Apple Inc. (Petitioner)
v.
Masimo Corporation (Patent Owner)

Petitioner Demonstratives

Case Nos. IPR2024-00243 and IPR2024-00244
U.S. Patent No. 10,722,159

Case No. IPR2024-00241
U.S. Patent No. 10,687,743

Before Hon. Robert L. Kinder, Richard H. Marschall, David Cotta, and Alyssa A. Finamore
Administrative Patent Judges

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

APPLE 1089
Apple v. Masimo
IPR2024-00243

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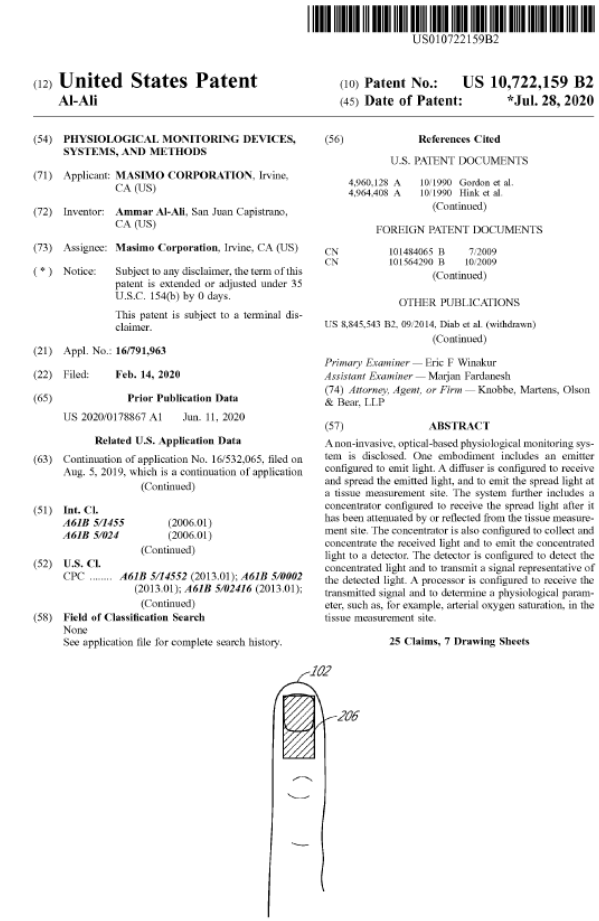
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’159 and ’743 Patent Overviews

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Overview of the ’159 Patent



US010722159B2

(12) **United States Patent**
Al-Ali

(10) **Patent No.: US 10,722,159 B2**
(45) **Date of Patent: *Jul. 28, 2020**

(54) **PHYSIOLOGICAL MONITORING DEVICES, SYSTEMS, AND METHODS**

(71) Applicant: **MASIMO CORPORATION**, Irvine, CA (US)

(72) Inventor: **Ammar Al-Ali**, San Juan Capistrano, CA (US)

(73) Assignee: **Masimo Corporation**, Irvine, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **16/791,963**

(22) Filed: **Feb. 14, 2020**

(65) **Prior Publication Data**

US 2020/0178867 A1 Jun. 11, 2020

Related U.S. Application Data

(63) Continuation of application No. 16/532,065, filed on Aug. 5, 2019, which is a continuation of application (Continued)

(51) **Int. Cl.**
A61B 5/1455 (2006.01)
A61B 5/024 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***A61B 5/14552*** (2013.01); ***A61B 5/0002*** (2013.01); ***A61B 5/02416*** (2013.01);
(Continued)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,960,128 A 10/1990 Gordon et al.
4,964,408 A 10/1990 Hink et al.
(Continued)

FOREIGN PATENT DOCUMENTS

CN 101484065 B 7/2009
CN 101564290 B 10/2009
(Continued)

OTHER PUBLICATIONS

US 8,845,543 B2, 09/2014, Diab et al. (withdrawn)
(Continued)

Primary Examiner — Eric F Winakur
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(74) *Attorney, Agent, or Firm* — Knobbe, Martens, Olson & Bear, LLP

(57) **ABSTRACT**

A non-invasive, optical-based physiological monitoring system is disclosed. One embodiment includes an emitter configured to emit light. A diffuser is configured to receive and spread the emitted light, and to emit the spread light at a tissue measurement site. The system further includes a concentrator configured to receive the spread light after it has been attenuated by or reflected from the tissue measurement site. The concentrator is also configured to collect and concentrate the received light and to emit the concentrated light to a detector. The detector is configured to detect the concentrated light and to transmit a signal representative of the detected light. A processor is configured to receive the transmitted signal and to determine a physiological parameter, such as, for example, arterial oxygen saturation, in the tissue measurement site.

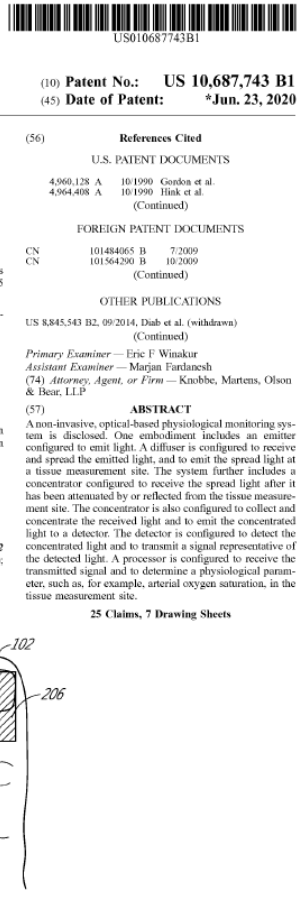
25 Claims, 7 Drawing Sheets

- The ’159 Patent was filed Feb. 14, 2020, and its earliest claimed priority date is July 2, 2015.
- The ’159 Patent includes 25 claims.
- The IPR2024-00243 Petition challenges all claims (claims 1-25), of which claims 1, 14, and 19 are independent.
- The IPR2024-00244 Petition challenges claims 1-5, 7-14, and 16-25.

APPLE-1001 (’159 Patent), Cover Page.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Overview of the ’743 Patent



US010687743B1

(12) **United States Patent**
Al-Ali

(10) **Patent No.: US 10,687,743 B1**
(45) **Date of Patent: *Jun. 23, 2020**

(54) **PHYSIOLOGICAL MEASUREMENT DEVICES, SYSTEMS, AND METHODS**

(71) Applicant: **MASIMO CORPORATION**, Irvine, CA (US)

(72) Inventor: **Ammar Al-Ali**, San Juan Capistrano, CA (US)

(73) Assignee: **Masimo Corporation**, Irvine, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **16/791,955**

(22) Filed: **Feb. 14, 2020**

Related U.S. Application Data

(63) Continuation of application No. 16/532,061, filed on Aug. 5, 2019, which is a continuation of application (Continued)

(51) **Int. Cl.**
A61B 5/1455 (2006.01)
A61B 5/145 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***A61B 5/14552*** (2013.01); ***A61B 5/0002*** (2013.01); ***A61B 5/02416*** (2013.01);
(Continued)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,960,128 A 10/1990 Gordon et al.
4,964,408 A 10/1990 Hink et al.
(Continued)

FOREIGN PATENT DOCUMENTS

CN 101484065 B 7/2009
CN 101564290 B 10/2009
(Continued)

OTHER PUBLICATIONS

US 8,845,543 B2, 09/2014, Diab et al. (withdrawn)
(Continued)

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(57) **ABSTRACT**

A non-invasive, optical-based physiological monitoring system is disclosed. One embodiment includes an emitter configured to emit light. A diffuser is configured to receive and spread the emitted light, and to emit the spread light at a tissue measurement site. The system further includes a concentrator configured to receive the spread light after it has been attenuated by or reflected from the tissue measurement site. The concentrator is also configured to collect and concentrate the received light and to emit the concentrated light to a detector. The detector is configured to detect the concentrated light and to transmit a signal representative of the detected light. A processor is configured to receive the transmitted signal and to determine a physiological parameter, such as, for example, arterial oxygen saturation, in the tissue measurement site.

25 Claims, 7 Drawing Sheets

- The ’743 Patent was filed Feb. 14, 2020, and its earliest claimed priority date is July 2, 2015.
- The ’743 Patent includes 25 claims.
- Is related to the same 10,448,871 patent as the ’159 patent and shares a specification with the ’159 patent.
- The IPR2024-00241 Petition challenges all claims (claims 1-25), of which claims 1, 14, and 22 are independent.

APPLE-1001 (’743 Patent), Cover Page.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Overview of the ’159 & ’743 Patents

FIGS. **7**A and **7**B are simplified schematic side and top views, respectively, of a 3D reflective pulse oximetry sensor **700** according to an embodiment of the present disclosure. In the illustrated embodiment, the 3D sensor **700** irradiates the tissue measurement site **102** and detects the emitted light that is reflected by the tissue measurement site **102**. 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, because the emitter **702** and detector **710** are on located the same side of the tissue measurement site **102**. The 3D sensor **700** includes an emitter **702**, a light diffuser **704**, a light block **706**, a light concentrator **708**, and a detector **710**.

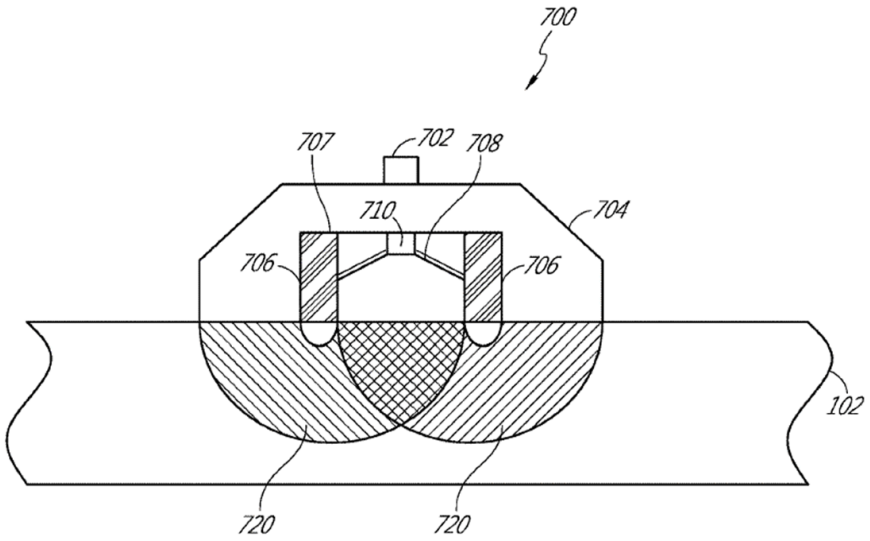


FIG. 7A

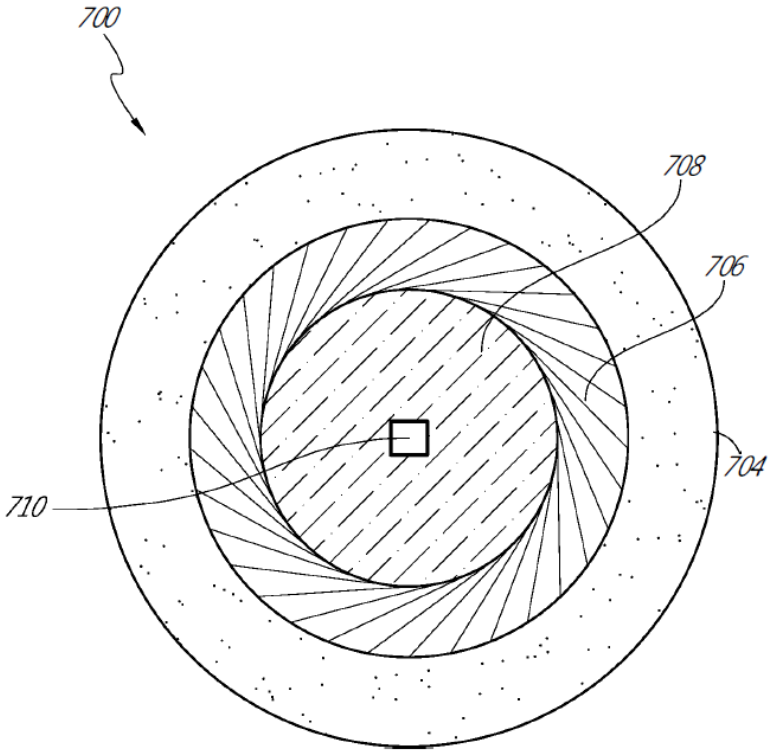


FIG. 7B

APPLE-1001 (‘159 patent), 10:40-51, FIGS. 7A, 7B; 243 Pet., 43; 243 Pet. Reply, 23-24.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Overview of the ’159 & ’743 Patents

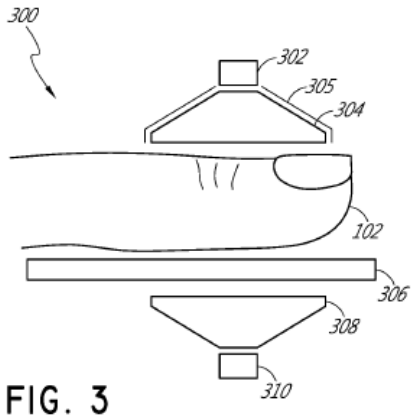


FIG. 3

Referring to FIG. **4A**, a top view of a portion of the 3D sensor **300** is provided. The light-absorbing detector filter **306** is illustrated having a top surface coated with a light-absorbing material. The light-absorbing material can be a black opaque material or coating or any other dark color or coating configured to absorb light. Additionally, a rectangular opening **402** is positioned relative to the light concentrator **308** (shown in phantom) and the detector **310** such that light may pass through the rectangular opening **402**, into the light concentrator **308**, and to the detector **310**. FIG. **4B** illustrates the top view of a portion of the 3D sensor **300** as in FIG. **4A**, with the addition of the tissue measurement site **102** in operational position. Accordingly, the rectangular opening **402**, the light concentrator **308** and the detector **310** are shown in phantom as being under the tissue measurement site **102**. In FIGS. **4A** and **4B**, the light concentrator

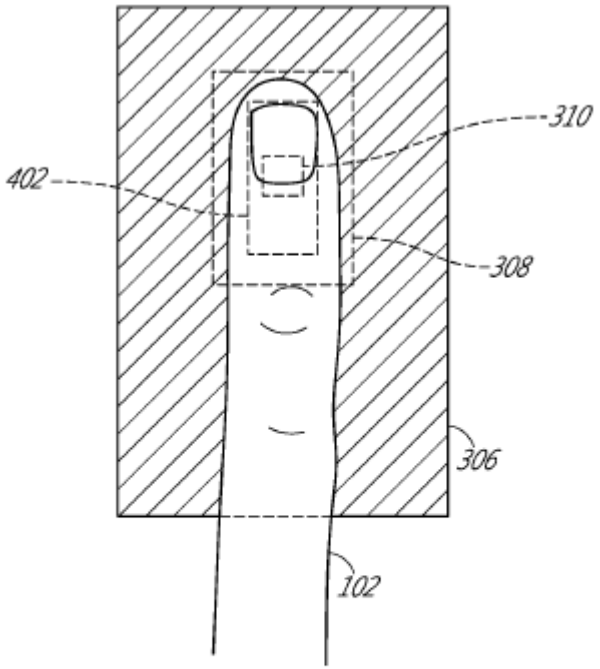


FIG. 4B

APPLE-1001 (‘159 patent), 9:31-46, FIGS. 3, 4B; 241 Pet. Rep., 10, 20; 243 Pet. Rep., 9, 20

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

’159 Patent Claims 1 and 19

1. A physiological monitoring device comprising:

a plurality of emitters configured to emit light in a first shape;

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;

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;

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;

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

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.

19. A system configured to measure one or more physiological parameters of a user, the system comprising:

a physiological monitoring device comprising:

a plurality of emitters configured to emit light in a first shape;

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;

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;

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;

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

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

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.

APPLE-1001 (‘159 Patent), Claims 1 and 19

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

’159 Patent Claim 14

14. A physiological monitoring device comprising:

a plurality of optical sources configured to emit light proximate a wrist of a user;

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;

a light block having a circular shape;

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;

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;

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

wherein the physiological monitoring device is configured to transmit physiological parameter data to a separate processor.

APPLE-1001 (‘159 Patent), Claim 14

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

’743 Patent Claims 1 and 14

1. A physiological measurement device comprising:
one or more emitters configured to emit light in an initial light pattern;
an optical transmission material configured to be positioned between the one or more emitters and a tissue measurement site, wherein the optical transmission material is configured to alter a direction of at least a portion of the light emitted from the one or more emitters to shape an output light pattern by which the emitted light is directed toward a surface of the tissue measurement site, wherein the output light pattern comprises a different geometric shape than the initial light pattern;
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;
a light block configured to prevent at least a portion of the light emitted from the one or more emitters from reaching the plurality of detectors without first reaching the tissue;
a surface comprising a dark-colored coating, the surface positioned between the plurality of detectors and the tissue, 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; and
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 a user responsive to the one or more signals.

14. A physiological measurement device comprising:
one or more optical sources configured to emit light of one or more wavelengths in an initial light pattern proximate a wrist of a user;
an optical transmission material configured to be positioned between the one or more optical sources and a tissue measurement site, wherein the optical transmission material is configured to alter a direction of at least a portion of the light emitted from the one or more optical sources to shape an output light pattern by which the emitted light is projected toward a surface of the tissue measurement site, the output light pattern comprising a different geometric shape than the initial light pattern;
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, wherein the one or more optical sources and the plurality of detectors are arranged in a reflectance measurement configuration;
a light block configured to prevent at least a portion of light emitted from the one or more optical sources from reaching the plurality of detectors without first reaching the tissue;
a surface comprising a dark-colored coating, the surface positioned between the plurality of detectors and the tissue, 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 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
a touch-screen display configured to present information responsive to the determined physiological parameter;
wherein the physiological measurement device is configured to wirelessly transmit physiological parameter data to a separate device.

APPLE-1001 (‘743 Patent), Claims 1 and 14

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

’743 Patent Claim 22

22. A physiological measurement device comprising:
one or more emitters configured to emit light;
a diffuser configured to be positioned between the one or more emitters and a tissue measurement site;
a circular shaped light block;
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;
wherein the light block is configured to prevent at least a portion of light emitted from the one or more emitters from reaching the plurality of detectors without first reaching tissue; and
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.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Overview of Grounds Instituted Against '159 Patent

243 Petition

Ground	Claims	Basis for Rejection (35 U.S.C. § 103)
1A	1-2, 4-13	Iwamiya-Sarantos
1B	3	Iwamiya-Sarantos-Han
1C	14-25	Iwamiya-Sarantos-Utter

243 Pet., 1.

244 Petition

Ground[1]	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
1G	14, 16-25	Sarantos in view of Utter
1H	14, 16-25	Sarantos in view of Shie and Utter

244 Pet., 1-22.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Overview of Grounds Instituted Against '743 Patent

241 Petition

Ground	Claims	Basis for Rejection (35 U.S.C. § 103)
1A	1-6, 9-13, 24, 25	Iwamiya in view of Sarantos
1B	7	Iwamiya in view of Sarantos and Utter
1C	8	Iwamiya in view of Sarantos and Han
1D	14-21	Iwamiya in view of Sarantos, Utter, and Han
1E	22-23	Iwamiya

241 Pet., 2.

244 Pet., 1-22.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Iwamiya-Sarantos Combinations

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

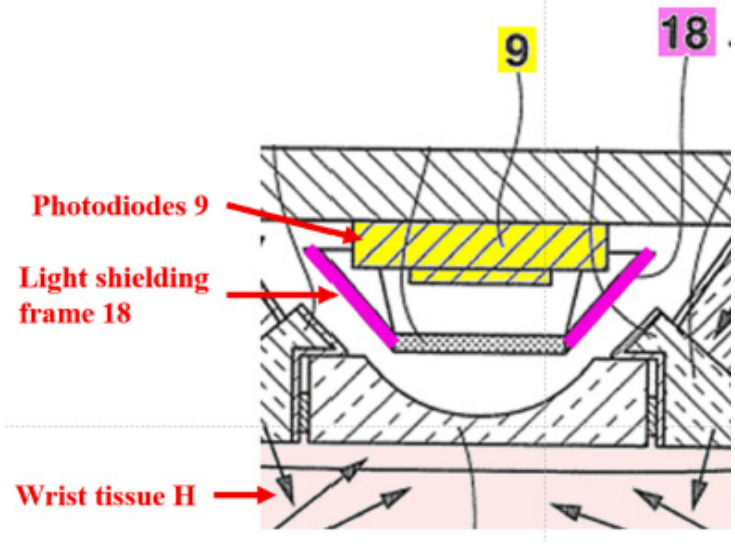
“Surface comprising a dark-colored coating”

(’159 elements [1.4], [19.5] and claim 12; ’743 elements [1e], [14e])

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Iwamiya Includes a Light Shielding Frame

As illustrated in FIGS. **3** and **4**, between the light receiving unit **9** and the scattered light taking unit **8**, an optical filter **17** is disposed in a state where the optical filter is mounted on the lower side of a light shielding frame **18** to surround the light receiving unit **9**. As illustrated in FIG. **8**, the optical filter **17** is configured to transmit light of a specific wavelength band of 900 nm or more and shield light of a wavelength band of 900 nm or less, such that the light receiving unit **9** alleviates an influence from a measurement change due to external light, such as sunlight.



APPLE-1004, 8:38-47, FIG. 4 (annotated); 241 APPLE-1003, ¶45; 243 APPLE-1003, ¶31; 241 Pet., 8, 11-12; 243 Pet., 6-8.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Sarantos Teaches a Dark-Colored Coating to Shield Light

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. The

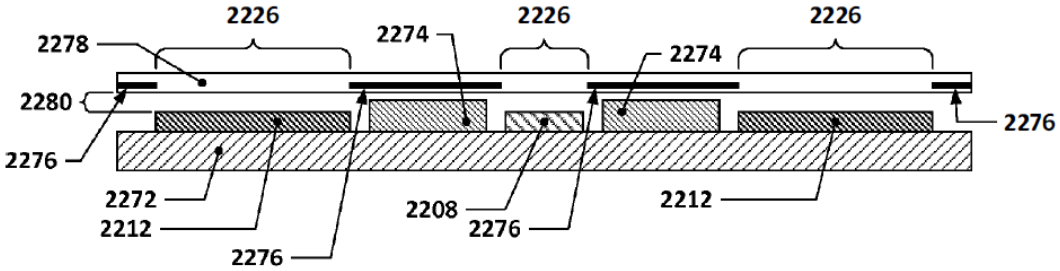


FIG. 22

APPLE-1005, 17:3-16, FIG. 22; 241 APPLE-1003, ¶47; 243 APPLE-1003, ¶33; 241 Pet., 12-13; 243 Pet., 11-12.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Iwamiya and Sarantos Combinations Render Obvious a Surface with a Dark-Colored Coating

Dr. Anthony

62. As I explained above, a POSITA would have been motivated to implement the light shielding frame of Iwamiya to include an in-mold label or other black or opaque material/coating as disclosed by Sarantos to serve the purpose indicated by the component's name: shielding the photodiodes 9 from stray light (one of the dominant noise sources), and thereby ensuring accuracy of the sensor. *See, e.g.*, APPLE-1004, 8:38-47, FIG. 4; APPLE-1005, 5:55-58, 17:1-25, FIG. 22.

243 APPLE-1003, ¶62; 241 APPLE-1003, ¶¶48, 70; 243 Pet., 8, 21; 241 Pet., 13, 30-31.

17:1-25, FIG. 22. A POSITA would have known how to apply the dark-colored coating in any suitable manner that would ensure light is effectively blocked from reaching the photodiodes except through the filter 17, e.g., by coating the exterior of the frame 18 with a dark, light-absorbing material. APPLE-1005, 17:1-25.

243 APPLE-1003, ¶34; 243 Pet., 9-10

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Iwamiya and Sarantos Combinations Render Obvious a Surface with a Dark-Colored Coating

Dr. Anthony

> 49. A POSITA 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 absorbing light and limiting reflections, which could lead to stray light (such as light from LEDs that has not yet been reflected by the user's skin) being incident on the photodiodes 9, thus improving the light blocking functionality of the resulting device.

241 APPLE-1003, ¶49; 243 APPLE-1003, ¶35; 241 Pet., 13-14; 243 Pet., 9.

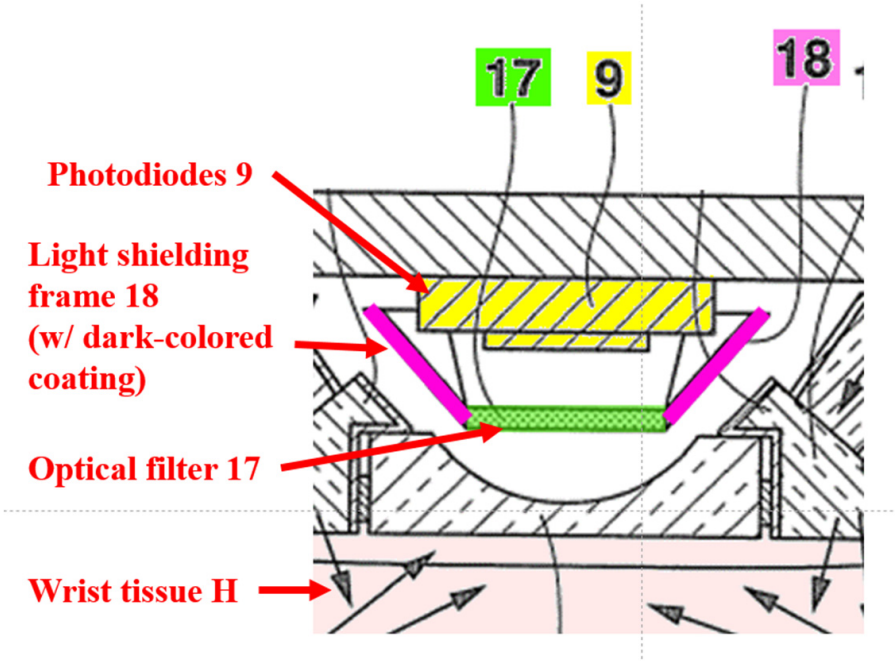
> 50. It also would have been obvious to a POSITA to use a dark-colored coating for light shielding frame 18 because dark-colored coatings and materials were well-known to effectively block light. *See, e.g.,* APPLE-1005, 17:1-16; APPLE-1013, 96-97[2] ("coat the housing around the photodiode with a material that does not scatter or reflect light"), 111 ("cover the sensor site with opaque material").

241 APPLE-1003, ¶50; 243 APPLE-1003, ¶¶32, 63; 241 Pet., 14; 243 Pet., 9-10, 12, 21.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Iwamiya and Sarantos Combinations Render Obvious a Surface with a Dark-Colored Coating



APPLE-1004, FIG. 4 (partial, zoomed in, annotated); 241 APPLE-1003, ¶71; 243 APPLE-1003, ¶64; 241 Pet. 31; 243 Pet., 23-24.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

A POSITA Would Have Been Motivated to Combine Iwamiya and Sarantos to Reduce Multiple Scattering

Dr. Anthony

> 53. Finally, a Sarantos-like dark-colored coating would have been more effective than a reflective material at reducing light scatter in the empty space surrounding the frame 18, thereby reducing the amount of light that could reflect back through the empty space and the optical filer 17 and the photodiodes. A POSITA would have sought to reduce these effects since any light that reflected back from the space surrounding frame 18 and through the optical filter 17 to the photodiodes would have different path lengths that could increase optical interference and reduce measurement accuracy. APPLE-1013, 69, 96-97.

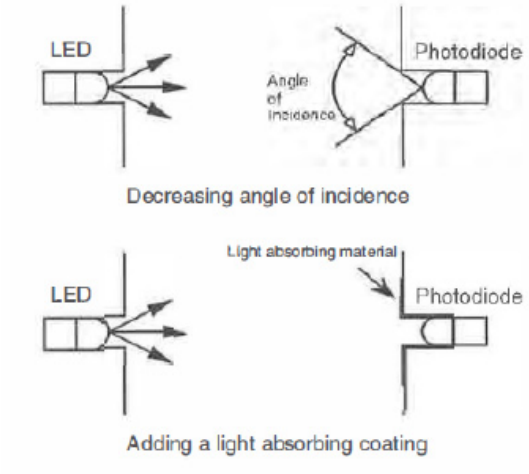
241 APPLE-1003, ¶53; 243 APPLE-1003, ¶36;
241 Pet., 17; 243 Pet., 8-9, 12.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

A POSITA Would Have Been Motivated to Combine Iwamiya and Sarantos to Reduce Multiple Scattering

Dr. Anthony

the form of light shielding frame 18. Webster goes on to describe the knowledge of a POSITA that "[t]wo additional measures can be taken to ensure this (figure 6.6). One is to decrease the angle of incidence to the photodiode. The second is to *coat the housing around the photodiode with a material that does not scatter or reflect light*." *Id.*, 96-97.



241 APPLE-1079, ¶7; 243 APPLE-1079, ¶7;
241 Pet. Rep., 6-7; 243 Pet. Rep., 6.

8. As another corroborating example of the knowledge of a POSITA that it would have been obvious and beneficial to implement Iwamiya's light shielding frame 18 to include a dark-colored coating, as taught by Sarantos, to prevent unwanted light scattering and light paths, the Schulz patent discusses the knowledge of a POSITA that light shields in optical physiological sensors "are advantageously formed from or coated with a light absorbing material which further mitigates the effects of ambient light, as well as stray (i.e., 'secondary') reflected light with the probe generated by the light source 103." APPLE-1032, 9:58-10:23. As Schulz explains (and would have been known to a POSITA), "light generated by the light source 103 can take several paths in reaching the detector" but "only one" of these paths "is the desired path." *Id.*

241 APPLE-1079, ¶8; 243 APPLE-1079, ¶8;
241 Pet. Rep., 6-7; 243 Pet. Rep., 6.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Corroborating Evidence Supports Motivation

Webster

The reasons for the increased absorbance are mainly *scattering* and *multiple scattering*. Light scattering causes the deviation of a light beam from its initial direction. It occurs when light is refracted by an object of a size similar to the magnitude of the wavelength of the light and a change in the index of refraction at the interface of this object. The wavelengths of red and infrared light do have the same order of magnitude as the geometric dimensions of red blood cells (approximately 7 μm in diameter). The discontinuity in the index of refraction at the interface between plasma and red blood cells and the great proportion of red blood cells in blood yield a highly light scattering medium. Light that is scattered once will likely be scattered again by cells and therefore multiple scattering occurs (Steinke and Shepherd 1986). Multiple scattering increases the optical path length and therefore increases the absorbance.

241 APPLE-1013 (243 APPLE-1009), 69; 241 APPLE-1079, ¶9; 243 APPLE-1079, ¶9; 241 Pet., 17; 243 Pet., 12.

To minimize errors, the pulse oximeter designer must attempt to limit the light reaching the photodiode to that which has traveled through tissue containing arterial blood (Nellcor 1993). This can be accomplished through thoughtful LED/photodiode placement. Light impervious barriers should be placed between LEDs and the photodiode in all areas where the emitted light could reach the photodiode without passing through tissue (New and Corenman 1987). Two additional measures can be taken to ensure this (figure 6.6). One is to decrease the angle of incidence to the photodiode. The second is to coat the housing around the photodiode with a material that does not scatter or reflect light.

241 APPLE-1013 (243 APPLE-1009), 96; 241 APPLE-1079, ¶7, 9; 243 APPLE-1079, ¶¶7, 9; 241 Pet., 17; 243 Pet., 12.

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Corroborating Evidence Supports Motivation

Schulz

Specifically, light generated by the light source **103** can take several paths in reaching the detector, only one of which is the desired path via the aforementioned first and second apertures **117**, **119** and through the interposed tissue material. Preferably, in order to obtain more accurate measurement of transmitted light intensity, these other paths are eliminated or attenuated. Hence, in one embodiment, the light absorbing material is disposed on the entire upper and lower surface elements **114**, **116** and shield **130** so as to substantially absorb any secondary reflections prior to being received by the detector **105**. In the embodiment of FIGS.

APPLE-1032, 9:64-10:7; 241 Pet. Reply, 4-5; 243 Pet. Reply, 4-5.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

The Alleged Option of Using a Reflective Material does not Detract from Obviousness of a Dark-Colored Coating

Dr. Anthony:

> 13. In contrast to Iwamiya's specific description of reflective materials for layers 13 and 15 and holder portion 43, Iwamiya leaves the choice of a suitable material for light shielding frame 18 to a POSITA. *Compare* APPLE-1004, 6:62-7:3, 7:41-49, 18:61-65, 28:64-29:1, 39:20-24 *with* APPLE-1004, 8:38-42. A POSITA would have found a dark-colored coating as taught in Sarantos to be an obvious and beneficial option for achieving the light-shielding function desired by Iwamiya, for the reasons previously discussed in my First 743 Declaration (APPLE-1003, ¶¶45-53) and this Supplemental 743 Declaration. Even if some other benefits might flow from use of a reflective material over a dark-colored coating in some cases, as alleged by Patent Owner, the mere existence of design tradeoffs would not have detracted from the obviousness of using a dark-colored coating to shield external light from reaching the photodetectors.

241 APPLE-1079, ¶13; 243 APPLE-1079, ¶13; 241 Pet. Reply, 6-7; 243 Pet. Reply, 5-7.

"The fact that the motivating benefit comes at the expense of another benefit, however, should not nullify its use as a basis to modify the disclosure of one reference with the teachings of another. "

-*Winner Intern. Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 n.8 (Fed. Cir. 2000)

241 Pet. Reply, 14; 243 Pet. Reply, 7

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

The Board was Correct in Finding Masimo's Arguments to be Insufficient

Institution Decision

> Finally, Patent Owner argues that Iwamiya teaches the use of a reflective material to provide light shielding functionality. *Id.* at 46–47.
>
> We do not agree with Patent Owner's arguments, on the current record, because these arguments do not sufficiently address the proffered rationale, i.e., that a POSITA would have looked to Sarantos's in-mold label or other masking techniques as a way to implement opacity in Iwamiya's light shielding frame. Petitioner's arguments regarding the benefits that a dark coating provides, such as minimizing ambient light, provide additional rationale for using a dark coating. To the extent Petitioner continues to rely

243 Institution Decision, 29-30; 241 Institution Decision, 28-29.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

"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;"

('159 elements [1.5] and [19.5]; '743 elements [1e], [14e])

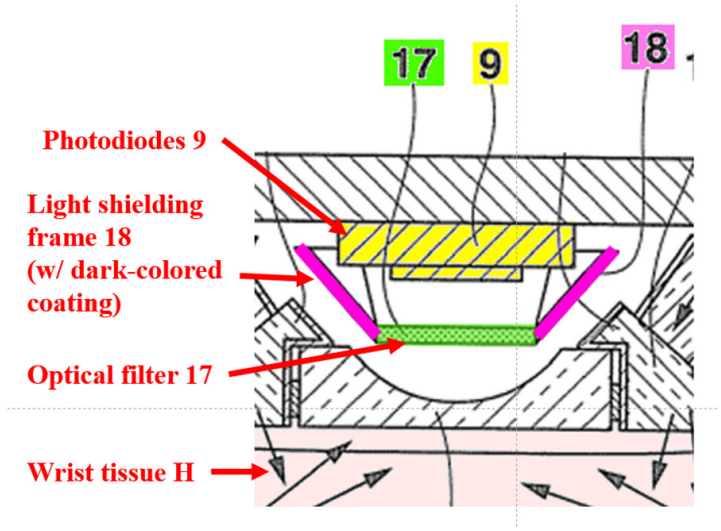
DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

The Opening in the Dark-Colored Coating Allows Light to Pass through the Surface

Dr. Anthony

> 65. Iwamiya describes that the "optical filter 17 is configured to transmit light of a specific wavelength band of 900 nm or more," and thus is configured to allow at least a portion of light reflected from the tissue to pass through to the photodiodes 9. APPLE-1004, 8:42-44.

243 APPLE-1003, ¶65; 241 APPLE-1003, ¶72; 243 Pet., 23-24; 241 Pet., 31-32.



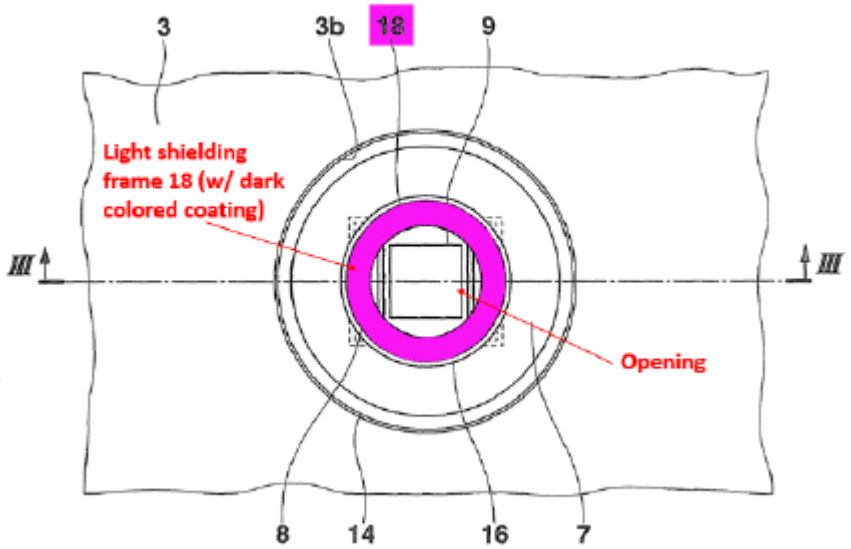
APPLE-1004, FIG. 4 (partial, zoomed in, annotated); 241 APPLE-1003, ¶71; 243 APPLE-1003, ¶64; 241 Pet. 31; 243 Pet., 23-24.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

The Opening in the Dark-Colored Coating Allows Light to Pass through the Surface

Dr. Anthony:

> 17. As shown in from the perspective depicted in Figure 2, the light shielding frame 18 (colored pink), which is implemented to include Sarantos's dark colored coating in the predictable combination, "surround[s]" the light receiving units 9 and has an opening that allows light to pass through the surface. This opening in the light shielding frame 18 is an opening in the dark colored coating in the Iwamiya-Sarantos combination because the dark colored coating is applied to the surface of the light shielding frame 18 based on Sarantos's suggestion.



241 APPLE-1079, ¶¶16-17; 243 APPLE-1079, ¶¶16-17; 241 Pet. Reply, 8-9; 243 Pet. Reply, 7-8.

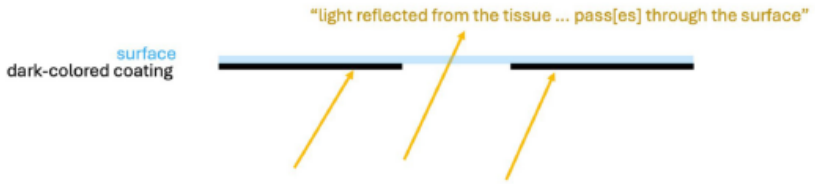
DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

29

No support for Masimo's construction in the specification

Dr. Anthony:

18. The Patent Owner's arguments in the 243-POR appear to assert that the claimed "opening" is required to include a transparent or translucent material. POR, 25. Patent Owner includes the following drawing in support of this argument:



POR, 25.

19. However, this drawing does not come from the figures of the '743 patent and is not based on the actual disclosures of the '743 patent. Rather, this drawing has been created by Patent Owner with no actual support in the '743 patent. A POSITA would not have understood elements [1E] and [14E] to require that the light pass into and exit from the material that defines the claimed "surface" but rather would have understood that the plain and ordinary meaning of these claim elements can be satisfied by the light passing through an opening in the material that defines the surface. For example, a POSITA would have understood that when water passes through a sieve or a piece of cloth, it flows through the openings rather than through the material itself. Yet, in this example, the water would be considered to pass through the surface of the sieve or piece of cloth.

241 APPLE-1079, ¶¶18-19; 243 APPLE-1079, ¶¶18-19; 241 Pet. Reply, 9-10; 243 Pet. Reply, 8-9.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

No Specification Support for Masimo's Construction

Dr. Anthony:

> 20. This proper assessment of the scope of elements [1e] and [14e] becomes even more clear when looking to how the specification of the '743 patent describes the opening in the dark-colored coating that allows light to pass through the surface. That is, all related descriptions in the '743 patent specification describe an opening free of material. There is not a single embodiment within the '743 Patent that describers the opening as including material with the light passing through a surface of that material. For example, one portion of the '743 patent describes a "light-absorbing detector filter" that is rectangular or square and "has an opening through which emitted light may pass." APPLE-1001, 3:64-4:14, 8:32-53.

241 APPLE-1079, ¶20; 243 APPLE-1079, ¶20; 241 Pet. Reply, 10; 243 Pet. Reply, 9.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

31

No Specification Support for Masimo's Construction

The'743/'159 Patent Specification:

The light-absorbing detector filter **306**, which is also depicted in FIG. **4**A in a top view, is a planar surface having an opening **402** through which the emitted light may pass after being attenuated by the tissue measurement site **102**. In the depicted embodiment, the opening **402** is rectangular-shaped, with dimensions substantially similar to the irradiated surface area **206**. According to an embodiment, the light-absorbing detector filter is substantially rectangular in shape and has outer dimensions of 4 cm in width and 8 cm in length, and has an opening through which emitted light may pass, the opening having dimensions of 2 cm in width and 5 cm in length. In another embodiment, the light-

Referring to FIG. **4**A, a top view of a portion of the 3D sensor **300** is provided. The light-absorbing detector filter **306** is illustrated having a top surface coated with a light-absorbing material. The light-absorbing material can be a black opaque material or coating or any other dark color or coating configured to absorb light. Additionally, a rectangular opening **402** is positioned relative to the light concentrator **308** (shown in phantom) and the detector **310** such that light may pass through the rectangular opening **402**, into the light concentrator **308**, and to the detector **310**. FIG. **4**B

APPLE-1001 ('743 patent), 8:32-43, 9:31-40, APPLE-1001 ('159 patent), 8:32-43, 9:31-40; 241 Pet. Reply, 10; 243 Pet. Reply, 9.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

32

Dr. Madisetti was Unable to Identify Specification Support for his Claim Interpretation

Dr. Madisetti:

Q. Do you believe that the opening 402 discussed in this paragraph and the paragraphs afterwards provides support for the claimed opening defined in the dark-colored coating?

MR. KIANG: Objection to scope.

THE WITNESS: As I said, I would let the specification speak for itself.

Q. Can you identify any examples in the '159 patent specification that provide support for the claimed opening defined in the dark-colored coating that allows light to pass through the surface?

MR. KIANG: Objection to scope.

THE WITNESS: As I said, Counsel, that is not something that I was asked to offer an opinion in the declaration. And I would defer to the specification and the intrinsic evidence and other statements that are typical of claim construction analysis.

APPLE-1086, 70:15-21, 73:2-13; 241 Pet. Reply, 34; 243 Pet. Reply, 31.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

33

Dr. Madisetti was Unable to Identify Specification Support for his Claim Interpretation

Dr. Madisetti:

Q. Did you consider any examples in the specification when determining the scope of the claim term, opening defined in the dark-colored coating, with respect to your analysis in your declaration?

A. I have not offered a specific opinion on the examples in the specification.

My opinions are captured in my declaration. And, I don't have any new opinions with respect to specific embodiments in the '159 or the '743 themselves.

Q. Can you identify any example in the '159 patent specification that you considered when forming your opinion regarding the scope of the claim term, opening defined in the dark-colored coating?

MR. KIANG: Objection to scope. Asked and answered.

THE WITNESS: As I said, Counsel, I have not offered a specific opinion as to which examples support which portion of the claim.

This is not a claim construction declaration. I was referring and rebutting specific opinions that Apple and its experts provided in this IPR and providing a technical analysis.

APPLE-1086, 80:19-81:7, 83:7-22; 241 Pet. Reply, 34; 243 Pet. Reply, 31.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

34

Dr. Madisetti was Unable to Identify Specification Support for his Claim Interpretation

Dr. Madisetti:

I was not treating this as a claim construction brief.

I believe that whatever the construction of opening does not matter, because there are far more serious problems with Apple's grounds for the reasons that I describe at -- even whatever the construction of opening may be in the Iwamiya-Sarantos combination, for example, light does not pass through the light shielding frame 18, that Apple has identified as the surface.

Q. I'm asking if the opening 402 provides an example of the claimed opening defined in the dark-colored coating.

MR. KIANG: Same objection.

THE WITNESS: As I said, I don't offer specific opinions on different examples. All I will admit is that these are embodiments in the specification. The claim language must be understood as per the legal guidance.

APPLE-1086, 84:1-11, 100:6-15; 241 Pet. Reply, 34; 243 Pet. Reply, 31.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

35

No Specification Support for Masimo's Construction

The'743/'159 Patent Specification:

The light-absorbing detector filter **306**, which is also depicted in FIG. **4**A in a top view, is a planar surface having an opening **402** through which the emitted light may pass after being attenuated by the tissue measurement site **102**. In the depicted embodiment, the opening **402** is rectangular-shaped, with dimensions substantially similar to the irradiated surface area **206**. According to an embodiment, the light-absorbing detector filter is substantially rectangular in shape and has outer dimensions of 4 cm in width and 8 cm in length, and has an opening through which emitted light may pass, the opening having dimensions of 2 cm in width and 5 cm in length. In another embodiment, the light-

Referring to FIG. **4**A, a top view of a portion of the 3D sensor **300** is provided. The light-absorbing detector filter **306** is illustrated having a top surface coated with a light-absorbing material. The light-absorbing material can be a black opaque material or coating or any other dark color or coating configured to absorb light. Additionally, a rectangular opening **402** is positioned relative to the light concentrator **308** (shown in phantom) and the detector **310** such that light may pass through the rectangular opening **402**, into the light concentrator **308**, and to the detector **310**. FIG. **4**B

APPLE-1001 ('743 patent), 8:32-43, 9:31-40, APPLE-1001 ('159 patent), 8:32-43, 9:31-40; 241 Pet. Reply, 10; 243 Pet. Reply, 9.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

36

Dr. Madisetti was Unable to Identify Specification Support for his Claim Interpretation

Dr. Madisetti:

Q. Okay. Then is the planar surface the same as the light-absorbing detector filter 306? Is it a component of the light-absorbing detector filter 306? Or is it something different from the light-absorbing detector filter 306?

A. I don't know.

Q. In comparing the specification to Claim 1 of the '159 patent, do you believe that the light-absorbing detector filter described here provides support for the claimed surface recited in Claim 1?

A. I don't have an opinion on that issue, Counsel. That is not an opinion I offered in my declaration.

APPLE-1086, 93:21-94:5, 104:1-8; 241 Pet. Reply, 34; 243 Pet. Reply, 31.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

37

Petitioner Properly Relies On Patent Owner's District Court Claim Construction

***Western Digital Corp. v. SPEX Techs., Inc.*, IPR2018-00084, Paper 14 at 10-11 (PTAB April 25, 2018)**

We agree with Petitioner that 37 C.F.R. § 104(b)(3) does not require Petitioner to express its subjective agreement regarding correctness of its proffered claim constructions or to take ownership of those constructions. Petitioner complies with our rules by identifying claim constructions it proposes as the basis for requesting review of the challenged claims. Petitioner's statement that its Petition "is *based on* the claim constructions urged by Patent Owner" in related District Court litigation (Pet. 8 (emphasis added)) suffices to identify claim constructions Petitioner is adopting for purposes of the requested review in compliance with § 104(b)(3).

***Philip Morris Products, S.A. v. Rai Strategic Holdings, Inc.*, IPR2020-00921, Paper 13 at 42-44 (Aug. 5, 2021)**

Under our rules, a petition must set forth "[h]ow the challenged claim is to be construed." 37 C.F.R. § 42.104(b)(3). Numerous decisions have held that this rule does not require a petitioner to express a subjective belief in the correctness of its proffered claim constructions, nor prohibit a petitioner from relying on claim constructions that it believes are incorrect.

***Apple Inc. v. CPC Patent Techs. Pty, Ltd.*, IPR2022-00601, Paper 11 at 12-14 (PTAB Sept. 28, 2022)**

claims. Pet. 6–8. Petitioner asserts its proposed constructions are consistent with constructions made by the district court in the related litigation between the parties (*see* Ex. 1077), constructions agreed to by the parties in the related litigation (*see* Ex. 1079), or constructions proposed by Patent Owner in the related litigation (*see* Ex. 1073).[7]

• • •

Based on the record before us, we adopt, for purposes of this Decision, Petitioner's unopposed proposed claim constructions. "[W]e need

Aylus Networks, Inc. v. Apple Inc., 856 F.3d 1353, 1360 (Fed. Cir. 2017)

"It follows that we should apply the doctrine in IPR proceedings before the PTO. Extending the prosecution disclaimer doctrine to IPR proceedings will ensure that claims are not argued one way in order to maintain their patentability and in a different way against accused infringers."

241 Pet. Reply, 1-2; 243 Pet. Reply, 1-2.

38

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Recited Photodiode Arrangement

('743 element [22d] and claims 5, 21; '159 element [14.4] and claims 5, 25)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

’743 Patent Claims 22, 5, and 21

22. A physiological measurement device comprising:
one or more emitters configured to emit light;
a diffuser configured to be positioned between the one or more emitters and a tissue measurement site;
a circular shaped light block;
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;
wherein the light block is configured to prevent at least a portion of light emitted from the one or more emitters from reaching the plurality of detectors without first reaching tissue; and
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.

5. The physiological measurement 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.

21. The physiological measurement device of claim **14**, 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.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

’159 Patent Claims 14, 5, and 25

14. A physiological monitoring device comprising:

a plurality of optical sources configured to emit light proximate a wrist of a user;

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;

a light block having a circular shape;

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;

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;

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

wherein the physiological monitoring device is configured to transmit physiological parameter data to a separate processor.

5. 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.

25. 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.

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Iwamiya-Sarantos Renders Obvious the Claimed Photodiode Arrangement

Iwamiya:

For example, plural light receiving units **9** may be two-dimensionally disposed in the places positioned at the side opposite to the skin H in the scattered light taking unit **8**. In this case, the plural light receiving units **9** are preferably disposed on the same circumference centered on an optical axis of the scattered light taking unit **8**.

APPLE-1004, 14:36-41; 241 Pet., 36-37; 243 Pet., 31.

Dr. Anthony:

(emphasis added); APPLE-1003, ¶¶80-84. Iwamiya's light block is circular, and the fact that Iwamiya's plural photodiodes 9 are arranged in "a spatial configuration corresponding to a shape of the portion of the tissue [measurement site encircled/bounded] by the light block" is evident from the fact that the photodiodes 9 are arranged "on the same **circumference** centered on an optical axis" of the circular light taking unit 8. APPLE-1004, 14:36-41. The use of the word "circumference" would have immediately brought to the mind of a POSITA a circular arrangement for the plurality of light receiving units 9, angularly spaced around a circular center at some radial distance. As I previously discussed, based

241 APPLE-1079, ¶22; 243 APPLE-1079, ¶22; 241 Pet. Rep., 26-27; 243 Pet. Rep., 26-27.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

42

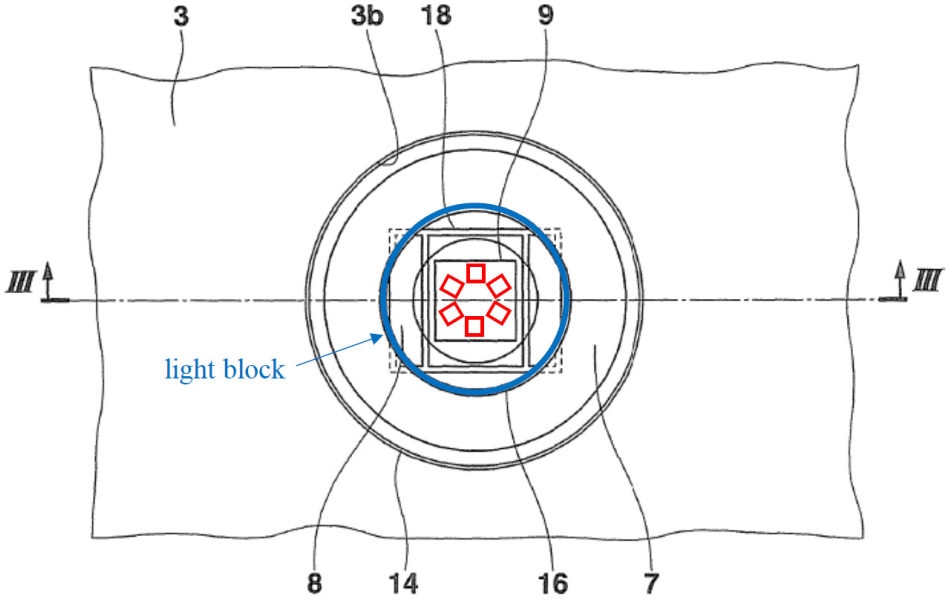
Iwamiya-Sarantos Renders Obvious the Claimed Photodiode Arrangement

Dr. Anthony:

APPLE-1004, 14:36-41. From this disclosure, a POSITA would have understood, and it would have been obvious, that the photodiodes 9 are thus arranged in an array having a spatial configuration corresponding to the circular shape of the tissue measurement site encircled by the circular light block, as illustrated below.

243 APPLE-1003, ¶77; 241 APPLE-1003, ¶81; 243 Pet., 31-32; 241 Pet., 37-38.

photodiodes 9 arranged "on the same **circumference** centered on an optical axis" of the circular light taking unit 8



243 APPLE-1003, ¶77; 241 APPLE-1003, ¶81; 243 Pet., 31-32; 241 Pet., 37-38.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

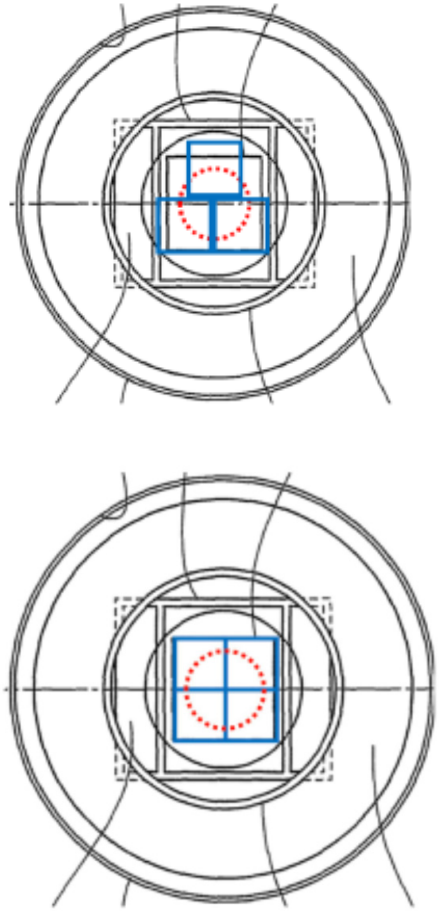
Iwamiya-Sarantos Renders Obvious the Claimed Photodiode Arrangement

Dr. Anthony:

As I mentioned above, the use of the most logical inference that a POSITA would have drawn from the use of the term "circumference" by Iwamiya (rather than describing the photodiodes as being in a square or triangular arrangement) is that the photodiodes were arranged in a circle about the circumference. While the proposed configurations for three or four photodiodes presented in the Patent Owner's Response may technically fall within the broadest possible interpretation of light receiving units 9 "disposed on the same circumference centered on an optical axis," they are not indicative of what would have readily come to mind to a POSITA upon reading of this disclosure of Iwamiya in the context of Iwamiya's broader disclosure as a whole. Rather, a POSITA would have read this disclosure of Iwamiya to represent what it actually says, a plurality of light receiving units 9 arranged in a circle about the same circumference. Additionally, Patent Owner's assertion that an arrangement of three photodetectors would form "a triangular array" is only true if one were to draw straight lines connecting the center points of the photodetectors. 243-POR, 64-65.

243 APPLE-1079, ¶24; 241 APPLE-1079, ¶24;
243 Pet. Rep., 28-29; 241 Pet. Rep., 28-29.

Masimo:



243 POR, 65; 241 POR, 66;
243 Pet. Rep., 28-29; 241 Pet. Rep., 28-29.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Obviousness of Combining Iwamiya and Sarantos to Determine Oxygen Saturation

('743 claims 11, 18, 24; '159 claims 8, 17)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Iwamiya's Wristwatch Measures Pulse Wave Using Infrared Light

In a central portion of the back cover **3** of the wristwatch case **1**, a biological information detecting apparatus **5** is provided, as illustrated in FIGS. **1** to **3**. In this case, the back

APPLE-1004, 5:64-66; 241 Pet. 7; 243 Pet. 5.

As illustrated in FIGS. **3** and **4**, the biological information detecting apparatus **5** comprises light emitting units **6** that emit observation light of a specific wavelength band to optically observe a skin tissue of a human body, an annular light guide unit **7** that guides the observation light emitted from the light emitting units **6** and annularly diffuses and irradiates the observation light with respect to a skin H, a scattered light

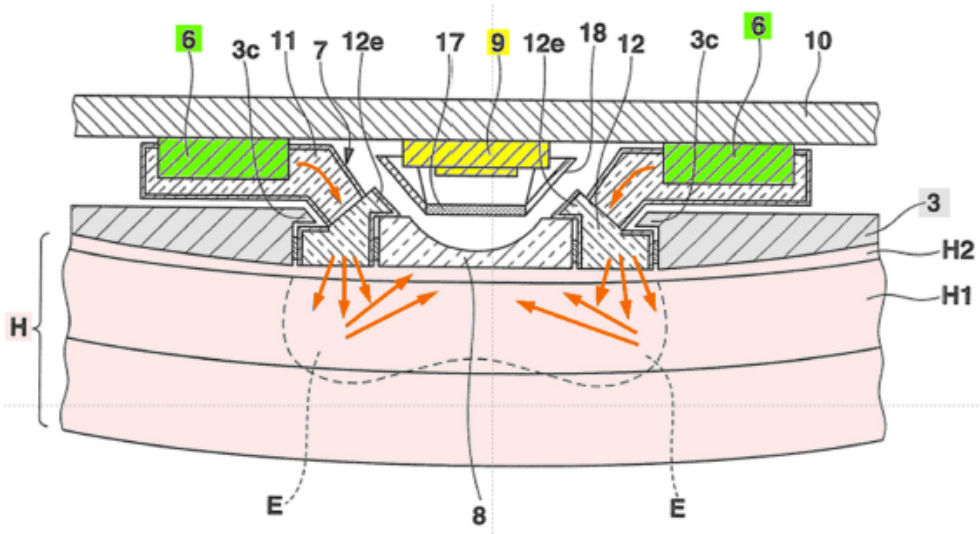
APPLE-1004, 6:7-14; 241 Pet. 7, 19-20; 243 Pet. 14-16.

Meanwhile, the light emitting unit **6** is composed of a light emitting diode (LED) and is configured to emit infrared light (λp=940 nm) where absorbance of melanine pigment contained in the skin H is low as the observation light. As illustrated in FIGS. **3** and **4**, the light emitting units **6** are provided in two places of the 3 o'clock side and the 9 o'clock side in a bottom surface of the circuit board **10** corresponding to the light guide unit **7**, respectively.

APPLE-1004, 6:31-39; 241: Pet., 7, 19, 44-45; 243 Pet., 14, 42.

ciently received. Therefore, biological information, such as a pulse wave, cannot be detected.

APPLE-1004, 2:5-6; 241 Pet. Reply, 13-14; 243 Pet. Reply, 13-14.



APPLE-1004, FIG. 4 (annotated); 241 Pet. 8; 243 Pet. 6.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Iwamiya Does Not Teach Away from Determining Blood Oxygen Saturation Using Red and Infrared Light

Dr. Anthony

32. It is true that the main disclosures of Iwamiya focus on accurately detecting a pulse wave for measuring a pulse rate (heart rate), which can be accomplished using a single wavelength of light. Iwamiya thus describes using a **single** wavelength of infrared light at 940 nm, instead of a combination of infrared light with red light for measuring **a pulse wave**. APPLE-1004, 1:62-2:6, 6:32-35. But Iwamiya never criticizes, discredits, or otherwise discourages investigation into the use of **two** wavelengths (one in the red wavelength spectrum and one in the infrared light wavelength spectrum) for measuring **oxygen saturation**, and does not criticize, discredit, or otherwise discourage investigation into using an additional wavelength of light as required to make different measurements in different operating modes. A POSITA would have been aware that using two different wavelengths of light provides a second measurement signal, increases the overall accuracy, improves signal-to-noise ratio, and enhances the performance or functionality of the device.

***Meiresonne v. Google, Inc.*, 849 F.3d 1379, 1382 (Fed. Cir. 2017)**

F.3d 1314, 1326 (Fed. Cir. 2009). A reference teaches away "when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken" in the claim. *Galderma Labs., L.P. v. Tolmar, Inc.*, 737 F.3d 731, 738 (Fed. Cir. 2013). A reference that "merely expresses a general preference for an alternative invention but does not criticize, discredit, or otherwise discourage investigation into" the claimed invention does not teach away. *Id.*

241 APPLE-1079, ¶32; 243 APPLE-1079, ¶29;241 Pet. Reply, 13; 243 Pet. Reply, 13.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Sarantos Teaches Determining Oxygen Saturation Using Red and Infrared Light

nounced in the green light spectrum. 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. In some

APPLE-1005, 13:44-53; 241 Pet., 43; 243 Pet., 38-39.

If multiple light-emitting devices are used, they may, for example, be spaced apart from one another, as shown in FIGS. **1** and **2**, or may be closely grouped. In some implementations,

APPLE-1005, 13:34-36; 241 Pet. Reply, 11; 243 Pet. Reply, 10-11.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Sarantos Teaches Determining Oxygen Saturation Using Red and Infrared Light

Dr. Anthony

25. There is no dispute that Sarantos discloses using photoplethysmographic techniques may also be used to measure other physiological parameters besides heart rate." EX1005, 13:44-49; 243-EX2100, ¶83; 244-EX2100, ¶107. Sarantos clearly contemplates embodiments where its device would measure blood oxygenation levels using red and infrared light. 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. And although Sarantos notes that its disclosed "ratios and dimensional values" are "tailored based on the green/yellow light spectrum" rather than the "red or infrared spectra" (*see* APPLE-1005, 18:48-51), Sarantos does not criticize, discredit, or otherwise discourage investigation into the use of red/infrared light for measuring blood oxygen levels. To the contrary, Sarantos expressly discloses such embodiments. APPLE-1005, 13:44-14:22.

243 APPLE-1079, ¶25; 241 APPLE-1079, ¶25; 243 Pet. Reply, 10-11; 241 Pet. Reply, 11.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

49

Sarantos Does Not Teach Away from Determining Blood Oxygen Saturation Using Red and Infrared Light

Dr. Anthony

> And although Sarantos notes that, with respect to the exemplary embodiments, its disclosed "ratios and dimensional values" are "tailored based on the green/yellow light spectrum" rather than the "red or infrared spectra" (*see* APPLE-1005, 18:48-51), Sarantos does not criticize, discredit, or otherwise discourage investigation into the use of red/infrared light for measuring blood oxygen levels. To the contrary, Sarantos expressly discloses such embodiments. APPLE-1005, 13:44-14:22. Based on my review, Sarantos's description of green/yellow light (APPLE-1005, 18:48-51) merely indicates that Sarantos chose to illustrate its exemplary embodiments with respect to devices sensitive to green/yellow light rather than other spectra. A POSITA reviewing Sarantos's alternative embodiments for measuring blood oxygen levels (APPLE-1005, 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.

243 APPLE-1003, ¶94; 244 APPLE-1003, ¶69; 243 Pet., 41-42; 244 Pet. 24-25.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Sarantos Teaches Determining Oxygen Saturation Using Red and Infrared Light

Dr. Anthony

> 26. Patent Owner now narrowly focuses on the use of the word "or" by Sarantos when describing use of red and infrared wavelengths for measuring blood oxygen saturation. 243-POR, 27-28; 244-POR, 41. First, these arguments by Patent Owner ignore that the term "or" is generally read to be inclusive unless specified otherwise, especially when being read by engineers, such as a POSITA in the relevant technology of the '159 Patent. Second, a POSITA would have understood Sarantos's disclosure to be describing that to measure blood oxygen saturation, each individual LED (or other light emitting device) would have been implemented to "predominantly emit[] light in the red or infrared spectrum" such that in the resulting device the multiple LEDs would collectively emit red and infrared light and thus would have successfully measured blood oxygen saturation. APPLE-1005, 13:44-14:5.

243 APPLE-1079, ¶26; 241 APPLE-1079, ¶26; 243 Pet. Reply, 11; 241 Pet. Reply, 11-12.

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Corroborating Evidence Demonstrates Knowledge of POSITA regarding use of Red and Infrared Light

Dr. Anthony

27. Third, Patent Owner's assertions that Sarantos's blood oxygen saturation implementation utilizes light of *only* red or *only* infrared wavelengths ignores the well-established knowledge of a POSITA regarding which wavelengths of light to use in in determining blood oxygen saturation. APPLE-1003, ¶¶87, 94-98. For example, Webster confirms the knowledge of a POSITA that by 2015 it was well-known that "wavelengths of interest in pulse oximetry" are "660 nm and 940 nm." APPLE-1009, 94-96. Brady similarly confirms the knowledge of a POSITA that optical sensors for pulse oximetry have light sources that "typically includes LEDs that generate both red (λ˜660 nm) and infrared (λ˜900 nm) radiation." APPLE-1028, [0052]-[0054][1].

243 APPLE-1079, ¶27; 241 APPLE-1079, ¶27; 243 Pet. Reply, 11; 241 Pet. Reply, 11-12.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Iwamiya and Sarantos Combinations Render Obvious a Wristwatch that Determines Oxygen Saturation Using Red and Infrared Light

Dr. Anthony

> as a first reason, a POSITA would have recognized that adding the capability to measure blood oxygen saturation (in addition to the ability to detect heart rate of the user) would have expanded range of physiological parameters measured by Iwamiya's sensor, thereby improving the functionality and utility of the resulting device. A POSITA would, for example, have recognized that determining additional physiological parameters such as blood oxygen saturation, and conveying those additional physiological parameter measurements to users would have increased the overall utility of the resulting device while "improving the quality and safety in patient monitoring," while at the same time negating the need to purchase and utilize additional devices to obtain those additional physiological parameter measurements. APPLE-1017, 3-4.

243 APPLE-1003, ¶88; 241 APPLE-1003, ¶90; 243 Pet., 38-40; 241 Pet., 43-44.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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The Law Does Not Require Apple to Show how Iwamiya and Sarantos Would be Physically Combined

In re Etter, 756 F.2d 852, 859 (Fed. Cir. 1985)

Etter's assertions that Azure cannot be incorporated in Ambrosio are basically irrelevant, the criterion being not whether the references could be physically combined but whether the claimed inventions are rendered obvious by the teachings of the prior art as a whole. *Orthopedic Equipment Co. v. United States*, 702 F.2d 1005, 1013, 217 USPQ 193, 200 (Fed.Cir.1983); *In re Andersen*, 391 F.2d 953, 958, *860 157 USPQ 277, 281 (CCPA 1968). Review of the Ambrosio

In re Mouttet, 686 F.3d 1322, 1332 (Fed. Cir. 2012)

substituting the crossbar arrays. It is well-established that a determination of obviousness based on teachings from multiple references does not require an actual, physical substitution of elements. *In re Etter*, 756 F.2d 852, 859 (Fed.Cir.1985) (en banc) ("Etter's assertions that Azure cannot be incorporated in Ambrosio are basically irrelevant, the criterion being not whether the references could be physically combined but whether the claimed inventions are rendered obvious by the teachings of the prior art as a whole."); *In re Sneed*, 710 F.2d 1544, 1550 (Fed.Cir.1983) ("[I]t is not necessary that the inventions of the references be physically combinable to render obvious the invention under review."); *In re Keller*, 642 F.2d 413, 425 (CCPA 1981) ("The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference....").

Facebook, Inc. v. Windy City Innovations, LLC, 973 F.3d 1321, 1343 (Fed. Cir. 2020)

As an initial matter, "[a] person of ordinary skill is also a person of ordinary creativity, not an automaton," so the fact that it would take some creativity to carry out the combination does not defeat a finding of obviousness. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421, 127 S.Ct. 1727, 167 L.Ed.2d 705 (2007); *see also ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1219 (Fed. Cir. 2016) ("The rationale of *KSR* does not support [the] theory that a person of ordinary skill can only perform combinations of a puzzle element A with a perfectly fitting puzzle element B."). The Board also correctly rejected Windy City's argument about the difficulty of physically creating the combination, noting that Facebook was not arguing that Rissanen's database would be bodily incorporated into Roseman's system. *'657 Final Written Decision*, at 35. Regardless, "[t]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference." *Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016) (quoting *In re Keller*, 642 F.2d 413, 425 (C.C.P.A. 1981)).

ClassCo, Inc. v. Apple, Inc., 838 F.3d 1214, 1219 (Fed. Cir. 2016)

Contrary to ClassCo's argument, *KSR* does not require that a combination only unite old elements without changing their respective functions. *KSR*, 550 U.S. at 416, 127 S.Ct. 1727. Instead, *KSR* teaches that "[a] person of ordinary skill is also a person of ordinary creativity, not an automaton." *Id.* at 421, 127 S.Ct. 1727. And it explains that the ordinary artisan recognizes "that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420, 127 S.Ct. 1727. The rationale of *KSR* does not support ClassCo's theory that a person of ordinary skill can only perform combinations of a puzzle element A with a perfectly fitting puzzle element B. To the contrary, *KSR* instructs that the obviousness inquiry requires a flexible approach. *Id.* at 415, 127

243 Pet. Reply, 10, 12; 241 Pet. Reply, 11-13.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Iwamiya and Sarantos Combinations Render Obvious a Wristwatch that Determines Oxygen Saturation Using Red and Infrared Light

Dr. Anthony's Examples of Iwamiya+Sarantos

> Iwamiya's device already includes 940 nm infrared LEDs that would be suitable for measuring blood oxygen levels; it would have been obvious and straightforward to augment the device with one or more LEDs emitting red light. *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."). For example, it would have been obvious and straightforward to add one or more red LEDs, as shown below.

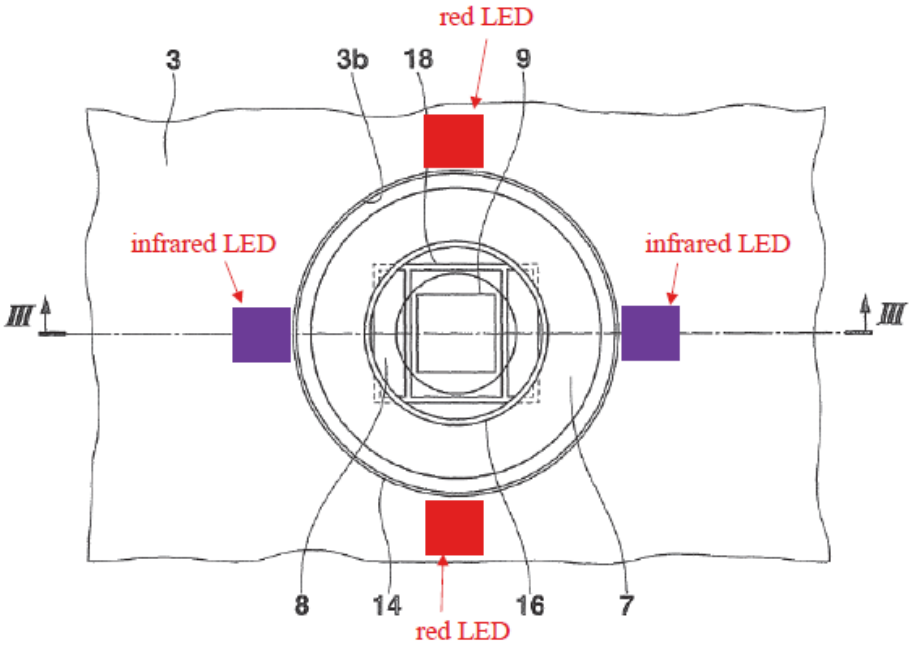


FIG.2

243 APPLE-1003, ¶95; 241 APPLE-1003, ¶92; 241 APPLE-1079, ¶28; APPLE-1004, FIG. 2 (modified based on Sarantos's teachings); 243 Pet., 42; 241 Pet., 44-45; 241 Pet. Rep., 12-14.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Iwamiya and Sarantos Combinations Render Obvious a Wristwatch that Determines Oxygen Saturation Using Red and Infrared Light

Dr. Anthony's Examples of Iwamiya+Sarantos

> As another example, it would have obvious and straightforward to replace one of Iwamiya's two original infrared LEDs with a red LED, as shown below.

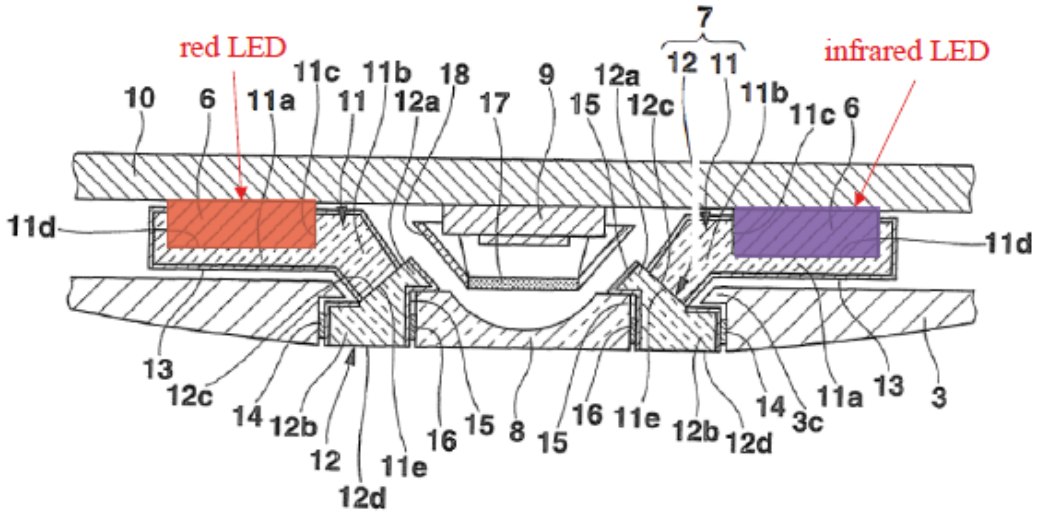


FIG.3

243 APPLE-1003, ¶95; 241 APPLE-1079, ¶29; APPLE-1004, FIG. 3 (modified based on Sarantos's teachings); 243 Pet., 42; 241 Pet., 44-45; 241 Pet. Rep., 12-14.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Iwamiya and Sarantos Combinations Render Obvious a Wristwatch that Determines Oxygen Saturation Using Red and Infrared Light

Dr. Anthony's Examples of Iwamiya+Sarantos

As yet another example, it would have obvious and straightforward to replace Iwamiya's two original infrared LEDs with a red LED and an infrared LED, as shown below.

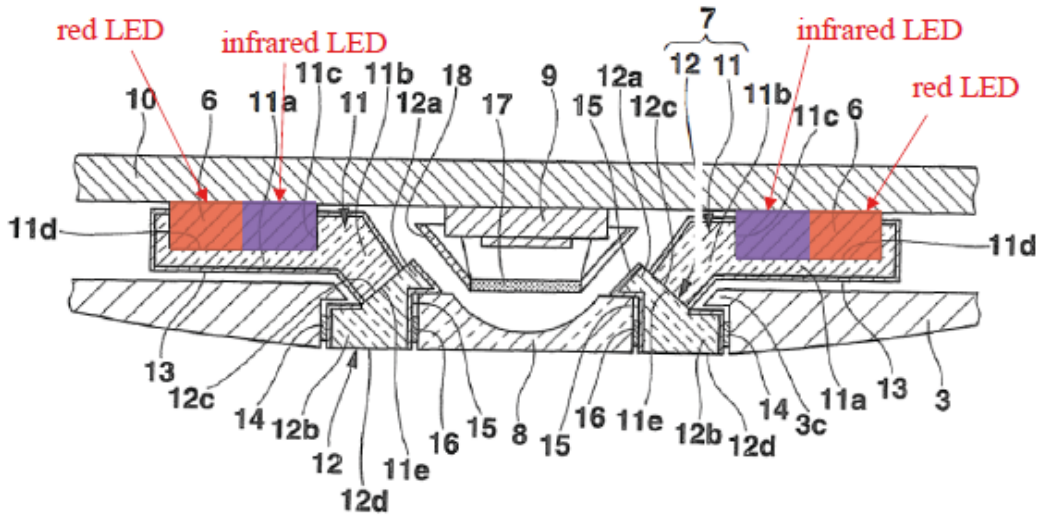


FIG.3

243 APPLE-1003, ¶95; 241 APPLE-1079, ¶30; APPLE-1004, FIG. 3 (modified based on Sarantos's teachings); 243 Pet., 42; 241 Pet., 44-45; 241 Pet. Rep., 12-14.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Iwamiya and Sarantos Combinations Render Obvious a Wristwatch that Determines Oxygen Saturation Using Red and Infrared Light

Dr. Anthony's Examples of Iwamiya+Sarantos

97. Likewise, a POSITA 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. The physics behind pulse oximetry and algorithms necessary to implement it had been known for decades before the '159 Patent.

photodiode."). Webster further observes that optical filters are often not even necessary in pulse oximeters. *Id.*, 96 ("these external filters do not appear to be used much"). Even if an optical filter were retained in the Iwamiya-Sarantos combination, it would have been obvious and well within the skill of a POSITA to select an optical filter configured to pass not just the infrared light that Iwamiya proposes for heart rate monitoring but also red light that would be used together with the infrared light for oxygen saturation measurements.

243 APPLE-1003, ¶97; 241 APPLE-1003, ¶72; 241 APPLE-1079, ¶31; APPLE-1004, FIG. 3 (modified based on Sarantos's teachings); 243 Pet., 42; 241 Pet., 31-32; 241 Pet. Rep., 12-13.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

"comprises a width and a length, and wherein the width is" different/larger than "the length"

('743 claims 9, 13, 17, 20; '159 claims 12, 24)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

’743 Claims 9, 13, 17, 20; ’159 Claims 12, 24

9. The physiological measurement device of claim **1**, wherein the output light pattern comprises a width and a length, and wherein the width is different than the length.

13. The physiological measurement 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.

17. The physiological measurement device of claim **14**, wherein the output light pattern comprises a width and a length, and wherein the width is different than the length.

20. The physiological measurement device of claim **14**, wherein the opening defined in the dark-colored coating comprises a width and a length, and wherein the width is larger than the length.

241 APPLE-1001, Claims 9, 13, 17, 20.

12. 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.

24. The system of claim **19**, wherein the second shape comprises a width and a length, and wherein the width is different from the length.

243 APPLE-1001, Claims 12, 24.

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Iwamiya-Sarantos Renders Obvious the Width and Length Limitations

Dr. Anthony

119. Sarantos describes that the photodiodes in this assembly have a "high-aspect ratio" ("HAR"), such that "at least 90% of the photodetector element active area[] … has a maximum first dimension along a first axis that is at least twice as large as a maximum second dimension of the photodetector element along a second axis that is perpendicular or orthogonal to the first axis." APPLE-1005,

120. Sarantos goes on to describe 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.

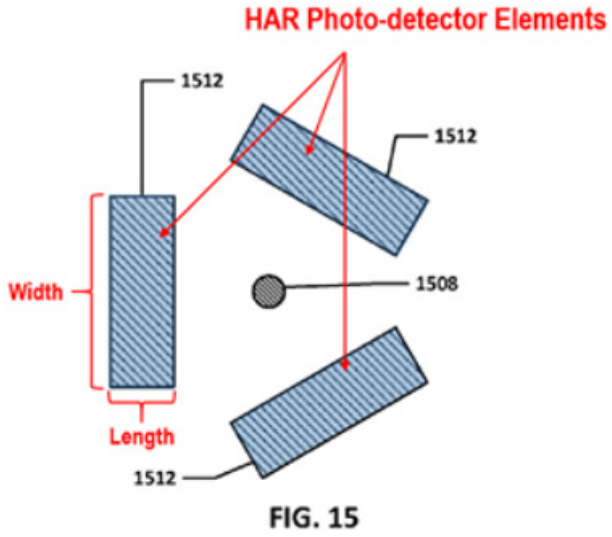


FIG. 15

APPLE-1005, FIG. 15 (annotated).

243 APPLE-1003, ¶¶119-120; 243 Pet., 48-49.

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Iwamiya-Sarantos Renders Obvious the Width and Length Limitations

Dr. Anthony

As I discussed in my First 243-Declaration (and in Section II.A.1, above), a POSITA would have recognized the benefits of applying Sarantos's suggestion to use a dark-colored coating on the surface of Iwamiya's light shielding frame 18 and applying this teaching would include Sarantos's teachings with respect to the shape of the opening in the dark-colored coating. APPLE-1003, ¶¶31-44, 118-120. For example, a POSITA would have recognized the benefits of using Sarantos's high-aspect-ratio (HAR) photodiodes because they are expressly disclosed by Sarantos. As explained in the portions of Sarantos that I previously cited, "a ***significant performance increase*** may be realized by deviating from the typical square" photodetectors "of conventional PPG sensors." APPLE-1005, 9:48-67. In another example, Sarantos explains that "[t]he present inventors have determined that the use of non-square photodetector elements in PPG sensors may provide a significant performance increase as compared with traditional PPG designs, which typically utilize square photodetector elements" while "maintaining essentially the same power consumption as a square photodetector element." *Id.* 7:3-11.

243 APPLE-1079, ¶54; 243 Pet. Rep., 25-26.

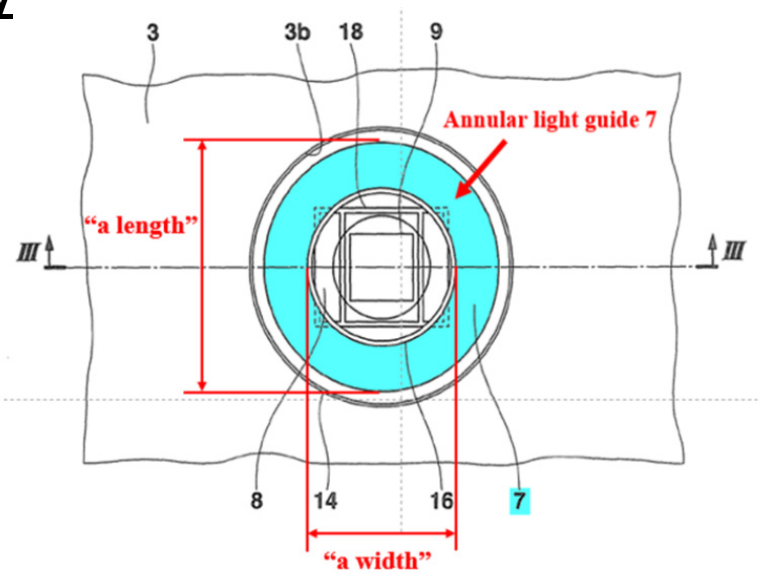
DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Iwamiya-Sarantos Renders Obvious the Width and Length Limitations

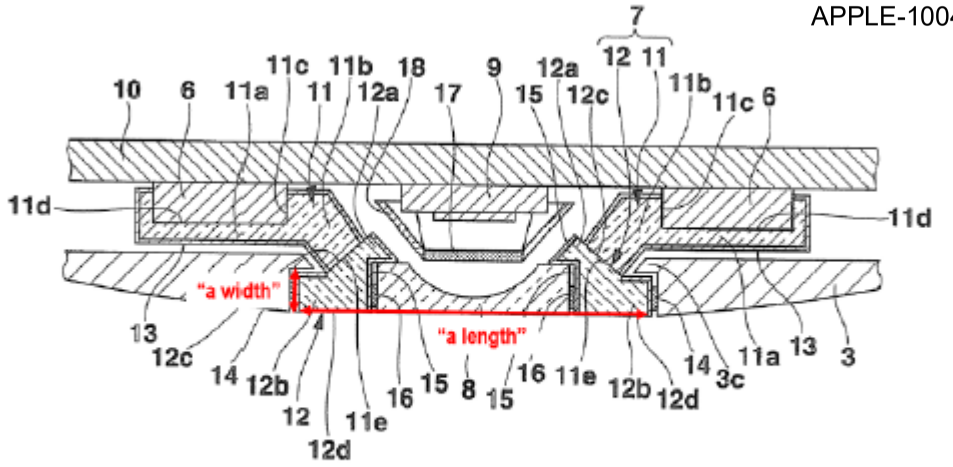
Dr. Anthony

86. In the ISC, Iwamiya's annular light guide unit 7 changes the shape of the light emitted from individual light emitting units 6 to an annular/ring shape (second shape), and causes the light to irradiate an annular portion of tissue. APPLE-1004, 7:61-65, 11:55-12:36, FIG. 4; *supra* [1b]. An annular/ring shape like that shaped by the light guide unit 7 has a width and a length, where the width is different from the length, as shown by FIG. 2:

241 APPLE-1003, ¶86; 1465 Pet., 40-42.



APPLE-1004, FIG. 2 (annotated).



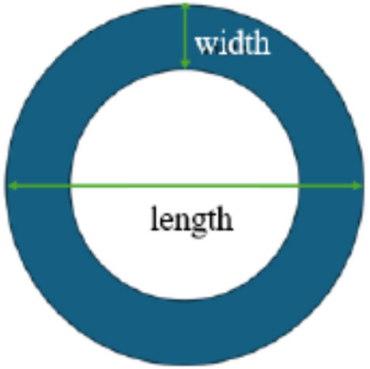
APPLE-1004, FIG. 3.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Iwamiya-Sarantos Renders Obvious the Width and Length Limitations

Dr. Anthony

Claim 9 does *not* specify where the length or width must be, or impose any limitation other than *any* width and *any* length *comprised in* in the output light pattern being different. In Iwamiya's FIG. 2 below, I point to several possible lengths and widths that all be included in the light pattern, even if the light pattern and guide are annular in shape.



241 APPLE-1079, ¶67, 241 Pet. Reply, 29-31.

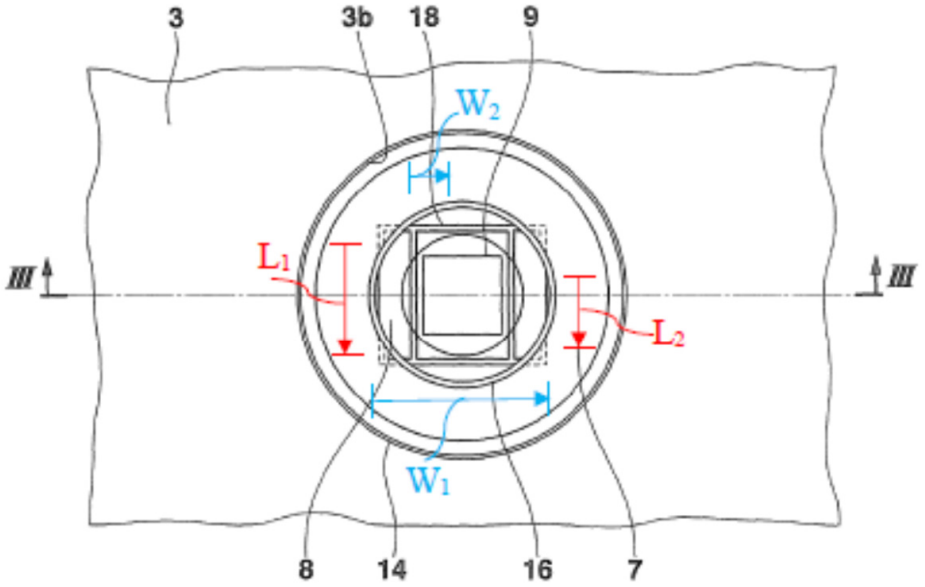


FIG.2

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Sarantos Based Grounds
(244 Grounds 1A, 1C-1D, 1G)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

"First shape" and a different "second shape" (elements [1.1]-[1.2], [18] and [19.1]-[19.2])

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

’159 Patent Claims 1 and 19

1. A physiological monitoring device comprising:

a plurality of emitters configured to emit light in a first shape;

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;

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;

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;

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

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.

19. A system configured to measure one or more physiological parameters of a user, the system comprising:

a physiological monitoring device comprising:

a plurality of emitters configured to emit light in a first shape;

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;

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;

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;

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

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

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.

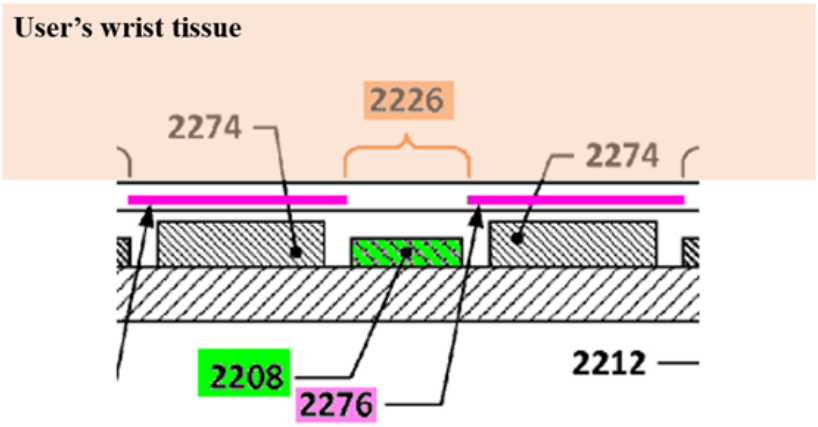
APPLE-1001 (‘159 Patent), Claims 1 and 19

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Sarantos Describes Light Shining Through Translucent or Transparent Material and Diffusing into Flesh

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. The window **2278** may be held against a person's skin, e.g., by being held in place with a strap, when heart rate measurements are obtained to allow light from the light source **2208** to shine 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** through the respective window regions **2226** associated with the HAR photodetector elements **2212**.

APPLE-1005, 17:1-25; 244 Pet., 7-10.



APPLE-1005, FIG. 22 (annotated); 244 Pet., 9.

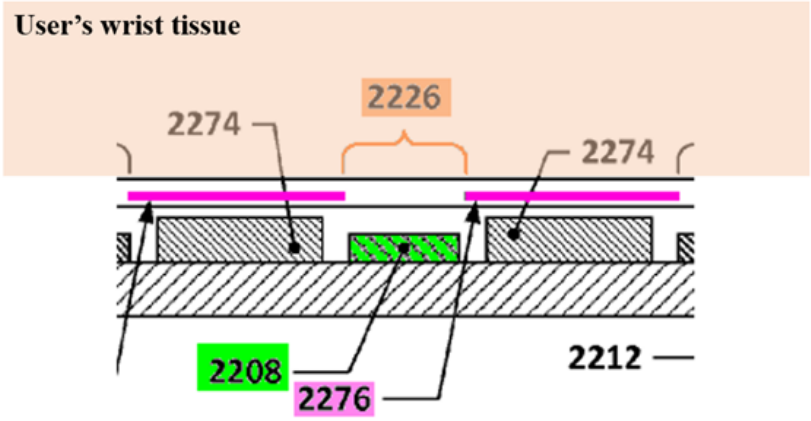
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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Sarantos Describes Light Shining Through Translucent or Transparent Material and Diffusing into Flesh

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. The window **2278** may be held against a person's skin, e.g., by being held in place with a strap, when heart rate measurements are obtained to allow light from the light source **2208** to shine 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** through the respective window regions **2226** associated with the HAR photodetector elements **2212**.

APPLE-1005, 17:1-25; 244 Pet., 7-10.



APPLE-1005, FIG. 22 (annotated); 244 Pet., 9.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

The arrangement of Sarantos's light-emitting devices defines the first shape

32. As would have been recognized by a POSITA, light emitted from the light emitting devices that make up the light source of Sarantos' device would be emitted in a first shape that is, at least in part, defined by the specific location, arrangement, and/or shape of each light emitting device of the light source.

33. Sarantos shows several examples of arrangements of the light source for imparting a first shape on the emitted light.

244 APPLE-1003, ¶¶32-33; 244 Pet., 7-9.

Sarantos describes that the "multiple light-emitting devices…may, for example, be spaced apart from one another" for example by being "distributed across the PPG sensor face." APPLE-1005, 13:34-14:1. Sarantos further describes that the plurality of light sources/light-emitting devices "may be closely grouped." *Id.* A POSITA would understand that the shape of the light would be different for different spacing between a collection of LEDs/emitters.

• • •

these disclosures reveal that Sarantos contemplated a wide variety of shapes for the shape of the light emitted by the light sources defined by the shape of the light-emitting devices, the spatial arrangement of the light emitting devices within each light source, and the spatial arrangement of the light sources with respect to each other.

244 APPLE-1079, ¶58; 244 Pet. Rep., 2-3.

If multiple light-emitting devices are used, they may, for example, be spaced apart from one another, as shown in FIGS. **1** and **2**, or may be closely grouped. In some implementations, all such light sources may be the same type of light source. In some other implementations, however, different types of light sources may be used for some or all of the light sources. For example, it may be desirable to utilize an LED that predominantly emits light in the green light spectrum for the purposes of detecting heart rate since the fluctuations in the light that is emitted back out of the person's skin may be more pronounced in the green light spectrum. 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. In some implementations, these light-emitting devices or light sources may be distributed across the PPG sensor face—for example, the light source **108** on the left side of FIG. **2** may be a green-wavelength LED, and the light source **108** on the right side of FIG. **2** may be a red- or infrared-wavelength LED. In some other implementations, light emitting devices may be closely clustered together, e.g., within a millimeter or two or less of each other; in such implementations, the clustered

APPLE-1005, 13:34-61; 244 Pet., 7, 10; 244 Pet. Rep., 2-3, 6.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

The arrangement of Sarantos's light-emitting devices defines the first shape

Therefore, the specific gaps and spacing between the multiple light-emitting devices also would have affected the first shape of the light. For example, four light-emitting devices arranged equidistantly around a center point would produce a clover shape. As another example, if the same four light emitting devices are arranged linearly, this would have produced a linear or oblong shape depending on the specific size of the light-emitting devices and the spacing between the light-emitting devices. Sarantos provides another similar example in FIG. 18 in which it shows a "light source 1808 [that] includes two light-emitting devices 1810" positioned side by side and emitting light at two different wavelengths. APPLE-1005, 15:24-43, 6:39-42.

• • •

APPLE-1005, FIG. 18. A POSITA would have recognized that this side-by-side arrangement of the light-emitting devices 1810 would have produced an elongated, oblong, possibly dumbbell first shape for the light, noting again that the design choice variation for the spacing between the LEDs also impacting the first shape.

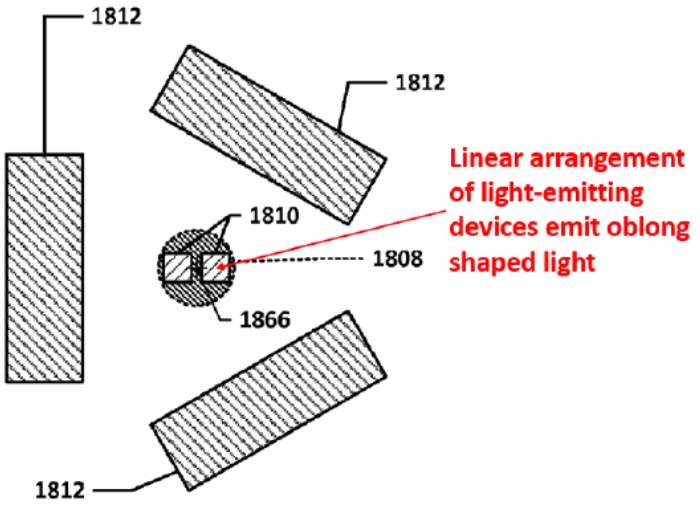


FIG. 18

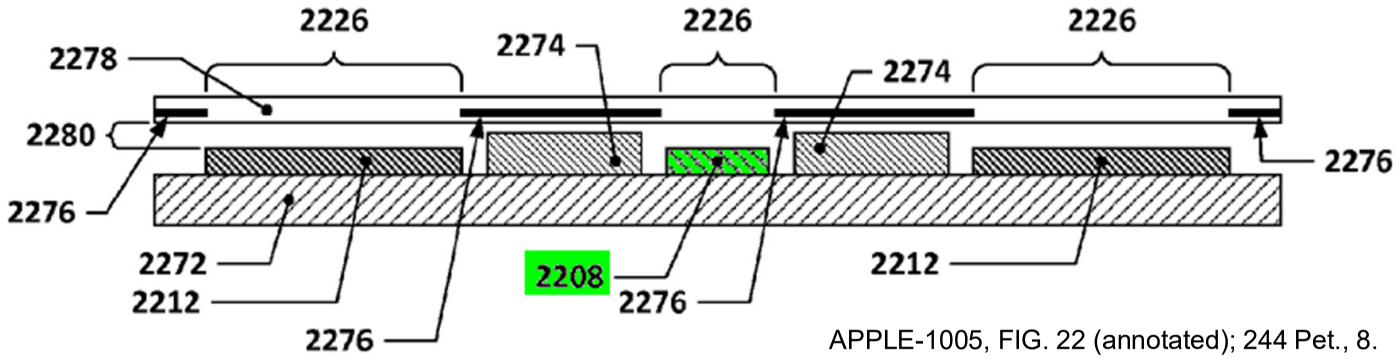
244 APPLE-1079, ¶59; 244 Pet. Rep., 2-5.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

The shape and refractive properties of Sarantos's window region define the second shape

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 tech-

APPLE-1005, 17:1-12; 244 Pet., 7-10.



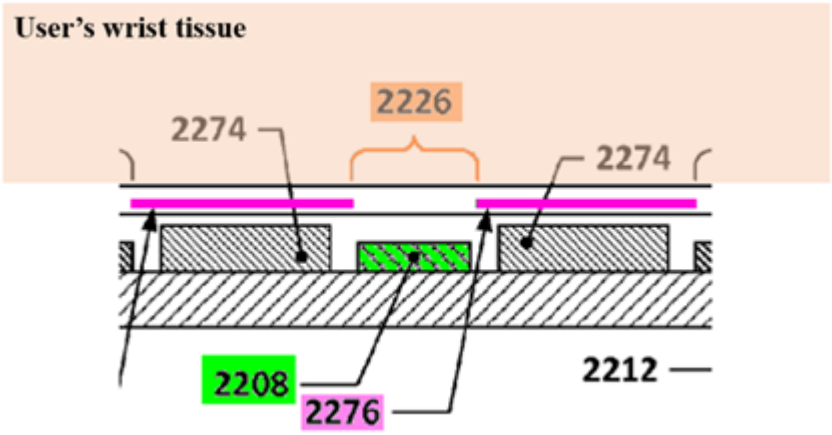
APPLE-1005, FIG. 22 (annotated); 244 Pet., 8.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

The shape and refractive properties of Sarantos's window region define the second shape

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.***" *Id.*, 17:6-10. In other words, the in-mold label defines the shape of the window portion 226 through which the light emitted by the light source 2208 is guided. A POSITA would have understood that light shining through a translucent or transparent material as described in the specific arrangement of Sarantos would necessarily change in shape due to the refractive properties of translucent and transparent materials and due to the shape defined by the in-mold label.

244 APPLE-1003, ¶35; 244 Pet., 9-10.



APPLE-1005, FIG. 22 (partial, annotated); 244 Pet., 9.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

The shape and refractive properties of Sarantos's window region define the second shape

The light having the first shape defined by the shape, quantity, and spatial arrangement of the plurality of light sources having multiple light-emitting devices is thus changed to a second shape due to the refractive properties of translucent and transparent materials and due to the shape defined by the in-mold label. That is, the first shape is changed to the second shape based on the specific refractive properties and shape of the window region over the light-emitting devices.

61. For example, Sarantos describes embodiments in which the "optical windows that may slightly ***refract light*** that passes through the windows." APPLE-1005, 18:23-31. Sarantos identifies such configurations as being within the scope of its device while distinguishing such refraction from configurations in which the windows "transport or redirect light in a significant manner." *Id.* These refractive implementations of the optical windows are combined with various different configurations for the shape of the openings in the window regions. For example, Sarantos describes that the window regions may be defined in a variety of manners. APPLE-1005, 17:1-18:16. For example, "windows 2478 may be formed

244 APPLE-1079, ¶¶60-61; 244 Pet. Rep., 5-6.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

The shape and refractive properties of Sarantos's window region define the second shape

material to cure and harden." *Id.* Sarantos describes that the window regions can have various shapes, including "square" and "non-square" configurations. *Id.*, 7:3-23; 9:1-28; 17:42-47; 13:34-14:1, 19:33-52 (discussing an annular "first boundary"). Sarantos also makes clear that the various different configurations, shapes of components, and other described aspects of the various embodiments can be employed with and are interchangeable with other arrangements, stating that the present invention is neither limited to any single aspect nor implementation, nor to any combinations and/or permutations of such aspects and/or implementations. Moreover, each of the aspects of the present invention, and/or implementations thereof, may be employed alone or in combination with one or more of the other aspects and/or implementations thereof." APPLE-1005, 21:3-9. Thus, the reason I

244 APPLE-1079, ¶61; 244 Pet. Rep., 5-6.

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

A POSITA would have recognized that the majority of arrangements disclosed by Sarantos change the shape

because, as would have been apparent to a POSITA, the *only* scenarios in which Sarantos's device would not have changed the first shape to a second shape are those configurations in which the arrangement of the plurality of light sources/light-emitting devices and the arrangement of the window region produce the same shape. However, it is clear from Sarantos's disclosure as a whole (as I reviewed above) that Sarantos contemplates numerous different configurations for the shape of the light emitted by the light sources (based on the shapes, sizes, and spatial configuration of the light-emitters that make up the light sources) and numerous different configurations for the shapes of the windows. As such, it would have been obvious that in most of the combinations contemplated by Sarantos, the shape defined by the arrangement of light-emitting devices (grouped into multiple light sources) would be different than the shape of light defined by the refractive windows having a shape defined by the in-mold label/mask. For

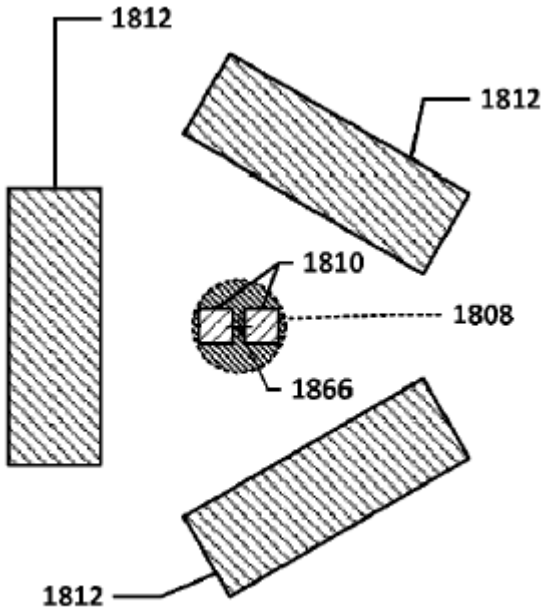


FIG. 18

244 APPLE-1079, ¶61; 244 Pet. Rep., 5-6.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Sarantos is not required to expressly spell out arrangements in which the shape of light changes

***Kennametal, Inc. v. Ingersoll Cutting Tool Co.*,**
780 F.3d 1376 (Fed. Cir. 2015)

HN2 A patent is invalid if "the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States." 35 U.S.C. § 102(b) (2006). 3 A prior art reference can only anticipate a claim if it discloses all the claimed limitations "arranged or combined in the same way as in the claim." *Wm. Wrigley Jr. Co. v. Cadbury Adams USA LLC*, 683 F.3d 1356, 1361 (Fed. Cir. 2012) (quoting *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1370 (Fed. Cir. 2008)). However, a reference can anticipate a claim even if it "d[oes] not expressly spell out" all the limitations arranged or combined as in the claim, if a person of skill in the art, reading the reference, would "at once envisage" the claimed arrangement or combination. *In re Petering*, 301 F.2d 676, 681, 49 C.C.P.A. 993, 1962 Dec. Comm'r Pat. 232 (C.C.P.A. 1962).

244 Pet. Reply, 6.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

"Light block having a circular shape" (element [14.3])

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

’159 Patent Claim 14

14. A physiological monitoring device comprising:
a plurality of optical sources configured to emit light proximate a wrist of a user;
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;
a light block having a circular shape;
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;
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;
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
wherein the physiological monitoring device is configured to transmit physiological parameter data to a separate processor.

APPLE-1001, Claim 14

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

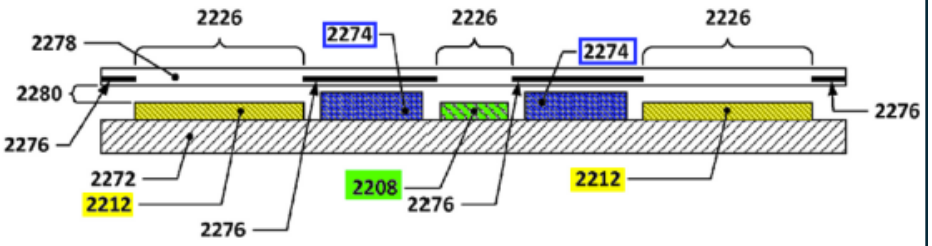
Sarantos Describes a Light Block Separating a Light Source from Annular Photodetector Elements

In order to reduce the chance that light from the light source **2208** will reach either of the HAR photodetector elements **2212** without first being diffused through the person's skin, the light source **2208** may be separated from the HAR photodetector elements **2212** within the PPG sensor by walls **2274**, which may extend to the window **2278** or may stop short of the window **2278**. In some implementations, an adhesive gap filler, e.g., black silicone, may be used to bridge any gap remaining between the walls **2274** and the window **2278**. A gap **2280** may exist between the window **2278** and the HAR photodetector elements **2212** in some implementations, although in other implementations, this gap may be eliminated and the HAR photodetector element **2212** may be butted up against the window **2278**. The walls **2274** may prevent light from the light source **2208** from reaching the HAR photodetector elements **2212** by following paths completely within the housing of the PPG sensor. As can be seen,

APPLE-1005,17:26-42; 244 Pet., 12, 19-20.

FIG. **25** depicts an example of an annular photodetector element **2512** with a light source **2508** in the middle, in accordance with an example implementation. The annular

APPLE-1005, 19:33-35; 244 Pet., 19-20, 41.



APPLE-1005, FIG. 22 (annotated); 244 Pet., 12.

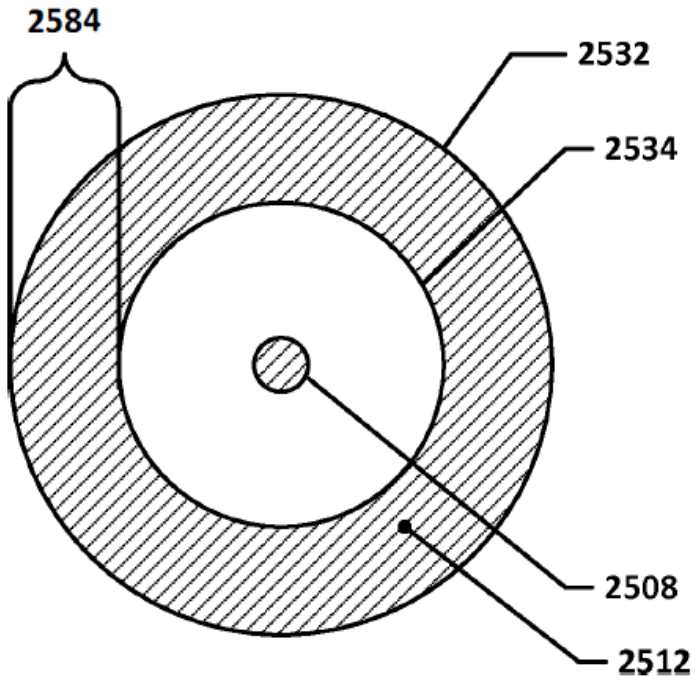


FIG. 25

APPLE-1005, FIG. 25; 1291 Pet., 37; 1465 Pet., 54.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Sarantos Describes a Light Block Separating a Light Source from Annular Photodetector Elements

Moreover, each of the aspects of the present invention, and/or implementations thereof, may be employed alone or in combination with one or more of the other aspects and/or implementations thereof. For the sake of brevity, many of those permutations and combinations will not be discussed and/or illustrated separately herein.

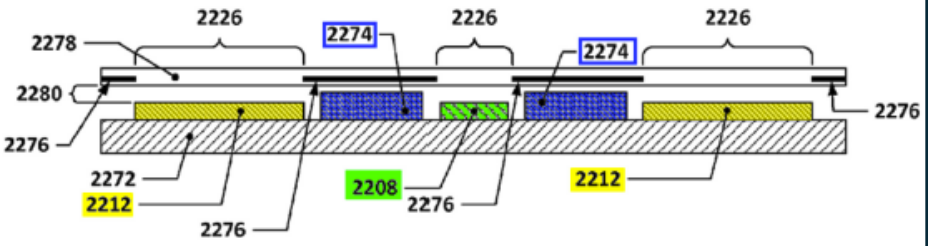
APPLE-1005, 21:6-11; 244 Pet. Rep, 5-6, 10, 12.

FIGS. **22** through **24** depict cross-sections of simplified representations of various PPG sensors, in accordance with various example implementations. Similar components in

APPLE-1005, 16:60-62; 244 Pet Rep., 10-11.

FIG. **25** depicts an example of an annular photodetector element **2512** with a light source **2508** in the middle, in accordance with an example implementation. The annular

APPLE-1005, 19:33-35; 244 Pet., 20, 41; 244 Pet. Rep., 2, 10-11.



APPLE-1005, FIG. 22 (annotated); 244 Pet., 12.

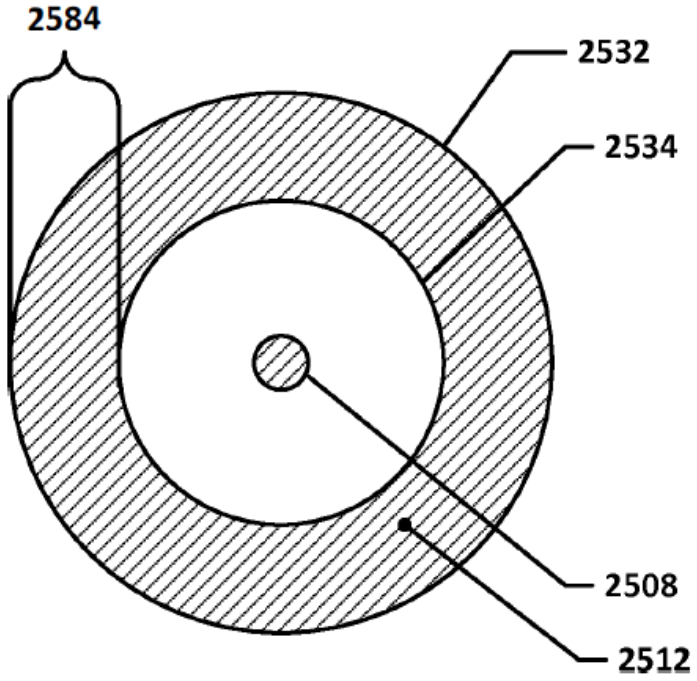


FIG. 25

APPLE-1005, FIG. 25; 1291 Pet., 37; 1465 Pet., 54.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Sarantos Describes a Light Block Separating a Light Source from Annular Photodetector Elements

Dr. Anthony

33. Sarantos shows several examples of arrangements of the light source for imparting a first shape on the emitted light. For example, Sarantos describes 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. APPLE-1005, 19:31-35, 16:60-32. A POSITA therefore would have viewed FIG. 25 and its corresponding disclosure as a natural extension of and incorporating the features of FIG. 22, including the by showing an example arrangement for the light source 2208 in the form of light source 2508 depicted in FIG. 25.

APPLE-1003, ¶33; 244 Pet., 7-9.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Sarantos Describes a Light Block Separating a Light Source from Annular Photodetector Elements

Dr. Anthony

POR, 18-19. However, contrary to Patent Owner's assertions, I did not propose combining multiple different embodiments, as Sarantos FIGS. 22 and 25 are cohesive. Sarantos explicit 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. This is consistent with Sarantos's disclosure that features from the various different configurations described within Sarantos can be combined with features of any other configuration. APPLE-1005, 21:3-9. Thus, Sarantos's FIG. 22 is a representation that is shared with more specific examples regarding the arrangement of the light sources and photodetectors described in Sarantos. Sarantos describes FIG. 25 as "**an example implementation**" of a **PPG sensor**. APPLE-1005, 19:31-35. A POSITA would have viewed FIG. 25 and its corresponding disclosure as a natural extension of and incorporating the features of FIG. 22, not a distinct disclosure requiring combination to show unpatentability. Indeed, the reason the light block

APPLE-1079, ¶62; 244 Pet Rep., 10-11.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

83

A Circular Shaped Light Block Separating a Light Source from Annular Photodetector Elements Would Have Been an Obvious Design Choice

Dr. Anthony

functionality around the entirety of the circumference. A POSITA would have at least found it 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. This configuration in combination with FIG. 22's depiction of the wall 2274 being positioned equidistant between the light source and photodetector elements indicates that a circular arrangement for the wall 2274 in FIG. 25's configuration is the most obvious design choice. A POSITA would have recognized that due to the annular configuration of detectors around a circular light source, the small form factor of the device overall, and the limited space in Sarantos' PPG sensor described in FIGS. 22 and 25, it would have been obvious to implement the wall 2274 as a circular shape light block as a reasonable and obvious design choice.

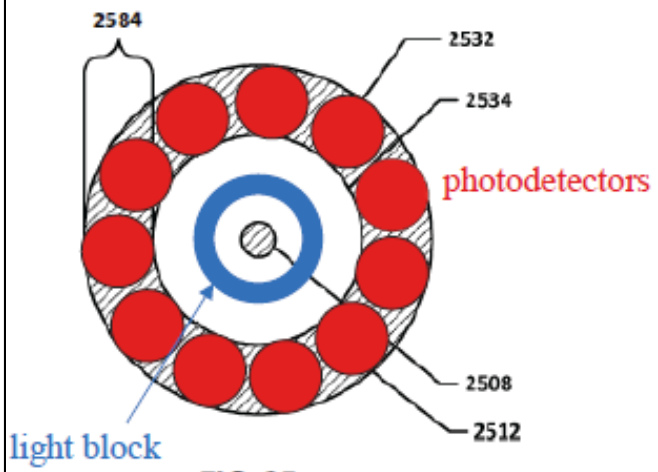


FIG. 25

APPLE-1003, ¶¶62-63; APPLE-1005, FIG. 25 (annotated); 244 Pet., 19-21.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

A Circular Shaped Light Block Separating a Light Source from Annular Photodetector Elements Would Have Been an Obvious Design Choice

Dr. Anthony

64. Returning to the configuration shown in FIG. 25, the circular spatial arrangement of the light source and photodetectors in this example configuration in combination with the depiction in FIG. 22 of the light block 2274 being positioned equidistantly around the light source would have indicated to a POSITA that a circular arrangement for the light block 2274 would have been the most obvious design choice for the light block due to the annular configuration of detectors around a circular light source, the small form factor of the device overall, and the limited space in Sarantos' PPG sensor. APPLE-1003, ¶62. While it is true that it would have been technically possible to use "a square light block" or a "rectangular" light block with the circular light source and circular photodetector configuration depicted in FIG. 25, as Patent owner asserts (244-POR, 19), a POSITA would have recognized that the most obvious and logical choice would have been a round light block that patches the circular configuration for both the light source and the array of photodetectors.

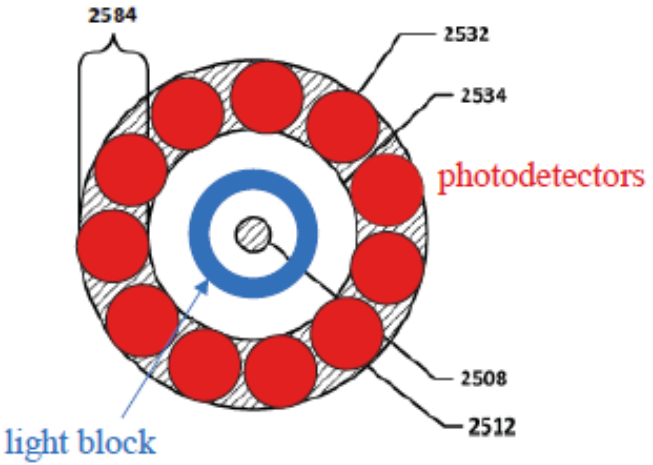


FIG. 25

APPLE-1079, ¶¶64, 66; APPLE-1005, FIG. 25 (annotated); 244 Pet. Rep., 9-11.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

85

A Circular Shaped Light Block Separating a Light Source from Annular Photodetector Elements Would Have Been an Obvious Design Choice

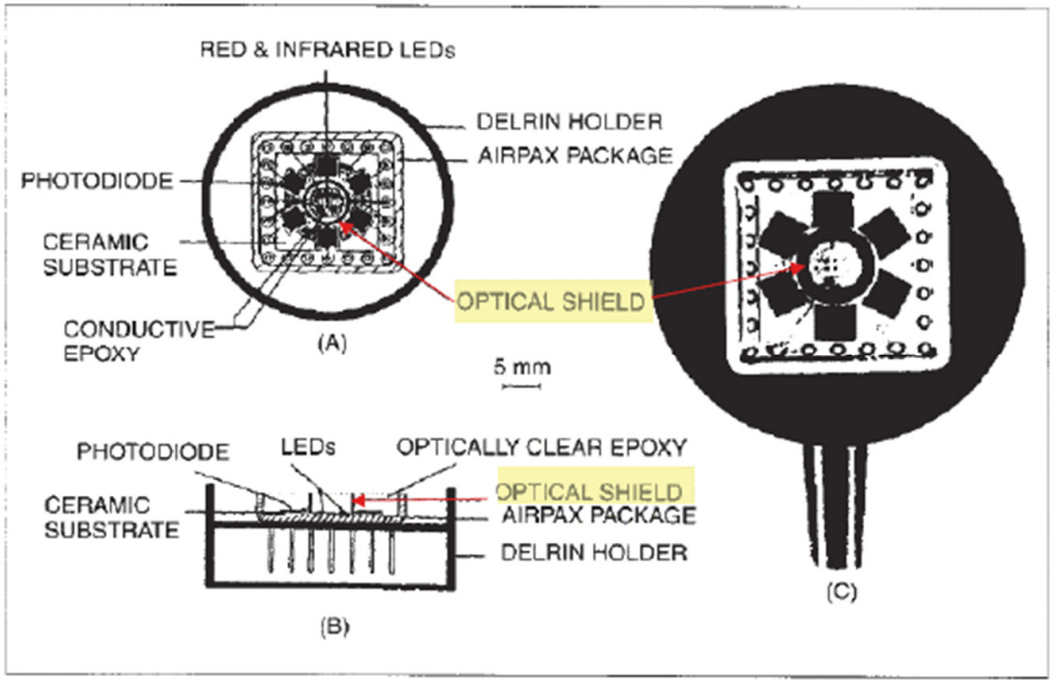
Dr. Anthony

67. Indeed, using a circular light block was common practice well before the Critical Date, and there was nothing new or inventive about changing one light block shape for another. For example, Fontaine shows a circular "optical shield" between "a ring of photodiodes" and "a central light source." APPLE-1042, 29.

APPLE-1079, ¶67; 244 Pet. Rep., 9.

These references provide evidence of the background knowledge that a POSITA would have brought to bear in an evaluation of the teachings of Sarantos, and confirm the notion that a POSITA would have been aware that a differently shaped light blocks was a known option and would have found it to be simply a matter of design choice to use different shapes.

Corroborated by Fontaine and Takatani



10. Schematic diagram of the reflectance oximeter sensor [68].

APPLE-10 (Takatani), 8; 244 Pet. Rep., 9.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

A Circular Shaped Light Block Separating a Light Source from Annular Photodetector Elements Would Have Been an Obvious Design Choice

***In re Kuhle*, 526 F.2d 553, 555 (CCPA 1975)**

> We also agree that the particular placement of the contact provides no novel or unexpected result. The manner in which electrical contact is made for Smith's battery [***9] would be an obvious matter of design choice within the skill of the art. See Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966); In re Gazda, 42 CCPA 770, 219 F.2d 449, 104 USPQ 400 (1955). As the board pointed out, use of a spring-loaded contact in the manner claimed is well known with the common flashlight. See In re Howard, 55 CCPA 1121, 394 F.2d 869, 157 USPQ 615 (1968).

244 Pet. Reply, 6.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

“spatial configuration” of photodetectors “corresponding to a shape of a portion of the tissue measurement site bounded by the light block” (element [14.4] and claims 5 and 25)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

’159 Patent Claims 14, 5, and 25

14. A physiological monitoring device comprising:
a plurality of optical sources configured to emit light proximate a wrist of a user;
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;
a light block having a circular shape;
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;
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;
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
wherein the physiological monitoring device is configured to transmit physiological parameter data to a ate processor.

APPLE-1001, Claim 14

5. 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.

APPLE-1001, Claim 5

25. 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-1001, Claim 25

89

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Sarantos Explicitly Contemplates Multiple Photodetectors Arranged in a Circular Array

1408 interposed midway between them. In FIG. **15**, three HAR photodetector elements **1512** are shown in a circular array centered on a light source **1508**. Similarly, in FIG. **16**, four HAR photodetector elements **1612** are arranged in a circular array about a light source **1608**. It is not necessary for

APPLE-1005, 14:60-64; 244 Pet., 21-22; 244 Pet. Rep., 13.

FIG. **25** depicts an example of an annular photodetector element **2512** with a light source **2508** in the middle, in accordance with an example implementation. The annular

APPLE-1005, 19:33-35; 244 Pet., 20, 41; 244 Pet. Rep., 2, 10-11.

In particular, it is to be understood that any of the implementations discussed 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, as discussed with respect to various other implementations discussed herein.

APPLE-1005, 20:52-57; 244 Pet., 21, 41; 244 Pet. Rep., 11.

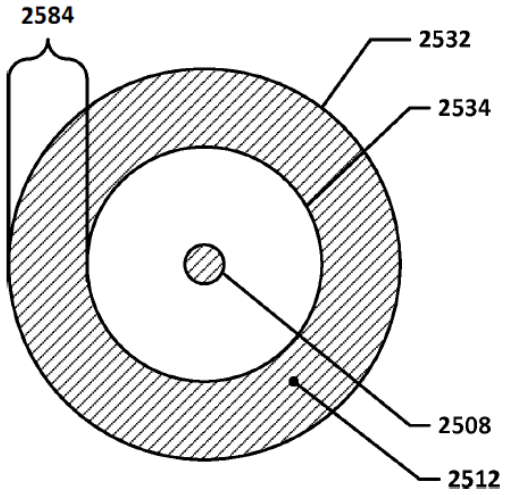


FIG. 25

APPLE-1005, FIG. 25; 244 Pet. 20.

06

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Sarantos Explicitly Contemplates Multiple Photodetectors Arranged in a Circular Array

Dr. Anthony

128. For example, although photodetector element 2512 depicted in FIG. 22 is described as a single photodetector element (APPLE-1005, 19:33-52), Sarantos states 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. 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 an annular configuration, as depicted below.

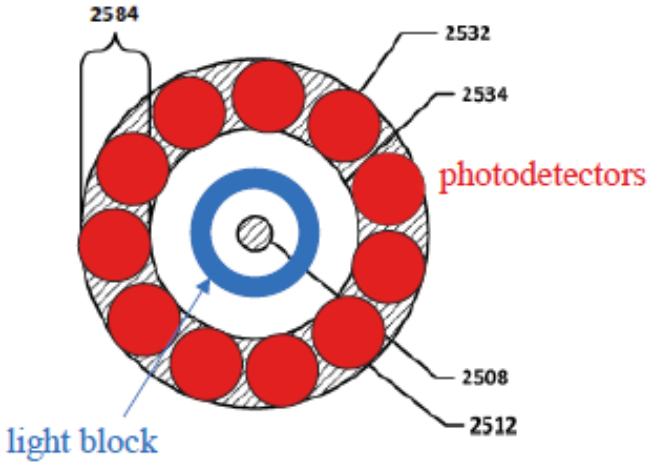


FIG. 25

APPLE-1003, ¶128; APPLE-1005, FIG. 25 (annotated); 244, Pet. 41.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Sarantos-Shie Combination
(244 Grounds 1B, 1E-1F, 1GH)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

A POSITA Would Have Been Motivated to Combine Sarantos and Shie

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Apple is Not Estopped From Arguing the Proposed Combination of Sarantos and Shie

***In re Freeman,* 30 F.3d 1459, 1465 (Fed. Cir. 1994)**

> HN6 Issue preclusion is appropriate only if: (1) the issue is identical to one decided in the first action; (2) the issue was actually litigated in the first action; (3) resolution of the issue was essential to a final judgment in the first action; and (4) plaintiff had a full and fair opportunity to litigate the issue in the first action. *A.B. Dick Co. v. Burroughs Corp.*, 713 F.2d 700, 702, 218 USPQ 965, 967 (Fed. Cir. 1983), *cert. denied*, 464 U.S. 1042, 79 L. Ed. 2d 171, 104 S. Ct. 707 (1984). [**17] We address these conditions seriatim.

Nestlé USA, Inc. v. Steuben Foods, Inc., 884 F.3d 1350, 1352 (Fed. Cir. 2018)

> col. 4 ll. 28-29 (same). Neither party has pointed to any material difference between the two patents or their prosecution histories that would give rise to claim construction issues in this appeal different from those raised in the prior appeal. Accordingly, Steuben Foods has had a full and fair opportunity to litigate the issue of claim construction during the prior appeal.

244 Pet. Rep., 13-17.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Apple is Not Estopped From Arguing the Proposed Combination of Sarantos and Shie

IPR2022-01465 Final Written Decision:

> Upon review of the foregoing, we conclude Apple's case for obviousness fails to provide a persuasive motivation for combining Sarantos and Shie to practice the invention of claim 13, for reasons provided below. These deficiencies apply even if one or more of Shie's lens structures is in fact "configured *to change the first shape [of light] into a second shape*," as claimed. Ex. 1001, 15:33–41 (emphasis added). Therefore, we need not reach Masimo's claim construction argument on this point (*see* PO Resp.

> For the foregoing reasons, we conclude Apple has not established a sufficient motivation for using *any* light shape changing material in Sarantos's Figure 22 sensor to support a conclusion of obviousness as to claim 13, without the benefit of impermissible hindsight.

EX2036, 142-143, 145; 244 Pet. Rep., 14

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

A POSITA Would Have Been Motivated to Combine Sarantos and Shie for Multiple Reasons

Dr. Anthony

> 99. There are multiple reasons that would have motivated a POSITA to use a light shape changing material, such as Shie's, in the sensor of Sarantos: (1) to increase power efficiency by precisely directing the light emitted toward the tissue to shine light closer to the photodiodes, (2) to increase accuracy of measurements and to decrease irregular readings caused by mole or other aberrations on the skin by directing light towards a larger area, and (3) to obscure the LED's appearance from a user.

244 APPLE-1003, ¶99; 244 Pet., 32-33

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

96

1) A POSITA Would Have Been Motivated to Combine Sarantos and Shie to Increase Power Efficiency by Precisely Directing the Light

Dr. Anthony

100. Regarding the first reason, a POSITA 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. A POSITA knew that directing the light emitted toward the tissue to shine light closer to the photodiodes is one way of increasing the signal level of the light detected by the photodiodes that minimizes power consumption while still providing adequate radiated power for pulse oximetry. APPLE-1009, 76, 105. For

244 APPLE-1003, ¶100; 244 Pet., 32-33

Corroborating Patent References

patient. These incremental changes in light absorption are then used to compute the oxygen saturation of the arterial blood as well as the patient's pulse rate. Since the pulsatile component of the signals received by the light detector represent only a small fraction of the incident light, it is important that the incident light be of significant magnitude to result in transmitted signals that have sufficient amplitude to provide accurate readings. In addition, the probe contain-

APPLE-1022 (Raley), 3:40-48.

[0050] One way to overcome the issues with lower signal intensity and higher power consumption can be illustrated in FIG. **6**E. Device **600** can include lens **603** coupled to light emitter **606** and/or lens **605** coupled to light sensor **604**. Lens **603** can be any type of lens such as a Fresnel lens or image displacement film (IDF) that steers the light over the optical isolation **644**. Lens **605** can be any type of lens such as an IDF or a brightness enhancement film (BEF) that shifts the light into an optical receiving area of light sensor **604**. Lens **603** can direct light emitted from light emitter **606** closer to lens **605**, and lens **605** can direct light to closer light sensor **604**. By employing lenses **603** and/or **605**, light may not have to travel a longer distance through skin **620**, and as a result, the signal intensity can be recovered.

APPLE-1008 (Han), [0050].

244 Pet., 33

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

1) A POSITA Would Have Been Motivated to Combine Sarantos and Shie to Increase Power Efficiency by Precisely Directing the Light

Dr. Anthony

APPLE-1003, ¶108. As such, Shie discloses a lens that can be used to achieve the first benefit I described because the microstructures can be used to direct the light narrowly to shine light closer to the photodiodes, which a POSITA would have recognized as achieving the benefit of increasing power efficiency and light intensity in the Sarantos-Shie combination. *Id.* For example, a POSITA would have known that "[b]y narrowing the beam of light emitted, more light can be collected by the lens and/or window resulting in a larger amount of detected light by the light sensor," thus improving measurement accuracy. APPLE-1008, [0065].

Microstructures **56** may also be made nonuniform across the lens **50** to minimize certain lens aberrations. For example, as indicated by the arrows in FIG. **3** the microstructures **56** at the outer edges of the lens may be designed to shape the light into a narrow distribution while the microstructures **56** in the middle may provide a broader light distribution pattern.

244 APPLE-1079, ¶75; APPLE-1007, 7:21-27
244 Pet. Rep., 17-18

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

2) A POSITA Would Have Been Motivated to Combine Sarantos and Shie to Increase Accuracy of Measurements by Directing Light to a Larger Area

Dr. Anthony

pigmentation of the skin." APPLE-1013, 105. A POSITA understood that pigments and dyes present on the skin may cause measurement errors. APPLE-1013, 36; APPLE-1048, 10 ("pigment may cause error"). A POSITA understood that illuminating a larger pulsatile vascular bed would reduce the effect of moles and skin aberrations and enhance the quality of the measurement. APPLE-1013, 105.

244 APPLE-1003, ¶101.

Corroborating Evidence

nail polish; according to their research, pigment may cause error despite its nonpulsatility. Indirect evidence for this is provided by anecdotes about low Sp_{O_2} readings from fingerprinting ink (which can even be transferred from finger to oximeter probe),[190] from henna, a stain used by some Middle Eastern women on the fingers and toes,[191] and from meconium in newborns.[192]

APPLE-1024 (Severinghaus), 10.

Table 2.4 Limitations to pulse oximetry and its application in a clinical setting. Adapted from Severinghaus and Kelleher (1992).

Pulse oximetry limitations
...
Skin pigments, dyes, and nail polish

APPLE-1009 (Webster), 36.

There are two techniques that can enhance the quality of the plethysmogram. One way is to use a large LED driving current, which determines the effective penetration depth of the incident light, which increases light intensity. So for a given LED/photodiode separation, using higher levels of incident light, we can illuminate a larger pulsatile vascular bed. As a result the reflected plethysmograms will contain a larger AC component. But, in practice, the LED

APPLE-1009 (Webster), 105.

344 Pet., 33-34

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

2) A POSITA Would Have Been Motivated to Combine Sarantos and Shie to Increase Accuracy of Measurements by Directing Light to a Larger Area

Dr. Anthony

76. Shie also expressly describes that the microstructures 56 for the parabolic convex lens can alternatively be configured to "provide a broader light distribution pattern." APPLE-1007, 7:8-27. Other lenses described by Shie can also achieve this light spreading functionality, such as the cylindrical lens described by Shie that spreads light "in a direction perpendicular to its width." 244-APPLE-1003, ¶109; APPLE-1007, 1:20-24; *see also* APPLE-1050, Figure 1. A POSTIA would have recognized that implementing these teachings of Shie in the wearable fitness monitor of Sarantos would have facilitated the second benefit of increasing accuracy of measurements and decreasing irregular readings caused by mole, pigment (e.g., tattoos), or other aberrations on the skin by directing light towards a larger area. 244-APPLE-1003, ¶101. Indeed, in my First 244-

244 APPLE-1079, ¶76; 244 Pet. Rep. 17-18.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

3) A POSITA Would Have Been Motivated to Combine Sarantos and Shie to Obscure the LED's Appearance from a User

Dr. Anthony

102. Regarding the third reason, a POSITA understood that users purchasing wrist-worn devices made decisions based partly on a device's appearance and would look at the front as well as the back of the device. 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 ("the back cover 3 is formed of a metal, such as stainless steel"); APPLE-1025, 1. An optical element with diffusing microstructures, which forms a portion of the back cover, would obscure the LED's appearance from the user while allowing light transmission toward the tissue. APPLE-1008, [0060]-[0063]. 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-1016; APPLE-1023. Adding an optical

244 APPLE-1003, ¶102.

Corroborated by Han

[0060] FIGS. **7**D-**7**F illustrate cross-sectional views of exemplary electronic devices employing one or more light paths for determining a heart rate signal according to examples of the disclosure. Device **700** can include window **701** located in front of a component such as light emitter **706** of FIG. **7**D and light sensor **704** of FIG. **7**E. Window **701** may be transparent, and as a result, the internal components of device **700** may be visible to a user. Since device **700** can include several components and associated wiring, it can be desirable to obscure the components and prevent internal components from being visible to a user's eye. In addition to obscuring the internal components, it may be desirable that the light emitted from light emitter **706** retains its optical power, collection efficiency, beam shape, and collection area so that the intensity of light is unaffected.

[0061] To obscure internal components, a lens such as a Fresnel lens **707** can be located between window **701** and light emitter **706**, as shown in FIG. **7**D. Fresnel lens **707** can have two regions: an optical center **709** and a cosmetic zone **711**. Optical center **709** can be placed in substantially a same area or location as light emitter **706** to collimate the emitted light into a smaller beam size. Cosmetic zone **711** can be located in areas outside of optical center **709**. The ridges of the cosmetic zone **709** can act to obscure the underlying internal components.

APPLE-1008, [0060]-[0061].

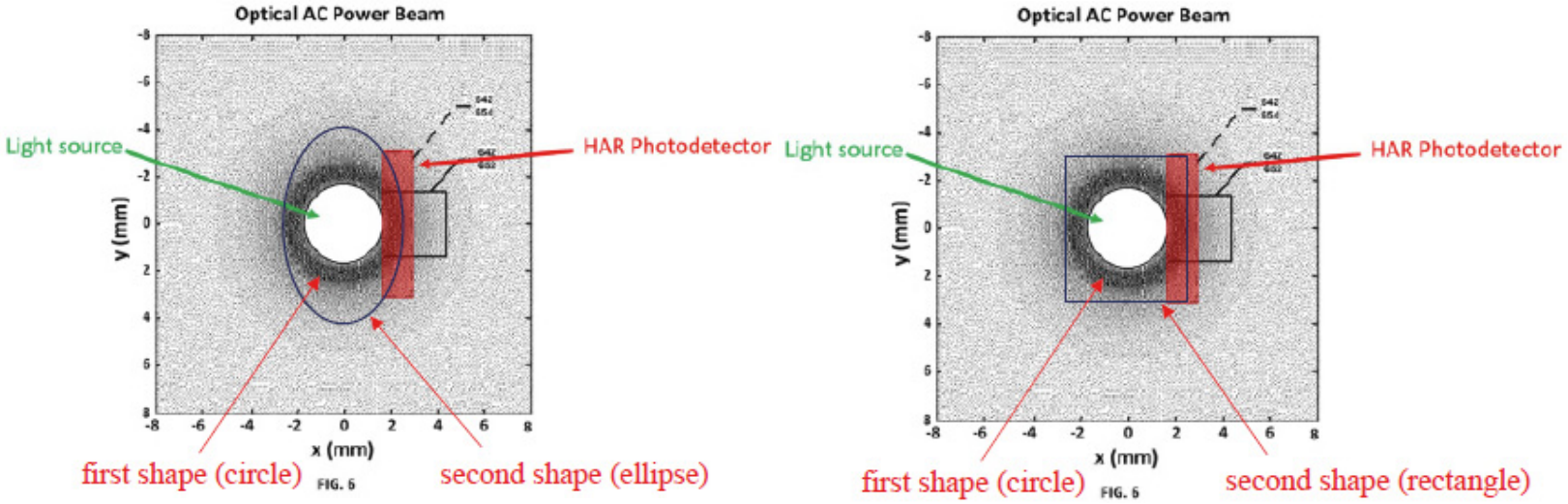
244 Pet., 34-35

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

A POSITA Would Have Been Motivated to Combine Sarantos and Shie to Allow Sarantos' Detector to Capture More Light Signal

Dr. Anthony

successfully in Sarantos's sensor. APPLE-1016; APPLE-1023. Adding an optical element to change the shape of the light would allow Sarantos's detector to capture more of the light signal, consistent with Sarantos's goal of providing "a significant improvement in the amount of AC light measurable by a photodetector without incurring a significant power consumption penalty." APPLE-1005, 9:51-57. This is demonstrated in the following demonstrative examples:



244 APPLE-1003, ¶102; APPLE-1005, FIG. 6 (annotated); Pet., 34-35.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

102

"First shape" and a different "second shape" (elements [1.1]-[1.2], [18] and [19.1]-[19.2])

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Shie Repeatedly Describes Changing the Shape of Light

integral in a portion of the optical element. The micro-structures are designed to homogenize light passing through the optical element to produce a predetermined pattern of smoothly varying, non-discontinuous light exiting the optical element. The light exiting the optical element is therefore altered according to both the macro-optical characteristic of the optical element as well as the homogenizing characteristics of the micro-structures.

APPLE-1007, Abstract; 244 Pet., 36.

optical elements. Such optical elements may be as simple as a conventional cylindrical lens where 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. An example of another optical element

APPLE-1007, 1:20-24; 244 Pet., 37.

30, **37** or **41** are again monolithic structures. Importantly, the monolithic nature of the optical elements yields the highly desirable light diffusing and shaping advantages without the attendant Fresnel losses in prior art laminated structures. In fact, the monolithic optical elements of the present invention actually and unexpectedly increase light transmission.

APPLE-1007, 6:61-7:7; 244 Pet., 36.

consistent and continuous intensity. These micro-structures can also be 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. The issued patents are directed to forming these surface structures by various means in photoresist materials and replicating theses structures in sub-masters. These sub-masters are utilized to further replicate the micro-structures in sheets of material which may be laminated or otherwise applied to objects in order to provide the light homogenizing, shaping and directing characteristics. The

APPLE-1007, 5:35-45; 244 Pet, 32; 244 Pet. Rep., 17-18.

Microstructures **56** may also be made nonuniform across the lens **50** to minimize certain lens aberrations. For example, as indicated by the arrows in FIG. **3** the micro-structures **56** at the outer edges of the lens may be designed to shape the light into a narrow distribution while the microstructures **56** in the middle may provide a broader light distribution pattern.

APPLE-1007, 7:21-27; 244 Pet., 36-37; 244 Pet. Rep., 17-18

which may be TIR or partially mirrored. Integral in the top surface of lightpipe **130** are micro-structures **136** which homogenize, shape, and direct light exiting the lightpipe **130** toward the user such a lightpipe may be used in devices such as laptop computers or other electronic devices.

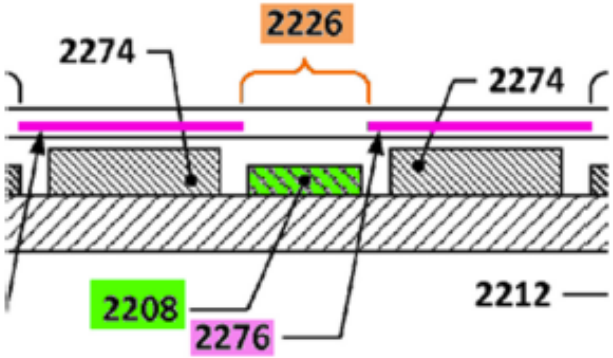
APPLE-1007, 9:40-45; 244 Pet., 36-37; 244 Pet. Rep., 17-18.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Sarantos and Shie Combinations Render Obvious Changing a First Shape of Light into a Different Second Shape

Dr. Anthony

104. As I discussed above, application of the teachings of Shei to Sarantos' device would have resulted in implementation of Sarantos' window region 2226 that is positioned between the light source 2208 and the user's skin to include the additional teachings of Shie regarding a 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, in order 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.



244 APPLE-1003, ¶¶104-105; APPLE-1005, FIG. 22 (annotated); 244 Pet., 36

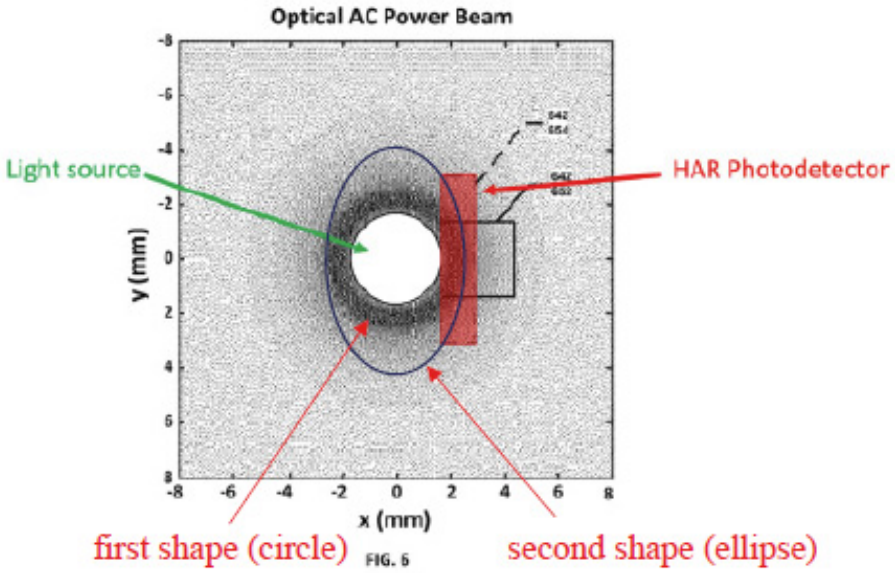
DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

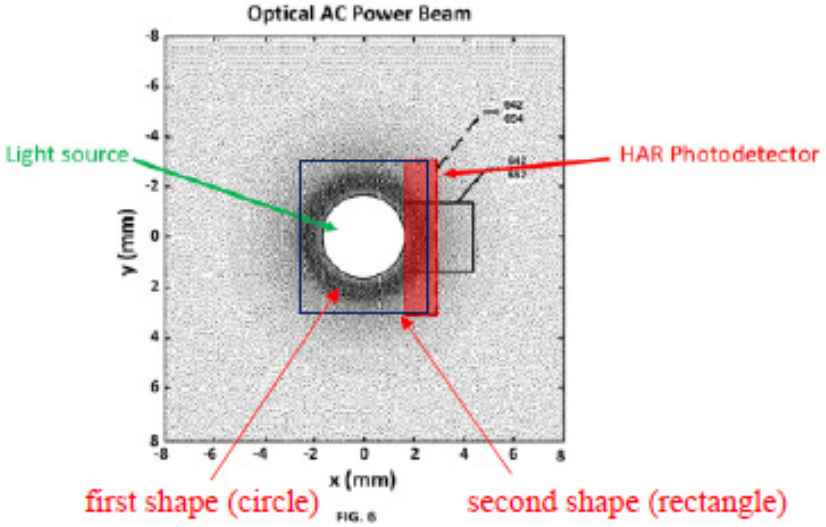
105

Sarantos and Shie Combinations Render Obvious Changing a First Shape of Light into a Different Second Shape

Dr. Anthony

110. In one example of the Sarantos-Shie combination, a POSITA knew that such a conventional cylindrical lens would change Sarantos's circular shaped light beam (APPLE-1005, FIG. 6) entering the cylindrical lens into an ellipse shaped light beam exiting the lens. An ellipse is a different geometric shape than a circle. As another example, a POSITA knew that a conventional cylindrical lens





APPLE-1005, FIG. 6 (annotated); 244 APPLE-1003, ¶¶102 110; 244 Pet., 34-36.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Sarantos and Shie Combinations Render Obvious Changing a First Shape of Light into a Different Second Shape

Dr. Anthony

110. In one example of the Sarantos-Shie combination, a POSITA knew that such a conventional cylindrical lens would change Sarantos's circular shaped light beam (APPLE-1005, FIG. 6) entering the cylindrical lens into an ellipse shaped light beam exiting the lens. An ellipse is a different geometric shape than a circle. As another example, a POSITA knew that a conventional cylindrical lens would change Sarantos's 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. A rectangle is a different geometric shape than a square. A POSITA knew that a cylindrical lens would predictably be used in a pulse oximeter. APPLE-1052, [0069].

244 APPLE-1003, ¶110; 244 Pet., 36.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Sarantos and Shie Combinations Render Obvious Changing a First Shape of Light into a Different Second Shape

Dr. Anthony

A POSITA would have recognized that, for example, the circular light shaping elements depicted described with respect to FIGs. 1a, 1b, 3a, 3b, 8a, and 8b of Shie would have been beneficially applied to the circular arrangements described in Sarantos. Similarly, the light shaping elements depicted with respect to FIGs. 5a, 5b, 6a, and 6b would have been beneficially applied to the square or rectangular arrangements described by Sarantos. Other embodiments/examples described in Shie would have been beneficially applied to those or other arrangements described by Sarantos depending on desired design characteristics.

244 APPLE-1003, ¶98; 244 Pet., 32.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

108

Reasonable Expectation of Success ("REOS")

A POSITA Would Have Had REOS in Determining Oxygen Saturation at the Wrist

('743 claims 11, 18, 24; '159 claims 8, 17)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

’159 Patent Claims 8 and 17
’743 Patent Claims 11, 18, and 24

’159 Patent Claims 8 and 17

8. The physiological monitoring device of claim **1**, wherein the physiological parameter comprises oxygen saturation.

17. The physiological monitoring device of claim **14**, wherein the physiological parameter comprises oxygen saturation.

’743 Patent Claims 11, 18, and 24

11. The physiological measurement device of claim **1**, wherein the physiological parameter is oxygen saturation.

18. The physiological measurement device of claim **14**, wherein the physiological parameter is oxygen saturation.

24. The physiological measurement device of claim **22**, wherein the physiological parameter is oxygen saturation.

110

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

A POSITA would have had Reasonable Expectation of Success Determining Oxygen Saturation at the Wrist

Dr. Anthony

1005, 13:40-14:22. Furthermore, a POSITA would have been motivated to implement Iwamiya's wrist-worn physiological sensor to measure blood oxygen saturation 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. *See, e.g.,* APPLE-1005, 13:40-14:22. A POSITA would have reasonably expected success in adapting Iwamiya's sensor to this purpose because wrist-worn pulse oximetry sensors, such as that described in Sarantos, were well-known in the art. *See, e.g.,* APPLE-1005, 13:40-14:22, FIG. 2.

243 APPLE-1003, ¶87; 243 Pet., 37-39.
241 APPLE-1003, ¶90; 241 Pet., 43-44.

100. Responsive to Patent Owner's arguments raised in another IPR proceeding involving a patent related to the '159 Patent, I reviewed over a dozen references that antedate the '159 Patent and that underscore how determining oxygen saturation at the wrist was not only well known, but had actually been successfully and repeatedly performed before the '159 Patent's earliest priority date.[3]

243 APPLE-1003, ¶100; 243 Pet., 41, 43.
241 APPLE-1079, ¶37; 241 Pet. Rep., 15-16.

111

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Corroborating References Demonstrate REOS

Cai: experiments are conducted. The experimental results have confirmed the feasibility of this wrist-band oximeter. Home

243 APPLE-1016, Abstract; 243 Pet., 40, 42; 241 APPLE-1035, Abstract; 241 Pet., 45-46.

Li: store-and-forward applications. 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).

243 APPLE-1015, Abstract; 243 Pet., 41-42; 241 APPLE-1034, Abstract; 241 Pet., 45-46.

Pang: In this paper, we present another novel reflective wrist pulse oximeter that has been developed in our laboratory.

243 APPLE-1014, 2; 243 Pet., 40-42; 241 APPLE-1014, 2; 241 Pet. Rep., 17.

Maattala: artifacts Many problems still have to be overcome but this study proves that wireless integrated pulse oximeter implanted in a chest belt or wrist band is possible to achieve with many benefits and practical applications.

243 APPLE-1018, 5; 243 Pet., 40-42; 241 APPLE-1036, 5; 241 Pet., 45-46.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

112

Corroborating References Demonstrate REOS

Cai

Implementation of a Wireless Pulse Oximeter Based on Wrist Band Sensor

Qing Cai, Jinming Sun, Ling Xia, Xingqun Zhao*
Collage of Biological Science and Medical Engineering
Southeast University, Nanjing, China
*Corresponding author E-mail address: ndt@seu.edu.cn

243 APPLE-1016/241 APPLE-1035, 1.

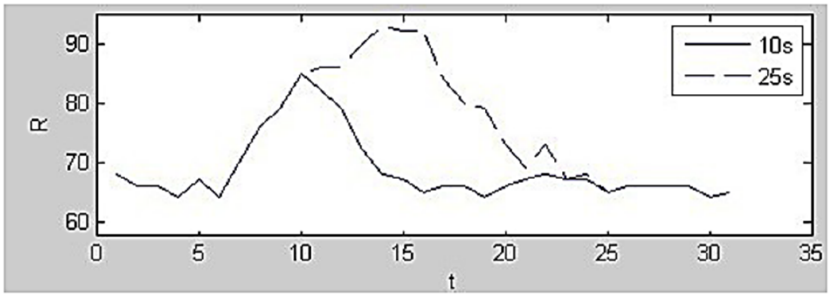


Figure 6. Change map of the value of R after breath holding for 10s and 25s

About 6s after the apnea, R values began to rise to a peak, which means oxygen saturation began to decrease. It can be seen from the comparison of these two graph that for the longer time of breath holding, the increasing amplitude of R is larger, that is the decreasing extend of oxygen saturation is larger, and the recovery time is longer as well.

The experimental results indicate that this system can effectively detect the change of oxygen saturation

243 APPLE-1016/241 APPLE-1035, 4.

V. CONCLUSION

This paper describes the system design of a wristband pulse oximer and completes the prototype fabrication. This oximeter can obtain oxygen saturation and heart rate information continuously and non-invasively through a wearable reflection sensor placed on the inner wrist; its facility makes it quite suitable for daily home care. From the waveform and measurement results it can be seen that the system can achieve the wrist pulse signal acquisition and noise filtering. The preliminary experiments have confirmed the reliability of the measurement results. The wireless transmission module transfers real time measurement data to community care center, providing the basis for community centralized care and remote monitoring. This wrist band pulse oximeter offers an effective means of home monitoring oxygen saturation, which has a broad application scope and aspects

243 APPLE-1016/241 APPLE-1035, 4.

243 APPLE-1003, ¶77; 243 Pet., 40-42; 241 APPLE-1003, ¶93; 241 APPLE-1079, ¶39; 241 Pet., 45; 241 Pet. Rep.,13-14

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Corroborating References Demonstrate REOS

Dr. Anthony (re Cai)

102. In 2010, Cai et al. published a feasibility study for 3rd International Conference on Biomedical Engineering and Informatics titled "Implementation of a Wireless Pulse Oximeter Based on Wrist Band Sensor." APPLE-1016 ("Cai"). Cai describes an "oxygen saturation measurement system" used to conduct experiments, with results confirming "the feasibility of this wrist-band oximeter." APPLE-1016, Abstract. APPLE-1016, 3. Cai illustrates the wrist band sensor in Figure 3:

243 APPLE-1003, ¶102; 243 Pet., 38, 41; 241 APPLE-1079, ¶39; 241 Pet. Rep., 16.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Corroborating References Demonstrate REOS

Li

This paper presents a small, low-cost pulse oximeter design appropriate for wearable and surface-based applications that also produces quality, unfiltered photo-plethysmograms (PPGs) ideal for emerging diagnostic algorithms.

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).

243 APPLE-1015 (241 APPLE-1034), Abstract.

Fig. 13 displays experimental data from the wrist at the three placement locations depicted in Fig. 14. The signal quality in location 2 is obviously lower relative to the SNR in locations 1 and 3, but all three are suitable PPGs.

243 APPLE-1015 (241 APPLE-1034), 8.

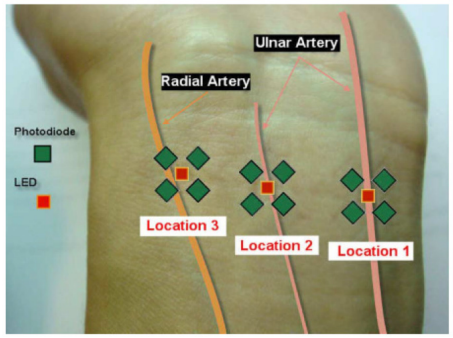


Fig. 14. Pulse oximeter measurement locations on the left wrist.

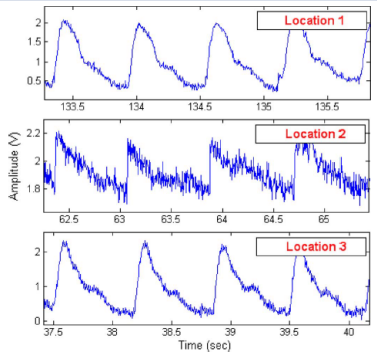


Fig. 13. Wrist PPGs corresponding to the placement locations in Fig. 14.

243 APPLE-1015 (241 APPLE-1034), FIGS. 13, 14

Dr. Anthony (re Li)

APPLE-1015, Abstract. Li provides in Figure 13 below "experimental data from the wrist at the three placement locations depicted in Fig. 14" below that shows that the "signal quality in location 2 is obviously lower relative to the SNR in locations 1 and 3, but ***all three are suitable PPGs***." APPLE-1015, 8. Li's approach confirms that a POSITA, at the time of the '159 Patent, had the "capability to acquire quality PPG data from the wrist (where the SNR dramatically improves with post-filtering)." *Id.*

243 APPLE-1003, ¶103; 243 Pet., 38, 41;
241 APPLE-1079, ¶40; 241 Pet. Rep., 17.

APPLE-1042, ¶30; 1291 Pet. Reply, 16-17; 1465 Pet. Reply, 14-15.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Corroborating References Demonstrate REOS

Pang

A Neo-Reflective Wrist Pulse Oximeter

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This work was supported by the CRGC through The University of Hong Kong, Hong Kong, under Grant 104002477.

ABSTRACT This paper relates to a genuine wrist pulse oximeter, which is a noninvasive medical device that can measure the pulse rate and oxygen saturation level in a person's blood. The device is novel due to its innovative design. It is a new type of reflective oximeter, which has a concave structure for housing the optical source and sensor.



FIGURE 2. Wireless transmission of sensor data from the wrist pulse

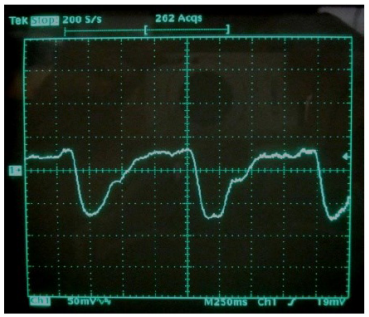


FIGURE 11. The pulse signal obtained by the red LED.

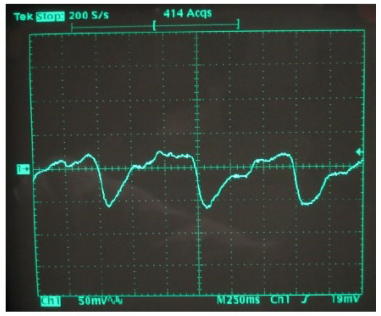


FIGURE 12. The pulse signal obtained by the infrared LED.

Apple-1014, Abstract, 1, FIGS. 2, 11-12.

Dr. Anthony

35. I provided detailed reviews of the Maattala, Cai, Li, Fontaine, and Pang references in each of my first two declarations and therefore will not repeat that analysis here. 243-APPLE-1003, ¶¶100-109; 244-APPLE-1003, ¶¶75-84. Each of these references demonstrates that detection of the physiological signals at the wrist used for determining blood oxygen saturation was successfully conducted prior to the '159 patent. *Id.* The additional references that I cited in my First Declarations similarly demonstrate the feasibility of determining blood oxygen

243 APPLE-1003, ¶106; 243 Pet., 38, 41;
243 APPLE-1079, ¶35; 243 Pet. Rep., 19.
241 APPLE-1079, ¶43; 241 Pet. Rep., 17.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Corroborating References Demonstrate REOS

Maattala

Optimum Place for Measuring Pulse Oximeter Signal in Wireless Sensor-Belt or Wrist-Band

Miia Määttälä, Antti Konttila and Esko Alasaarela
Optoelectronics and Measurement Techniques Laboratory, University of Oulu, Oulu, Finland
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Wan-Young Chung
Division of Computer & Information Engineering, Dongseo University, Busan, South-Korea

Considerably clear signals were achieved both from wrist and chest and best resulted SNR was 27dB from the chest. The highest normalized signal amplitude was detected from the wrist appearing as big as 5.9% of the total measured signal, which was relatively high

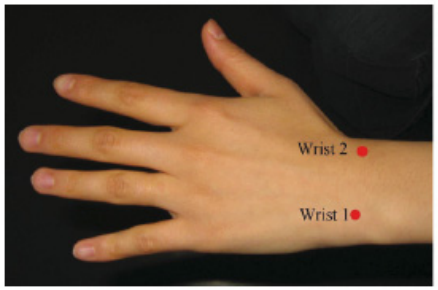


Figure 8. Measurement spots on the outer wrist

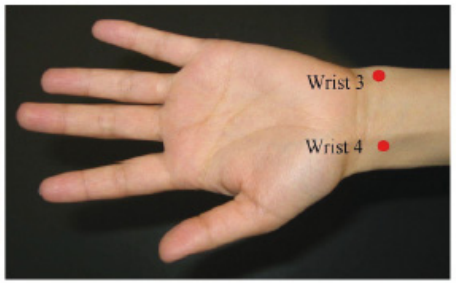


Figure 9. Measurement spots on the inner wrist

243 APPLE-1018 (241 APPLE-1036), 1, Figures 8 and 9.

Dr. Anthony (re Maattala)

Maattala shows normalized SNRs for the measurements in Figure 11. APPLE-1018, 4. Maattala concluded that "wireless integrated pulse oximeter implanted in a … wrist band is possible to achieve with many benefits and practical applications." APPLE-1018, 5.

243 APPLE-1003, ¶101; 243 Pet., 38, 41.

243 APPLE-1003, ¶101; 243 Pet., 38, 41;
241 APPLE-1079, ¶38; 241 Pet. Rep., 16.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Corroborating References Demonstrate REOS

Dr. Anthony

36. For example, Brady is a patent application filed in 2006 that describes a wrist-worn physiological sensor that can measure and track various physiological parameters and other measurable statistics of the wearer, including "calories burnt during a set time period, [] heart rate, ***blood oxygenation levels***, distance traveled, target zones and optionally dynamic blood pressure." APPLE-1028, [0046]-[0047], [0032]-[0033]. The heart rate and blood oxygenation level parameters are measured using an optical device. *Id.* [0033]. Brady describes various specific configurations for the optical sensor, including different combinations of wavelengths of light emitted by its light emitters, that can be used to measure blood oxygen saturation. *Id.*, [0051]-[0054]. For example, in one configuration:

243 APPLE-1079, ¶36; 243 Pet. Rep., 18-19.
241 APPLE-1079, ¶45-46; 241 Pet. Rep., 19.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Corroborating References Demonstrate REOS

Dr. Anthony

37. In another example, Lindberg describes an apparatus having "a patch which in turn is making part of a handcuff construction suitable for ***wrist measurements***…for determining ***blood characteristics*** including Hb and also ***SpO_2***." APPLE-1017, 18. Lindberg specifically describes embodiments in which "[t]he PPG sensor was especially designed to be used on the wrist." *Id.*, 49. Lindberg describes various details on how to specifically blood oxygen saturation at the wrist, describing that "[f]or SpO_2 determination, the above handcuff construction may preferably comprise two LEDs with wavelengths within the red and infrared range." *Id.*, 49-50. This includes specific embodiments in which "only reflected light was detected, fastened on the wrist." *Id.*, 52, 80-82. Figure 17 shows the successful measurement of PPG signals.

243 APPLE-1079, ¶36; 243 Pet. Rep., 18-19.
241 APPLE-1079, ¶45-46; 241 Pet. Rep., 19.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

119

The ’159/’743 Patent’s Limited Disclosure of Wrist-Based Pulse Oximetry Suggests REOS

’159 Patent

FIGS. **7**A and **7**B are simplified schematic side and top views, respectively, of a 3D reflective pulse oximetry sensor **700** according to an embodiment of the present disclosure. In the illustrated embodiment, the 3D sensor **700** irradiates the tissue measurement site **102** and detects the emitted light that is reflected by the tissue measurement site **102**. 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, because the emitter **702** and detector **710** are on located the same side of the tissue measurement site **102**. The 3D sensor **700** includes an emitter **702**, a light diffuser **704**, a light block **706**, a light concentrator **708**, and a detector **710**.

APPLE-1001, 10:40-51; 243 Pet. Rep., 20, 241 Pet. Rep., 20-21.

The pulse oximetry system **800** can measure analyte concentrations at least in part by detecting optical radiation attenuated by tissue at a measurement site **102**. The measurement site **102** can be any location on a patient’s body, such as a finger, foot, earlobe, wrist, forehead, or the like.

APPLE-1001, 12:16-20; 243 Pet. Rep., 20; 241 Pet. Rep., 20-21.

Dr. Duckworth

Q. Do you believe that the specification and figures of the '745 patent enable a POSITA to practice the claims of the '745 patent?

A. Yes.

APPLE-1080, 17:19-22; 243 Pet. Rep., 21; 241 Pet Rep., 21.

A POSITA at the time of the invention July 2, 2015, with the ordinary skills of a POSITA, having the '745 patent in hand, would that POSITA be able to successfully implement a pulse oximetry system that measures at the wrist?

A. Yes, I believe so.

APPLE-1080, 48:17-22; 243 Pet. Rep., 21; 241 Pet Rep., 21.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

The ’159/’743 Patent’s Limited Disclosure of Wrist-Based Pulse Oximetry Suggests REOS

***In re Epstein*, 32 F.3d 1559, 1568 (Fed. Cir. 1994)**

> Rather, the Board's observation that appellant did not provide the type of detail in his specification that he now argues is necessary in prior art references supports the Board's finding that one skilled in the art would have known how to implement the features of the references and would have concluded that the reference disclosures would have been enabling.

***Uber Techs., Inc. v. X One, Inc.*, 957 F.3d 1334, 1339 (Fed. Cir. 2020)**

> Importantly, the alleged novelty of the '593 patent is not related to the differences between server-side or terminal-side plotting. '593 patent col. 1 ll. 30-31 (identifying purported novelty as "two way position information sharing"). The specification of the '593 patent is entirely silent on how to transmit user locations and maps from a server to a user's mobile device, suggesting that a person of ordinary skill in the art was more than capable of selecting between the known methods of accomplishing this. The '593 patent confirms that its invention,

***In re Publicover*, 813 F. App’x 527, 532 (Fed. Cir. 2020)**

> Publicover argues that Venable and Kiderman's disclosures are too sparse to adequately explain to a skilled artisan how to modify Venable's system to identify vestibulo-ocular movement. But as the examiner and Board correctly found, Publicover's specification is just as sparse on how a system would identify this type of eye movement. Under the circumstances, we find this attorney argument as to the capabilities of a skilled artisan unpersuasive. *See Uber Techn., Inc. v. X*

243 Pet. Reply, 22; 241 Pet. Reply, 21-22.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

121

’159 Patent Claims 1/19 and 14 Show a Lack of Features Required for Measuring Oxygen Saturation

1. A physiological monitoring device comprising:

a plurality of emitters configured to emit light in a first shape;

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;

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;

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;

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

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.

14. A physiological monitoring device comprising:

a plurality of optical sources configured to emit light proximate a wrist of a user;

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;

a light block having a circular shape;

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;

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;

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

wherein the physiological monitoring device is configured to transmit physiological parameter data to a separate processor.

243 APPLE-1001, Claims 1 and 14;
243 Pet. Rep., 21; 244 Pet. Rep.,27.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

122

’159 Patent Claims 1/19 and 14 Show a Lack of Features Required for Measuring Oxygen Saturation

Dr. Anthony

41. Patent Owner’s expert in the related ’745 patent proceedings, Dr. Duckworth, was likewise unable to identify any specific feature or combination of features recited in the claims that allows for pulse oximetry at the wrist. APPLE-1080, 33:12-19, 37:9-38:7[3], 39:9-45:22, 47:10-16, 49:1-15, 58:6-59:2, 83:20-84:4. Indeed, the differences between claims 1/19 and 14 show that a shape-changing material (elements [1.2]/[19.3]), a dark-colored coating (elements [1.4]/[19.5]), or a specific spatial configuration of the photodiodes (element [14.4]) is not required for measuring oxygen saturation at the wrist because none of these features appear in every independent claim. To the extent a POSITA would have understood the

243/244 APPLE-1079, ¶41; 243 Pet. Rep., 21; 244 Pet. Rep.,27.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Apple Engineers' Testimony Does Not Negate Strong Evidence of REOS from Third-Party References

Dr. Anthony

saturation at the wrist." 243-POR, 37; 1465-POR, 44. However, the Apple's engineers' testimony regarding their subjective experiences developing pulse oximetry for the Apple Watch is entirely different from the issues of whether Sarantos enables performing the basic, claimed function of determining an oxygen saturation parameter at the wrist and whether a POSITA would have reasonably expected success in modifying Iwamiya's device to perform the basic, claimed function of determining an oxygen saturation parameter at the wrist. Significantly, no record evidence indicates that the Apple engineers intended to speak from the perspective of a POSITA.

243/244 APPLE-1079, ¶42; 243 Pet. Rep., 22-23; 244 Pet. Rep.,28; 241 APPLE-1079, ¶52; 241 Pet., Rep., 22.

***In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998)**

Obviousness is determined from the vantage point of a hypothetical person having ordinary skill in the art to which the patent pertains. *See* 35 U.S.C. § 103(a). This legal construct is akin to the "reasonable person" used as a reference in negligence determinations. The legal construct also presumes that all prior art references in the field of the invention are available to this hypothetical skilled artisan. *See* *In re Carlson*, 983 F.2d 1032, 1038, 25 U.S.P.Q.2d 1207, 1211 (Fed. Cir.1993).

243 Pet. Rep., 15; 244 Pet Rep., 21; 241 Pet Rep., 16.

***In re Carlson*, 980 F.2d 1032, 1037-1038 (Fed. Cir. 1993)**

We recognize that Geschmacksmuster on display for public view in remote cities in a far-away land may create a burden of discovery for one without the time, desire, or resources to journey there in person or by agent to observe that which was registered and protected under German law. Such a burden, however, is by law imposed upon the hypothetical person of ordinary skill in the art who is charged with knowledge of all the contents of the relevant prior art. *Kimberly-Clark Corp. v. Johnson & Johnson*, 745 F.2d 1437, 1454, 223 USPQ 603, 614 (Fed.Cir.1984); *see also* *In re Hall*, 781 F.2d 897, 899-900, 228 USPQ 453, 456 (Fed.Cir.1986) (doctoral dissertation, *1038 catalogued and available at Freiburg University, Germany, provides sufficient "public accessibility" for a printed publication under section 102(b)).

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Apple Engineers' Testimony Does Not Negate Strong Evidence of REOS from Third-Party References

***Intelligent Bio-Systems, Inc. v. Illumina Cambridge, Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016)**

> [F]ailure to consider the appropriate scope of the ... patent's *claimed invention* in evaluating the reasonable expectation of success ... constitutes a legal error that [is] review[ed] without deference." *Allergan*, 754 F.3d at 966 (emphasis added).

***Huawei Techs. Co. v. Iancu*, 813 F. App'x 505, 511 (Fed. Cir. 2020)**

> Huawei briefly argues that the Board failed to explain why a relevant artisan would have had a reasonable expectation of success when combining the prior art. HN3 A relevant artisan "need only have a reasonable expectation of success of developing the *claimed invention*." *Allergan, Inc. v. Apotex Inc.*, 754 F.3d 952, 962 (Fed. Cir. 2014). Here, the claims require only that a terminal receive a control

Sound View Innovations, LLC v. Hulu, LLC, 818 F. App'x 1009, 1013 (Fed. Cir. 2020)

> Since the claims here did not require a certain level of practicality, the Board did not err in finding a "reasonable expectation of success . . . [in] meet[ing] the limitations of the claimed invention." *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016).[3] The Board in determining a reasonable expectation of success properly limited the inquiry to the claims as written. *Id.* ("[F]ailure to consider the appropriate scope of the . . . patent's *claimed invention* in evaluating the reasonable expectation of success . . . constitutes a legal error. . . ." (first, second, and third alterations in original) (quoting *Allergan, Inc. v. Apotex Inc.*, 754 F.3d 952, 966 (Fed. Cir. 2014))); *BTG Int'l Ltd. v. Amneal Pharm. LLC*, 923 F.3d 1063, 1075 (Fed. Cir. 2019) (rejecting the patent owner's argument that a reasonable expectation of success must be based on the likelihood of "survival advantage" of certain steroids, a feature not required by the claims).

241 Pet. Rep., 24;
243 Pet. Rep., 24;
244 Pet. Rep., 30.

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Apple Engineers' Testimony Does Not Negate Strong Evidence of REOS from Third-Party References

Dr. Anthony

saturation at the wrist." 243-POR, 37; 1465-POR, 44. However, the Apple's engineers' testimony regarding their subjective experiences developing pulse oximetry for the Apple Watch is entirely different from the issues of whether Sarantos enables performing the basic, claimed function of determining an oxygen saturation parameter at the wrist and whether a POSITA would have reasonably expected success in modifying Iwamiya's device to perform the basic, claimed function of determining an oxygen saturation parameter at the wrist. Significantly, no record evidence indicates that the Apple engineers intended to speak from the perspective of a POSITA.

The '159 Patent claims do not specify a required accuracy or quality of its oxygen saturation measurements. Patent Owner's reliance on evidence of Apple's own successes developing pulse oximetry for the Apple Watch is primarily directed to [redacted] that are not relevant to assessing reasonable expectation of success in a manner commensurate with the broad scope of the oxygen saturation feature actually claimed in the '159 Patent. The broad scope of the claims covers a practical use of a rudimentary pulse oximetry function that does not require the same level of functionality provided in the Watch. For example, as

narrative. Considered in its entirety, it is clear that the challenges confronting the engineers in developing the pulse oximetry feature for the Apple Watch was not the mere task of determining an oxygen saturation parameter at the wrist, as required by the claims, but rather in developing a pulse oximetry function that would meet [redacted]

45. That the challenges in developing the Apple Watch stemmed primarily from constraints not imposed by the claims of the '159 Patent is apparent from portions of the engineers' ITC testimony not cited in the PORs. For example,

243/244 APPLE-1079, ¶¶42-45; 243 Pet. Rep., 22-23; 244 Pet. Rep.,28-29;
241 APPLE-1079, ¶¶52-55; 241 Pet., Rep., 22-24..

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Apple Engineers' Testimony Does Not Negate Strong Evidence of REOS from Third-Party References

Brian Land



EX2076, 958:19-24.



EX-2076, 970:21 – 971:2.



EX2076, 965:18-20.



EX2076, 971:20-972:5.

243 Pet. Rep., 25; 244 Pet. Rep., 30; 241 Pet. Rep., 24-25.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Apple Engineers' Testimony Does Not Negate Strong Evidence of REOS from Third-Party References

Mehra



APPLE-1082, 878:4-16.

Venugopal



APPLE-1083, 832:23-833:6.

Block



Apple-1084, 902: 13-19.

243 Pet. Rep., 25; 244 Pet. Rep., 30; 241 Pet. Rep., 24-25.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

128

Apple Engineers' Testimony Does Not Negate Strong Evidence of REOS from Third-Party References

Shui

[redacted]

EX2082, 108:15-21.

[redacted]

EX2082, 109:13-20.

243 Pet. Rep., 25; 244 Pet. Rep., 30; 241 Pet. Rep., 24-25.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

129

Apple Engineers' Testimony Does Not Negate Strong Evidence of REOS from Third-Party References

Waydo

[redacted]

EX2078, 925:6-12.

[redacted]

EX2078, 949:13-16.

[redacted]

EX2081, 167:18-169:10

243 Pet. Rep., 25; 244 Pet. Rep., 30; 241 Pet. Rep., 24-25.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Apple Engineers' Testimony Does Not Negate Strong Evidence of REOS from Third-Party References

Dr. Mannheimer

[redacted]

EX2080, 136:19-137:1.

[redacted]

EX2077, 1015:13-1016:1.

243 Pet. Rep., 25; 244 Pet. Rep., 30; 241 Pet. Rep., 24-25.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Apple Engineers' Testimony Does Not Negate Strong Evidence of REOS from Third-Party References

Dr. Mannheimer

[redacted]

EX2080, 160:21-161:2.

[redacted]

EX2077, 1000:23-1001:1.

[redacted]

EX2077, 999:5-11.

[redacted]

EX2077, 1000:6 -1000:19.

[redacted]

EX2077, 1006:20-21.

243 Pet. Rep., 25; 244 Pet. Rep., 30; 241 Pet. Rep., 24-25.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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The Testimony of Masimo's Declarant Should be Given Little or No Weight

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Unresponsiveness of Dr. Madisetti

Madisetti Deposition:

Q. So, you don't know whether or not a person of ordinary skill would be able to utilize the pulse oximetry sensor of Figure 3 or the pulse oximetry sensor of Figure 5 in the system shown in Figure 8; is that correct?

MR. KIANG: Objection, misstates testimony. Objection, relevance and scope.

THE WITNESS: As I said, that is not my testimony. My testimony is that I have not offered such an opinion at this point in my declaration because I believe that the issues that you are raising go beyond the scope of the IPR in the current legal matter.

And I was not asked to offer an opinion on that issue.

To the extent I am asked and allowed I may do so in the future.

But, it is not part of the current declaration.

BY MR. BISENIUS:

Q. You are being asked. I'm asking you right now: Can the pulse oximetry sensor from Figure 5 be used in the system of Figure 8? Would a POSITA know how to do that?

MR. KIANG: Objection to scope.

THE WITNESS: As I said, I was meaning that it was asked by the court to do so, and allowed by the court.

So, I have not been asked or asked by the court.

APPLE-1086, 144:6-145:13; 241 Pet. Rep., 33; 243 Pet. Rep., 30; 244 Pet. Rep., 32.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Unresponsiveness of Dr. Madisetti

Madisetti Deposition:

THE WITNESS: As I said, Counsel, I would -- I think both of us would be comfortable if I did not introduce new opinions. I am not planning to introduce any new opinions. And you are continuously inviting me to offer opinions on things that I have not opined on.

So, this is not something that I have discussed in my declaration, and therefore I don't want to offer an opinion on this important legal matter on the fly.

So, I will defer to whatever is in the declaration.

Of course, if asked by the court and allowed, I may do so in the future. But at this part and this declaration, I have not offered such an opinion.

And I am not able to develop an opinion on the fly, because this is an important issue and one that requires consideration which I will do if asked and allowed by the court.

APPLE-1086, 158:6-159:8, 146:13-17; 241 Pet. Rep., 33; 243 Pet. Rep., 30; 244 Pet. Rep., 32.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Unresponsiveness of Dr. Madisetti

Madisetti Deposition:

Q. Does the '159 patent describe what material the light-absorbing detector filter 306 is made from?

A. I believe I will again defer to the specification itself. And I have not memorized the specification so I will rely on whatever is disclosed.

A. As I said, Counsel, I have provided my opinions in the declaration, and the declaration I believe contains my complete opinions.

Anything that is not in my declaration is not part of my opinions in this particular matter. So, I would defer to whatever is in my declaration as my opinions and the statement of my complete opinions.

I hope you are not wishing to elicit opinions that are not in my declaration.

Q. So, my question is would you understand the opening 402 to be required to include material or would it be empty space or could it be both?

A. And now you are talking about issues like infringement, about issues like opening and what an opening is.

I understand that Apple has offered other opinions in other matters that are discussed in my declaration with respect to what it means by opening.

So, I certainly defer to what I discussed in my declaration that -- for example, in Paragraph 54, I offer an opinion that in the Delaware litigation, Apple and its expert, Dr. Sarrafzadeh argued that the plain and ordinary meaning of opening means empty space and so on.

APPLE-1086, 44:1-7, 75:5-15, 47:2-19; 241 Pet. Rep., 33-34; 243 Pet. Rep., 30; 244 Pet. Rep., 32

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Unresponsiveness of Dr. Madisetti

Madisetti Deposition:

Q. So my question is: Is the word "annular" referring to the shape of the light guide unit?

A. I'm not sure why you use the word "shape." All I can say it's modifying -- it says here that H positioned in a central portion of an annular irradiation area E wherein the observation light is irradiated by the annular light guide unit 7.

Q. Could a square light guide unit be annular?

MR. KIANG: Objection to form.

THE WITNESS: I'm not sure what you're asking, Counsel.

BY MR. BISENIUS:

Q. I'm asking you if a square light guide unit could be annular?

A. I don't know what a square light guide unit means.

Q. Do you know what shape a square is?

A. Yes, a square is a geometrical shape with four vertices with equal sides.

Q. So could a square-shaped light guide unit be annular?

A. I don't know. I'm not sure what you're asking.

APPLE-1087, 442:11-443:18, 445:4-446:7; 241 Pet. Rep., 34; 243 Pet. Rep., 31-32; 244 Pet. Rep., 32-33

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Dr. Madisetti Appeared To Have No Understanding of the ’159/’743 Specification

Madisetti Deposition:

Q. Do you believe that the opening 402 discussed in this paragraph and the paragraphs afterwards provides support for the claimed opening defined in the dark-colored coating?

MR. KIANG: Objection to scope.

THE WITNESS: As I said, I would let the specification speak for itself.

I'm asking, did you consider any examples in the '159 patent specification when forming your opinion about the scope of the term, opening defined in the dark-colored coating?

THE WITNESS: As I said, I did not discuss any opinions. I reviewed the patent. I have not discussed any opinions with respect to embodiments other than the opinions that I offered in my declaration.

So, I don't have anything to say there.

Q. Can you identify any examples in the '159 patent specification that provide support for the claimed opening defined in the dark-colored coating that allows light to pass through the surface?

MR. KIANG: Objection to scope.

THE WITNESS: As I said, Counsel, that is not something that I was asked to offer an opinion in the declaration. And I would defer to the specification and the intrinsic evidence and other statements that are typical of claim construction analysis.

APPLE-1087, 70:15-73, 81:10-82:3; 241 Pet. Rep., 34; 243 Pet. Rep., 31.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Dr. Madisetti Appeared To Have No Understanding of the ’159/’743 Specification

Madisetti Deposition:

Q. In comparing the specification to Claim 1 of the '159 patent, do you believe that the light-absorbing detector filter described here provides support for the claimed surface recited in Claim 1?

A. I don't have an opinion on that issue, Counsel. That is not an opinion I offered in my declaration.

I have not written this declaration to discuss every example in this specification and how it relates to each claim.

I defer to the language in the specification for what it discloses.

Q. So, my question is, does the light-absorbing detector filter described in the '159 patent provide support for the claimed surface comprising a dark-colored coating? Is it something different from the claimed surface comprising a dark-colored coating or do you not know?

MR. KIANG: Objection to scope.

THE WITNESS: Again, Counsel, you are asking me about specific examples that I have not offered an opinion on, as how or if and why they support a particular portion of the specification.

I understand that in an IPR you don't look at written description or enablement and other such issues.

APPLE-1087, 104:1-105:13; 107:10-108:3; 241 Pet. Rep., 34; 243 Pet. Rep., 31.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Dr. Madisetti Appeared To Have No Understanding of the ’159/’743 Specification

Madisetti Deposition:

Q. And so, you have analyzed this claim element. It discusses an opening defined in the dark-colored coating.

What I'm asking you is, do you understand the opening to require empty space? Do you understand the opening to require a material positioned in the opening? Or would both satisfy this claim element?

MR. KIANG: Objection to scope.

THE WITNESS: Again, I'm -- Counsel, you are going outside of my declaration.

Q. In your opinion, would an opening that includes a transparent or translucent material satisfy the claim that opening is defined as a dark-colored coating?

MR. KIANG: Objection to scope.

THE WITNESS: As I said again, Counsel, I have not offered specific opinions on infringement or a particular product or a particular term in general.

I have referred to, in my declaration, specifically the combinations of prior art, Iwamiya and Sarantos. My opinions are restricted to the prior art references that I have discussed.

APPLE-1087, 50:10-58:22; 241 Pet. Rep., 34; 243 Pet. Rep., 31.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Dr. Madisetti Appeared To Have No Understanding of the ’159/’743 Specification

Madisetti Deposition:

Q. Does Figure 8 depict a light block?

MR. KIANG: Objection to scope.

THE WITNESS: As I said, Counsel, I don't have an opinion on that issue, sitting here today. I would defer to the specification, which I believe, as I said earlier, fully supports the claims. But this is not an opinion that I offered in my declaration, because I was not asked to opine on that issue.

BY MR. BISENIUS:

Q. Does the embodiment of Figure 8 include a light block?

MR. KIANG: Objection to scope.

THE WITNESS: I don't offer an opinion on that issue in my declaration because that's not something I was asked to do. I believe that the specification fully supports the claims, and I will rest at that statement for the reasons I discussed earlier with you.

Q. Well, I'm not asking you about written description or enablement. I'm asking about examples that informed your claim construction. So let's look back to Column 9, the paragraph starting at line 19.

Does this paragraph discuss a light block?

A. Again, I don't have a specific opinion on the specifications and what each particular paragraph discloses in my report. So I'm not sure if you're referring to a particular portion of my report. I'll be glad to answer.

APPLE-1087, 396:2-21; 374:14-375:3; 241 Pet. Rep., 34; 243 Pet. Rep., 31.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

The Testimony of Masimo's Declarant Should be Given Little or No Weight

***Juniper Networks, Inc. v. Swarm Tech. LLC,* IPR2021-01445, Paper 62 at 14 (PTAB Feb. 7, 2023)**

That does not mean that we found all of the testimony in this proceeding, whether provided by Dr. Weissman or Dr. Nelson, credible. In judging the credibility of experts, we focus on whether the witness offers corroboration and provides opinions that are consistent with the prior art, and the witness' cross-examination testimony. In our obviousness analysis below, we specially identify the relevant testimony provided by the parties' declarants that we find to be credible and not credible.

10X Genomics, Inc. v. The University of Chicago, IPR2015-01157, Paper 30 at 2 (PTAB May 26, 2016)

After consideration of the issues, the Board denied authorization of a motion to strike. The panel noted that any nonresponsiveness of a witness to questioning during cross-examination would go to the weight given to that witness's direct testimony, but that a motion to strike the testimony altogether was not warranted. Rather, Chicago was advised that it could call the Board's attention to the alleged nonresponsiveness of Dr. Huck by filing observations on cross-examination, as provided for in the Scheduling Order in this case.

***Nobel Biocare Services AG v. Instradent USA, Inc.*, 903 F.3d 1365, 1382 (Fed. Cir. 2018)**

Nobel's expert did not explain what size bevel would be too small. The Board did not err in rejecting Nobel's arguments based on this "unspecific expert testimony." *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1366 (Fed. Cir. 2016), cert. denied sub nom. *Google Inc. v. Arendi S.A.R.L.*, 137 S. Ct. 1329, 197 L. Ed. 2d 517 (2017); *see also Skky*, 859 F.3d at 1022 (explaining "the Board was not required to credit [appellant]'s expert evidence simply because [appellant] offered it").

241 Pet. Rep., 33; 243 Pet. Rep., 29-30; 244 Pet. Rep., 31.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

No Support for Masimo's Assertions that Deposition Questions were "far outside the scope"

Madisetti Deposition:

Q. So I recognize that you have not put that direct opinion in your declarations, but the point of this deposition is to clarify statements that you've made in your declarations. And you've opined as to the claim scope of a claim element that discusses a light block and a plurality of detectors. And you've presented opinions as to whether or not the prior art discloses those claim elements that disclose the light block or plurality of detectors.

Q. I realize that you didn't answer that specific question in your declaration, but you did discuss claim construction for claim elements that recite a light block having a particular shape, and you discussed whether or not certain prior art disclosed those elements having -- a light block having that particular shape.

And so I'm asking you, would a POSITA, prior to July 2015, have been aware of any functional significance related to the particular shape for a light block in these types of sensors?

APPLE-1087, 384:12-385:11, 410:21-411:18; 241 PO Sur-Reply, 28; 243 PO Sur-Reply, 26.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

"wherein the output light pattern comprises an oval shape"

('743 claim 10)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Iwamiya-Sarantos Renders Obvious Claim 10

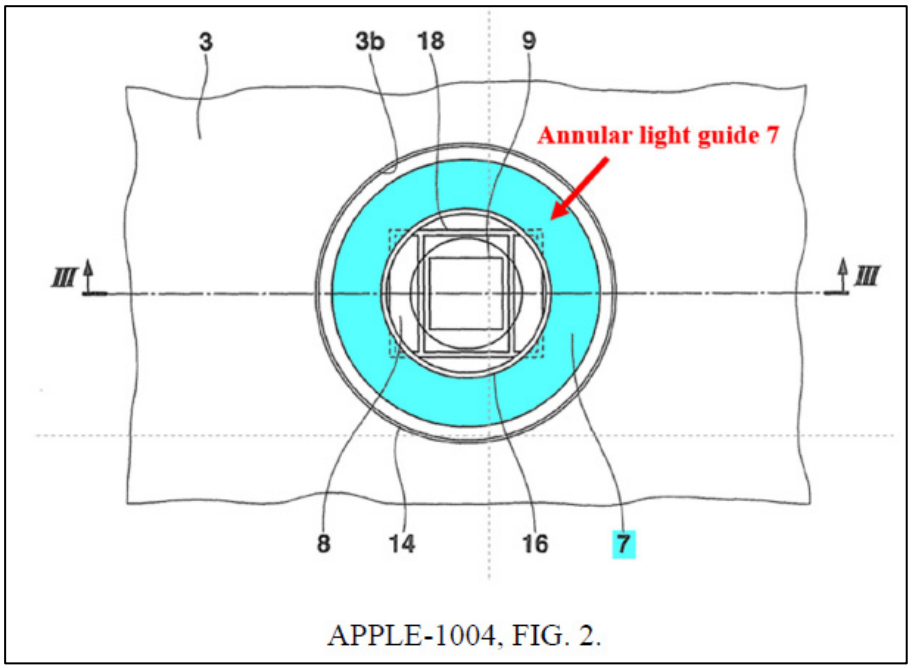
Iwamiya

The light guide unit **7** comprises a light guiding ring portion **11** and a diffusion/irradiation ring portion **12**, as illustrated in FIGS. **3** and **4**. The light guiding ring portion **11** is formed in almost a ring shape, using a material such as transparent glass or a transparent resin with a high light transmitting property. The light guiding ring portion **11** has the con-

243 APPLE-1004, 6:40-45; Pet. Rep, 32; Pet. 21-22.

As illustrated in FIGS. **3** and **4**, the biological information detecting apparatus **5** comprises light emitting units **6** that emit observation light of a specific wavelength band to optically observe a skin tissue of a human body, an annular light guide unit **7** that guides the observation light emitted from the light emitting units **6** and annularly diffuses and irradiates the

243 APPLE-1004, 6:7-14; Pet. 21; POR, 27.



APPLE-1004, FIG. 2.

243 APPLE-1004, FIG. 2; Pet. Rep, 32; Pet. 21-22.

Dr. Anthony Suppl. Dec.

11a and inclined ring portion 11b. APPLE-1004, FIGS. 2, 3, 6:40-52. Moreover, the dictionary definition of "annular" is "shaped like or forming a ring." and a POSITA would have understood that a ring encompasses an oval shape. APPLE-1095, 55. This understanding of "ring" is consistent with the use of "ring," for example when describing oval-shaped rings around planetary objects or describing jewelry around a finger. And because a POSITA would have understood that the

243 APPLE-1079, ¶71; Pet. Rep, 32.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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THANK YOU

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE