

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of: Ammar Al-Ali
U.S. Patent No.: 10,722,159 Attorney Docket No.: 50095-0134IP2
Issue Date: July 28, 2020
Appl. Serial No.: 16/791,963
Filing Date: February 14, 2020
Title: PHYSIOLOGICAL MONITORING DEVICES, SYSTEMS,
AND METHODS

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**PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT
NO. 10,722,159 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42**

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LIST OF EXHIBITS

APPLE-1001	U.S. Patent. No. 10,722,159 to Al-Ali (“the ’159 patent”)
APPLE-1002	Prosecution History of the ’159 patent (Application No. 16/791,963)
APPLE-1003	Declaration of Dr. Brian Anthony
APPLE-1004	U.S. Patent No. 8,670,819 to Iwamiya
APPLE-1005	U.S. Patent No. 9,392,946 to Sarantos
APPLE-1006	U.S. Patent No. 8,446,275 to Utter
APPLE-1007	U.S. Patent No. 6,483,976 to Shie
APPLE-1008	U.S. Patent Pub. No. 2016/0058312 (“Han”)
APPLE-1009	Design of Pulse Oximeters, J.G. Webster; Institution of Physics Publishing, 1997 (“Webster”)
APPLE-1010	U.S. Patent No. 10,470,695 (the “’695 patent”)
APPLE-1011	<i>Apple v. Masimo</i> , Case No. IPR2020-01722, Paper 29 (Final Written Decision) (PTAB May 5, 2022) (the “’695 FWD”)
APPLE-1012	<i>Masimo Corporation, et al. v. Apple Inc.</i> , Redacted Complaint, ITC Inv. No. 337-TA-1276
APPLE-1013	RESERVED

- APPLE-1014 Pang et al., A Neo-Reflective Wrist Pulse Oximeter, IEEE Access, Volume 2 (January 12, 2015)
- APPLE-1015 Li et al., A Wireless Reflectance Pulse Oximeter With Digital Baseline Control for Unfiltered Photoplethysmograms, IEEE Transactions on Biomedical Circuits and Systems, Vol. 6, No. 3 (June 2012)
- APPLE-1016 Cai et al., Implementation of a Wireless Pulse Oximeter Based on Wrist Band Sensor, 3rd International Conference on Biomedical Engineering and Informatics
- APPLE-1017 International Publication No. WO 2001/17421 to Lindberg et al.
- APPLE-1018 Maattala et al., Optimum Place for Measuring Pulse Oximeter Signal in Wireless Sensor-Belt or Wrist-Band, 2007 International Conference on Convergence Information Technology
- APPLE-1019 Fitbit Surge Fitness Super Watch User Manual, Version 1.3 (2015) available at https://help.fitbit.com/manuals/manual_surge_en_US.pdf
- APPLE-1020 Duffy, Jill, Fitbit Surge Review, pcmag.com (Jan. 29, 2015) available at <https://www.pcmag.com/reviews/fitbit-surge>
- APPLE-1021 U.S. Patent Pub. No. 2006/0253010 (“Brady”)
- APPLE-1022 U.S. Patent No. 6,014,576 (“Raley”)
- APPLE-1023 Excerpts from Bronzino, The Biomedical Engineering Handbook, CRC Press, Inc. (1995) (“Bronzino”)
- APPLE-1024 Severinghaus et al., Recent Developments in Pulse Oximetry, Anesthesiology, Vol. 76, No. 6 (June 1992)
- APPLE-1025 Duffy, MIO Alpha BLE Review, PC Magazine (Jan. 28, 2013) available at <https://www.pcmag.com/reviews/mio-alpha-ble>
- APPLE-1026 – APPLE-1032 RESERVED

- APPLE-1033 U.S. Patent No. 6,801,799 (“Mendelson”)
- APPLE-1034 Mendelson et al., A Wearable Reflectance Pulse Oximeter for Remote Physiological Monitoring, Proceedings of the 28th IEEE EMBS Annual International Conference (Sept. 3, 2006)
- APPLE-1035 U.S. Patent Pub. No. 2013/0267854 (“Johnson”)
- APPLE-1036 U.S. Patent Pub. No. 2005/0116820 (“Goldreich”)
- APPLE-1037 U.S. Patent No. 5,164,858 to Aguilera
- APPLE-1038 U.S. Patent No. 5,830,137 to Scharf
- APPLE-1039 U.S. Patent Pub. No. 2005/0267346 (“Faber”)
- APPLE-1040 ITC Inv. No. 337-TA-1276 Exhibit RX-0508 (Jianchu Yao and Steve Warren, Stimulating Student Learning with a Novel “In-House” Pulse Oximeter Design (2005))
- APPLE-1041 U.S. Patent Pub. No. 2014/0323829 (“LeBoeuf”)
- APPLE-1042 Fontaine et al., Reflectance-Based Pulse Oximeter for the Chest and Wrist, Worcester Polytechnic Institute (April 2013) *available at* <https://digital.wpi.edu/show/6969z2326>
- APPLE-1043 U.S. Patent No. 7,468,036 to Rulkov
- APPLE-1044 International Publication No. WO 2011/051888 (“Ackermans”)
- APPLE-1045 International Publication No. WO 2012/140559 (“Shmueli”)
- APPLE-1046 U.S. Patent No. 7,650,176 to Sarussi
- APPLE-1047 U.S. Patent Pub. No. 2002/0095092 (“Kondo”)

- APPLE-1048 U.S. Patent Pub. No. 2015/0355604 (“Fraser”)
- APPLE-1049 U.S. Patent No. 6,398,727 to Bui
- APPLE-1050 Beam Shaping with Cylindrical Lenses, *available at*
<https://www.newport.com/n/beam-shaping-with-cylindrical-lenses>
- APPLE-1051 U.S. Patent No. 9,316,495 to Suzuki et al.
- APPLE-1052 U.S. Patent Pub. No. 2010/0261986 to Chin et al.
- APPLE-1053 Dickey, Laser Beam Shaping Theory and Techniques, Second Edition, Taylor & Francis Group, LLC (2014)
- APPLE-1054 U.S. Patent Pub. No. 2014/0051955 to Tiao et al.
- APPLE-1055 – 1059 [RESERVED]
- APPLE-1060 Combined Civil and Criminal Federal Court Management Statistics (Sep. 30, 2023) | United States Courts (uscourts.gov),
https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_distprofile0630.2023.pdf
- APPLE-1061 Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (USPTO June 21, 2022) (“*Director’s Guidance*”)
- APPLE-1062 Apple’s Complaint for Patent Infringement (Design), *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01377 (D. Del. Oct. 20, 2022)
- APPLE-1063 Apple’s Complaint for Patent Infringement (Utility), *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (D. Del. Oct. 20, 2022)
- APPLE-1064 Defendant Masimo Corporation’s Answer to Complaint and Counterclaims, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (D. Del. Dec. 12, 2022)

- APPLE-1065 Order Granting Joint Motion to Amend the Case Schedule, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (D. Del. Sep. 21, 2023)
- APPLE-1066 Stipulation by Apple Inc.
- APPLE-1067 Email Identifying Masimo’s District Court Invalidity Grounds (Nov. 16, 2023)
- APPLE-1068 Excerpt of Apple’s District Court Expert Invalidity Report, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (Nov. 22, 2023)
- APPLE-1069 Order Granting Unopposed Motion to Stay Certain Patent Counterclaims, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (Jan. 10, 2023)
- APPLE-1070 [RESERVED]
- APPLE-1071 U.S. Patent No. 10,687,745 to Al-Ali (“the ’745 patent”)
- APPLE-1072 Institution Decision, *Apple Inc. v. Masimo Corp.*, IPR2022-01291 Pap. 15 (PTAB Feb. 1, 2023)
- APPLE-1073 U.S. Patent No. 10,470,695 to Al-Ali (“the ’695 patent”)
- APPLE-1074 Final Written Decision, *Apple Inc. v. Masimo Corp.*, IPR2020-01722 Pap. 29 (PTAB May 5, 2022)

LISTING OF CLAIMS

Claim 1	
[1.0]	A physiological monitoring device comprising:
[1.1]	a plurality of emitters configured to emit light in a first shape;
[1.2]	a material positioned between the plurality of emitters and a tissue measurement site on a wrist of a user when the physiological monitoring device is in use, the material configured to change the first shape into a second shape by which the light emitted from one or more of the plurality of emitters is projected towards a surface of the tissue measurement site;
[1.3]	a plurality of detectors configured to detect at least a portion of the light after passing through tissue, the plurality of detectors further configured to output at least one signal responsive to the detected light;
[1.4]	a surface comprising a dark-colored coating, the surface positioned between the plurality of detectors and the tissue when the physiological monitoring device is in use,
[1.5]	wherein an opening defined in the dark-colored coating is configured to allow at least a portion of light reflected from the tissue to pass through the surface;
[1.6]	a light block configured to prevent at least a portion of the light emitted from the plurality of emitters from reaching the plurality of detectors without first reaching the tissue; and
[1.7]	a processor configured to receive and process one or more signals responsive to the at least one outputted signal and determine a physiological parameter of the user responsive to the one or more signals.
Claim 2	
[2.0]	The physiological monitoring device of claim 1, further comprising a display configured to present visual feedback responsive to the determined physiological parameter.
Claim 3	
[3.0]	The physiological monitoring device of claim 2, wherein the display is a touch-screen display.
Claim 4	

[4.0]	The physiological monitoring device of claim 1, wherein the plurality of emitters and the plurality of detectors are arranged in a reflectance measurement configuration.
Claim 5	
[5.0]	The physiological monitoring device of claim 1, wherein the plurality of detectors are arranged in an array having a spatial configuration corresponding to a shape of a portion of the tissue measurement site bounded by the light block.
Claim 6	
[6.0]	The physiological monitoring device of claim 1, wherein the light block comprises an at least partially circular shape, and wherein the plurality of emitters are positioned outside the light block and the plurality of detectors are positioned inside the light block.
Claim 7	
[7.0]	The physiological monitoring device of claim 1, wherein the physiological parameter comprises pulse rate.
Claim 8	
[8.0]	The physiological monitoring device of claim 1, wherein the physiological parameter comprises oxygen saturation.
Claim 9	
[9.0]	The physiological monitoring device of claim 1, wherein the material comprises plastic.
Claim 10	
[10.0]	The physiological monitoring device of claim 1, wherein the material comprises glass.
Claim 11	
[11.0]	The physiological monitoring device of claim 1, wherein the second shape comprises a circular geometry.
Claim 12	
[12.0]	The physiological monitoring device of claim 1, wherein the opening defined in the dark-colored coating comprises a width and a length, and wherein the width is larger than the length.
Claim 13	
[13.0]	The physiological monitoring device of claim 1, wherein the dark-colored coating comprises black.
Claim 14	
[14.0]	A physiological monitoring device comprising:
[14.1]	a plurality of optical sources configured to emit light proximate a wrist of a user;

[14.2]	a diffuser configured to be positioned between the plurality of optical sources and a tissue measurement site on the wrist of the user when the physiological monitoring device is in use;
[14.3]	a light block having a circular shape;
[14.4]	a plurality of detectors configured to detect at least a portion of the light after the light passes through a portion of the tissue measurement site bounded by the light block, wherein the plurality of detectors are arranged in an array having a spatial configuration corresponding to a shape of the portion of the tissue measurement site bounded by the circular shaped light block, wherein the plurality of detectors are further configured to output at least one signal responsive to the detected light, and wherein the plurality of optical sources and the plurality of detectors are arranged in a reflectance measurement configuration;
[14.5]	wherein the light block is configured to prevent at least a portion of light emitted from the plurality of optical sources from reaching the plurality of detectors without first reaching tissue;
[14.6]	a processor configured to receive and process one or more signals responsive to the at least one outputted signal and determine a physiological parameter of the user responsive to the one or more signals; and
[14.7]	wherein the physiological monitoring device is configured to transmit physiological parameter data to a separate processor.
Claim 15	
[15.0]	The physiological monitoring device of claim 14, wherein the plurality of optical sources are positioned outside the light block and the plurality of detectors are positioned inside the light block.
Claim 16	
[16.0]	The physiological monitoring device of claim 14, wherein the physiological parameter comprises pulse rate.
Claim 17	
[17.0]	The physiological monitoring device of claim 14, wherein the physiological parameter comprises oxygen saturation.
Claim 18	
[18.0]	The physiological monitoring device of claim 14, wherein the plurality of optical sources are configured to emit light in a first shape, and wherein the diffuser comprises a material configured to change the first shape into a second shape by which the light emitted

	from one or more of the plurality of optical sources is projected towards the tissue measurement site.
Claim 19	
[19.0]	A system configured to measure one or more physiological parameters of a user, the system comprising:
[19.1]	a physiological monitoring device comprising:
[19.2]	a plurality of emitters configured to emit light in a first shape;
[19.3]	a material positioned between the plurality of emitters and a tissue measurement site when the physiological monitoring device is in use, the material configured to change the first shape into a second shape by which the light emitted from one or more of the plurality of emitters is projected towards the tissue measurement site;
[19.4]	a plurality of detectors configured to detect at least a portion of the light passing through tissue, the plurality of detectors further configured to output at least one signal responsive to the detected light;
[19.5]	a surface comprising a dark-colored coating, the surface positioned between the plurality of detectors and the tissue when the physiological monitoring device is in use, wherein an opening defined in the dark-colored coating is configured to allow at least a portion of light reflected from the tissue to pass through the surface;
[19.6]	a light block configured to prevent at least a portion of light from the plurality of emitters from reaching the plurality of detectors without first reaching the tissue; and
[19.7]	a processor configured to receive and process one or more signals responsive to the outputted at least one signal and determine a physiological parameter of the user responsive to the one or more signals; and
[19.8]	a processing device configured to wirelessly receive physiological parameter data from the physiological monitoring device, wherein the processing device comprises a user interface, a storage device, and a network interface configured to wirelessly communicate with the physiological monitoring device, and wherein the user interface includes a touch-screen display configured to present visual feedback responsive to the physiological parameter data.
Claim 20	
[20.0]	The system of claim 19, wherein the system is configured to determine a state of wellness of the user based on the determined physiological parameter.

Claim 21	
[21.0]	The system of claim 19, wherein the system is configured to determine a trend of wellness of the user based on the determined physiological parameter.
Claim 22	
[22.0]	The system of claim 19, wherein the visual feedback presented by the touch-screen display is responsive to at least one of a pulse rate and an oxygen saturation of the user.
Claim 23	
[23.0]	The system of claim 19, wherein the material comprises at least one of glass and plastic.
Claim 24	
[24.0]	The system of claim 19, wherein the second shape comprises a width and a length, and wherein the width is different from the length.
Claim 25	
[25.0]	The system of claim 19, wherein the plurality of detectors are arranged in an array having a spatial configuration corresponding to a shape of a portion of the tissue measurement site bounded by the light block.

Apple Inc. (“Petitioner” or “Apple”) petitions for *Inter Partes* Review (“IPR”) of claims 1-5, 7-14, and 16-25 (“the Challenged Claims”) of U.S. Patent 10,722,159 (“the ’159 patent”).

I. REQUIREMENTS FOR IPR UNDER 37 C.F.R. § 42.104

A. Standing

Apple certifies that the ’159 Patent is available for IPR and that Apple is not estopped from requesting IPR.

B. Challenge and Relief Requested

Apple requests IPR of the Challenged Claims on the grounds set forth in the table shown below. Accompanying explanations and support are provided in the Declaration of Dr. Anthony (APPLE-1003). APPLE-1003, ¶¶11-226.

Ground¹	Claims	Basis for Rejection (35 U.S.C. § 103)
1A	1-5, 7-9, 12-13	Sarantos
1B	1-5, 7-14, 16-18	Sarantos in view of Shie
1C	2	Sarantos in view of Brady
1D	3	Sarantos in view of Brady and Han
1E	2	Sarantos in view of Shie and Brady
1F	3	Sarantos in view of Shie, Brady, and Han

¹ The petition provides obviousness grounds based on Sarantos alone and in combination with one or more of Brady, Han, and Utter, and alternatively includes obviousness grounds based on the Sarantos-Shie combination, further combined with one or more of Brady, Han, and Utter.

Ground ¹	Claims	Basis for Rejection (35 U.S.C. § 103)
1G	14, 16-25	Sarantos in view of Utter
1H	14, 16-25	Sarantos in view of Shie and Utter

The '159 patent claims priority to an application filed July 2, 2015 (“Critical Date”). Each of the prior art references applied in the Grounds listed above qualifies as prior art to the '159 patent on at least the bases shown below:

Reference	Filed	Published	35 U.S.C. §102 Prior Art Basis
Sarantos	05/28/2015	07/19/2016	§102(a)(2)
Shie	05/09/2001	11/19/2002	§102(a)(1), §102(a)(2)
Brady	04/06/2006	11/09/2006	§102(a)(1), §102(a)(2)
Han	12/12/2014	03/03/2016	§102(a)(2)
Utter	04/23/2012	05/21/2013	§102(a)(1), §102(a)(2)

None of these references were previously cited by the Examiner or used in a rejection. Han was cited on the face of the '159 patent, but not relied on by the Examiner. Here, Han is relied upon in a limited manner in this petition for certain dependent claim features and therefore discretionary denial under 35 U.S.C. § 325(d) would be unwarranted under these circumstances.

II. SUMMARY OF THE '159 PATENT

A. Brief Description

The '159 patent, entitled “Physiological Monitoring Devices, Systems, and Methods,” describes a “non-invasive, optical-based physiological monitoring

system.” APPLE-1001, Abstract.

B. Summary of the Prosecution History

Masimo filed the application that issued as the '159 Patent (16/791,963) (“’963 Application”) with a request for accelerated examination on February 14, 2020, a little over one month after Masimo initiated its serial litigation campaign against Apple through its January 9, 2020 complaint in the U.S. District Court for the Central District of California (CDCA) (Case No. 8:20-cv-00048), and approximately six months *after* Apple filed IPRs challenging claims of genealogically related U.S. Patent No. 10,470,695 (“’695 Patent”).²

Just 7 weeks later, on April 2, 2020, a Notice of allowance was issued, notably omitting any discussion of art applied in Apple’s IPRs, including art (e.g., Sarantos) on which the present Petition’s grounds are premised. APPLE-1002, 44-52. Without bringing this omission to the attention of the examiner, Masimo paid the issue fee on April 21, 2020, over two months before it was due, in an apparent attempt to achieve issuance prior to the institution decision of the ’695 IPRs and allowed the patent to grant on July 28, 2020. *Id.*, 35-37, 9.

² *See, generally*, IPR2020-01722, -01723. The ’963 Application claimed priority to the application from which the ’695 Patent issued (16/226,249), and incorporated that application by reference. APPLE-1001, 1:4-20

Notably, on May 12, 2021, the Board endorsed the relevance of this prior art, finding a reasonable likelihood of unpatentability to exist. Still, Masimo said nothing.

And, on May 5, 2022, the Board rendered its final written decision finding unpatentable every challenged claim of the '695 Patent based on art applied in Apple's IPRs. *Apple Inc. v. Masimo Corp.*, IPR2020-01722 Pap. 29, 2 (PTAB May 5, 2022).

The '159 Patent's file history is without any indication that Masimo brought the prior art applied in this Petition to the examiner's attention prior to allowance or grant of claims in the '963 Application. Rather, content with allowance, Masimo simply paid the issue fee upon receipt of a first action Notice of Allowance, which limits its discussion to U.S. Patent Pub. No. 2014/0361147 ("Fei") and U.S. Patent No. 5,830,137 ("Scharf"). APPLE-1002, 44-52.

C. Level of Ordinary Skill in the Art

A person of ordinary skill in the art relating to the subject matter of the '159 Patent ("POSITA") would have had a working knowledge of physiological monitoring technologies. The person would have had a Bachelor of Science degree in an academic discipline emphasizing the design of electrical, computer, or software technologies, in combination with training or at least one to two years of related work experience with capture and processing of data or information,

including but not limited to physiological monitoring technologies. APPLE-1003, ¶¶20-22. Alternatively, the person could have had a Master of Science degree in a relevant academic discipline with less than a year of related work experience in the same discipline. *Id.*

III. CLAIM CONSTRUCTION UNDER 37 C.F.R. §§ 42.104(b)(3)

All claim terms should be construed according to the *Phillips* standard.

Phillips v. AWH Corp., 415 F.3d 1303 (Fed. Cir. 2005); 37 C.F.R. §42.100. Apple submits that no claim terms need be construed to resolve issues of controversy in the present Petition. *See Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011).

IV. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. Ground 1A: Claims 1-5, 7-9, and 12-13 are obvious in view of Sarantos

1. Overview of Sarantos

Sarantos describes a “wristband-type wearable fitness monitor” that measures “physiological parameters” of the wearer, such as the person’s “heart rate” and “blood oxygenation levels.” APPLE-1005, 2:5-14, 5:55-59, 7:12-14, 13:39-47; APPLE-1003, ¶¶25-28. The monitor performs these measurements using a photoplethysmographic (PPG) sensor, which includes one or more light sources (e.g., LEDs) and an array of photodetectors. APPLE-1005, 1:9-10, 1:43-47, 7:12-16, 15:23-43. Sarantos describes that when the monitor “is worn by a

person in a manner similar to a wristwatch, the back face” of the monitor “may be pressed against the person’s skin, allowing the light sources” of the PPG sensor “to illuminate the person’s skin.” *Id.*, 1:48-51, 7:12-23. The light “diffuses through the person’s flesh and a portion of this light is then emitted back” (i.e., reflected) “out of the person’s skin in close proximity to where the light was introduced into the flesh.” *Id.*, 7:24-28; APPLE-1003, ¶¶25-26. The photodetector array of the PPG sensor measures the “intensity” of this reflected light, and provides signals representing the intensity to the “control logic” of the monitoring device. APPLE-1005, 2:5-14, 7:12-23, 13:39-47. Sarantos’s photodetector array is comprised of at least one, but often multiple, photodetector elements, and Sarantos discloses many variations. For instance, FIGs. 9-12 illustrate four different designs of “high-aspect-ratio” (“HAR”) photodetector elements. APPLE-1005, 6:18-32. A HAR photodetector is a non-square photodetector where at least 90% of its “active area” has a maximum first dimension at least twice as large as a maximum second dimension. APPLE-1005, 9:57-10:15. The photodetector is not limited to a particular geometric shape, but its photodetector elements may instead be non-rectangular, for instance, “arcuate” (FIG. 13), “annular”/circular (FIG. 25) or otherwise arranged. APPLE-1005, 6:33-35, 55-57. And yet, many of Sarantos’s embodiments comprise multiple photodetectors encircling a singular light source. APPLE-1005, FIGs. 13-18. In fact, Sarantos notes that a single light source may

provide light to multiple HAR photodetectors, with “little or no additional power consumption” required, while also “increas[ing] the signal to ambient noise ratio of the PPG sensor.” APPLE-1005, 14:46-55.

The control logic, upon receiving the signals from the photodetector array, calculates different physiological parameters based on characteristics of the reflected light signal. *Id.*, 1:54-56, 7:12-23. For example, the person’s heart rate can be calculated based on “fluctuations in the amount of light from the light source that is emanated back out of the flesh” that correspond fluctuations in blood volume associated with each beat of the person’s heart. *Id.*, 7:23-60; APPLE-1003, ¶28.

2. Analysis

(a) Claim 1

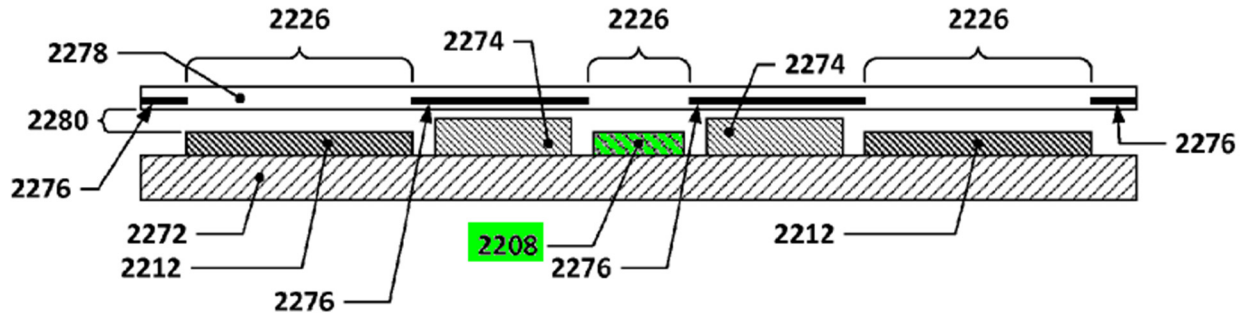
Element [1.0]

Sarantos discloses a “wristband-type wearable fitness monitor” including a photoplethysmography (PPG) sensor, which is a physiological monitoring device. APPLE-1005, 7:12-16; APPLE-1003, ¶¶29-30.

Element [1.1]

Sarantos’ sensor includes “light source” 2208 having a plurality of light emitting devices (such as light emitting diodes, i.e., LEDs). APPLE-1005, 2:18-19 (“the light source may include a plurality of light-emitting devices.”), 13:34-53, 14:5-22, 17:1-25. A POSITA would have found it obvious to configure the light

sources of the Sarantos sensor to emit light in a first shape characterized by the specific location, arrangement, and/or shape of each light emitting device, *e.g.*, at light source 2208 (annotated in green) in FIG. 22 of Sarantos. APPLE-1003, ¶¶31-33:



APPLE-1005, Detail of FIG. 22 (annotated)

For example, a POSITA would have recognized that the circular arrangement of the light-emitting devices that make up the light source 2508 would emit light in a circular shape:

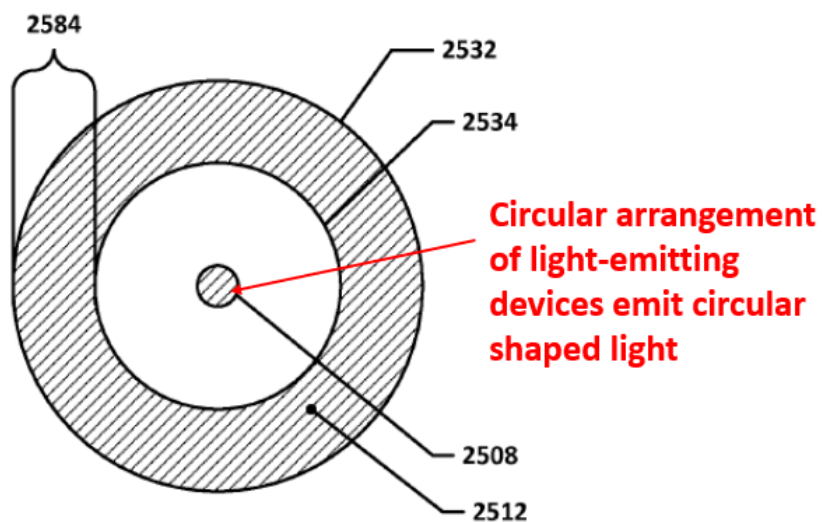


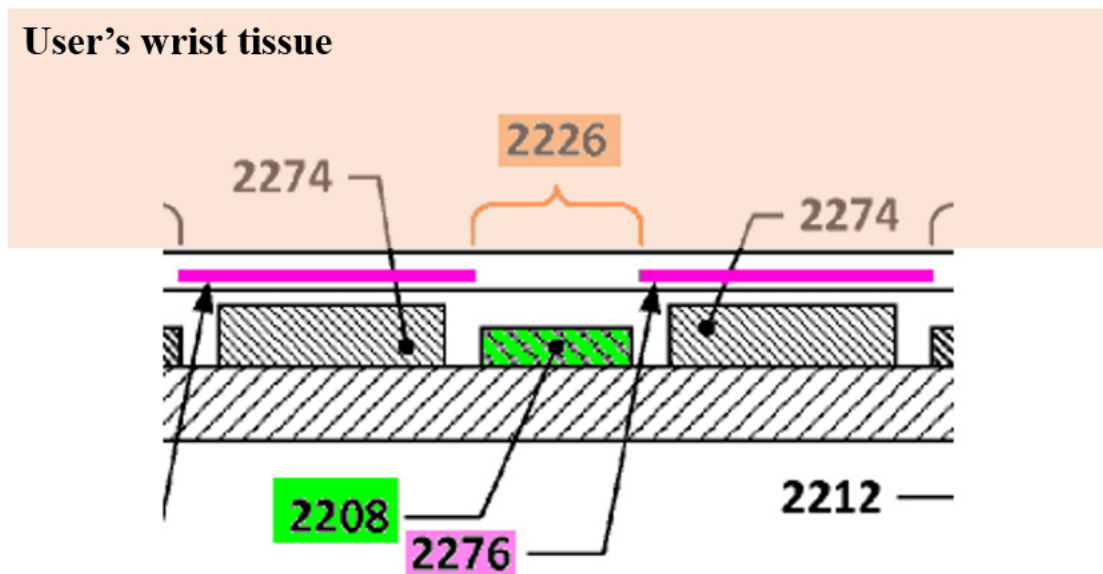
FIG. 25

APPLE-1005, FIG. 25, 19:33-35.

Therefore, Sarantos discloses a plurality of emitters configured to emit light in a first shape. APPLE-1003, ¶¶31-33.

Element [1.2]

Sarantos FIG. 22 depicts light source 2208 (annotated in green below) comprising the plurality of light emitting devices that shine through a window region 2226 (orange) defined by in-mold labels 2274 (pink). APPLE-1005, 2:17-19, 17:1-51, 18:8-16, FIG. 22; APPLE-1003, ¶¶34-35:



APPLE-1005, Detail of FIG. 22 (annotated).

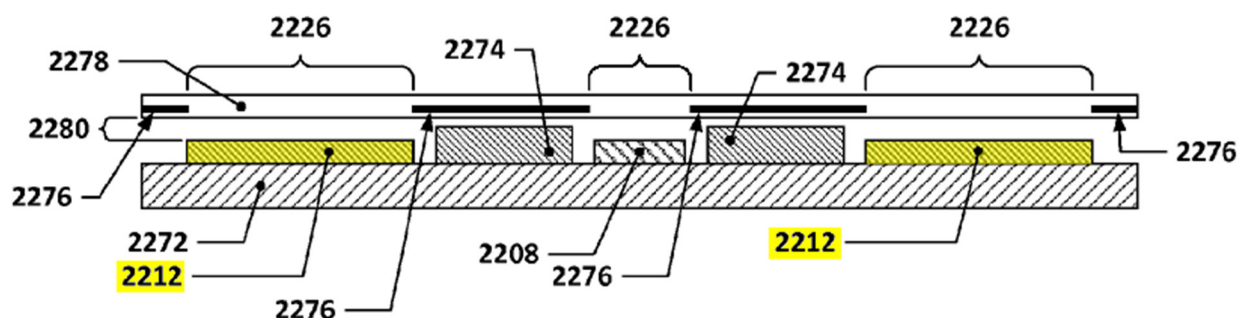
The window may be made from translucent or transparent material.

APPLE-1005, 17:4-6. A POSITA would have found it obvious that light shining

through translucent or transparent material would change in shape due to the refractive properties of translucent and transparent materials. APPLE-1003, ¶35.

Element [1.3]

Sarantos discloses a plurality of photodetector elements 2212 configured to detect light after the light passes through tissue. APPLE-1005, 17:1-25, FIG. 22. The following annotated FIG. 22 from Sarantos shows the plurality of photodetectors 2212 (annotated in yellow). APPLE-1003, ¶¶36-38:



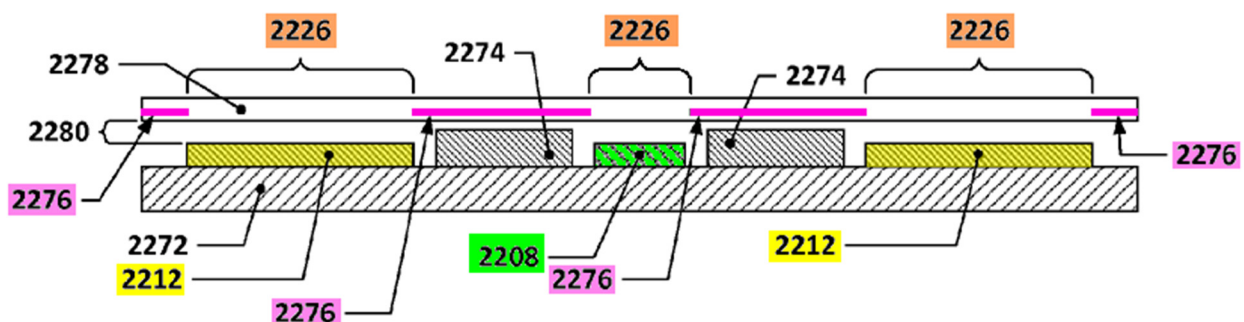
APPLE-1005, Detail of FIG. 22 (annotated)

The photodetectors are configured to detect light after the light passes through tissue. APPLE-1005, 17:16-25. The photodetectors then output a signal responsive to the detected light which is used to determine a physiological parameter of a user such as heart rate or blood oxygen saturation. APPLE-1005, 20:7-33, 4:44-50 (“...determine a heart rate measurement based, at least in part, on the at least one light intensity measurement”), 13:44-58, 18:44-48; APPLE-1003, ¶38. For example, Sarantos describes that “control logic” implemented as a combination of hardware and software “collect[s] data from one or more

photodetectors” based on a received “signal indicative of an amount of detected light from the photodetector element” to “determine a measurement of a person’s heart rate.” APPLE-1005, 20:7-33.

Elements [1.4]-[1.5]

FIG. 22 of Sarantos depicts a surface (window 2278) with “an in-mold label 2276” that is “black or otherwise rendered opaque to light to prevent light from entering or exiting the PPG sensor through the window 2278 except through window regions 2226.” APPLE-1005, 17:1-25, FIG. 22. As shown in FIG. 22, the in-mold label 2276 is positioned between the photodetector elements 2212 and tissue of user’s wrist, wherein window regions 2226 (which meet the definition of “opening” provided by Masimo for purposes of infringement) in the dark-colored coating allow light reflected from the tissue to reach photodetectors 2212. *Id.* The following annotated FIG. 22 shows the window regions 2226 (orange), the in-mold labels 2276 (pink), and the photodetectors 2212 (yellow). APPLE-1003, ¶¶39-42.



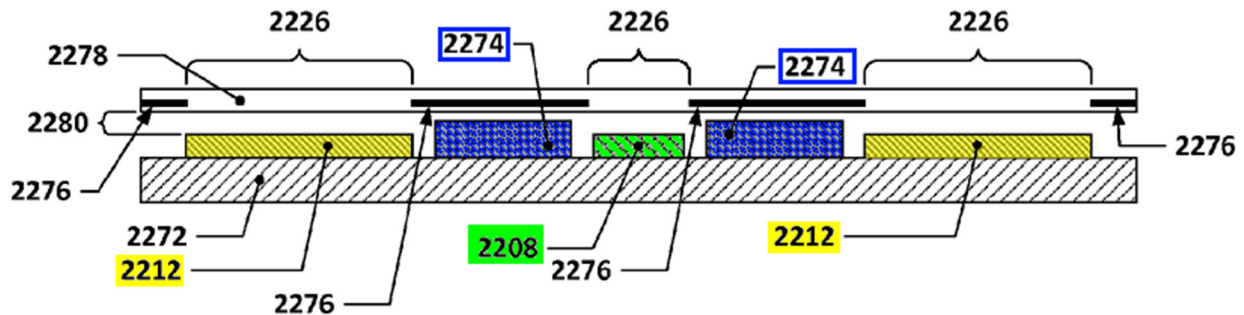
APPLE-1005, Detail of FIG. 22 (annotated)

Sarantos explains that various types of surfaces with dark-colored coatings

may be used to block stray light from reaching the photodetector elements 2212, including “a painted or silk-screened mask” applied to the window 2278. APPLE-1005, 17:1-16; APPLE-1003, ¶41.

Element [1.6]

Sarantos discloses walls 2274 which serve as light blocks that prevent light emitted from light source 2208, the claimed plurality of emitters (*supra* [1.1]), from reaching photodetector elements 2212 without first passing through the tissue of a user’s wrist. APPLE-1005, 17:26-51; APPLE-1003, ¶¶43-44.



APPLE-1005, Detail of FIG. 22 (annotated)

As shown in FIG. 22, the walls 2274 (blue) are positioned between the LEDs 2208 (green) and the photodetectors 2212 (yellow) and are thus configured to prevent at least a portion of the light emitted from the LEDs 2208 from reaching the plurality of photodetectors 2212 without first reaching the tissue of the user. APPLE-1005, FIG. 22; APPLE-1003, ¶¶43-44.

Element [1.7]

Sarantos discloses a control logic 2706 implemented as a combination of

hardware and software that “collect[s] data from one or more photodetectors” based on a received “signal indicative of an amount of detected light from the photodetector element” to “determine a measurement of a person’s heart rate.” APPLE-1005, 20:7-33. The control logic includes processor 2768 and memory 2770, which are “operatively coupled” with one another. *Id.* A POSITA would have found it obvious that “coupled” logic elements, like processors and memories, send signals to one another since coupled elements are in frequent communication with one another. APPLE-1003, ¶¶45-46. Accordingly, because the processor and memory elements communicate via signals, a POSITA would have found it obvious that Sarantos’s memory 2770 generates additional signals in response to the outputted signal from the photodetectors so that the processor 2768 may, based on these additional signals, appropriately determine a measurement of the user’s physiological parameter, like heart rate. APPLE-1003, ¶46; APPLE-1005, 20:7-14.

To the extent a POSITA would not have found it obvious that Sarantos’s memory 2770 generates signals responsive to the outputted signals from the photodetectors, it would have been obvious to include intermediary components in between the photodetectors and the processor 2768. APPLE-1003, ¶¶47-48. Indeed, Sarantos provides a “high-level” circuit implementation and does not detail how to process the signal from the photodetectors; Sarantos suggests that the

control logic 2706 can flexibly include “one *or more processors*.”³ APPLE-1005, 20:14-16. Based on this flexible teaching, a POSITA would have included additional, intermediary components that pre-process the raw signals from the photodetectors prior to sending them to processor 2768. APPLE-1003, ¶47. This is because a POSITA would have understood that monitoring devices relying on sensing technology, like Sarantos’s device, often required (and still require) additional intermediary components to filter, amplify, and convert analog signals from sensors, like Sarantos’s photodetectors, prior to sending them to digital processors for interpretation. APPLE-1003, ¶¶47-48. Prior sensing technologies would have ensured success, as they have successfully used, *e.g.*, separate processors (such as a “signal processor,” ’159 patent, 13:11-17, or a sensor processor) and/or additional electronic components, like analog-to-digital converters, filters, or amplifiers, to process signals from photodiodes. APPLE-1003, ¶47-48.

Any one of these intermediary components in the Sarantos device is responsive to the outputted signal from the photodetectors, and accordingly generate signals and send them to Sarantos’s processor 2768. APPLE-1003, ¶48. The processor, upon responsively receiving these signals, then processes them to determine the physiological parameter. *Id.*; APPLE-1005, 20:7-14.

³ All emphasis added unless otherwise noted.

Claim 2

[2.0]

Sarantos provides a side-by-side comparison of a prior art wristband-type wearable fitness monitor (FIG. 1) and its inventive wristband-type wearable fitness monitor. APPLE-1005, FIGs. 1-2, 5:52-58. Sarantos distinguishes itself from prior art through the HAR photodetector design; the conventional characteristics of wearable fitness monitors (*e.g.*, watch-like characteristics) are present in both the prior art and Sarantos's embodiments. *Compare* APPLE-1005, FIG. 1 with FIG. 2. Indeed, Sarantos discloses logic and processing components that collect data from the photodetectors and determine the heart rate, but does not provide details on how to present the physiological parameters to the users. APPLE-1005, 20:7-23. As such, a POSITA would have found it obvious to implement features typically found in a conventional wearable fitness monitor, such as a display configured to present visual feedback responsive to determined physiological parameters (like pulse rate). APPLE-1003, ¶¶49-54. Indeed, Sarantos expressly identifies the Fitbit Surge fitness monitoring watch as an express example of the type of wearable fitness monitoring device that would have been beneficially improved by the improved HAR photodetector design described in Sarantos. APPLE-1005, 1:25-31. Therefore, a POSITA would have found it obvious to implement the wristband-type wearable fitness monitor of Sarantos in a Fitbit Surge, including the user

interface of the Fitbit Surge. APPLE-1003, ¶¶51-54. “The Surge has a touch screen with a backlight and three buttons.” APPLE-1019, 11-12, 36 (“The Surge display is a touch screen”); APPLE-1020, 2. The Surge presents a visual representation of a physiological parameter, specifically “heart rate.” APPLE-1019, 18-24, 32, 10-13; APPLE-1020, 2-3, 8.



APPLE-1019, 24.

A POSITA would have been motivated to present visual feedback to the user by, in light of the prior art devices expressly cited and illustrated by Sarantos, implementing one of the most conventional and intuitive forms of technology: a display. APPLE-1003, ¶¶52-53. Doing so, increases the capabilities of Sarantos’s physiological monitoring device because it would have visually provided important data to the user without compromising the functionality of Sarantos’s sensors, including the measured heart rate and blood oxygen saturation physiological parameters calculated by Sarantos’s device. *Id.* Additionally, a POSITA would have had a reasonable expectation of success in implementing the display to

present visual feedback responsive to determined physiological parameters because doing so entails the use of known solutions to improve similar systems and methods in the same way. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007); APPLE-1003, ¶¶53-54. Displays, on wrist-worn devices, that provide visual feedback to users were well-known at the time of the invention. APPLE-1003, ¶53; APPLE-1019, 18-24, 32, 10-13; APPLE-1020, 2-3, 8. Indeed, as noted above, Sarantos mentions the Fitbit Surge, a conventional fitness monitoring device implementing a touchscreen display presenting visual feedback of physiological parameters. APPLE-1005, 1:25-31; APPLE-1019, 18-24, 32, 10-13; APPLE-1020, 2-3, 8; APPLE-1003, ¶¶51-54. Further, like the Surge, Sarantos's device is a physiological monitoring device which includes the same components for measuring physiological parameters, such as a battery, processor, memory, emitters, and photodetectors. APPLE-1003, ¶54. Each of these components are compatible to an implementation of Sarantos's device that includes a display and thus the modification would be routine and straight forward. *Id.*

(b) Claim 3

[3.0]

As discussed with respect to claim 2, *supra*, a POSITA would have obviously implemented a display (including a touch-screen display) in Sarantos's physiological device to present visual feedback responsive to the user's

physiological parameters like heart rate for the reasons discussed above. APPLE-1003, ¶¶51, 53-55; APPLE-1019, 18-24, 32, 10-13; APPLE-1020, 2-3, 8. Touch-screen interfaces were well known for such wearable devices by 2015. APPLE-1003, ¶¶54-55; APPLE-1019, 18-24, 32, 10-13; APPLE-1020, 2-3, 8.

(c) **Claim 4**

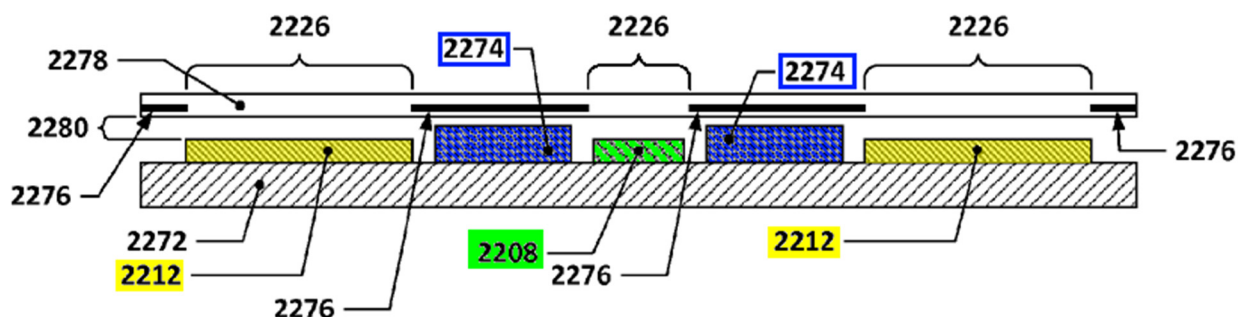
[4.0]

Sarantos describes that light emitted from the light source “shine[s] through its associated window region 2226 and *into the person’s skin*, where the light then diffuses into the surrounding flesh and is then *emitted back out of the person’s skin* and into the HAR photodetector elements” positioned on the same side of the device as the light source. APPLE-1005, 17:1-25, Fig 22. A POSITA would have recognized such a configuration as a reflectance measurement configuration. APPLE-1003, ¶¶56-57; *see, e.g.*, APPLE-1009, 87-88, Figure 7.2.

(d) **Claim 5**

[5.0]

Sarantos discloses that “FIGS. 22 through 24 depict cross-sections of simplified representations of **various PPG sensors**, in accordance with **various example implementations**.” APPLE-1005, 16:60-62, 6:52-54. As discussed with respect to element [1.6], *supra*, Sarantos’ walls 2274 shown in FIG. 22 provide the claimed light block:



APPLE-1005, Detail of FIG. 22 (annotated)

Sarantos provides multiple exemplary arrangements of photodetectors that can comport with the layout shown in this cross-sectional design, and that each individually satisfy this claim. APPLE-1003, ¶¶58-66. As shown in FIG. 22, the light block 2274 is spaced equidistantly between the light source 2208 and photodetector elements 2212. FIG. 25 as “**an example implementation**” of a **PPG sensor** and therefore a POSITA would have recognized that FIG. 25 is one of the “**various PPG sensors**, in accordance with **various example implementations**” corresponding to the cross-section view of FIG. 22, FIG. 25 and its corresponding disclosure as a natural extension of and incorporating the features of FIG. 22, including the equidistantly spaced light block. APPLE-1005, 19:31-35, 16:60-32; APPLE-1003, ¶¶58-61. Alternatively, it would have been obvious to implement the wall 2274 of FIG. 22 in the annular arrangement of FIG. 25 to beneficially prevent light that has not been attenuated through the user’s skin from reaching the photodetector elements. APPLE-1003, ¶62; APPLE-1005, 17:26-42; *see also Boston Scientific Scimed, Inc. v. Cordis Corp.*, 554 F.3d 982,

991 (Fed. Cir. 2009) (“Combining two embodiments disclosed adjacent to each other in a prior art patent does not require a leap of inventiveness.”)

FIG. 25 shows an annular photodetector element 2512 with a light source 2508 in the middle. APPLE-1005, 19:22-35, Fig. 25; APPLE-1003, ¶61.

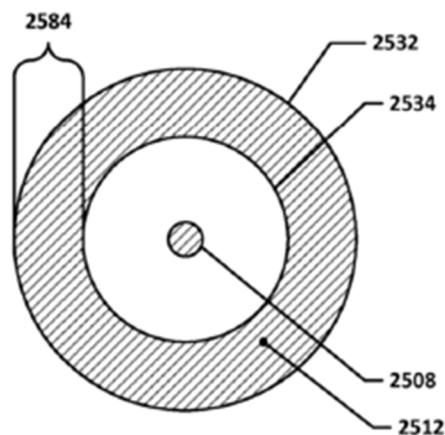


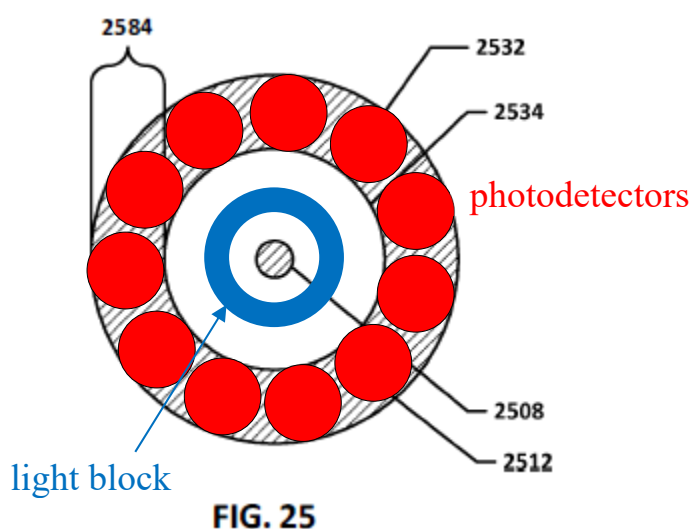
FIG. 25

A POSITA would have recognized that implementing the example annular arrangement of FIG. 25 to include the light block (wall 2274) expressly disclosed with respect to FIG. 22 (to beneficially prevent light that has not attenuated through the user’s tissue from reaching the photodetector elements 2512) the light block would be arranged in a circular configuration. APPLE-1003, ¶61.

Alternatively, it would have at least been obvious to arrange the light block (wall 2274) in a circular arrangement in the annular configuration of FIG. 25 because both the light source 2508 and photodetector elements 2512 have a circular arrangement. APPLE-1003, ¶62. Given the annular configuration of detectors

around a circular LED, the small form factor, and the limited space in Sarantos' PPG sensor described in FIGS. 22 and 25, a POSITA would have found a circular shape light block to be the most reasonable and obvious design choice. APPLE-1003, ¶62.

Sarantos also discloses that “it is to be understood that any of the implementations above with respect to a single photodetector element spaced apart from a light source may also be implemented *using a plurality of photodetector elements* arranged about the light source.” APPLE-1005, 20:52-57. Therefore, a POSITA would have understood that the annular photodetector element 2512 of FIG. 25 can be implemented using a plurality of photodetector elements (depicted by red circles) arranged about the light source in an annular configuration, as depicted below. APPLE-1003, ¶¶63-64.



APPLE-1005, FIG. 25 (modified)

Alternatively, FIGs. 15-16 provide this claim, disclosing multiple

photodetector elements (three and four respectively) arranged in an array corresponding to a circular shape about their respective light sources. APPLE-1005, 14:56-15:8. FIG. 18 illustrates a similar circular configuration of photodetector elements surrounding a light source comprising two light-emitting devices. APPLE-1005, 15:24-43. A POSITA would have used any of these arrangements of photodetector elements in accordance with the layout taught in FIG. 22 by, *e.g.*, arranging the photodetector elements in a circular configuration (as illustrated in FIGs. 15-16 and 18) with an insulated light block between the light source and the photodetectors (as illustrated in FIG. 22). APPLE-1003, ¶65. For instance, a POSITA, based on the teachings of Sarantos, would have implemented the circular configuration of the photodetectors shown in FIG. 18 based on FIG. 22's layout as follows:

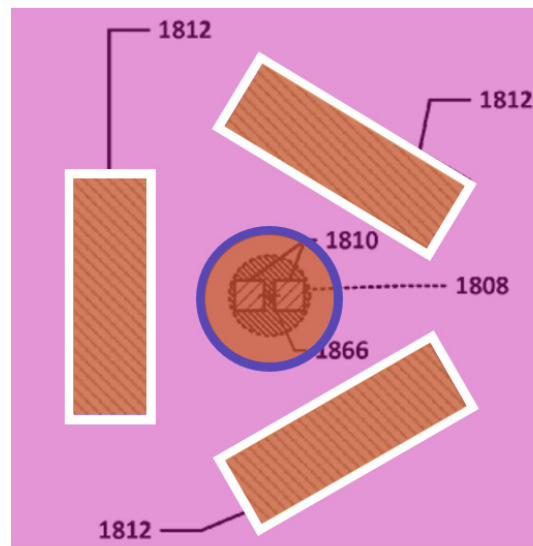


FIG. 18

APPLE-1005, FIG. 18 (annotated), with light block (blue), window with in-mold label (purple), window regions (orange), photodetectors 1812, lightsource 1808.⁴

As described above in [1.6], the light block bounds the light emitted from the light source such that the light reaches the tissue measurement site without first reaching the photodetectors. A POSITA would have found it obvious that the spatial configuration of the array of photodetectors would correspond to the shape of the tissue bounded by the light block to provide uniform emittance of light into the tissue to the photodetectors. APPLE-1003, ¶66. Accordingly, the photodetectors are arranged in an array having a spatial configuration corresponding to the tissue shape bound by the light block. *Id.*

(e) Claim 7

[7.0]

As discussed above in [1.7], Sarantos discloses measuring the heart (pulse) rate of the user. APPLE-1005, 13:40-53, 2:5-12, 8:3-18; APPLE-1003, ¶67.

(f) Claim 8

[8.0]

⁴ The annotated Figure 18 illustrates an exemplary circular shape for the light block. A POSITA would have understood that differently shaped light blocks (e.g., rectangular, triangular, etc.) could be used with the circular configuration of the photodetectors shown above.

A discussed in Section VI.A.1, *supra*, Sarantos describes a wrist-worn physiological sensor that measures physiological parameters by reflecting light into the user's skin and measuring the reflected light. APPLE-1005, 1:48-56, 2:5-14, 7:12-28; APPLE-1003, ¶¶26-28. 68. Sarantos describes well-known “photoplethysmographic techniques...to measure other physiological parameters besides heart rate, such as blood oxygenation levels” by providing “light-emitting devices that are each able to emit different wavelengths of light” including “light in the red or infrared spectrum” to facilitate such blood oxygen saturation measurement. APPLE-1005, 13:44-58; APPLE-1003, ¶¶28, 68. Sarantos describes that “techniques for measuring blood oxygenation levels, may be most effective using light of...red wavelengths, e.g., 660 nm, or in the infrared spectrum.” APPLE-1005, 18:44-48. Furthermore, although Sarantos notes that its disclosed “ratios and dimensional values” of its primary embodiment are “tailored based on the green/yellow light spectrum” rather than the “red or infrared spectra” (*see* APPLE-1005, 18:48-51), Sarantos clearly contemplates embodiments where its device would measure blood oxygenation levels using red and infrared light. APPLE-1003, ¶69. This is evident from Sarantos's express description of structural modifications that would be made to accommodate multiple LEDs of different wavelengths, including that “multiple light-emitting devices ... may[] ... be spaced apart from one another, as shown in FIGS. 1 and 2, or may be closely

grouped.” APPLE-1005, 13:34-36, 13:44-14:22. A POSITA reviewing Sarantos’s alternative embodiments for measuring blood oxygen levels at col. 13:36-14:22 would have understood and found obvious that the ratios and dimensions of Sarantos’s HAR photodetectors could and would be suitably adjusted to optimize for the detection of red and infrared light as appropriate for measuring blood oxygen saturation levels. APPLE-1003, ¶69.

Alternatively, it would be obvious to modify the device of Sarantos, based on Sarantos’ own disclosures of measuring blood oxygen saturation, to include such blood oxygen saturation measurement functionality to beneficially allow “[p]eople with cardiac or pulmonary disease [to] check on their blood oxygenation continuously, especially while jogging or exercising” to ensure that blood oxygen levels are within acceptable ranges to avoid injury or medical emergencies. APPLE-1014, 1; APPLE-1003, ¶70. Such functionality would have also beneficially allowed pilots “to determine if they need supplemental oxygen, especially when they fly a non-pressurized airplane.” *Id.* Such a functionality would have allowed alpinists “climbing on high altitudes” to ensure that their blood oxygen levels are within a safe range. *Id.*

Sarrantos’ descriptions of measuring blood oxygen saturation at the wrist are also enabled, as such techniques were well-known in the art well before 2015, including in engineering and scientific papers published by well-respected and

authoritative organizations such as IEEE. APPLE-1003, ¶¶71-84; *see, e.g.*, APPLE-1005, 13:40-14:22, FIG. 2; APPLE-1014, 2 (“we present another novel reflective wrist pulse oximeter that has been developed in our laboratory.”); APPLE-1015, Abstract (“This sensor has demonstrated an ability to gather high-integrity data at fingertip, wrist, earlobe, palm, and temple locations from a group of 48 subjects (20 to 64 years old).”); APPLE-1016, Abstract (“The experimental results have confirmed the feasibility of this wrist-band oximeter.”); APPLE-1018; APPLE-1021, [0007], [0032]-[0033], [0051]-[0054], [0058]. A POSITA also would have known how to, and would have found it obvious to optimize the sensitivity of the photodiodes, implement an optical filter that would pass both red and infrared light, and implement commonly known signal processing algorithms for calculating oxygen saturation from the detected light signals. *See, e.g.*, APPLE-1009, 94 (“The designer should keep in mind the wavelengths of interest in pulse oximetry (660 nm and 940 nm) when deciding on an appropriate photodiode.”), 96 (“Many photodiodes are available in a variety of packaging types each of which filters out selected wavelengths of light.”); APPLE-1003, ¶¶73-74.

Further, a POSITA would have recognized the conventional nature of basic pulse oximetry techniques that had been known for decades before the ’159 Patent, as discussed above, and it would have been well within the ordinary skill and creativity of a POSITA to implement such a device. *Facebook, Inc. v. Windy City*

Innovations, LLC, 973 F.3d 1321, 1343 (Fed. Cir. 2020); *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1219 (Fed. Cir. 2016); APPLE-1003, ¶¶71-84.

Furthermore, Sarantos provides at least the same level of disclosure with respect to performing pulse oximetry at the wrist as the '159 patent itself. APPLE-1003, ¶¶85-88. The '159 Patent only mentions the wrist as a possible tissue measurement site in passing, with no acknowledgment of any alleged challenges of measuring at the wrist and no solutions specifically tailored to addressing the alleged challenges. *See* APPLE-1001, 2:57-58 (“The tissue measurement site can include, such as, for example, a finger, a wrist, or the like.”); 10:45-47 (“The 3D sensor 700 can be placed on a portion of the patient’s body that has relatively flat surface, such as, for example a wrist...”); 12:18-20 (“The measurement site 102 can be any location on a patient’s body, such as a finger, foot, earlobe, wrist, forehead, or the like.”). The '159 Patent does not mention any adjustments or modifications required to implement reflective blood oxygen measurement at the wrist rather than other locations on the user. APPLE-1003, ¶¶85-87. To the extent a POSITA would have understood the disclosure of the '159 Patent as teaching oxygen saturation measurements at the wrist, a POSITA would have also understood that level of skill is sufficient to enable the prior art under *In re Epstein*, 32 F.3d 1559, 1568 (Fed. Cir. 1994). APPLE-1003, ¶¶85-88.

(g) **Claim 9**

[9.0]

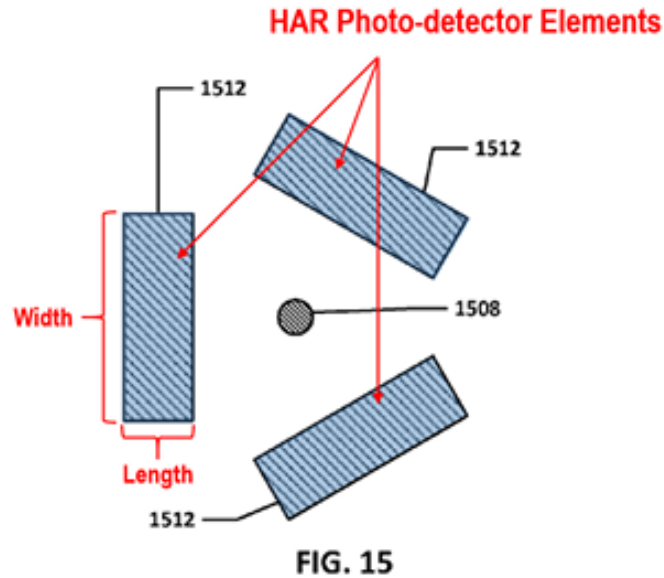
Sarantos teaches that its window (the claimed material, *supra* [1.2]) may be formed from “acrylic,” which a POSITA would have known is a type of plastic. APPLE-1005, 17:4-6; APPLE-1003, ¶89; *see e.g.* APPLE-1007, 5:49-54. In addition, a POSITA would have known that many translucent materials are comprised of plastic. APPLE-1003, ¶89.

(h) **Claim 12**

[12.0]

Sarantos’s window regions 2226 (the claimed opening under Masimo’s definition asserted for purposes of infringement, *supra* [1.4]-[1.5]) are “associated with the HAR photodetector elements 2212.” APPLE-1005, 17:16-25. Specifically, the window regions 2226 “overlap their respective HAR photodetector elements” and are “mutually coextensive.” APPLE-1005, 17:42-51. HAR (“high-aspect-ratio”) photodetectors refer to “*non-square* photodetectors” which each “has a maximum first dimension along a first axis that is at least twice as large as a maximum second dimension . . . along a second axis that is perpendicular or orthogonal to the first axis.” APPLE-1005, 9:57-64; APPLE-1003, ¶¶90-92.

FIG. 15, for instance, shows that the HAR photodiodes can have a width larger than their length. APPLE-1003, ¶91.



APPLE-1005, FIG. 15 (annotated).

Sarantos further discloses that “the window regions 2226 through which the light reaches the HAR photodetector elements 2212 each overlap their respective HAR photodetector elements 2212” and “the window regions 2226 are mutually coextensive with their respective HAR photodetector elements 2212.”

APPLE1005, 17:42-47.

Accordingly, each window region comprises a width and length wherein the width is larger than the length. APPLE-1003, ¶¶90-92. Though Sarantos specifically refers to the maximum first dimension as a “length” and the maximum second dimension as a “width,” a POSITA would have understood that “lengths” and “widths” of rectangles are interchangeable terms in this context. APPLE-1005, 10:11-15; APPLE-1003, ¶92.

(i) **Claim 13**

[13.0]

As described *supra* [1.4]-[1.5], Sarantos's in-mold label 2276 (the claimed dark-colored coating) "may be black." APPLE-1005, 17:1-16; APPLE-1003, ¶93.

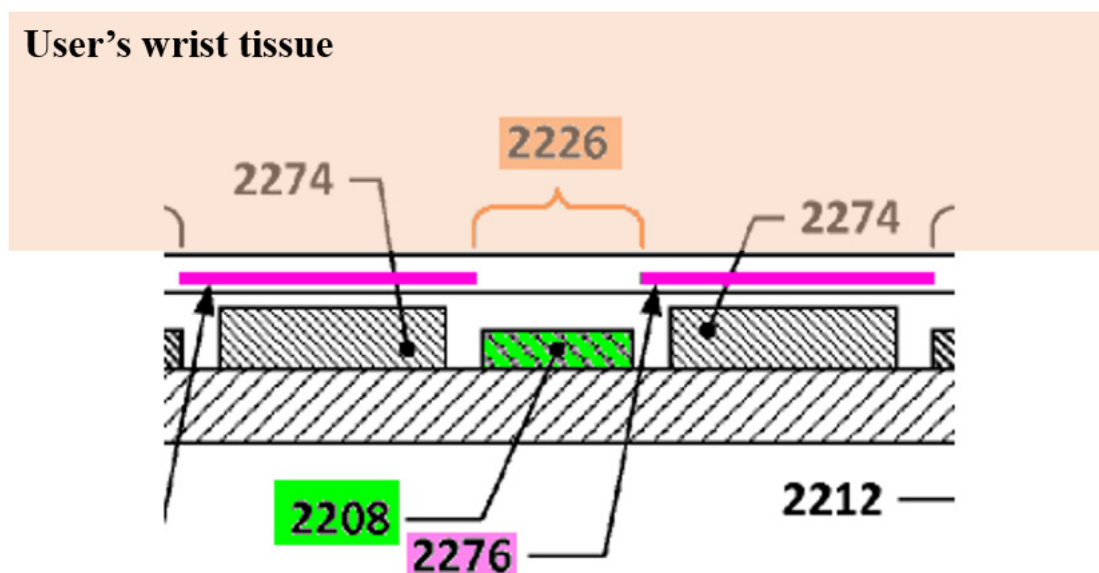
B. Ground 1B: Claims 1-5, 7-14, and 16-18 are obvious over Sarantos in view of Shie

1. Overview of Shie

Shie describes a diffuser that has a "light diffusing and shaping advantages" and changes a first shape of light into a second shape. APPLE-1007, 6:61-7:7; APPLE-1003, ¶¶94-95. The diffuser includes a "plurality of surface micro-structures" that "are designed to homogenize light passing through" the diffuser "to produce a predetermined pattern of smoothly varying, non-discontinuous light exiting the" diffuser. APPLE-1007, Abstract. Shie describes that the exiting light "is therefore altered according to both the macro-optical characteristic of the" diffuser "as well as the homogenizing characteristics of the micro-structures." *Id.* For example, Shie describes examples of "an optical element in the form of a cylindrical lens" where "the curvature and contour of the cylindrical lens surfaces" "define the macro-optical characteristics of the lens" and "micro-structures" provide "diffusing characteristics" that together yield "light diffusing and shaping advantages." APPLE-1007, 6:44-7:7.

2. Sarantos-Shie Combination

In the Sarantos-Shie combination, per Shie, a diffuser has a “light diffusing and shaping advantages” and changes a first shape of light into a second shape. APPLE-1007, 6:61-7:7; APPLE-1003, ¶¶96-98. Various “optical elements” such as lenses “are used routinely to manipulate light in optical instrumentation” and “for directing the light from the light source.” APPLE-1023, 10; APPLE-1003, ¶97. It would therefore have been obvious to a POSITA to use the light shape changing material of Shie in the wristwatch sensor of Sarantos to implement Sarantos’ region 2226, which is positioned by Sarantos between LEDs 2208 and the user’s wrist tissue, as shown in FIG. 22 below, to change the shape of light emitted by light emitting devices included in light source 2208 into a second shape projected onto the tissue. APPLE-1005, 7:12-16, FIG. 22; APPLE-1003, ¶¶98-102.



APPLE-1005, Detail of FIG. 22 (annotated).

Shie explains that “optical elements [that] receive[] light from a light source having particular characteristics defined by the properties of the light source and then alter the light propagating through the optical element” were known in the art. APPLE-1007, 1:42-45. This includes “[d]iffusers [that] have been applied as a separate layer to optical elements in order to add both light diffusing and directing characteristics.” *Id.*, 2:13-15. Shei provides numerous examples of various lens shapes and structures that provide the disclosed light shaping functionality. *Id.*, 5:35-45; FIGs. 1a-8b; APPLE-1003, ¶98.

A POSITA would have been motivated to implement region 2226 between LEDs 2208 and the user’s wrist tissue in the device of Sarantos using a light shape

changing material (as taught by Shie), to more precisely direct the light emitted toward the tissue so as to increase power efficiency by shining light closer to photodiodes, as light not incident on the photodiodes represents wasted power. APPLE-1003, ¶¶99-100. A POSITA would have understood that the “pulsatile component of absorption... is a small fraction of the received signal... used by the pulse oximeter instrument to perform its measurements,” and thus, “it is important that the incident light be of significant magnitude to result in transmitted signals that have sufficient amplitude to provide accurate readings.” APPLE-1022, 3:40-48; APPLE-1003, ¶100. A POSITA knew that directing the light emitted toward the tissue to shine light closer to the photodiodes increases the signal level of the light detected by the photodiodes to minimize power consumption while still providing adequate radiated power for pulse oximetry. APPLE-1009, 76, 105; APPLE-1008, [0064]; APPLE-1003, ¶100. Applying Shie’s teachings to Sarantos would have furthered Sarantos’ express goal of providing “a significant improvement in the amount of AC light measurable by a photodetector without incurring a significant power consumption penalty” by configuring the resulting device to capture more of the light signal. APPLE-1005, 9:51-57; APPLE-1003, ¶100.

Applying Shie’s teachings regarding light shaping elements to Sarantos’ device would have also allowed for increased accuracy of measurements by

directing light towards a larger area to decrease irregular readings caused by moles or other aberrations on the skin. APPLE-1003, ¶101. For example, a POSITA would have understood that “the skin surface, tissue, muscle, bone and especially blood cause light scattering which increases the absorbance of light” (APPLE-1009, 68-70), and “most of the total attenuation is due to the scattering of light away from the detector by the highly heterogeneous tissue.” APPLE-1023, 62. “The problem has been to contend with the wide variation in scattering and nonspecific absorption properties of very complex heterogeneous tissue” and “[l]ight scattering is still a source of inaccuracy in pulse oximeters.” APPLE-1023, 60; APPLE-1009, 51. “The intensity of back scattered light from the skin depends... also on the structure and pigmentation of the skin.” APPLE-1009, 105. A POSITA understood that illuminating a larger pulsatile vascular bed would reduce measurement errors caused by moles and skin aberrations and enhance the quality of the measurement. APPLE-1009, 36, 105; APPLE-1024, 10 (“pigment may cause error”).

Additionally, the proposed modification would have allowed the designers of the resulting device to tune the light intensity to provide the most accurate physiological parameter detection. APPLE-1003, ¶102 (citing APPLE-1016). Applying Shei’s teachings regarding shaping elements to the device of Sarantos also would have allowed the resulting device to be designed to obscure appearance

of the light source from a user. APPLE-1003, ¶¶100-101; APPLE-1008, [0061]-[0063]. Device appearance at least partially drives consumer demand. Typically, the back of a watch has an opaque cover to conceal the electronic components from a user's view. APPLE-1004, 5:66-67; APPLE-1025, 1. An optical element with diffusing microstructures (as taught by Shie), which forms a portion of the back cover, would obscure the light source's appearance from the user while allowing light transmission toward the tissue. APPLE-1003, ¶102.

Light shape changing materials were known to be used for such purposes in the prior art, so a POSITA would have reasonably expected Shie's light shape changing material (e.g., diffuser) to work successfully in Sarantos's sensor. APPLE-1003, ¶102; APPLE-1016; APPLE-1023.

3. Analysis

(a) Claim 1

Elements [1.0]-[1.1], [1.3]-[1.7]

Sarantos demonstrates that the Sarantos-Shie combination provides, or at least renders obvious, elements [1.0]-[1.1], [1.3]-[1.7] for the reasons discussed in Ground 1A, *supra*. APPLE-1003, ¶¶103, 29-33, 36-48.

Element [1.2]

As described above in Section IV.B.2 (*supra*), in the device resulting from the combination of Sarantos with Shie, Sarantos' region 2226 that is positioned

between the light source 2208 and the user's skin is implemented based on the teachings regarding Shie's diffuser with "***light diffusing and shaping*** advantages" positioned between Sarantos FIG. 22's light emitting devices in light source 2208 and the user's wrist tissue, to change the shape of light from a first shape characterized by the specific location, arrangement, and/or shape of each light emitting device in the resulting device into a second shape projected towards a surface of the tissue. APPLE-1007, 6:61-7:7, APPLE-1003, ¶¶104-111, 96-102 .

In the combination, Sarantos' region 2226 that is positioned between the light source 2208 and the user's skin is implemented to, for example, include "a predetermined pattern of smoothly varying, non-discontinuous light exiting the optical element" where the light is "altered according to both the macro-optical characteristic of the optical element as well as the homogenizing characteristics of the micro-structures" based on the teachings of Shie. APPLE-1007, Abstract; APPLE-1003, ¶¶106-107.

Shie gives numerous examples of how such a light shaping element can be beneficially implemented in the resulting combination. In one example, Shie describes "micro-structures" in a substrate "created in such a manner so as to control the direction of light output from a light source so as to ***shape the light*** output into a desired distribution pattern or envelope" and "applied to objects in order to provide the light homogenizing, ***shaping*** and directing characteristics."

APPLE-1007, 5:29-45; APPLE-1003, ¶108. In another example, “a parabolic convex lens” includes microstructures at the outer edges of the lens “designed to *shape the light* into a narrow distribution” and microstructures in the middle to “provide a broader light distribution pattern.” APPLE-1007, 7:8-27; APPLE-1003, ¶108. In another example, Shie describes a lightpipe with micro-structures integral in the top surface of the lightpipe “which homogenize, *shape*, and direct light exiting the lightpipe.” APPLE-1007, 9:36-45, 10:10-15 (“...shape substantially all of a light output of the monolithic optical element.”); APPLE-1003, ¶108.

In yet another example, “a beam of light entering the lens remains unaffected in its width and is spread by the cylindrical lens contour in a direction perpendicular to its width.” APPLE-1007, 1:20-24; APPLE-1003, ¶109. In one example, a POSITA knew that such a conventional cylindrical lens would change Sarantos’ circular shaped light beam (APPLE-1005, FIG. 6) entering the cylindrical lens into an ellipse shaped light beam exiting the lens. APPLE-1003, ¶110. An ellipse is a different geometric shape than a circle. As another example, a POSITA knew that a conventional cylindrical lens would change Sarantos’ square shaped light beam (APPLE-1005, FIG. 18, square shaped light-emitting devices 1810) entering the cylindrical lens into a rectangle shaped light beam exiting the lens. APPLE-1003, ¶110.

Shie also describes an optical element in the form of a Fresnel lens that

“may be formed in any number of shapes, configurations and contours” and the “particular size, cross-sectional shape and contour of the Fresnel optics as well as the size, curvature, and frequency of the continuous rings determine the macro-optical characteristic of a particular Fresnel lens.” APPLE-1007, 6:3-28. A POSITA would have found it obvious that the shape of the Fresnel lens determines the shape of the light exiting the Fresnel lens APPLE-1003, ¶111.

(b) Claims 2-5, 7-8

Sarantos demonstrates that the Sarantos-Shie combination provides, or at least renders obvious, claims 2-5 and 7-8 for the reasons discussed in Ground 1A, *supra*. APPLE-1003, ¶112, 49-88.

(c) Claim 9

[9.0]

Shie teaches that the optical elements may be formed from any suitable material, including “acrylic plastic” and “any other suitable plastic” materials. APPLE-1007, 5:49-54, 6:12-15, 10:35-39; APPLE-1003, ¶113.

(d) Claim 10

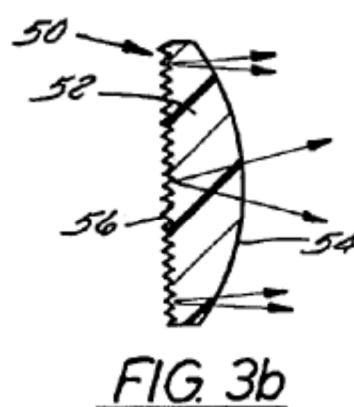
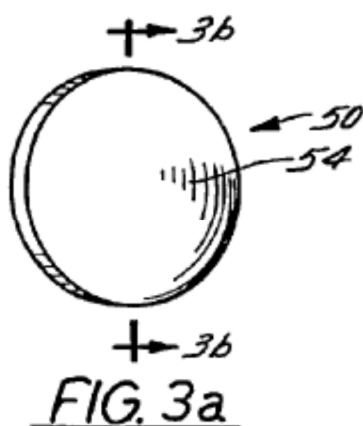
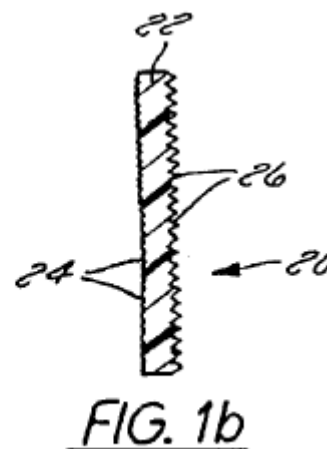
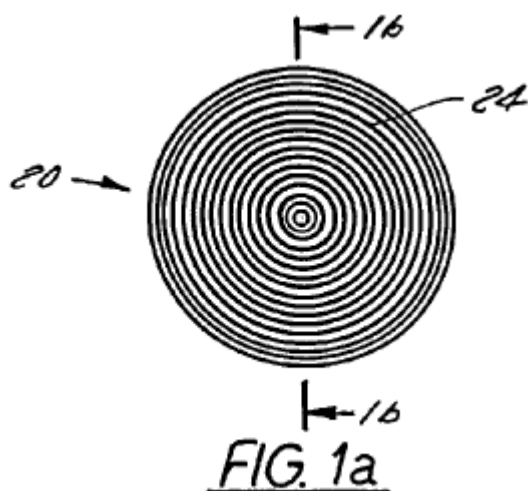
[10.0]

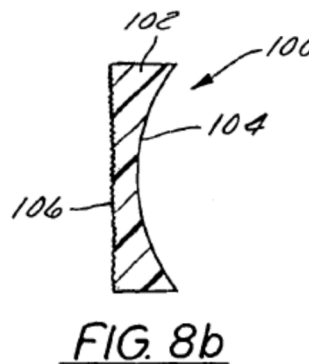
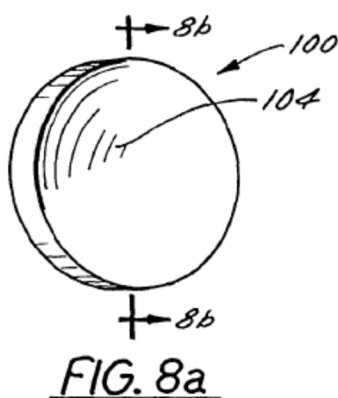
Shie teaches that the optical elements, may be formed from a variety of glasses, such as “sol-gel glass, quartz glass,” and “any other suitable ... glass.” APPLE-1007, 5:49-54, 10:45-49; APPLE-1003, ¶114.

(a) **Claim 11**

[11.0]

Shie provides, or at least renders obvious, that in the Sarantos-Shie combination, the second shape comprises a circular geometry. For example, FIGs. 1a, 1b, 3a, 3b, 8a, and 8b of Shie show optical elements having circular profiles that a POSITA would have recognized would have imparted a circular shape to the light exiting the optical element (the second shape) regardless of the initial shape of the light. APPLE-1003, ¶¶115-116.





APPLE-1007, 1:63-6:43, 7:8-27, 8:24-34, *see also* APPLE-1005, FIG. 18 (showing rectangular profile for first shape of light emitted from light emitters).

(b) Claims 12-13

Sarantos demonstrates that the Sarantos-Shie combination provides, or at least renders obvious, claims 12-13 for the reasons discussed in Ground 1A, *supra*. APPLE-1003, ¶¶117, 90-93.

(c) Claim 14

Element [14.0]

Supra Ground 1A, [1.0].

Element [14.1]

Supra Ground 1A, [1.0]-[1.1]. APPLE-1005, 2:18-19, 13:34-53, 14:5-22, 17:1-25. Because Sarantos's physiological sensor is a wristwatch, the plurality of light-emitting devices emit light proximate a user's wrist. APPLE-1005, 7:12-25, 8:39-43, 13:47-58, FIG. 2; APPLE-1003, ¶119.

Element [14.2]

Supra Ground 1B, [1.2]. The optical elements disclosed by Shie are diffusers. APPLE-1003, ¶¶120. Shie is titled “optical element having an integral surface diffuser.” APPLE-1007, Cover. For example, the optical elements include “a light ***diffusing*** and shaping surface structure.” *Id.*, 3:23-57, *see also* 6:48-52, 7:12-16, 7:59-64, 8:6-9, 8:24-34, 11:3-7.

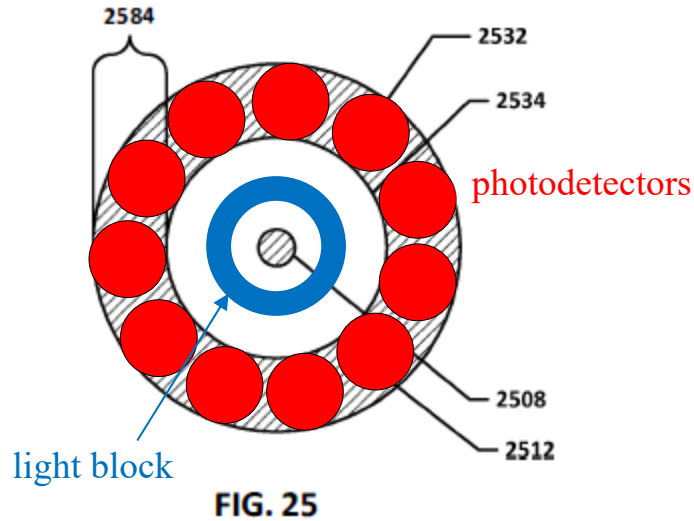
Element [14.3]

Supra, Ground 1A, [1.6], [5.0]; APPLE-1003, ¶¶121-126.

Element [14.4]

Supra, Ground 1A, [1.3], [1.6], [4.0], [5.0], Ground 1B, [14.3].

With respect to the arrangement depicted in FIG. 25 (which is a version of the cross-sectional arrangement of FIG. 22 (APPLE-100519:31-35, 16:60-32)), Sarantos is clear that “any of the implementations above...may also be implemented ***using a plurality of photodetector elements*** arranged about the light source.” APPLE-1005, 20:52-57. From Sarantos’ disclosure, a POSITA would have understood that the annular photodetector element 2512 of FIG. 25 can be implemented using a plurality of photodetector elements (depicted by red circles) arranged about the light source in a circular configuration corresponding to the circular shape of the portion of the tissue measurement site bounded by the circular shaped light block. APPLE-1003, ¶¶127-131.



APPLE-1005, FIG. 25 (modified)

As described with respect to element [1.3] in Ground 1A, *supra*, the photodetectors are configured to detect light after the light passes through tissue. APPLE-1005, 17:16-25. The photodetectors then output a signal responsive to the detected light which is used to determine a physiological parameter of a user such as heart rate or blood oxygen saturation. APPLE-1005, 20:7-33, 4:44-50, 13:44-58, 18:44-48; APPLE-1003, ¶¶130. For example, Sarantos describes that “control logic” implemented as a combination of hardware and software “collect[s] data from one or more photodetectors” based on a received “signal indicative of an amount of detected light from the photodetector element” to “determine a measurement of a person’s heart rate.” APPLE-1005, 20:7-33.

As described with respect to claim [4] in Ground 1A, *supra*, Sarantos describes, the light source emits light that “shine[s] through its associated window region 2226 and into the person’s skin, where the light then diffuses into the

surrounding flesh and is then *emitted back out of the person's skin* and into the HAR photodetector elements 2212” positioned on the same side of the device as the light source. APPLE-1005, 17:1-25, Fig 22. A POSITA would have recognized such a configuration a reflectance measurement configuration. APPLE-1003, ¶131; *see, e.g.*, APPLE-1009, 87-88, Figure 7.2.

Element [14.5]

Supra Ground 1A, [1.6], Ground 1B, [14.3].

Element [14.6]

Supra Ground 1A, [1.7].

Element [14.7]

Sarantos discloses “one or more processors and a memory” that are used to collect and analyze data collected from the photodetectors to determine a heart rate. APPLE-1005, 20:7-14, 20:14-18; APPLE-1003, ¶134. In view of those disclosures, a POSITA would have found limitation [14.7] obvious. APPLE-1003, ¶134. For instance, a POSITA would have found it obvious to include multiple processors, as Sarantos teaches, in light of conventional devices comprising multiple processors to, *e.g.*, expedite computing and increase processing capabilities. *Id.* In that configuration, the multiple processors would be configured to transmit and receive physiological parameter data to and from one another. *Id.*

(d) Claim 16

Supra Ground 1A, [1.7], [7.0].

(e) **Claim 17**

Supra Ground 1A, [8.0].

(f) **Claim 18**

Supra Ground 1A, [1.1], Ground 1B, [1.2], [14.2].

C. Ground 1C: Claim 2 is obvious over Sarantos in view of Brady

1. Overview of Brady

Brady describes wrist worn monitoring device having “an optical sensor” and a display for displaying “pulse rate; blood oxygenation levels; calories expended by the user of a pre-set time period; target zones of activity; time; distance traveled; and dynamic blood pressure.” APPLE-1021, Abstract, [0032], [0047], [0058]-[0059] (LED or LCD display).

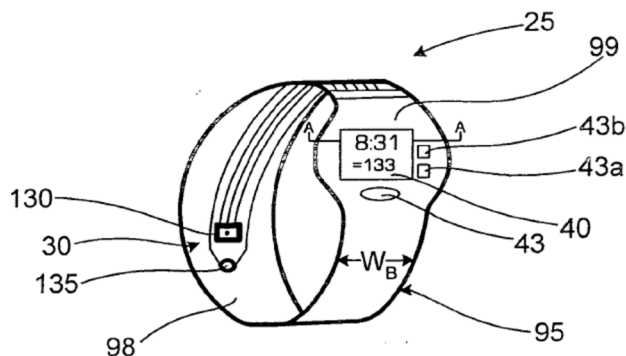


FIGURE 1

APPLE-1021, FIG. 1.

2. Sarantos-Brady Combination

A POSITA would have beneficially applied Brady to the Sarantos to implement the wrist-worn monitoring device of Sarantos to include a display

screen for displaying physiological parameters and other information about the user's health conditions including heart rate, blood oxygenation levels, calories burned, and activity level. APPLE-1003, ¶¶138-141; APPLE-1021, [0058].

Sarantos discloses measuring various physiological parameters of the user and it would have been beneficial to display such information to the user to allow the user to easily and continually monitor their health status. APPLE-1005, 20:7-33, 4:44-50, 13:44-58, 18:44-48; APPLE-1003, ¶140. Sarantos' sensor is implemented as an improvement to known watch-type physiological monitoring devices.

APPLE-1005, APPLE-1005, FIGs. 1-2, 5:52-58, 1:25-31. Brady discloses just such a traditional watch-type physiological monitoring device that includes one of the most conventional and intuitive forms of technology for conveying measured physiological parameters to the user: a display. APPLE-1003, ¶¶139-140. Such a configuration would allow the resulting device to “preferably display[] a visual alert when a user enters or exits a target zone” for a monitored physiological parameter, such as heart rate. APPLE-1021, [0064]. Displaying this information on the wrist-worn device itself would allow the user to quickly and easily view this information, including while in motion. APPLE-1003, ¶140.

Displays, on wrist-worn devices, that provide visual feedback to users were well-known at the time of the invention and therefore a POSITA would have had a reasonable expectation of success in implementing the display to present visual

feedback responsive to determined physiological parameters. APPLE-1003,

¶¶141, 52-53; APPLE-1019, 18-24, 32, 10-13; APPLE-1020, 2-3, 8.

3. Analysis

(a) Claim 2

[2.0]

In the combination, Brady discloses that the resulting device includes a “display member...to display pulse rate, blood oxygenation levels” and other measured parameters for the user. APPLE-1021, [0058]-[0059]; APPLE-1003, ¶¶139-142.

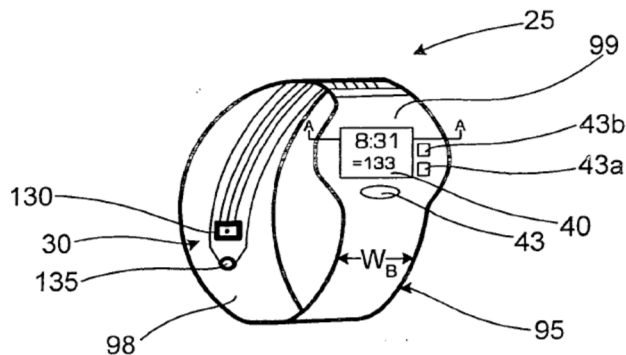


FIGURE 1

APPLE-1021, FIG. 1.

D. Ground 1D: Claim 3 is obvious over Sarantos in view of Brady and Han

1. Overview of Han

Han describes various embodiments of a “photoplethysmographic (PPG) device” that “include[s] one or more light emitters and one or more light sensors to generate the multiple light paths for measuring a PPG signal and perfusion indices

of a user.” APPLE-1008, Abstract. The PPG sensor can detect information that can be used to determine, e.g., a pulse rate or blood oxygen saturation for a user. *Id.*, [0026]. The PPG device can be implemented as a “wearable device 144 that can include a touch screen 128 and can be attached to a user using a strap 146.” *Id.*, [0029].

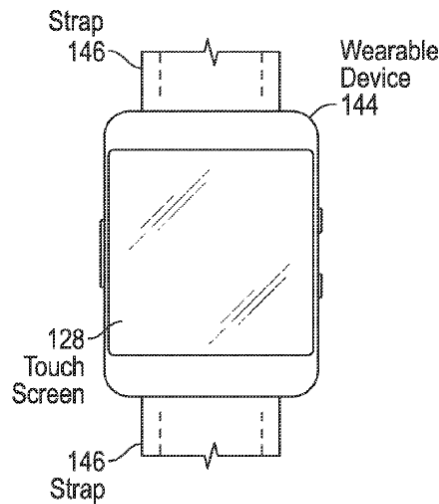


FIG. 1C

APPLE-1008, FIG. 1C.

The wearable device includes a processor that “together with an operating system can operate to execute computer code and produce and use data.” *Id.*, [0068]. The touchscreen display can display determined physiological parameter data for the user. *Id.*, [0070]-[0071].

2. Sarantos-Brady-Han Combination

A POSITA would have been motivated, would have found obvious, and would have reasonably expected success in beneficially applying the teachings of

Han to the Sarantos-Brady combination such that the resulting wrist-worn monitoring device would be implemented with a touch-screen display. APPLE-1003, ¶¶143-150. The Sarantos-Brady device includes a “display member...to display pulse rate, blood oxygenation levels” and other measured parameters for the user that “allows a user to scroll and select from terms display on the display member 40.” APPLE-1021, [0058]-[0059], [0064]. A POSITA would have recognized that a touchscreen user interface (as taught by Han) would have increased the utility of the resulting device by allowing for an easy and intuitive way to provide user input to the wrist-worn device, including to scroll through menus, change views, and make selections. APPLE-1008, [0029], [0072]-[0077]; APPLE-1021, [0064]-[0065]; APPLE-1003, ¶147. A POSITA would have recognized that touchscreen user interfaces for mobile devices, including wrist-worn watch devices, were ubiquitous by 2015 and therefore implementing the device of Sarantos-Brady to include a touchscreen interface on the display would have provided users with a familiar interface that they would have readily known how to use. APPLE-1003, ¶148. Furthermore, use of a touchscreen interface would have eliminated the need to provide other physical interface components such as buttons or keys, thereby contributing to a sleek, user friendly design for the resulting device. APPLE-1003, ¶149.

Further, a POSITA would have found it obvious to enhance the Sarantos-

Brady combination based on Han because doing so entails the use of known solutions to improve similar systems and methods in the same way. *KSR*, 550 U.S. at 417. A POSITA would have recognized that applying Han’s teachings of a wrist-worn physiological monitor having a touchscreen to Sarantos-Brady would have led to the predictable result and a POSITA would have had a reasonable expectation of success. APPLE-1008, [0029], [0072]-[0077]; APPLE-1003, ¶¶149-150.

3. Analysis

(a) Claim 3

[3.0]

As shown in Han’s FIG. 1C, the device resulting from Sarantos-Brady-Han combination is a “wearable device” that “include[s] a touch screen 128 and can be attached to a user using a strap 146.” *Id.*, [0029], [0067], [0072]-[0077]; APPLE-1003, ¶¶146-151.

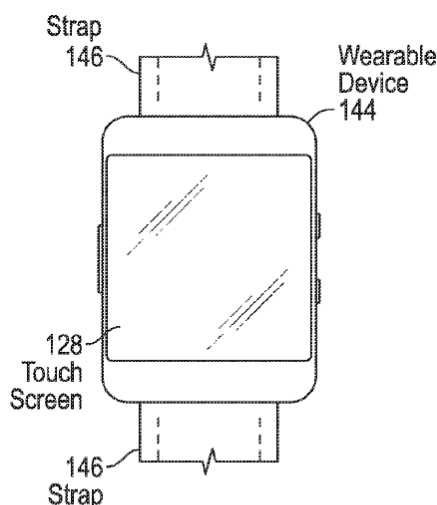


FIG. 1C

APPLE-1008, FIG. 1C.

E. Ground 1E: Claim 2 is obvious over Sarantos in view of Shie and Brady

A POSITA would have applied Brady to the Sarantos-Shie combination to provide claim 2 in the same manner and for the same reasons as discussed in Ground 1C, *supra*. APPLE-1003, ¶¶152, 142. The Sarantos-Shie-Brady combination provides claim 2 for the same reasons discussed in Ground 1C, *supra*.

F. Ground 1F: Claim 3 is obvious over Sarantos in view of Shie, Brady, and Han

A POSITA would have applied Han to the Sarantos-Shie-Brady combination to provide claim 3 in the same manner and for the same reasons as discussed in Ground 1D, *supra*. APPLE-1003, ¶¶153, 151. The Sarantos-Shie-Brady-Han combination provides claim 3 for the same reasons discussed in Ground 1D, *supra*.

G. Ground 1G: Claims 14, 16-25 are obvious over Sarantos in view of Utter

1. Overview of Utter

Utter describes “[g]eneral health and wellness management techniques and devices...configured for use with a data-capable personal worn or carried device. APPLE-1006, Abstract. Utter describes wrist-worn bands “that are configured to gather large amounts of personally relevant data that can be used to improve user health, fitness levels, medical conditions, athletic performance, sleeping physiology, and physiological conditions.” APPLE-1006, 12:56-64; APPLE-1003, ¶¶154-157. Utter’s system can evaluate overall wellness of a user based on physiological information such as heart rate and blood oxygen saturation. APPLE-1006, 13:1-16, 13:41-43, 17:56-57 (describing “light/infrared (‘IR’) sensor” and “pulse/heart rate (‘HR’) monitor”), 21:6-17. Utter’s system provides “a graphical representation of a user’s wellness” based on detected and received information. *Id.*, 25:38-55, 28:24-41.

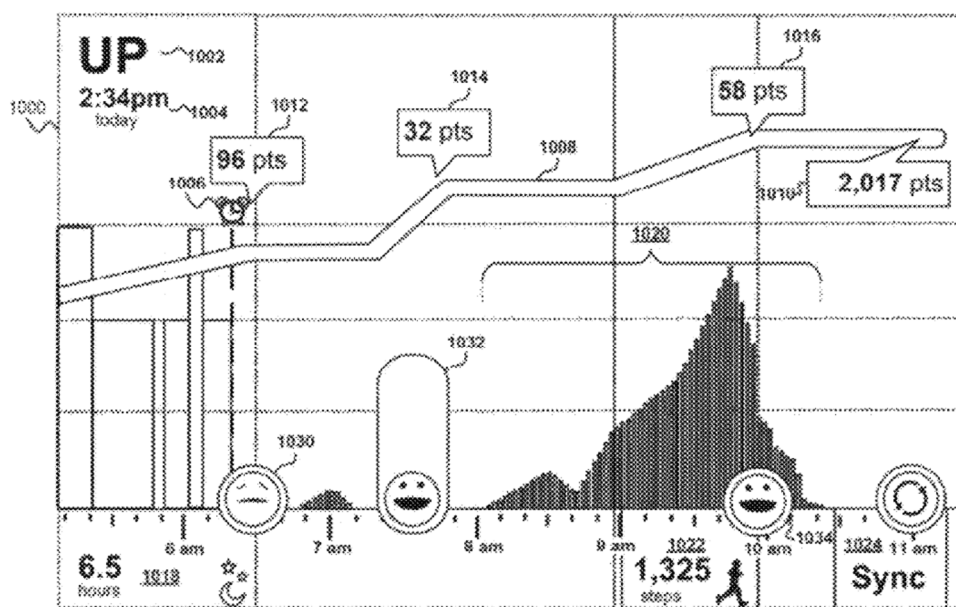
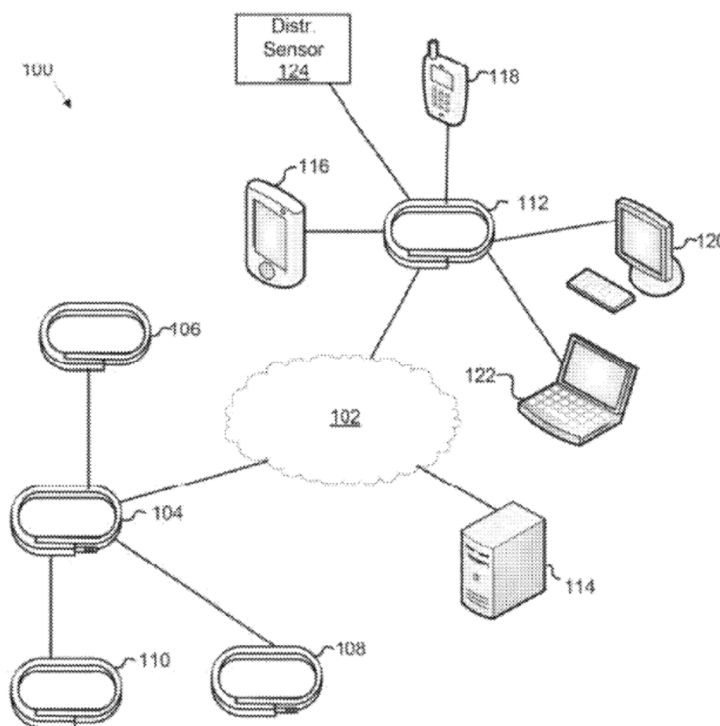


FIG. 10

APPLE-1006, FIG. 10.

Utter's system "is configured to process data, such as data representing parameters based on sensor measurements or the like, as well as derived parameters that can be derived (e.g., mathematically) based on data generated by one or more sensors." APPLE-1006, 33:14-35.

Utter describes using "wireless communication" to "transfer data from one or more bands 104-112 to various destinations" including "mobile computing device 116, mobile communications device 118, [or] computer 120." APPLE-1006, 14:42-15:3, 24:18-25.



APPLE-1006, FIG. 1

Both the wrist worn sensor devices and peripheral computing devices (such as mobile computing devices) can download and execute applications to conduct “[a]nalysis, evaluation, or other operations...on data gathered by an application” which can be displayed as part of a “graphical user interface” on “mobile computing device 116 or any other type of client.” *Id.*, 21:45-65, 36:15-30. The data collection, processing, and displaying functions can be performed on the wrist-worn device, the mobile device, or distributed between the wrist-worn device, the mobile device “or any other device.” *Id.*, 36:23-30.

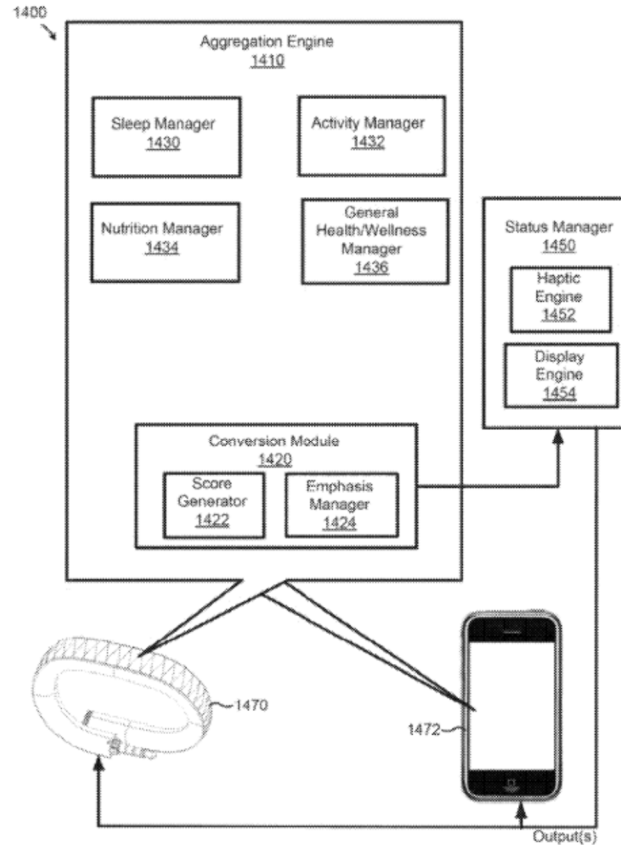


FIG. 14

APPLE-1006, FIG. 14.

2. Sarantos-Utter Combination

In the Sarantos-Utter combination, a wrist-worn optical biological information detecting apparatus transmits physiological data wirelessly to a secondary device such as a mobile computing device, mobile phone, or computer, (as taught by Utter). APPLE-1006, 12:56-64, 13:1-16, 14:42-15:3, 24:18-25; APPLE-1003, ¶¶158-168. A POSITA would have understood that Utter's secondary devices, such a mobile computing device 116, mobile communications device, desktop computer, and laptop computer, all conventionally comprise, among many other components, a touch screen user interface, a storage device, one

or more processors, and a network interface configured to wirelessly communicate with the primary physiological monitoring device. APPLE-1006, 32:25-46, 36:21-23 (...a touch-sensitive screen on a mobile phone 1472), 13:57-65, 14:42-15:3, 24:18-25 (“...wireless communication technologies”), 24:59-4; APPLE-1003, ¶¶157, 159.

Utter’s configuration allows the secondary device to act as a user interface to the physiological monitoring device, disclosing that “[a]nalysis, evaluation, or other operations...on data gathered by an application” is displayed as part of a “graphical user interface” on “mobile computing device 116 or any other type of client.” APPLE-1006, 21:45-65, 36:15-30; APPLE-1003, ¶160.

Utter further discloses that the secondary device (*i.e.*, mobile computing device or computer) “perform[s] various analyses and evaluations that can generate information as to a person’s physical (e.g., healthy, sick, weakened, or other states, or activity level), emotional, or mental state” and “determine an aggregate value for producing a graphical representation of a user’s wellness.” APPLE-1006, 13:1-16, 25:38-41, 28:24-29:8; APPLE-1003, ¶¶160-161, 155-156. A POSITA would have been motivated to wirelessly connect Sarantos’s wearable device to a secondary processing device having a user interface with a touch screen display as taught by Utter to increase the functionality of the system by utilizing the secondary display and processing capabilities of the secondary processing device,

as described above without significantly increasing the power consumption of Sarantos' device. APPLE-1006, ¶¶162-163; APPLE-1006, 14:42-15:3, 24:18-25, FIG. 1, FIG. 14.

For example, a POSITA would have understood that it is important for wearable sensors to avoid power-consuming features, such as large amounts of data processing or elaborate graphical displays, because such added features may necessitate a larger power supply unit which would have detrimentally increased the weight of the device. APPLE-1003, ¶162; *see, e.g.*, APPLE-1004, 5:54-66, FIG. 1. By wirelessly transmitting information to a mobile computing device or laptop “using any number of wireless communication technologies,” additional features can be realized, such as the calculation of additional metrics regarding the user's health, including the wellness scores described by Utter, without the need to increase the battery capacity, and therefore weight, of Sarantos' sensor. APPLE-1003, ¶162; APPLE-1006, 14:42-15:3, 24:18-25, 13:1-16, 33:14-35, 25:38-41, 21:6-22, 28:23-29:8; *see also* APPLE-1009, 199.

Further, a POSITA would have found it obvious to modify Sarantos based on Utter, and would have reasonably expected success in doing so, because doing so entails the use of known solutions to improve similar systems and methods in the same way by implementing Sarantos to communicate with a remote device to display information based on the received physiological parameters. *KSR*, 550 U.S.

at 417; APPLE-1006, 14:42-15:3, 24:18-25, 21:45-65, 36:15-30; APPLE-1003, ¶¶166-167.

Transmitting the physiological parameter data calculated by Sarantos' wrist-worn sensor device to a secondary device to allow for combination with additional data to generate overall wellness data and trends (along with other applicable teachings of Utter) "can be used to improve user health, fitness levels, medical conditions, athletic performance, sleeping physiology, and physiological conditions." APPLE-1006, 12:56-64, 33:50-60, 34:15-27; APPLE-1003, ¶¶163-165. For example, the resulting system can motivate the user to improve activity levels to improve overall health. APPLE-1006, 34:11-19, 35:26-31. Such wireless transmittal of physiological parameters can allow for sharing of information with other users. APPLE-1006, 14:23-42, 21:25-43,

Such a modification would have been routine and straightforward to a POSITA, and it would have been clear that such a combination would predictably work and provide the expected functionality, because Utter describes a physiological monitoring system that operated in the proposed manner. APPLE-1003, ¶¶166-168.

3. Analysis

(a) Claim 14

Elements [14.0]-[14.6]

Sarantos-Utter provides, or at least renders obvious, elements [14.0]-[14.6] for the reasons discussed in Ground 1B, *supra*. APPLE-1003, ¶¶169-175, 118-133.

Element [14.7]

As described above in Section IV.G.2, *supra*, the Sarantos-Utter combination discloses that the resulting physiological monitoring device wirelessly transmits physiological parameter data to a separate processor, such a mobile computing device or computer. APPLE-1006, 14:42-15:3, 24:18-25, 36:21-30, 13:57-65, FIG. 1, FIG. 14; APPLE-1003, ¶¶156, 158-159, 162-163, 176-177. For example, Utter describes “transfer[ing] data from one or more bands 104-112 to various destinations (e.g., another of bands 104-112, server 114, mobile computing device 116, mobile communications device 118, computer 120, laptop 122, and distributed sensor 124” and that “[t]he exchanged data may include personal physiological data and data derived from sensory-based user interfaces (‘UI’).” APPLE-1006, 14:4-15, 14:53-57. This communication occurs via “wireless communication facilities.” *Id.*, 14:42-15:3.

(b) Claim 16

Supra Ground 1A, [7.0].

(c) Claim 17

Supra Ground 1A, [8.0].

(d) Claim 18

Supra Ground 1A, [1.1]-[1.2].

(e) Claim 19

Element [19.0]

Sarantos-Utter provides a system configured to measure various physiological parameters of a user. *Supra* [1.0]; Sections IV.A.1, IV.G.1-2; APPLE-1003, ¶¶181-182, 29-30.

Element [19.1]

Supra Ground 1A, [1.0].

Element [19.2]

Supra Ground 1A, [1.1].

Element [19.3]

Supra Ground 1A, [1.2].

Element [19.4]

Supra Ground 1A, [1.3].

Element [19.5]

Supra Ground 1A, [1.4]-[1.5].

Element [19.6]

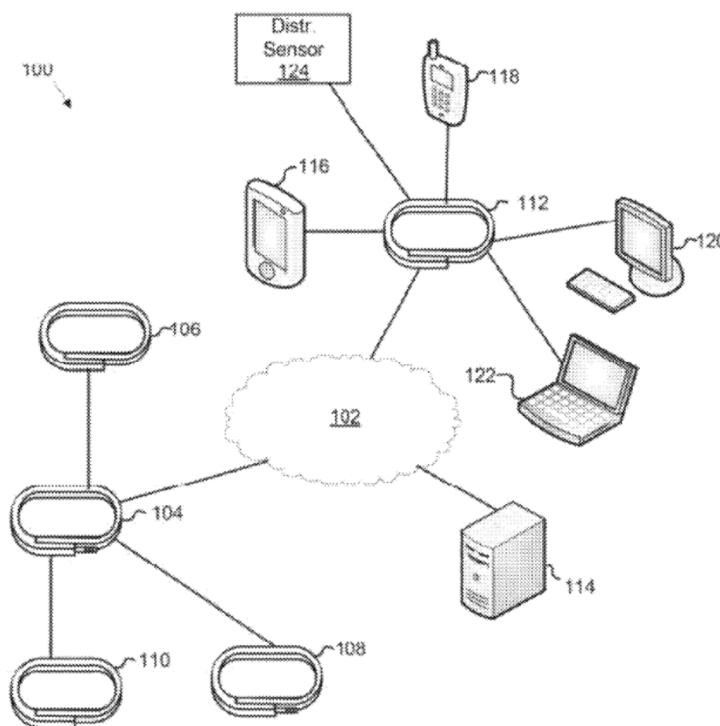
Supra Ground 1A, [1.6].

Element [19.7]

Supra Ground 1A, [1.7].

Element [19.8]

In the combination, Utter is applied to Sarantos such that Sarantos's device transmits information physiological parameter data determined at the device wirelessly from that device to a secondary device such as a mobile computing device or computer. APPLE-1006, 14:42-15:3, 24:18-25, 36:21-30, 13:57-65, 13:1-16, 13:41-43, 17:56-57, 21:6-17, FIG. 1, FIG. 14; APPLE-1003, ¶¶190-200. Specifically, Utter describes "transfer[ing] data from one or more bands 104-112 to various destinations (e.g., another of bands 104-112, server 114, mobile computing device 116, mobile communications device 118, computer 120, laptop 122, and distributed sensor 124" and that "[t]he exchanged data may include personal physiological data and data derived from sensory-based user interfaces ('UI')." APPLE-1006, 14:4-15, 14:53-57. This communication can occur via "wireless communication facilities." *Id.*, 14:42-15:3, 17:32-37, 24:18-25 ("... any number of wireless communication technologies").



APPLE-1006, FIG. 1

A POSITA would have recognized from Utter's descriptions of using WiFi, Bluetooth, NFC, and other wireless communications protocols between the various devices that the secondary devices include a network interface configured to wirelessly communicate with the wrist-worn physiological monitoring device. APPLE-1006, 14:42-15:3, 17:32-37, 24:18-25; APPLE-1003, ¶¶191-192.

This configuration allows the secondary device to act as an improved display for the wrist-worn wearable physiological device, by performing “[a]nalysis, evaluation, or other operations...on data gathered by an application” which can be displayed as part of a “graphical user interface” on “mobile computing device 116 or any other type of client.” APPLE-1006, 21:45-65. For example, “[d]isplay

engine 1454 can be configured to ***generate a graphical representation*** on an interface such as a ***touch-sensitive screen*** on a mobile phone 1472.” *Id.*, 36:15-30.

The data collection, processing, and displaying functions can be performed on the wrist-worn device, the mobile device, or distributed between the wrist-worn device, the mobile device “or any other device.” *Id.*, 36:23-30; APPLE-1003, ¶200, 157. Therefore, Utter expressly contemplates an embodiment in which processing of the received signals to determine physiological parameters such as heart rate and blood oxygen saturation is conducted on the wrist-worn device while the mobile computing device (or other secondary device) is “configured to generate a graphical representation on an interface, such as a touch-sensitive screen on a mobile phone” which would have been beneficially applied to Sarantos as described above. *Id.* 36:21-24, 14:4-15, 14:53-57, 13:1-16, 13:41-43, 17:56-57, 21:6-17.

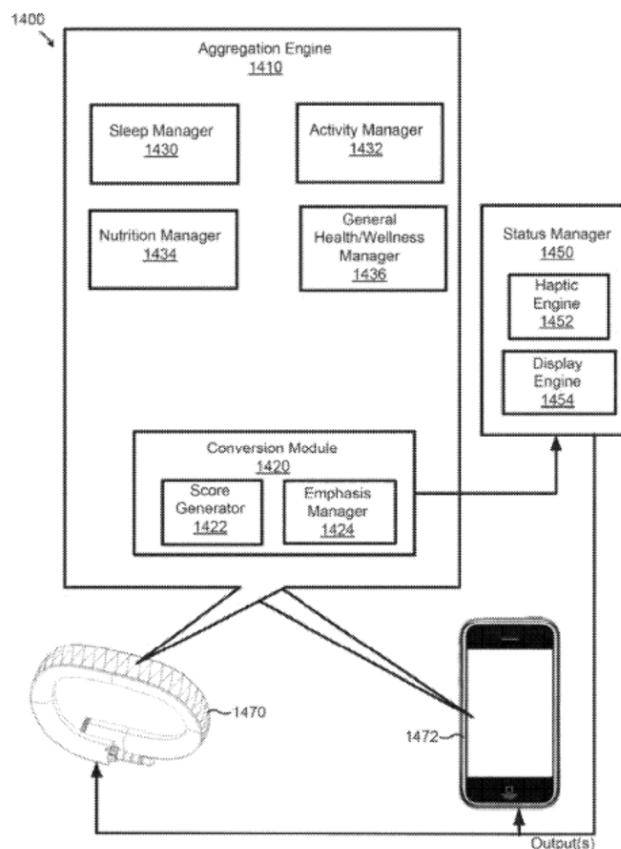


FIG. 14

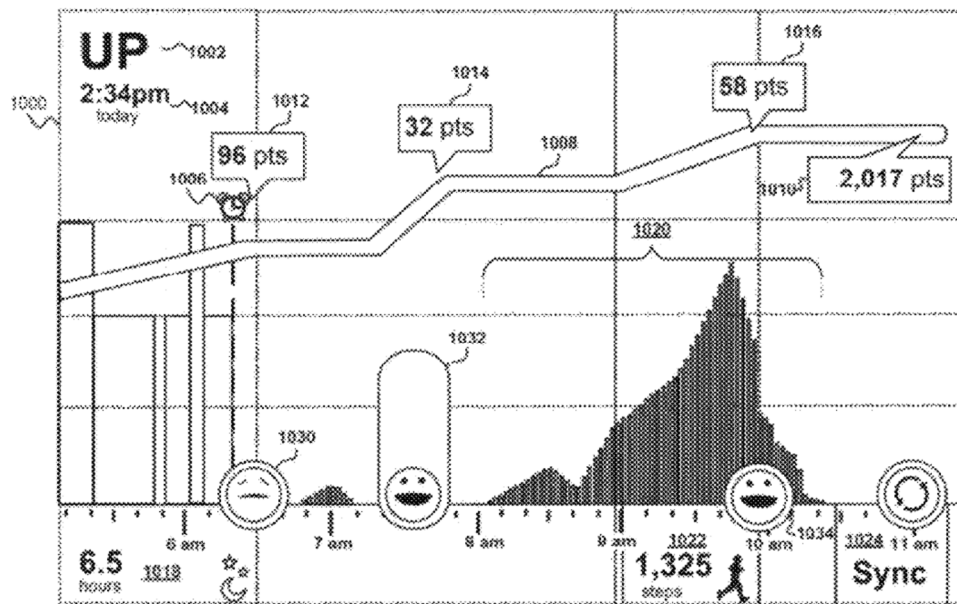
APPLE-1006, FIG. 14

The secondary device (i.e., mobile computing device) can display various metrics regarding the user's health, and receive inputs through a "touch-sensitive screen." APPLE-1006, 36:15-30, 13:1-16, 25:38-41, 28:24-29:8, 33:14-35, FIG. 10; APPLE-1003, ¶¶195, 163. The secondary device also includes storage such as "system memory 1306 (e.g., RAM), storage device 1308 (e.g., ROM)." APPLE-1006, 32:30-38.

Additionally, Utter describes a configuration in which an "iPhone" is used as a user interface for both receiving input and displaying information and POSITA

would have known that iPhones at the time included a touch-screen user interface, a storage device, and a wireless network interface. APPLE-1006, 24:52-25:13; APPLE-1003, ¶195.

The secondary device (*i.e.*, mobile computing device or computer) can “perform various analyses and evaluations that can generate information as to a person’s physical (e.g., healthy, sick, weakened, or other states, or activity level), emotional, or mental state” using sensed parameters such as “heart rate” and can “determine an aggregate value for producing a graphical representation of a user’s wellness.” APPLE-1006, 13:1-16, 25:38-41, 28:24-29:8, 13:41-43, 17:56-57, 21:6-17, 27:41-52, 21:59-65; APPLE-1003, ¶¶196-199, 181, 165, 160.



APPLE-1006, FIG. 10.

The system “process[es] data, such as data representing parameters based on

sensor measurements or the like, as well as derived parameters that can be derived (e.g., mathematically) based on data generated by one or more sensors.” APPLE-1006, 33:14-35.

(f) **Claim 20**

[20.0]

The resulting system can “perform various analyses and evaluations that can generate information as to a person’s physical (e.g., healthy, sick, weakened, or other states, or activity level), emotional, or mental state” using sensed parameters such as “heart rate” and can “determine an aggregate value for producing a graphical representation of *a user’s wellness*.” APPLE-1006, 13:1-16, 25:38-41, 28:24-29:8, 13:41-43, 17:56-57, 21:6-31, 21:59-65, 22:14-22, 27:41-52; APPLE-1003, ¶¶201-203.

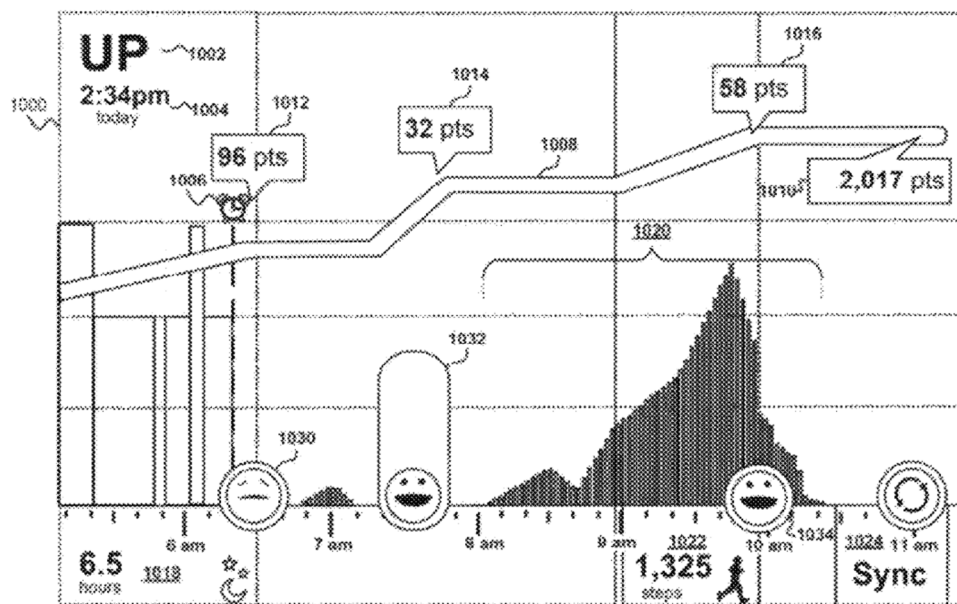


FIG. 10

[21.0]

The screenshot displays the 'UP' app interface. At the top left, the word 'UP' is prominently displayed. Below it, the time '2:34pm' and the date 'today' are shown. A line graph plots 'points' (pts) against time. The graph starts at 1000 points at 6 am, rises to 1002 at 6:30 am (labeled '96 pts'), 1004 at 7 am (labeled '32 pts'), 1008 at 8 am, and 1016 at 9 am (labeled '58 pts'). A bracket indicates a total of '2,017 pts' for the period from 8 am to 10 am. Below the line graph, a bar chart shows step counts. The total steps for the day are '1,325 steps'. The interface includes a 'Sync' button at the bottom right and a '6.5 hours' indicator at the bottom left. A '1000' point marker is also visible on the left side of the graph.

APPLE-1006, FIG. 10.

As another example, FIG. 11 “shows a summary of a user’s wellness progress over the course of a week.” APPLE-1006, 28:24-29:8; APPLE-1003, ¶206.

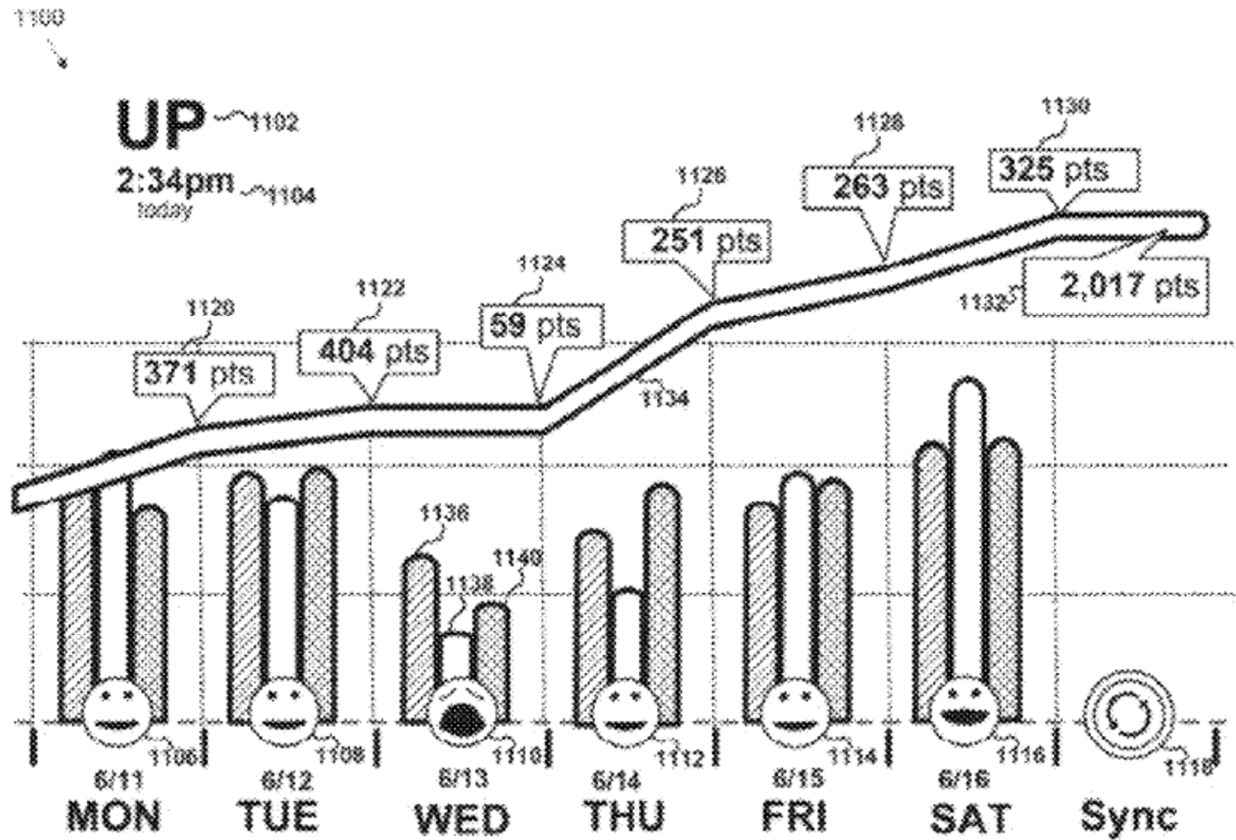


FIG. 11

APPLE-1006, FIG. 11.

In another example, “data may be analyzed by sensor input evaluation module 420...to *determine trends*, patterns, and other useful information.” APPLE-1006, 20:8-16, 35:7-26, 41:4-29.

(h) **Claim 22**

Supra Ground 1A, [7.0]-[8.0], Ground 1G, [19.8]; APPLE-1006, 27:41-52

(the “graphical representation may include...the user’s heart rate”).

(i) Claim 23

Supra Ground 1A, [9.0].

(j) Claim 24

Supra Ground 1A, [12.0]

(k) Claim 25

Supra Ground 1A, [5.0].

H. Ground 1H: Claims 14, 16-25 are obvious over Sarantos and Shie in view of Utter

1. Sarantos-Shie-Utter Combination

A POSITA would have been motivated and found it obvious to combine Sarantos-Shie with Utter for at least the same reasons underlying the Sarantos-Utter combination described above in Section VI.G.2, *supra*. APPLE-1003, ¶¶212, 158-168. Such combination would have been routine and straightforward to the POSITA. *Id.*

2. Analysis

(a) Claim 14

Elements [14.0]-[14.6]

Sarantos-Shie-Utter provides, or at least renders obvious, elements [14.0]-[14.6] for the reasons discussed in Ground 1B, *supra*. APPLE-1003, ¶¶213, 118-133.

Element [14.7]

Supra Ground 1G, [14.7].

(b) Claim 16

Supra Ground 1A, [7.0].

(c) Claim 17

Supra Ground 1A, [8.0].

(d) Claim 18

Supra Ground 1A, [1.1], Ground 1B, [1.2], [14.2].

(e) Claim 19

Elements [19.0]-[19.7]

Sarantos-Shie-Utter provides, or at least renders obvious, elements [19.0]-[19.7] for the reasons discussed with respect to elements [1.0]-[1.7] in Grounds 1A and 1B and elements [19.0]-[19.7] in Ground 1G, *supra*. APPLE-1003, ¶220.

Element [19.8]

Supra Ground 1G, [19.8].

(f) Claims 20-21

Supra Ground 1G, claims [20]-[21]

(g) Claim 22

Supra Ground 1A, [7.0]-[8.0], Ground 1G, [19.8]; APPLE-1006, 27:41-52 (the “graphical representation may include...the user’s heart rate”).

(h) Claim 23

Supra Ground 1A, [9.0], Ground 1B, [9.0]-[10.0].

(i) Claim 24

Supra Ground 1A, [12.0].

(j) Claim 25

Supra Ground 1A, [5.0].

V. PTAB DISCRETION SHOULD NOT PRECLUDE INSTITUTION

A. 314(a) – *Fintiv*

Consistent with Congressional intent, the goals of *Fintiv*, and the Interim Guidance issued by Director Vidal on June 21, 2022 (“*Director’s Guidance*”), Petitioner respectfully asks the Board to reach the merits of the challenges raised in this Petition. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11, 6 (PTAB Mar. 20, 2020)(precedential)(“*Fintiv*”); APPLE-1061, 6-7, 9. As demonstrated below, a holistic analysis of the *Fintiv* framework favors institution.

The concerns addressed by *Fintiv* are simply not present. Not only will the Final Written Decision (“FWD”) be rendered well in advance of trial in co-pending District Court proceedings based on median time-to-trial statistics, but Apple has doubled-down with a comprehensive institution-invoked stipulation to ensure that there can be no redundancy between art considered in this IPR and art asserted in the District Court. *Director’s Guidance*, 9; APPLE-1060, 14; APPLE-1066, 1.

More, the Petition presents compelling challenges, as it applies largely the same prior art to similarly address claims that closely resemble those of the '745 patent for which institution was recently granted. *See* APPLE-1072, 5, 23; APPLE-1071, 15:31-61 ('745 patent claim 1); APPLE-1001, 15:31-58 ('159 patent claim 1). More specifically, the Board instituted review of the '745 patent based on asserted grounds including the same Sarantos-Shie combination. *See Apple Inc. v. Masimo Corp.*, IPR2022-01291 Pap. 15, 23 (PTAB Feb. 1, 2023); APPLE-1072, 5, 23.

The present grounds are premised on Dr. Anthony's robustly corroborated testimony, which if unrebutted at trial, would compel a conclusion that the Challenged Claims are unpatentable by a preponderance of the evidence. For at least that additional reason, "the PTAB should not discretionarily deny institution under *Fintiv*." APPLE-1061 (*Director's Guidance*), 3-5, 9; IPR2022-01242 Pap. 23 at 3, 5-6 (PTAB Feb. 27, 2023)(precedential)("Commscope").

Indeed, the Board's institution of an IPR based on the instant Petition would serve to efficiently address issues of invalidity, just as the Board's earlier review of the related '695 patent resolved unpatentability of all challenged claims.⁵

⁵ More specifically, the Board invalidated every challenged claim of the '695 patent based on references including Sarantos. *See Apple Inc. v. Masimo Corp.*,

1. Factor 1: Neither Party has yet Requested a Stay with Respect to the '159 Patent

Factor 1 does not favor denial. Neither party has indicated a lack of intent to request a stay of the related litigation with respect to the '159 patent⁶, and the Board has indicated that it “will not attempt to predict” how a district court might adjudicate a future motion to stay, if/when filed. *See Fintiv*, 12; *Sand Revolution II, LLC v. Cont'l Intermodal Group – Trucking LLC*, IPR2019-01393, Pap. 24, 7 (June 16, 2020)(“*Sand Revolution*”)(informative); *Sotera Wireless Inc. v. Masimo*

IPR2020-01722 Pap. 28, 26 (PTAB May 5, 2022) (“Petitioner has shown by a preponderance of the evidence that claims 6, 14, and 21 would have been obvious in view of the combined teachings of Sarantos, Mendelson-1991, and Chin”), 8-9 (reproducing '695 patent independent claim 1 and dependent claim 6, which, similar to the '159 patent's independent claim 1, together recite “a plurality of emitters,” “a plurality of detectors,” and “a light block” that “prevents at least a portion of light emitted...from being detected by the plurality of detectors without attenuation by the tissue”); APPLE-1074, 8-9, 26; APPLE-1073, 15:32-63 (claim 1), 16:16-19 (claim 6).

⁶ Notably, Judge Noreika granted a stay of Masimo counterclaims asserting U.S. Patent Nos. 10,912,501, 10,912,502, 10,945,648, 10,687,745, and 7,761,127, until conclusion of an ongoing ITC matter, including all appeals. APPLE-1069, 1.

Corp., IPR2020-01019 Pap. 12, 14 (PTAB Dec. 1, 2020)(“*Sotera*”)(precedential).

2. Factor 2: The Board and Parties can Only Speculate as to the Trial Date, and Statistics Disfavor Denial

As the Director recognizes, “scheduled trial dates are unreliable and often change.” *Director’s Guidance*, 8. Thus, the “PTAB will weigh this factor against exercising discretion to deny institution...if the median time-to-trial is...after the projected statutory deadline for the PTAB’s [FWD].” *Id.*, 9. Indeed, the Delaware District Court, which presides over the related litigation and which is one of the country’s busiest patent courts, recently granted a joint motion to amend the case schedule that moved the case management conference back by approximately two months, but has not yet set an estimated trial date. *See* APPLE-1065, 3 (indicating a “New Deadline” for “Trial” of “TBD”).

Based on the October 20, 2022 filing date of Apple’s original complaint, an average time-to-trial of 37.8 months, and the 18-month IPR schedule, the Board is expected to issue its FWD in June or July, 2025, nearly six months ahead of the statistically indicated December, 2025 district court trial date. APPLE-1060, 14.

Accordingly, Factor 2 disfavors denial. *Director’s Guidance*, 9; *see also Masimo Corp. v. Apple Inc.*, IPR2023-00634 Pap. 1, 108 (Feb. 27, 2023)(Petition)(arguing against denial based on “published statistics indicat[ing] that the median time to trial for a civil action in the District of Delaware is almost three years”).

More, in this case, several factors contribute to uncertainty with respect to the yet-scheduled trial date, including, for example, whether a single trial will be conducted to address all 6 of Apple's asserted utility patents, all 4 of Apple's asserted design patents, and all 5 of Masimo's counter-asserted utility patents (including the '159 patent). *See*, generally, APPLE-1062-1065, APPLE-1069. For example, it remains unclear whether the 5 Masimo patents that are subject to stay until conclusion of the related ITC matter, including all appeals, will eventually be tried together with the 5 additional Masimo patents that are not subject to stay, or if separate trials addressing those two sets of patents might instead be conducted in sequence. *See* APPLE-1069, 1.

For at least these reasons, Factor 2 disfavors denial.⁷ *See Director's Guidance*, 9.

⁷ Moreover, Apple has been diligent. Patent Owner filed its D. Del. counterclaims asserting 10 patents, including the '159 Patent, in the context of ongoing complex litigation, initiated by Masimo on January 9, 2020 by its C. D. Cal. complaint, that has thus far involved 37 patents and, in addition to the PTAB, forums including C.D. Cal., ITC, D. Del., and the Fed. Cir. In addition to today's filings, Apple has demonstrated at least a reasonable likelihood of success in proving unpatentability of 22 of these patents at the PTAB, and has indeed been found to have demonstrated

3. Factor 3: Petitioner's Diligence and Investment in IPR Disfavors Denial

Factor 3 disfavors denial. Apple's substantial investment in petitions addressing the 10 patents asserted by Patent Owner in District Court Litigation (including the 5 patents reasserted from ITC litigation) should counterbalance—and frankly outweigh—the resources invested in the co-pending District Court Litigation. It would be unjust to consider resources expended in District Court (equally by both parties), without considering Apple resources expended to prepare petitions that would be irretrievably lost without consideration on the merits.

For example, as explained below with respect to Factor 4, to ensure that an IPR proceeding instituted on the basis of this Petition will be a true alternative to district court litigation that might otherwise address overlapping issues, Apple stipulates that, if the Board institutes this IPR, Apple will not, for the instituted claims, seek resolution in the co-pending Delaware District Court proceeding of

unpatentability of claims in 18 of the corresponding 20 FWDs that have issued thus far. For at least that additional reason, Factor 2 favors institution. *See Apple Inc. v. Seven Networks, LLC*, IPR2020-00156, Pap. 10, 9 & n.8 (June 15, 2020)(“*Seven Networks*”)(factor 2 should be analyzed on a sliding scale based on petitioner diligence and relative trial dates).

any ground of invalidity that utilizes any of the prior art asserted in this petition, i.e., Sarantos, Shie, Brady, Han, or Utter. APPLE-1066. Consistent with Apple's stipulation, Apple's district court expert invalidity report does not include any of Sarantos, Shie, Brady, Han, or Utter. APPLE-1068. As such, discretionary denial of the instant petition would prevent Apple from being heard, not only by the PTAB, but also by the District Court, both with respect to the compellingly meritorious grounds presented within this petition, and also with respect to any ground of invalidity utilizing any of Sarantos, Shie, Brady, Han, or Utter. *Id.*

In this way, Apple's stipulation is broader in several dimensions than a *Sotera* stipulation, at least according to Masimo. For instance, despite offering a *Sotera* stipulation in support of its petitions, after institution, Masimo advances in district court invalidity grounds the same references that it applied within its instituted IPR petitions.⁸

⁸ For example, the Board instituted Masimo's *Sotera*-backed petition challenging Apple's D. Del.-asserted '257 patent, and Masimo has since revealed that it relies for its district court invalidity grounds on the same Markel and Mills references applied in that petition, further combined with product art. *Masimo Corp. v. Apple Inc.*, IPR2023-00745 Pap. 1, 12-13, 85 (Mar. 22, 2023); APPLE-1067, 1.

Similarly, Masimo relies in district court on the same Chae reference applied in its

For at least these reasons, *Fintiv* factor 3 disfavors denial. *See Seven Networks*, 11-12; *Sotera*, 16-17; *Snap, Inc. v. SRK Technology LLC*, IPR2020-00820, Pap. 15, 11-13 (Oct. 21, 2020)(“*Snap*”)(precedential).

4. Factor 4: The Petition’s Grounds are Materially Different from Any that Might be Raised in Litigation

Factor 4 strongly disfavors denial. First, Patent Owner asserts only ’159 Patent claims 1, 7, 8, 19, and 22, and this Petition challenges claims 1-5, 7-14, and 16-25 claims. Accordingly, a vast majority of the Challenged Claims (18 out of 23’) will be left unaddressed in District Court Litigation. *See Seven Networks*, 21.

Second, to eliminate any doubt as to the absence of meaningful overlap between the District Court Litigation and IPR, Apple stipulates that, if the Board institutes this IPR, Apple will not, for the instituted claims, seek resolution in the co-pending District Court proceeding of any ground of invalidity that utilizes any

now-instituted and *Sotera*-backed ’352 patent petition, further combined with product art. *Masimo Corp. v. Apple Inc.*, IPR2023-00664 Pap. 1, 33, 94 (Mar. 6, 2023); APPLE-1067, 1. Finally, Masimo relies in district court on the same Kotanagi reference applied in its now-instituted and *Sotera*-backed ’783 patent petition, further combined with product art. *Masimo Corp. v. Apple Inc.*, IPR2023-00634 Pap. 1, 6, 109 (Feb. 27, 2023); APPLE-1067, 1.

of Sarantos, Shie, Brady, Han, or Utter. APPLE-1066.

By this stipulation, Factor 4 strongly disfavors denial, at least because Apple's stipulation guarantees that the prior art relied on in this IPR will not be relitigated/otherwise litigated in the co-pending District Court proceeding. *See Apple Inc. v. AliveCor, Inc.*, IPR2021-00972 Pap. 10, 13-16 (PTAB Dec. 8 2021)(“*AliveCor*”); APPLE-1068 (demonstrating that Apple's district court expert invalidity report does not leverage Sarantos, Shie, Brady, Han, or Utter).

Notably, Apple's stipulation is substantially more robust than a *Sand Revolution* stipulation, by which a petitioner pledges not to pursue the same grounds of invalidity in district court litigation, while leaving open the possibility of the same references applied within a petition being reasserted by the same petitioner in different district court invalidity grounds. *See Sand Revolution* at 11-12. For at least that reason, Apple respectfully submits that ***Apple's stipulation***, which ***guarantees that there will be no overlap*** between the prior art relied on in this IPR and the prior art relied on in the District Court proceeding, should be accorded substantially more weight than a *Sand Revolution* stipulation. *Cf. Sand Revolution* at 12.

Further, and as noted above with respect to Factor 3, Apple's stipulation is also broader than a *Sotera* stipulation, at least insofar as it is apparently Masimo's position that a *Sotera* stipulation leaves open the possibility of the same references

applied within an instituted IPR petition being reasserted by the same petitioner in district court invalidity grounds that could not reasonably have been raised in that petition. *See Sotera*, 13-14, 19; 35 U.S.C § 315(e)(2). More specifically, Masimo’s Delaware District Court invalidity positions with respect to Apple’s ’257, ’352, and ’783 patents rely on many of the same references already applied within Masimo’s *Sotera*-backed and earlier-instituted IPR petitions, further combined with product art that is not eligible for PTAB consideration. *See* APPLE-1067, 1; IPR2023-00745 Pap. 1, 12-13, 85; IPR2023-00664 Pap. 1, 33, 94; IPR2023-00634 Pap. 1, 6, 109.

Whether the District of Delaware will allow Masimo to proceed in this manner remains to be seen, but recent decisions treating language of the § 315(e)(2) estoppel provision that is co-extensive with *Sotera* suggest that it might. *See Sotera*, 19; 35 U.S.C § 315(e)(2). For example, a recent D. Del. decision held that so long as printed publications are used in combination with product or system art such that the “combination is substantively different from the grounds that were raised or reasonably could have been raised” in the IPR, IPR estoppel does not apply. *Ioengine, LLC v. PayPal Holdings, Inc.* 607 F. Supp. 3d 464, 513 (D. Del. Jun. 15, 2022) (Bryson); *see also Chemours Co. FC, LLC v. Daikin Indus. Ltd.*, No. 1:17-cv-01612, 2022 WL 2643517, at *1 (D. Del. Jul. 8, 2022) (Noreika) (holding that IPR estoppel does not apply to prior art products, even if cumulative

to references asserted in IPR).

In stark contrast with Masimo's *Sotera* stipulations and Masimo's reliance on overlapping references applied in IPR and the District Court Litigation, Apple's stipulation extinguishes the possibility of *any overlap* in prior art between this IPR and grounds resolved in counterpart D. Del. proceedings, thereby ensuring that IPR is a true alternative to the District Court Litigation with respect to that art.

Moreover, Masimo asserts only a small subset of the claims challenged in this IPR (5 of 23). Further, official statistics indicate that the Board will issue its FWD months in advance of the District Court trial. APPLE-1060, 14

At least because *the invalidity grounds to be resolved in the District Court Litigation involve no overlap in prior art and only a small subset of the Challenged Claims*, Factor 4 strongly disfavors denial. *See AliveCor*, 16; *Seven Networks*, 21.

5. Factor 5: The PTAB Parties are Not Different Than District Court Parties

Factor 5 should, at worst, be neutral. The Litigation involves the same parties. However, the *Fintiv* decision says nothing about weighing Factor 5 in favor of denial when the petitioner and the defendant in the parallel proceeding are the same; with respect to Factor 5, *Fintiv* instead notes that "if a petitioner is unrelated" the Board has weighed that "fact against exercising discretion to deny institution." *Fintiv*, 13-14; *see also Cisco Systems, Inc. v. Ramot at Tel Aviv*

University Ltd., IPR2020-00122, Pap. 15, 10 (Crumbley, dissenting).

Neither the grounds of unpatentability advanced by the instant Petition nor the prior art itself will be addressed in the District Court Litigation, as the invalidity contentions omit the petitioned prior art. APPLE-1068. Presented with a similar situation, the Board in *Snap* resolved “the fifth *Fintiv* factor as neutral or, at most, weighing slightly in favor of exercising discretion to deny institution”. *Snap*, 16.

6. Factor 6: The Merits of this Petition Compel Institution

Factor 6 strongly disfavors denial. Here, the strength of the merits alone outweighs any potential inefficiencies, regardless of whether the timing of the District Court Litigation is thought relevant (it is not, as demonstrated with respect to Factors 1-5). *Fintiv*, 14-15 (noting under Factor 6 that “if the merits of a ground raised in the petition seem particularly strong...institution of a trial may serve...overall system efficiency and integrity”). Indeed, institution was recently granted on a petition advancing similar prior art grounds against claims of the ’745 patent, which recite similar subject matter. APPLE-1072, 5, 23.

With Factors 2, 3, 4, and 6 disfavoring denial, and with remaining Factors 1 and 5 otherwise neutral, discretion should not be exercised to deny institution (and thus, substantive consideration on the merits). *Fintiv*, 19 (declining to deny institution based on a “holistic” balancing of “all of the *Fintiv* factors”).

Moreover, Director Vidal has further explained that “where the PTAB determines that the information presented at the institution stage presents a compelling unpatentability challenge, that determination alone demonstrates that the PTAB should not discretionarily deny institution under *Fintiv*.” *Director’s Guidance*, 4-5. More specifically, the PTAB will not discretionarily deny institution if “the Petition presents challenges ‘in which the evidence, if unrebutted in trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence.’” *Commscope*, 3 (quoting *Director’s Guidance*, 4); *Director’s Guidance*, 3-5, 9.

The merits of this Petition are compelling. As the instant Petition demonstrates, evidence including the applied references and Dr. Anthony’s robustly corroborated testimony, if unrebutted in trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence.

Indeed, the Board has already found unpatentable every challenged claim of the related ’695 Patent based on grounds including Sarantos, and is nearing conclusion of IPRs of the related ’745 Patent based on grounds including Sarantos and Shie. IPR2020-01722 Pap. 28, 26 (PTAB May 5, 2022); IPR2022-01291 Pap. 15, 23 (PTAB Feb.1, 2023); IPR2022-01465 Pap. 15, 2 (PTAB Feb. 6, 2023).

The counterpart IPR2022-01291 trial is particularly relevant to the instant Petition’s compelling merits, as Masimo has in that trial failed to effectively rebut

Apple's evidence of unpatentability of at least the '745 Patent's independent claim 1, which is nearly identical to the '159 Patent's independent claim 1, over the same Sarantos-Shie combination advanced in the instant Petition. *See* IPR2022-01291 Pap. 29, 44-50 (May 26, 2023), Pap. 39, 3-7 (Aug. 21, 2023); APPLE-1071, 15:31-61 ('745 patent claim 1); APPLE-1001, 15:31-58 ('159 patent claim 1).

Both because a holistic analysis of the *Fintiv* factors disfavors denial, and because the merits of the instant Petition are compelling, Apple respectfully submits that the Board should not discretionarily deny institution under *Fintiv*.⁹ *Fintiv*, 19; *Director's Guidance*, 3-5, 9; *Commscope*, 3.

B. 325(d) – Advanced Bionics

As explained above (*supra*, §II.B.), *the examiner never issued a rejection during the '159 Patent's prosecution*. APPLE-1002, 44-52.

Masimo failed to cite the Sarantos reference applied in this Petition to the examiner, despite being in possession of Apple's earlier IPR petitions challenging claims of the related '695 Patent based on Sarantos. *See, generally*, IPR2020-

⁹ Apart from Petitioners' showing that *Fintiv* favors institution, the *Fintiv* framework should not be followed because it is legally invalid. The framework (1) exceeds the Director's authority, (2) is arbitrary and capricious, and (3) was adopted without notice-and-comment rulemaking.

01722, -01723. There is no indication in the '159 Patent's file history that the examiner was even aware of, let alone substantively considered, the Sarantos or Utter references applied in this Petition prior to granting allowance leading to issuance of the '159 patent. *See, generally*, APPLE-1002.

Further, because the '159 Patent's prosecution did not involve negotiation between the applicant and the examiner regarding the teachings of the prior art applied in the instant Petition, the instant Petition's art and arguments cannot be said to be the same as, or substantially similar to, art and arguments previously presented to the Office in connection with the '159 Patent. *See, generally*, APPLE-1002.

VI. PAYMENT OF FEES – 37 C.F.R. §42.103

Petitioner authorizes the Office to charge Deposit Account No. 06-1050 for the petition fee set in 37 C.F.R. §42.15(a) and for any other required fees.

VII. CONCLUSION

Accordingly, Petitioner respectfully requests IPR of the Challenged Claims.

VIII. MANDATORY NOTICES UNDER 37 C.F.R. §42.8

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

Apple Inc. is the petitioner and real party in interest.

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

Petitioner is not aware of any disclaimers, reexamination certificates or

petitions for *inter partes* review for the '159 Patent.

The '159 Patent is the subject of *Apple Inc., v Masimo Corporation, et al.*, 1-22-cv-01378, D. Del. APPLE-1031. This Petition is being filed concurrently with another petition for IPR of the '159 Patent (IPR2024-00243).¹⁰

Apple has also previously filed IPRs challenging Masimo patents in IPR2022-01271, IPR2022-01272, IPR2022-01273, IPR2022-01274, IPR2022-01275, IPR2022-01276, IPR2022-01299, IPR2022-01300, IPR2022-01291, IPR2022-01292, IPR2022-01465, IPR2022-01466, IPR2020-01520, IPR2020-01521, IPR2020-01722, IPR2020-01536, IPR2020-01537, IPR2020-01538, IPR2020-01539, IPR2020-01713, IPR2020-01714, IPR2020-01715, IPR2020-01716, IPR2020-01723, IPR2020-01737, IPR2020-01737, IPR2021-00195, IPR2021-00208, and IPR2021-00209.

Among these cases, three are particularly relevant due to related subject matter and claim scope. In IPR2020-01722 challenging related U.S. Patent No. 10,470,695, the Board found all challenged claims (claims 6, 14, and 21) invalid.

¹⁰ Pursuant to the Trial Practice Guide, both petitions for IPR of the '159 Patent are being filed with a paper providing a succinct explanation of the differences between the petitions, why the issues addressed by the differences are material, and why the Board should exercise its discretion to institute both petitions.

Apple Inc. v. Masimo Corp., IPR2020-01722 Pap. 29, 2 (PTAB May 5, 2022).

Patent Owner disclaimed the unchallenged claims of the '695 Patent following institution of the IPR.

In IPR2022-01291 and IPR2022-01465, the Board has instituted IPR of related U.S. Patent No. 10,687,745 based on challenges involving several of the same prior art references asserted in this Petition. The '745 Patent is the subject of *Masimo Corporation, et al. v. Apple Inc.*, ITC Inv. No. 337-TA-1276.

C. Lead And Back-Up Counsel Under 37 C.F.R. §42.8(b)(3)

Petitioner provides the following designation of counsel.

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D. Service Information

Please address all correspondence and service to the address listed above.

Petitioner consents to electronic service by email at IPR50095-0134IP2@fr.com.

Respectfully submitted,

Dated: December 12, 2023

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CERTIFICATION UNDER 37 CFR § 42.24

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter partes* Review totals 13,991 words, which is less than the 14,000 allowed under 37 CFR § 42.24.

Dated: December 12, 2023

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that on December 12, 2023, a complete and entire copy of this Petition for *Inter Partes* Review and all supporting exhibits were provided via Federal Express, to the Patent Owner by serving the correspondence address of record as follows:

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