have been obvious over Kotanagi, Honda and Jabori, further in view of Park.

a. Motivation to Combine

As discussed above with respect to Ground 1, a POSITA would have been motivated before the effective filing date to combine the teachings of Kotanagi and Honda, and had a reasonable expectation of success in doing so. For example, they both teach wireless charging and biosensing of a pulse signal and are analogous art.

A POSITA would have been motivated before the effective filing date to combine the teachings of Kotanagi, Honda, Park, and Jabori, because 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 1:53–59. EX1003 ¶252.

A POSITA would have looked to Park and Jabori as they both teach methods for aligning wireless charging devices, and a POSITA would have found their teachings obviously substitutable with those found in Honda. EX1003 ¶¶253; 254–255.

This motivation to combine also applies to the other Ground 4 combinations and dependents from Claim 12. EX1003 ¶¶256. Further motivations to combine are provided throughout this petition.

2. Dependent Claim 13

Claim 13 depends from Claim 12 and adds **“the wearable electronic device is magnetically coupled to the external inductive power transmitter dock through the cover and the biosensor module.”**

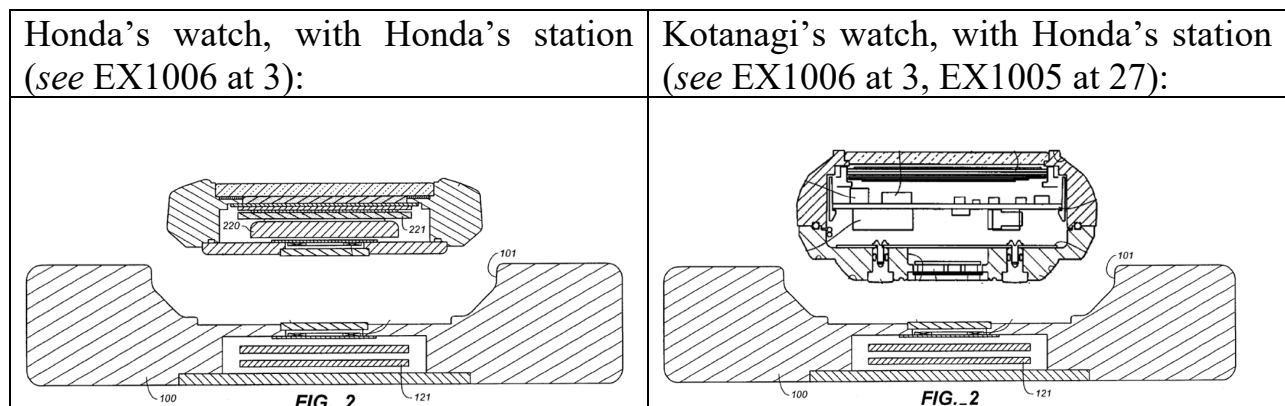
These limitations are obvious for the reasons provided in section IV(B)(1) with respect to Park’s magnetic alignment. This claim adds the device is coupled “through the cover and the biosensor module.” In Kotanagi as modified by Honda, as discussed with respect to Claim 11 above, power is transmitted through the cover glass (which also supports Kotanagi’s LED and photodetector). Honda thus teaches that magnetic induction causes coupling “through” these structures.

Based on the above, Claim 13 would have been obvious over Kotanagi and Honda. Alternatively, Claim 13 would have been obvious over Kotanagi and Honda, combined with Park.

3. Dependent Claim 17

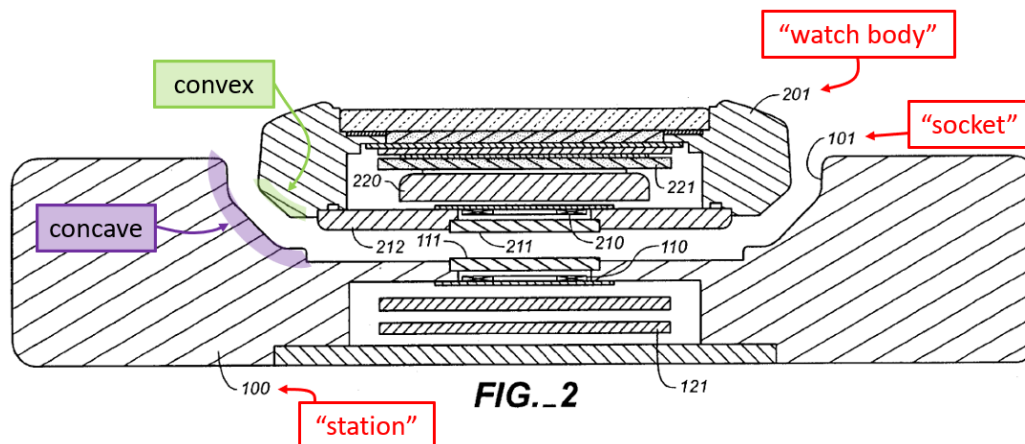
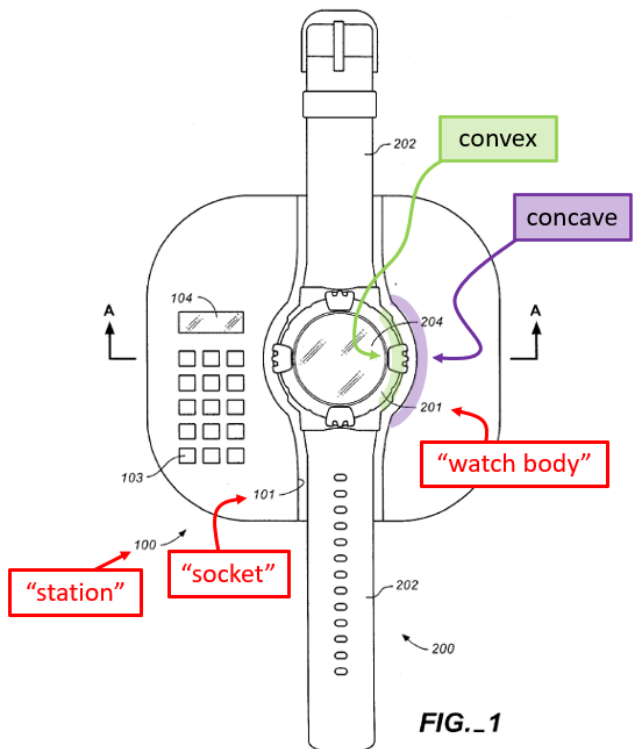
Claim 17 depends from Claim 15 and adds “**the wireless charging receive coil is configured to receive power from an external inductive power transmitter dock; the electronic watch defines a convex contoured surface along the bottom portion; and the convex contoured surface is configured to facilitate alignment with a concave contoured surface of the external inductive power transmitter dock.**”

A POSITA would have known that Kotanagi’s recharging in a “contactless state” (EX1005 ¶(0053)) involves a wireless charging receive coil that receives power from an external inductive power transmitter dock. This would have suggested modifying Kotanagi to include Honda’s coil (*see supra* § IV(A)(4), discussing Claim 15). Consistent with Honda’s teaching to align by seating a watch in a station “socket” (EX1006 6:7), a POSITA would also have readily used Honda’s charging station (or something similar), with Kotanagi’s watch, as shown in the figures below. EX1003 ¶264.



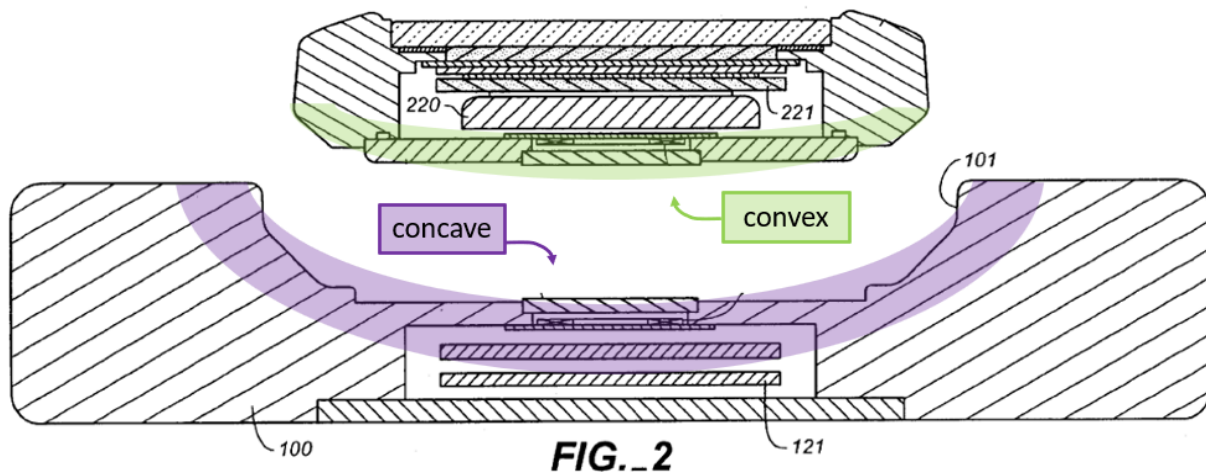
After addressing any potential scale differences, a POSITA would have readily combined Kotanagi and Honda at least because the figures suggest complementary shapes. Thus, Honda and Kotanagi teach a charging dock and facilitating alignment as claimed. EX1003 ¶264.

As shown above for Claim 12, Honda's charging station (EX1006 at 2-3) has "concave contoured" surfaces and uses these complementary shapes for charging alignment. Example concave or near-concave surfaces in Honda's wireless charging station are shown here, where Honda's watch body is correspondingly convex or near-convex.



See EX1006 at 2–3.

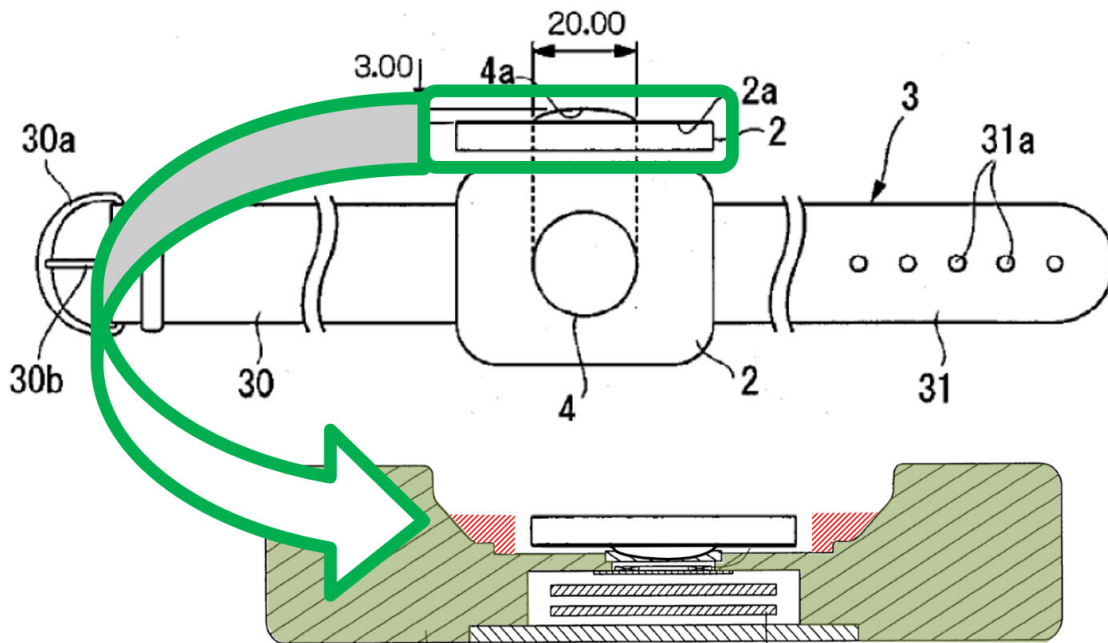
Figure 2 shows two different convex or near-convex contoured surfaces “along the bottom portion” of Honda’s watch, one to the right, and one to the left. Although Honda’s watch has a central flattened portion between these two sides, the complementary shapes and rounded edges in these figures would have suggested to a POSITA that a complimentary concave charging socket can be used to align a convex device. EX1003 ¶266.



See *id.* at 3 (Fig. 2).

Kotanagi’s Figure 10 teaches an electronic watch that “defines a convex contoured surface along the bottom portion” as claimed (EX1005 ¶(0080)), and consistent with the above discussion of Claim 12, a POSITA would have understood to use the Kotanagi watch’s convex contoured surface “to facilitate alignment with a concave contoured surface of the external inductive power transmitter dock,” as claimed, at least based on Honda’s statement that the socket

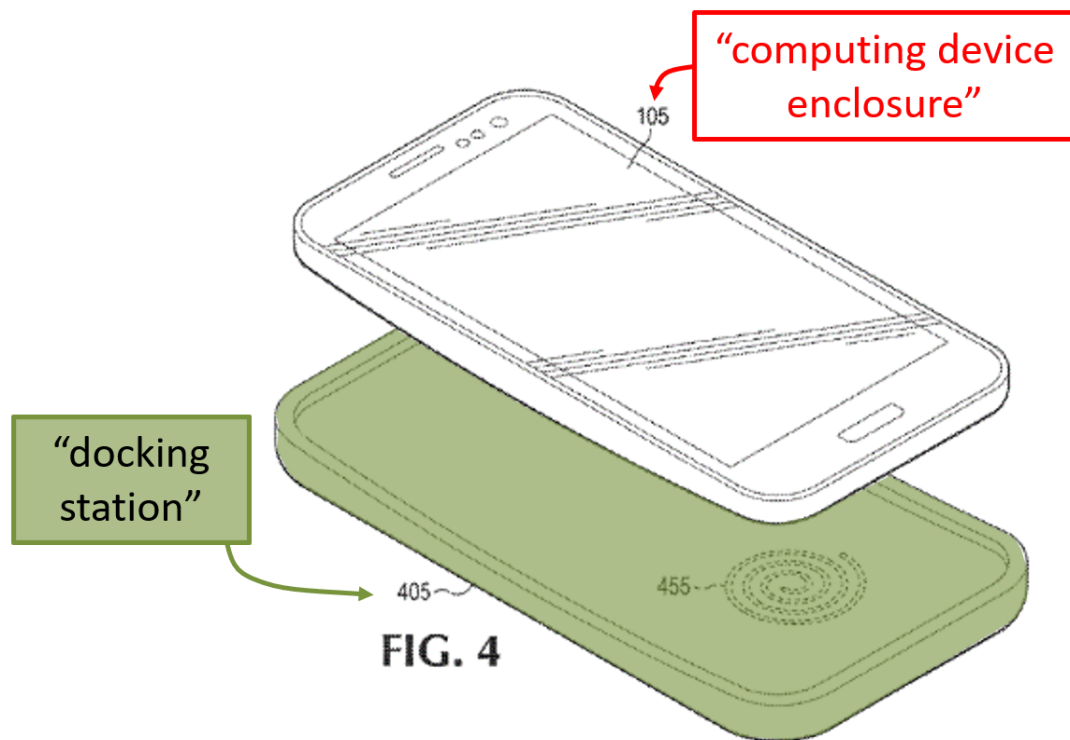
can be “shaped to be slightly larger than” the device being charged. *Id.* 6:9.
EX1003 ¶267.



See EX1005 at 28 (Fig. 8); EX1006 at 3 (Fig. 2) (shape modification added).

A POSITA would have readily made these modifications based on the teachings of Kotanagi and Honda. For example, a POSITA would have known from Honda to maintain a distance between transmitter-side and receiver-side coils of approximately 3 to 5 mm (or less) (see Honda’s discussion of Fig. 14, EX1006 13:3–13), and therefore provided a concavity for the convex protrusion where the receive-side coil is located behind it. EX1003 ¶268.

Further, **Jabori** teaches shapes for wireless power transmission that promote alignment, describing a device with a “convex shape” and a docking station with a “concave shape.” See EX1017 [0017].



See EX1017 at 16 (Fig. 4).

From this, a POSITA would have understood to further modify the combination of Kotanagi and Honda to be convex/concave. EX1003 ¶269.

This is further supported by **Park**, which teaches facilitating alignment with a cradle that “may have the same shape” as the device being charged. EX1012 [0102]; EX1015 at 18.

Based on the above, Claim 17 would have been obvious in view of Kotanagi, Honda, and Jabori. Alternatively, Claim 17 would have been obvious in view of Kotanagi, Honda, and Jabori, combined with Park.

4. Dependent Claim 18

Claim 18 depends from Claim 17 and adds “**wherein the convex contoured**

surface is configured to protrude toward a portion of skin of the user when the electronic watch is worn.”

As discussed for example with respect to claims 12 and 17, Kotanagi, Honda, and Jabori teach protruding convex surfaces. *See supra* §§ IV(D)(1) and (3). Kotanagi’s “protruding part 4” (e.g., Fig. 10, EX1005 at 28) protrudes toward a user’s skin. When mounted to a wrist, the protrusion “facilitates contact between the living body surface and the lower surface of the protruding part.” *Id.* ¶94. Likewise, Honda’s watch is configured to be “fastened to a wrist of a user” to “detect biological information.” EX1006 6:15–20. Accordingly, Kotanagi alone, or as modified by Honda, teaches these limitations and Claim 18 would have been obvious over Kotanagi and Honda.

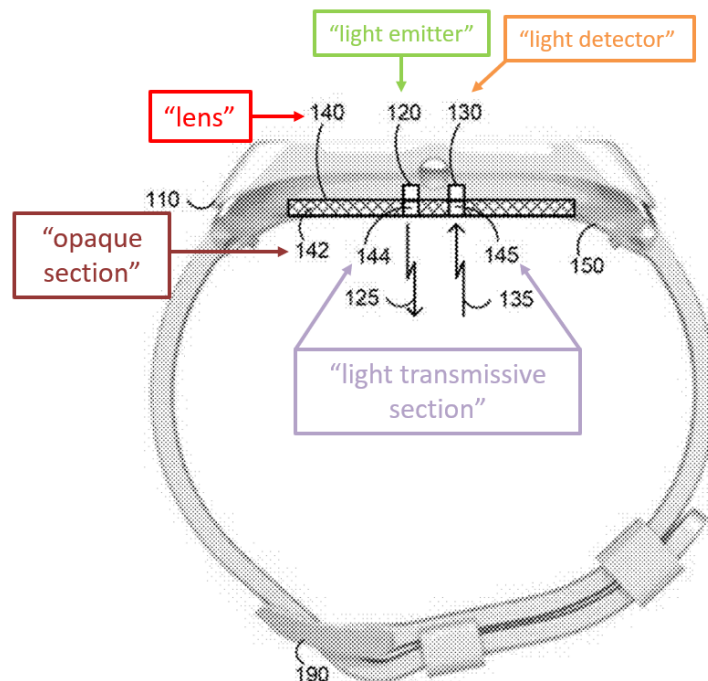
Further, **Jabori** teaches a device with an outwardly protruding “convex shape.” *See* EX1017 [0017]. Thus, alternatively, Claim 18 would have been obvious over Kotanagi, Honda, in further view of Jabori.

E. Ground 5: Claims 3 and 14 are unpatentable because they would have been obvious in view of Kotanagi, Honda, Kateraas, and Fraser

1. Dependent Claim 3

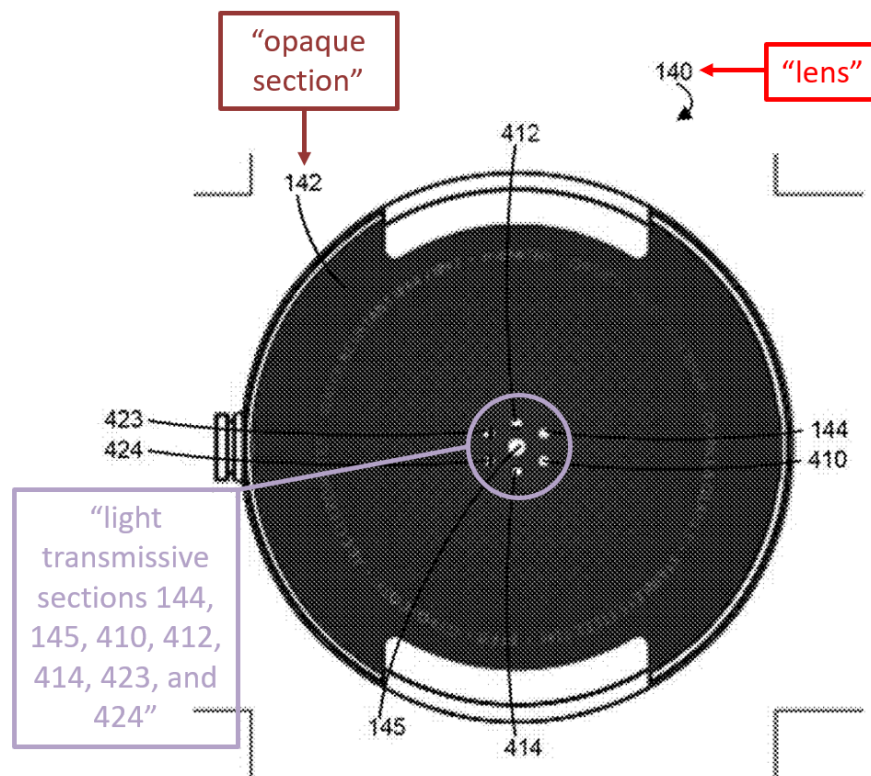
Claim 3 depends from Claim 1 and adds “**the ceramic cover defines a first opening to transmit the light from the light source; and the ceramic cover defines a second opening to receive the light reflected from the region of skin.**”

The analysis of Ground 3, Claim 3 applies here, adding Fraser to further teach the cover openings for light transmission (emission and reception). Fraser’s array of “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 at [0027]. In this figure, arrow 125 shows light emission:



Id. at 2 (Fig. 1).

Fraser also teaches that “light transmissive section 145 can transmit light reflected from a user to the light detector 130 of FIG. 3.” *Id.* at [0027]. In the figure above, light coming in 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.* at [0018].

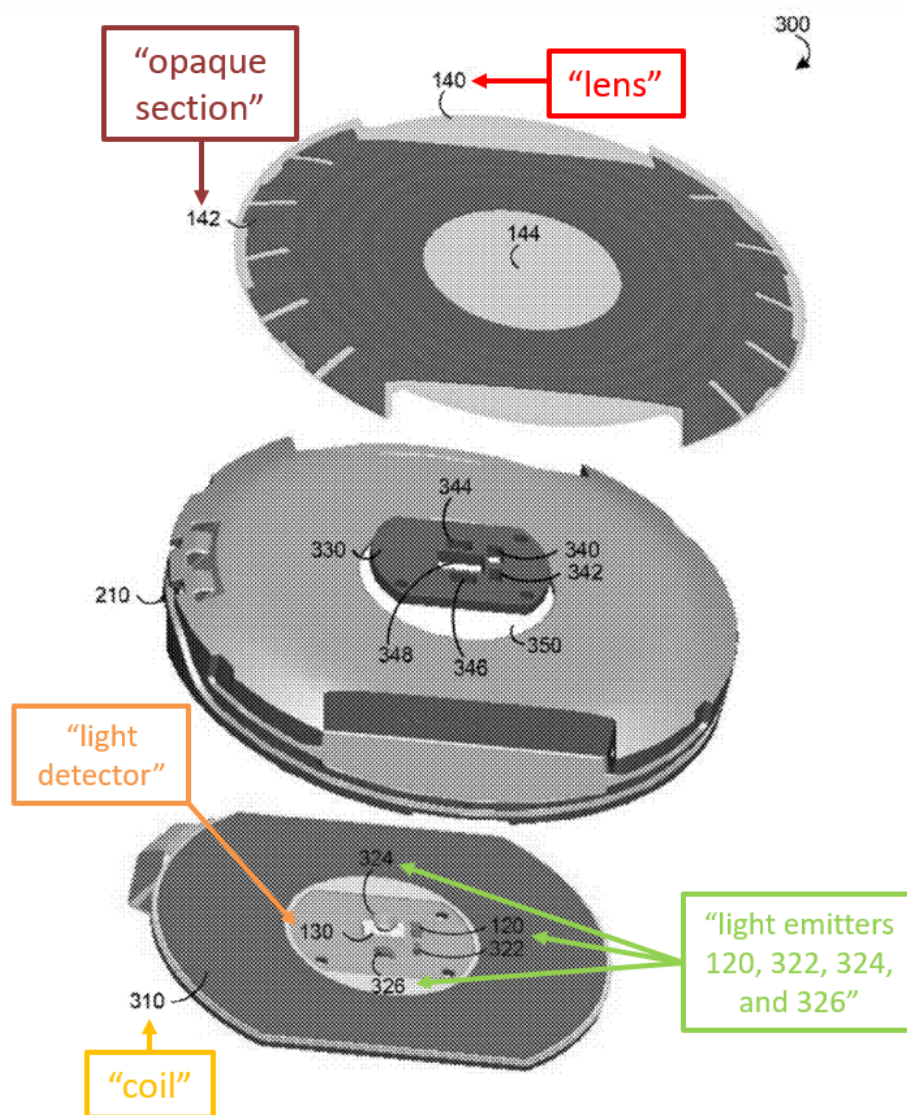


See id. at 5 (Fig. 4).

Thus, Fraser teaches the claimed cover openings for light transmission (emission and reception). EX1003 ¶¶275–278.

a. Motivation to Combine

It would have been obvious to combine Kotanagi and Fraser for various reasons. For example, both teach optical biosensing and contactless/wireless charging, and they are analogous art. EX1005 at ¶(0053), EX1041 at [0026]. Fraser's light emitters are surrounded by a wireless charging coil, as shown below:



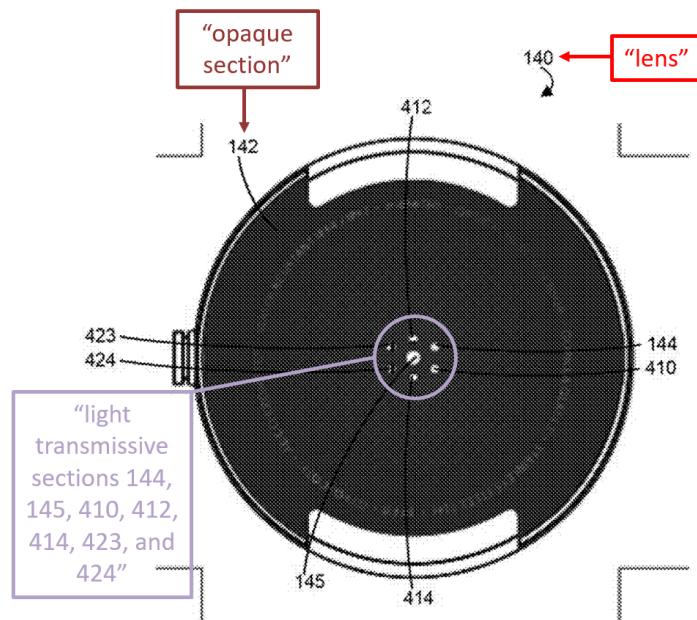
See EX1041 at 4 (Fig. 3).

Moreover, Fraser teaches that a watch may employ “light transmissive sections to focus emitted and received light.” EX1041 at [0029]. Because Kotanagi’s watch is intended to emit and receive light, a POSITA would have looked to Fraser for how to focus or guide the light and would have modified Kotanagi’s structure with a reasonable expectation of success. This motivation also applies to Claim 14, below. EX1003 ¶¶280–281.

2. Dependent Claim 14

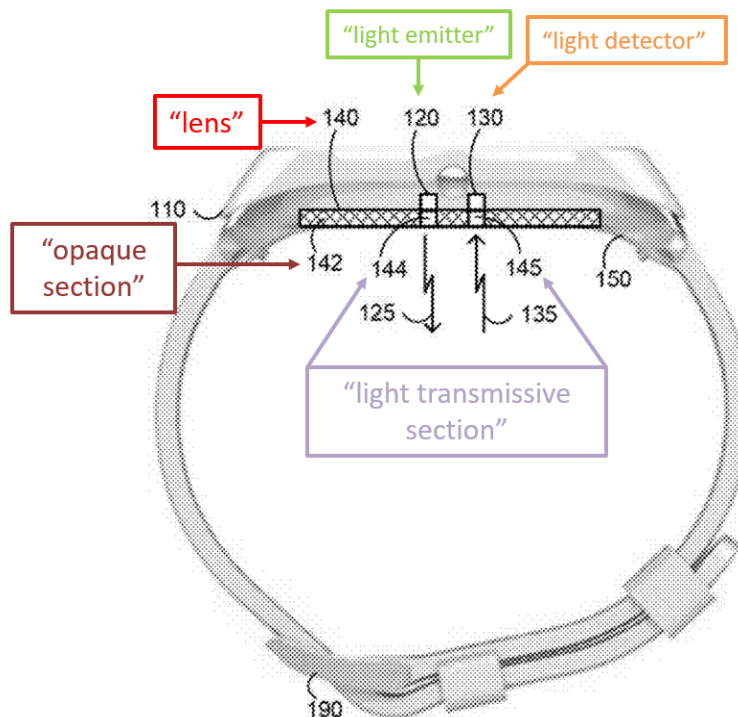
Claim 14 depends from Claim 9 and adds “**the biosensor module includes an array of optical components; and the cover includes an array of windows, each window aligned with a corresponding optical component of the array of optical components.**”

The analysis of Ground 3, Claim 14 applies here, except Fraser is used instead of Kateraas to teach an array of windows aligned with an array of optical components. Fraser’s “light transmissive sections 144, 410, 412, 414, 423, and 424” form an array. EX1003 ¶283.



See EX1041 at 5 (Fig. 4).

The light transmissive sections are "aligned" (e.g., with emitter 120 and detector 130) as shown below, to perform their transmission function:

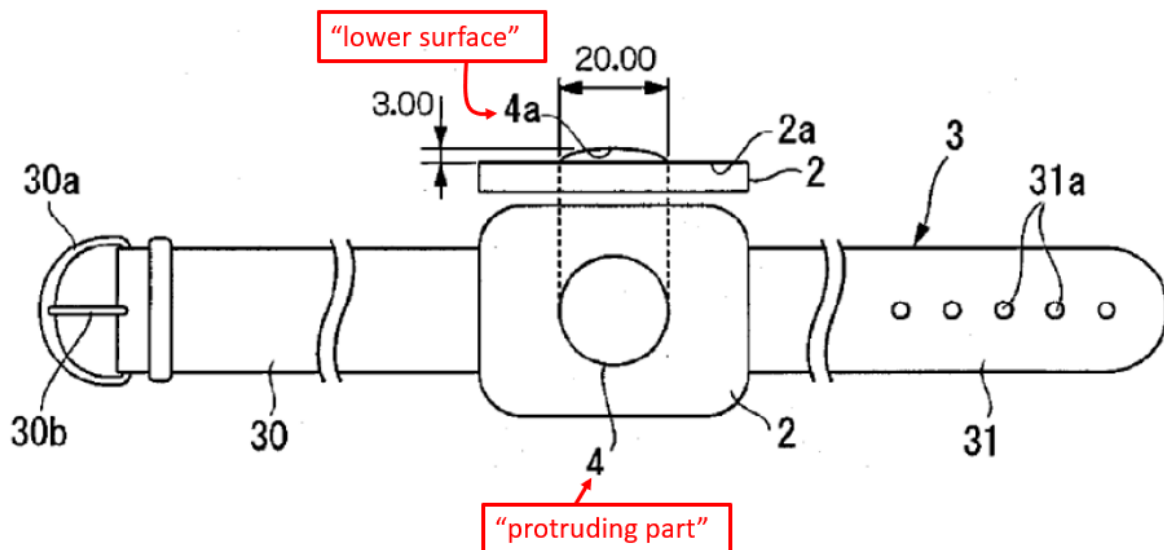


See EX1041 at 2 (Fig. 1).

F. Ground 6: Claim 8 is unpatentable because it would have been obvious in view of Kotanagi, Honda, Jabori, and optionally, in further combination with Kateraas and/or Park

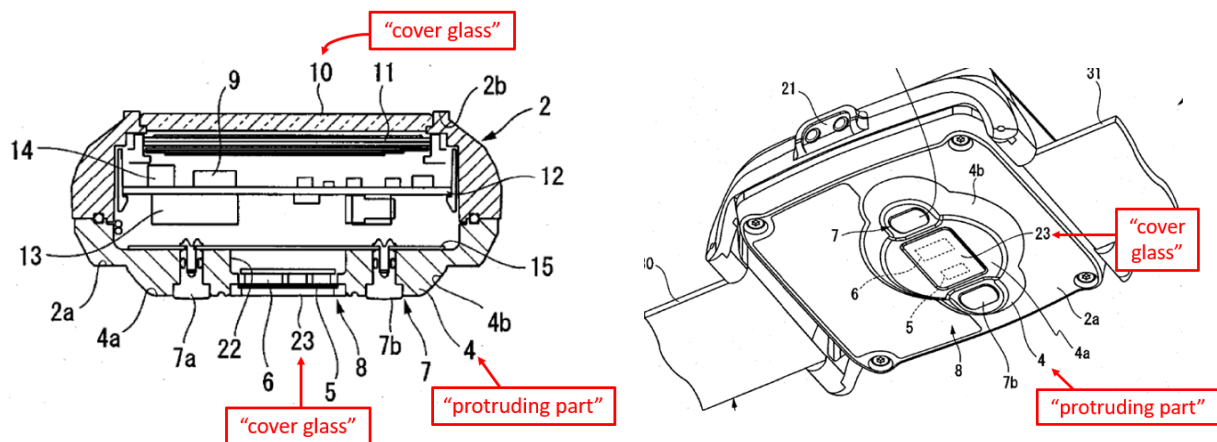
Claim 8 depends from Claim 1 and adds “**wherein: the ceramic cover has a convex contoured shape that protrudes toward the user; and the convex contoured shape facilitates alignment between the ceramic cover and a mating surface of the external wireless charging device.**”

Kotanagi’s Figure 10 shows a protruding part with a convex contoured shape that protrudes toward the user:



See EX1005 at 28 (Fig. 8); EX1005 ¶(0080).

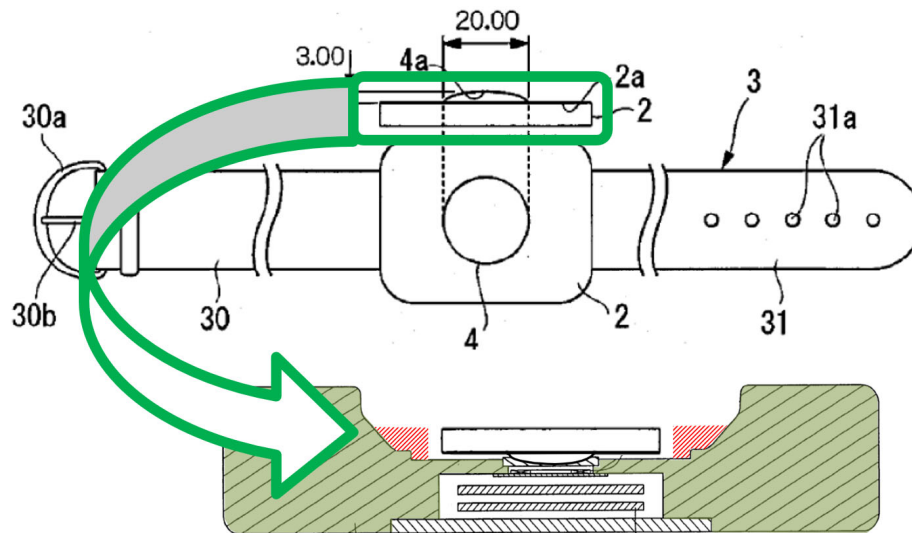
Kotanagi does not specify many details of this protruding part. However, Kotanagi elsewhere includes a cover glass within a “protruding part 4”:



See EX1005 at 26, 27 (Figs. 5, 7). As shown above with respect to Figure 10, Kotanagi also shows how a “cover glass” can span the entire top opening of its housing. A POSITA would have understood from these teachings that Kotanagi’s lower cover glass could likewise span an entire opening, such that the “protruding part 4” of Figure 10 could be a “cover glass.” EX1003 ¶285.

As explained in section IV(c)(1)(c), Kotanagi and Kateraas teach the limitation of a “ceramic cover,” consistent with the construction provided in § II(F)(1).

As discussed above with respect to Ground 4, Claim 12 (*see supra* §§ (IV)(D)(1) and (3), Honda teaches complementary shapes for charging, and Jabori and Park teach convex and complimentary mating surfaces for wireless charging. A POSITA would have understood from these teachings to modify Honda’s charging station. EX1003 ¶286–292.



See EX1005 at 28 (Fig. 8); EX1006 at 3 (Fig. 2) (modification added).

Based on the above, Claim 8 would have been obvious in view of Kotanagi, Honda, and Jabori. Alternatively, Claim 8 would have been obvious in view of Kotanagi, Honda, and Jabori, combined with Kateraas and/or Park.

a. Motivation to Combine

As discussed above with respect to Ground 1, a POSITA would have been motivated before the effective filing date to combine the teachings of Kotanagi and Honda. As discussed above with respect to Ground 3, a POSITA would have been motivated before the effective filing date to combine the teachings of Kotanagi and Honda with Kateraas, and had a reasonable expectation of success in doing so. As discussed above with respect to Ground 4, a POSITA would have been motivated before the effective filing date to combine the teachings of Kotanagi and Park and Jabori. EX1003 ¶¶294–297.

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 approximately four 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 discovery or infringement or invalidity contentions have been exchanged and claim construction briefing has not started.

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 this 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 '783 patent and none of the references the Petition relies on were considered during examination. Further, the references presented 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 ceramic cover, convex shapes, and other features. By contrast,

the Examiner found that the references considered during examination did not disclose all limitations of the independent claims. 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 1–20 of the '783 patent.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: February 27, 2023

By: / Philip M. Nelson /

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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
foregoing **PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO.**
10,627,783, exclusive of the parts exempted as provided in 37 C.F.R. § 42.24(a),
contains 13,791 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: February 27, 2023

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Masimo v. Apple
IPR Petition – U.S. Patent No. 10,627,783

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing **PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 10,627,783** and **EXHIBITS 1001-1012, 1014-1017, 1020, 1022, 1025-1031, 1033-1039 and 1041-1049** are being served on February 27, 2023, via Federal Express overnight delivery on counsel of record for U.S. Patent No. 10,627,783 as addressed below:

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Dated: February 27, 2023

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