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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. IPR2023-00774
U.S. Patent No. D883,279

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. D883,279

TABLE OF CONTENTS

Page No.

I. MANDATORY NOTICES 4

A. Real Party-In-Interest (37 C.F.R. §42.8(b)(1)) 4

B. Related Matters (37 C.F.R. §42.8(b)(2)) 4

C. Lead and Backup Counsel (37 C.F.R. §42.8(b)(3)) 4

D. Service Information (37 C.F.R. §42.8(b)(4)) 5

E. Grounds for Standing (37 C.F.R. §42.104) 5

F. Payment of Fees (37 C.F.R. §42.15(a)) 5

II. SUMMARY OF GROUNDS 5

A. Status of References as Prior Art 6

III. THE D'279 PATENT 7

A. Overview 7

B. Prosecution History 9

IV. CLAIM CONSTRUCTION 9

A. Legal Standard for Design Patent Claim Construction 9

B. Claim Construction of the D'279 Patent 11

1. The Functional Elements of the Claimed Sensor Design Should Be Factored Out of the Challenged Claim's Scope 16

a. The Convex Protrusion Is Functional 17

b. The Arc-Shaped Portions' Arrangement Is Functional 23

TABLE OF CONTENTS
(*cont'd*)

Page No.

c. The Rectangles' Arrangement Is Functional 29

d. The Concentric Circles Are Functional 32

e. The Overall Circular Sensor Shape Is Functional 34

V. LEGAL STANDARD 35

A. Designer of Ordinary Skill 35

B. Obviousness 36

VI. THE CHALLENGED CLAIM IS UNPATENTABLE 38

A. Overview of Key Prior Art 38

1. Paulke 38

2. Yuen 40

3. Fong 41

4. Bushnell 42

5. Mendelson 44

6. Chung 45

B. GROUND 1: Obviousness Over Paulke, Mendelson, Bushnell, Chung 47

1. Paulke Is A Primary Reference 47

a. Arc-Shaped Portions 49

b. Convex Protrusion 51

TABLE OF CONTENTS
(*cont'd*)

Page No.

c. Rectangles 54

d. Concentric Circles 57

2. The Challenged Claim Would Have Been Obvious 59

a. Mendelson, Bushnell, and Chung Are Secondary References 59

b. The Challenged Claim Would Have Been Obvious Over Paulke, Mendelson, Bushnell, and Chung 63

C. GROUND 2: Obviousness Over Yuen, Mendelson, Bushnell, Chung 77

1. Yuen Is A Primary Reference 77

a. Arc-Shaped Portions 79

b. Convex Protrusion 81

c. Rectangles 82

d. Concentric Circles 85

2. The Challenged Claim Would Have Been Obvious 86

a. Mendelson, Bushnell, and Chung Are Secondary References 86

b. The Challenged Claim Would Have Been Obvious Over Yuen, Mendelson, Bushnell, and Chung 90

D. GROUND 3: Obviousness Over Fong, Mendelson, Bushnell, Chung 95

TABLE OF CONTENTS
(*cont'd*)

Page No.

1. Fong Is A Primary Reference 95

   a. Arc-Shaped Portions 98

   b. Convex Protrusion 99

   c. Rectangles 101

   d. Concentric Circles 103

2. The Challenged Claim Would Have Been Obvious 105

   a. Mendelson, Bushnell, and Chung Are Secondary References 105

   b. The Challenged Claim Would Have Been Obvious Over Fong, Mendelson, Bushnell, and Chung 109

VII. SECONDARY CONSIDERATIONS 113

VIII. CONCLUSION 114

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Page No(s).

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678 Fed. App'x. 1002 (Fed. Cir. 2017) 37

Amgen Inc. v. Sanofi,
872 F.3d 1367 (Fed. Cir. 2017) 45, 46

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94 F.3d 1563 (Fed. Cir. 1996) 18

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IPR2017-00096, Paper 28 (PTAB Mar. 30, 2017) 16, 35

Durling v. Spectrum Furniture Co.,
101 F.3d 100 (Fed. Cir. 1996) .....*passim*

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543 F.3d 665 (Fed. Cir. 2008) 10

Ethicon Endo-Surgery, Inc. v. Covidien, Inc.,
796 F.3d 1312 (Fed. Cir. 2015) 11

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383 U.S. 1 (1966).....36

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730 F.3d 1301 (Fed. Cir. 2013) 10

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117 Fed. App'x 761 (Fed. Cir. 2005) 36

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988 F.3d 1117 (Fed. Cir. 1993) 19, 30

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485 F.3d 1157 (Fed. Cir. 2007) 113

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747 F.3d 1326 (Fed. Cir. 2014) .....*passim*

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851 F.2d 1401 (Fed. Cir. 1988) 7

OddzOn Prods., Inc. v. Just Toys, Inc.,
122 F.3d 1396 (Fed. Cir. 1997) 10

Phillips v. AWH Corp.,
415 F.3d 1303 (Fed. Cir. 2005) 9

Richardson v. Stanley Works, Inc.,
597 F.3d 1288 (Fed. Cir. 2010) 10, 16, 35

Sport Dimension, Inc. v. Coleman Co., Inc.,
820 F.3d 1316 (Fed. Cir. 2016) 11

Tokai Corp. v. Easton Enterprises, Inc.,
632 F.3d 1358 (Fed. Cir. 2011) 114

Unwired Planet, LLC v. Google Inc.,
841 F.3d 995 (Fed. Cir. 2016) 7

OTHER AUTHORITIES

35 U.S.C. § 103 .....*passim*

35 U.S.C. § 112 .....45, 46

35 U.S.C. § 171 10

37 C.F.R. § 42.100 9

LIST OF EXHIBITS

Exhibit No.	Description
1001	U.S. Patent No. D883,279
1002	File History of U.S. Patent No. D883,279
1003	Declaration of Joel Delman
1004	*Curriculum Vitae* of Joel Delman
1005	*Apple Inc. v. Masimo Corporation, et al.*, Complaint, No. 1:22-cv-01377 (D. Del.)
1006	PCT Appl. Pub. No. WO 2017/165532 ("Paulke")
1007	U.S. Pat. Appl. Pub. No. 2019/0196411 ("Yuen")
1008	U.S. Pat. No. D827,831 ("Fong")
1009	U.S. Pat. Appl. Pub. No. 2017/0086743 ("Bushnell")
1010	U.S. Pat. Appl. Pub. No. 2019/0324593 ("Chung")
1011	U.S. Pat. No. 6,801,799 ("Mendelson")
1012	Korean Pat. Appl. No. 10-2018-0038206
1013	Certified English Translation of Korean Pat. Appl. No. 10-2018-0038206 ("Chung-KR-Application")
1014	Declaration of R. James Duckworth, Ph.D.
1015	*Curriculum Vitae* of R. James Duckworth, Ph.D.
1016	Scott Jung, "Medgadget Joins the Verily Baseline ProjectStudy, Part 2: The Tech," archived on October 27, 2017 by the Internet Organization's "Wayback Machine" at https://web.archive.org/web/20171027221742/https://www.medgadget.com/2017/10/medgadget-joins-verily-baseline-project-study-part-2-tech.html

Exhibit No.	Description
1017	*Masimo Corp. et al. v. Apple Inc.*, Apple's September 14, 2022 Public Second Corrected Post-Hearing Brief, ITC Inv. No 337-TA-1276
1018	"Apple Watch Series 4: Beautifully redesigned with breakthrough communication, fitness and health capabilities," archived on September 12, 2018 by the Internet Organization's "Wayback Machine" at https://web.archive.org/web/20180912191250/https://www.apple.com/newsroom/2018/09/redesigned-apple-watch-series-4-revolutionizes-communication-fitness-and-health/
1019	"Your heart rate. What it means, and where on Apple Watch you'll find it," archived on January 23, 2019 by the Internet Organization's "Wayback Machine" at https://web.archive.org/web/20190123031906/https://support.apple.com/en-us/HT204666
1020	"Apple Watch Series 4 – Health," archived on September 20, 2018 by the Internet Organization's "Wayback Machine" at https://web.archive.org/web/20180920103403/https:/www.apple.com/apple-watch-series-4/health/
1021	*Masimo Corp. et al. v. Apple Inc.*, June 6-10, 2022 Public Hearing Transcript, ITC Inv. No 337-TA-1276
1022	"Charge Apple Watch," https://support.apple.com/guide/watch/charge-apple-watch-apd2b717523a/watchos (last visited Mar. 6, 2023)
1023	"Apple Watch Magnetic Charging Cable (1 m)," https://www.apple.com/shop/product/MX2E2AM/A/apple-watch-magnetic-charging-cable-1m (last visited Mar. 6, 2023)
1024	U.S. Pat. No. 10,610,157 ("'157 patent")
1025	U.S. Pat. No. 10,627,783 ("'783 patent")
1026	*Masimo v. Apple*, Excerpts of Redacted Sept. 23, 2022 Opening Expert Report of Steve Warren, Ph.D., No. 8:20-cv-48 (CD Cal.)

Exhibit No.	Description
1027	"Apple Watch Series 4 Teardown," https://www.ifixit.com/Teardown/Apple+Watch+Series+4+Teardown/113044 (last visited Mar. 6, 2023)
1028	U.S. Pat. Appl. Pub. No. 2017/0325744
1029	K192415 510(k) Summary for Verily Study Watch, https://www.accessdata.fda.gov/cdrh_docs/pdf19/K192415.pdf (last visited Mar. 6, 2023)
1030	U.S. Pat. No. 10,912,501
1031	Y. Mendelson et al., "Measurement Site and Photodetector Size Considerations in Optimizing Power Consumption of a Wearable Reflectance Pulse Oximeter," Proceedings of the 25th IEEE Conference (2003)
1032	U.S. Pat. No. D753,510
1033	U.S. Pat. No. D782,537
1034	U.S. Pat. No. D735,131
1035	Chinese Design Reg. No. 303285726
1036	Konig et al., *Reflectance Pulse Oximetry – Principles and Obstetric Application in the Zurich System*, 1998
1037	Yitzhak Mendelson, *Invasive and Noninvasive Blood Gas Monitoring*, 1991
1038	*Masimo Corp. et al. v. Apple Inc.*, Public Excerpts of Apple's June 6, 2022 Opening Presentation, ITC Inv. No 337-TA-1276
1039	U.S. Pat. No. D816,524
1040	*Masimo Corp. et al. v. Apple Inc.*, Public Excerpts of Final Initial Determination on Violation of Section 337, ITC Inv. No 337-TA-1276

Exhibit No.	Description
1041	U.S. Pat. No. 10,912,502
1042	U.S. Pat. No. 10,945,648
1043	N. Meziane et al., Dry Electrodes for Cardiography, Physiological Measurement 34 (2013)
1044	U.S. Pat. No. 6,265,789
1045	*Apple Inc. v. Masimo Corporation, et al.*, Masimo's Public Opposition to Apple's Motion for an Expedited Trial, No. 1:22-cv-01377 (D. Del.)
1046	*Apple Inc. v. Masimo Corporation, et al.*, Public Excerpt of January 30, 2023 Declaration of James Malackowksi in Support of Apple Inc.'s Motion for an Expedited Trial, No. 1:22-cv-01377 (D. Del.)
1047	U.S. Pat. No. 6,091,530 ("Duckworth")
1048	U.S. Pat. No. 6,075,755 ("Zarchan")
1049	Y. Mendelson, "A Wearable Reflectance Pulse Oximeter for Remote Physiological Monitoring," Proceedings of the 28th IEEE Conference (2006)
1050	Y. Mendelson, "Wearable Wireless Pulse Oximetry for Physiological Monitoring," PPL Workshop (2008)

Masimo Corporation ("Masimo" or "Petitioner") requests *inter partes* review ("IPR") under 35 U.S.C. §§311-319 and 37 C.F.R. §42 of the claim ("the Challenged Claim") of U.S. Patent D883,279 ("the D'279 Patent").

Apple's D'279 Patent claims the design of the convex protruding sensor (red, below) on the back of Apple Watch Series 4, which includes the Watch's arc-shaped electrodes (gray), circular array of photodiodes (blue), and Fresnel lens (orange). These functional elements are used to take ECG and heart rate measurements. Much, if not all, of the claimed design is dictated by functional requirements.

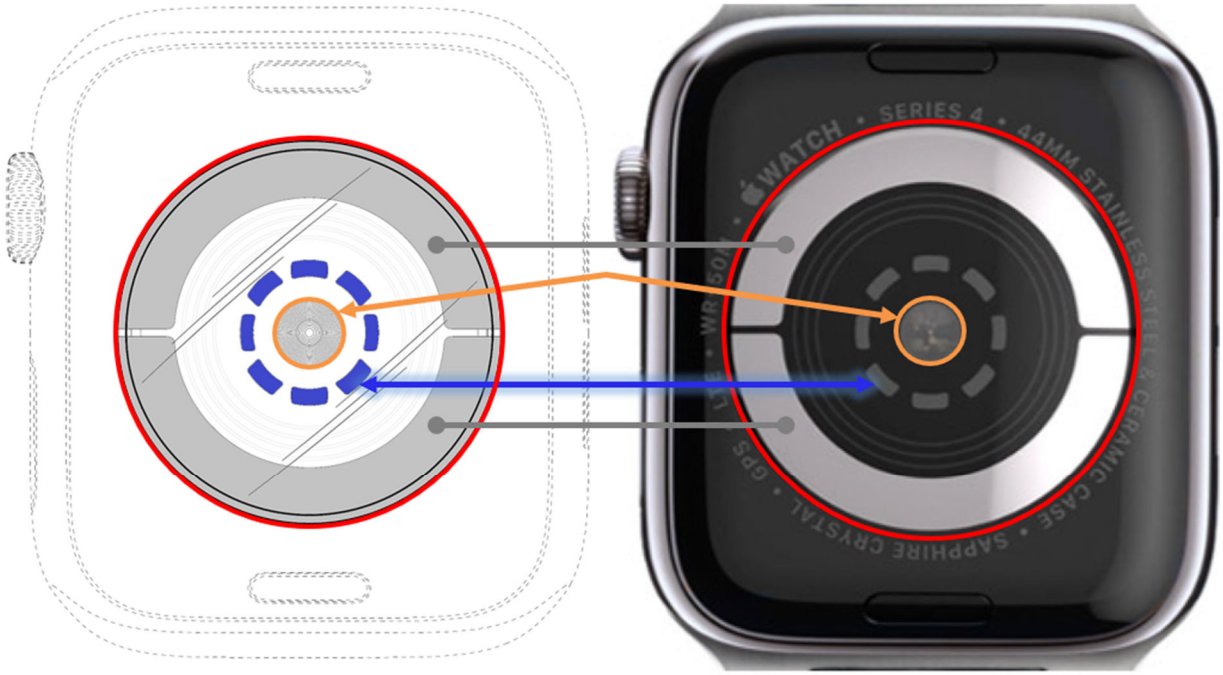
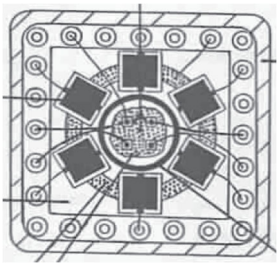
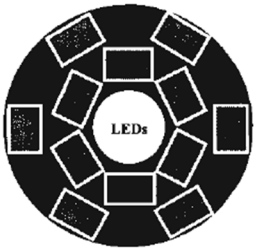
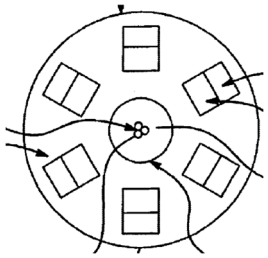
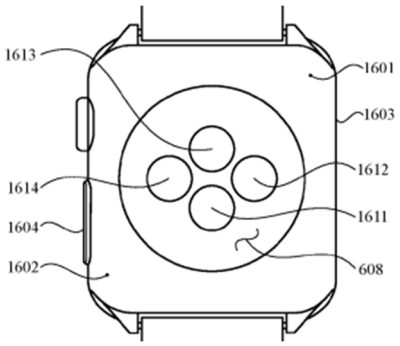
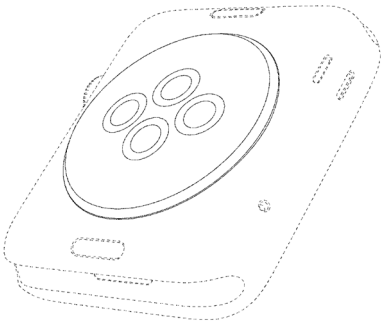
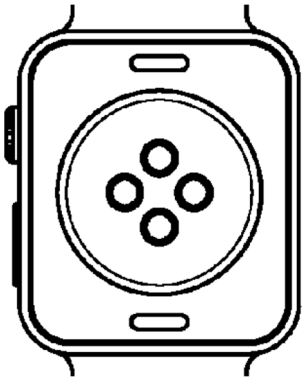
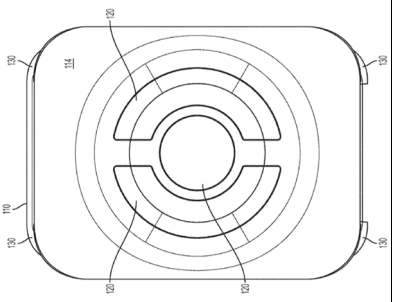
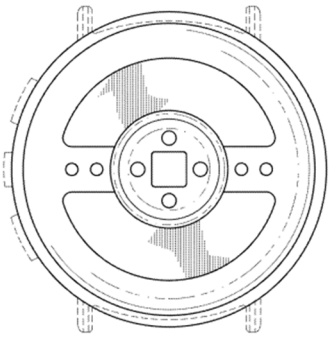
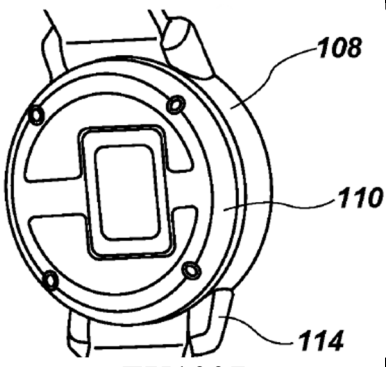
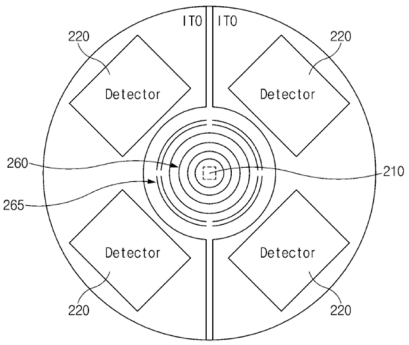


FIG. 4

The claimed design also merely recycles design aspects that were commonly used in pre-existing sensors and wearable devices with the same or similar health-monitoring features, as shown in the chart below.

1991  EX1037	**2003**  EX1031	**2005**  EX1011
2014  EX1025	**2015**  EX1033	**2015**  EX1035
2015  EX1009	**2016**  EX1006	**2017**  EX1008
2017  EX1039	**2017**  EX1007	**2018**  EX1010

And as explained in this Petition, a designer of ordinary skill would have combined the prior art to arrive at the following designs.

Ground 1
Paulke-Mendelson-Bushnell-Chung



Ground 2
Yuen-Mendelson-Bushnell-Chung



Ground 3
Fong-Mendelson-Bushnell-Chung



Accordingly, the Challenged Claim would have been obvious based on the grounds presented in this Petition. Masimo thus respectfully submits that IPR should be instituted and the Challenged Claim canceled as invalid.

I. MANDATORY NOTICES

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

Petitioner, Masimo Corporation, is the real party-in-interest.

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

The parties are currently engaged in district court litigation, captioned *Apple Inc. v. Masimo Corporation, et al.*, No. 1:22-cv-01377 (D. Del.), where Apple Inc. ("Apple" or "Patent Owner") has asserted the D'279 Patent against Masimo. EX1005. Masimo is not aware of any disclaimers, reexamination certificates, or other IPR petitions for the D'279 Patent.

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

Masimo provides the following designation of counsel, all of whom are included in Customer No. 64,735 identified in Masimo's Power of Attorney.

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

Please direct all correspondence to lead counsel and back-up counsel at the addresses shown above. Masimo also consents to electronic service by email to MasimoIPR279@knobbe.com.

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

Masimo certifies that the D'279 Patent is available for IPR. This Petition is being filed within one year of service of a complaint against Masimo in *Apple Inc. v. Masimo. Corp., et al.*, No. 1:22-cv-01377 (D. Del.). Masimo is not barred or estopped from requesting this review on the grounds identified in this Petition.

F. Payment of Fees (37 C.F.R. §42.15(a))

The Office may charge the §42.15(a) fee to Deposit Account No. 11-1410. Review of the D'279 Patent's sole claim is requested. Payment for any additional fees due may be charged to the above-referenced Deposit Account.

II. SUMMARY OF GROUNDS

As explained in this Petition, the Challenged Claim is invalid under 35 U.S.C. § 103 as obvious over the following grounds.[1]

[1] Masimo is not conceding the Challenged Claim satisfies 35 U.S.C. § 112 or other statutory requirements. Masimo is pursuing prior-art-based grounds only and does not waive any arguments concerning other grounds.

Ground	References
1	Paulke, Mendelson, Bushnell, Chung
2	Yuen, Mendelson, Bushnell, Chung
3	Fong, Mendelson, Bushnell, Chung

Accompanying explanations and support are provided in the Declarations of Joel Delman (EX1003) and R. James Duckworth, Ph.D. (EX1014).

A. Status of References as Prior Art

The D'279 Patent claims priority to June 27, 2018. EX1001, 2. Masimo takes no position regarding whether the D'279 Patent is entitled to that filing date, but has applied references that pre-date June 27, 2018 and qualify as prior art, as shown below. EX1003 ¶¶55-60.

Exhibit	Reference	Prior Art Date	Prior Art Under 35 U.S.C. §
1006	WO2017/165532 ("Paulke")	09/28/2017 (published)	102(a)(1)
1007	US2019/0196411 ("Yuen")	12/27/2017 (filed)	102(a)(2)
1008	USD827,831 ("Fong")	04/04/2017 (filed)	102(a)(2)
1009	US2017/0086743 ("Bushnell")	03/30/2017 (published)	102(a)(1)
1010	US2019/0324593 ("Chung")	04/02/2018 (effectively filed)	102(a)(2)
1011	US6,801,799 ("Mendelson")	10/05/2004 (patented)	102(a)(1)

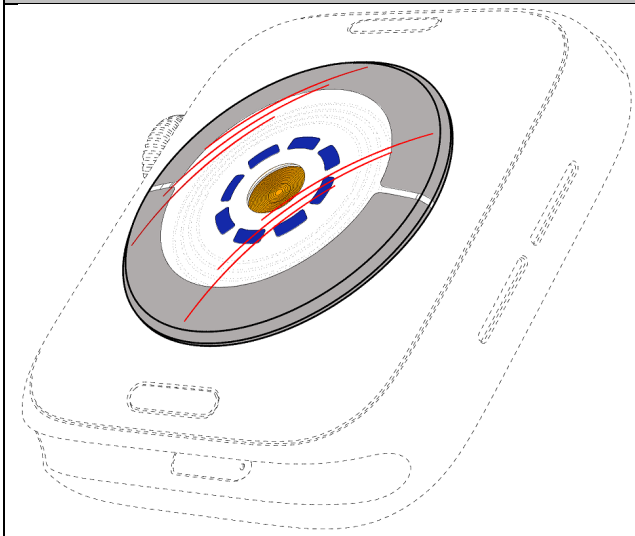
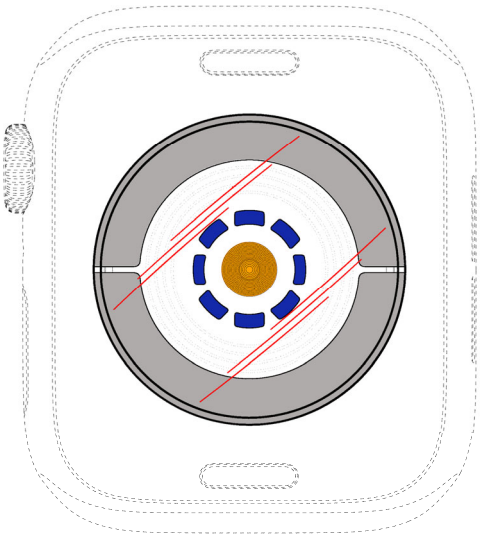
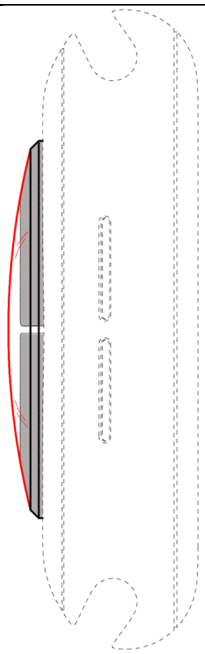
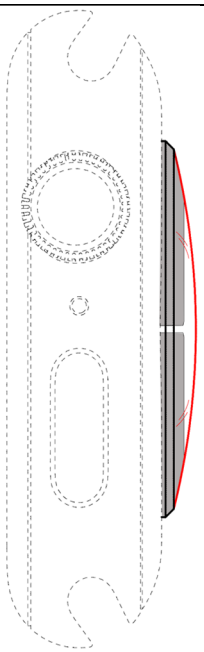
None of the applied references are of record to the D'279 Patent.

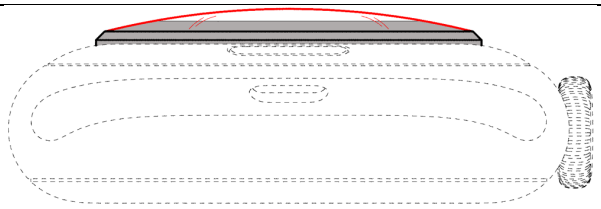
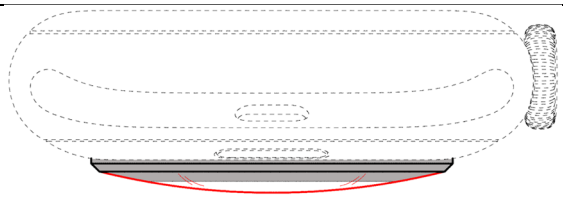
These references constitute analogous art because they are from the same field as the D'279 Patent, *e.g.*, wearable electronic devices, and concern the design of common wearable device sensor components, including electrodes and optical sensors. *Infra* §VI.A; *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1000 (Fed. Cir. 2016). Thus, a skilled artisan presumably would have been aware of these references. *In re Nilssen*, 851 F.2d 1401, 1403 (Fed. Cir. 1988).

III. THE D'279 PATENT

A. Overview

The D'279 Patent, titled "Electronic Device," claims "[t]he ornamental design for an electronic device, as shown and described" in FIGS. 1-9. EX1001. The D'279 Patent claims the design of a circular protrusion on the back of the device. As shown below, the protrusion includes two arc-shaped portions (gray) surrounding a circular array of rectangles (blue), with the rectangles surrounding concentric circles (orange). The protrusion's outermost surface (red) is convex.

D'279 Patent	
 FIG. 2 "FIG. 2 is a bottom rear perspective view [of an electronic device showing the claimed design]."	 FIG. 4 "FIG. 4 is a rear view thereof."
 FIG. 5 "FIG. 5 is a left side view thereof."	 FIG. 6 "FIG. 6 is a right side view thereof."

 FIG. 7	 FIG. 8
"FIG. 7 is a top view thereof."	"FIG. 8 is a bottom view thereof."

Id.[2] As explained below, the D'279 Patent claims aspects of the underlying article—Apple Watch Series 4.

B. Prosecution History

The D'279 Patent issued from U.S. Application No. 29/684,822 (the "'822 Application"), which was filed on March 25, 2019 with Figures 1-135. EX1001, Cover; EX1002, 3-113. On April 12, 2019, Apple "replac[ed] Figures 1–135 with replacement Figures 1–9." EX1002, 161-163. On January 8, 2020, the '822 Application was allowed without rejection (EX1002, 187-193), and issued as the D'279 Patent on May 5, 2020. EX1001, Cover.

IV. CLAIM CONSTRUCTION

A. Legal Standard for Design Patent Claim Construction

In an IPR, claims are construed according to the *Phillips* standard. 37 C.F.R. § 42.100; *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005). Masimo thus employs that standard herein.

[2] FIGS. 1, 3, and 9 are not included above because nothing on the device's front is claimed. EX1001, FIGS. 1, 3, 9, Description; EX1003 ¶24.

The scope of a design patent is defined by the solid lines depicted in its figures in conjunction with their descriptions. *Egyptian Goddess, Inc. v. Swisa, Inc.*, 543 F.3d 665, 680 (Fed. Cir. 2008). Verbally describing a claimed design is often "helpful to point out … various features of the claimed design as they relate to … the prior art." *Id.* at 680; *see High Point Design LLC v. Buyers Direct, Inc.*, 730 F.3d 1301, 1314–15 (Fed. Cir. 2013) (remanding, in part, for "verbal description of the claimed design to evoke a visual image consonant with that design").

A design patent may only protect the "ornamental design" of an article. 35 U.S.C. § 171. Thus, when a design patent contains functional and ornamental elements, the claimed design's "scope is limited to [the ornamental] aspects alone and ***does not extend to any functional elements of the claimed article***."[3] *Richardson v. Stanley Works, Inc.*, 597 F.3d 1288, 1293-94 (Fed. Cir. 2010) (factoring out functional elements of design patent from obviousness analysis). And "[w]here a design contains both functional and non-functional elements, the scope of the claim ***must be construed*** in order to identify the non-functional aspects of the design as shown in the patent," if any. *OddzOn Prods., Inc. v. Just Toys, Inc.*, 122 F.3d 1396, 1405 (Fed. Cir. 1997).

[3] All emphasis, annotations, and coloring added unless indicated otherwise.

There are several factors for assessing the functionality of a claimed design. Whether suitable alternative designs are available is "an important—if not dispositive—factor in evaluating the legal functionality of a claimed design." *Ethicon Endo-Surgery, Inc. v. Covidien, Inc.*, 796 F.3d 1312, 1329-30 (Fed. Cir. 2015). Additional factors "serv[ing] as a useful guide for claim construction functionality" include: whether the claimed design represents the best design; whether alternative designs would adversely affect the article's utility; whether there are any concomitant utility patents; whether advertising touts particular design features as having specific utility; and whether there are any design elements or an overall appearance clearly not dictated by function. *Sport Dimension, Inc. v. Coleman Co., Inc.*, 820 F.3d 1316, 1322 (Fed. Cir. 2016).

B. Claim Construction of the D'279 Patent

The D'279 Patent claims the design of a protrusion from the back of an electronic device. The claimed protrusion includes arc-shaped portions (gray) surrounding a circular arrangement of rectangles (blue) that is positioned around concentric circles (orange), as shown below.

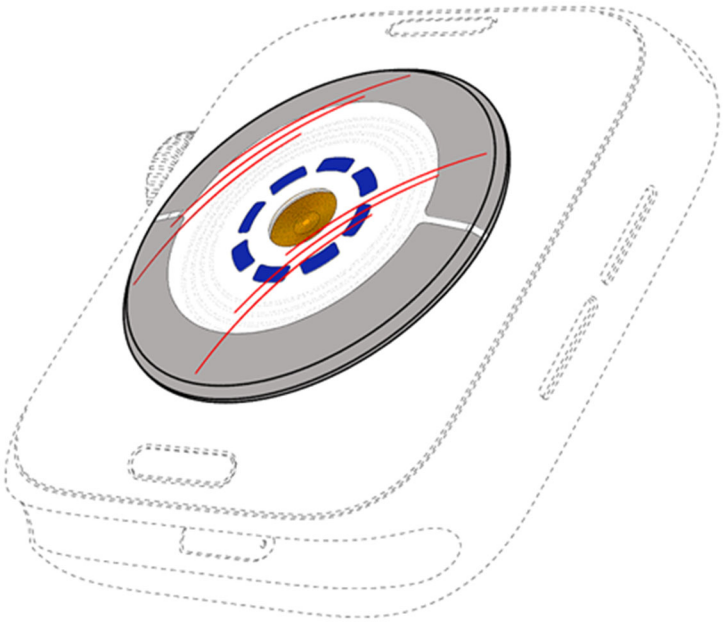


FIG. 2

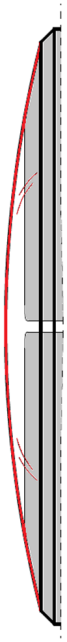


FIG. 5

EX1001, FIGS. 2, 5; *supra* §III.A. The claimed protrusion's outermost surface is a convex surface (red). EX1001, FIGS. 2, 4-8; EX1003 ¶39. The convex surface (red) forms a dome covering the claimed rectangles (blue) and concentric circles (orange). *Id.* The claimed convex surface is transparent such that the arc-shaped portions, rectangles, and concentric circles are underneath and visible through the convex surface. *Id.*; M.P.E.P. § 1503.02(II) ("Oblique line shading must be used to show transparent … surfaces….").

The claimed protrusion also includes a vertical edge (pink) and chamfered edge (green) between the convex surface and the back of the device. EX1001, FIG. 2; EX1003 ¶40.

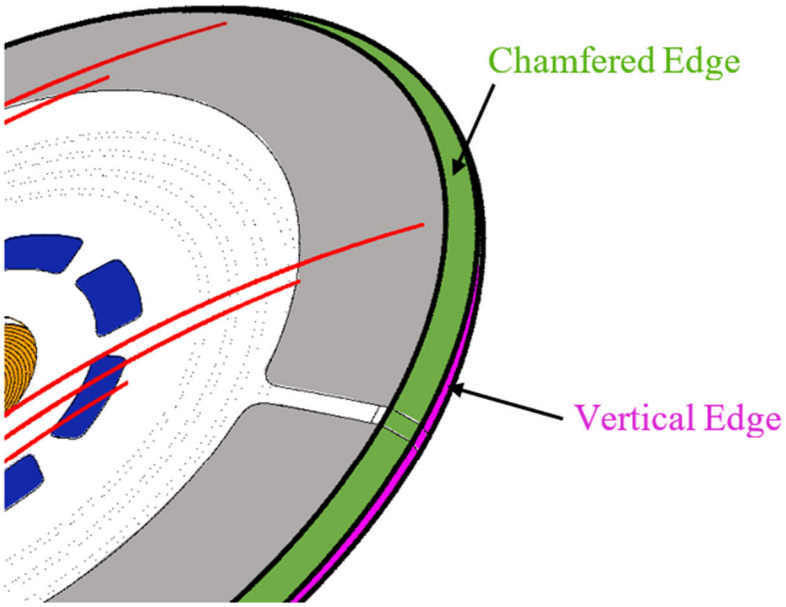
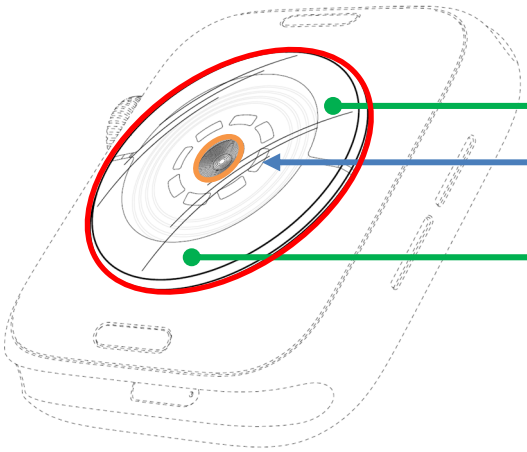
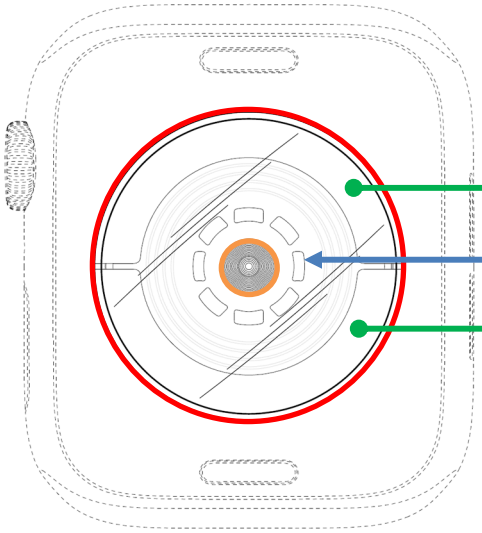
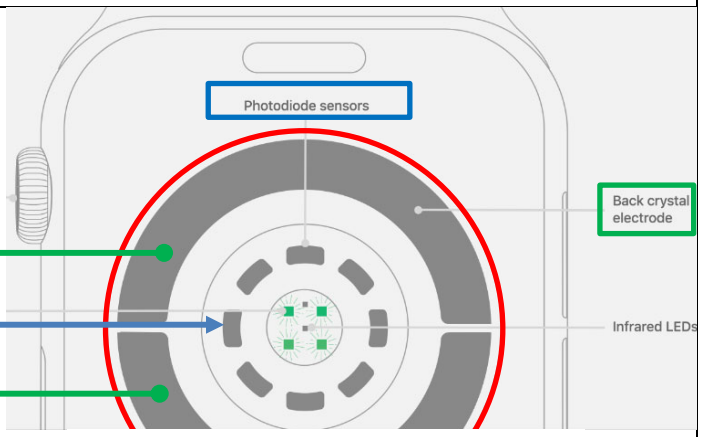
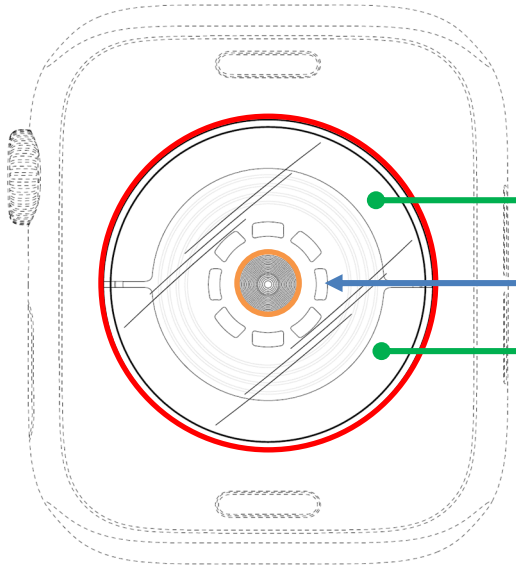


FIG. 2

The article underlying the D'279 Patent is Apple Watch Series 4—the smartwatch Apple released less than three months after the D'279 Patent's purported filing date. EX1018; EX1003 ¶41. The D'279 Patent claims the convex protrusion (red) on the back of Apple Watch Series 4, including the Watch's arc-shaped electrodes (green), photodiodes (blue), and Fresnel lens (orange).

Claimed Design (EX1001)	Apple Watch Series 4
 FIG. 2	 EX1020, 5
 FIG. 4	 EX1019, 3 (depicting LEDs under the Fresnel lens (not shown))

Claimed Design (EX1001)	Apple Watch Series 4
	
FIG. 4	EX1005, 2

EX1003 ¶41; EX1014 ¶44. As shown above, the claimed arc-shaped portions depict the "built-in electrodes" on the back of the Series 4 Watch, and the claimed rectangles and concentric circles depict the photodiodes and Fresnel lens, respectively, of the "optical heart sensor" inside the Watch. EX1019, 2-3; EX1020, 5; EX1003 ¶41.

The arc-shaped electrodes are functional elements of the Watch's ECG sensor, and the photodiodes and Fresnel lens are functional elements of the Watch's optical sensor. EX1014 ¶45. The electrodes' function is measuring electrical impulses through the skin. EX1019, 3. The Watch's optical sensor "uses what is known as photoplethysmography" ("PPG") to measure heart rate. *Id.*, 2-3; EX1014 ¶45. The optical sensor's LEDs emit light, which the Fresnel lens directs into the user's wrist.

Id. Some of that light is reflected back to the Watch, which receives it with eight "light-sensitive photodiodes." *Id.* The received light is used "to detect the amount of blood flowing through your wrist" and thereby determine the user's heart rate. EX1019, 2-3; EX1014 ¶45. Thus, the functions of the Fresnel lens and the photodiodes are directing light and receiving light, respectively. *Id.* Moreover, the convex protrusion, which houses the above-identified features, functions to improve the performance of the Watch's optical sensor and ensure a proper connection with the Watch's charger. *Infra* §IV.B.1.a.

Like the convex protrusion, electrodes, Fresnel lens, and photodiodes of Apple Watch Series 4, the corresponding design aspects claimed by the D'279 Patent are functional elements, as explained below.

1. The Functional Elements of the Claimed Sensor Design Should Be Factored Out of the Challenged Claim's Scope

The claimed Apple Watch sensor design includes numerous design elements that are functional and should thus be "factored out" of the Challenged Claim's scope. *Richardson*, 597 F.3d at 1293-94, *see, e.g.*, *Campbell Soup Co. v. Gamon Plus, Inc.*, IPR2017-00096, Paper 28, at 7 (PTAB Mar. 30, 2017), 7 (applying *Richardson* to construe design), 14 (considering "placement and positioning" of functional elements in invalidity analysis "not required under our claim construction").

a. The Convex Protrusion Is Functional

The design of the claimed convex protrusion, which includes the convex surface, chamfered edge, and vertical edge, is dictated by the functionality of the underlying article—Apple Watch Series 4.

Convex Surface: As Apple explained in the parties' ITC investigation, the convex surface (i.e., "dome" or "curved" shape) on the back of every Apple Watch "has been constant" since the 2015 release of the original Apple Watch ("Series 0"). EX1021, 47:12-16, 46:22-23. Apple admitted the "very practical reason[s] for that dome shape." *Id.*, 47:23-24. Specifically, Apple admitted using the convex surface because it "***fits snugly in the [wireless charging] cradle* and *is designed to align the watch with the charging hardware components*** so that the charging can occur in an efficient way." *Id.*, 47:20-23. Apple's admission was confirmed by the "distinguished engineer" leading the development of Apple Watch's health sensors, Brian Land. *Id.*, 954:15-955:9. Land testified that Apple Watch's convex surface was designed to (1) mate with the charging "***dock that has a complementary shape***" and (2) align the Watch and charger for "efficient wireless charging." *Id.*, 959:14-960:2. Indeed, every Apple Watch has the same convex surface so that it mates snugly with the complementary concave surface of the Apple Watch charger, as shown below.



EX1005, 7; EX1023, 2 (all Apple Watches use charger design above); EX1014 ¶46.

Accordingly, the claimed convex surface was designed for the underlying Watch to perform its intended functions of (1) mating snugly with the corresponding surface of its charger and (2) aligning with the charger for efficient wireless charging. EX1014 ¶46. An alternative surface is unavailable because a different surface shape would not mate snugly or properly align with the established concave surface of the Watch's charger for efficient wireless charging. *Id.* Rather, using a different surface shape for the protrusion on the back of the Watch would render it incompatible with its charger's concave surface. *Id.* Thus, the claimed convex surface is dictated by function because the Watch's protrusion must be convex as claimed to perform the intended charger mating and alignment functions for efficient charging. *Id.*; *see, e.g.*, *Best Lock Corp. v. Ilco Unican Corp.*, 94 F.3d 1563, 1566 (Fed. Cir. 1996) (finding key blade shape dictated by function because "key blade

must be designed as shown in order to perform its intended function" of mating with corresponding lock).

Additional factors confirm that the claimed convex surface is functional.

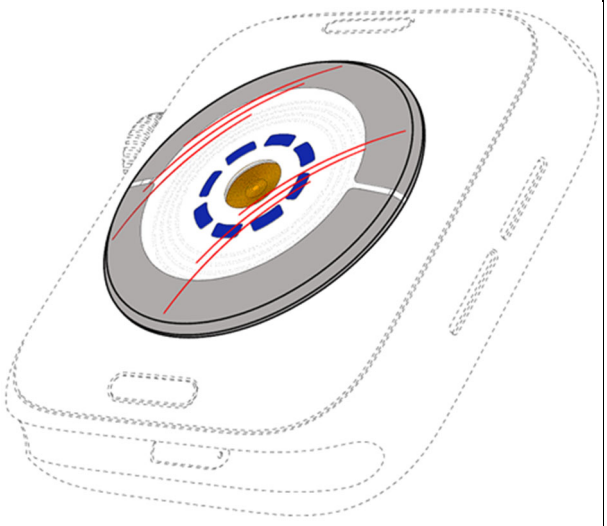
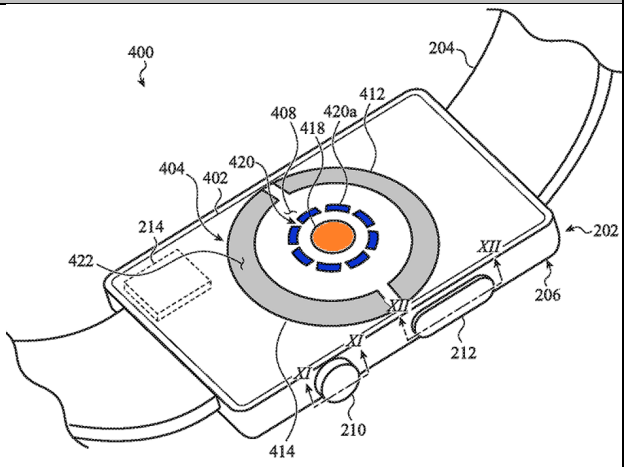
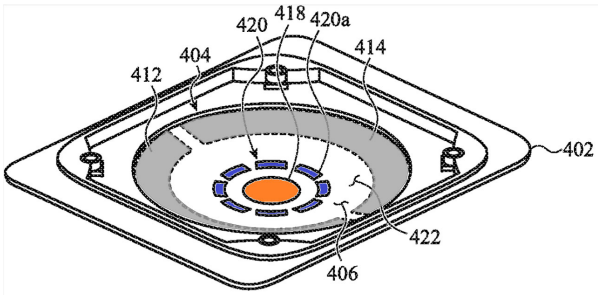
First, the claimed convex surface represents the best design because it allows the underlying Watch to mate snugly and properly align with its charger's complementary concave shape, as explained above. EX1014 ¶47. Using a different surface would be a worse design because it would be incompatible with the established, concave surface of the claimed article's charger, as explained above. *Id.*

Second, using a different surface shape would adversely affect the claimed article's utility. Specifically, changing the curvature applied to the outermost surface of the Watch's protrusion would impede the Watch's ability to properly mate and align with its charger, thereby impeding its ability to recharge. *Id.* ¶48; EX1021, 959:14-960:2; EX1025, 45:18-28, 42:63-43:4. Because the Watch charges by mating and aligning with its charger's complementary concave surface, the claimed convex surface enabling that Watch-charger connection is "essential to the use of the article" and thus, primarily functional. EX1014 ¶48; *L.A. Gear, Inc. v. Thom McAn Shoe Co.*, 988 F.3d 1117, 1123 (Fed. Cir. 1993).

Third, Apple's marketing touts the claimed convex surface as being useful to align the Watch with its charger. For example, Apple's website indicates the convex surface on the back of every Apple Watch was designed to mate with "[t]he concave

end of the charging cable" and ensure the Watch and charger are properly aligned. EX1022, 1; EX1014 ¶49.

Fourth, concomitant utility patents ***from Apple*** describe the convex surface claimed in the D'279 Patent. Apple filed U.S. Pat. No. 10,610,157 (the "'157 patent") in August 2018, just after the D'279 Patent's purported June 2018 filing date but before the September 2018 launch of Apple Watch Series 4. EX1024, Cover. And both the D'279 Patent and '157 patent disclose the design of the same underlying article—Apple Watch Series 4. EX1001, FIGS. 2, 4-8; EX1024, FIGS. 4-5; EX1014 ¶50. As shown below, the D'279 Patent's claimed design is depicted in the '157 patent. *Id.*

D'279 Patent	'157 patent (EX1024)
 FIG. 4	 FIG. 4A  FIG. 4C

The '157 patent explains the FIGS. 4A-4C device has a convex or "dome-shaped" carrier 404 with a "surface 408 [that] protrudes or extends away from a back member 402 of the watch." EX1024, 12:67-13:3, FIGS. 4A-4C. The '157 patent even claims the convex "protruding" surface, thus confirming the D'279 Patent's claimed convex surface is functional. *Id.*, claim 15; EX1014 ¶50.

Another Apple patent (U.S. Pat. No. 10,627,783 (the "'783 patent")) demonstrates that the convex surface claimed in the D'279 Patent is to achieve the above-discussed charger mating and alignment functions. EX1014 ¶51. The '783

patent explains "power transfer efficiency … may decrease as misalignment increases" between the watch and its charging dock. EX1025, 42:63-43:4. The '783 patent thus describes using "alignment assistance features to effect alignment of the [watch] 100 with the dock 1802 along a mutual axis." *Id.*, 43:10-13; *id.*, 43:13-15. For example, the '783 patent explains (and shows in FIGS. 18-19, below) that "the bottom surface of the [watch] 100 is convex and the top surface of the [charging] dock 1802 is concave, following the same curvature as the bottom surface of the [watch] 100…. [to] facilitate alignment of the [watch] and dock for efficient wireless power transfer." *Id.*, 45:20-28; *id.*, 43:19-32.

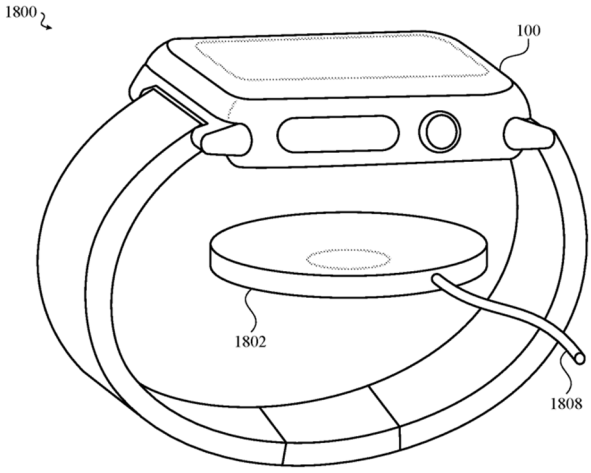


FIG. 18

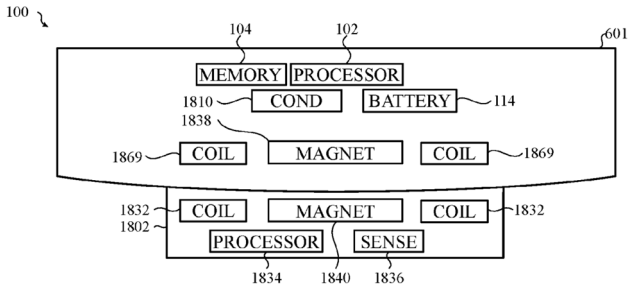


FIG. 19

Accordingly, the '783 patent demonstrates that function—not ornamentation—dictates the design of the claimed convex surface. EX1014 ¶51.

The claimed convex surface is also disclosed in Paulke, Yuen, and Bushnell—utility patent publications. *Infra* §§VI.B.1.b-VI.C.1.b. Additionally, the Apple Watch was recently found to infringe claims of Masimo patents requiring a

protrusion with a convex surface (EX1040, 41, 44, 53, 55), which the patents explain increases the sensor's signal-to-noise ratio. EX1041, 21:9-43; EX1042, 21:1-35; EX1014 ¶52. Thus, ***at least seven utility patent filings*** confirm the claimed convex surface is functional. EX1014 ¶52.

Fifth, the claimed convex surface protrudes from the back of Apple Watch Series 4—a light-based physiological measurement device. *Supra* §IV.B. And Apple's expert recently opined that using convex protruding features in such devices functions to improve contact between the sensor and skin, reduce errors, make wearing the device more comfortable, improve measurement quality, and more. EX1026 ¶111; *id.* ¶¶112-113; EX1014 ¶53.

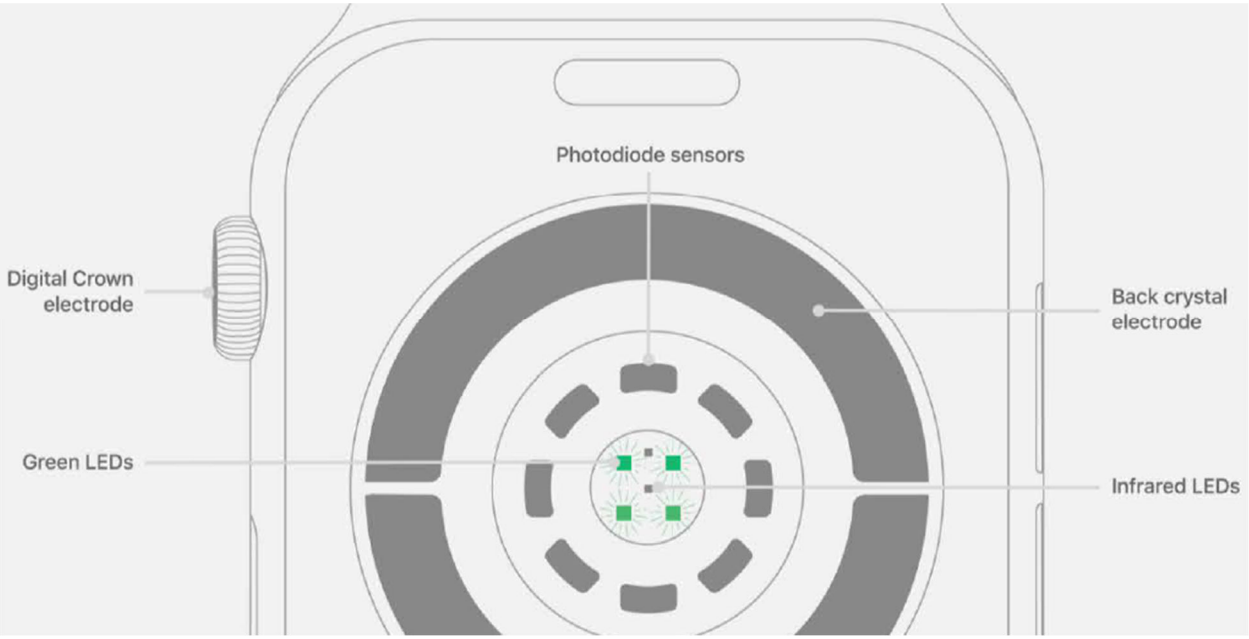
Chamfered Edge: The design of the claimed chamfered edge is dictated by the function of improving user comfort. EX1021, 1236:17-1237:3, 1229:8-10; EX1017, 115, 119-120; EX1014 ¶54.

Vertical Edge: The claimed vertical edge is functional because it increases the protrusion's height to increase the signal-to-noise ratio of the Watch's optical sensor. *See, e.g.*, EX1041, 21:9-43, 25:47-61; EX1014 ¶55.

b. The Arc-Shaped Portions' Arrangement Is Functional

Apple Watch Series 4 includes arc-shaped electrodes that are intended to measure electrical impulses through the skin. *Supra* §IV.B. Those electrodes are

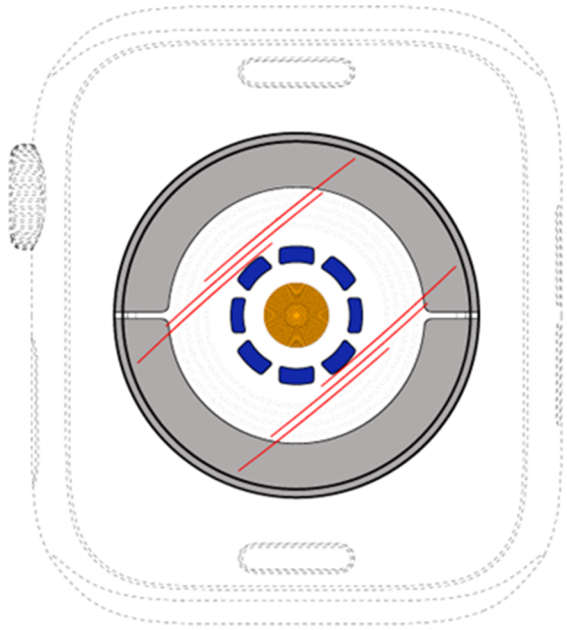
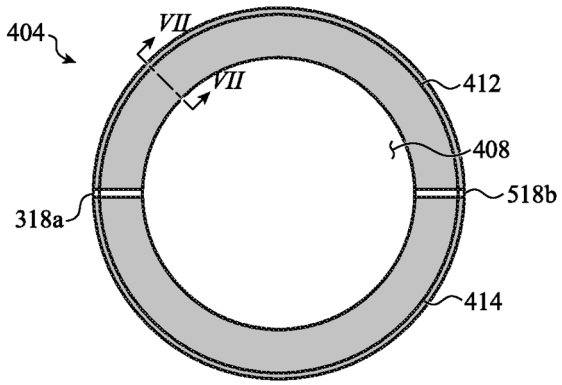
arranged around a circular array of rectangular photodiodes, *id.*, thus allowing the photodiodes to receive the light used to measure heart rate.



EX1019, 2-3; EX1014 ¶57. The same design is claimed by the D'279 Patent. EX1001, FIG. 4.

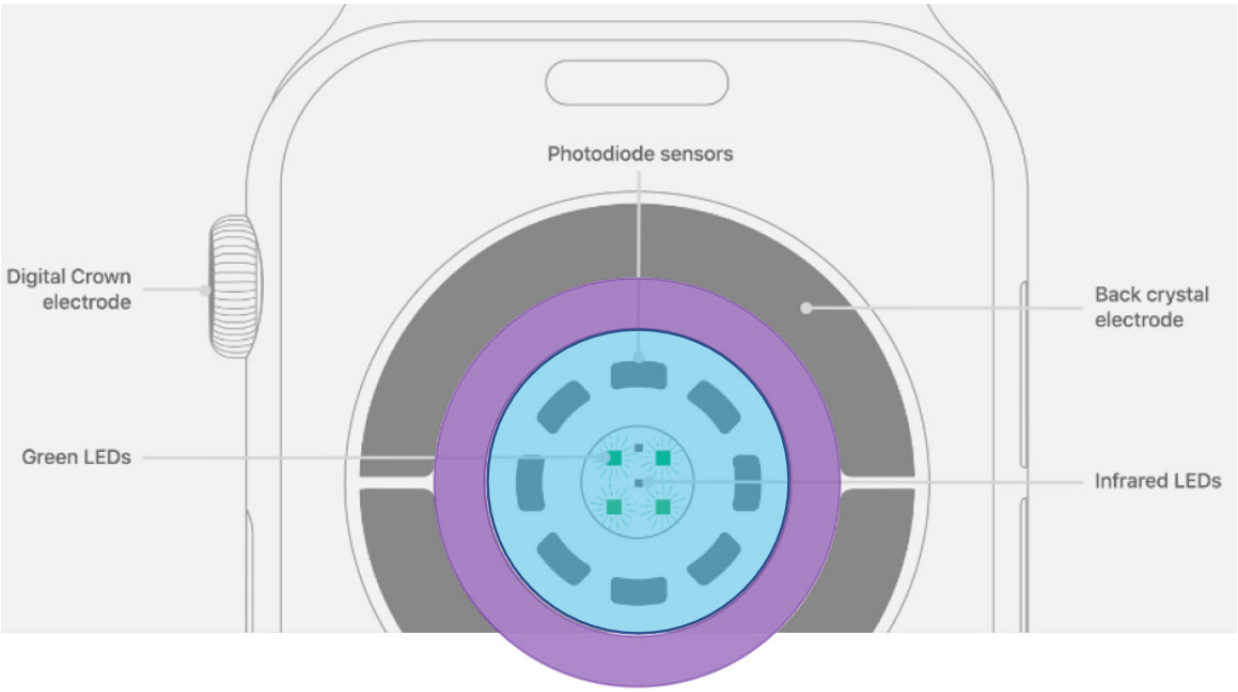
To achieve these functions, Apple's concomitant utility patent explains that the device's electrodes should be arranged as claimed in the D'279 Patent. Specifically, the '157 patent explains the electrodes are "arc-shaped and positioned" and "sized" to achieve two functions: (1) "provid[ing] good electrical contact between the electrodes 412, 414 and skin" and (2) "allow[ing] optical communication" between the optical sensor and skin. EX1024, 17:20-34; *id.*, 13:54-59; EX1014 ¶58. To achieve these functions, the '157 patent discloses an

arrangement of electrodes (gray, right) that is essentially identical to the claimed design (gray, left), as shown below.

D'279 Patent, FIG. 4	EX1024 ('157 patent)
	 ***FIG. 5D***

EX1014 ¶58. The '157 patent even claims the D'279 Patent's arrangement of arc-shaped portions. *Id.*; EX1024, claims 3, 9 . The '157 patent teaches that the minimal spacing ("gaps") between the claimed arc-shaped electrodes maximizes the area of "electrical contact between the electrodes 412, 414 and skin" to "improve electrical sensor efficiency." EX1024, 17:20-35, FIGS. 4A, 5C-5D; EX1014 ¶58. Accordingly, the '157 patent confirms the claimed arrangement of arc-shaped portions is dictated by the intended functions of the underlying Apple Watch's electrodes. *Id.*

Additionally, the claimed arc-shaped portions' design is dictated by the need to ensure that the electrodes do not interfere with other components. As shown below, a wireless charging coil (purple) surrounds the optical sensor (blue) of Apple Watch Series 4.



EX1019, 3; EX1027, 11; EX1014 ¶59. The '157 patent explains the arc-shaped electrodes are designed to avoid interfering with "electrical structures" (i.e., the charging coil (purple)) and "optical communication" between the optical sensor (blue) and skin. EX1024, 17:20-34; EX1014 ¶59. Thus, avoiding interference with the charging coil and optical sensor in the underlying Watch dictates that the arc-shaped electrodes must be designed as claimed in the D'279 Patent. EX1014 ¶59. Apple's '783 patent also teaches that, for efficient wireless charging, the Watch's charging coil (purple) must align with its charger's corresponding coil (green):

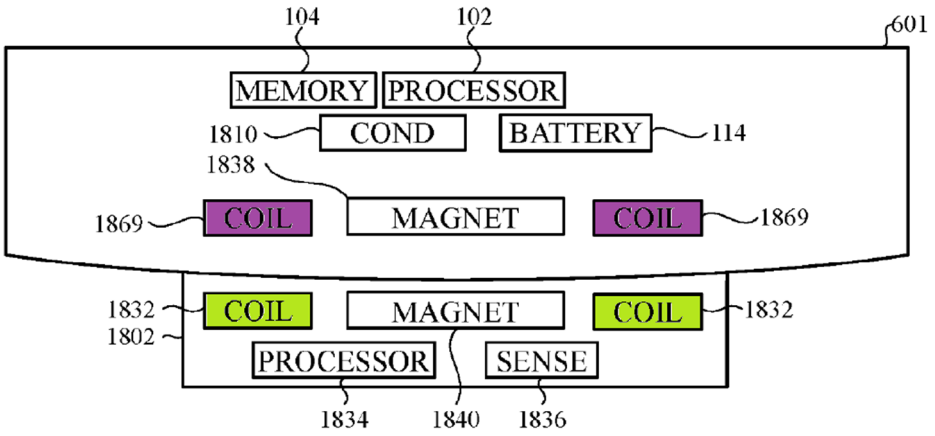
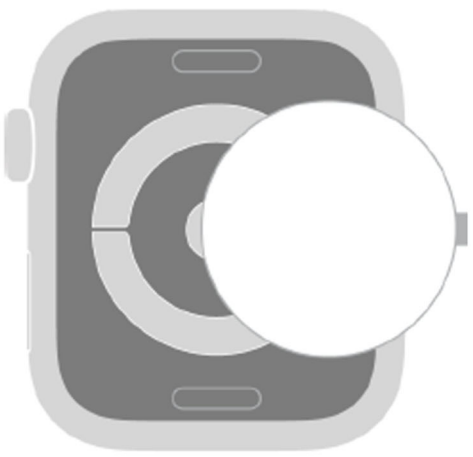


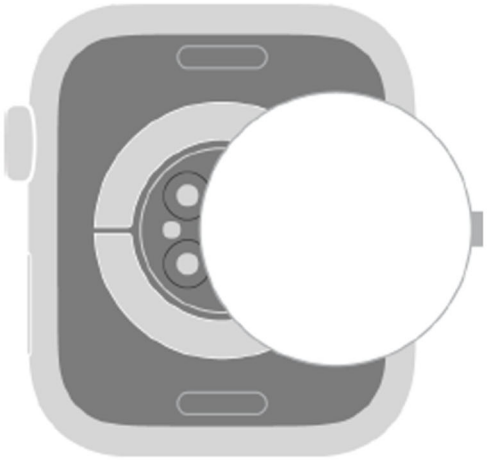
FIG. 19

EX1025, FIG. 19, 42:63-43:48, 45:18-51; EX1014 ¶60; *see, e.g.*, EX1021, 47:17-24, 959:14-960:2. Thus, the location of the coil in Apple Watch's charger dictates the coil's location in the Watch. EX1014 ¶60. Because the electrodes cannot interfere with the Watch's charging coil or optical sensor, as explained above, the claimed arcs are the most efficient design for maximizing the electrodes' contact area with the skin. *Id.*; EX1003 ¶49. And if the electrodes were shaped differently, they would either provide a smaller area of electrical contact with the skin or risk interfering with the Watch's charging coil and/or optical sensor. EX1014 ¶61. Thus, using a different shape for the electrodes would impose a trade-off that the claimed arrangement avoids. *Id.*

Additionally, every Apple Watch with ECG functionality has used the claimed design of arc-shaped electrodes.



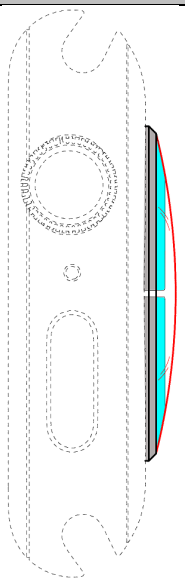
Apple Watch Series 4-5



Apple Watch Series 6-8, Ultra

EX1022. Apple retaining the claimed arc-shaped electrodes for ***five consecutive Watch generations*** indicates that the claimed design represents the most useful arrangement for this functional element. EX1014 ¶62; EX1003 ¶49.

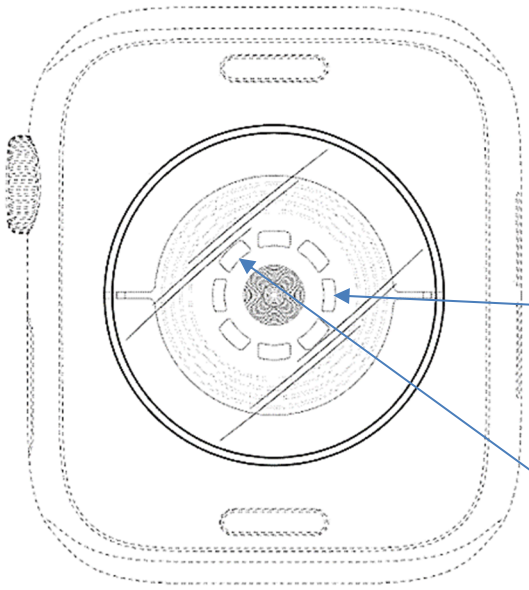
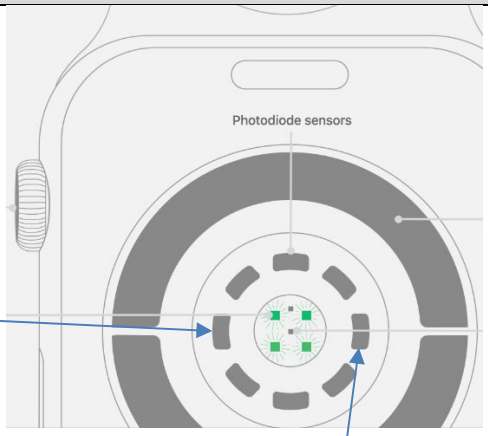
Further, like Apple Watch Series 4, the claimed electrodes' outermost surface (cyan) follows the protrusion's convex surface (red).

D'279 Patent, FIG. 6	Apple Watch Series 4 (EX1027, 11)
 FIG. 6	

This convex surface can roll around the user's wrist when the Watch is worn, such that there may be portions of the convex surface that do not contact skin. EX1014 ¶63. But such a device cannot measure electrical impulses if its electrodes do not contact skin. EX1007 ¶¶34, 36; EX1014 ¶63. Thus, the claimed design ensures that at least a part of each electrode contacts the skin by positioning arc-shaped electrodes around the convex surface's entire outer periphery (other than two small gaps). EX1001, FIGS. 2, 4-6; EX1014 ¶63. An alternative design would necessarily cover less of the convex surface's outer periphery than the claimed design, thereby increasing the possibility that electrical impulses could not be measured because one or both electrodes did not contact skin. *Id.* Accordingly, an alternative to the claimed design would adversely affect the device's electrical signal-measuring utility. EX1014 ¶63.

c. The Rectangles' Arrangement Is Functional

Apple Watch Series 4 requires photodiodes to receive the light needed to measure heart rate. EX1019, 2-3; EX1014 ¶65. As shown below, the claimed rectangles depict the photodiodes included within the Watch for this purpose.

Claimed Rectangles	Apple Watch Series 4's Photodiodes
 EX1001, FIG. 4	 EX1019, 3  EX1005, 2

EX1014 ¶65. Because these rectangular photodiodes are "essential to the use of the article" to measure heart rate, the claimed rectangles are primarily functional. *L.A. Gear*, 988 F.3d at 1123.

Further, the claimed photodiodes are arranged in a radially-symmetric array surrounding the unclaimed LEDs. EX1001, FIG. 4; EX1014 ¶66. The prior art confirms this well-known design has a functional purpose—"maximiz[ing] the detection of backscattered light from the skin." EX1011, 4:59-62; *id.*, 4:14-65;

EX1014 ¶66. Also, the number and size of photodiodes is driven by the functional purpose of increasing the optical sensor's signal-to-noise ratio. EX1011, 4:6-16, FIG. 7, 4:59-61, 9:22-33; EX1014 ¶66. Accordingly, the claimed arrangement of rectangles is driven by function. *Id.*

Apple's concomitant utility patent discloses the same arrangement of rectangles claimed in the D'279 Patent. The '157 patent describes the convex-surfaced "carrier 404" (below), which has "eight radial openings" (420) over the corresponding "light receivers (e.g., photodetectors, such as photodiodes)" of the underlying optical sensor 416. EX1024, FIGS. 4A-4C, 15:5-7, 15:34-40; EX1014 ¶67.

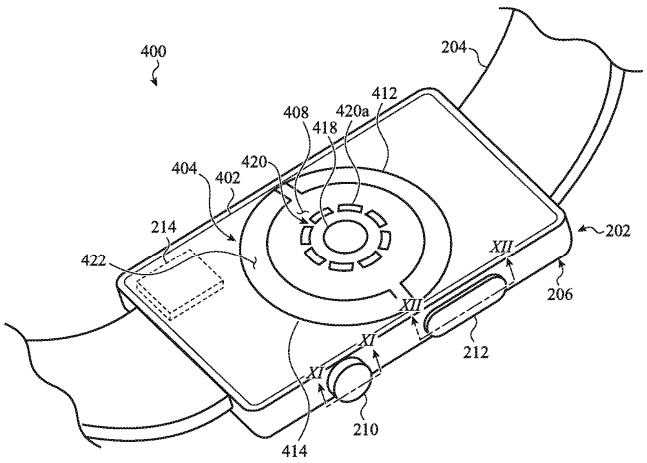


FIG. 4A

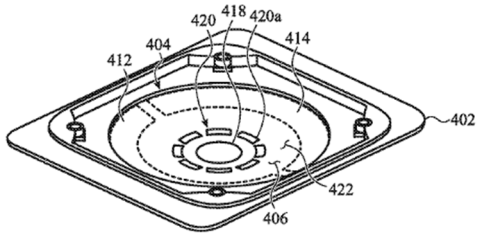


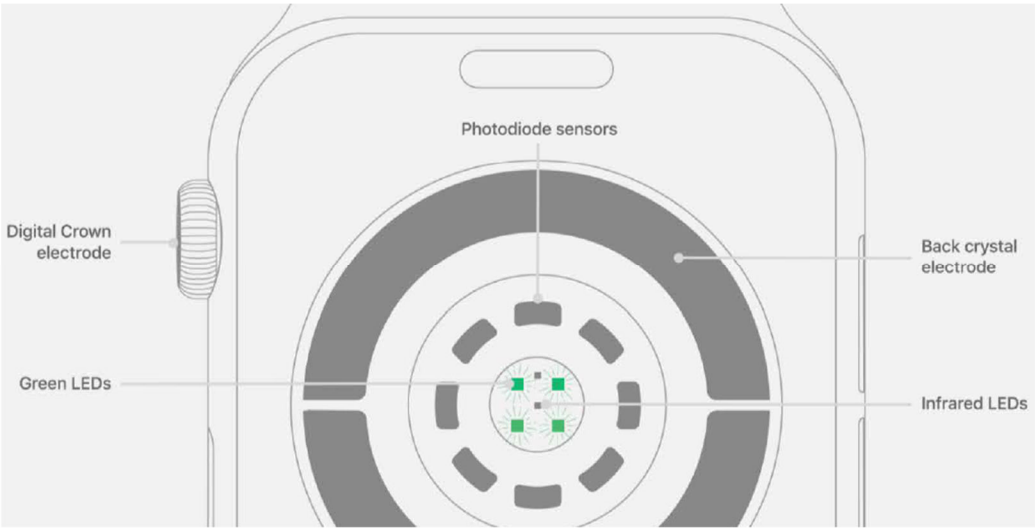
FIG. 4C

Like Apple Watch Series 4, the '157 patent's watch has central "light emitters (e.g., LEDs)" surrounded by a circular array of eight photodiodes "to perform a sensor function (e.g., to determine a heart rate)." EX1024, 15:34-37, 15:7-15 ("the optical

subsystem 416 is designed" to receive light), 15:65-16:2; EX1014 ¶67. The '157 patent thus confirms the functionality of the claimed arrangement of rectangles. *Id.*

d. <u>The Concentric Circles Are Functional</u>

Apple Watch Series 4 includes central LEDs for emitting light.

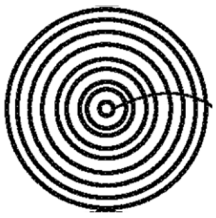


EX1019, 2-3; EX1014 ¶69. As shown below, the Watch's protrusion includes a Fresnel lens (orange, left) over those LEDs, which the D'279 Patent claims using concentric circles (orange, right). EX1005, 2; EX1001, FIG. 4; EX1014 ¶69; *supra* §IV.B.



EX1005, 2 **EX1001, FIG. 4**

Concomitant utility patent filings confirm the functionality of the claimed Fresnel lens. One Apple utility patent publication depicts the below Fresnel lens and explains the "protrusion can include a Fresnel lens" over the light emitters to improve optical sensing efficiency by "collimating" (or "redirect[ing]") light such that more light is "collected instead of being lost." EX1028 ¶¶53, 56, FIG. 9B (excerpted); EX1014 ¶70.

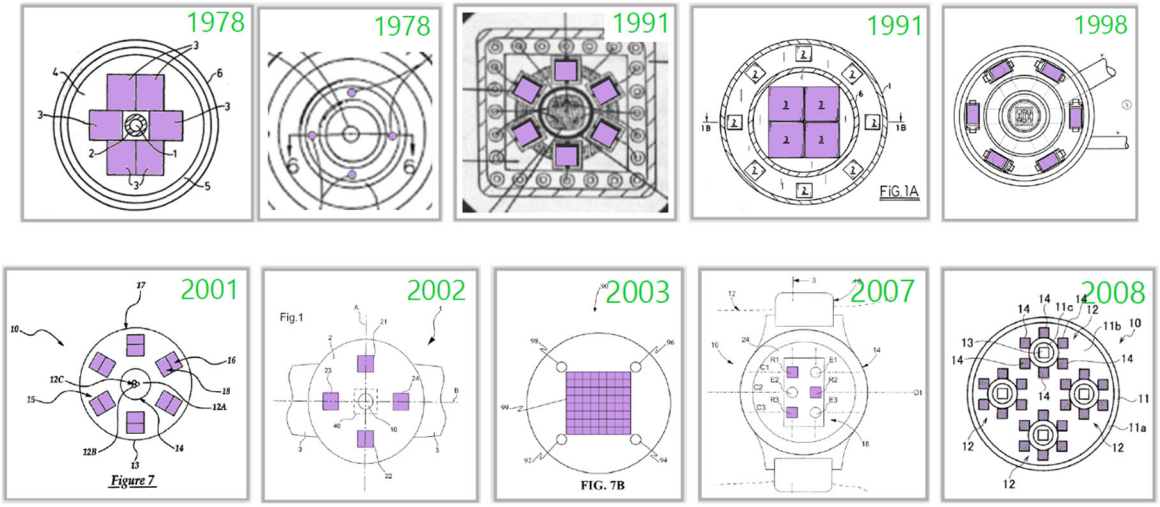


Other prior art confirms that a "Fresnel lens … above the light emitting unit" functions to improve optical sensing efficiency by outputting "collimated light."

EX1010 ¶¶62-63; EX1014 ¶70. Even Apple's utility patent on the Series 4 Watch describes including a Fresnel lens in the Watch's convex protrusion. EX1024, 14:35-52, FIGS. 4A-4C; EX1014 ¶70.

e. <u>The Overall Circular Sensor Shape Is Functional</u>

The overall circular shape of the claimed sensor design is a functional design aspect, as is confirmed by the ubiquitous use of circular shapes for prior art sensors.



EX1038, 2-3 (excerpted); EX1014 ¶72. The overall circular sensor shape is also functional because it is more comfortable for wrist-worn devices. EX1014 ¶72. Moreover, circular photodiode arrays were known to achieve improved sensor performance, *supra* §IV.B.1.c, and an overall circular shape most efficiently houses a circular sensor design with minimal wasted space. EX1014 ¶72. An overall circular shape also functions to maximize the usable sensor surface area for a given sensor width. *Id.*

Accordingly, the above-discussed design elements are dictated by function and should be "factored out" of the Challenged Claim's scope. *Richardson*, 597 F.3d at 1293-94, *Campbell*, IPR2017-00096, Paper 28 at 14; EX1014 ¶74. Broken lines are expressly disclaimed and should also be disregarded. EX1001, Description.

V. LEGAL STANDARD

A. Designer of Ordinary Skill

For purposes of this Petition, a designer of ordinary skill in the art related to the D'279 Patent ("DOSA") would have had an undergraduate or graduate degree in industrial/product design, along with at least two years of relevant work experience in the field of industrial/product design of portable electronic devices. EX1003 ¶26. A DOSA would not need to be familiar with electrical, biomedical, or other advanced technical concepts employed by such devices. *Id.* ¶27. Rather, the DOSA would consult or collaborate with a person of ordinary skill in the art ("POSITA") regarding concepts outside of the DOSA's expertise. *Id.* Here, a POSITA would have had at least a Bachelor or Master of Science degree in electrical or biomedical engineering, or a comparable engineering discipline, in combination with at least two years of related work experience involving wearable devices for noninvasively measuring health parameters. EX1014 ¶28.

B. Obviousness

A patent is invalid as obvious if "the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious" to a person of ordinary skill in the relevant art before the invention's effective filing date. 35 U.S.C. § 103. The obviousness analysis considers the four *Graham* factors. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966)). "'In the design patent context, the ultimate inquiry under section 103 is whether the claimed design would have been obvious to a [DOSA].'" *Durling v. Spectrum Furniture Co.*, 101 F.3d 100, 103 (Fed. Cir. 1996).

Design patent obviousness is a two-step inquiry. First, "one must find a single reference, 'a something in existence, the design characteristics of which are basically the same as the claimed design.'" *Id.* (internal citation omitted). To identify such a "primary reference," one must: "(1) discern the correct visual impression created by the patented design as a whole; and (2) determine whether there is a single reference that creates 'basically the same' visual impression.'" *Id.* A primary reference need not be identical to, or even contain every ornamental feature present in, the claimed design to be "basically the same" as that design. *See, e.g.*, *MRC Innovations, Inc. v. Hunter Mfg., LLP*, 747 F.3d 1326, 1333 (Fed. Cir. 2014) (affirming obviousness based on primary reference lacking at least three ornamental elements of claimed design); *Jore Corp. v. Kouvato, Inc.*, 117 Fed. App'x 761, 763 (Fed. Cir. 2005)

(finding prior art drill bit proper primary reference despite different shaft shape than claimed design).

Second, "'secondary' references 'may be used to modify [the primary reference] to create a design that has the same overall visual appearance as the claimed design.'" *MRC*, 747 F.3d at 1331 (internal citation omitted). Secondary references can be used if they are "'so related to the primary reference that the appearance of certain ornamental features in one would suggest the application of those features to the other.'" *Id.*

Notably, the obviousness inquiry "asks whether a designer 'would have combined ***teachings*** of the prior art to create the same overall visual appearance as the claimed design,' not merely the figures or illustrations." *3Form, Inc. v. Lumicor, Inc.*, 678 Fed. App'x. 1002, 1011 (Fed. Cir. 2017) (internal citation omitted) (affirming design patent obviousness based on utility patent specification). A DOSA can thus consider the "teachings of the prior art" and is not restricted to prior art illustrations. *Id.* Moreover, a finding of obviousness does not require that the combination of prior art references suggests a design identical to the claimed design. *See, e.g.*, *In re Lamb*, 286 F.2d 610, 611 (C.C.P.A. 1961) ("[T]hat there are differences over the prior art structures is not alone sufficient to justify a holding that the design is patentable."). Rather, "on numerous occasions [the Federal Circuit

has] invalidated design patents despite the inclusion of ornamental features that were ***entirely absent from prior art designs***." *MRC*, 747 F.3d at 1335.

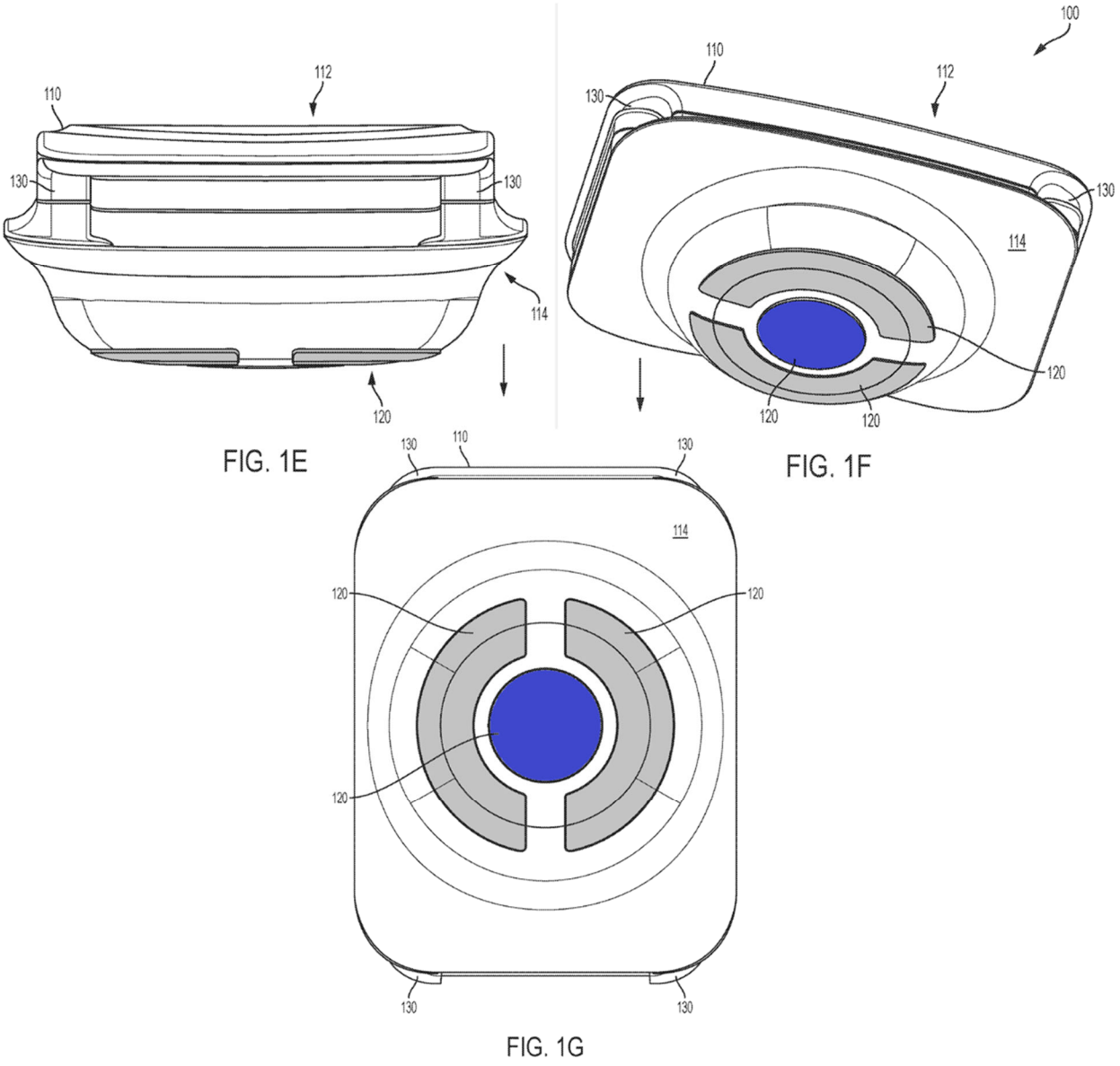
VI. THE CHALLENGED CLAIM IS UNPATENTABLE

As explained for Grounds 1-3, the Challenged Claim would have been obvious over the prior art presented herein.

A. Overview of Key Prior Art

1. Paulke

Paulke discloses "designs and techniques for incorporating biosensor devices into a wearable article for making physiological measurements…." EX1006, 5:27-29, Cover. Paulke's "biosensors 120" are incorporated in the convex surface protruding from the back of the device.



Id., FIGS. 1E-2A, 14:12-28.

Paulke's arc-shaped biosensors 120 (gray) are electrodes or "galvanic skin response (GSR) sensor pads 122, which detect and/or measure electrodermal activity (e.g., skin conductance) of the wearer." *Id.*, 14:29-32, FIG. 2A; EX1014 ¶76. Paulke's arc-shaped electrodes surround a central, circular biosensor 120 (blue). EX1006, 14:26-28, FIGS. 1F-1G. One example of Paulke's central biosensor 120

is a "blood oxygen sensor 124" that can be replaced "with any other suitable biosensor(s)," including "oxygen saturation sensors." *Id.*, FIG. 2A, 15:6-18. Paulke's blood oxygen sensor, like other oxygen saturation sensors, is a PPG sensor. *Id.*; EX1014 ¶76. A DOSA would have understood that Paulke's sensor, like any PPG sensor, necessarily includes (1) a light source, (2) at least one light detector (e.g., photodiodes), and (3) an opening to allow light to be detected by the detector. EX1003 ¶55; EX1014 ¶77; EX1011, FIGS. 3-4, 7, 1:33-61, 4:6-65.

2. <u>Yuen</u>

Yuen's "smartwatch" includes the "electrocardiogram sensor 116, [and] photoplethysmography [PPG] sensor 118" shown below.

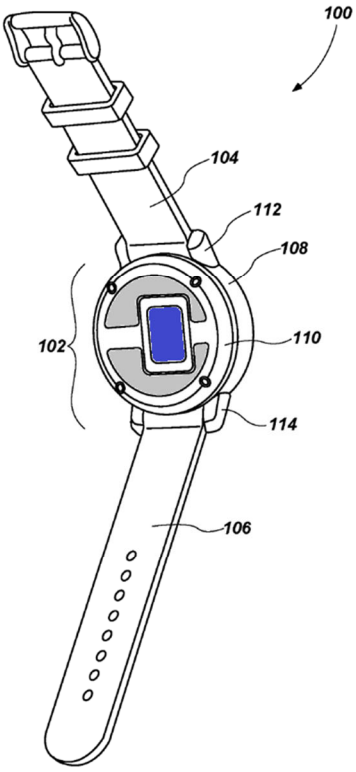


FIG. 1B

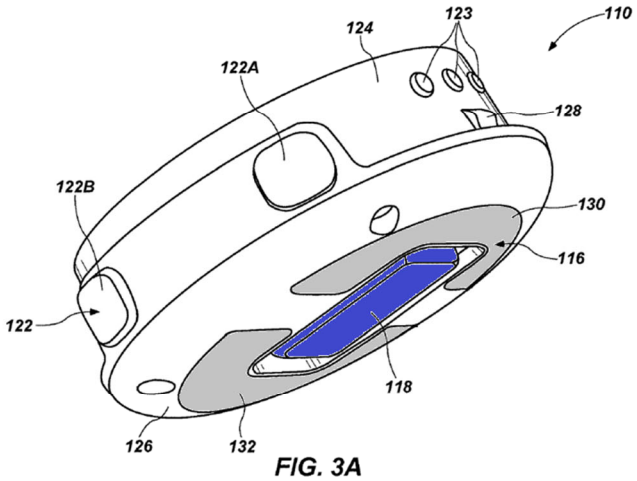
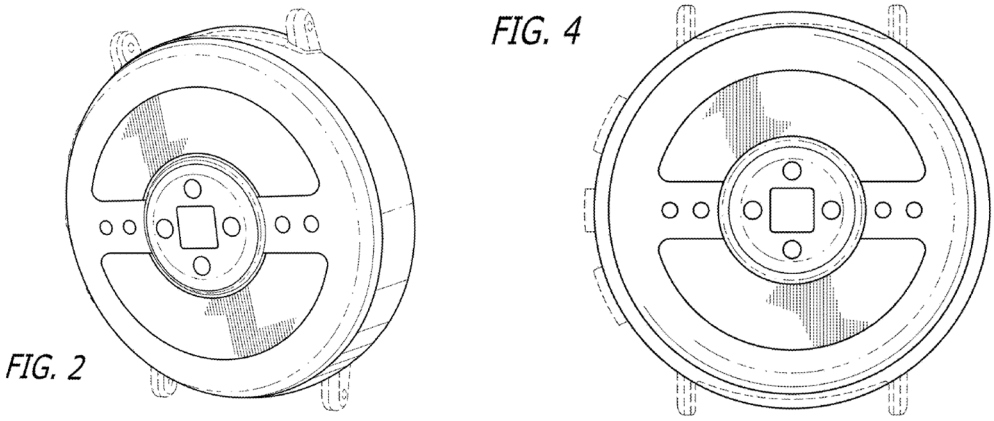


FIG. 3A

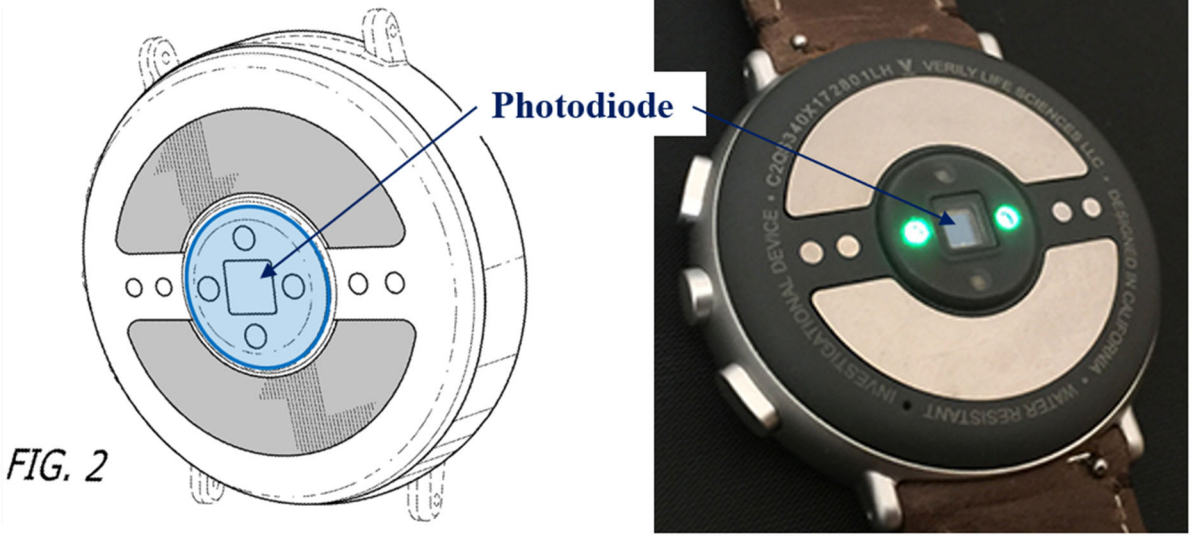
EX1007 ¶32, FIGS. 1B, 3A. As shown above (gray), the "electrodes 130, 132 of the ECG sensor 116" extend through Yuen's convex "back cover 126" and "have a general half-moon shape." *Id.*, FIGS. 1B, 3A, ¶35. Yuen's PPG sensor (blue) also "extend[s] through the back cover 126" between the arc-shaped electrodes. *Id.*, FIGS. 1B, 3A, ¶42. Yuen discloses using "any [] ECG sensor 116 known in the art" and "any PPG sensor 118 known in the art" with its device. *Id.* ¶¶34, 41.

3. Fong

Fong discloses the below design of a "Health Monitoring Wrist Wearable."



EX1008, FIGS. 2, 4, Cover. Verily Life Sciences is listed as Fong's assignee. *Id.*, Cover. As shown below, Verily Life Sciences' "Study Watch" is the article underlying Fong's design. EX1003 ¶57.

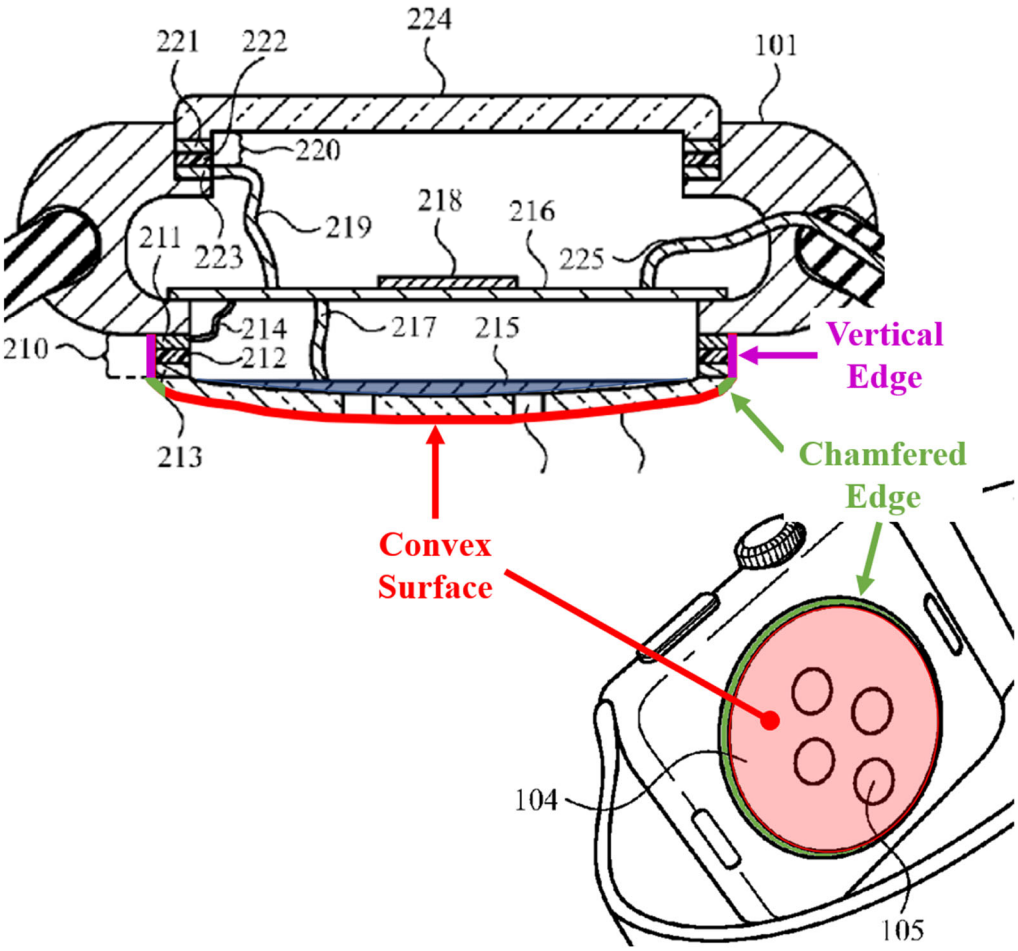


Fong (EX1008, FIG. 2) Verily Study Watch (EX1016, 3)

As shown above and explained in a 2017 article, Fong's arc-shaped electrodes (gray) surround an optical sensor (blue). EX1008, FIGS. 2, 4; EX1016, 2-3 ("On the bottom of the watch are the green LEDs and optical sensor[] [e.g., photodiode(s)] that detect the heart rate, [and] metal electrodes that measure electrodermal activity."); EX1014 ¶79; EX1003 ¶57. Fong's optical sensor is a PPG sensor with at least one photodiode (shown above). EX1029, 6; EX1014 ¶79.

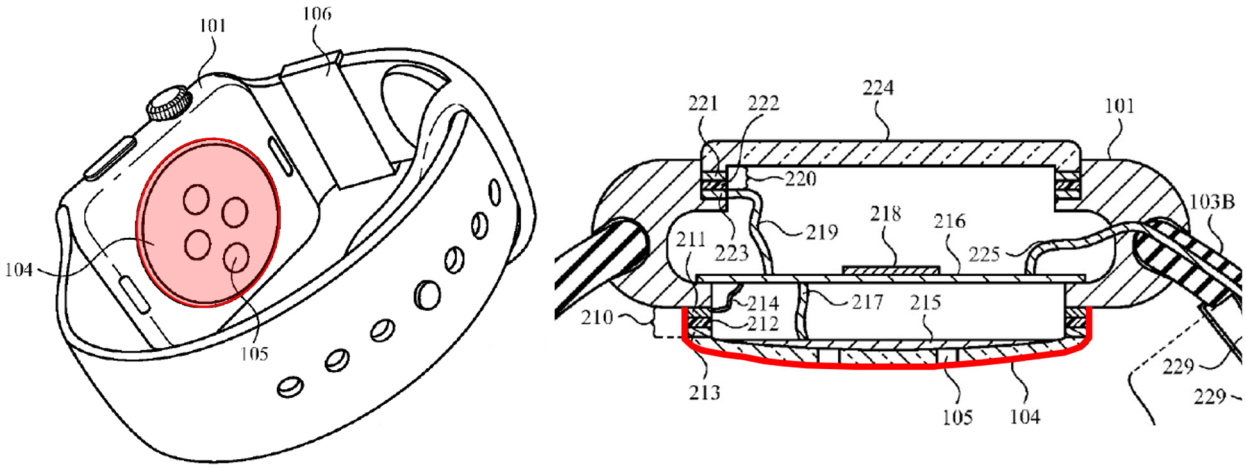
4. <u>Bushnell</u>

Bushnell, an Apple patent publication, describes an Apple Watch-like "wearable electronic device." EX1009, Cover, Abstract, ¶36. Bushnell's "housing component 104" includes a convex surface (red) covering a "health sensor 215" such as "a photoplethysmogram (PPG) sensor" (blue). *Id.*, ¶¶37, 48, FIGS. 1A-2B.



Bushnell FIGS. 2A, 1A (excerpted)

Between the convex surface (red) and the device's body, Bushnell's housing component includes a vertical edge (pink) and a chamfered edge (green). *Id.*, FIGS. 1A-2B, ¶¶21-24; EX1003 ¶58. Collectively, Bushnell's convex surface, chamfered edge, and vertical edge form the convex protrusion shown in red below.



EX1009, FIGS. 1A, 2A; EX1003 ¶58.

5. Mendelson

Mendelson discloses oxygen saturation (i.e., pulse oximeter/blood oxygen) sensors, which are PPG sensors. EX1011, Cover, 1:15-2:27; EX1014 ¶81; EX1003 ¶59. Mendelson's sensors include "radially-symmetric" arrays of photodiodes around central LEDs. EX1011, 4:14-62, FIG. 7; EX1014 ¶81; EX1003 ¶59. Mendelson's FIG. 7 sensor design includes two symmetrical six-photodiode arrays (16/18, blue), for a total of 12 rectangular photodiodes surrounding the central LEDs (12A-12C). EX1011, FIG. 7, 9:22-40; EX1014 ¶81; EX1003 ¶59.

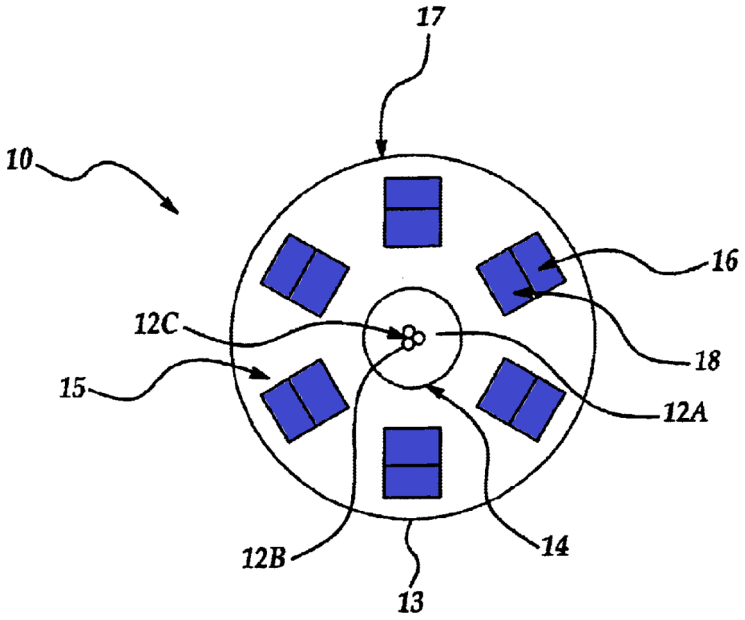


Figure 7

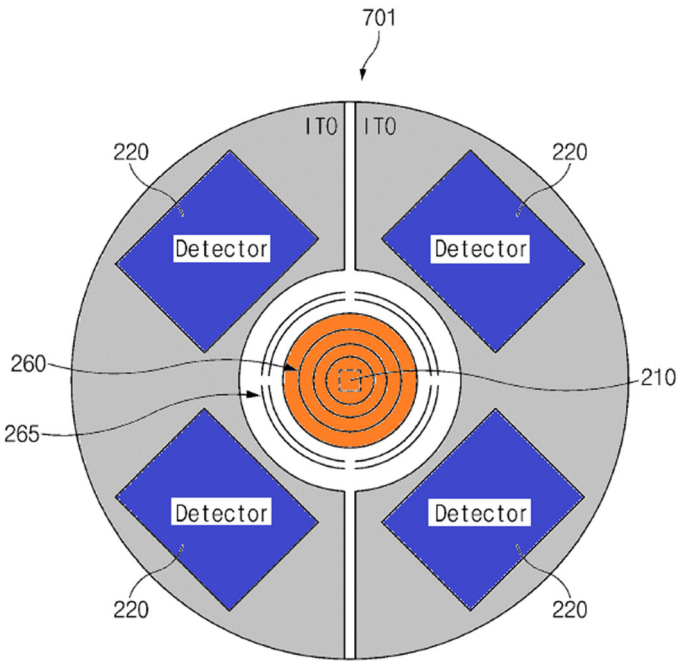
6. Chung

Chung "claims priority under 35 U.S.C. § 119 to Korean Patent Application Serial No. 10-2018-0038206" ("Chung-KR-Application"), which was filed on April 2, 2018. EX1010 ¶1. For Chung to receive this April 2018 date "for prior art purposes, 'the specification of the [Chung-KR-Application] must contain a written description of the invention ... [sufficient] to enable an ordinarily skilled artisan to practice the invention claimed in [Chung],'" in compliance with 35 U.S.C. § 112(a). *Amgen Inc. v. Sanofi*, 872 F.3d 1367, 1380 (Fed. Cir. 2017) (internal citation omitted). A specification's written description is adequate under § 112(a) if it reasonably conveys to a POSITA that the inventors possessed the claimed subject matter by its filing date. *Id.*, 1373. And a specification is enabling under § 112(a)

if it teaches a POSITA how to make and use the claimed invention without undue experimentation. *Id.*, 1376.

The Chung-KR-Application adequately describes and enables Chung's claims under 35 U.S.C. § 112(a). EX1014 ¶82. Accordingly, Chung was effectively filed on April 2, 2018 and is prior art under 35 U.S.C. § 102(a)(2).

Chung discloses a wearable "electronic device including an optical sensor using a Fresnel lens." EX1010 ¶2, FIGS. 1B, 7. Chung optical sensor is a PPG sensor that "may be mounted on a back surface of the electronic device 102" to "emit a light to the wrist" and "collect biometric information of the user." *Id.* ¶¶45, 49; EX1014 ¶83. As shown below, Chung's "optical sensor 701 … includes one light emitting unit 210, the Fresnel lens 260 [orange] for light emission, and a plurality of light receiving units 220 (e.g., detectors) [blue]." *Id.* ¶103, FIG. 7.



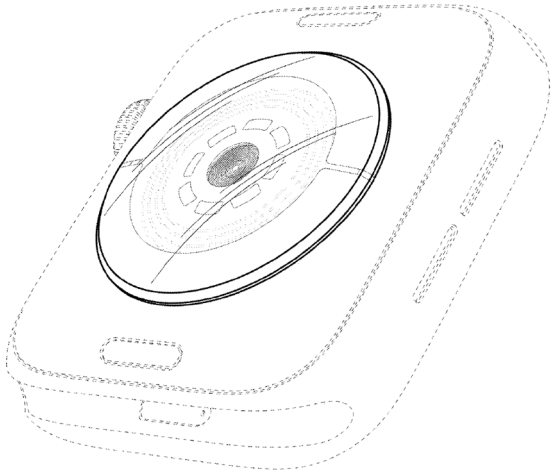
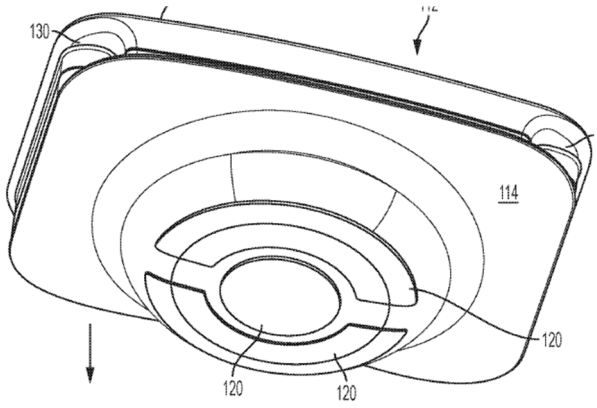
Chung's Fresnel lens (orange) is "disposed above the light emitting unit 210" in the sensor's "center portion," surrounded by arc-shaped electrodes (gray). *Id.* ¶¶104, 109, FIG. 7.

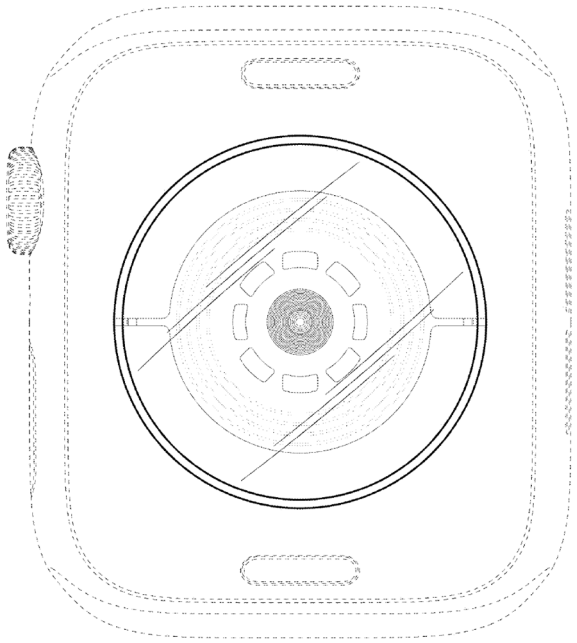
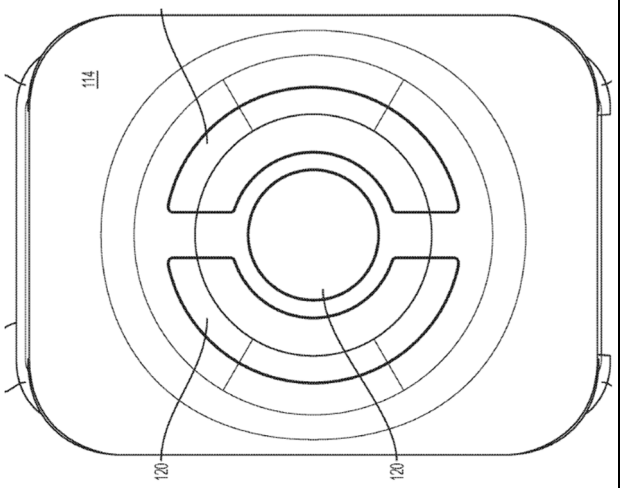
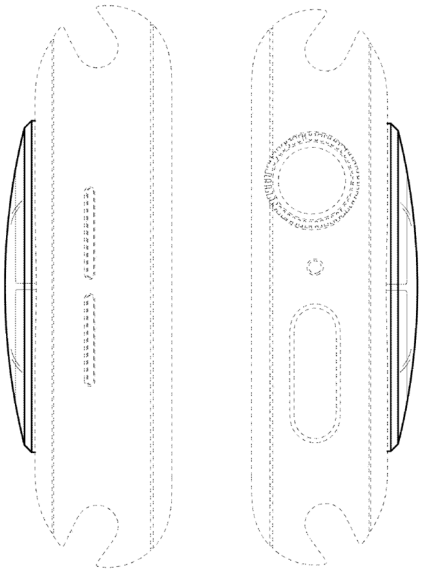
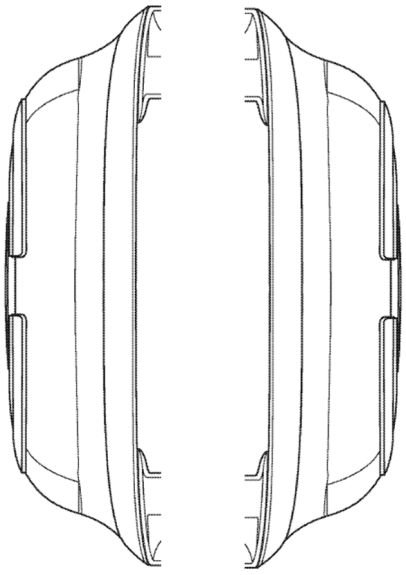
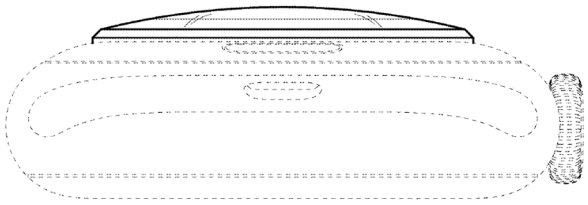
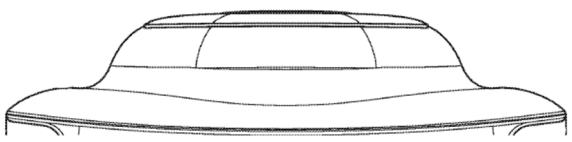
B. GROUND 1: Obviousness Over Paulke, Mendelson, Bushnell, Chung

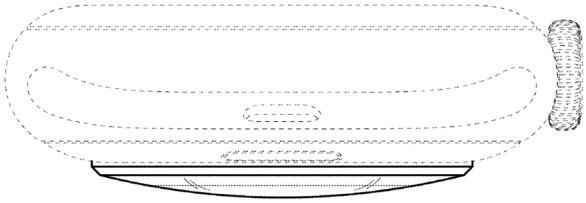
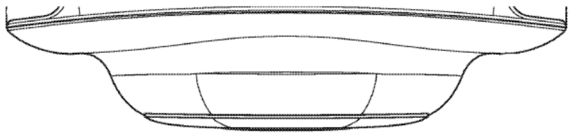
1. Paulke Is A Primary Reference

Paulke is a primary reference because it is a single prior art reference with basically the same design characteristics as the claimed design. EX1006, FIGS. 1-2; EX1003 ¶¶61-74. As shown below, any differences between Paulke and the D'279 Patent do not change the overall visual similarity of the designs. *MRC*, 747 F.3d at 1332-33 (a primary reference can have some "major differences" and "slight differences" from the claimed design).

The following comparison demonstrates that the design characteristics of Paulke are basically the same as the claimed design:

D'279 Patent	Paulke (EX1006)
	
FIG. 2	FIG. 1F

D'279 Patent	Paulke (EX1006)
 FIG. 4	 FIG. 1G (rotated)
 FIG. 5 FIG. 6	 FIG. 1E (rotated)
 FIG. 7	 FIG. 1D (rotated)

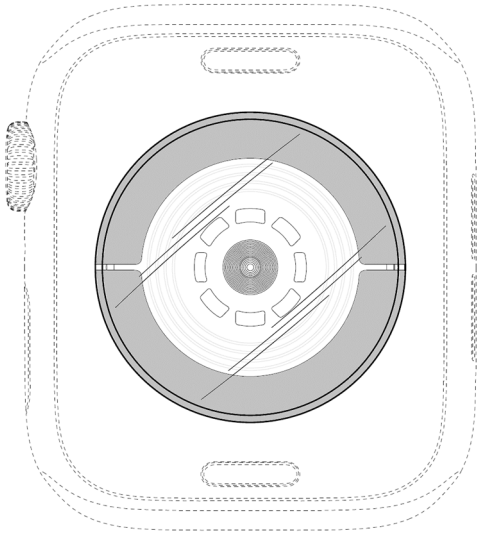
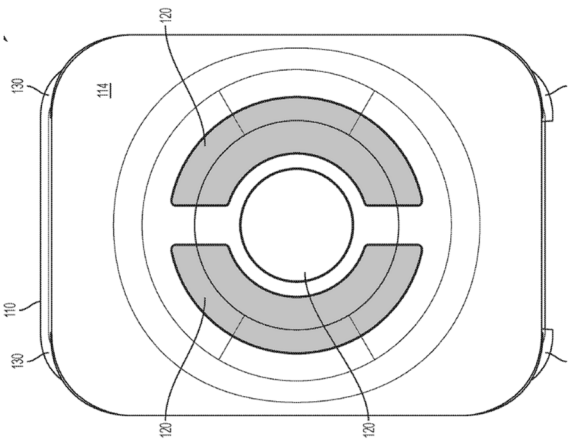
D'279 Patent	Paulke (EX1006)
 FIG. 8	 FIG. 1D (rotated)

EX1001, FIGS. 2, 4-8; EX1006, FIGS. 1D-2A; EX1003 ¶61. The above comparison demonstrates that Paulke is an appropriate primary reference because its design conveys basically the same overall visual impression as the claimed design. *Id.* The overall visual similarity between the design characteristics of Paulke and the claimed design is further confirmed by the following comparison of their respective design aspects. *Id.*

a. <u>Arc-Shaped Portions</u>

The arc-shaped portions' arrangement should be disregarded as a functional element. *Supra* §IV.B.1.b. But even if considered, Paulke and the D'279 Patent disclose substantially the same arrangement of arc-shaped portions.

Paulke and the claimed design each have arc-shaped portions that are spaced apart from each other and a central circular area. EX1001, FIG. 4; EX1006, FIG. 1G; EX1003 ¶63. And as shown below, the arc-shaped portions of Paulke and the D'279 Patent provide the same overall visual impression. *Id.*

D'279 Patent	Paulke (EX1006)
	
FIG. 4	FIG. 1G (rotated)

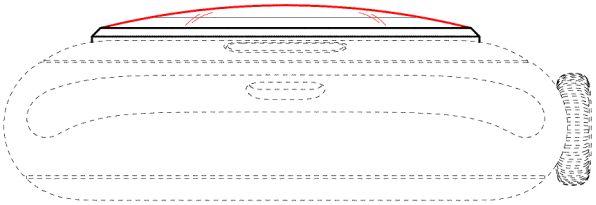
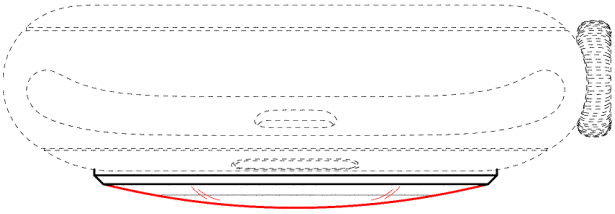
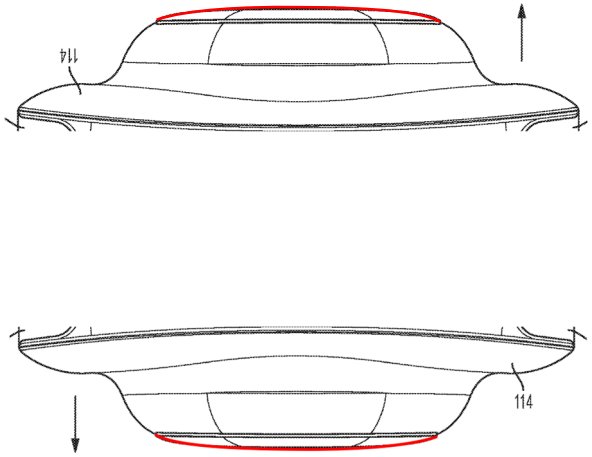
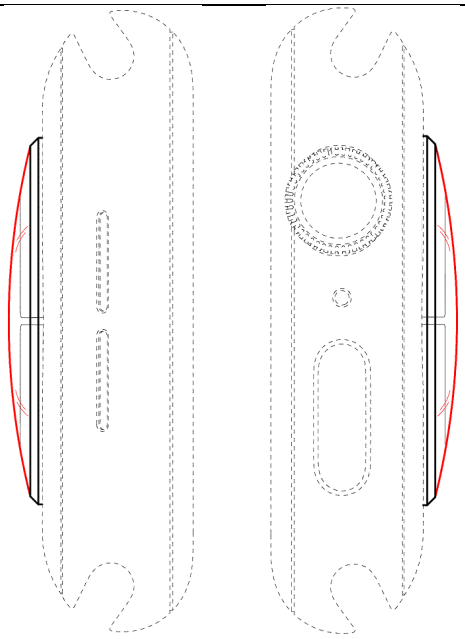
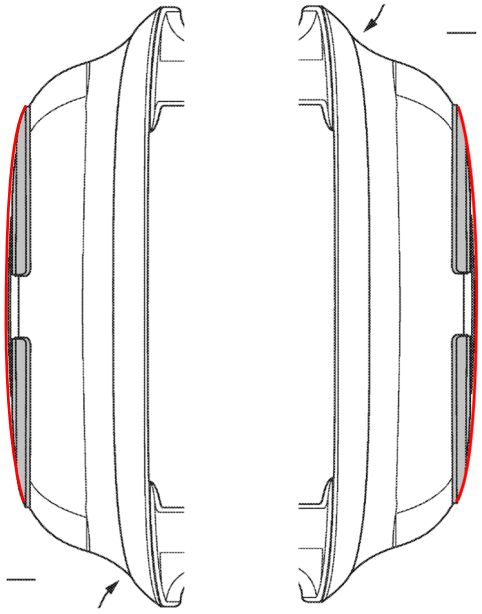
Paulke's arc-shaped portions are spaced slightly farther apart than the claimed design, but that difference, or any difference in the size, shape, or spacing of the arc-shaped portions of Paulke and the claimed design, does not alter the overall visual similarity of these designs. *Id.*; *see MRC*, 747 F.3d at 1333 ("slight differences … do[] not defeat a claim of obviousness" or prevent use as primary reference); *Lamb*, 286 F.3d at 612 ("[T]hat some dimensions are changed in a different degree than others is not patentably significant."). And any differences between the design of Paulke and the claimed design would have been obvious changes to a DOSA. *Infra* §VI.B.2.b.

Thus, Paulke discloses arc-shaped portions with basically the same design characteristics as the claimed design. EX1003 ¶63.

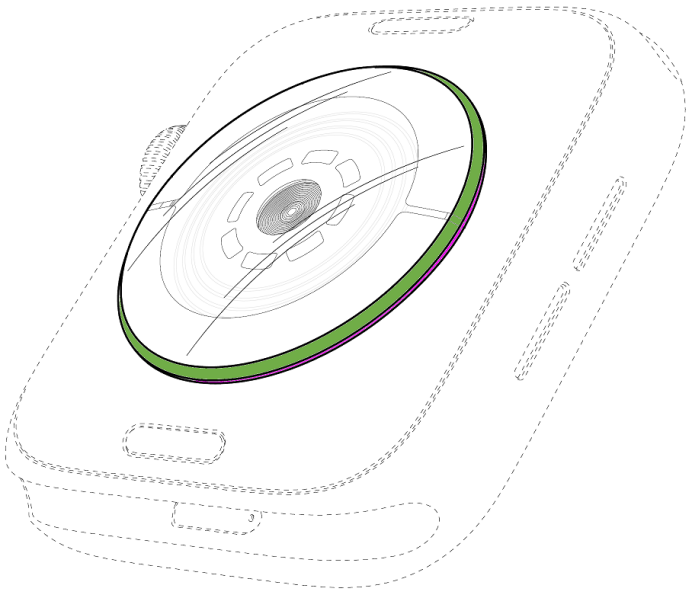
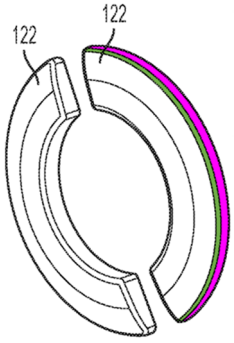
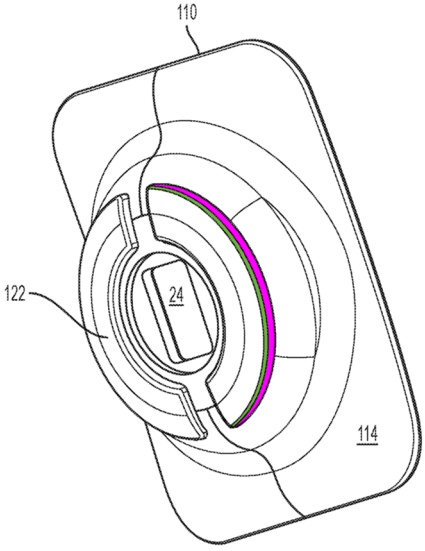
b. Convex Protrusion

The claimed convex protrusion—the convex surface, chamfered edge, and vertical edge—should be disregarded as a functional element of the claimed design. *Supra* §IV.B.1.a.

If the convex surface is considered, Paulke and the claimed design have a convex surface that provides the same overall visual impression, as shown below. EX1001, FIGS. 5-8; EX1006, FIGS. 1D-1E; EX1003 ¶65.

D'279 Patent	Paulke (EX1006)
 FIG. 7  FIG. 8	 FIG. 1D (rotated)
 FIG. 5 FIG. 6	 FIG. 1E (rotated)

Further, if the chamfered and vertical edges are considered, Paulke's design includes a vertical edge (pink) and chamfered edge (green) providing the same overall visual impression as the claimed design. EX1001, FIG. 2; EX1006, FIG. 2A; EX1003 ¶65.

D'279 Patent	Paulke (EX1006)
 FIG. 2	 FIG. 2A (excerpted)  FIG. 2A (assembled, excerpted)[4]

Any differences between the design of Paulke and the claimed design would not prevent Paulke's use as a primary reference. EX1001, FIGS. 2, 4-8; EX1006, FIGS. 1D-2A; EX1003 ¶65; *MRC*, 747 F.3d at 1332-33.

Accordingly, Paulke discloses a convex protrusion with basically the same design characteristics as the claimed design. EX1003 ¶65.

[4] A DOSA would have understood that the exploded view of Paulke FIG. 2A would appear as shown when assembled. EX1003 ¶65 n.1.

c. Rectangles

The claimed design depicts the arc-shaped portions surrounding a circular array of eight rectangles (i.e., the photodiodes of Apple Watch Series 4). *Supra* §IV.B. However, the precise arrangement of those rectangles should be disregarded because it is a functional element. *Supra* §IV.B.1.c. Accordingly, the claimed design encompasses any arrangement of rectangles surrounded by and spaced apart from the arc-shaped portions. EX1003 ¶67. And Paulke discloses a design with the same basic design characteristics.

Paulke's arc-shaped portions surround a central biosensor 120. EX1006, FIGS. 1F-2A, 14:12-15. That central biosensor includes a "blood oxygen sensor 124," which "is protected from the outside by a glass lens 128." EX1006, FIG. 2A, 15:6-9. Paulke depicts this configuration in FIG. 2A's exploded view.

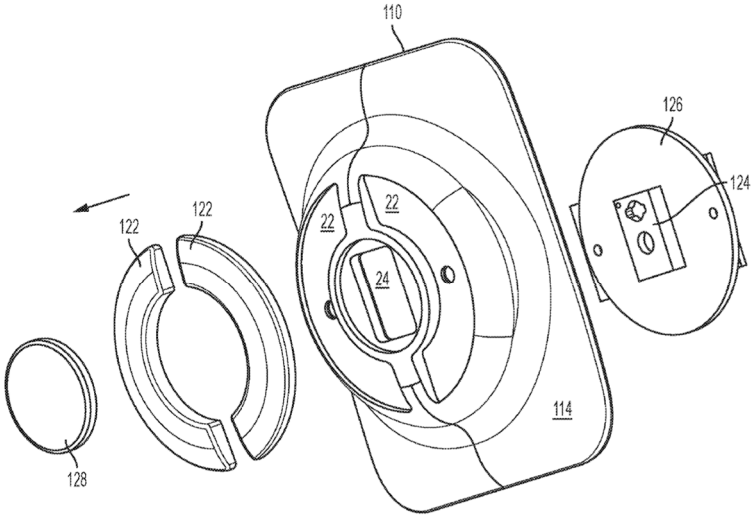
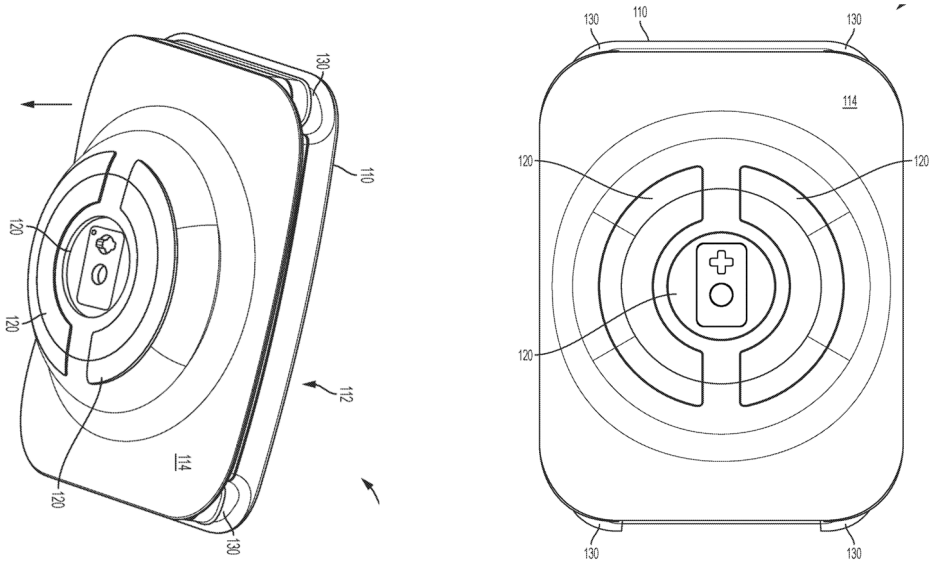


FIG. 2A

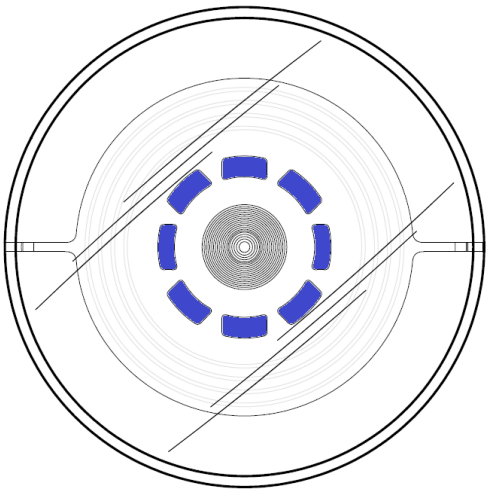
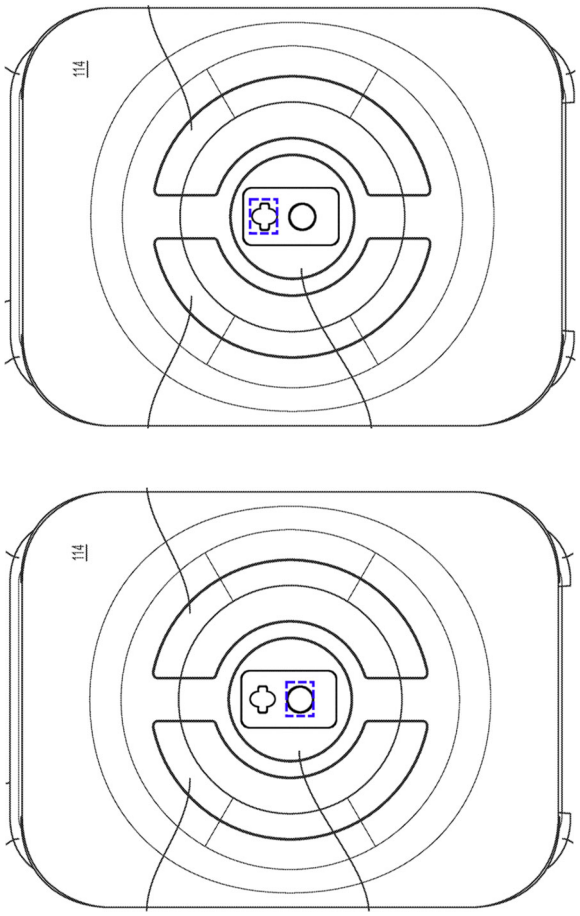
Id. Assembling the FIG. 2A configuration, Paulke discloses arc-shaped portions surrounding the blood oxygen sensor, as shown below.



EX1006, FIGS. 1F (left), 1G (right)
(modified to show blood oxygen sensor 124 of FIG. 2A)

EX1003 ¶68.

For Paulke's blood oxygen sensor, or any PPG sensor, to measure blood oxygen (i.e., oxygen saturation), a DOSA would have understood the sensor necessarily includes (1) a light source (e.g., LEDs), (2) at least one light detector (e.g., photodiodes), and (3) an opening to allow light to reach and be detected by the detector. EX1003 ¶69; EX1014 ¶77; *supra* §VI.A.1. A DOSA also would have known that rectangular photodiodes were ubiquitous for such sensors. *Infra* §VI.B.2.b. Thus, a DOSA would have understood Paulke included a rectangular photodiode (blue) associated with the PPG sensor's opening, as shown in the exemplary figures below (right). EX1006, FIG. 1G; EX1003 ¶69; EX1014 ¶77.

D'279 Patent	Paulke (EX1006)
 FIG. 4	 FIG. 1G (Composites with FIG. 2A)

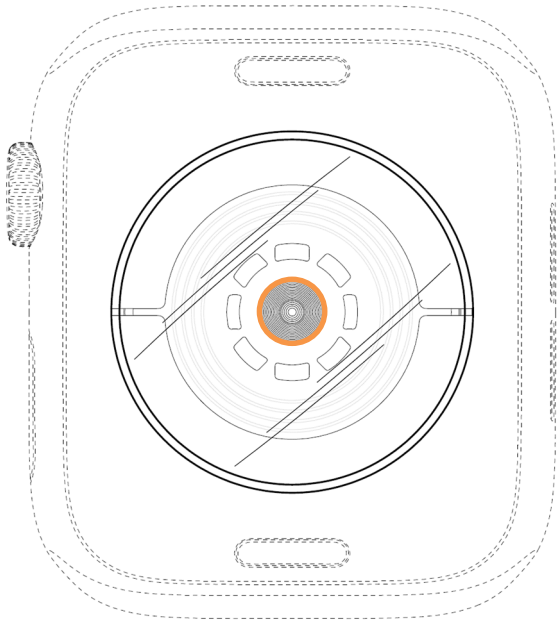
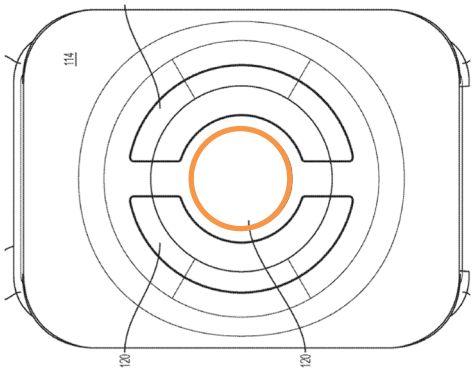
The claimed design includes a circular arrangement of rectangles, as shown above. EX1003 ¶69. Therefore, a DOSA would have understood that Paulke and the claimed design include one or more central rectangles with the same basic design characteristics. *Id.* And regardless, Paulke would still be an appropriate primary reference even if it did not include a central rectangle. *Id.*; *see, e.g.*, *MRC*, 747 F.3d at 1332-33.

Further, if the D'279 Patent's circular array of eight rectangles is found to be non-functional and included within the Challenged Claim's scope, Paulke differs from the claimed design because Paulke includes the one rectangle above. EX1003 ¶70. But Paulke remains a primary reference despite this difference. *MRC*, 747 F.3d at 1332-33. Paulke also remains a primary reference because any difference in the arrangement of rectangles does not change the overall visual similarity of Paulke and the claimed design. EX1001, FIGS. 2, 4-8; EX1006, FIG. 1D-1G; EX1003 ¶70. Paulke is also a primary reference despite any such difference because, as Apple previously argued, "there's ***nothing patentable*** about multiple detectors." EX1021, 58:3-13 (also referencing EX1038, 2).

Accordingly, Paulke discloses a design with the same basic design characteristics as the claimed design. EX1003 ¶71.

d. <u>Concentric Circles</u>

The claimed concentric circles should be disregarded as a functional element. *Supra* §IV.B.1.d. But even if those circles are considered, Paulke and the claimed design both include a central circle, as shown below.

D'279 Patent	Paulke (EX1006)
 FIG. 4	 FIG. 1G (rotated)

EX1001, FIG. 4; EX1006, FIG. 1G; EX1003 ¶73. Paulke differs because it includes the one central circle shown above rather than multiple concentric circles. *Id.* But Paulke remains a primary reference despite this difference. *MRC*, 747 F.3d at 1332-33. Indeed, Paulke is a primary reference because its overall design includes concentric circles, and the concentric circles' arrangement does not change the overall visual similarity between Paulke and the claimed design. EX1001, FIG. 4; EX1006, FIG. 1G; EX1003 ¶73.

Accordingly, Paulke discloses the same basic design characteristics as the claimed design. EX1003 ¶73.

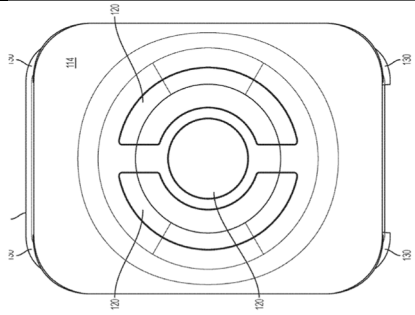
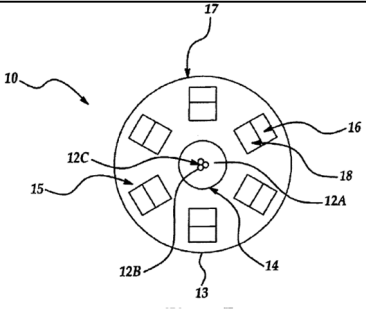
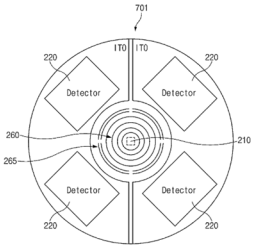
In sum, Paulke is a primary reference because it discloses basically the same visual impression as the claimed design. *Id.* ¶74.

The D'279 Patent's circular array of rectangles and concentric circles are functional and thus do not change the two designs' overall visual similarity. *Supra* §§IV.B.1.c-d. Even if these aspects were considered, Paulke's differences compared to the claimed design would be that Paulke has one rectangle, not a circular array of them, and one central circle, not concentric circles. EX1003 ¶74. However, as shown below, these differences would have been obvious to a DOSA. *Id.* Indeed, combining Paulke with Mendelson, Bushnell, and Chung creates a sensor design with the same overall visual appearance as the claimed Apple Watch sensor design. *Id.*

2. <u>The Challenged Claim Would Have Been Obvious</u>

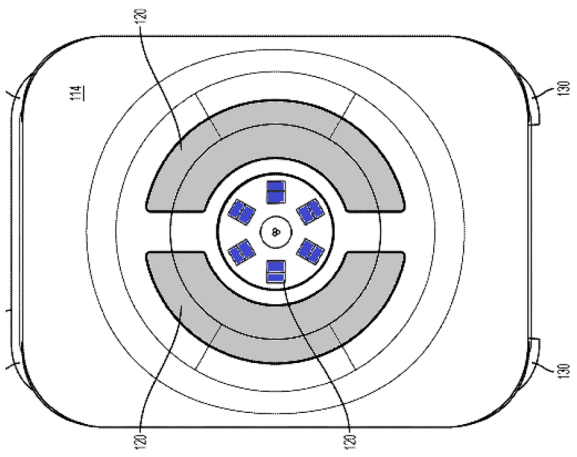
a. <u>Mendelson, Bushnell, and Chung Are Secondary References</u>

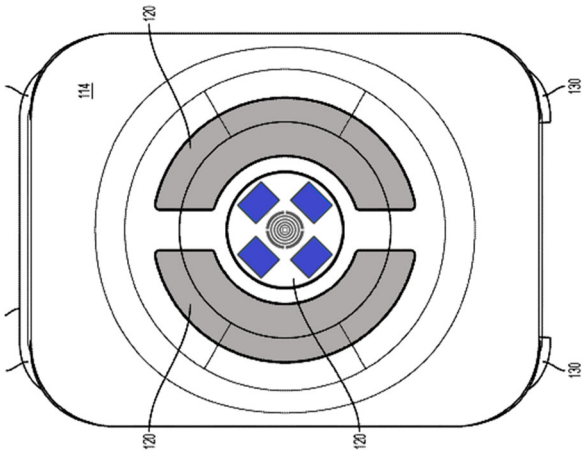
<u>Mendelson/Chung</u>: The following visual comparison demonstrates that the sensor designs of Mendelson and Chung are so related to Paulke that they are proper secondary references.

Paulke (Primary)	**Mendelson (Secondary)**	**Chung (Secondary)**
		
EX1006, FIG. 1G (rotated)	EX1011, FIG. 7	EX1010, FIG. 7

EX1003 ¶75. As shown above, Paulke's arc-shaped biosensors 120 surround a central circular biosensor 120. EX1006, FIG. 1G Paulke explains that its central circular biosensor can be blood oxygen sensor 124 (a PPG sensor) or may be replaced with "any suitable biosensor(s)" including "oxygen saturation sensors." EX1006, FIG. 2A, 15:9-18; *supra* §VI.A.1; EX1003 ¶75. Thus, Paulke suggests replacing its central circular biosensor with a suitable PPG sensor. *Id.*

Mendelson and Chung are so related to Paulke because they disclose suitable sensors for Paulke's design. As shown above, Mendelson and Chung's PPG sensors have a circular shape like Paulke's central biosensor. EX1011, FIG. 7; EX1010, FIG. 7. As shown in the composite figures below, the similarity between the circular shape of Mendelson and Chung's sensors and Paulke's central biosensor would have suggested using Mendelson's (left) sensor and Chung's sensor (right) with Paulke's design.

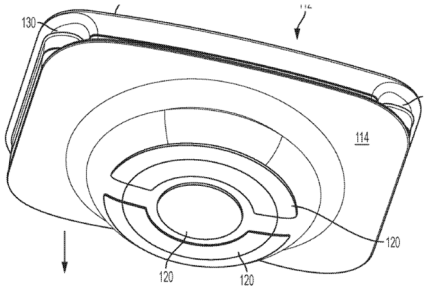
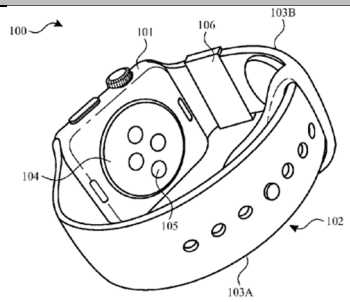
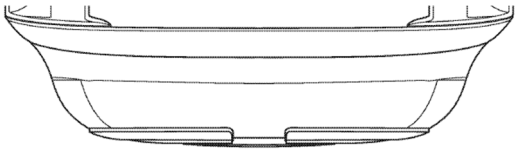
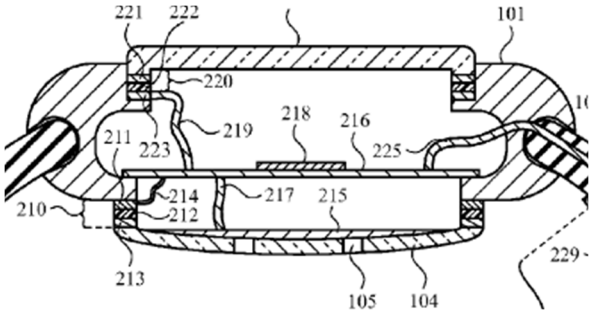




EX1006, FIG. 1G (combined with EX1011, FIG. 7 (left) and EX1010, FIG. 7 (right)); EX1003 ¶76. The designs are also related because Paulke expressly suggests combining its sensor design with a suitable PPG sensor (EX1006, 15:9-18), which Mendelson and Chung disclose. EX1011, FIG. 7, 9:22-40; EX1010, FIG. 7, ¶¶103-109; EX1014 ¶85; EX1003 ¶76. The three PPG sensor designs are further related because they include the same basic components—a light source and light detector(s) (e.g., photodiodes). *Supra* §VI.A.1; EX1003 ¶76.

Accordingly, because of the relatedness and similarity of the designs, the appearance of Mendelson's FIG. 7 sensor and Chung's FIG. 7 sensor would have suggested the application of their features, including Mendelson's sensor and Chung's Fresnel lens, to the design of Paulke's central biosensor. EX1003 ¶76. Thus, Mendelson and Chung are appropriate secondary references. *Id.*

Bushnell: The below visual comparison demonstrates that Bushnell's sensor design is so related to Paulke that Bushnell is a proper secondary reference.

Paulke (Primary)	Bushnell (Secondary)
 EX1006, FIG. 1F	 EX1009, FIG. 1A
 EX1006, FIG. 1E	 EX1009, FIG. 2A

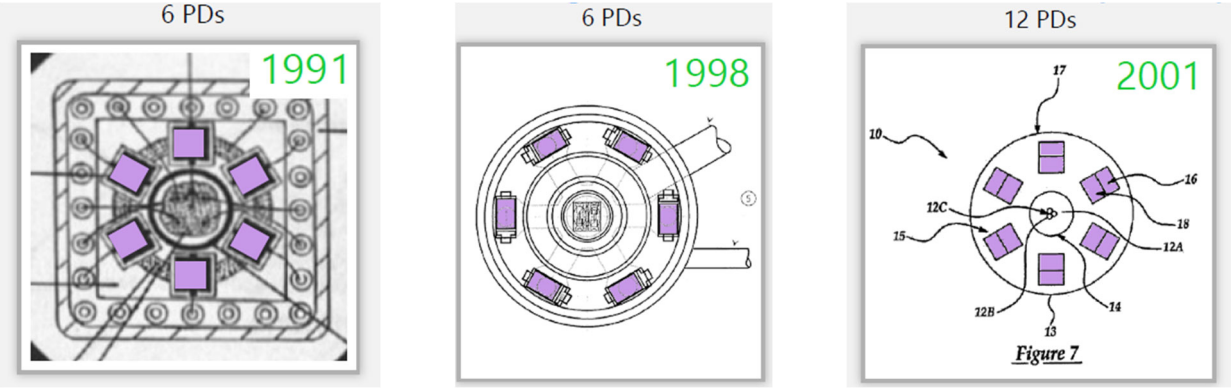
EX1003 ¶77. Bushnell is so related to Paulke because it discloses a suitable design for Paulke's device. As shown above, both references concern a circular, convex surface protruding from the back of the wrist-worn device that incorporates the device's sensors. EX1006, FIGS. 1D-1G; EX1009, FIGS. 1-7; EX1003 ¶77. Further, the similarities between the circular convex protrusion of Bushnell's housing component 104 and Paulke's protruding sensor design would have suggested using Bushnell's design with Paulke's device. *Id.* The designs are also related because in each, the convex protruding surface incorporates electrodes and a PPG sensor. EX1006, FIGS. 1D-2A, 14:26-15:18; EX1009 ¶¶40, 48, 71, 74 (describing "multiple electrodes … positioned on the [convex] housing

component"), FIGS. 2-7; EX1003 ¶77; EX1014 ¶¶76, 80. The designs are further related because Paulke suggests using any known PPG sensor (EX1006, 15:9-18), which Bushnell discloses. EX1009 ¶48; EX1003 ¶77. Additionally, the designs are related because their PPG sensors include the same basic components. *Supra* §VI.A.1; EX1003 ¶77.

Accordingly, given the designs' relatedness and similarity, the appearance of Bushnell's design would have suggested the application of its features, including its convex housing component, to the design of Paulke's device. EX1003 ¶77. Bushnell is thus an appropriate secondary reference. *Id.*

b. The Challenged Claim Would Have Been Obvious Over Paulke, Mendelson, Bushnell, and Chung

Mendelson: Using Mendelson's sensor design with Paulke would have been a change that was suggested by the prior art (including Paulke) and well within the knowledge, experience, skill, and creativity of, a DOSA. EX1003 ¶78. Indeed, Apple has argued that sensors with circular arrangements of six or more rectangular photodiodes ("PDs," purple), including Mendelson (below, right), were ubiquitous in the prior art.

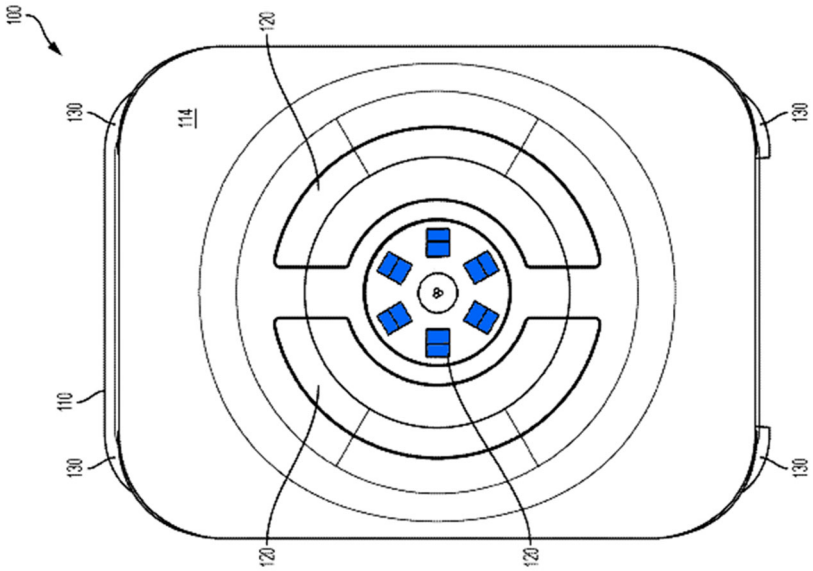


EX1038, 2 (excerpted); EX1021, 58:3-13 (Apple arguing that "every one of these devices [on EX1038, 2] has multiple detectors for detecting light, multiple photodiodes"); EX1017 at 59-60 ("[Since] at least 1978" and "[p]rior to 2008, it also was known that optical sensors could include four or more photodiodes"). The trivial nature of adding a circular arrangement of photodiodes was confirmed by Apple's expert, who opined that, by 2008, "[a POSITA] would have known you could include a plurality of photodiodes" in a sensor that were "arranged radially, meaning in a circular arrangement." EX1021, 1191:21-1192:6.

In addition to being a known modification, a DOSA would have been motivated to use Mendelson's FIG. 7 sensor in place of Paulke's central blood oxygen sensor for numerous reasons. Paulke expressly suggests such a combination by disclosing that "any suitable biosensor(s)," including "oxygen saturation sensors," may be used for its central circular biosensor. EX1006, 15:9-18; EX1003 ¶79. And as shown above, the relatedness of Mendelson's FIG. 7 sensor design to

Paulke would have suggested to a DOSA to combine features from Mendelson's sensor with Paulke. EX1006, 15:9-18; EX1011, FIG. 7; EX1003 ¶79.

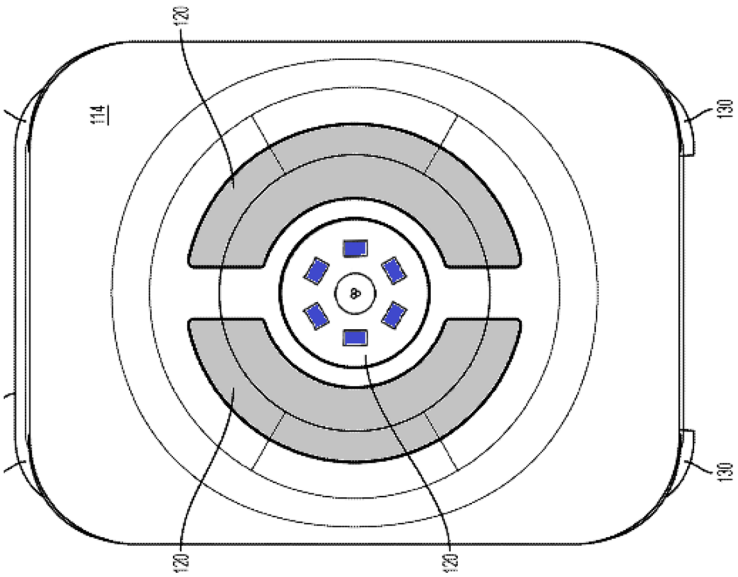
Further, achieving a symmetrical sensor design would have motivated a DOSA to combine Mendelson with Paulke as proposed. ***First***, a DOSA would have been motivated to replace Paulke's asymmetrical blood oxygen sensor with Mendelson's symmetrical sensor to achieve the more marketable and visually appealing symmetrical design shown below.



Paulke (EX1006, FIG. 1G) combined with Mendelson (EX1011, FIG. 7)

EX1003 ¶80. ***Second***, a DOSA would have been motivated to combine Mendelson with Paulke to achieve a symmetrical center biosensor because doing so would be consistent with the symmetry exhibited by Paulke's arc-shaped and circular biosensors. EX1006, FIGS. 1F-3C, 12C, 16A, 17A; EX1003 ¶80. ***Third***, a DOSA would have been motivated to make the proposed combination to achieve an overall

symmetric sensor surface (i.e., a symmetric arrangement of arc-shaped and central sensors). EX1003 ¶80. Indeed, Paulke reflects this motivation because the vast majority of its sensor designs have an overall symmetric arrangement of outer and central biosensors. *Id.*; EX1006, FIGS. 1-3, 12-22. ***Fourth***, a DOSA would have been motivated to combine the "photodiodes arranged symmetrically around the LEDs" (i.e., "radially-symmetric photodetector array") of Mendelson's FIG. 7 sensor with Paulke as proposed to improve sensor accuracy and "maximize the detection of backscattered light." EX1011, 4:14-16, 4:59-62, 9:22-40; EX1003 ¶76; EX1014 ¶80. ***Fifth***, rather than use both of Mendelson's six-photodiode arrays with Paulke as shown above, a DOSA alternatively would have been motivated to use one array, as shown below, to improve the performance of the PPG sensor while being cheaper and easier to make than Mendelson's FIG. 7 sensor.

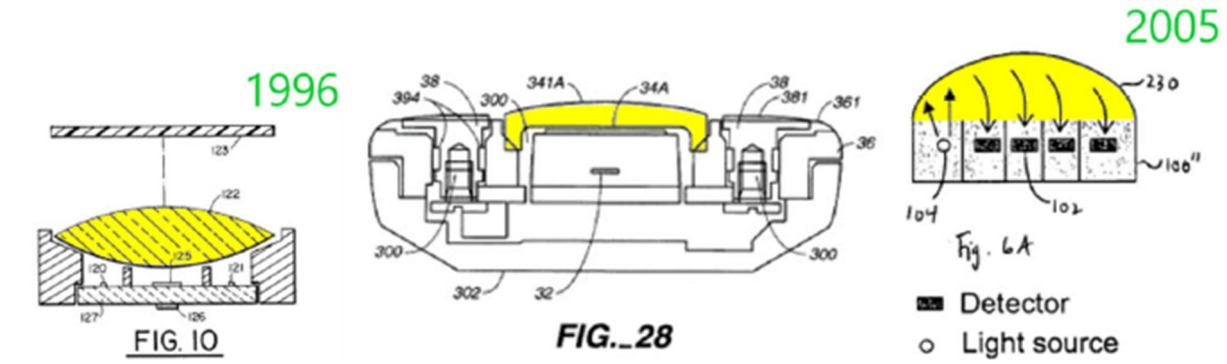


Paulke combined with Mendelson's Six-Photodiode Array

EX1006, FIG. 1G; EX1011, FIG. 7, 9:22-34; EX1014 ¶87; EX1003 ¶80. A DOSA also would have been motivated to modify the above design to have eight rectangular photodiodes (instead of six) to improve the sensor's accuracy. EX1011, 4:6-16, 4:59-62; EX1014 ¶87; EX1003 ¶80.

Furthermore, the difference between the claimed photodiode shapes (curved rectangles) and those in Mendelson (straight rectangles) was a change known in the art, which Apple confirmed by arguing that, years before the D'279 Patent, there was "nothing patentable" about multiple photodiodes. EX1021, 58:3-13, 1191:21-1192:6; EX1038, 2; EX1003 ¶81. And a DOSA would have been motivated to apply a slight curvature to each photodiode: (1) to visually parallel the corresponding curvatures of Paulke's (or Yuen or Fong's) arc-shaped portions and the sensor's overall circular shape; and (2) because using the same curvature for design aspects across the sensor face or back of the device would provide a visually consistent, simplistic, and appealing look of concentric circles. EX1006, FIGS. 1A-1C, 2B, 5A-5B; EX1011, FIG. 7; EX1003 ¶81.

Bushnell: Combining Bushnell's convex sensor housing with Paulke (or Yuen or Fong) would have been a change that was motivated by the prior art and well within a DOSA's capabilities. EX1003 ¶82. Indeed, Apple argued that sensors with convex protrusions, such as those shown below, were well-known long before the D'279 Patent.



EX1017, 64 (excerpted), 63 (arguing "prior to 2008, it also was known that optical sensors could include protrusions, including convex protrusions."), 22 (arguing "convex protrusions" known "for more than 50 years"), 75 (arguing "a POSITA would have understood the benefits of including a convex protrusion, including to improve signal quality."). Apple and its expert further argued that combining a convex protrusion with an optical sensor would have been obvious because the combination had "'already been done in various forms.'" EX1017, 120 (quoting EX1021, 1237:4-1238:6).

In addition to being a known modification, a DOSA would have been motivated to combine Bushnell's convex housing component 104 with Paulke's (or Yuen or Fong's) device for numerous reasons. First, a DOSA would have been motivated to combine Bushnell's convex housing component with Paulke's device to achieve the smooth, simplistic, and visually appealing back surface known in the art for such devices, as shown for example in Bushnell.

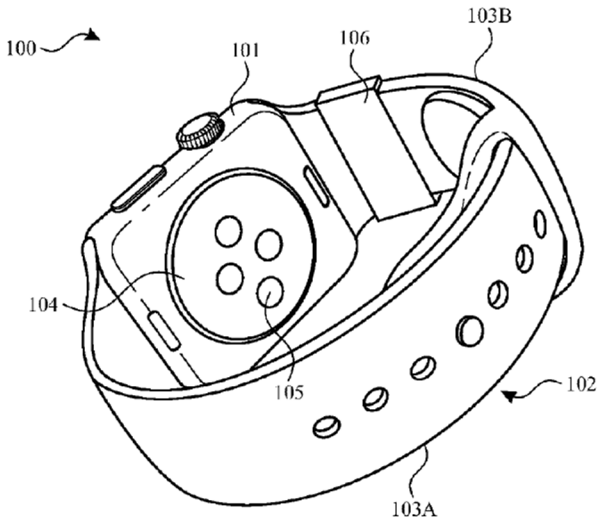


FIG. 1A

EX1009, FIG. 1A; EX1003 ¶83. Indeed, a DOSA would have understood that Bushnell's convex housing component was more visually appealing than Paulke's design because the separate protruding shapes of Paulke's design create a jagged, uneven appearance on the back of Paulke's device. EX1006, FIGS. 1E-2A; EX1009, FIGS. 1A, 2A; EX1003 ¶83. A DOSA also would have been motivated to make the proposed combination because the smooth, continuous design of Bushnell's housing component would be more comfortable against the user's skin than the numerous edges of the separate protruding shapes in Paulke's design. *Id.* A DOSA would have been further motivated to combine Bushnell's convex housing component with Paulke as proposed to cover and protect Paulke's sensors from damage and debris. EX1006, 15:6-9 (Paulke's "sensor … is protected from the outside by a glass lens 128"); EX1003 ¶83. Indeed, Apple has argued that one of skill would have been motivated to cover sensors in wearable devices like Paulke to "protect[] [the sensor]

from damage or interference caused by contaminants, such as hair, sweat/liquid, dirt, debris, etc." EX1017, 119. Further, Bushnell teaches that the convex surface of its housing component is transparent, and a DOSA would have been motivated to use a transparent material for that convex surface to allow light to pass through it and reach the underlying photodiodes. EX1009, FIGS. 2A-2B; EX1003 ¶83.

Further, a DOSA would have been motivated to combine Bushnell's convex housing component with Paulke to enable Paulke's device to align and mate with the complementary concave surface of prior art wireless chargers, as shown below.

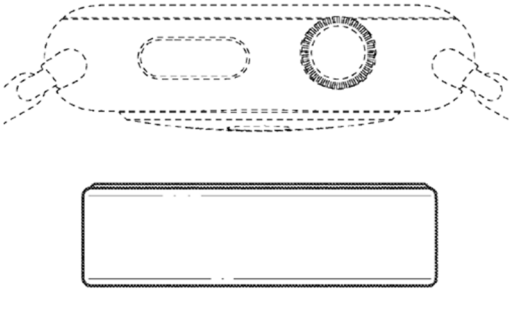


FIG. 10

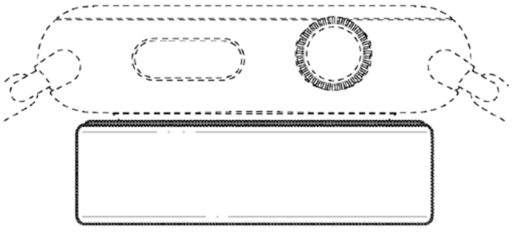


FIG. 11

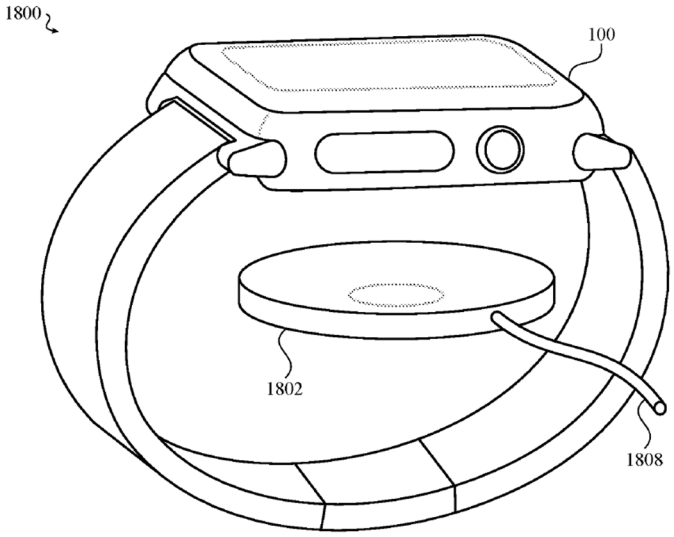
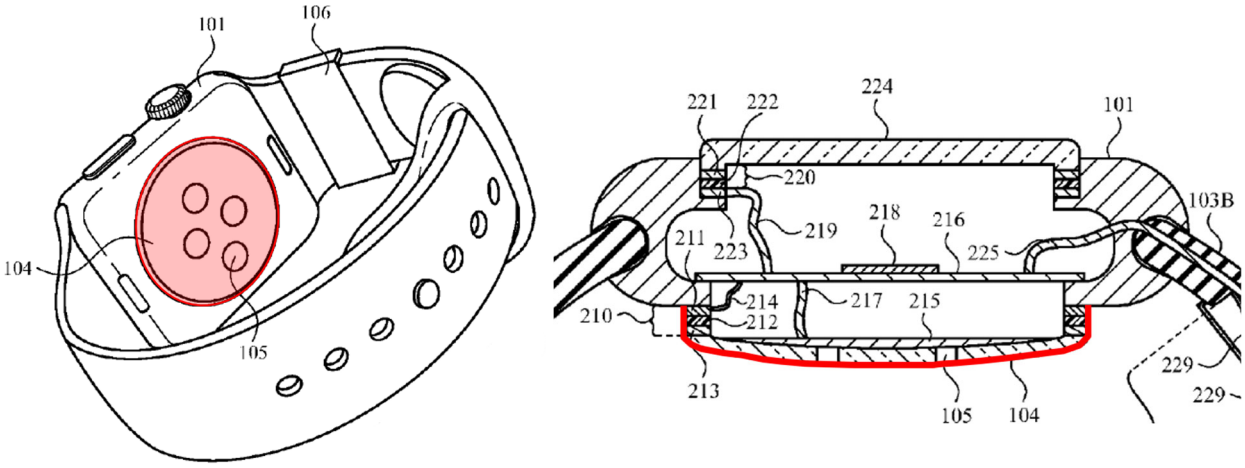


FIG. 18

EX1034, FIGS. 10-11 (left); EX1025, FIG. 18 (right), FIG. 19, 43:5-35, 45:18-51; EX1003 ¶84.

Additionally, a DOSA would have understood that Bushnell's housing component 104 is a convex protrusion from the back of the device, as shown in red below.



EX1009, FIGS. 1A, 2A; EX1003 ¶85. By 2018, a DOSA would have understood that using a convex protrusion like Bushnell's housing component was known to significantly improve the signal strength of PPG sensors. EX1030, 20:29-33 ("a convex [protrusion] … was found to help signal strength by about an order of magnitude"), 21:9-43 (explaining that a convex protrusion can significantly improve the transmittance and signal-to-noise ratio of the sensor, as shown in FIG. 5), FIG. 5; EX1014 ¶91; EX1003 ¶85. Indeed, Apple and its expert argued this motivation was well-known. EX1017, 75 ("A POSITA would have understood the benefits of including a convex protrusion, including to improve signal quality."); EX1021, 1210:13-1211:8 ("[I]t was already well-known that a convex curvature itself could be a useful element in increasing signal quality."). Thus, a DOSA would have been

motivated to combine Bushnell's convex housing component (red, above) with Paulke as proposed to improve the signal strength of Paulke's PPG sensor. EX1014 ¶91; EX1003 ¶85.

A DOSA also would have been motivated to combine Bushnell's convex housing component with Paulke to improve the contact (or coupling) between the sensor surface and the user's skin. EX1030, 20:52-60 ("[r]igid materials [for protrusion] can improve measurement accuracy ... by conforming the measurement site to the contact area"); EX1014 ¶92; EX1003 ¶85. Again, Apple argued this was a known motivation. EX1017, 117 ("A POSITA would have known there are benefits to using a protrusion with a convex surface, including, … better coupling and thus better measurements.").

Further, a DOSA would have understood that the proposed combination with Bushnell resulted in a device with the claimed vertical and chamfered edges because Bushnell's convex housing component includes those design aspects. *Supra* §VI.A.4; EX1003 ¶86. Additionally, a DOSA would have been motivated to combine Bushnell's chamfered edge with Paulke's sensor because chamfered edges were known design aspects to provide a simplistic, visually appealing transition between sensor components. EX1009, FIG. 1A; EX1006, FIG. 2A; EX1003 ¶86. A DOSA would have been further motivated to combine Bushnell's chamfered edge with Paulke because, as Apple confirmed, chamfered edges were "well-known" and

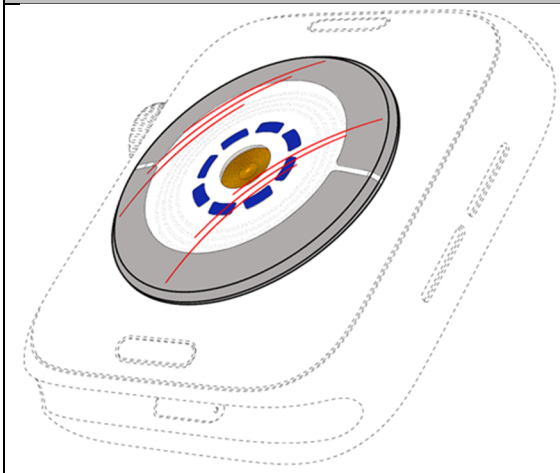
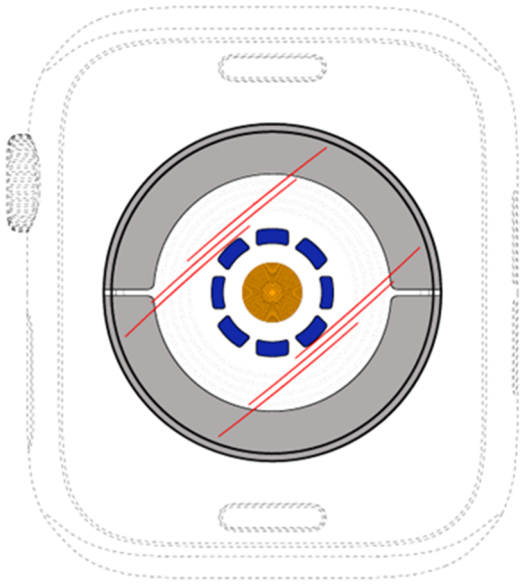
"disclosed in multiple [prior art] references" as providing improved user comfort. EX1017, 114.

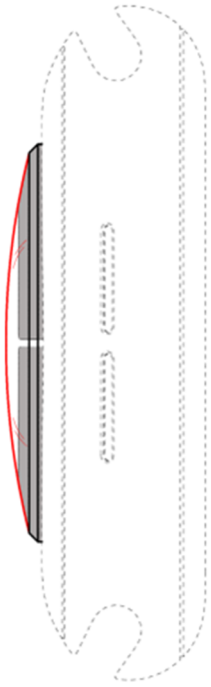
Chung: A DOSA would have been motivated to incorporate the Fresnel lens from Chung's FIG. 7 sensor over the LEDs (of Mendelson's PPG sensor) and within the convex protrusion (from Bushnell) used with Paulke's device. First, the relatedness of Paulke, Mendelson, and Chung suggests such a combination. *Supra* §VI.B.2.a. Further, a DOSA would have been motivated to make this combination because the addition of Chung's Fresnel lens would be visually consistent with the surrounding circular shapes of Paulke's design. EX1006, FIG. 1G; EX1010, FIG. 7; EX1003 ¶87. A DOSA also would have been motivated to make this combination "to obscure" the LEDs inside the device "and to reduce [the LEDs'] perceptibility." EX1028 ¶53; EX1003 ¶87. Further, a DOSA would have been motivated to include a Fresnel lens above the PPG sensor's LEDs as proposed to improve optical sensing efficiency. EX1028 ¶¶53, 56; EX1010 ¶¶62-63; EX1014 ¶93; EX1003 ¶87.

Moreover, any differences between the proposed combination and the claimed design were changes taught by the prior art. EX1003 ¶88. Any difference in the precise spacing, shape, size, or dimensions between the arc-shaped portions of Paulke (or Yuen or Fong) and the claimed design would have been a routine change that was suggested by the prior art and well within the capabilities of a DOSA. EX1006, 15:22-23 ("[a]ny suitable arrangement, alignment, shape, size" for the arc-

shaped portions), 14:29-32; EX1003 ¶88. A DOSA also would have been motivated to extend the ends of the arc-shaped electrodes (of Paulke, Yuen, and Fong) closer together to maximize the arc-shaped electrodes' surface area for contacting the user's skin in use. EX1014 ¶¶88 (discussion for Paulke), 98 (Yuen), 107 (Fong); EX1003 ¶88; EX1006, 15:22-24, 15:3-5 (teaching to shape arc-shaped portions "to help maintain contact between biosensors 120 and the wearer's skin"), 5:31-32, 6:5-7, 13:13-16, 16:1-4, FIG. 2B; *see also* EX1024, 17:22-28. A DOSA also would have been motivated to ensure that the electrodes, which are typically made of a conductive metal/coating (EX1044, FIG. 15, 13:22-48), were shaped to avoid interference between the device's charging coils and its charger. EX1014 ¶90 (discussion for Paulke), 99 (Yuen), 108 (Fong); EX1003 ¶88; EX1024, 17:22-31. And Apple confirmed that any difference between the chamfered edges of Paulke (or Yuen or Fong) and the claimed design would have been a modification suggested by the prior art by arguing that "[t]he use of chamfered edges" was "well-known in the art," "had been around for many decades, and was disclosed in multiple [prior art] references" as providing improved user comfort. EX1017, 114; EX1003 ¶88.

Accordingly, a DOSA would have been motivated to combine Paulke with Mendelson's sensor, Bushnell's convex housing component, and Chung's Fresnel lens as proposed to create a sensor with the same overall visual appearance as the claimed design, as shown below. EX1003 ¶89.

D'279 Patent	Paulke-Mendelson-Bushnell-Chung
 FIG. 2	
 FIG. 4	

D'279 Patent	Paulke-Mendelson-Bushnell-Chung
 FIG. 5	
 FIG. 7	

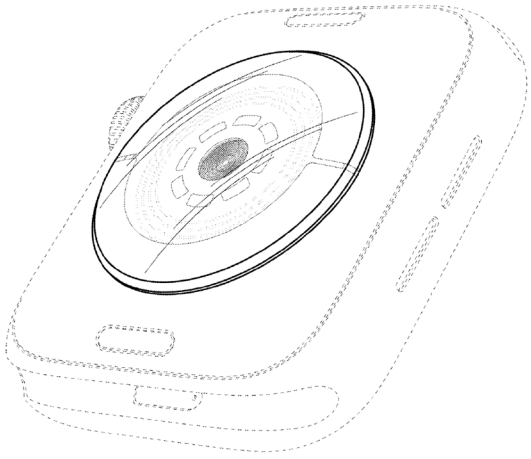
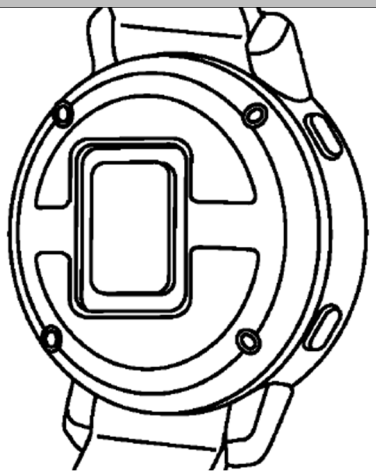
Thus, the Apple Watch sensor design claimed by the D'279 Patent would have been obvious to a DOSA over Paulke, Mendelson, Bushnell, and Chung. EX1003 ¶89. .

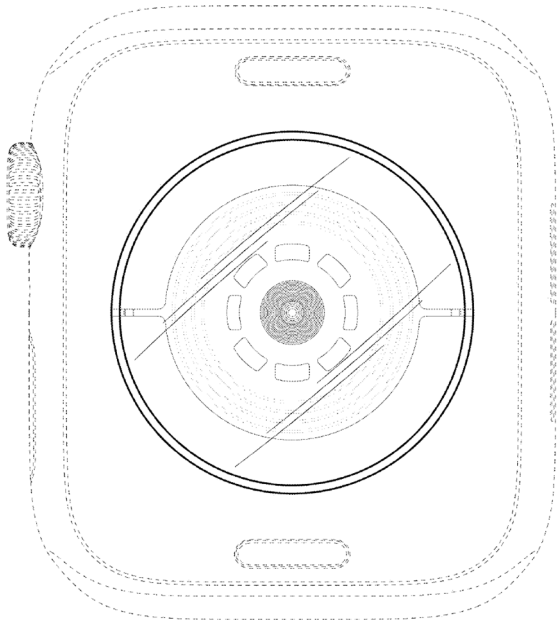
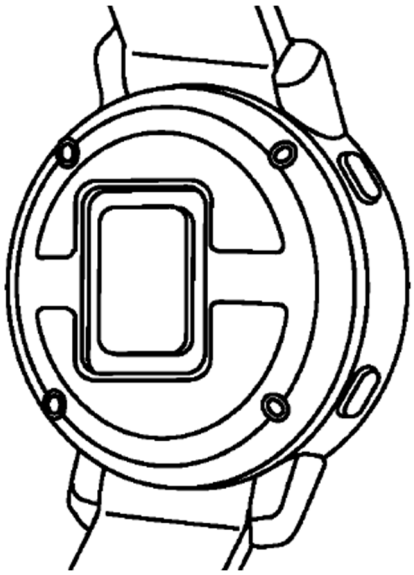
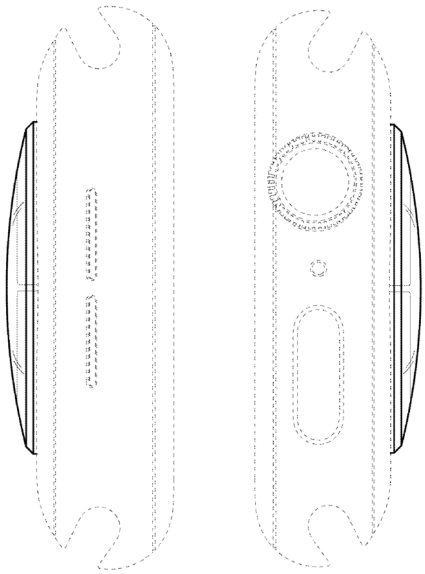
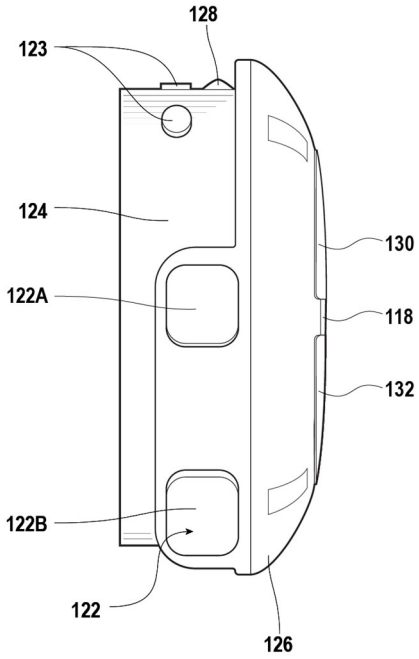
C. GROUND 2: Obviousness Over Yuen, Mendelson, Bushnell, Chung

1. Yuen Is A Primary Reference

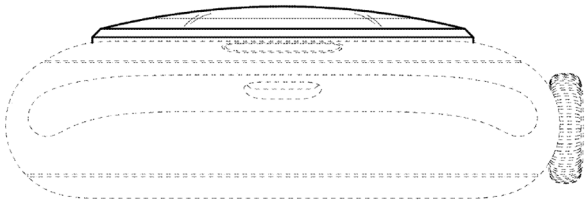
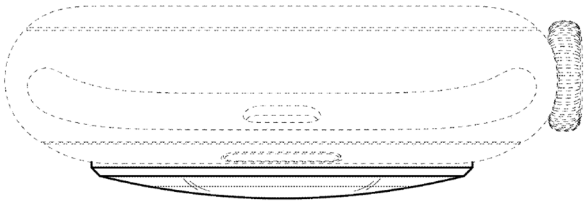
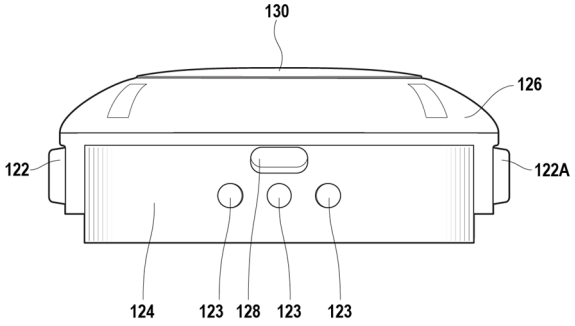
Yuen is a primary reference because its design characteristics are basically the same as the claimed design. EX1007, FIGS. 1, 3-4; EX1003 ¶¶90-102. As shown below, any differences between Yuen and the D'279 Patent do not change the designs' overall visual similarity. *See MRC*, 747 F.3d at 1332-33.

The following comparison demonstrates that the design characteristics of Yuen are basically the same as the claimed design:

D'279 Patent	Yuen (EX1007)
	
FIG. 2	FIG. 4 (flipped)

D'279 Patent	Yuen (EX1007)
 FIG. 4	 FIG. 4 (flipped)
 FIG. 5 FIG. 6	 Composite of FIGS. 1B, 3-4[5]

[5] EX1003 ¶90 n.2.

D'279 Patent	Yuen (EX1007)
 FIG. 7  FIG. 8	 Composite of FIGS. 1B, 3-4[6]

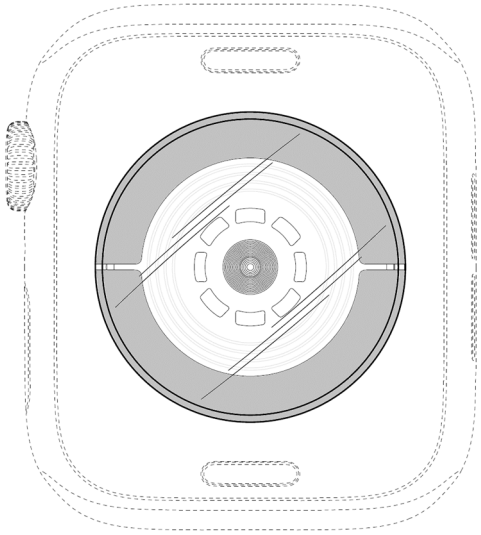
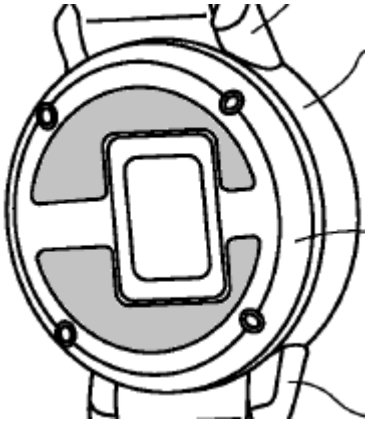
EX1001, FIGS. 2, 4-8; EX1007, FIGS. 1B, 3-4; EX1003 ¶90. The above comparison thus shows that Yuen is an appropriate primary reference because Yuen and the claimed design convey basically the same overall visual impression. *Id.* The overall visual similarity between the design characteristics of Yuen and the claimed design is further confirmed by the following comparison of their respective design aspects. *Id.*

a. <u>Arc-Shaped Portions</u>

The arc-shaped portions' arrangement should be disregarded as a functional element. *Supra* §IV.B.1.b. But even if considered, Yuen and the D'279 Patent disclose substantially the same arrangement of arc-shaped portions.

[6] EX1003 ¶90 n.3.

Yuen and the claimed design each have arc-shaped portions that are spaced apart from each other and a central sensor area. EX1001, FIG. 4; EX1007, FIGS. 1, 3-4; EX1003 ¶92. And the arc-shaped portions of Yuen and the D'279 Patent provide the same overall visual impression, as shown below. *Id.*

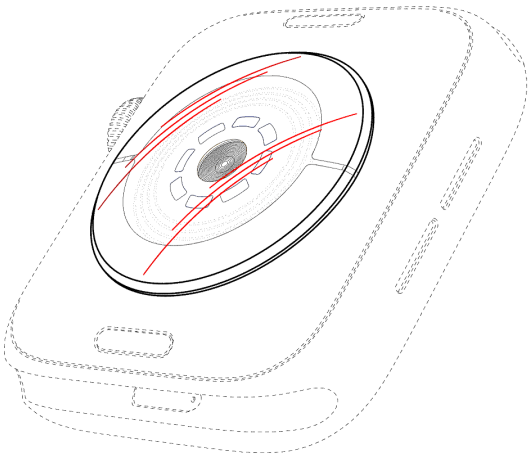
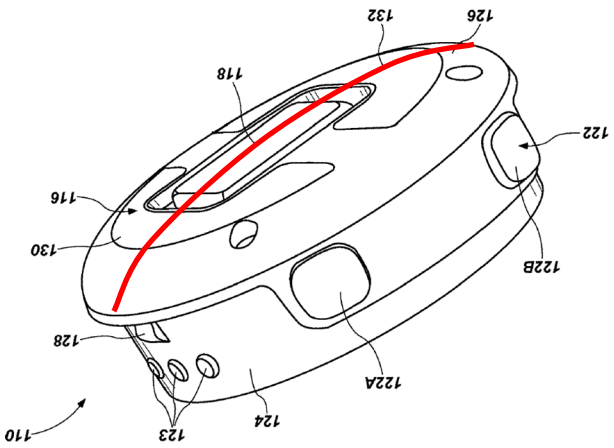
D'279 Patent	**Yuen (EX1007)**
	
FIG. 4	FIG. 1B

Yuen's arc-shaped portions have a slightly different shape and spacing than in the claimed design, but that difference, or any difference in the size, shape, or spacing of the arc-shaped portions of Yuen and the claimed design, does not alter the overall visual similarity of these designs. EX1001, FIG. 4; EX1007, FIGS. 1, 3-4; EX1003 ¶92; *MRC*, 747 F.3d at 1332-33. And any differences between Yuen and the claimed design would have been obvious changes to a DOSA. *Infra* §VI.C.2.b.

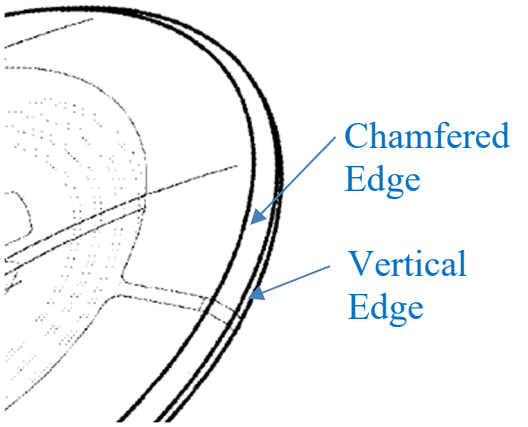
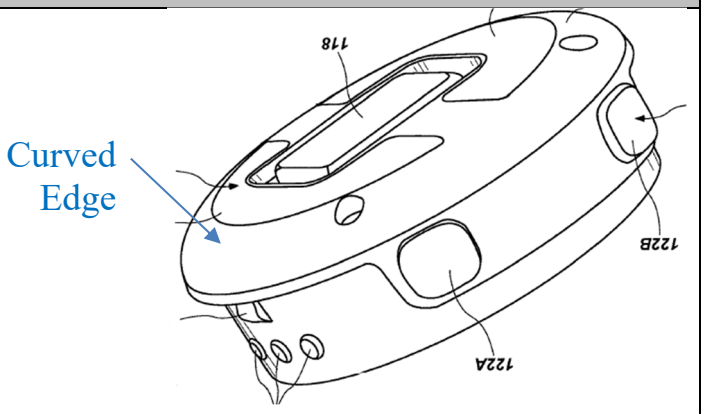
Thus, Yuen discloses arc-shaped portions with basically the same design characteristics as the claimed design. EX1003 ¶92.

b. Convex Protrusion

The claimed convex protrusion—the convex surface, chamfered edge, and vertical edge—should be disregarded as a functional element. *Supra* §IV.B.1.a. If the convex surface is considered, Yuen and the claimed design have a convex surface that provides the same overall visual impression, as shown below. EX1001, FIGS. 2, 4-8; EX1007, FIGS. 3-4; EX1003 ¶94.

D'279 Patent	Yuen (EX1007)
 FIG. 2	 FIG. 3A (rotated)

Further, if the chamfered and vertical edges are considered, Yuen's design differs only slightly because it has a curved edge (below, right) instead of vertical and chamfered edges (below, left). EX1001, FIG. 2; EX1007, FIG. 3A; EX1003 ¶94.

D'279 Patent	Yuen (EX1007)
 FIG. 2	 FIG. 3A (rotated)

However, any differences between the design of Yuen and the claimed design would not prevent Yuen's use as a primary reference. *Id.*; EX1003 ¶94; *MRC*, 747 F.3d at 1332-33 (primary reference can have some "major differences" and "slight differences" from claimed design).

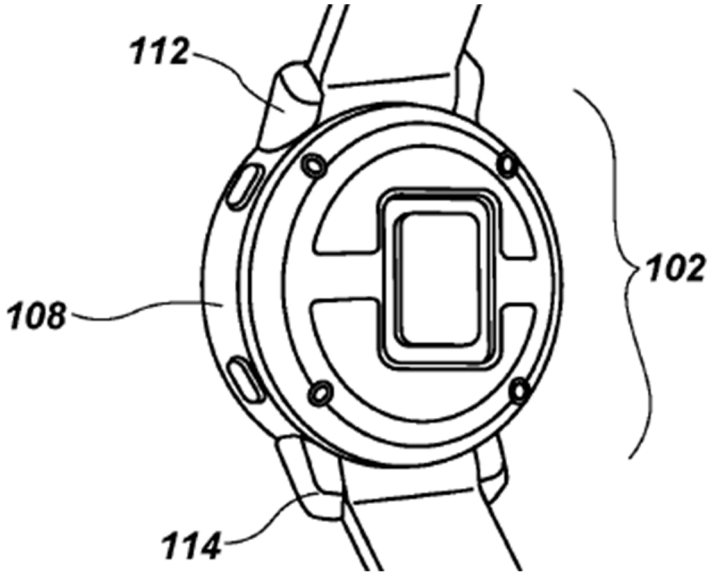
Accordingly, Yuen discloses a convex protrusion with basically the same design characteristics as the claimed design. EX1003 ¶94.

c. Rectangles

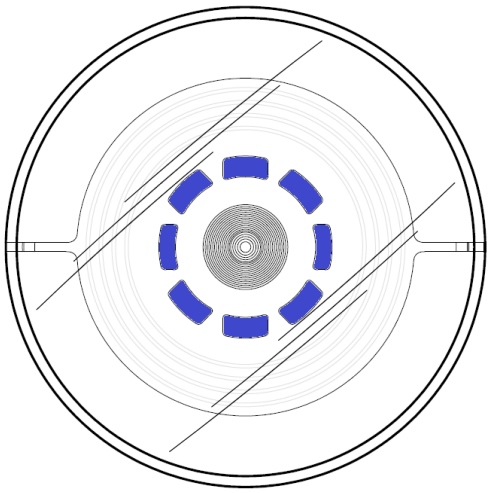
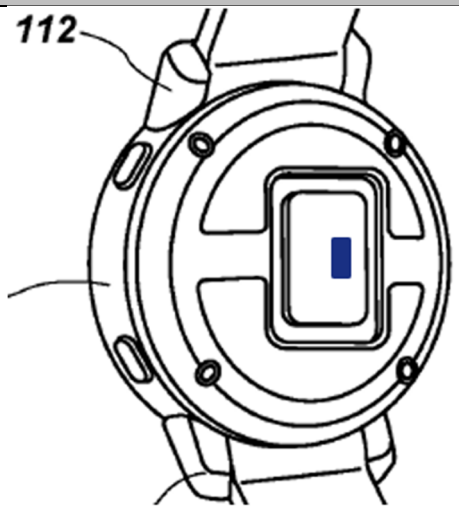
The claimed arrangement of rectangles should be disregarded because it is a functional element. *Supra* §IV.B.1.c. Yuen discloses a design with the same basic design characteristics as the claimed design because Yuen includes at least one central rectangle, as explained below.

Yuen's arc-shaped portions surround a central PPG sensor, which can be "any PPG sensor 118 known in the art." EX1007, FIGS. 1B, 3A, 4, ¶¶41-42. Yuen's

PPG sensor "extend[s] through the back cover 126 in a location in-between [arc-shaped] electrodes of the … ECG sensor," as shown below.



Id., ¶42, FIG. 4. For the reasons explained above with respect to Paulke, *supra* §VI.B.1.c, a DOSA would have understood Yuen's PPG sensor included at least one rectangular photodiode, as shown in the example below (right). EX1007, FIG. 4; EX1014 ¶78; EX1003 ¶97.

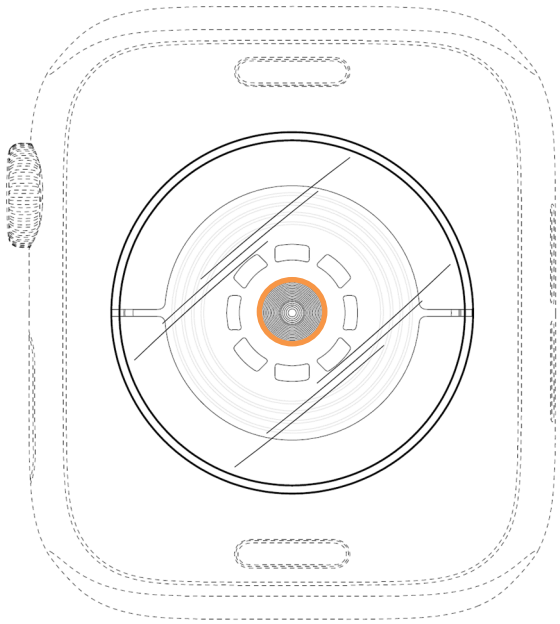
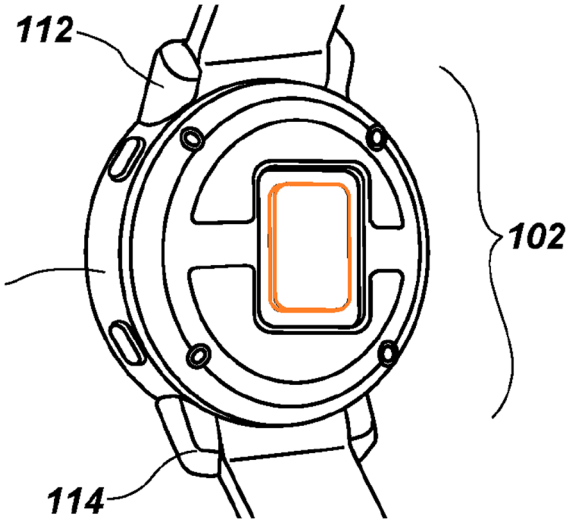
D'279 Patent	Yuen (EX1007)
 FIG. 4	 FIG. 4 (Composite)

The claimed design includes a circular arrangement of rectangles, as shown above. EX1003 ¶97. Therefore, a DOSA would have understood that Yuen and the claimed design include one or more central rectangles with the same basic design characteristics. *Id.* Regardless, even if Yuen did not include a central rectangle, it would still be an appropriate primary reference. *Id.*; *see MRC*, 747 F.3d at 1332-33.

If the D'279 Patent's circular array of eight rectangles is considered, Yuen differs from the claimed design because Yuen only includes the one rectangle above. EX1003 ¶98. Despite this difference, Yuen remains an appropriate primary reference for the same reasons discussed above regarding Paulke. *Id.* ¶¶98-99; *supra* §VI.B.1.c.

d. Concentric Circles

The claimed concentric circles should be disregarded as a functional element. *Supra* §IV.B.1.d. If those circles are considered, Yuen differs from the claimed design because it includes a central square rather than central concentric circles, as shown below.

D'279 Patent	Yuen (EX1007)
 FIG. 4	 FIG. 4

EX1001, FIG. 4; EX1007, FIG. 4; EX1003 ¶101. But Yuen remains a primary reference despite this difference. *Id.*; *MRC*, 747 F.3d at 1332-33 (primary reference can have some "major differences" and "slight differences" from claimed design). Indeed, Yuen is a primary reference because its overall design (above, right) includes multiple concentric circles, and the arrangement of concentric circles does not

change the overall visual similarity between Yuen and the claimed design. EX1003 ¶101; EX1001, FIG. 4; EX1007, FIG. 4.

Accordingly, Yuen discloses basically the same design characteristics as the claimed design. EX1003 ¶101.

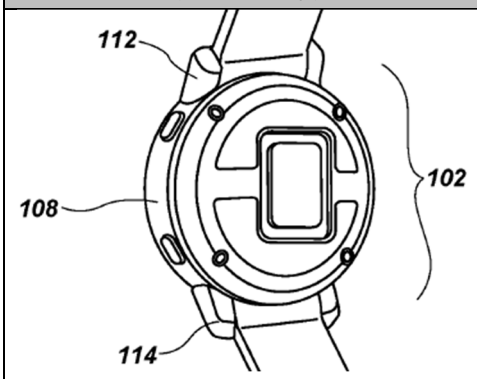
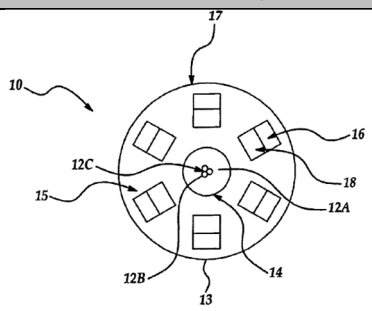
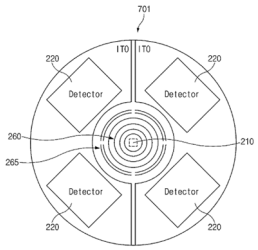
In sum, Yuen is a primary reference because it discloses basically the same visual impression as the claimed design. *Id.* ¶102.

The D'279 Patent's circular array of rectangles and concentric circles are functional and thus do not change the two designs' overall visual similarity. *Supra* §§IV.B.1.c-d. Even if these design aspects were considered, Yuen's only differences from the claimed design would be that Yuen has one rectangle instead of a circular array of them, one central rectangle instead of concentric circles, and curved edges. EX1003 ¶102. However, as shown below, these differences would have been obvious to a DOSA. *Id.* Indeed, combining Yuen, Mendelson, Bushnell, and Chung creates a design with the same overall visual appearance as the claimed Apple Watch sensor design. *Id.*

2. The Challenged Claim Would Have Been Obvious

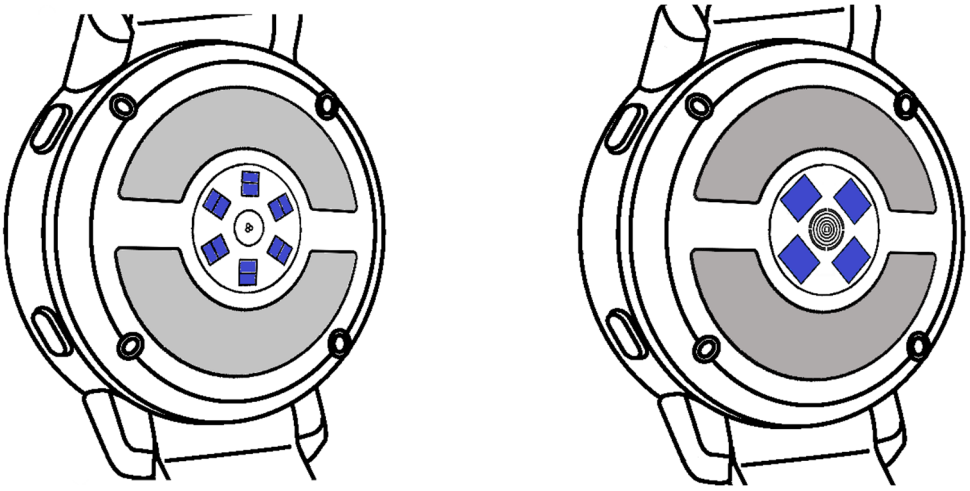
a. Mendelson, Bushnell, and Chung Are Secondary References

Mendelson/Chung: The following visual comparison demonstrates that the sensor designs of Mendelson and Chung are so related to Yuen that they are proper secondary references.

Yuen (Primary)	**Mendelson (Secondary)**	**Chung (Secondary)**
		
EX1007, FIG. 4	EX1011, FIG. 7	EX1010, FIG. 7

EX1003 ¶103. Yuen describes and shows (above) that its arc-shaped electrodes surround a central PPG sensor. EX1007 ¶¶35, 41-42, FIG. 4. Yuen expressly suggests using "any PPG sensor [] known in the art" for the PPG sensor of Yuen's device. *Id.* ¶41; EX1003 ¶103.

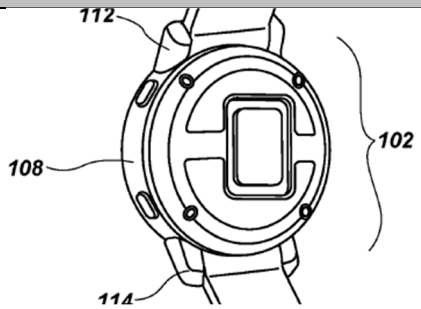
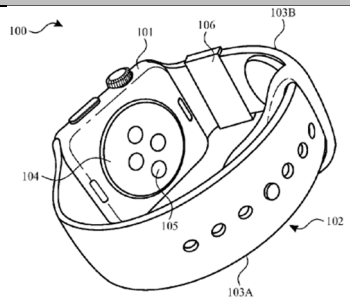
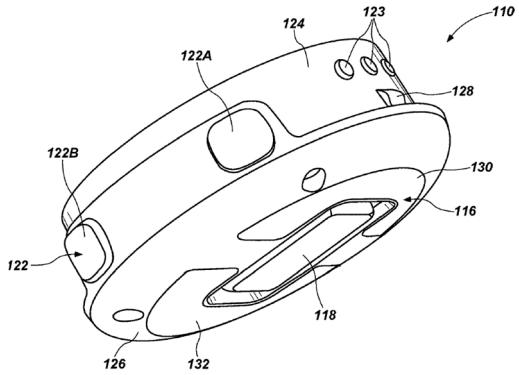
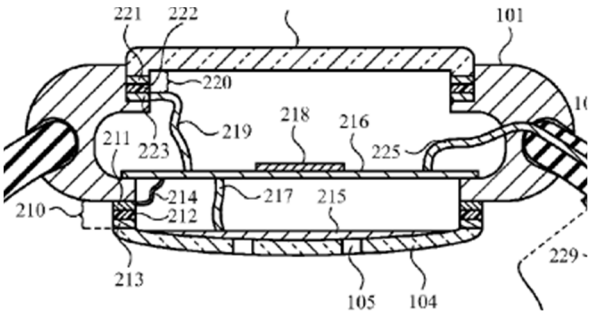
Mendelson and Chung are so related to Yuen because they disclose suitable PPG sensors for Yuen's design. *Supra* §§VI.A.5-6; EX1003 ¶104. As shown in the composite figures below, Mendelson's (left) and Chung's (right) PPG sensors have a circular shape especially suited for the available area between Yuen's arc-shaped electrodes.



EX1007, FIG. 4 (combined with EX1011, FIG. 7 (left) and EX1010, FIG. 7 (right)); EX1003 ¶104. The designs are also related because Yuen suggests combining its device with any suitable PPG sensor (EX1007 ¶41), which Mendelson and Chung disclose. EX1011, FIG. 7, 9:22-40; EX1010, FIG. 7, ¶¶103-109; EX1014 ¶95; EX1003 ¶104. The three PPG sensors designs are further related because they include the same basic components. *Supra* §VI.A.1; EX1003 ¶104.

Accordingly, given the relatedness and similarity of the designs, the appearance of Mendelson's FIG. 7 sensor and Chung's FIG. 7 sensor would have suggested the application of their features, including Mendelson's sensor and Chung's Fresnel lens, to the design of Yuen's PPG sensor. EX1003 ¶104. Thus, Mendelson and Chung are appropriate secondary references. *Id.*

Bushnell: The below visual comparison demonstrates that Bushnell's sensor design is so related to Yuen's sensor that Bushnell is a proper secondary reference.

Yuen (Primary)	Bushnell (Secondary)
 EX1007, FIG. 4	 EX1009, FIG. 1A
 EX1007, FIG. 3A	 EX1009, FIG. 2A

EX1003 ¶105. Yuen (above, left) discloses arc-shaped electrodes, a central PPG sensor, and a circular convex surface protruding from the back of the wrist-worn electronic device. *Id.*; EX1007, FIGS. 1B, 3A, 4, Abstract, ¶¶35-36, 41-42.

Bushnell is so related to Yuen because it discloses a suitable design for Yuen's device. As shown above, both references concern a circular, convex surface that protrudes from the back of the wrist-worn device and incorporates the device's sensors. EX1007, FIGS. 1B, 3A, 4; EX1009, FIGS. 1-7; EX1003 ¶106. The similarities between the convex surface and overall circular shape of Bushnell's housing component 104 and Yuen's convex protruding back surface 126 would have

suggested using Bushnell's design with Yuen's device. *Id.*; EX1003 ¶106. The designs are also related because, in each, the convex protruding surface incorporates electrodes and a PPG sensor. EX1007 ¶¶35-36, 42, FIG. 3A; EX1009 ¶¶40, 48, 71, 74, FIGS. 2-7; EX1003 ¶106; EX1014 ¶¶78, 80. Additionally, the designs are related because Yuen suggests using any known PPG sensor (EX1007 ¶41), which Bushnell discloses. EX1009 ¶48; EX1003 ¶106. The designs are also related because their PPG sensors include the same basic components. *Supra* §VI.A.1; EX1003 ¶106.

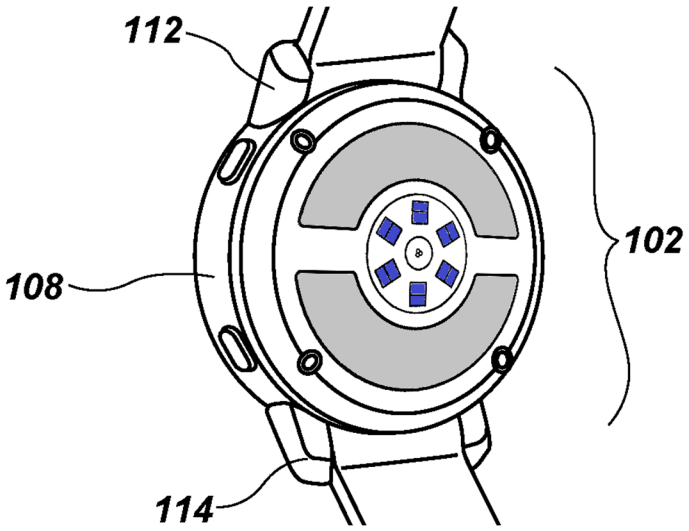
Accordingly, given the designs' relatedness and similarity, the appearance of Bushnell's design would have suggested the application of its features, including its convex housing component, to the design of Yuen's device. EX1003 ¶106. Bushnell is thus an appropriate secondary reference. *Id.*

b. The Challenged Claim Would Have Been Obvious Over Yuen, Mendelson, Bushnell, and Chung

Mendelson: Combining Mendelson's sensor design with Yuen was a known change that was suggested by the prior art and well within a DOSA's capabilities. *Supra* §VI.B.2.b; EX1003 ¶107.

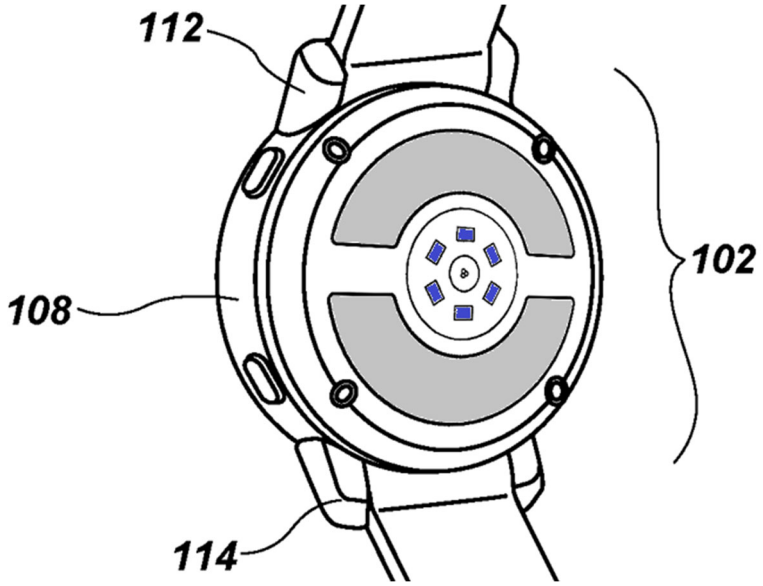
Moreover, a DOSA would have been motivated to use Mendelson's sensor design with Yuen's device. First, Yuen suggests such a combination. EX1007 ¶¶41-42, FIG. 1B; EX1011, FIG. 7; EX1003 ¶108. Second, the relatedness of Mendelson and Yuen's designs would have suggested their combination. *Supra* §VI.C.2.a;

EX1003 ¶108. Third, achieving a symmetrical sensor design would have motivated this combination, for the reasons explained above. *Supra* §VI.B.2.b; EX1003 ¶108. For example, a DOSA would have been motivated to use Mendelson's PPG sensor design because the resulting symmetrical design, shown below, would be more visually appealing and marketable than Yuen's asymmetrically located PPG sensor.



Yuen (EX1007, FIG. 4) combined with Mendelson (EX1011, FIG. 7)

EX1003 ¶108. Fourth, improving Yuen's PPG sensor accuracy would have motivated this combination. *Supra* §VI.B.2.b; EX1014 ¶96; EX1003 ¶108. Fifth, a DOSA would have been motivated to use Mendelson's design because, unlike Yuen's square PPG sensor, Mendelson's circular design is visually consistent with the surrounding circular shapes of Yuen's device. EX1007, FIGS. 1B, 3A, 4; EX1003 ¶108. Sixth, a DOSA would have been motivated to use one of Mendelson's six-photodiode arrays in Yuen's device, *supra* §VI.B.2.b, as shown below.



Yuen combined with Mendelson's Six-Photodiode Array

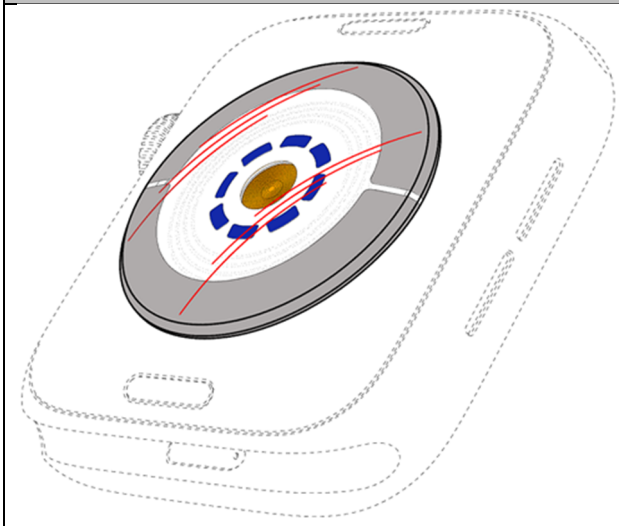
EX1007, FIG. 4; EX1011, FIG. 7, 4:1-62; EX1014 ¶97; EX1003 ¶108. And seventh, the differences between the six straight rectangle-shaped photodiodes shown above and the claimed design (eight curved rectangle-shaped photodiodes) are changes that a DOSA would have been motivated to make. *Supra* §VI.B.2.b; EX1003 ¶108.

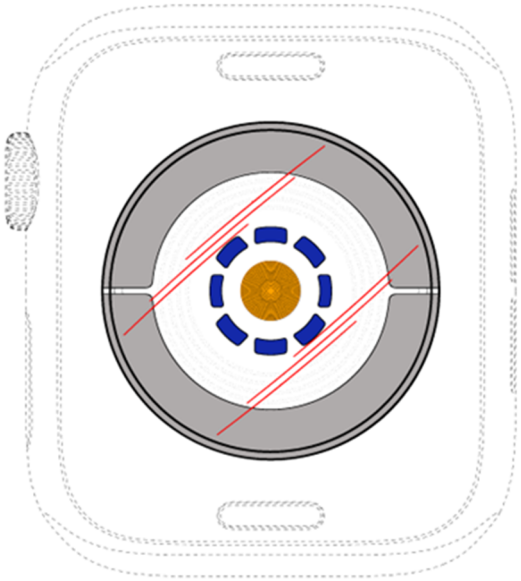
Bushnell, Chung: For the same reasons explained above in Section VI.B.2.b, combining Bushnell's convex housing component (including its chamfered and vertical edges) with Yuen's device and Chung's FIG. 7 Fresnel lens over the LEDs of the PPG sensor used by Yuen (i.e., Mendelson's sensor) as proposed would have been routine changes that a DOSA would have been motivated to make. EX1014 ¶¶100-102; EX1003 ¶¶109-110. Additionally, a DOSA would have been motivated to combine Yuen's device with Bushnell as proposed to attain the smoother and

more visually appealing back surface provided by Bushnell's convex housing component 104. EX1009, FIG. 1; EX1003 ¶109.

Moreover, any differences between the proposed combination and the claimed design would have been changes that were taught by the prior art and a DOSA would have been motivated to make. *Supra* §VI.B.2.b; EX1003 ¶111.

Accordingly, a DOSA would have been motivated to combine Yuen with Mendelson's sensor, Bushnell's convex housing component, and Chung's Fresnel lens to create a sensor with the same overall visual appearance as the claimed design, as shown below. EX1003 ¶112.

D'279 Patent	Yuen-Mendelson-Bushnell-Chung
 FIG. 2	

D'279 Patent	Yuen-Mendelson-Bushnell-Chung
 FIG. 4	
 FIG. 5	

D'279 Patent	Yuen-Mendelson-Bushnell-Chung
 FIG. 7	

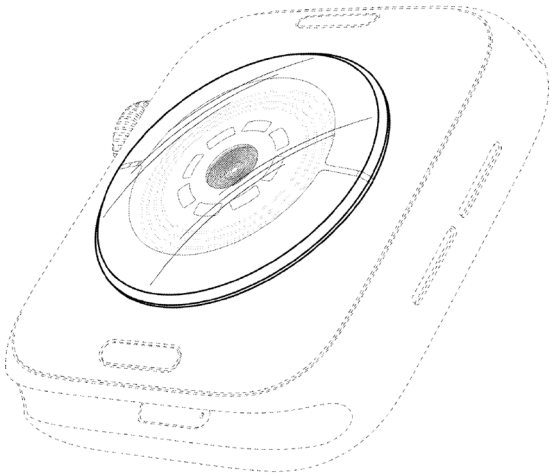
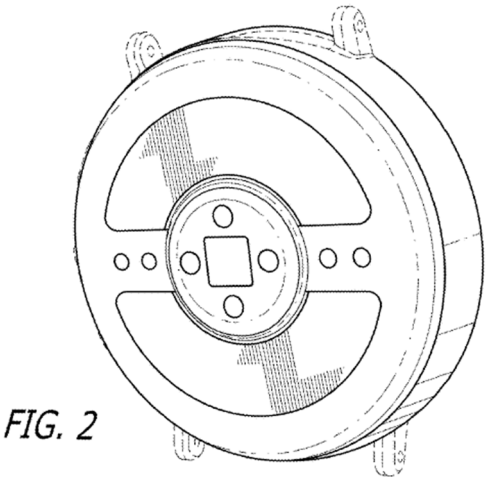
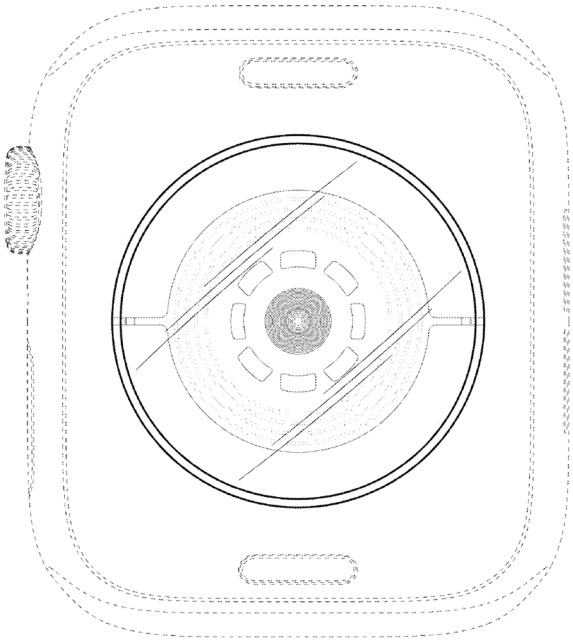
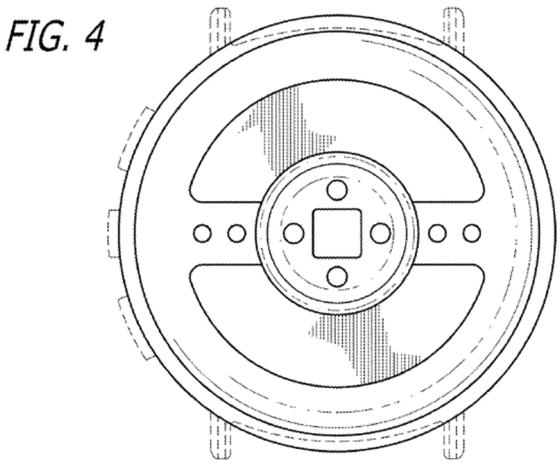
Thus, the Apple Watch sensor design claimed by the D'279 Patent would have been obvious to a DOSA over Yuen, Mendelson, Bushnell, and Chung. EX1003 ¶112.

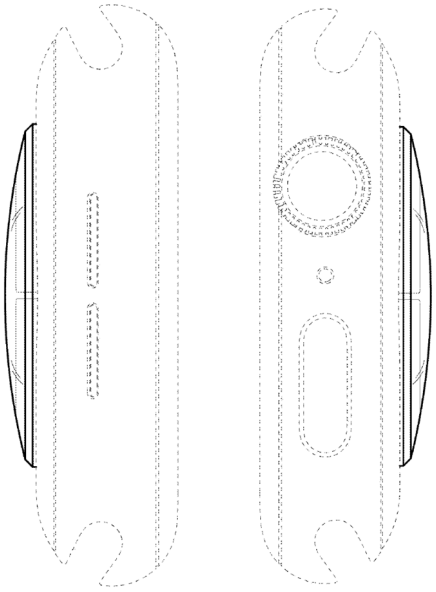
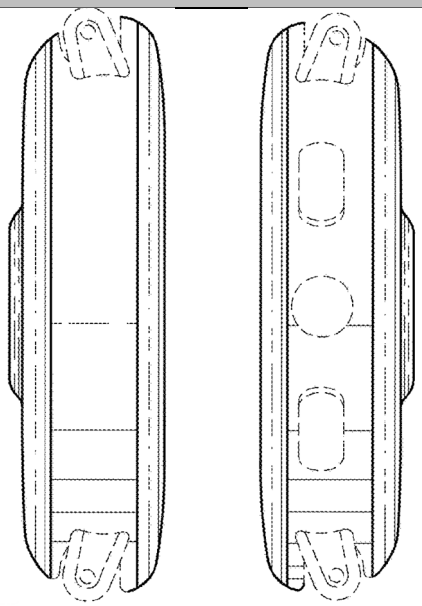
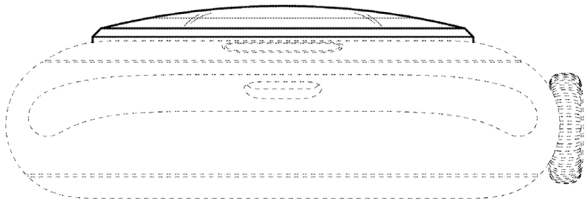
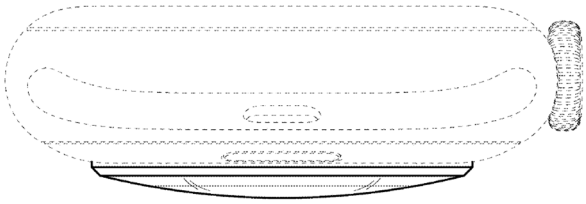
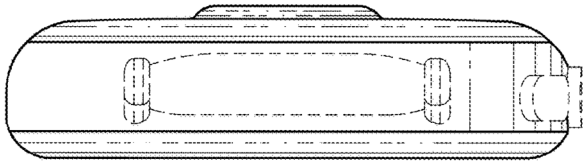
D. GROUND 3: Obviousness Over Fong, Mendelson, Bushnell, Chung

1. Fong Is A Primary Reference

Fong is a primary reference because its design characteristics are basically the same as the claimed design. EX1001, FIGS. 2, 4-8; EX1008, FIGS. 2, 4-8; EX1003 ¶¶113-125. As shown below, any differences between Fong and the D'279 Patent do not change the overall visual similarity of the designs. *See, e.g.*, *MRC*, 747 F.3d at 1332-33.

The following comparison demonstrates that the design characteristics of Fong are basically the same as the claimed design:

D'279 Patent	Fong (EX1008)
 FIG. 2	 FIG. 2
 FIG. 4	 FIG. 4

D'279 Patent	Fong (EX1008)
 FIG. 5 FIG. 6	 FIG. 5 FIG. 6
 FIG. 7  FIG. 8	 FIG. 7  FIG. 8

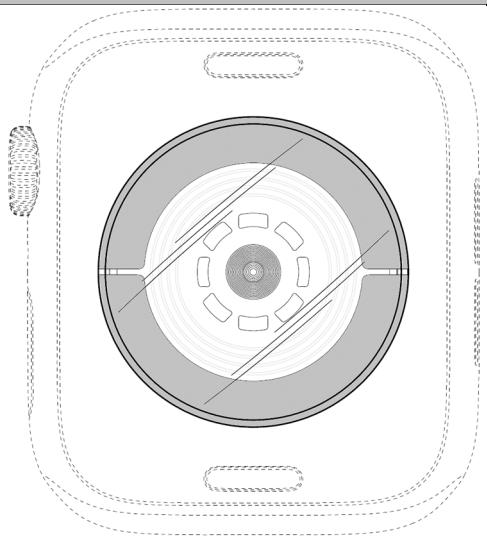
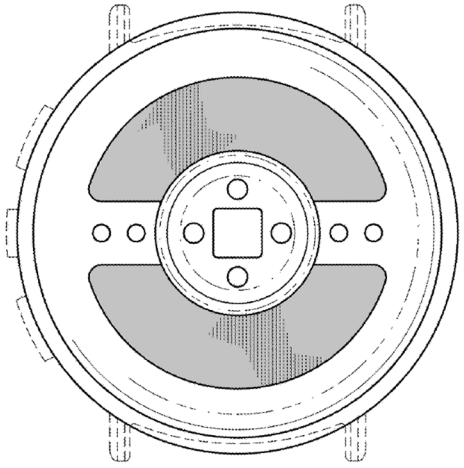
EX1001, FIGS. 2, 4-8; EX1008, FIGS. 2, 4-8; EX1003 ¶113. The above comparison thus shows that Fong is an appropriate primary reference because Fong and the claimed design convey basically the same overall visual impression. *Id.* The overall visual similarity between the design characteristics of Fong and the claimed design

is further confirmed by the following comparison of their respective design aspects. *Id.*

a. <u>Arc-Shaped Portions</u>

The arc-shaped portions' arrangement should be disregarded as a functional element. *Supra* §IV.B.1.b. But even if considered, Fong and the D'279 Patent disclose substantially the same arrangement of arc-shaped portions.

Fong and the claimed design each have arc-shaped portions that are spaced apart from each other and a central circular area. EX1001, FIGS. 2, 4; EX1008, FIGS. 2, 4; EX1003 ¶115. The arc-shaped portions of Fong and the D'279 Patent provide the same overall visual impression, as shown below.

D'279 Patent	Fong (EX1008)
	
FIG. 4	FIG. 4

EX1001, FIGS. 2, 4; EX1008, FIGS. 2, 4; EX1003 ¶115. Fong's arc-shaped portions are slightly wider and farther apart than in the claimed design, but that difference, or

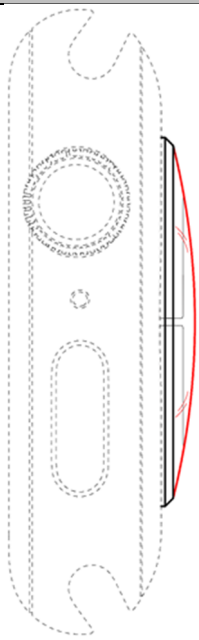
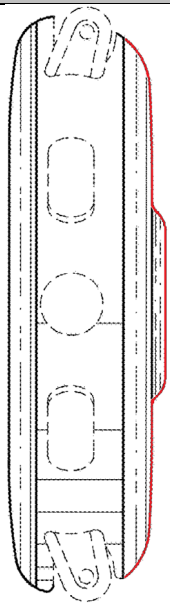
any difference in the size, shape, or spacing of the arc-shaped portions of Fong and the claimed design, does not alter the overall visual similarity of these designs. *Id.*; *see MRC*, 747 F.3d at 1333. And any differences between Fong and the claimed design would have been obvious changes to a DOSA. *Infra* §VI.D.2.b.

Thus, Fong discloses arc-shaped portions with basically the same design characteristics as the claimed design. *Id.* ¶115.

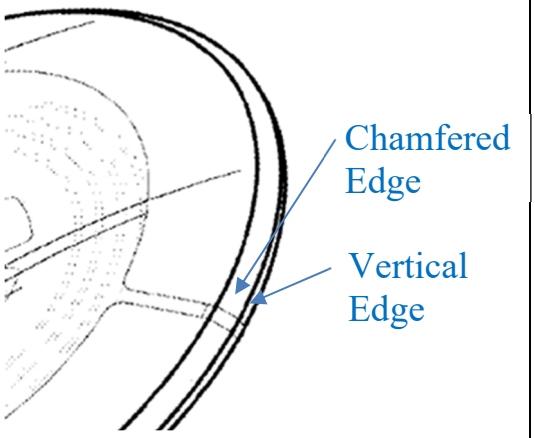
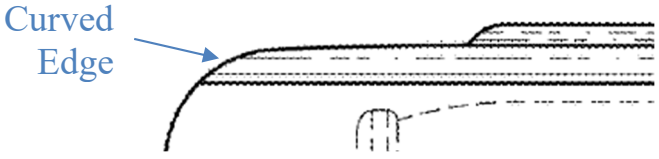
b. Convex Protrusion

The claimed convex protrusion—the convex surface, chamfered edge, and vertical edge—should be disregarded as functional. *Supra* §IV.B.1.a.

If the convex surface is considered, Fong discloses the same basic design characteristics as the claimed design, as shown below. EX1001, FIGS. 2, 4-8; EX1008, FIGS. 1-8; EX1003 ¶117.

D'279 Patent	Fong (EX1008)
 FIG. 6	 FIG. 6

As shown above, a DOSA would have understood that Fong's design includes a convex surface (red). EX1008, FIG. 6; EX1003 ¶117. Further, if the chamfered and vertical edges are considered, Fong's design differs slightly because it has a curved edge (below, right) instead of a chamfered and vertical edge (below, left).

D'279 Patent	Fong (EX1008)
 FIG. 2	 FIG. 7

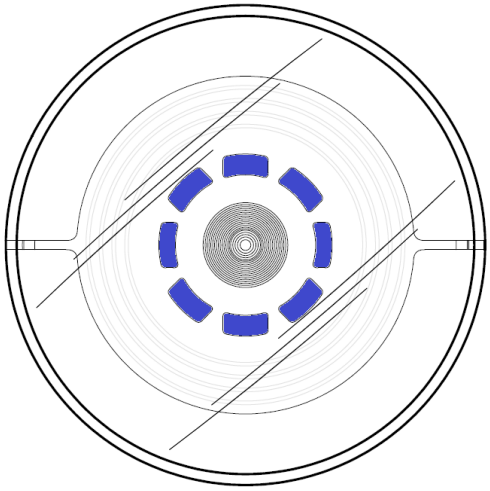
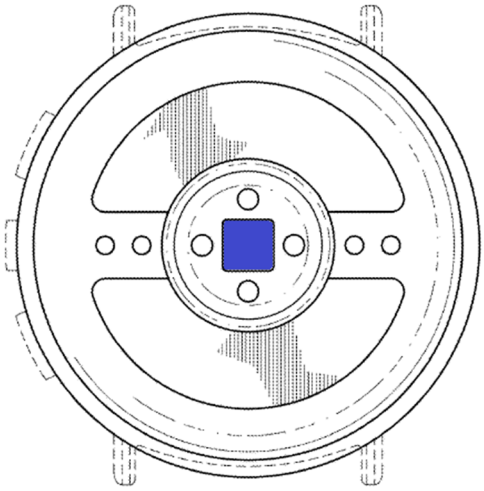
EX1001, FIGS. 2, 5-8; EX1008, FIGS. 2, 5-8; EX1003 ¶117. However, any differences between Fong and the claimed design do not prevent Fong's use as a primary reference. *Id.*; *MRC*, 747 F.3d at 1332-33 (permitting primary reference with "three major differences").

Accordingly, Fong discloses a convex protrusion with basically the same design characteristics as the claimed design. EX1003 ¶117.

c. Rectangles

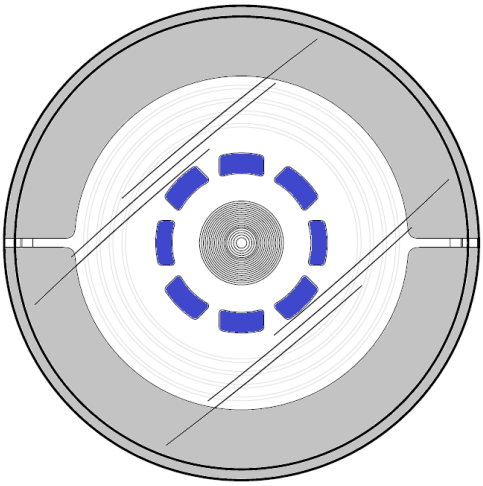
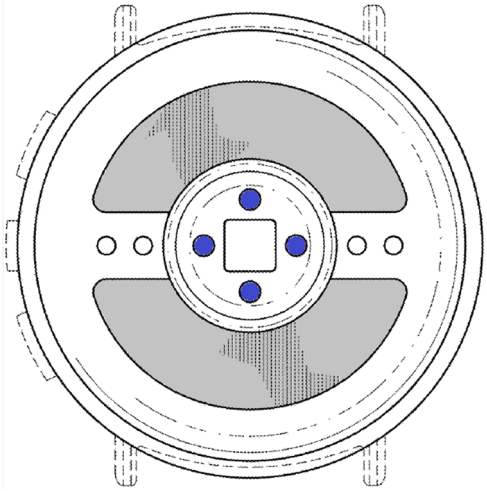
The claimed arrangement of rectangles should be disregarded because it is a functional element. *Supra* §IV.B.1.c. Fong discloses a design with the same basic design characteristics because Fong includes at least one central rectangle, as explained below.

A DOSA would have understood that Fong's PPG sensor included at least one rectangular photodiode and one or more light sources for the reasons explained above. *Supra* §VI.B.1.c. Indeed, Fong's PPG sensor includes at least one rectangular photodiode, as shown below (right). *Supra* §VI.A.3; EX1003 ¶120.

D'279 Patent	Fong (EX1008)
 FIG. 4	 FIG. 4

The claimed design includes a circular arrangement of rectangles, as shown above. EX1003 ¶120. Therefore, a DOSA would have understood that Fong and the claimed design include one or more central rectangles with the same basic design characteristics*Id.* Regardless, even if Fong did not include a central rectangle, it would still be an appropriate primary reference. *Id.*; *MRC*, 747 F.3d at 1332-33.

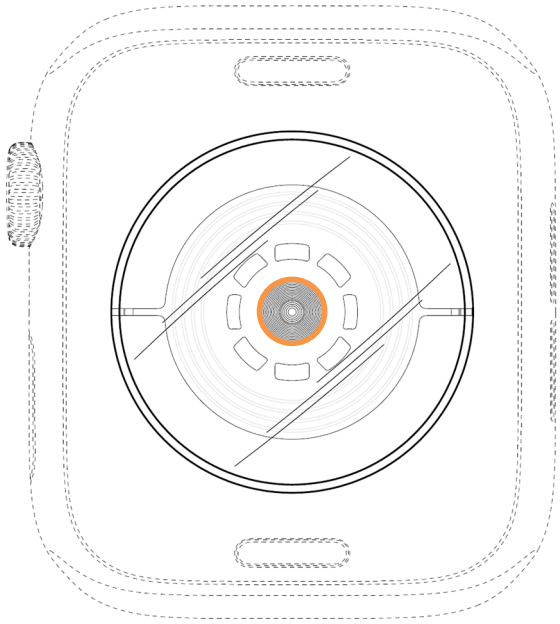
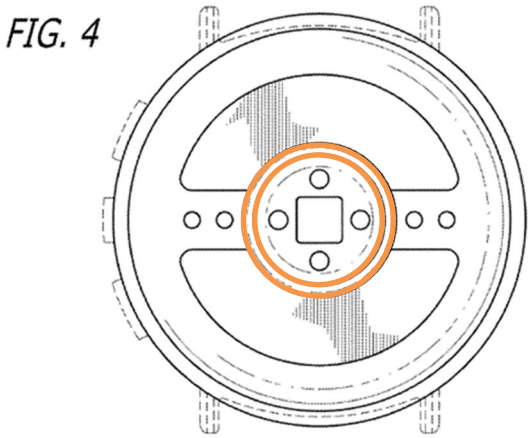
If the D'279 Patent's circular array of eight rectangles is considered, Fong differs only slightly from the claimed design because Fong's circular array only includes the four circles shown below. EX1001, FIG. 4; EX1008, FIG. 4; EX1003 ¶121.

D'279 Patent	Fong (EX1008)
 FIG. 4	 FIG. 4

Despite this difference, Fong remains an appropriate primary reference for the same reasons discussed above regarding Paulke. EX1003 ¶122; *supra* §VI.B.1.c.

d. <u>Concentric Circles</u>

The claimed concentric circles should be disregarded as a functional element. *Supra* §IV.B.1.d. If those circles are considered, Fong differs from the claimed design because it includes fewer central concentric circles than the claimed design, as shown below.

D'279 Patent	Fong (EX1008)
 FIG. 4	 FIG. 4

EX1001, FIG. 4; EX1008, FIG. 4; EX1003 ¶124. But Fong remains a primary reference despite this difference. *MRC*, 747 F.3d at 1332-33 (permitting primary reference with "three major differences"). Indeed, Fong is a primary reference because its overall design (above, right) includes multiple concentric circles, and the arrangement of the concentric circles does not change the overall visual similarity between Fong and the claimed design. EX1003 ¶124; EX1001, FIG. 4; EX1008, FIG. 4.

Accordingly, Fong discloses the same basic design characteristics as the claimed design. EX1003 ¶124.

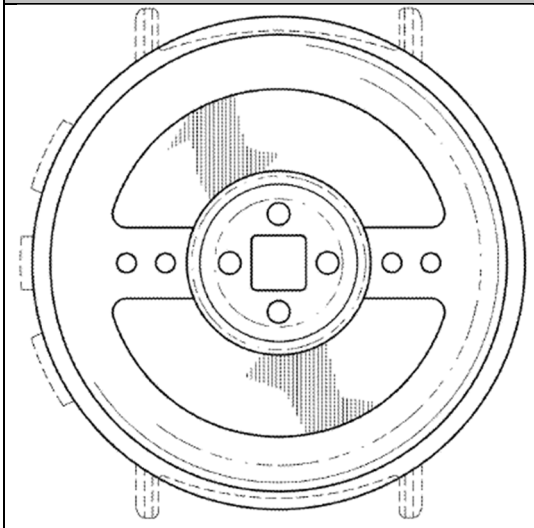
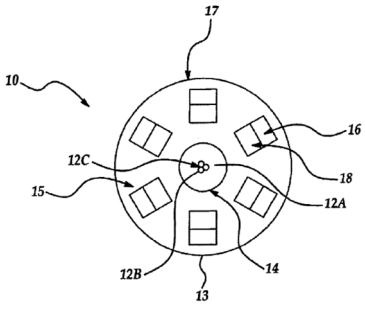
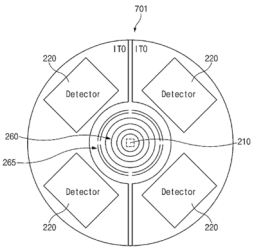
In sum, Fong is a primary reference because it discloses basically the same visual impression as the claimed design. *Id.* ¶125.

The claimed rectangles and concentric circles are functional and do not change the two designs' overall visual similarity. *Supra* §§IV.B.1.c-d. Even if these design aspects were considered, Fong's only differences from the claimed design would be that Fong's circular array has four circles instead of eight rectangles, and Fong has curved edges. EX1003 ¶125. However, as shown below, these differences would have been obvious to a DOSA. *Id.* Indeed, combining Fong, Mendelson, Bushnell, and Chung creates a design with the same overall visual appearance as the claimed Apple Watch sensor design. *Id.*

2. The Challenged Claim Would Have Been Obvious

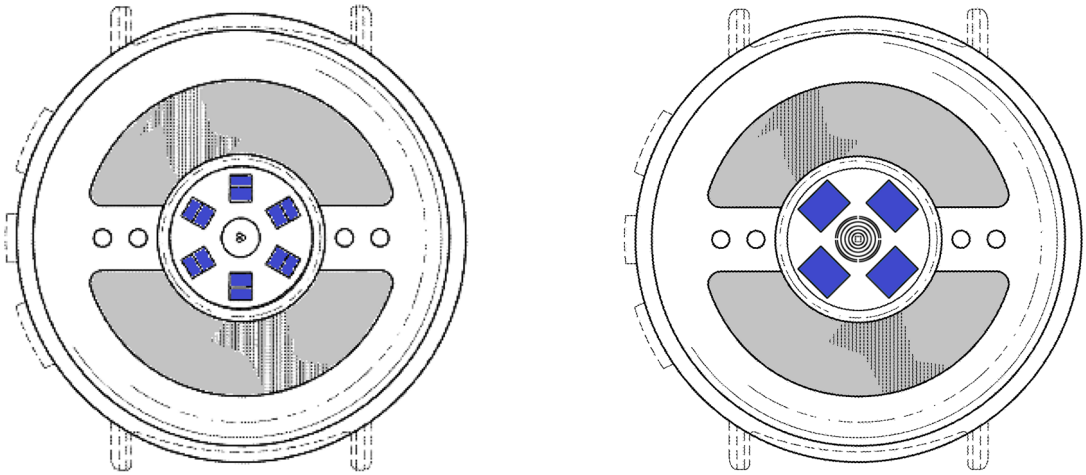
a. Mendelson, Bushnell, and Chung Are Secondary References

Mendelson/Chung: The following visual comparison demonstrates that the sensor designs of Mendelson and Chung are so related to Fong that they are proper secondary references.

Fong (Primary)	**Mendelson (Secondary)**	**Chung (Secondary)**
		
EX1008, FIG. 4	EX1011, FIG. 7	EX1010, FIG. 7

EX1003 ¶126. Fong's design includes arc-shaped electrodes surrounding a central PPG sensor, which has a circular array of circles and a central rectangular photodiode. *Id.*; *supra* §VI.A.3.

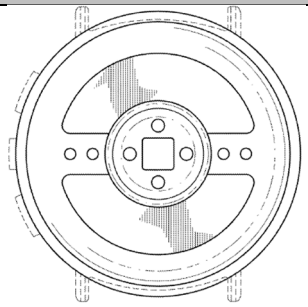
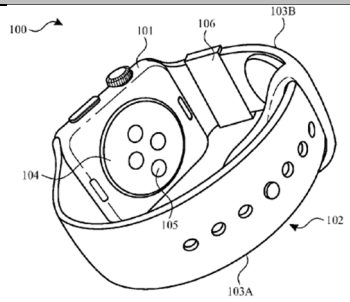
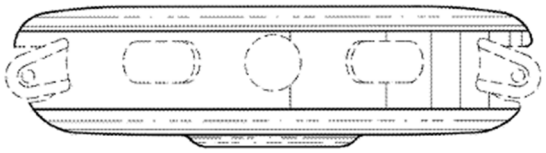
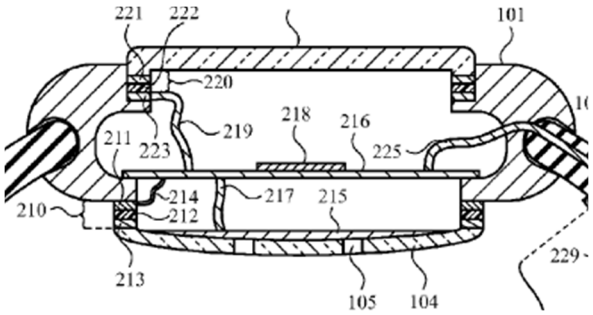
Mendelson and Chung are so related to Fong because they disclose suitable sensors for Fong's design. EX1011, 1:42-61; EX1010 ¶¶4, 32, 103-109; EX1014 ¶104; EX1003 ¶127. Indeed, Mendelson's sensor (left) and Chung's sensor (right) have a circular shape especially suited for the available area between Fong's arc-shaped electrodes, as shown in the composite figures below.



EX1008, FIG. 4 (combined with EX1011, FIG. 7 (left) and EX1010, FIG. 7 (right)); EX1003 ¶127. Additionally, the designs are related because the prior art suggested combining wearable devices like Fong with known PPG sensors. EX1006, 15:9-18; EX1007 ¶41; EX1003 ¶127. The designs are also related because Fong, Mendelson, and Chung's PPG sensors include the same basic components. *Supra* §VI.A.1; EX1003 ¶127. The designs are further related because each includes a symmetrical circular array of simple geometric shapes on a circular PPG sensor, as shown above. EX1003 ¶127.

Accordingly, given the relatedness and similarity of the designs, the appearance of Mendelson's FIG. 7 sensor and Chung's FIG. 7 sensor would have suggested the application of their features, including Mendelson's sensor and Chung's Fresnel lens, to the design of Fong's PPG sensor. *Id.* Thus, Mendelson and Chung are appropriate secondary references. *Id.*

Bushnell: The below visual comparison demonstrates that Bushnell's sensor design is so related to Fong that Bushnell is a proper secondary reference.

Fong (Primary)	Bushnell (Secondary)
 EX1008, FIG. 4	 EX1009, FIG. 1A
 EX1008, FIG. 6 (rotated)	 EX1009, FIG. 2A

EX1003 ¶128. As shown above, Fong's wrist-worn device has arc-shaped electrodes, a central PPG sensor, and a circular surface protruding from the back of the device. *Id.*; *supra* §VI.A.3.

Bushnell is so related to Fong because it discloses a suitable design for Fong's device. As shown above, both designs include a circular surface that protrudes from the back of the wrist-worn device and houses the device's sensors. EX1008, FIGS. 2, 4-8; EX1009, FIGS. 1-7; EX1003 ¶129. The similarities between the convex surface and overall circular shape of Bushnell's housing component 104 and the

sensor surface of Fong would have suggested using Bushnell's design with Fong's device. *Id.* Additionally, the designs are related because both have electrodes and a central PPG sensor incorporated in a protruding surface. EX1008, FIGS. 2, 4-8; EX1009, FIGS. 1-7, ¶¶40, 48, 71, 74; EX1003 ¶129; EX1014 ¶¶79-80. The designs are also related because the prior art (EX1006, 15:9-18; EX1007 ¶41) suggested combining wearable devices like Fong with known PPG sensors designs, which Bushnell discloses. EX1009, FIGS. 1-2, ¶48; EX1003 ¶129. Fong and Bushnell's designs are further related because their PPG sensors include the same basic components. *Supra* §VI.A.1; EX1003 ¶129.

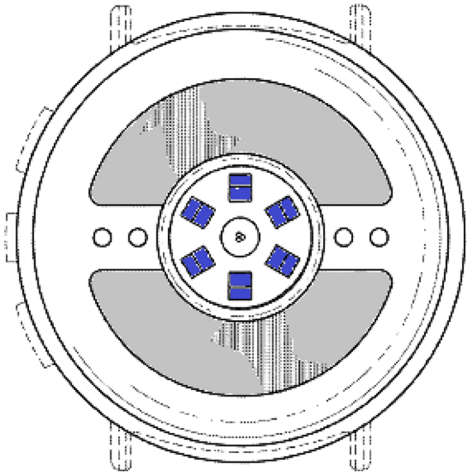
Thus, given the relatedness and similarity of the designs, the appearance of Bushnell's design would have suggested the application of its features, including its convex housing component, to the design of Fong's device. EX1003 ¶129. Bushnell is thus an appropriate secondary reference. *Id.*

b. <u>The Challenged Claim Would Have Been Obvious Over Fong, Mendelson, Bushnell, and Chung</u>

<u>Mendelson</u>: Combining Mendelson's sensor design with Fong was a known change that was suggested by the prior art. *Supra* §VI.B.2.b; EX1003 ¶130.

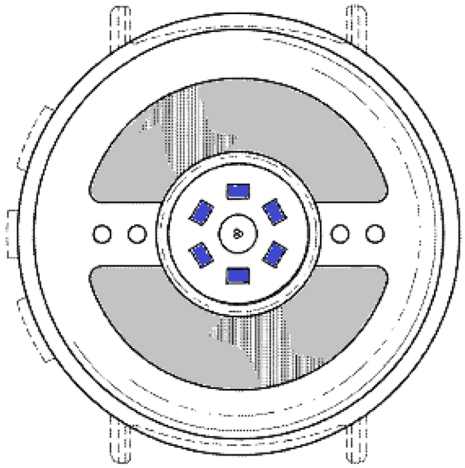
A DOSA would have been motivated to use Mendelson's sensor in place of Fong's PPG sensor. First, the prior art suggested the combination. EX1006, 15:9-18; FIGS. 1F-2A; EX1007 ¶¶41-42, FIGS. 3-4; EX1003 ¶131. Second, the

relatedness of Mendelson's and Fong's designs (*supra* §VI.D.2.a) would have suggested their combination, as shown below.



Fong (EX1008, FIG. 4) combined with Mendelson (EX1011, FIG. 7)

EX1003 ¶131. Third, improving Fong's PPG sensor accuracy would have motivated this combination. *Supra* §VI.B.2.b; EX1014 ¶105; EX1003 ¶131. Fourth, a DOSA would have known that, unlike Fong's central square photodiode, Mendelson's circular array of photodiodes is visually consistent with the surrounding circular shapes of Fong's device. EX1008, FIGS. 3-4; EX1003 ¶131. Fifth, a DOSA would have been motivated to use one of Mendelson's six-photodiode arrays in Fong's device, *supra* §VI.B.2.b, as shown below.



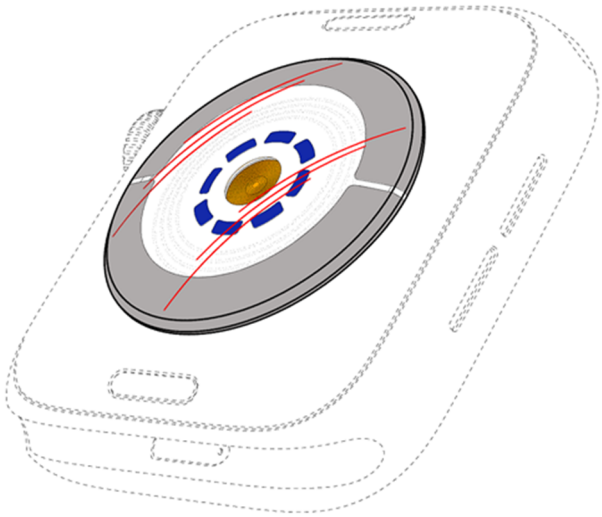
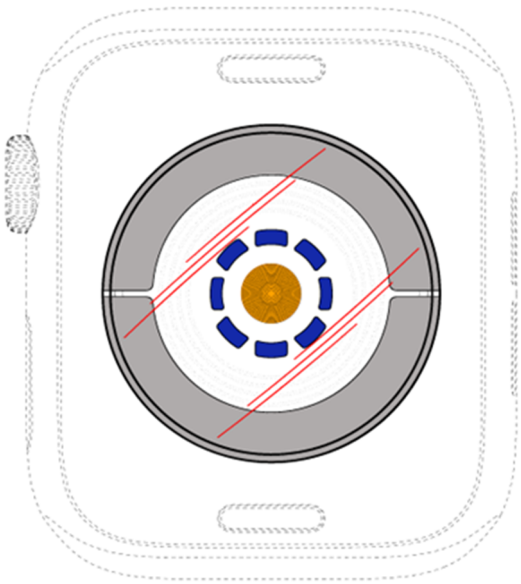
Fong combined with Mendelson's Six-Photodiode Array

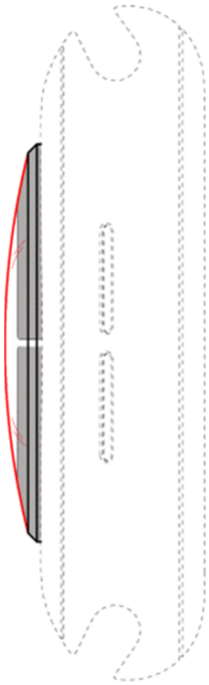
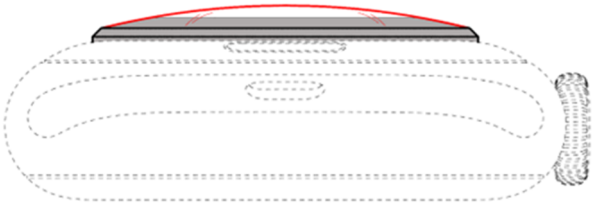
EX1008, FIG. 4; EX1011, FIG. 7, 4:1-62; EX1014 ¶106; EX1003 ¶131. And sixth, the differences between the six straight rectangle-shaped photodiodes shown above and the claimed design were known changes that a DOSA would have been motivated to make. *Supra* §VI.B.2.b; EX1003 ¶131.

Bushnell, Chung: For the same reasons explained above in Section VI.B.2.b, combining Bushnell's convex housing component (including its chamfered and vertical edges) with Fong's device and Chung's FIG. 7 Fresnel lens over the LEDs of the PPG sensor used by Fong (i.e., Mendelson's sensor) as proposed would have been routine changes that a DOSA would have been motivated to make. EX1014 ¶¶109-111; EX1003 ¶¶132-133.

Moreover, any differences between the proposed combination and the claimed design would have been changes taught by the prior art and a DOSA would have been motivated to make. *Supra* §VI.B.2.b; EX1003 ¶134.

Accordingly, a DOSA would have been motivated to combine Fong with Mendelson's FIG. 7 sensor, Bushnell's convex housing component, and Chung's Fresnel lens to create a sensor with the same overall visual appearance as the claimed design, as shown below. EX1003 ¶135.

D'279 Patent	Fong-Mendelson-Bushnell-Chung
 FIG. 2	
 FIG. 4	

D'279 Patent	Fong-Mendelson-Bushnell-Chung
 FIG. 5	
 FIG. 7	

Thus, the Apple Watch sensor design claimed by the D'279 Patent would have been obvious to a DOSA over Fong, Mendelson, Bushnell, and Chung. EX1003 ¶135.

VII. SECONDARY CONSIDERATIONS

Secondary considerations should be considered if present, 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). Masimo reserves the right to respond to any secondary

considerations set forth by Apple in this proceeding. In parallel litigation, Apple alleged that Masimo's W1 watch copied the claimed design. EX1045, 14. But the W1 watch was independently developed by Masimo and does not embody the claimed design. *Id.*, 21-23. Apple also alleged that Apple Watches' commercial success and praise supports the D'279 Patent's validity. EX1046 ¶¶145-152. But Apple failed to establish nexus between the success or praise of its Watches in general and the D'279 Patent, which claims specific shapes on the back of the Watch. *Id.*; *supra* §III.A. Indeed, "no nexus exists" because the claimed design was present in the prior art. *Tokai Corp. v. Easton Enterprises, Inc.*, 632 F.3d 1358, 1369-70 (Fed. Cir. 2011); *supra* §VI. Accordingly, Apple's secondary considerations "evidence" does not outweigh the strong *prima facie* case of obviousness demonstrated above.

VIII. CONCLUSION

For the reasons set forth in this Petition, Masimo has shown a reasonable likelihood of prevailing in showing that the Challenged Claim would have been obvious. Accordingly, Masimo respectfully requests that the Board institute IPR and cancel the Challenged Claim as invalid.

Respectfully submitted,

KNOBBE, MARTENS ,OLSON & BEAR, LLP

Dated: March 24, 2023

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Attorney for Petitioner Masimo Corporation

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), Counsel for Petitioner Masimo Corporation hereby certifies that this document complies with the type-volume limitation of 37 C.F.R. § 42.24(a). According to the word-processing system used to prepare this document, the document contains approximately 13,928 words, including any statement of material facts to be admitted or denied in support, and excluding the table of contents, table of authorities, mandatory notices under § 42.8, exhibit list, certificate of service or word count, or appendix of exhibits or claim listing.

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: March 24, 2023

/Douglas B. Wentzel/
Douglas B. Wentzel (Reg. No. 74,897)
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Attorney for Petitioner Masimo Corporation

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on the date below a copy of this **PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. D883,279 AND EXHIBITS 1001-1050** were served by FedEx on the Patent Owner at the correspondence address of record for the subject patent as follows:

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