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Paper No. 15
Date: February 1, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

MASIMO CORPORATION,
Patent Owner.

IPR2022-01291
Patent 10,687,745 B1

Before JOSIAH C. COCKS, NEIL T. POWELL, and JAMES A. TARTAL, *Administrative Patent Judges*.

TARTAL, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Apple Inc. ("Petitioner")[1] filed a Corrected Petition pursuant to 35 U.S.C. §§ 311–319 requesting an *inter partes* review of claims 1, 9, 15, 18, 20, and 27 ("the Challenged Claims") of U.S. Patent No. 10,687,745 B1 (Ex. 1001, "the '745 patent"). Paper 10 ("Pet."). Masimo Corporation ("Patent Owner")[2] filed a Preliminary Response. Paper 11.

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314(b) (2018); 37 C.F.R. § 42.4(a) (2019). An *inter partes* review may not be instituted "unless . . . the information presented in the petition . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a). Upon consideration of the Petition, the Preliminary Response, and the evidence of record, we conclude that the information presented shows a reasonable likelihood that Petitioner would prevail in showing the unpatentability of at least one of the Challenged Claims. Accordingly, we authorize an *inter partes* review to be instituted as to the Challenged Claims of the '745 patent on the grounds raised in the Petition. Our factual findings and conclusions at this stage of the proceeding are based on the evidentiary record developed thus far (prior to Patent Owner's Response). This is not a final decision as to patentability of claims for which *inter partes* review is instituted. Any final decision will be based on the record, as fully developed during trial.

[1] Petitioner identifies no additional real parties in interest. Pet. 47.
[2] Patent Owner identifies no additional real parties in interest. Paper 5, 2.

II. BACKGROUND

A. The '745 Patent

The '745 patent is titled "Physiological Monitoring Devices, Systems, and Methods," and issued on June 23, 2020, from U.S. Patent Application No. 16/835,772, filed March 31, 2020. Ex. 1001, codes (21), (22), (45), (54). The '745 patent summarizes its disclosure as follows:

> This disclosure describes embodiments of non-invasive methods, devices, and systems for measuring blood constituents, analytes, and/or substances such as, by way of non-limiting example, oxygen, carboxyhemoglobin, methemoglobin, total hemoglobin, glucose, proteins, lipids, a percentage therefor (e.g., saturation), pulse rate, perfusion index, oxygen content, total hemoglobin, Oxygen Reserve Index™ (ORI™) or for measuring many other physiologically relevant patient characteristics. These characteristics can relate to, for example, pulse rate, hydration, trending information and analysis, and the like.

Id. at 2:40–50.

Figures 7A and 7B of the '745 patent are reproduced below:

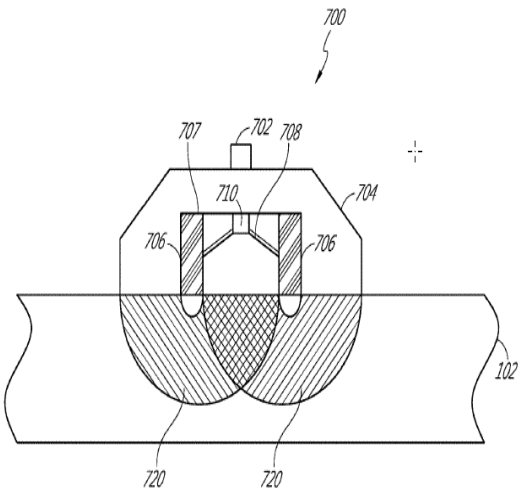

FIG. 7A

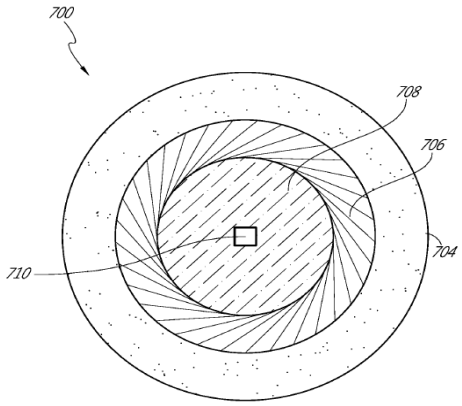

FIG. 7B

Figures 7A and 7B above depict side and top views, respectively, of a three-dimensional pulse oximetry sensor according to an embodiment of the '745

patent. *Id.* at 5:28–33. Sensor 700 includes emitter 702, light diffuser 704, light block (or blocker) 706, light concentrator 708, and detector 710. *Id.* at 10:49–51. The sensor functions to irradiate tissue measurement site 102, e.g., a patient's wrist, and detects emitted light that is reflected by the tissue measurement site. *Id.* at 10:43–49. "[L]ight blocker 706 includes an annular ring having a cover portion 707 sized and shaped to form a light isolation chamber for the light concentrator 708 and the detector 710." *Id.* at 11:10–12. "[L]ight blocker 706 and cover 707 ensures that the only light detected by the detector 710 is light that is reflected from the tissue measurement site." *Id.* at 11:16–19.

Figure 8 of the '745 patent is reproduced below:

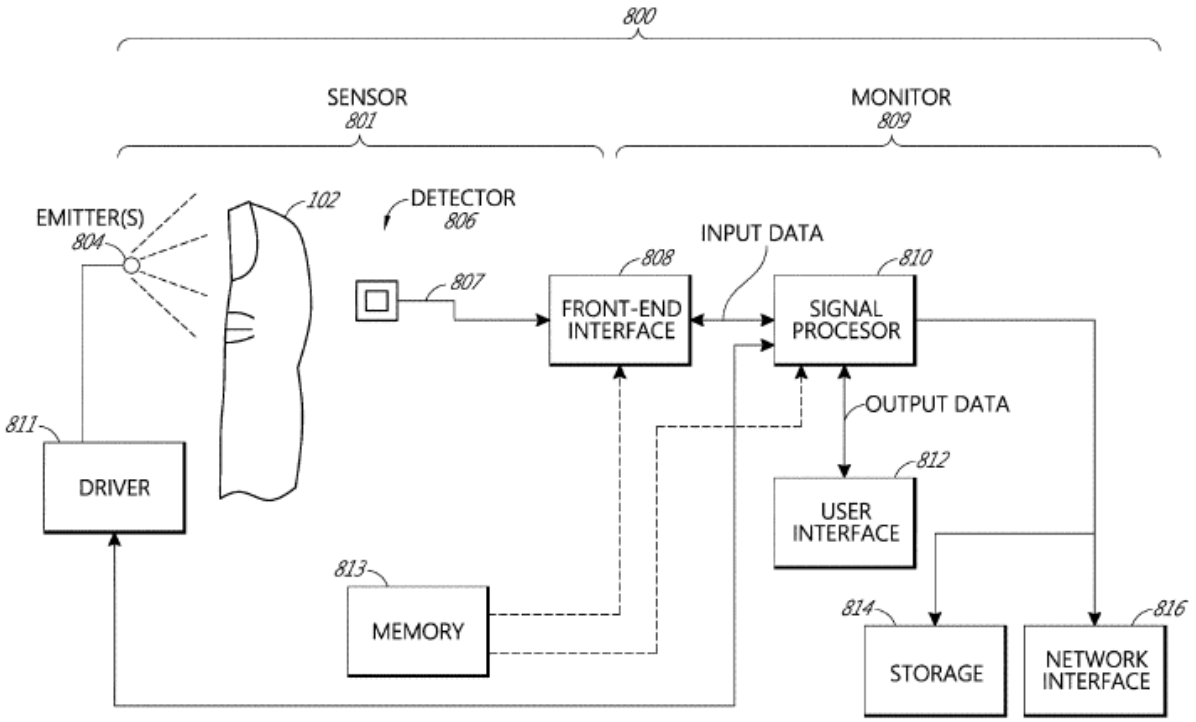

FIG. 8

Figure 8 above illustrates "a block diagram of an example pulse oximetry system capable of noninvasively measuring one or more blood analytes in a

monitored patient." *Id.* at 5:34–37. Pulse oximetry system 800 includes sensor 801 (or multiple sensors) coupled to physiological monitor 809. *Id.* at 12:21–23. Sensor 801 includes emitter 804 and detector 806. *Id.* at 12:32–34. Monitor 809 includes signal processor 810, which "includes processing logic that determines measurements for desired analytes based on the signals received from the detector 806." *Id.* at 13:33–40. Monitor 809 also includes user interface 812 that provides "an output, e.g., on a display, for presentation to a user of pulse oximetry system 800." *Id.* at 13:33–35, 13:64–66.

B. Illustrative Claim

Petitioner challenges claims 1, 9, 15, 18, 20, and 27 of the '745 patent. Pet. 1. Claims 1, 15, and 20 are independent. Claim 1 is illustrative of the claimed subject matter and is reproduced below.

> 1. A physiological monitoring device comprising:
> a plurality of light-emitting diodes configured to emit light in a first shape;
> a material configured to be positioned between the plurality of light-emitting diodes and tissue 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 light-emitting diodes is projected towards the tissue;
> a plurality of photodiodes configured to detect at least a portion of the light after the at least the portion of the light passes through the tissue, the plurality of photodiodes further configured to output at least one signal responsive to the detected light;
> a surface comprising a dark-colored coating, the surface configured to be positioned between the plurality of photodiodes 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;
>
> a light block configured to prevent at least a portion of the light emitted from the plurality of light-emitting diodes from reaching the plurality of photodiodes without first reaching the tissue; and
>
> a processor configured to receive and process the outputted at least one signal and determine a physiological parameter of the user responsive to the outputted at least one signal.

Ex. 1001, 15:32–61.

C. Asserted Grounds of Unpatentability

Petitioner asserts that the Challenged Claims are unpatentable based on the following grounds:

Claims Challenged	35 U.S.C. §[3]	References/Basis
1, 9	103	Iwamiya,[4] Sarantos[5]
15, 18, 20, 27	103	Iwamiya, Sarantos, Venkatraman[6]
1, 9, 15, 18	103	Sarantos, Shie[7]
15, 18, 20, 27	103	Sarantos, Shie, Venkatraman

Pet. 2–3. Petitioner further relies on the supporting Declaration of Dr. Brian W. Anthony, dated July 22, 2022. Ex. 1003. Patent Owner relies on the Declaration of R. James Duckworth, dated November 4, 2022. Ex. 2002.

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[3] The Leahy-Smith America Invents Act ("AIA") included revisions to 35 U.S.C. § 103 that became effective on March 16, 2013. We apply the post-AIA version of § 103 here, because the earliest provisional application identified in the '745 patent was filed after the effective date of the AIA. *See* Ex. 1001, code (60).

[4] U.S. Patent No. 8,670,819 B2, issued Mar. 11, 2014 (Ex. 1004, "Iwamiya").

[5] U.S. Patent No. 9,392,946 B1, issued Jul. 19, 2016 (Ex. 1005, "Sarantos").

[6] U.S. Pat. App. Pub. No. 2014/0275854 A1, published Sep. 18, 2014 (Ex. 1006, "Venkatraman").

[7] U.S. Patent No. 6,483,976 B2, issued Nov. 19, 2002 (Ex. 1007, "Shie").

D. Related Proceedings

Petitioner filed three other petitions challenging claims of the '745 patent in IPR2022-01292, IPR2022-01465, and IPR2022-01466.[8] Patent Owner identifies numerous additional patent applications, patents, and *inter partes* review proceedings as related to the '745 patent. Paper 5, 1–2; Paper 14, 2.

The parties further identify the '745 patent as a subject of *Masimo Corporation, et al. v. Apple Inc.,* ITC Inv. No. 337-TA-1276. Pet. 47; Paper 5, 1. Petitioner also states that on December 12, 2022, Patent Owner asserted the '745 patent against Petitioner in U.S. District Court for the District of Delaware (Case No. 1:22-cv-01378-MN), Paper 13, 1; *see also* Paper 14, 1 (identifying the same district court case).

Additionally, the application that issued as the '745 patent was a continuation of an application that issued as U.S. Patent No. 10,470,695 ("the '695 patent"). Ex. 1001, code (63). Petitioner states that through an *inter partes* review the Board found claims 6, 14, and 21 of the '695 patent not patentable "after Patent Owner disclaimed the remaining claims of the '695 Patent following institution of the IPR." Pet. 48–49 (citing *Apple Inc. v. Masimo Corp.*, IPR2020-01722, Paper 29 at 2 (PTAB May 5, 2022)). Patent Owner further identifies *Masimo Corporation v. Apple Inc.*, Case No. 22-01895, pending before the U.S. Court of Appeals for the Federal

[8] Petitioner filed a Notice Ranking Petitions requesting that we consider whether to institute review based on the Petition in this proceeding prior to considering any other petition. *See* Paper 3 ("NRP"). In the NRP Petitioner misidentifies what references are asserted in each petition; however, Petitioner's discussion in the NRP of the references asserted in each petition makes clear that Petitioner seeks consideration of the Petition here prior to our consideration of any other petition. *Id.*

Circuit, as an "appeal from final written decision in an *inter partes* review proceeding involving a related patent," and we understand the '695 patent is at issue in that appeal. Paper 5, 2.

III. ANALYSIS

A. Discretionary Denial of Institution Under 35 U.S.C. § 325(d)

A petition may be denied because "the same or substantially the same prior art or arguments previously were presented to the Office." 35 U.S.C. § 325(d). When applying Section 325(d), we utilize a two-part framework. *See Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential). Only if the same or substantially the same art or arguments were previously presented to the Office do we then consider whether petitioner has demonstrated a material error by the Office. *Id.* "At bottom, this framework reflects a commitment to defer to previous Office evaluations of the evidence of record unless material error is shown." *Id.* at 9.

First, we determine "whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office." *Id.* at 8. Under the first part of our framework, we consider (i) the similarities and material differences between the asserted art and the prior art involved during examination; (ii) the cumulative nature of the asserted art and the prior art evaluated during examination; and (iii) the extent of the overlap between the arguments made during examination and the manner in which petitioner relies on the prior art or patent owner distinguishes the prior art. *See Advanced Bionics*, Paper 6 at 9 n.10, 10–11 (citing factors (a), (b), and (d) of *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (PTAB Dec. 15, 2017) (precedential as to § III.C.5, first

para.)). Second, "if either condition of [the] first part of the framework is satisfied," we consider "whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims." *Id.*

In the Petition, to show the unpatentability of the challenged claims, Petitioner relies on the following four references: Iwamiya, Sarantos, Venkatraman, and Shie. Pet. 2–3. Petitioner argues that discretionary denial is not warranted, explaining that although Iwamiya was cited on the face of the '745 patent, there is no indication in the file history that the examiner was aware of or considered Sarantos, Venkatraman, or Shie. Pet. 46 (citing Ex. 1002, 147–53). According to Petitioner, the examiner issued no rejections and entered a notice of allowance five weeks after the filing of the application that led to the '745 patent. *Id.* Petitioner argues that "neither condition of the first prong of the *Advanced Bionics* framework is met," and discretionary denial is not warranted. *Id.* at 47.

Patent Owner does not discuss the relevant considerations for discretionary denial under Section 325(d) and *Advanced Bionics*. Instead, Patent Owner asserts that the examiner is presumed to have considered Iwamiya, and that Petitioner has "the burden to 'overcom[e] the deference that is due' to the USPTO." Prelim. Resp. 34 (citations omitted). In light of Patent Owner's failure to address the relevant considerations and the fact that three of the four asserted references were not previously presented to the Office, the first prong of the *Advanced Bionics* framework has not been met and no basis has been shown for the exercise of our discretion to deny the Petition.

B. Legal Standards for Obviousness

A patent claim is unpatentable for obviousness if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). In *Graham v. John Deere Co.*, 383 U.S. 1 (1966), the Supreme Court set out a framework for assessing obviousness that requires consideration of four factors: (1) the "level of ordinary skill in the pertinent art," (2) the "scope and content of the prior art," (3) the "differences between the prior art and the claims at issue," and (4) "secondary considerations" of nonobviousness such as "commercial success, long felt but unsolved needs, failure of others, etc." *Id.* at 17–18; *KSR*, 550 U.S. at 407.

"Whether an ordinarily skilled artisan would have been motivated to modify the teachings of a reference is a question of fact." *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1327 (Fed. Cir. 2016) (citations omitted). "[W]here a party argues a skilled artisan would have been motivated to combine references, it must show the artisan 'would have had a reasonable expectation of success from doing so.'" *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1360–61 (Fed. Cir. 2017) (quoting *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1068–69 (Fed. Cir. 2012)).

C. Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art, various factors may be considered, including the "type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active

workers in the field." *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citation omitted).

Petitioner contends a person of ordinary skill in the art would have had "a working knowledge of physiological monitoring technologies," "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" or "a Master of Science degree in a relevant academic discipline with less than a year of related work experience in the same discipline." Pet. 5–6 (citing Ex. 1003 ¶¶ 25–26). Patent Owner does not dispute the level of ordinary skill identified by Petitioner. *See* Prelim. Resp. 10.

For purposes of this Decision, we find that the '745 patent and the cited prior art references reflect the appropriate level of skill at the time of the claimed invention and that the level of appropriate skill reflected in these references and in the '745 patent is consistent with the level of skill proposed by Petitioner. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). Accordingly, for purposes of this Decision, this is the definition for a person of ordinary skill in the art we adopt.

D. Claim Construction

We apply the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b). 37 C.F.R. § 42.100(b). Under that standard, claim terms "are generally given their ordinary and customary meaning" as would have been understood by a person of ordinary skill in the art at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc)).

"In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17). Extrinsic evidence is "less significant than the intrinsic record in determining 'the legally operative meaning of claim language.'" *Phillips*, 415 F.3d at 1317.

Petitioner states that "[a]ll claim terms should be construed according to the *Phillips* standard." Pet. 6. Further, according to Petitioner, "no claim terms need be construed to resolve issues of controversy in the present Petition." *Id.*

Patent Owner first argues that the Petition fails to identify "[h]ow the challenged claim is to be construed," as required by 37 C.F.R. § 42.104(b)(3). Prelim. Resp. 10–11. Patent Owner directs us to a portion of the Patent Trial and Appeal Board Consolidated Trial Practice Guide (Nov. 2019) ("CTPG"), which more fully states as follows:

> If a petitioner believes that a claim term requires an express construction, the petitioner must include a statement identifying a proposed construction of the particular term and where the intrinsic and/or extrinsic evidence supports that meaning. On the other hand, a petitioner may include a statement that the claim terms require no express construction. The patent owner may then respond to these positions and/or propose additional terms for construction, with corresponding statements identifying a proposed construction of any particular term or terms and where the intrinsic and/or extrinsic evidence supports those meanings.

CTPG 44–45.[9] Patent Owner disregards the second sentence in the CTPG excerpt above, and instead asserts that the Petition "does not meet" some purported "requirement" of the first sentence of the excerpt. Prelim. Resp. 10–11. Patent Owner's argument fails because the Petition makes clear, in conformance with 37 C.F.R. § 42.104(b)(3) and consistent with the CTPG, that Petitioner contends that the *Phillips* standard applies and that no claim term requires express construction. *See* Pet. 6.

Second, Patent Owner disputes the sufficiency of Petitioner's contentions with regard to "the material configured to change the first shape into a second shape," as recited in claims 1 and 20. Prelim. Resp. 12–17; Ex. 1001, 15:32–61, 17:20–18:17. According to Patent Owner, the claim term "second shape" must be expressly construed because Petitioner agreed in an ITC proceeding that a difference in shape requires more than a difference in size. Prelim. 12. Patent Owner then argues that Petitioner fails to show how the proposed combination of Sarantos and Shie "would result in a change from a 'first shape' of light to a 'second shape,'" and, thus, "the Petition should be denied." *Id.* Relatedly, Patent Owner argues that the recited "material configured" is not properly equated or limited to "a diffuser only," and that the material must be "configured to change the first shape into a second shape." Prelim. Resp 16–17 (citing Ex. 2002 ¶¶45–46).

Patent Owner fails to show any disagreement between the parties, at this stage of the proceeding, over the meaning of "material configured to change the first shape into a second shape." Merely disputing whether a claimed feature is taught by one combination of art asserted by Petitioner does not show that the Petition must be denied because of an absence of an

[9] Available at https://www.uspto.gov/TrialPracticeGuideConsolidated.

express construction of a claim term. We find that Patent Owner has not identified any dispute over the meaning of "the material configured to change the first shape into a second shape" and that no express construction is required for purposes of this Decision.

Third, Patent Owner argues that we should "interpret the scope of [c]laim 15 as excluding arrangements of two or three photodiodes," because claim 15 recites "the plurality of photodiodes are arranged in an array having a spatial configuration corresponding to a shape of the portion of the tissue measurement site encircled by the light block." Prelim. Resp. 17–19; Ex. 1001, 16:36–17:3. Patent Owner reasons that during prosecution of a "parent application" with "a similarly phrased limitation," it "explained that two and three photodiodes can only represent a line or a triangle, respectively and cannot represent a circular shape." *Id.* at 18–19 (citing Ex. 2002 ¶¶ 47–48 Ex. 2057, 322). Patent Owner fails to present a dispute on the current record over the construction of the recited "plurality of photodiodes." Whether a particular configuration of photodiodes taught by the prior art meets the claim limitation is a separate issue and we find no express construction necessary for purposes of this Decision on the current record.

E. Alleged Obviousness Over Iwamiya and Sarantos

Petitioner contends the subject matter of claims 1 and 9 of the '745 patent would have been obvious over Iwamiya and Sarantos. Pet. 6–20. Petitioner provides a detailed explanation of its contentions in the Petition, including a clause-by-clause analysis specifying how the combination of Iwamiya and Sarantos teaches each limitation, and those contentions are supported by the testimony of Dr. Anthony. *Id.*; Ex. 1064 ¶¶ 29–48.

Below we provide a brief summary of Iwamiya and Sarantos. We then focus our discussion on claim 1, including Patent Owner's arguments in opposition directed primarily to the recited "surface comprising a dark-colored coating." Prelim. Resp. 21, 43–47.[10]

1. Summary of Iwamiya

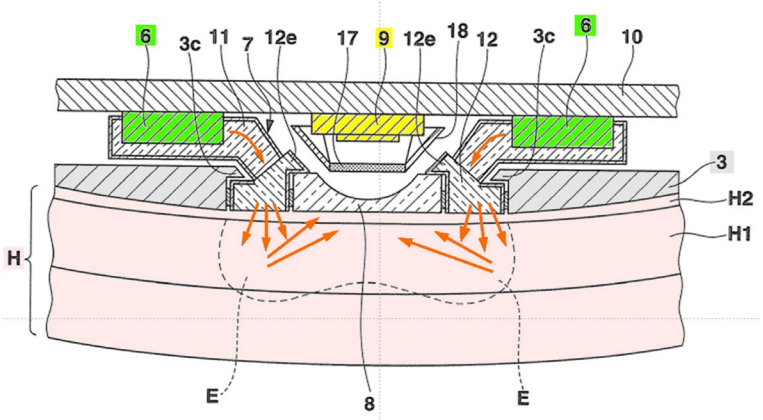
Iwamiya, titled Optical Biological Information Detecting Apparatus and Optical Biological Information Detecting Method, is directed "an optical biological information detecting apparatus" comprised of the following:

> a light emitting unit which emits observation light of a specific wavelength band to optically observe a desired portion of a tissue of a skin of a human body; an annular light guide unit which guides the observation light to a desired area of a surface of the skin corresponding to the desired portion of the tissue of the skin, and which annularly irradiates the observation light onto the desired area of the surface of the skin; and a light receiving unit which is disposed at a position surrounded by the annular light guide unit, and which receives scattered light scattered by the desired portion of the tissue of the skin after the observation

[10] Patent Owner also argues that Petitioner fails to address known objective indicia of nonobviousness. Prelim. Resp. 22–33. Patent Owner's arguments refer to "measuring oxygen saturation at the wrist," "a pulse oximetry feature," and specifically to claims 9 and 18, but not to claim 1. *See, e.g., id.* at 22, 24, 27. For objective indicia evidence to be accorded substantial weight, a nexus must exist between the proffered evidence and the merits of the invention as claimed. *See Wyers v. Master Lock Co.*, 616 F.3d 1231 (Fed. Cir. 2010). "Where the offered secondary consideration actually results from something other than what is both claimed and *novel* in the claim, there is no nexus to the merits of the claimed invention." *In re Kao*, 639 F.3d 1057 (Fed. Cir. 2011). Although Patent Owner expresses that there is a nexus between the identified objective indicia of non-obviousness and the claimed invention (Prelim. Resp. 32–33), the preliminary record before us does not appear complete on the matter. The parties may further address objective indicia of nonobviousness during trial.

> light is annularly irradiated onto the desired area of the surface of the skin by the annular light guide unit.

Ex. 1004, code (54), 2:32–46. The apparatus may be provided in "a central portion of the back cover" of a "wristwatch." *Id.* at 5:54–66; Fig. 1. As an overview of Iwamiya, Petitioner provides the following annotated version of Figure 4 of Iwamiya illustrating "an enlarged cross-sectional view" of "a state where biological information, such as a pulse wave, is detected while the back cover of the wristwatch . . . contacts the skin of an arm":



Pet. 6–7; Ex. 1004, 4:13–16, Fig. 4. As explained by Petitioner, the annotated version of Figure 4 of Iwamiya above illustrates a device with "LEDs 6 (shown in green) that emit light (orange) that is ref[l]ected by the tissue of the wearer's wrist (light pink) and detected by photodiodes 9 (yellow)." Pet. 6 (citing Ex. 1003 ¶ 29).

2. Summary of Sarantos

Sarantos, titled Heart Rate Sensor with High-Aspect-Ratio Photodetector Element, relates to the use of "non-square photodetector elements" in photoplethysmographic (PPG) sensors "designed for use with wearable biometric monitoring devices" to obtain a "significant performance increase as compared with traditional PPG designs, which typically utilize

square photodetector elements." Ex. 1005, code (54), 1:8–13, 6:66–7:7.

Petitioner provides the following 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." [Ex. 1005], 2:5–14, 5:55–59, 7:12–14, 13:39–47. 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. *Id.*, 1:9–10, 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; [Ex. 1003], [30]. The photodetector array of the PPG sensor measures the "intensity" of this reflected light, and provides signals representing the intensity to "control logic" of the monitoring device. [Ex. 1005], 2:5–14, 7:12–23, 13:39–47, The control logic can then calculate 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; [Ex. 1003], [30].

Pet. 7–8.

3. Independent Claim 1

Petitioner contends that each limitation of claim 1 is taught by the combination of Iwamiya and Sarantos and that a person of ordinary skill in the art would have been motivated to combine the references as asserted. Pet. 8–19. Petitioner contends that Iwamiya teaches, as shown in Figure 4 reproduced above, "an 'optical biological information detecting apparatus[,]'

which is a physiological monitoring device," including "light emitting units 6," corresponding to a plurality of light emitting diodes, and annular light guide unit 7, which "changes the shape of the light emitted from individual light emitting units 6 to an annular shape (a second shape)." *Id.* at 8–13 (citing, e.g., Ex. 1003 ¶¶ 31, 34–36; Ex. 1004, 5:54–66, 6:7–14, 6:22–45, 7:4–6, 7:61–65, 11:55–12:36, 15:30–33, Figs. 1–4, 12). With regard to the recited "plurality of photodiodes," Petitioner directs us to light receiving units 9 of Iwamiya composed of a silicon photo diode. *Id.* at 13 (citing Ex. 1004, 14:36–41, 8:20–23). Petitioner also contends that reflection layers 13 and 15 of Iwamiya correspond to the recited "light block," and that Iwamiya teaches central processing unit 20 corresponding to the recited processor. Pet. 18–19 (citing, e.g., Ex. 1003 ¶¶ 45–47; Ex. 1004, 6:62–7:3, 7:41–49, 8:61–9:7, 9:36–43, Fig. 3).

The only limitation of claim 1 specifically addressed by Patent Owner under this ground at this stage of the proceeding regards the recited "surface comprising a dark-colored coating." Petitioner first directs us to light shielding frame 18 of Iwamiya, which is positioned between photodiodes 9 and the tissue, as shown in Figure 4 of Iwamiya reproduced above. Pet. 14–15. Petitioner does not suggest that Iwamiya expressly teaches the surface of light shielding frame 18 includes a dark-colored coating. Instead, Petitioner directs us to in-mold label 2276 of Sarantos, which Petitioner identifies as a "dark colored coating." *Id.* at 15 (citing Ex. 1003 ¶ 41; Ex. 1005, 5:55–58, Fig. 22).

Figure 22 of Sarantos is reproduced below.

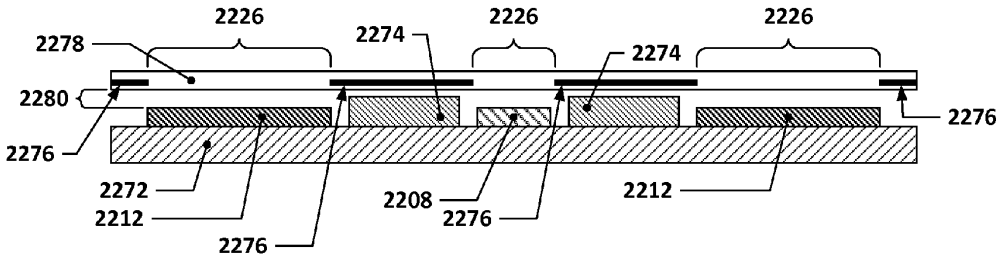


FIG. 22

Figure 22 illustrates a cross section of a PPG sensor. Ex. 1005, 6:52–54.

Sarantos further explains as follows:

> In FIG. 22, a substrate 2272 supports two HAR photodetector elements 2212 that are positioned on either side of a light source 2208. A window 2278 is offset from the substrate 2272. The window 2278, in this implementation, is made from a translucent or transparent material, such as transparent acrylic, with an in-mold label 2276 embedded within it. The in-mold label 2276 may be 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. In other implementations, other masking techniques, such as a painted or silk-screened mask applied to the window 2278, may be used. Regardless of which technique is used, the in-mold label 2276 or the masking may prevent stray light from other sources, e.g., ambient light, from reaching the HAR photodetector elements 2212 and affecting the heart rate signal obtained by the PPG sensor.

Ex. 1005, 17:1–16. Petitioner further reasons as follows:

> A [person of ordinary skill in the art] would have been motivated to employ an in-mold label or other black or opaque material as disclosed by Sarantos in the light shielding frame 18 of Iwamiya to serve the purpose indicated by the component's name: shielding the photodiodes 9 from stray light, and thereby ensuring accuracy of the sensor. APPLE-1003, [42]; *see, e.g.*, APPLE-1004, 8:38–47, FIG. 4; APPLE-1005, 5:55–58, 17:1–25, FIG. 22. A [person of ordinary skill in the art] would have understood that a dark-colored coating, such as that described by Sarantos, would have served this purpose by not only blocking

> light but also by limiting reflections, which could lead to stray light being incident on the photodiodes 9. It also would have been obvious to a [person of ordinary skill in the art] to use a dark-colored coating for light shielding frame 18 because dark-colored coatings and materials were well-known to effectively block light. APPLE-1003, [42]; *see, e.g.*, APPLE-1005, 17:1–10. A [person of ordinary skill in the art] would have known that a light shielding frame 18 or holder portion 43 as disclosed by Iwamiya can be of various proportions, and a thin surface is a coating. *See id.* Because using dark-colored coatings in light blocks was so well-known, and Iwamiya and Sarantos are both wrist-worn reflectance-based physiological sensors, a [person of ordinary skill in the art] would have reasonably understood the combination of Iwamiya with Sarantos to be successful with no unexpected results. *Id*.

Pet. 16–17.

In opposition, Patent Owner argues that Petitioner "points to nothing within the references themselves or any other contemporaneous evidence to support" the asserted combination of Iwamiya and Sarantos. Prelim. Resp. 43. According to Patent Owner, Petitioner "fails to identify any problem with Iwamiya's light shielding frame 18 or reason it needed modification," fails "to identify any contemporaneous evidence suggesting Iwamiya had any problem with 'stray light,'" "Iwamiya's optical filter 17 already accomplished" the function of "stray light rejection," and Iwamiya "never talks about limiting reflections." *Id.* at 43–45 (citing, e.g., Ex, 2002 ¶¶ 92–97). More specifically, Patent Owner contends that Iwamiya describes the use of aluminum in holder portion 43 that is "subjected to alumite treatment to have a reflection function." *Id.* at 45 (quoting Ex. 1004, 18:61–65). From this Patent Owner asserts Iwamiya teaches the use of "reflective materials" and applying a dark-colored coating would "change the principle of operation of Iwamiya." *Id.* (citing Ex. 2002 ¶ 98).

According to Patent Owner, the '745 patent describes the benefits of a light-absorbing material, and Petitioner's asserted combination "is a masterclass in hindsight." *Id.* at 46–47 (citing Ex. 2002 ¶¶ 99–101).

We find Petitioner has sufficiently shown for purposes of institution reasons supporting the asserted combination. Iwamiya teaches the use of a light shielding frame and Sarantos provides an express motivation to use "a painted or silk-screened mask," corresponding to a "dark-colored coating" to prevent "stray light from other sources" from reaching photodetector elements. *See, e.g.*, Ex. 1004 Fig. 5; Ex. 1005, 17:1–16. We have considered Patent Owner's arguments, including that Iwamiya needed no improvement and relies on a contrary principle of operation, and find them to be insufficient on the current record to overcome the rationale shown by Petitioner.

4. Dependent Claim 9

Claim 9 depends from claim 1 and further requires "wherein the physiological parameter comprises oxygen saturation." Ex. 1001, 16:21–23. Petitioner contends that Iwamiya's sensor detects oxygen saturation. Pet. 19 (citing Ex. 1003 ¶ 48; Ex. 1004, 8:61–9:7). According to Petitioner, Iwamiya teaches "'pulse wave' or heart rate" as an example and "oxygen saturation comprises heart rate sensing at different wavelengths." *Id.* However, Petitioner directs us to no portion of Iwamiya that expressly describes either a sensor that measures "oxygen saturation" or that measures heart rate "at different wavelengths." *See generally* Pet. Patent Owner argues that "Iwamiya discloses the use of only a *single wavelength* of light at 940 nm," and does not teach or suggest measuring different wavelengths or oxygen saturation. Prelim. Resp. 35 (citing Ex. 2002 ¶ 80; Ex. 1004, 10:34–38, 11:19–23). Patent Owner's argument directed to the sufficiency

of the disclosure of Iwamiya, alone, appears to have merit, but we note that Petitioner also relies on teachings of Sarantos pertaining to oxygen saturation,

In that respect, Petitioner further argues that "Sarantos discloses measuring blood oxygenation levels," and "[t]o the extent not disclosed by Iwamiya, a [person of ordinary skill in the art] would have been motivated to determine oxygen saturation using Iwamiya's physiological sensor, based on the teachings of Sarantos, in order to expand the range of physiological parameters measured by Iwamiya's sensor, thereby improving the functionality and utility of the sensor." Pet. 20 (citing Ex. 1003 ¶ 49; Ex. 1005, 13:40–14:22). Sarantos provides the following express disclosure:

> At the same time, photoplethysmographic techniques may also be used to measure other physiological parameters besides heart rate, such as blood oxygenation levels. It may, in such situations, be desirable to utilize an LED that predominantly emits light in the red or infrared spectrum for such purposes. Thus, it may be desirable to include separate light-emitting devices that are each able to emit different wavelengths of light; each light emitting device may be used to supply light for a different type of photoplethysmographic measurement.

Ex. 1005, 13:44–53. According to Petitioner, there would have been a reasonable expectation of success in the asserted combination "because wrist-worn pulse oximetry sensors, such as that described in Sarantos, were well-known in the art." *Id.* (citing Ex. 1003 ¶ 49; Ex. 1005, 13:40–14:22, Fig. 2).

Patent Owner argues that Sarantos relies on the "green/yellow light spectrum," and, therefore, "teaches away from using the described system for red and infrared wavelengths of pulse oximetry." Prelim. Resp. 37–38 (citing Ex. 1005, 18:48–51; Ex. 2002 ¶¶ 64, 81); *see also id.* at 38–39

(arguing that Iwamiya uses only a single wavelength of infrared light). According to Patent Owner, Sarantos "discloses improvements to a wrist-worn *pulse rate* sensor," which measures "the same parameter measured by Iwamiya's sensor." *Id.* at 38. Patent Owner also argues that Iwamiya "teaches away from a combination with Sarantos," because of the optical filters employed. *Id.* at 38–39. In light express disclosure in Sarantos of the measurement of blood oxygenation levels we find, on the current record, Petitioner has provided a sufficient explanation of how the combination of references teaches the recited limitations of claim 9, as well as a reason for their combination.

5. Determination of a Reasonable Likelihood of Prevailing

"Once all relevant facts are found, the ultimate legal determination [of obviousness] involves the weighing of the fact findings to conclude whether the claimed combination would have been obvious to an ordinary artisan." *Arctic Cat*, 876 F.3d at 1361. On balance, considering the record presently before us, Petitioner has established a reasonable likelihood that it would prevail in showing that the combination of Iwamiya and Sarantos would have rendered the subject matter of claims 1 and 9 of the '745 patent obvious to one of ordinary skill in the art at the time of the invention.

F. Additional Grounds

Petitioner contends that the subject matter of claims 15, 18, 20, and 27 would have been obvious over Iwamiya, Sarantos, and Venkatraman. Pet. 20– 29. Petitioner relies on Venkatraman as teaching a device "configured to transmit physiological parameter data to a separate processor." *Id.* at 25–28. According to Petitioner, a person of ordinary skill in the art "would have been motivated to transmit information from Iwamiya's wrist-worn wearable device, which has limited display space and

processing power, to a secondary device like a smart phone, as taught by Venkatraman in order to increase the functionality of the system without significantly increasing the power consumption of Iwamiya's sensor." *Id.* at 25–26 (citing, Ex. 1003 ¶ 63; Ex. 1004, 5:54–66, Fig. 1; Ex. 1006 31:1–16; 37:41–63, 55:29–51, 57:20–58.9; Ex. 1011, 10:23–27). In addition to arguments addressed above, Patent Owner argues with regard to claim 27 that Iwamiya would not have been combined with Sarantos to provide a "second wavelength." For the reasons discussed above we find on the current record that Petitioner has provided a sufficient rationale supporting the combination of Iwamiya and Sarantos for purposes of institution. Patent Owner also argues with regard to claims 15 and 18 that Iwamiya does not disclose photodiodes "in an array having a spatial configuration corresponding to a shape of the portion of the tissue measurement site encircled by the light block." Prelim. Resp. 21, 42, 47–48. Patent Owner's argument appears to be premised on its contentions regarding the scope of claim 15, addressed above, which would benefit from further development during trial.

Petitioner also contends that the subject matter of claims 1, 9, 15, and 18 would have been obvious over Sarantos and Shie, and that claims 15, 18, 20, and 27 would have been obvious over the combination of Sarantos, Shie and Venkatraman. Pet. 30–43. Petitioner provides the following 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, [71]. 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.*

Pet. 30. Patent Owner argues, among other things, that Petitioner "speculates about the references' teachings," and "fails to identify the shape of the 'first shape' or the shape of the 'second shape' in its proposed combination of Sarantos with Shie." *Id.* 49. We note in this regard that the claims at issue do not appear to require the identification of a particular shape. For example, claim 1 recites "material configured to change the first shape into a second shape." Ex. 1001, 15:32–61.

This Decision does not depend on these additional grounds and the parties' arguments with respect to grounds involving Shie would benefit from further development at trial. Because we have determined above that, at this stage of the proceeding and on the present record, the information presented in the Petition shows that there is a reasonable likelihood that Petitioner would prevail with respect to at least one claim challenged based on alleged obviousness over Iwamiya and Sarantos, we need not further address, in this Decision, Petitioner's additional grounds of unpatentability. *See* 35 U.S.C. § 314(a).

IV. CONCLUSION

For the foregoing reasons, we determine that Petitioner demonstrates a reasonable likelihood of prevailing with respect to at least one of the claims challenged in the Petition. Accordingly, *inter partes* review of the '745 patent shall proceed in this case on all of the grounds raised in the Petition. *See SAS Inst.*, 138 S. Ct. at 1359–60 (holding that a decision to institute under 35 U.S.C. § 314 may not institute on fewer than all claims challenged in the petition); *PGS Geophysical AS v. Iancu*, 891 F.3d 1354,

1360 (Fed. Cir. 2018) (stating that the decision whether to institute *inter partes* review requires "a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition").

Our determination in this Decision is not a final determination on either the patentability of any challenged claims or the construction of any claim term. The factual findings set forth in this Decision are preliminary and provided for the sole purpose of deciding whether to institute a review. Any final findings will be based on the full trial record, including any information presented by Patent Owner in a timely filed response to the Petition. *See Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1068 (Fed. Cir. 2016) (noting that "there is a significant difference between a petitioner's burden to establish a 'reasonable likelihood of success' at institution, and actually proving invalidity by a preponderance of the evidence at trial") (quoting 35 U.S.C. § 314(a) and comparing *id.* with § 316(e)).

IV. ORDER

Upon consideration of the record before us, it is:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1, 9, 15, 18, 20, and 27 of U.S. Patent No. 10,687,745 B1 is instituted with respect to all grounds set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), *inter partes* review of U.S. Patent No. 10,687,745 B1 shall commence on the entry date of this Order, and notice is hereby given of the institution of a trial.

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