

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of: Smith et al.
U.S. Patent No.: 10,984,911 Attorney Docket No.: 50095-0136IP2
Issue Date: April 20, 2021
App. Serial No.: 17/028,655
Filing Date: September 22, 2020
Title: MULTIPLE WAVELENGTH SENSOR EMITTERS

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**PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT
NO. 10,984,911 PURSUANT TO 35 U.S.C. §§ 311-319, 37 C.F.R. § 42**

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LIST OF EXHIBITS

APPLE-1001	U.S. Patent No. 10,984,911 to Smith et al. (“the ’911 patent”)
APPLE-1002	Excerpts from the Prosecution History of the ’911 patent
APPLE-1003	Declaration of Dr. Thomas Kenny
APPLE-1004	U.S. Patent Application Publication No. 2004/0039272 to Abdul-Hafiz et al. (“Abdul-Hafiz”)
APPLE-1005	U.S. Patent No. 6,014,576 to Raley (“Raley”)
APPLE-1006	U.S. Patent No. 5,188,108 to Secker (“Secker”)
APPLE-1007	U.S. Patent No. 5,983,122 to Jarman et al. (“Jarman”)
APPLE-1008	U.S. Patent No. 5,413,100 to Barthelemy et al.
APPLE-1009	U.S. Patent No. 6,721,585 to Parker (“Parker”)
APPLE-1010	U.S. Patent No. 5,720,284 to Aoyagi et al. (“Aoyagi”)
APPLE-1011	Excerpts from Webster, Design of Pulse Oximeters, Institution of Physics Publishing (1997)(“Webster”)
APPLE-1012	U.S. Patent No. 5,692,503 to Kuenstner (“Kuenstner”)
APPLE-1013-1059	RESERVED
APPLE-1060	Combined Civil and Criminal Federal Court Management Statistics (Sep. 30, 2023) United States Courts (uscourts.gov), available at: https://www.uscourts.gov/sites/default/files/fcms_na_distprofile0930.2023.pdf
APPLE-1061	Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (USPTO June 21, 2022)(“ <i>Director’s Guidance</i> ”)

- APPLE-1062 Apple's Complaint for Patent Infringement (Design), *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01377 (D. Del. Oct. 20, 2022)
- APPLE-1063 Apple's Complaint for Patent Infringement (Utility), *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (D. Del. Oct. 20, 2022)
- APPLE-1064 Defendant Masimo Corporation's Answer to Complaint and Counterclaims, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (D. Del. Dec. 12, 2022)
- APPLE-1065 Order Granting Joint Motion to Amend the Case Schedule, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (D. Del. Sep. 21, 2023)
- APPLE-1066 Stipulation by Apple Inc.
- APPLE-1067 Email Identifying Masimo's District Court Invalidity Grounds (Nov. 16, 2023)
- APPLE-1068 Excerpt of Apple's District Court Expert Invalidity Report, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (Nov. 22, 2023)
- APPLE-1069 Order Granting Unopposed Motion to Stay Certain Patent Counterclaims, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (Jan. 10, 2023)

LISTING OF CHALLENGED CLAIMS

Claim 1	
1[p]	A physiological monitoring device comprising:
1[a]	at least three LEDs recessed into a cavity, the at least three LEDs configured to emit light of at least three different wavelengths;
1[b]	at least one detector configured to detect at least a portion of the light emitted from the at least three LEDs after at least a portion of the light has been attenuated by tissue, the at least one detector configured to output at least one signal responsive to the detected light;
1[c]	a light block surrounding the at least one detector,
1[d1]	the light block comprising a shoebox structure configured to recess the at least one detector into the shoebox structure,
1[d2]	wherein the shoebox structure is at least partially formed of a black material,
1[d3]	wherein a top of the shoebox structure includes only one opening through which light is configured to pass,
1[d4]	the opening comprising an area smaller than a detection surface area of the at least one detector; and
1[e]	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.
Claim 2	
2	The device of claim 1, wherein the at least three LEDs comprises at least eight LEDs.

Claim 3	
3	The device of claim 2, wherein the at least eight LEDs comprises at least two LEDs of the same wavelength.
Claim 4	
4	The device of claim 1, wherein the at least three LEDs comprises at least twelve LEDs.
Claim 6	
6	The device of claim 1, wherein the at least one detector comprises at least two detectors.
Claim 8	
8	The device of claim 1, wherein the opening provides an optical path from the tissue to the at least one detector.
Claim 10	
10[p]	A physiological monitoring device comprising:
10[a]	at least three LEDs recessed into a cavity, the at least three LEDs configured to emit light of at least three different wavelengths;
10[b]	at least one detector configured to detect at least a portion of the light emitted from the at least three LEDs after at least a portion of the light has been attenuated by tissue, the at least one detector configured to output at least one signal responsive to the detected light;
10[c]	an electromagnetic interference shield positioned between the at least three LEDs and the at least one detector;
10[d1]	a light block surrounding the at least one detector,
10[d2]	the light block at least partially formed of black materials,
10[d3]	the light block comprising a base, four side walls and a top forming an enclosure, wherein the light block comprises a window,

10[d4]	the window having an area smaller than a detection surface area of the at least one detector; and
10[e]	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.
Claim 11	
11	The device of claim 10, wherein the at least three LEDs comprises at least eight LEDs.
Claim 12	
12	The device of claim 11, wherein the at least eight LEDs comprises at least two LEDs of the same wavelength.
Claim 13	
13	The device of claim 10, wherein the at least three LEDs comprises at least twelve LEDs.
Claim 15	
15	The device of claim 10, wherein the at least one detector comprises at least two detectors.
Claim 17	
17	The device of claim 10, wherein the window provides an optical path from the tissue to the at least one detector.
Claim 19	
19[p]	A method for determining a physiological parameter of a living patient, the method comprising:
19[a]	positioning a sensor with respect to body tissue of a living patient,
19[b]	the sensor comprising at least three LEDs,

19[c]	at least one detector, and
19[d1]	a light block at least partially surrounding the at least one detector,
19[d2]	wherein a top of the light block comprises only one opening through which light is configured to pass;
19[e]	activating the at least three LEDs such that at least three wavelengths of light are emitted from the at least three LEDs;
19[f]	detecting, at the at least one detector, at least a portion of the light emitted from the at least three LEDs after at least a portion of the light has been attenuated by the body tissue and passed through the opening of the top of the light block, wherein the at least one detector outputs at least one signal responsive to the detected light; and
19[g]	determining a physiological parameter of the living patient responsive to the outputted at least one signal.
Claim 20	
20	The method of claim 19, wherein an area of the opening is smaller than a detection surface area of the at least one detector.
Claim 21	
21[a]	The method of claim 19, wherein the light block is formed of black materials and
21[b]	further comprises a base, side walls, and a top forming an enclosure, and wherein the at least one detector is positioned in the enclosure.
Claim 23	
23	The method of claim 19, wherein the at least three LEDs comprises at least eight LEDs.

Claim 24	
24	The method of claim 23, wherein the at least eight LEDs comprises at least two LEDs of the same wavelength.
Claim 25	
25	The method of claim 19, wherein the at least three LEDs comprises at least twelve LEDs.
Claim 26	
26	The method of claim 19, wherein the at least one detector comprises at least two detectors.
Claim 28	
28	The method of claim 19, wherein the at least a portion of the light passes through the opening after it interacts with the body tissue.

Apple Inc. (“Petitioner”) petitions for *Inter Partes* Review of claims 1-4, 6, 8, 10-13, 15, 17, 19-21, 23-26, and 28 (“the Challenged Claims”) of U.S. Patent No. 10,984,911 (“the ’911 patent”).

I. REQUIREMENTS FOR IPR

A. Standing

Petitioner certifies that the ’911 patent is available for IPR, and Petitioner is not barred from requesting IPR.

B. Challenge and Relief Requested

Petitioner requests IPR of the Challenged Claims on the grounds listed below. A declaration from Dr. Thomas Kenny (APPLE-1003) supports this Petition.

Ground	Claims	Basis
1A	1, 6, 8, 10, 15, 17, 19-21, 26, 28	§103: Abdul-Hafiz and Raley
1B	2-4, 11-13, 23-25	§103: Abdul-Hafiz, Raley, and Secker

As shown below, each reference pre-dates the ’911 patent’s earliest proclaimed priority date (March 1, 2005; “Critical Date”), which Petitioner does not concede.

Reference	Date	Prior Art At Least Under
Abdul-Hafiz (APPLE-1004)	2/26/2004 (published)	§102(b)
Raley (APPLE-1005)	1/11/2000 (issued)	§102(b)

Reference	Date	Prior Art At Least Under
Secker (APPLE-1006)	2/23/1993 (issued)	§102(b)

II. THE '911 PATENT

A. Brief Description

The '911 patent describes “a physiological measurement system 10 having a monitor 100 and a multiple wavelength sensor assembly 200,” as shown in FIG. 1, that purportedly provides “enhanced measurement capabilities as compared with conventional pulse oximetry.” APPLE-1001, 5:34-37; APPLE-1003, ¶¶42-47. According to the '911 patent, “the multiple wavelength sensor assembly 200 allows the measurement of blood constituent and related parameters in addition to oxygen saturation and pulse rate” or “the measurement of oxygen saturation and pulse rate with increased accuracy or robustness as compared with conventional pulse oximetry.” APPLE-1001, 5:39-45.

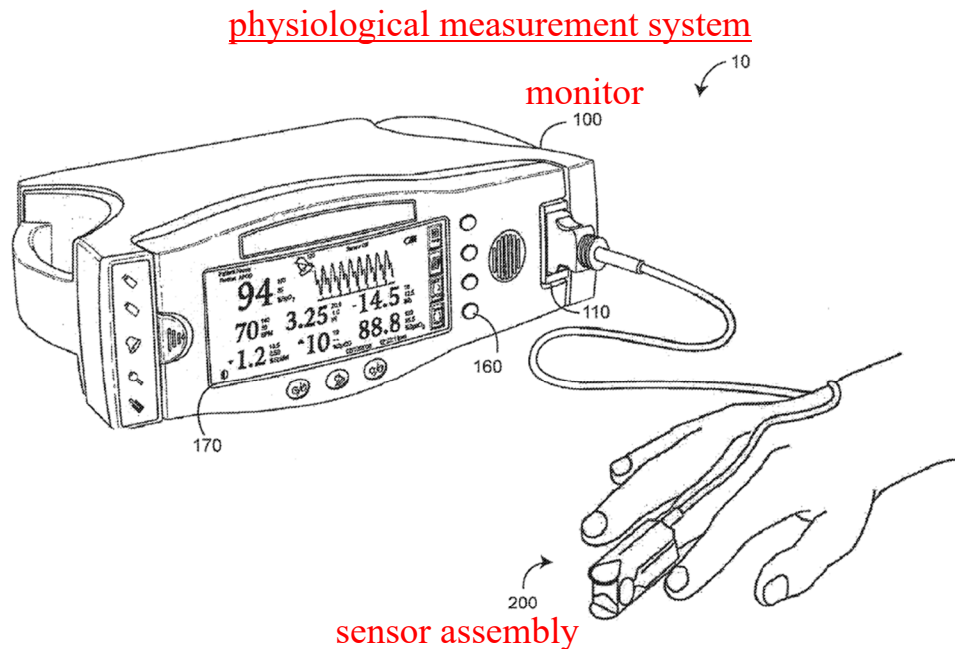


FIG. 1

APPLE-1001, FIG. 1¹

The multiple wavelength sensor assembly 200 of the '911 patent has a sensor 400, one embodiment of which is shown in FIG. 46. APPLE-1001, 5:12-13, 5:52-54, 19:5-27. The sensor 400 has an emitter assembly 500 housed by an emitter shell 3800 and an emitter pad 3000 and a detector assembly 2400 housed by a detector shell 3900 and a detector pad 3100. APPLE-1001, 19:5-15. The detector assembly 2400 inserts into a shoe box 3200, and the shoe box 3200 inserts into the detector pad 3100. APPLE-1001, 19:15-17. "The emitter assembly 500 is configured to transmit optical radiation having multiple wavelengths into the tissue

¹ Annotations and color added to figures unless otherwise noted.

site,” and the “detector assembly 2400 is configured to generate a sensor signal”
“responsive to the optical radiation after tissue attenuation.” APPLE-1001, 9:4-9,
9:35-38.

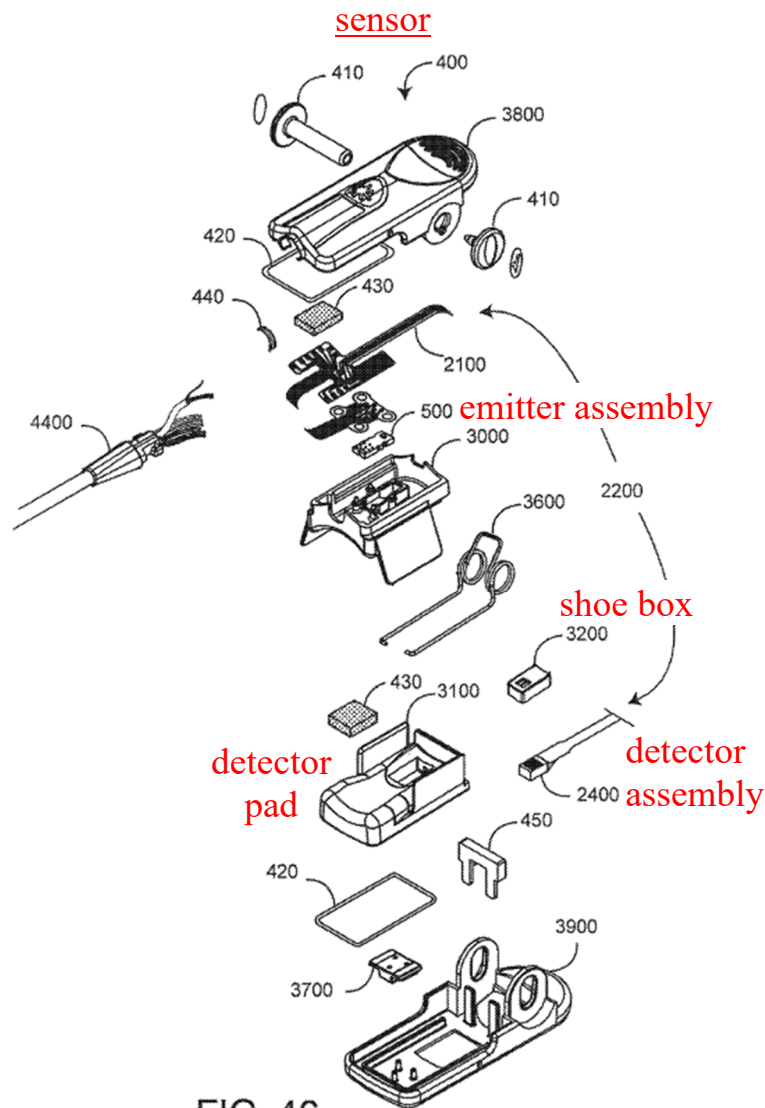


FIG. 46

APPLE-1001, FIG. 46

The emitter assembly 500 includes multiple light emitting diodes that
transmit optical radiation having multiple wavelengths, “advantageously allowing

multiple parameter measurements,” according to the ’911 patent. APPLE-1001, 6:56-63, 7:14-21. In one embodiment, the light emitting diodes include “eight LEDs having nominal wavelengths” “adapted to a physiological measurement system 10 (FIG. 1) for measuring HbCO [(carboxyhemoglobin)] and/or METHb [(methemoglobin)] in addition to S_pO_2 [(oxygen saturation)] and pulse rate.” APPLE-1001, 8:7-13, 2:28-30, 3:19-26.

FIG. 31B illustrates a detector pad 3100 having a shoe box cavity 3120 that accommodates a shoe box 3200 shown in FIGS. 32A and 32B. APPLE-1001, 15:4-23. The shoe box 3200 accommodates the detector assembly 2400. *Id.* “A detector window 3210 provides an optical path from a tissue site to the detector 2410.” *Id.* The “shoe box 3200 is colored black or other substantially light absorbing color.” *Id.* The “detector assembly 2400 inserts into [the] shoe [box] 3200, and the shoe [box] 3200 inserts into the detector pad 3100.” APPLE-1001, 19:15-17.

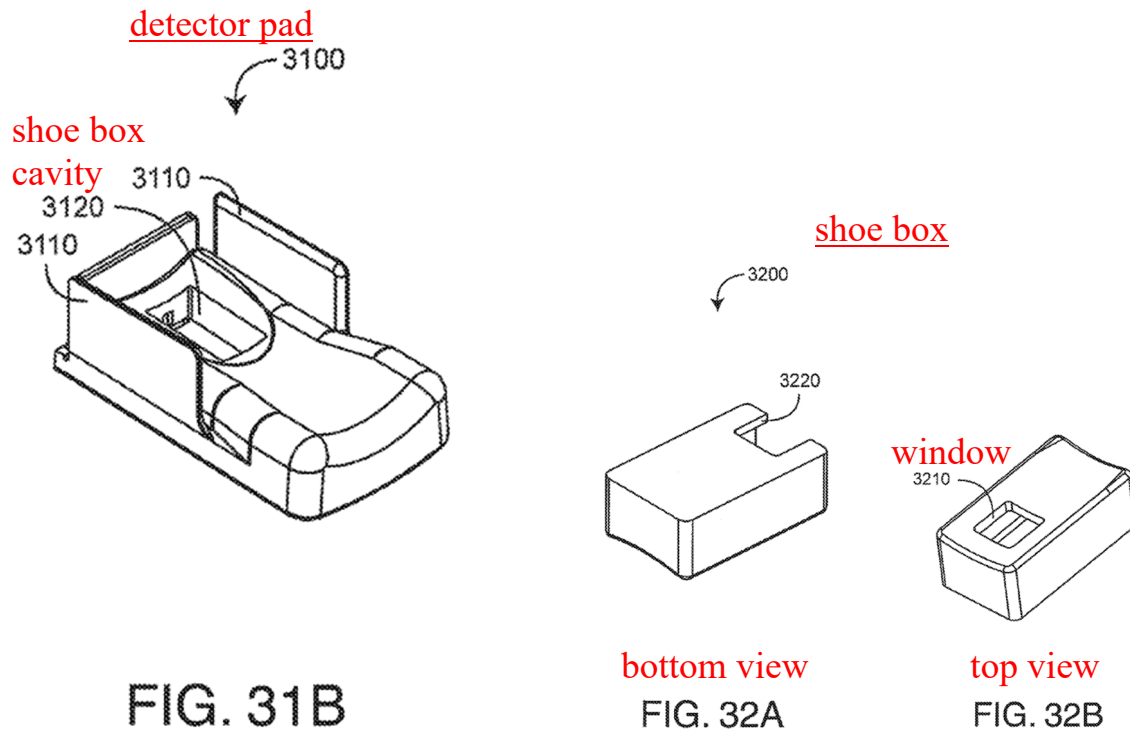


FIG. 31B

bottom view
FIG. 32A

top view
FIG. 32B

APPLE-1001, FIGS. 31B, 32A, 32B

B. Summary of the Prosecution History

Application Serial No. 17/028,655 that issued as the '911 patent was filed on September 22, 2020 with 20 claims. APPLE-1001, cover page (22); APPLE-1002, 96-99. The original 20 claims were canceled, and new claims 21-49 were added in a preliminary amendment dated October 22, 2020. APPLE-1002, 183-189.

In an office action dated November 9, 2020, claims 21-49 were rejected over U.S. Patent No. 6,580,086 to Schulz et al. in view of U.S. Patent No. 5,355,880 to Thomas et al. APPLE-1002, 195-202. The Examiner further considered U.S. Patent No. 5,313,940 to Fuse et al. as pertinent to the '911 patent's disclosure. *Id.*

In a response dated February 9, 2021, the applicant amended independent

claim 21 to recite that “a top of the shoebox structure includes only one opening through which light is configured to pass,” independent claim 30 to include “an electromagnetic interference shield positioned between the at least three LEDs and the at least one detector,” and independent claim 39 to recite that “a top of the light block comprises only one opening through which light is configured to pass.”

APPLE-1002, 291-300. The Applicant stated in a summary of interview that the Examiner agreed that the claims as amended overcome the outstanding rejections.

Id.; APPLE-1002, 310. On March 3, 2021, the examiner allowed the claims.

APPLE-1002, 314-320; APPLE-1003, ¶¶48-51.

C. Level of Ordinary Skill

A person of ordinary skill in the art at the time of the '911 patent (“POSITA”) would have had at least a Bachelor of Science in electrical engineering, mechanical engineering, biomedical engineering, computer engineering, physics, or a related field, with at least one to two years of relevant work experience with capture and processing of data or information including but not limited to physiological information, or equivalents thereof. APPLE-1003, ¶22. Superior education could compensate for a deficiency in work experience, and vice-versa. *Id.*

D. Claim Construction

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

Phillips v. AWH Corp., 415 F.3d 1303 (Fed. Cir. 2005); 37 C.F.R. § 42.100. Based on the well-established principal that “claim terms need only be construed to the extent necessary to resolve the controversy,” no express constructions are required to institute review and find the Challenged Claims unpatentable. *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011).

III. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. GROUND 1A—Claims 1, 6, 8, 10, 15, 17, 19-21, 26, and 28 are obvious over Abdul-Hafiz and Raley

1. Abdul-Hafiz

Abdul-Hafiz describes “a pulse oximetry system 100 having a sensor 110 applied to a patient, a monitor 160 and a patient cable 140 connecting the sensor 110 and the monitor 160,” shown in FIG. 1. APPLE-1004, [0002]; APPLE-1003, ¶¶52-55. “The sensor 110 is attached to a tissue site, such as an adult patient’s finger (as shown).” *Id.* “The sensor 110 is configured with both red and infrared LEDs 112 (hidden) that, for finger attachment, project light through the fingernail and into the blood vessels and capillaries underneath.” *Id.* “A photodiode 114 (not visible) is positioned at the finger tip opposite the fingernail so as to detect the LED emitted light as it emerges from the finger tissues.” *Id.*

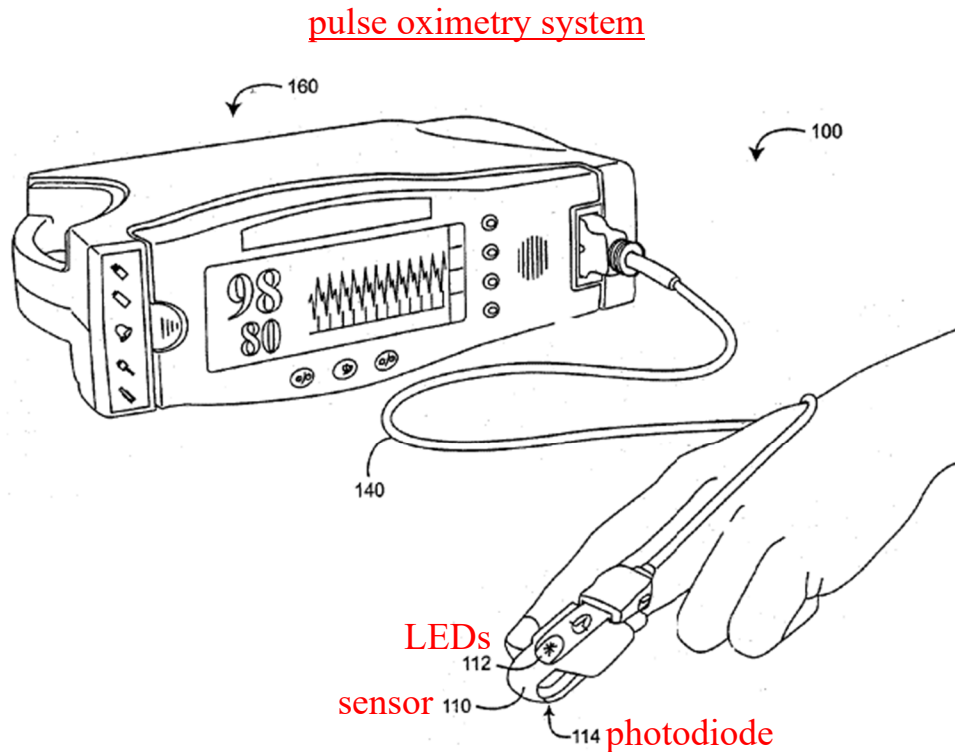


FIG. 1 (Prior Art)

APPLE-1004, FIG. 1

Abdul-Hafiz explains that “[e]mitted light 210 is projected from the LEDs 112 into the fingernail bed,” shown in FIG. 2. APPLE-1004, [0003]. “Received light 220 propagates through the finger tissues to the detector 114, subject to absorption and scattering, to generate a desired sensor signal.” *Id.* “Light which illuminates the detector 114 without propagating through the finger is unwanted optical ‘noise’ that corrupts the desired sensor signal.” *Id.* “Noise sources include ambient light 230 and piped light 240.” *Id.* “Ambient light 230 is transmitted to the detector 114 from external light sources, i.e. light sources other than the LEDs 112.” *Id.* “Piped light 240 is stray light from the LEDs 112 that is transmitted

around a tissue site along a light conductive surface, such as a reflective inner surface of face stock material, directly to the detector 114.” *Id.*

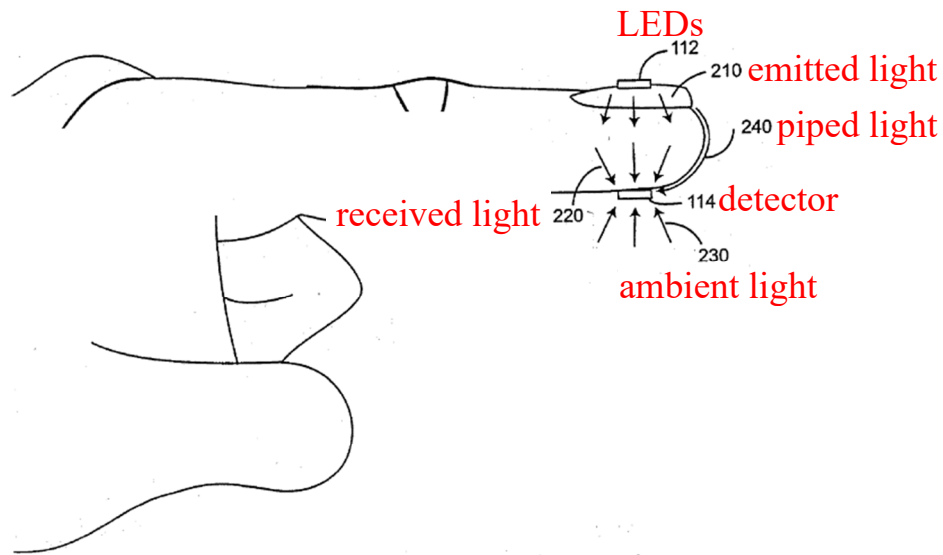


FIG. 2 (Prior Art)

APPLE-1004, FIG. 2

Abdul-Hafiz provides a shielded detector assembly 1000 incorporating “a low noise optical housing 400,” shown in FIGS. 4A-4C, 5A-5D, and 6A-6B. APPLE-1004, [0017]-[0020], [0033], [0039]. “The housing 400 is configured to accept a detector 820 (FIGS. 6A-B) and provide ambient light and piped light reduction.” APPLE-1004, [0033]. The “detector 820 is enclosed in the optical housing 400” “so that the active area of the photodiode chip 821 is aligned with the housing aperture 470.” APPLE-1004, [0039]. An EMI shield 1010 also encloses the detector 820, and a corresponding flexible circuit assembly 801 exits the housing 400 between the base 460 and the flange 420. *Id.*

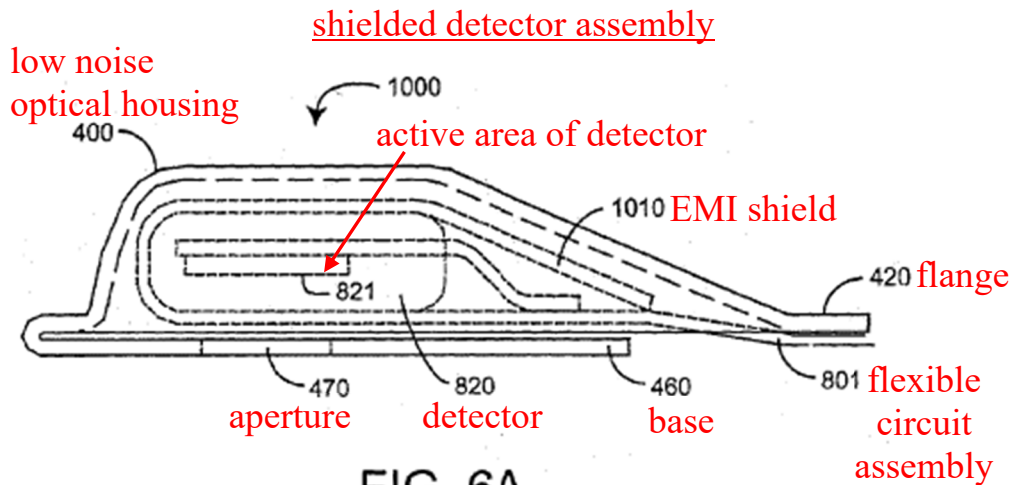


FIG. 6A

APPLE-1004, FIG. 6A

The detector assembly 1000 is incorporated into a sensor 750 shown in FIG. 7C. APPLE-1004, [0041]. The connector end 759 “has a plug portion configured to insert into a mating patient cable connector so as to mechanically and electrically connect the sensor [750] to a patient cable 140 (FIG. 1).” APPLE-1004, [0040]-[0041].

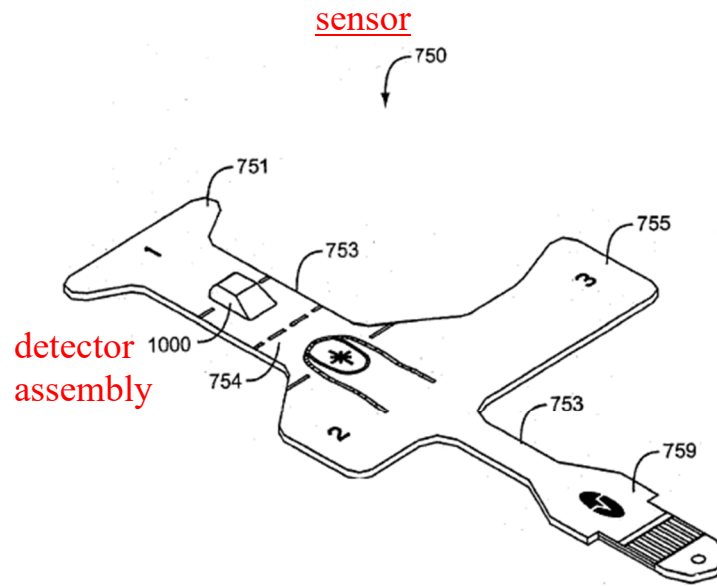


FIG. 7C

APPLE-1004, FIG. 7C

2. Raley

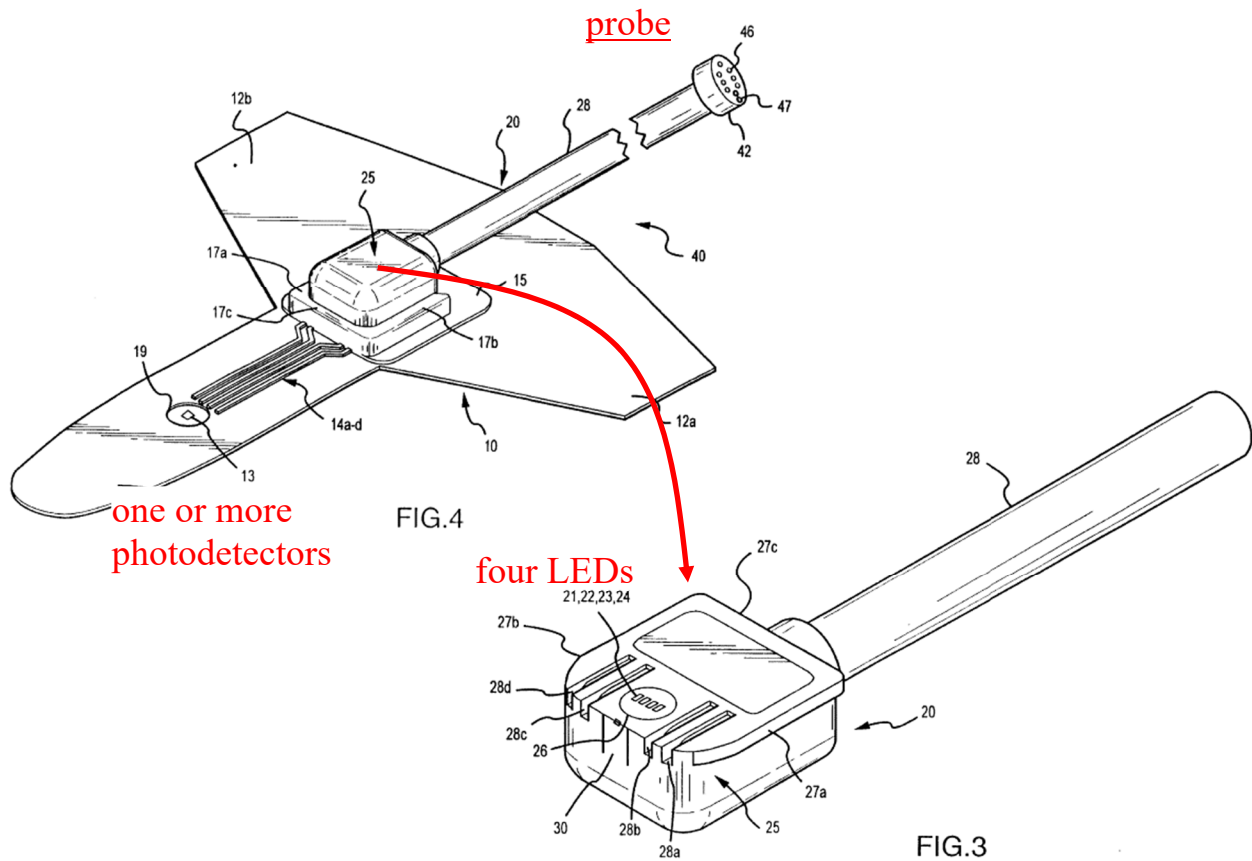
Raley is related to “medical monitoring probes used in photoplethysmographic monitors.” APPLE-1005, 1:6-7; APPLE-1003, ¶¶56-58. Raley explains that “[o]ne of the primary uses of photoplethysmography has been the monitoring of the oxygen saturation of a patient’s blood,” but “there is a desire to expand the use of photoplethysmography into the monitoring of additional blood analytes such as carboxyhemoglobin, methemoglobin and other dyshemoglobins.” APPLE-1005, 1:39-45.

Raley explains that a “pulse oximeter instrument makes use of a plurality of

light-emitting devices, each of which transmits light at a predetermined wavelength, which wavelengths are selected such that at least one is highly absorbed by oxygenated hemoglobin in the arterial blood and at least one is highly absorbed by reduced hemoglobin in the arterial blood.” APPLE-1005, 3:17-23.

According to Raley, it is “also possible to measure additional analytes in the arterial blood, such as additional dyshemoglobins, with one additional wavelength of light for each component.” APPLE-1005, 3:33-36. Raley further explains that “a photoplethysmographic instrument designed to generate four blood analyte levels” uses “at least four separate emitters each producing light with a distinct spectral content.” APPLE-1005, 4:5-9.

In a specific embodiment, Raley describes a monitor “capable of measuring a plurality of blood analyte concentrations such as O₂Hb, RHb, COHb and MetHB” that uses a probe 40 having a “plurality of emitters 21, 22, 23 and 24” that “may be light-emitting-diodes (LED’s)” and “each emit light having a distinct spectral content characterized by a distinct center wavelength denoted by λ_1 λ_2 λ_3 and λ_4 .” APPLE-1005, 3:52-4:3. “The intensity of light transmitted through the tissue under test is measured by one or more photodetectors 13” that provide “a signal corresponding to the intensity of light received denoted I_{λ_1} , I_{λ_2} , I_{λ_3} and I_{λ_4} .” APPLE-1005, 4:29-33. The monitor determines “an estimate of the blood analyte levels” based on the intensity signals. APPLE-1005, 4:33-44.



APPLE-1005, FIGS. 3, 4

3. Abdul-Hafiz+Raley Combination

As discussed above in Section I.A.1, Abdul-Hafiz discloses that “[p]ulse oximetry is a widely accepted noninvasive procedure for measuring the oxygen saturation level of arterial blood, an indicator of a person’s oxygen supply.”

APPLE-1004, [0002]. For this purpose, Abdul-Hafiz provides a “pulse oximetry system 100” that includes “a sensor 110” that “is configured with both red and infrared LEDs 112” that “for finger attachment, project light through the fingernail and into the blood vessels and capillaries underneath” and a “photodiode 114” “to detect the LED emitted light as it emerges from the finger tissues.” APPLE-1004,

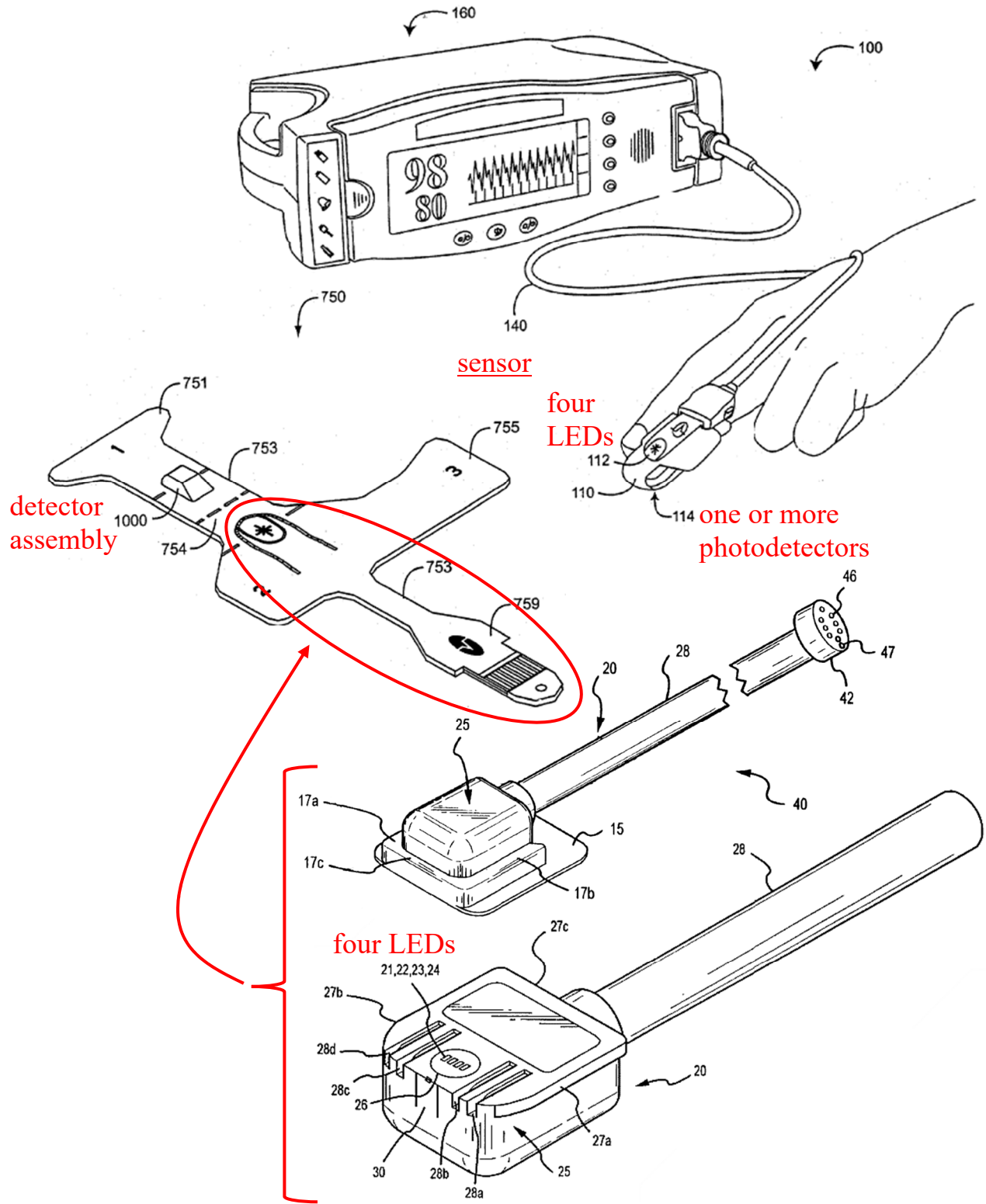
[0002]; APPLE-1003, ¶¶62-63.

As discussed above in Section I.A.2, Raley discloses that although “[o]ne of the primary uses of photoplethysmography has been the monitoring of the oxygen saturation of a patient’s blood,” “there is a desire to expand the use of photoplethysmography into the monitoring of additional blood analytes such as carboxyhemoglobin, methemoglobin and other dyshemoglobins.” APPLE-1005, 1:39-45. To monitor additional blood analytes, Raley provides a probe for use with a photoplethysmographic monitor. APPLE-1005, 3:52-57. The probe includes at least four LEDs each emitting light having a distinct spectral content characterized by a distinct center wavelength “for measuring three or four blood analytes such as oxyhemoglobin, deoxyhemoglobin, carboxyhemoglobin and methemoglobin” and “one or more photodetectors” to measure the “intensity of light transmitted through the tissue.” APPLE-1005, 3:52-4:9, 4:29-44, 5:63-6:2. The monitor includes a data processing circuit that executes data processing instructions stored in memory to determine an estimate of the blood analyte levels based on the intensity signals. APPLE-1005, 4:29-44; APPLE-1003, ¶64.

A POSITA seeking to implement Abdul-Hafiz’s pulse oximetry system would have found it obvious based on Raley’s teachings to arrive at a predictable configuration of a pulse oximetry system (an example shown below) having a sensor with at least four LEDs with distinct center wavelengths and one or more

photodetectors to measure the intensity of the light emitted by the four LEDs, and a data processing circuit that executes data processing instructions stored in memory to determine an estimate of three or four blood analyte levels based on the intensity signals. APPLE-1005, 3:52-4:9, 4:29-44, 5:63-6:2; APPLE-1003, ¶¶65-66.

Abdul-Hafiz's pulse oximetry system modified in view of Raley



APPLE-1004, FIGS. 1, 7C; APPLE-1005, FIGS. 3, 4 (partial)

A POSITA would have found it obvious and would have been motivated to incorporate Raley's teachings into Abdul-Hafiz's pulse oximetry system to expand the use of photoplethysmography into the monitoring of additional blood analytes. APPLE-1005, 1:39-45, 3:52-4:9, 5:63-6:2; APPLE-1003, ¶67. A POSITA understood that blood oxygenation can be adversely affected by the generation of additional hemoglobin species, called dyshemoglobins. APPLE-1007, 1:19-36. For example, carboxyhemoglobin is generated when carbon monoxide molecules bind to the hemoglobin in blood. *Id.* An accurate measurement of carboxy hemoglobin concentration in the patient's blood may be needed when the patient is a smoker or if carbon monoxide poisoning is suspected. *Id.*; APPLE-1011, 54. Additionally, elevated methemoglobin levels in the blood can be caused by various medications, illegal drugs, and certain pathological conditions such as sickle cell anemia. APPLE-1007, 1:19-36. Therefore, measurement of the methemoglobin concentration is also useful during patient evaluation. *Id.*

A POSITA would have found it obvious and would have been motivated to incorporate Raley's teachings into Abdul-Hafiz's pulse oximetry system to further compensate for errors in the measurement of oxygen saturation due to the presence of carboxyhemoglobin and methemoglobin in the blood in above normal levels. APPLE-1007, 1:63-2:14; APPLE-1008, 3:25-37; APPLE-1003, ¶68. A POSITA understood that if carboxyhemoglobin or methemoglobin is present in the blood in

above normal levels, a conventional two-wavelength pulse oximeter will give falsely high readings for the arterial oxygen saturation. *Id.*

Moreover, a POSITA would have viewed the implementation of Abdul-Hafiz's pulse oximetry system in a manner that applied Raley's teachings as merely the predictable result (e.g., a pulse oximetry system having a sensor with at least four LEDs with distinct center wavelengths and one or more photodetectors to measure the intensity of the light emitted by the four LEDs, and a data processing circuit that executes data processing instructions stored in memory to determine an estimate of three or four blood analyte levels based on the intensity signals) of combining known prior art elements according to known methods, and would have expected success in enhancing Abdul-Hafiz's system in this way. APPLE-1003, ¶69; *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 405 (2007).

A POSITA would have understood that Raley's teachings are applicable to a photoplethysmographic monitor such as Abdul-Hafiz's pulse oximetry system and would be implemented in Abdul-Hafiz's system in a manner that is similar to its implementation in Raley's system, with Raley's suggestions merely improving/adding to Abdul-Hafiz's system. APPLE-1003, ¶70. Adding two LEDs to a system that already contains two LEDs would be a straightforward modification for a POSITA that was already relying on the system of Abdul-Hafiz, which included circuits and data processing instructions for operating LEDs and

gathering data associated with signals at two wavelengths. *Id.* The addition of two more LEDs, and modification of the system to include two more sets of circuits and instructions would be well-within the capabilities of a POSITA, especially considering that the circuits and instructions for the third and fourth LED would be nearly identical to that of the first and second LED. *Id.*

Given the similarities between Abdul-Hafiz and Raley, a POSITA would have appreciated that the benefits provided by Raley's teachings would apply to Abdul-Hafiz's system. APPLE-1003, ¶71. Specifically, the addition of a third and fourth LED would provide information about the blood at a third and fourth wavelength, providing the opportunity to capture measurements of additional blood analytes as described in Raley. *Id.* A POSITA would have been motivated and would have found it obvious and straightforward to implement the system of Abdul-Hafiz with the teachings of Raley to provide a pulse oximetry system for measuring additional blood analytes and/or for more accurately measuring oxygen saturation due to the presence of carboxyhemoglobin and methemoglobin in the blood in above normal levels. *Id.*

4. Analysis

(a) Claim 1

(i) Element 1[p]

To the extent the preamble is limiting, Abdul-Hafiz discloses that “[p]ulse

oximetry is a widely accepted noninvasive procedure for **measuring the oxygen saturation level of arterial blood**, an indicator of a person's oxygen supply."

APPLE-1004, [0002]. Abdul-Hafiz provides "a **pulse oximetry system 100** having a sensor 110 applied to a patient, a monitor 160 and a patient cable 140 connecting the sensor 110 and the monitor 160." *Id.* "The sensor 110 is attached to a tissue site, such as an adult patient's finger (as shown)." *Id.* Abdul-Hafiz's pulse oximetry system 100 is a physiological monitoring device that measures a patient's oxygen saturation level of arterial blood. APPLE-1003, ¶72.

Abdul-Hafiz+Raley's physiological monitoring device

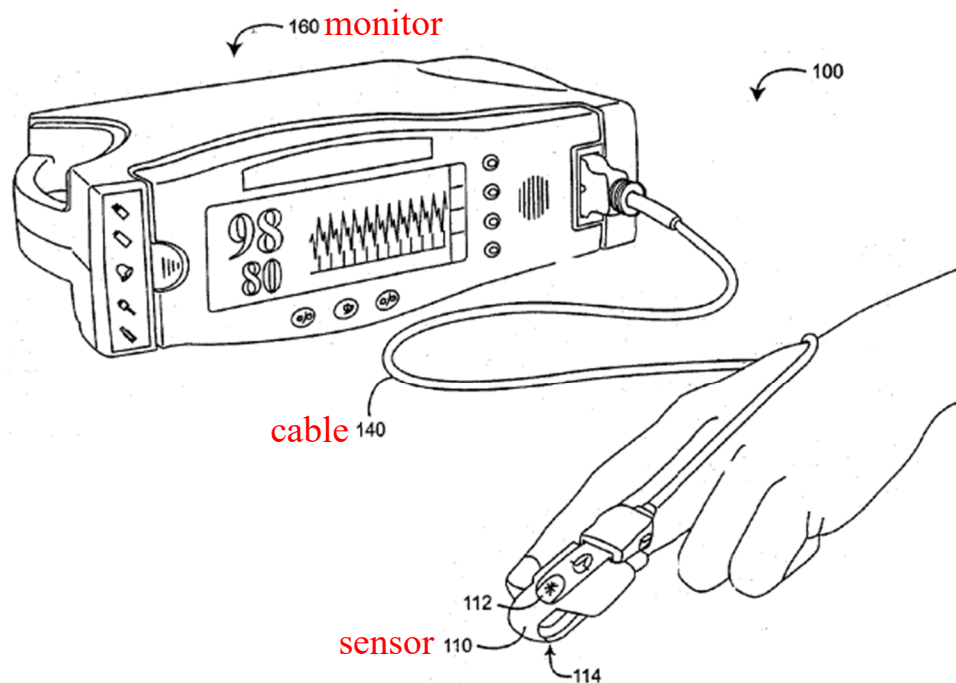


FIG. 1 (Prior Art)

APPLE-1004, FIG. 1

(ii) **Element 1[a]**

Abdul-Hafiz's "pulse oximetry system 100" includes "a **sensor 110**" that "is configured with both **red and infrared LEDs 112**" that "for finger attachment, **project light** through the fingernail and into the blood vessels and capillaries underneath." APPLE-1004, [0002].

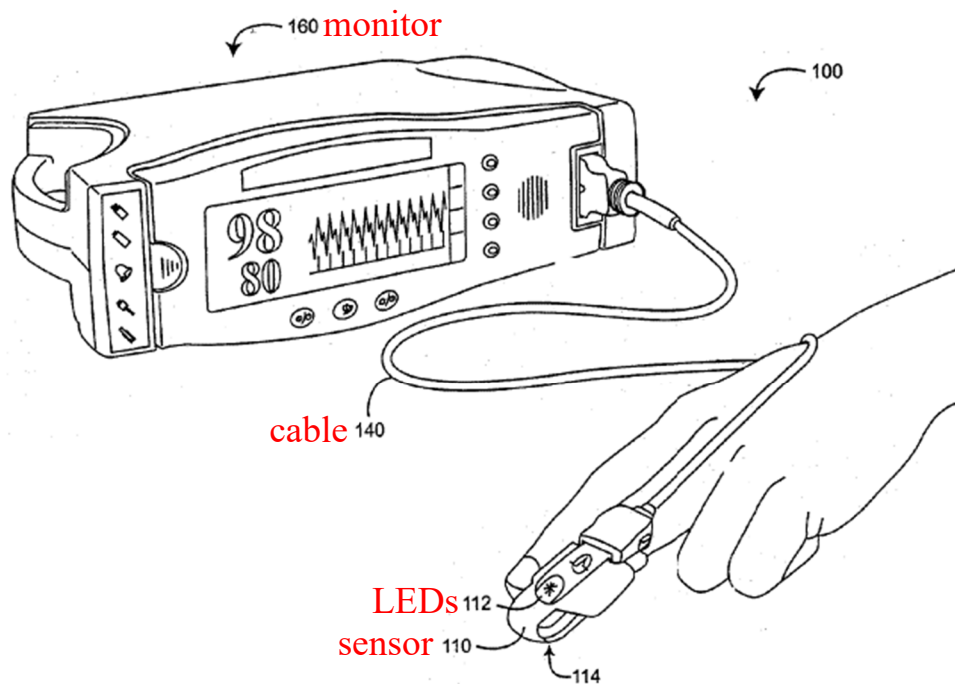


FIG. 1 (Prior Art)

APPLE-1004, FIG. 1

As shown in Abdul-Hafiz FIG. 2, "[e]mitted light 210 is projected from the **LEDs 112** into the fingernail bed." APPLE-1004, [0003]; APPLE-1003, ¶¶73-74.

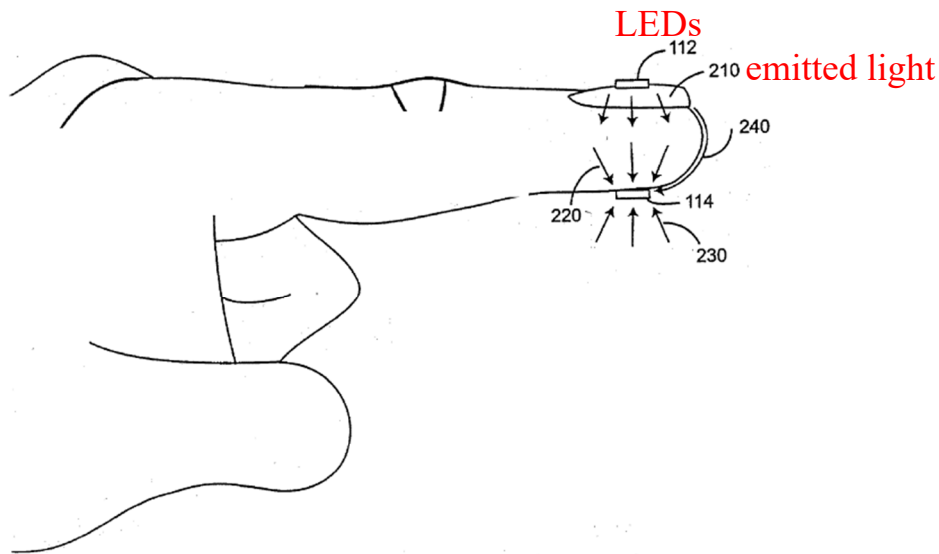


FIG. 2 (Prior Art)

APPLE-1004, FIG. 2

Raley describes that a “pulse oximeter instrument operates by use of a **probe that illuminates an appendage of the patient** (such as a finger, earlobe, toe, neonatal appendages, or the nasal septum) that is rich in arterial blood and measures the differential absorption of the light by the pulsatile portion of the arterial blood flow to thereby **determine oxygen saturation of the arterial blood.**” APPLE-1005, 3:11-36. “The pulse oximeter instrument makes use of a **plurality of light-emitting devices, each of which transmits light at a predetermined wavelength**, which wavelengths are selected such that at least one is highly absorbed by oxygenated hemoglobin in the arterial blood and at least one is highly absorbed by reduced hemoglobin in the arterial blood.” *Id.* Raley discloses that although “[o]ne of the primary uses of photoplethysmography has been the monitoring of the oxygen saturation of a patient’s blood,” “there is a

desire to expand the use of photoplethysmography into the monitoring of additional blood analytes such as carboxyhemoglobin, methemoglobin and other dyshemoglobins.” APPLE-1005, 1:39-45. According to Raley, “[i]t is also possible to **measure additional analytes in the arterial blood**, such as additional dyshemoglobins, **with one additional wavelength of light for each component.**” APPLE-1005, 3:11-36. “In a photoplethysmographic instrument designed to generate four blood analyte levels, the preferred embodiment is to use **at least four separate emitters each producing light with a distinct spectral content.**” APPLE-1005, 3:52-4:9.

Raley provides a “probe 40” for use with a “photoplethysmographic monitor” that “is capable of measuring a plurality of blood analyte concentrations such as O₂Hb, RHb, COHb and MetHB.” APPLE-1005, 3:52-4:9. The probe 40 includes “**a plurality of emitters 21, 22, 23 and 24** located in the connector-end 25 of interconnect cable segment 20.” *Id.* The “**plurality of emitters 21, 22, 23 and 24**” may be “**light-emitting-diodes**” (LEDs) that “**each emit light having a distinct spectral content characterized by a distinct center wavelength denoted by λ_1 λ_2 λ_3 and λ_4 .**” *Id.*

Raley’s “FIG. 3 depicts a bottom elevational view” “of the patient end of interconnect cable segment 20” with “**four emitters 21, 22, 23 and 24**” “useful in a photoplethysmographic monitor for measuring three or four blood analytes such

as oxyhemoglobin, deoxyhemoglobin, carboxyhemoglobin and methemoglobin.”

APPLE-1005, 5:63-6:2; APPLE-1003, ¶¶75-77.

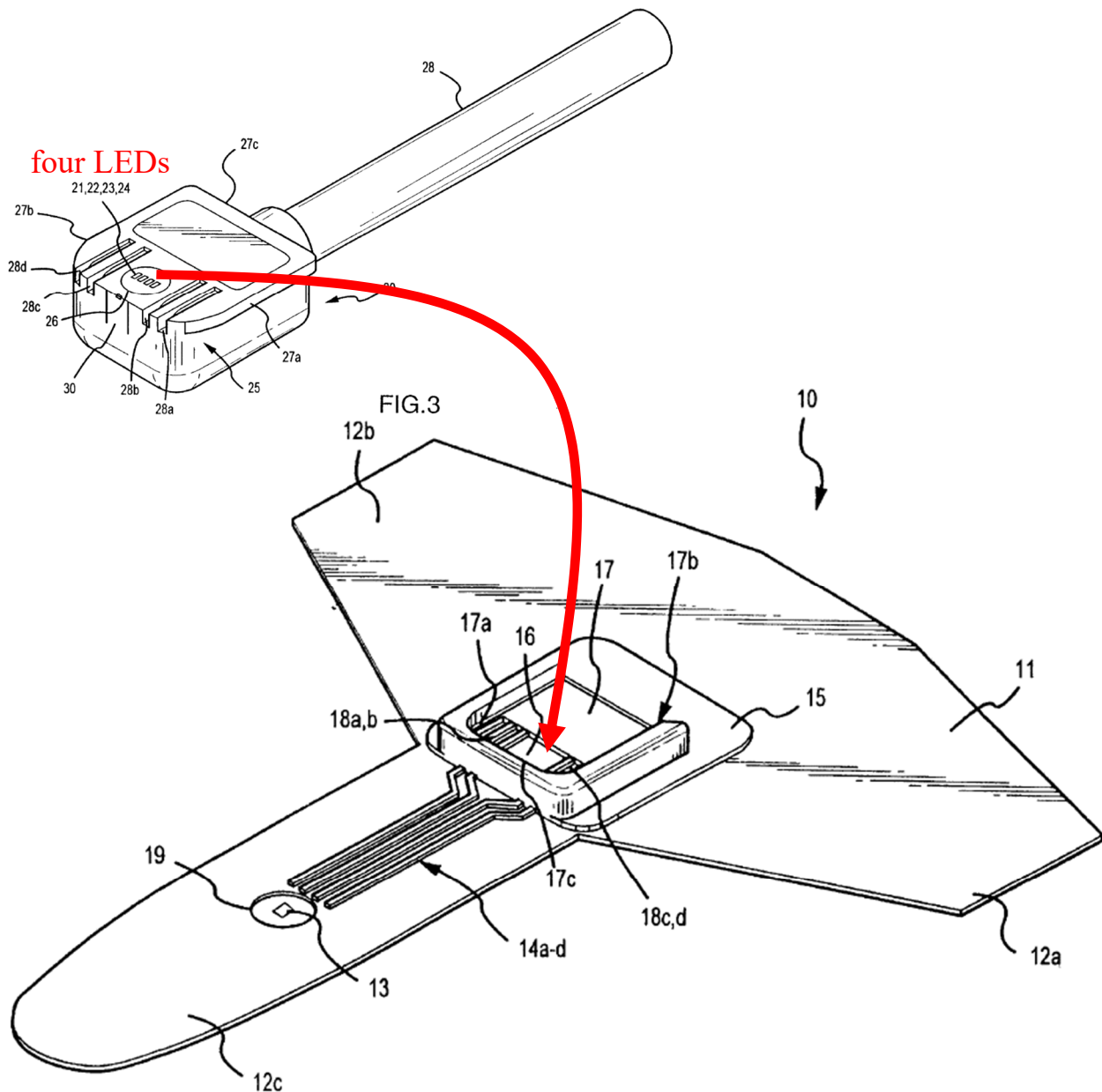


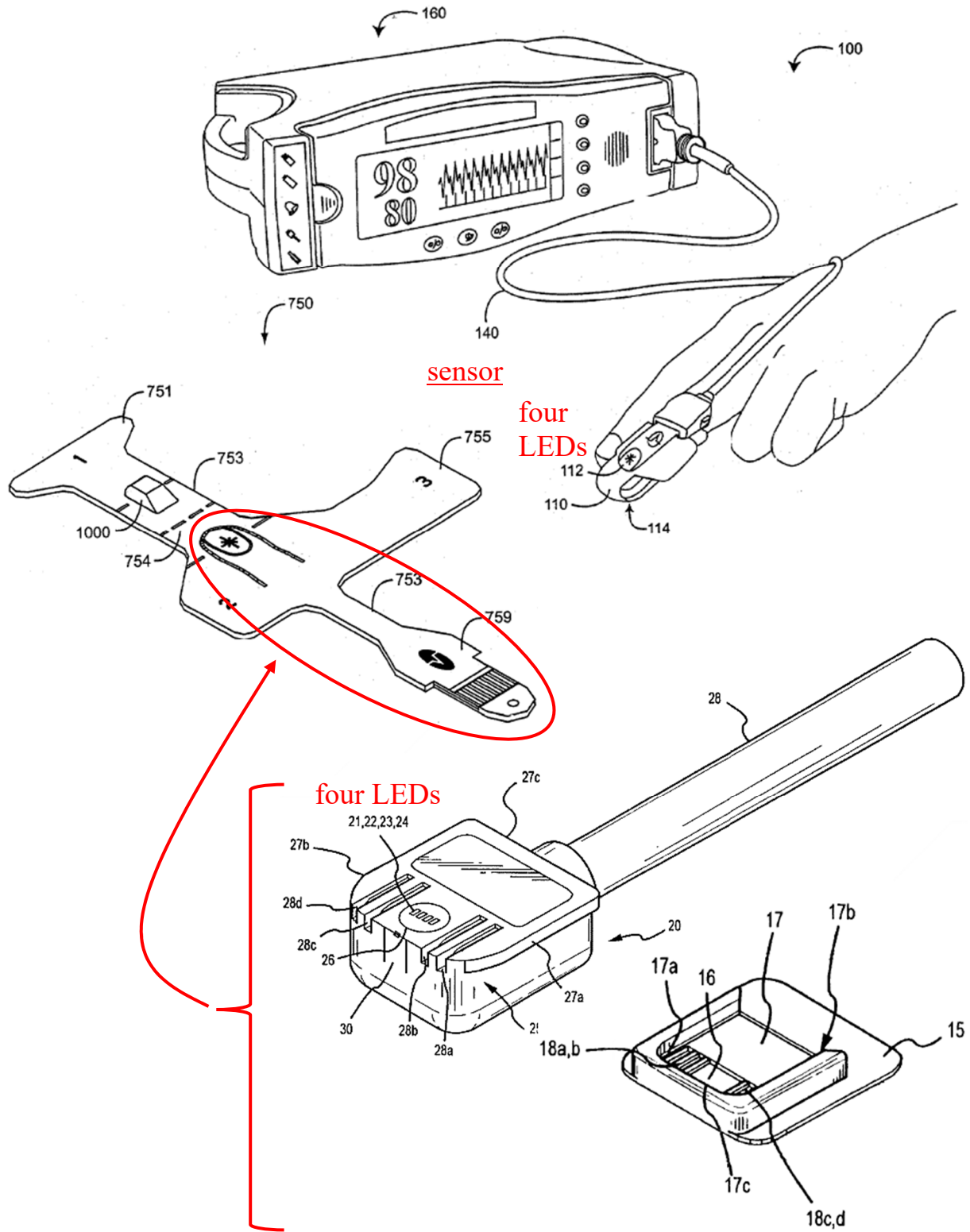
FIG.1

APPLE-1005 FIGS. 1, 3

As discussed above in Section I.A.3, a POSITA would have found it obvious

and straightforward and would have been motivated to implement Abdul-Hafiz's pulse oximetry system based on Raley's teachings to provide a pulse oximetry system (an example shown below) having a sensor with **at least four LEDs with different center wavelengths** for measuring additional blood analytes. APPLE-1005, 3:52-4:9, 4:29-44, 5:63-6:2; APPLE-1003, ¶78.

Abdul-Hafiz+Raley's physiological monitoring device



APPLE-1004, FIGS. 1, 7C; APPLE-1005, FIGS. 3, 1 (partial)

In addition, Raley's "FIG. 3 depicts a bottom elevational view" "of the patient end of interconnect cable segment 20" with "**four emitters 21, 22, 23 and 24.**" APPLE-1005, 5:63-6:2. Interconnect cable segment 20 is held in a connector 17 that "houses an optically transmissive window 16" that "enables light to be passed from emitters 21, 22, 23 and 24" "to the patient while protecting the patient from excess heat." APPLE-1005, 5:38-51. "The light transmitted" from the four emitters "passes through window or opening 26 and window 16 in probe-end 10 and impinges on the tissue of the patient." APPLE-1005, 4:63-67. A POSITA would have understood or at least found it obvious that the **four LEDs are recessed into a cavity** covered by window/opening 26 of the interconnect cable segment 20 and that **the interconnect cable segment 20 with the four LEDs is recessed into a cavity** formed in connector 17 and covered by window 16, as shown below, which provides the benefit of "protecting the patient from excess heat" emitted by the LEDs. APPLE-1003, ¶79; APPLE-1005, 5:38-51.

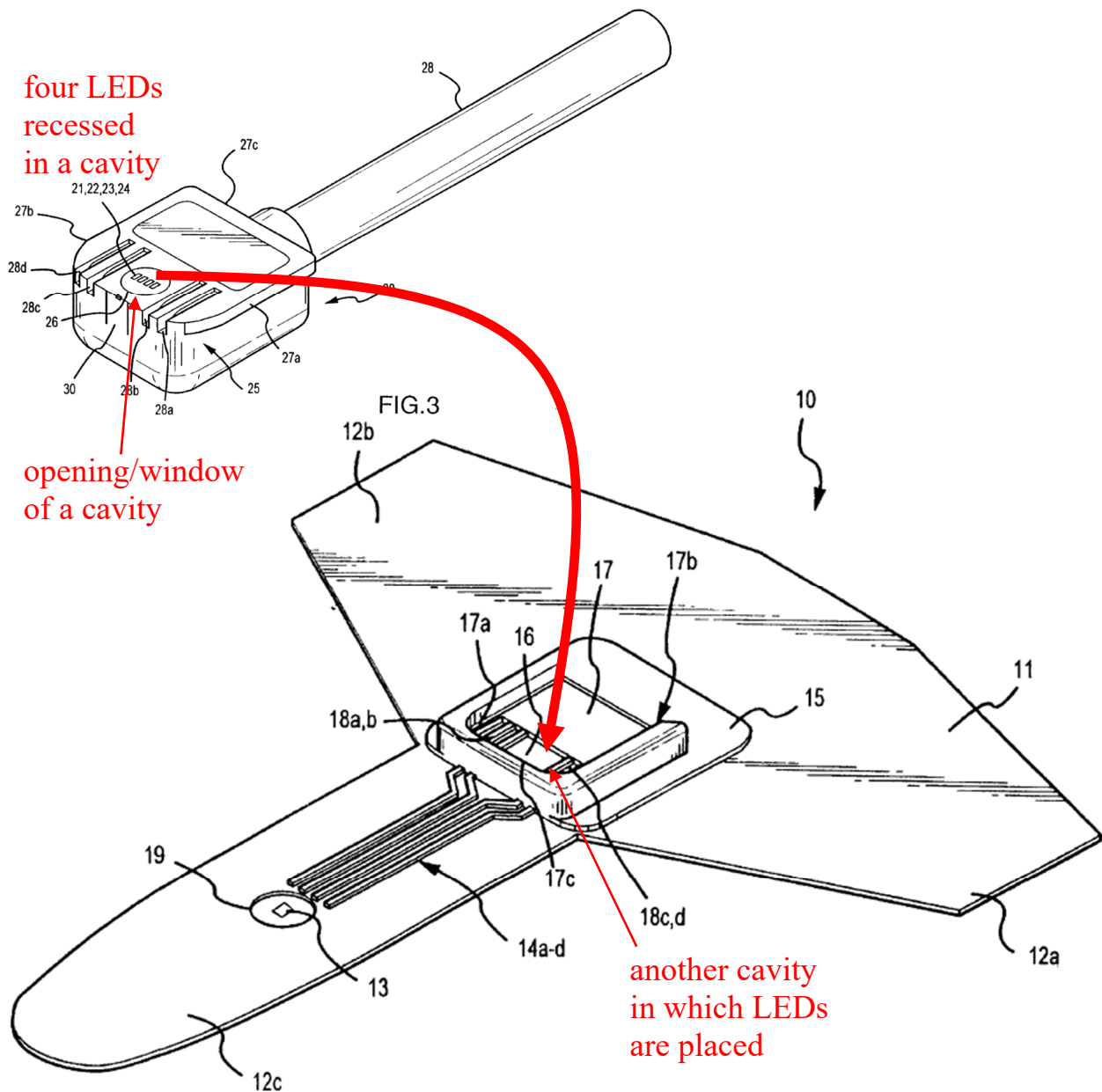


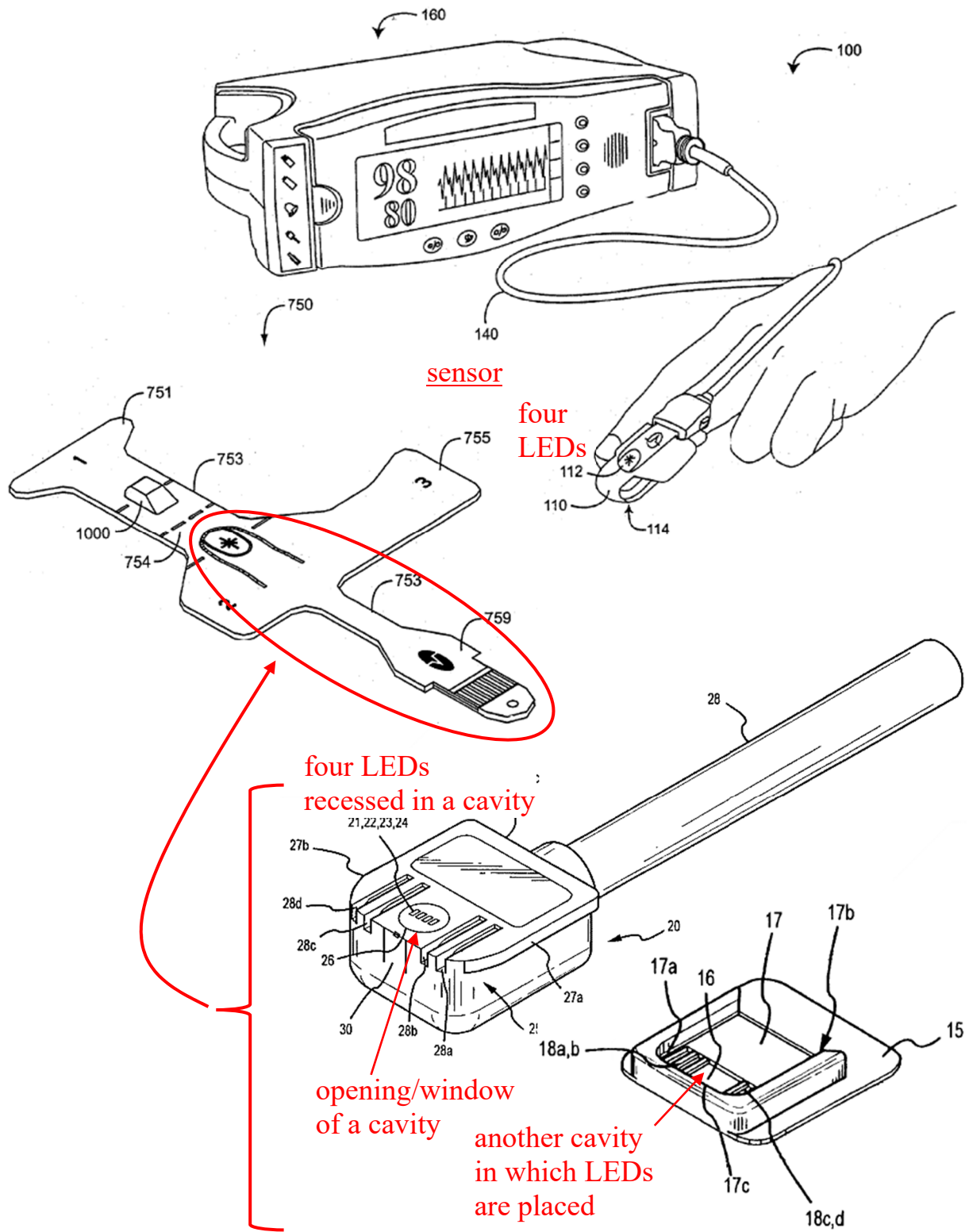
FIG. 1

APPLE-1005 FIGS. 1, 3

As in Raley's system, a POSITA would have understood or at least found it obvious that, in the Abdul-Hafiz+Raley's system, the **four LEDs are recessed into a cavity** covered by window/opening 26 of the interconnect cable segment 20

and that **the interconnect cable segment 20 with the four LEDs is recessed into a cavity** formed in connector 17 and covered by window 16, as shown below, which provides the benefit of “protecting the patient from excess heat” emitted by the LEDs. APPLE-1003, ¶80; APPLE-1005, 5:38-51.

Abdul-Hafiz+Raley's physiological monitoring device



APPLE-1004, FIGS. 1, 7C; APPLE-1005, FIGS. 3, 1 (partial)

(iii) **Element 1[b]**

Abdul-Hafiz's "pulse oximetry system 100" includes "a sensor 110" that "is configured with both red and infrared LEDs 112" that "for finger attachment, project light through the fingernail and into the blood vessels and capillaries underneath." APPLE-1004, [0002]. **"A photodiode 114 (not visible) is positioned at the finger tip opposite the fingernail so as to detect the LED emitted light as it emerges from the finger tissues." *Id.***

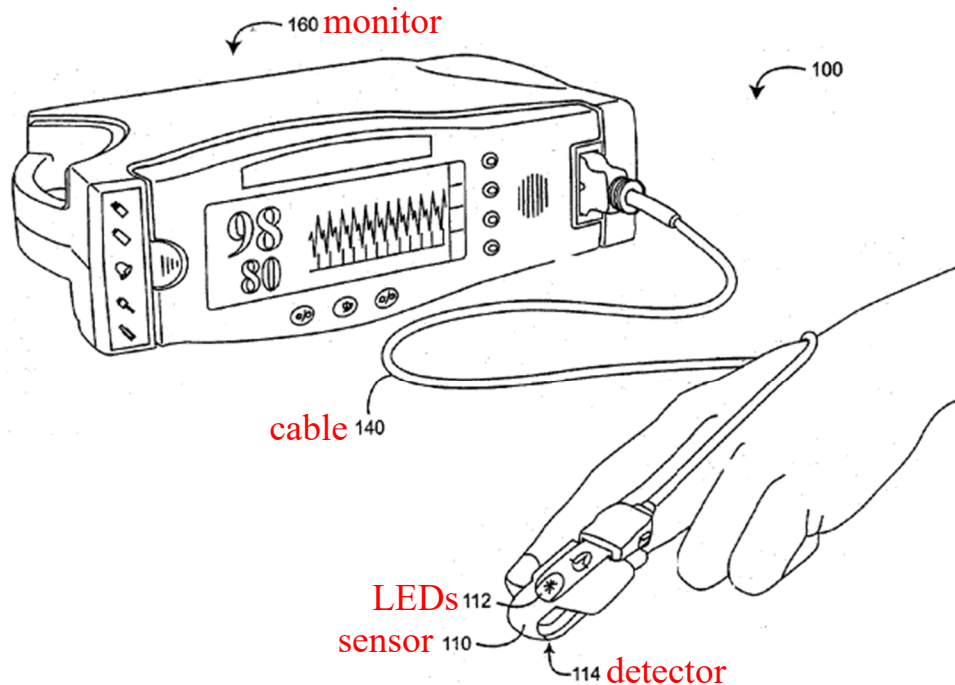


FIG. 1 (Prior Art)

APPLE-1004, FIG. 1

As shown in Abdul-Hafiz FIG. 2, "[e]mitted light 210 is projected from the LEDs 112 into the fingernail bed." APPLE-1004, [0003]. "Received light 220 propagates through the finger tissues to the detector 114, subject to absorption and

scattering, to generate a desired sensor signal.” *Id.*; APPLE-1003, ¶¶81-82.

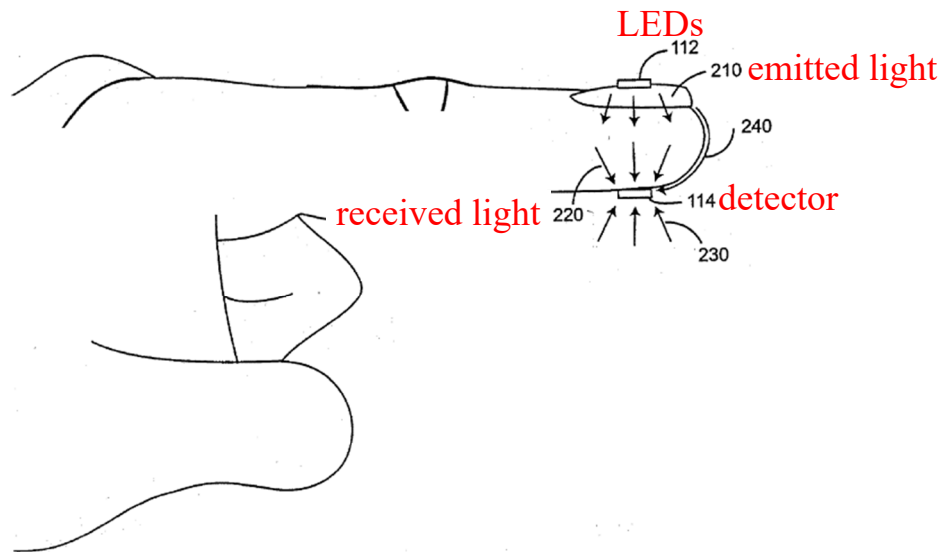


FIG. 2 (Prior Art)

APPLE-1004, FIG. 2

Similarly, Raley discloses that the “intensity of light transmitted through the tissue under test is measured by **one or more photodetectors** 13 which are located in the disposable probe-end 10.” APPLE-1005, 4:29-44. “Photodetector 13 **provides a signal corresponding to the intensity of light received denoted $I_{\lambda 1}$, $I_{\lambda 2}$, $I_{\lambda 3}$ and $I_{\lambda 4}$.**” *Id.*; APPLE-1003, ¶83.

In the combined pulse oximetry system of Abdul-Hafiz+Raley, one or more photodetectors would measure the intensity of light transmitted through the tissue by the four LEDs and provide a signal corresponding to the intensity of light received denoted by $I_{\lambda 1}$, $I_{\lambda 2}$, $I_{\lambda 3}$ and $I_{\lambda 4}$. APPLE-1003, ¶84; APPLE-1004, [0002], [0003]; APPLE-1005, 4:29-44.

Abdul-Hafiz+Raley's physiological monitoring device

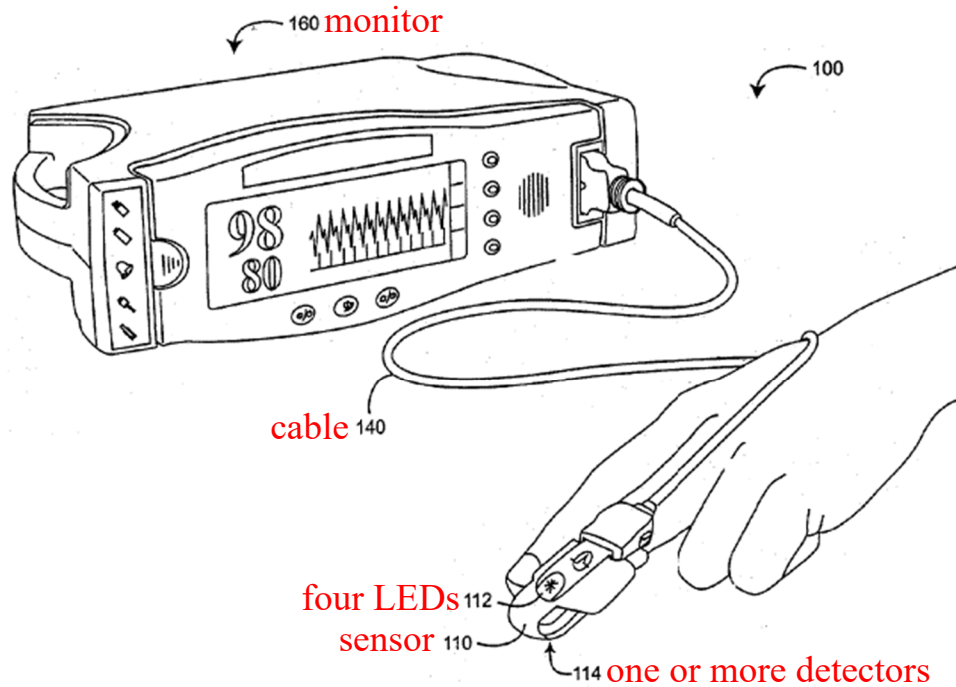


FIG. 1 (Prior Art)

APPLE-1004, FIG. 1

(iv) **Element 1[c]**

Abdul-Hafiz discloses that “FIG. 2 illustrates various optical noise sources for a sensor 110.” APPLE-1004, [0003]. “Light which illuminates the detector 114 without propagating through the finger is **unwanted optical ‘noise’ that corrupts the desired sensor signal.**” *Id.* “Noise sources include ambient light 230 and piped light 240.” *Id.* “Ambient light 230 is transmitted to the detector 114 from external light sources, i.e. light sources other than the LEDs 112.” *Id.* “Piped light 240 is stray light from the LEDs 112 that is transmitted around a tissue site along a light conductive surface, such as a reflective inner surface of face stock

material, directly to the detector 114.” *Id.*

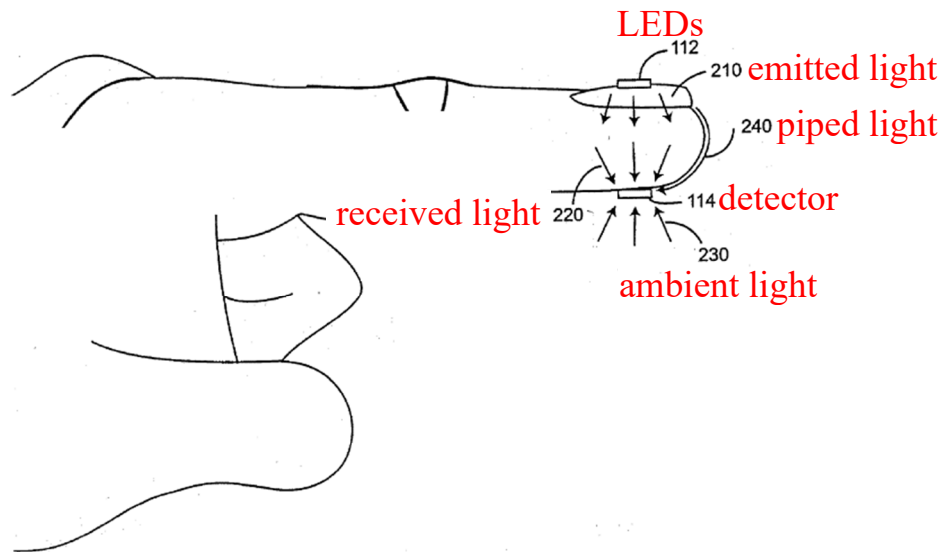


FIG. 2 (Prior Art)

APPLE-1004, FIG. 2

At least under Patent Owner’s apparent application of element 1[c] in its complaint for infringement and proposed construction in the litigation, Abdul-Hafiz’s optical housing 400 is **a light block**. APPLE-1003, ¶¶85-87. To block unwanted optical noise, Abdul-Hafiz provides “**a low noise optical housing 400**” (**light block**)(FIGS. 4A-C) that “is configured to **accept a detector 820** (FIGS. 6A-B) and **provide ambient light and piped light reduction.**” APPLE-1004, [0033]. The “**low noise optical housing 400 advantageously incorporates the functions of a light barrier**, opaque cover, spacer and aperture...in a relatively small, easy to manufacture, one-piece design.” *Id.* Abdul-Hafiz’s “FIGS. 5A-D illustrate the housing 400 in an open position 510 (FIGS. 5AB) and a closed position 560 (FIGS. 5C-D).” APPLE-1004, [0038]. “In the closed position 560,

the housing 400 provides an optical enclosure for a detector” and thus at least partially surrounds the detector. *Id.*; APPLE-1003, ¶87. As shown in FIG. 6A below, a “detector 820 is enclosed in the optical housing 400” (light block). APPLE-1004, [0039].

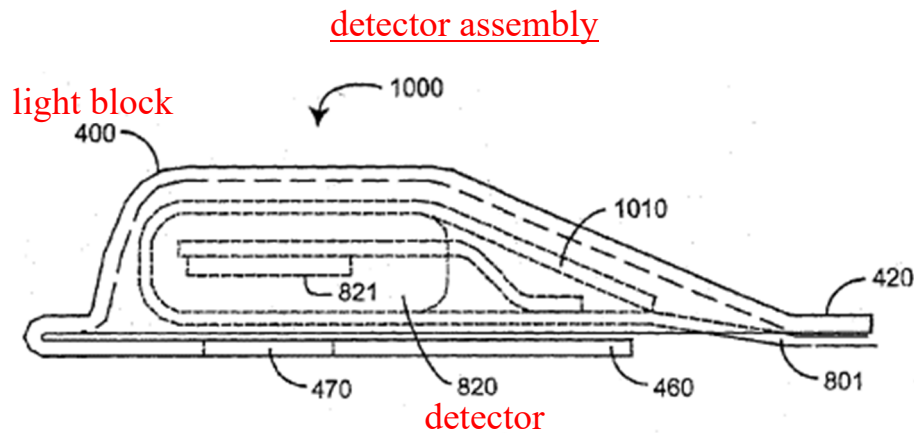
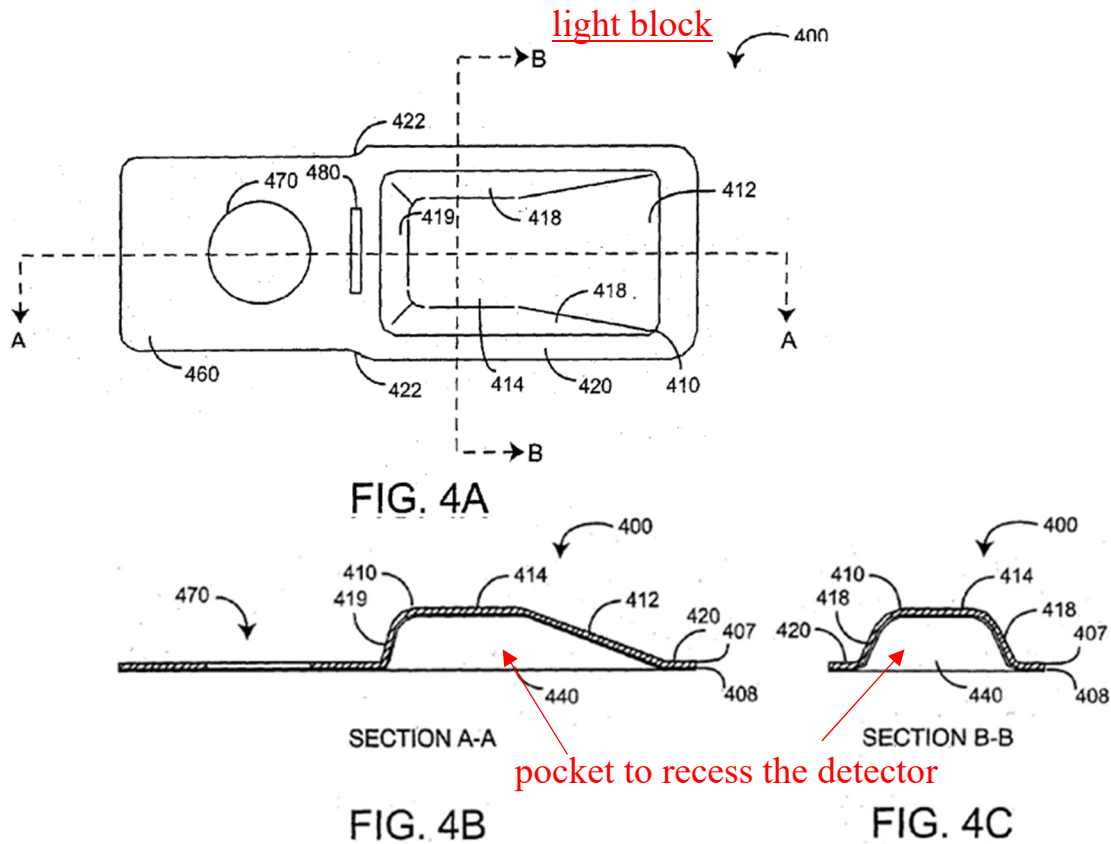


FIG. 6A

APPLE-1004, FIG. 6A

Abdul-Hafiz’s “optical housing 400” (light block) includes a “cover 410” and “base 460.” APPLE-1004, [0033]. As shown in FIGS. 4B-C, the “cover 410 defines [a] pocket 440 for securing a detector 820.” APPLE-1004, [0036]. A POSITA would have understood that the optical housing 400 (light block) is configured to recess the detector 820 into the pocket 440 of the housing. APPLE-1003, ¶88.



APPLE-1004, FIGS. 4A-4C

As shown in FIG. 6A, the “**detector 820** is enclosed in the **optical housing 400.**” APPLE-1004, [0039]. A POSITA would have understood that the optical housing 400 (**light block**) is configured to recess the detector 820 into the pocket of the housing. APPLE-1003, ¶89.

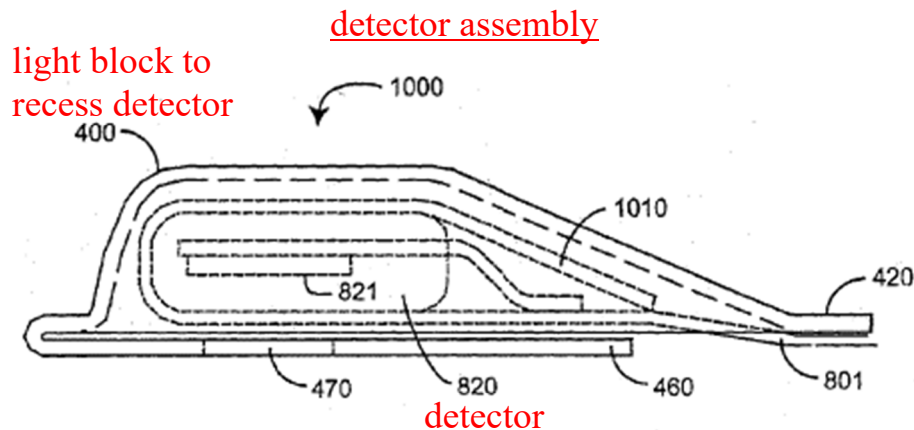


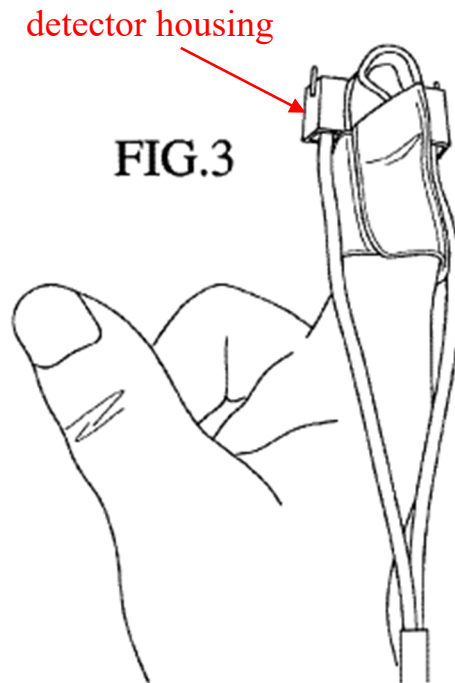
FIG. 6A

APPLE-1004, FIG. 6A

At least under Patent Owner's apparent application of element 1[c] in its complaint for infringement and proposed construction in the litigation, Abdul-Hafiz's optical housing 400 (**light block**) has a **shoebox structure**. APPLE-1003, ¶90.

To the extent the structure of Abdul-Hafiz's optical housing 400 were deemed to **not** correspond to that of a **light block** or a **shoebox structure**, a POSITA would have recognized that detector housings, as used in Abdul-Hafiz, come in various shapes and sizes. APPLE-1003, ¶91. Abdul-Hafiz explicitly states that while the "low noise optical housing has been disclosed in detail in connection with various embodiments," "[t]hese embodiments are disclosed by way of example only" and "[o]ne of ordinary skill in the art will appreciate many variations and modifications." APPLE-1004, [0053]. To that end, Parker

corroborates what a POSITA would have known, that one conventional structure for a detector housing is a structure having surfaces and openings that are all rectangular shaped, corresponding to **a light block** and **a shoebox structure**:



APPLE-1009, FIG. 3

A POSITA, therefore, would have found it obvious to implement Abdul-Hafiz's optical housing 400 using a differently shaped optical housing, e.g., one with the shape of a light block and shoebox structure. APPLE-1003, ¶92. Indeed, using such a housing, as evidenced by Parker, was common practice well before the Critical Date, and there was nothing new or inventive about changing one housing shape for another. *Id.* Nor does the specification of the '911 patent indicate otherwise. *Id.* References like Parker provide evidence of the background

knowledge that a POSITA would have brought to bear in an evaluation of the teachings of Abdul-Hafiz, and confirm the notion that a POSITA would have been aware that a differently shaped optical housing for housing a detector of a physiological sensor was a known option and would have found it to be simply a matter of design choice to use different shapes for Abdul-Hafiz's optical housing. *Id.*

A POSITA would have understood that the Abdul-Hafiz housing and the Parker housing perform the same function of enclosing the detector in an optical sensor attached to a user's finger. APPLE-1003, ¶93; APPLE-1009, FIG. 3. Abdul-Hafiz does not suggest that the shape of such a housing has any functional significance in the operation of the optical sensor, or that any particular known shape was preferred or restricted. APPLE-1003, ¶93. Thus, the evidence indicates that housing shapes like those disclosed by Parker and Abdul-Hafiz were known in the art to be predictable substitutes for one another, and therefore obvious variants. *KSR*, 550 U.S. at 416-417.

Further, the '911 patent provides no explanation of how the particular light block shape solves some problem or presents some unexpected result. *See In re Kuhle*, 526 F.2d 553, 555 (CCPA 1975). Rather, a POSITA would have simply recognized that the light block shape is a non-inventive feature and that it would have been quite routine to use a differently shaped structure surrounding the at

least one detector. APPLE-1003, ¶94; *see Apple Inc. v. Masimo Corp.*, IPR2021-00193, Paper 30, 76-80 (PTAB June 2022).

(v) **Element 1[d1]**

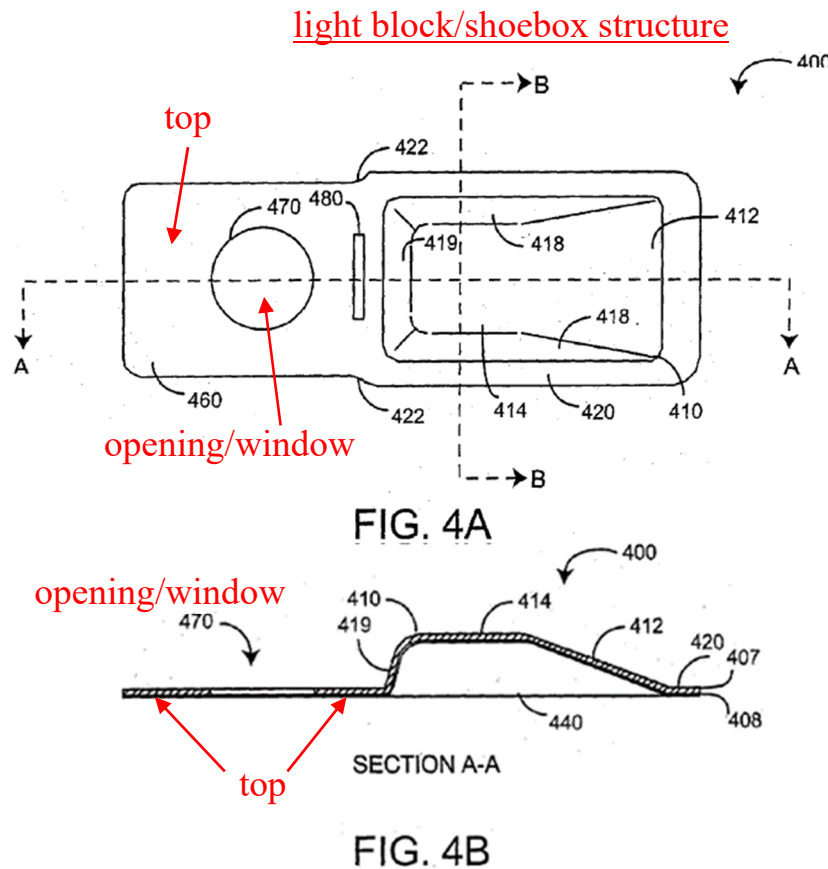
Abdul-Hafiz’s “**housing 400** is advantageously constructed of a flat substrate which, in one embodiment, is **a laminate of two materials** including an outer white layer 407 and **an inner black layer 408**.” APPLE-1004, [0034]. “By utilizing a laminate of both white and **black material**, the low noise optical housing 400 advantageously functions both as a light absorber and as a light reflector.” *Id.* “**The black layer 408 absorbs unwanted ambient light, preventing it from reaching the enclosed detector 820** (FIGS. 6A-B).” *Id.* Alternatively, “**the housing 400 is formed from a black substrate**, which is painted white on the outside, i.e. the side corresponding to the outer white layer 407, or otherwise coated on the outside with a reflecting material or substance.” APPLE-1004, [0035]. Thus, Abdul-Hafiz’s housing (light block) is formed of black materials. APPLE-1003, ¶95.

(vi) **Element 1[d2]**

Abdul-Hafiz discloses that, as “shown in FIGS. 4A-C, the **base 460 [top]** defines a generally centered **aperture 470 [opening/window]** and a slot 480 proximate the flange 420, partially extending across the base width 503 (FIG. 5A).” APPLE-1004, [0037]. “The slot 480 allows the base 460 to be easily folded

so that **the aperture 470 is in proper alignment with the detector active area.**”

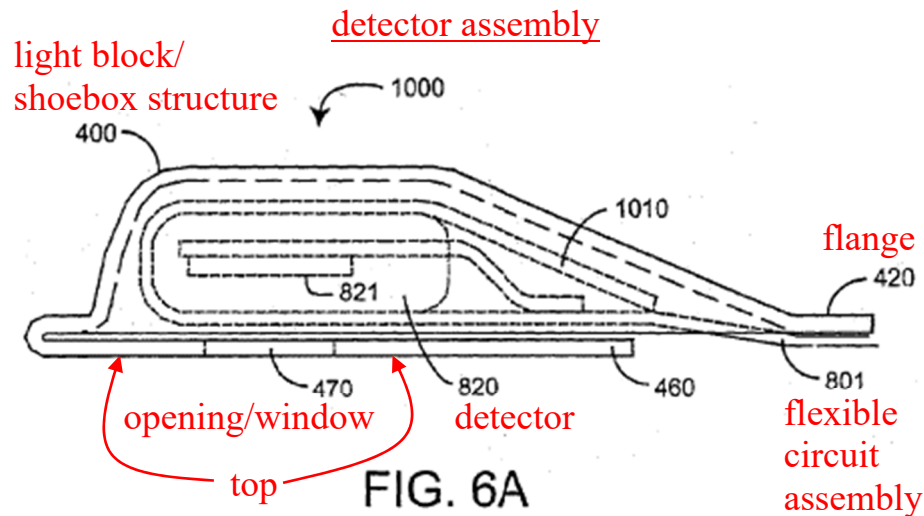
Id. The aperture 470 is “**generally centered within the base portion and aligned with the detector in the closed position so as to pass light through to the detector.**” APPLE-1004, Abstract, [0005]-[0007]; APPLE-1003, ¶96.



APPLE-1004, FIGS. 4A-4C

As shown in FIG. 6A, the “detector 820 is enclosed in the optical housing 400” “so that **the active area of the photodiode chip 821 is aligned with the housing aperture 470**” (opening/window). APPLE-1004, [0039]. From Abdul-Hafiz’s disclosure, a POSITA would have understood that the aperture 470 is the

only opening through which light is configured to pass. APPLE-1003, ¶97. The gap between the base 460 (top) and the flange 420 through which the flexible circuit assembly 801 exits the housing (light block) is not configured to pass light to the detector. *Id.*; APPLE-1004, [0039].



APPLE-1004, FIG. 6A

Similarly, the '911 patent also includes an opening in the light block for inserting the detector assembly and for the flex circuit to exit the light block. APPLE-1001, 15:17-19, 19:15-17; APPLE-1003, ¶98.

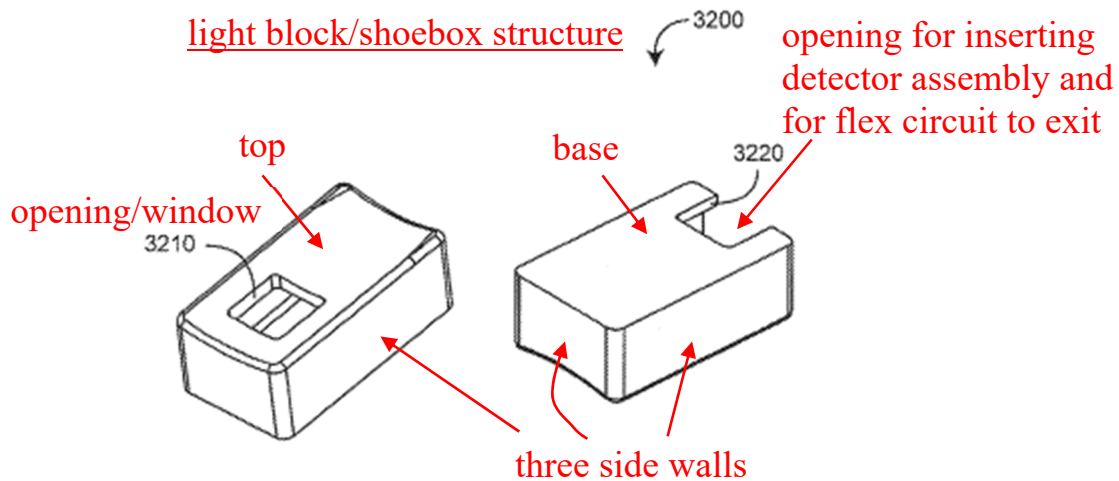


FIG. 32B

FIG. 32A

APPLE-1001, FIGS. 32A-32B

(vii) **Element 1[d3]**

Because Abdul-Hafiz+Raley is a transmittance pulse oximetry system, a POSITA would have understood that the received light 220 transmitted by the LEDs 112 through the finger is incident on the detector 114 with small angles of incidence, and optical noise sources such as ambient light 230 and piped light 240 are incident on the detector 114 with large angles of incidence, as shown by Abdul-Hafiz's FIG. 2. APPLE-1004, [0003]; APPLE-1003, ¶99. To block unwanted optical noise from reaching the detector, Abdul-Hafiz provides "a low noise optical housing 400" to "provide ambient light and piped light reduction." APPLE-1004, [0033].

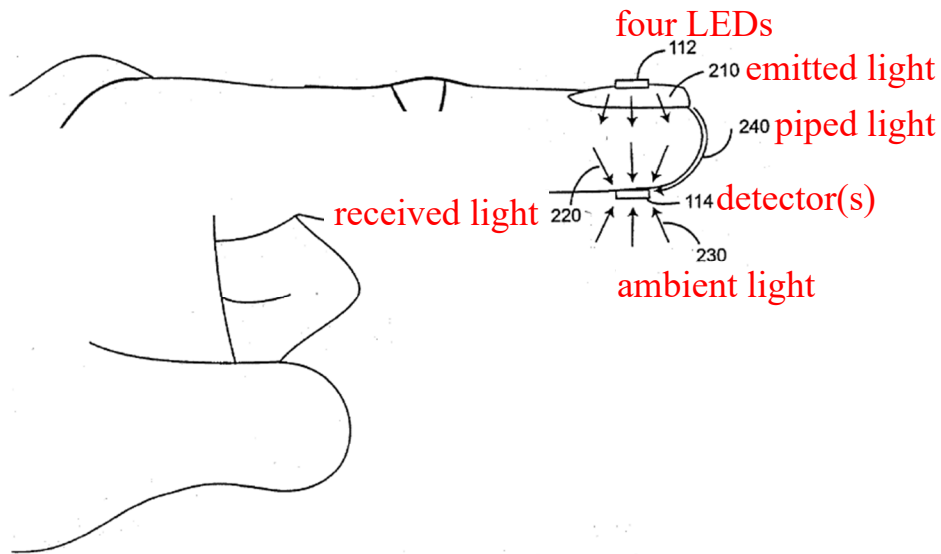
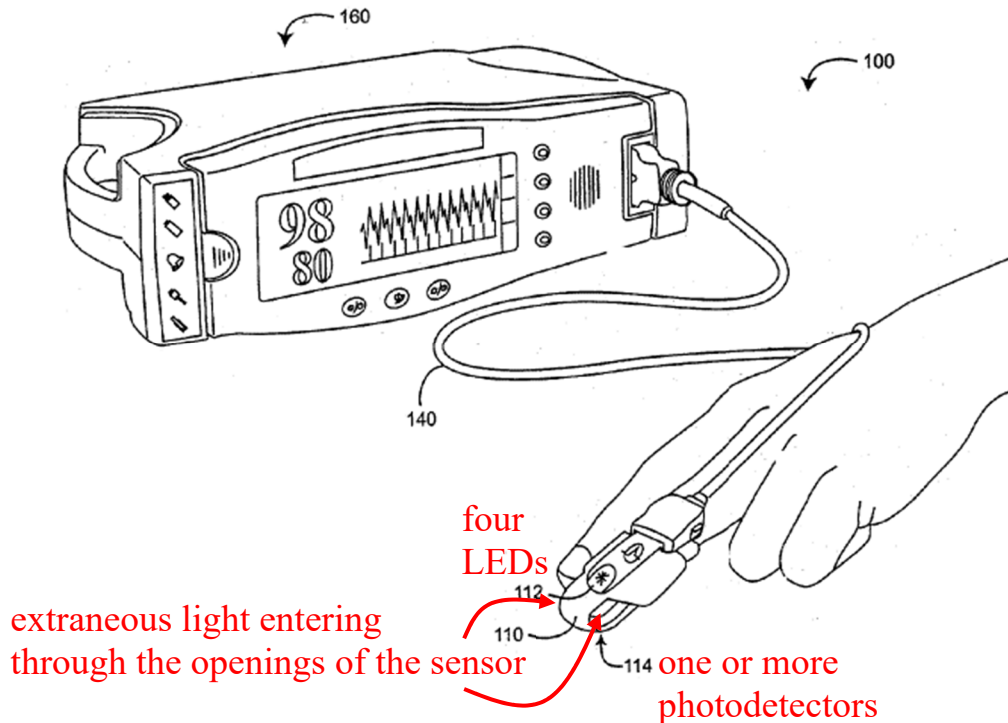


FIG. 2 (Prior Art)

APPLE-1004, FIG. 2

A POSITA would have understood that Abdul-Hafiz+Raley's sensor does not completely enclose the entire finger, as shown in Abdul-Hafiz's FIG. 1 below, and consequently, it is possible that extraneous light enters through the openings of the sensor and is guided through the skin of the finger to the detector, causing erroneous or inaccurate measurements. APPLE-1004, [0003]; APPLE-1003, ¶100.

Abdul-Hafiz+Raley's pulse oximetry system



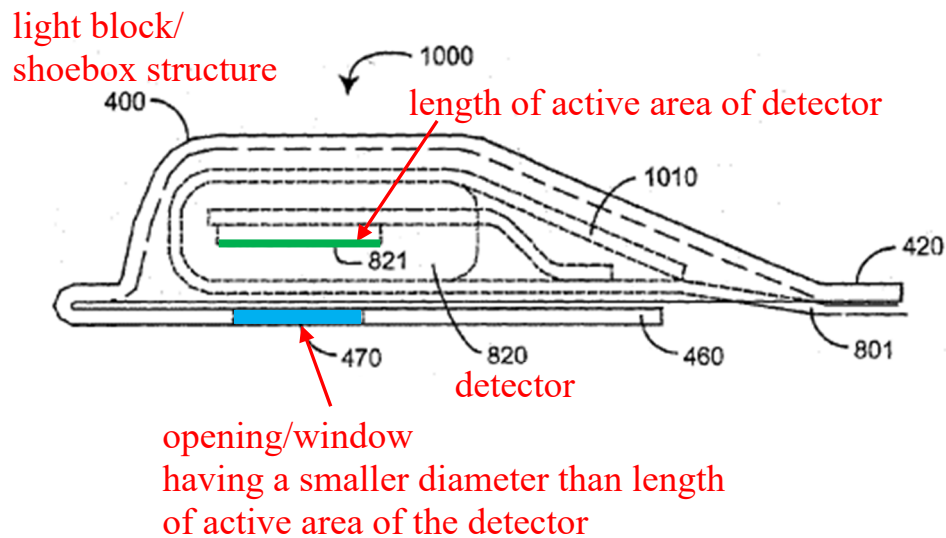
APPLE-1004, FIG. 1

As discussed above, Abdul-Hafiz discloses that “the **base 460 [top]** defines a generally centered **aperture 470 [opening/window]**” and “also provides a spacer and aperture to reduce light piping.” APPLE-1004, [0037]. Abdul-Hafiz discloses that “**the aperture 470 is in proper alignment with the detector active area**” “so as to pass light through to the detector,” and the “detector 820 is enclosed in the optical housing 400” “so that **the active area of the photodiode chip 821 is aligned with the housing aperture 470.**” APPLE-1004, [0037], [0039], Abstract, [0005]-[0007]. Abdul-Hafiz’s FIG. 6A shows a side view of the optical housing enclosing the detector with the aperture 470 (**opening/window**) having a diameter

that is smaller than the length of the active area of the photodiode chip 821

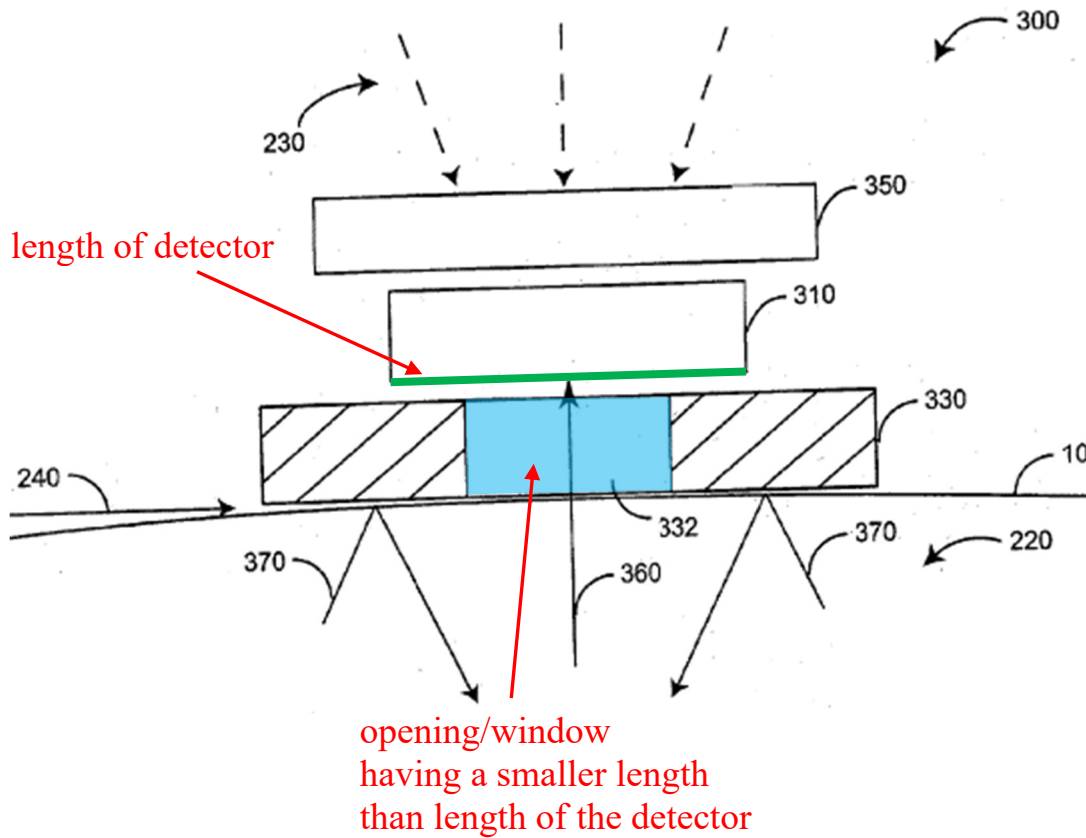
(**detection surface area**). APPLE-1003, ¶101.

Abdul-Hafiz+Raley's shielded detector assembly



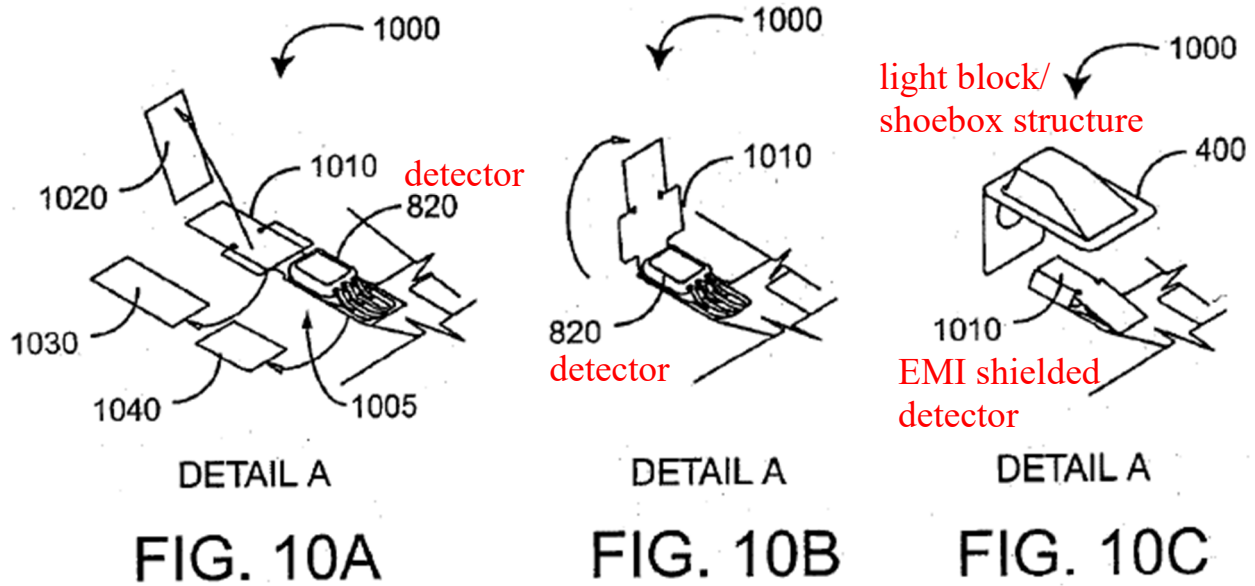
APPLE-1004, FIG. 6A

Abdul-Hafiz further discloses that “the low noise optical housing 400 advantageously incorporates the functions of a light barrier, opaque cover, spacer and aperture, as described with respect to FIG. 3.” APPLE-1004, [0033]. FIG. 3 more clearly shows that the aperture 322 has a smaller length than the length of the detector 310 “configured to receive light 220 that has propagated through a tissue site 10.” APPLE-1004, [0004]; APPLE-1003, ¶102.



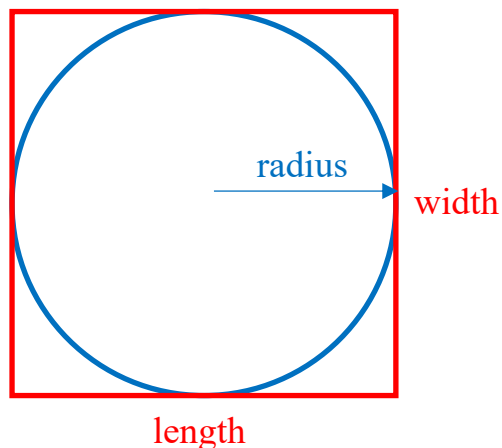
APPLE-1004, FIG. 3

Abdul-Hafiz shows that its detector 820 has a square or rectangular shape, e.g., in FIGS. 10A-10B, and its aperture 470 has a circular shape, e.g., in FIGS. 4A, 5A, 10C, 11B. APPLE-1003, ¶103.

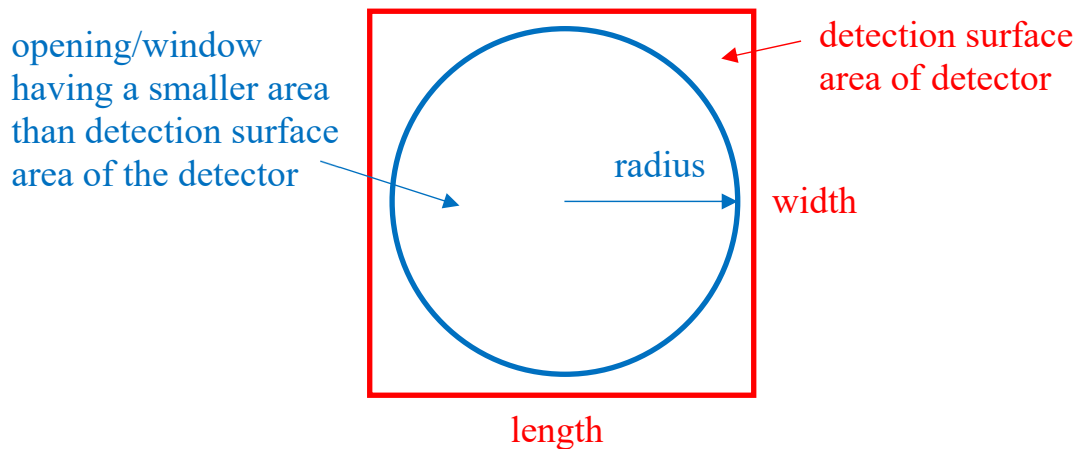


APPLE-1004, FIGS. 10A-10C

The area of a circle is calculated as $A = \pi r^2$ where r is the radius, and the area of a square or rectangle is calculated as $A = lw$ where l is the length and w is the width. APPLE-1003, ¶104. A POSITA would have recognized that a circle, having a diameter that is equal to or smaller than each side length of a square or rectangle, has a smaller surface area than that of the square or rectangle, as shown below. *Id.*

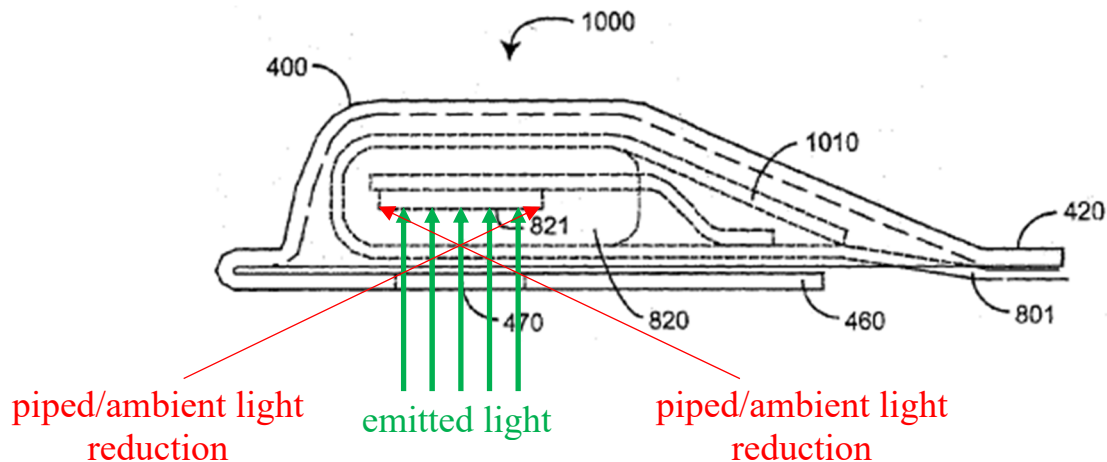


Abdul-Hafiz shows figures where the aperture has a smaller diameter than the length of the active area of the detector, and thus a POSITA would have understood or found it obvious that Abdul-Hafiz's aperture (**opening/window**) has **an area smaller than** the active area of the photodiode chip 821 (**detection surface area**). APPLE-1003, ¶105.



A POSITA also would have understood that such a dimensional relationship between Abdul-Hafiz's aperture and the active area of the photodiode chip 821 is consistent with Abdul-Hafiz's expressly disclosed purpose of the "low noise optical housing 400" to "provide ambient light and piped light reduction." APPLE-1004, [0033]; APPLE-1003, ¶106. That is, based on Abdul-Hafiz's disclosure, a POSITA would have understood or found it obvious that Abdul-Hafiz limiting the aperture diameter of its optical housing would desirably reduce the extraneous light entering through the opening of the housing and the finger as a light guide. *Id.*; APPLE-1004, [0003]. Indeed, as shown in the following

annotated figure, limiting the aperture diameter relative to the active area of the photodiode chip 821 prevents rays from optical noise sources such as ambient light 230 and piped light 240, which are typically incident on the detector 114 at a large angle of incidence, from reaching the active area of the detector. *Id.*



APPLE-1004, FIG. 6A

(viii) **Element 1[e]**

As discussed above in element 1[p], Abdul-Hafiz discloses that “[p]ulse oximetry is a widely accepted noninvasive procedure for **measuring the oxygen saturation level of arterial blood**, an indicator of a person’s oxygen supply.”

APPLE-1004, [0002]. Abdul-Hafiz provides “**a pulse oximetry system 100 having a sensor 110 applied to a patient, a monitor 160** and a patient cable 140 connecting the sensor 110 and the monitor 160.” *Id.*; APPLE-1003, ¶107.

As discussed above in element 1[a], Raley provides a “probe 40” for use with a “photoplethysmographic monitor” that “is capable of measuring a plurality

of blood analyte concentrations such as O₂Hb, RHb, COHb and MetHB.”

APPLE-1005, 3:52-4:9. As discussed above in element 1[b], in the combined pulse oximetry system of Abdul-Hafiz+Raley, the photodetector would measure the intensity of light transmitted through the tissue at four wavelengths (λ_1 , λ_2 , λ_3 , and λ_4) provided by the four LEDs and provide four signals corresponding to the intensity of light received denoted by I_{λ_1} , I_{λ_2} , I_{λ_3} , and I_{λ_4} . APPLE-1003, ¶108; APPLE-1004, [0002], [0003]; APPLE-1005, 4:29-44.

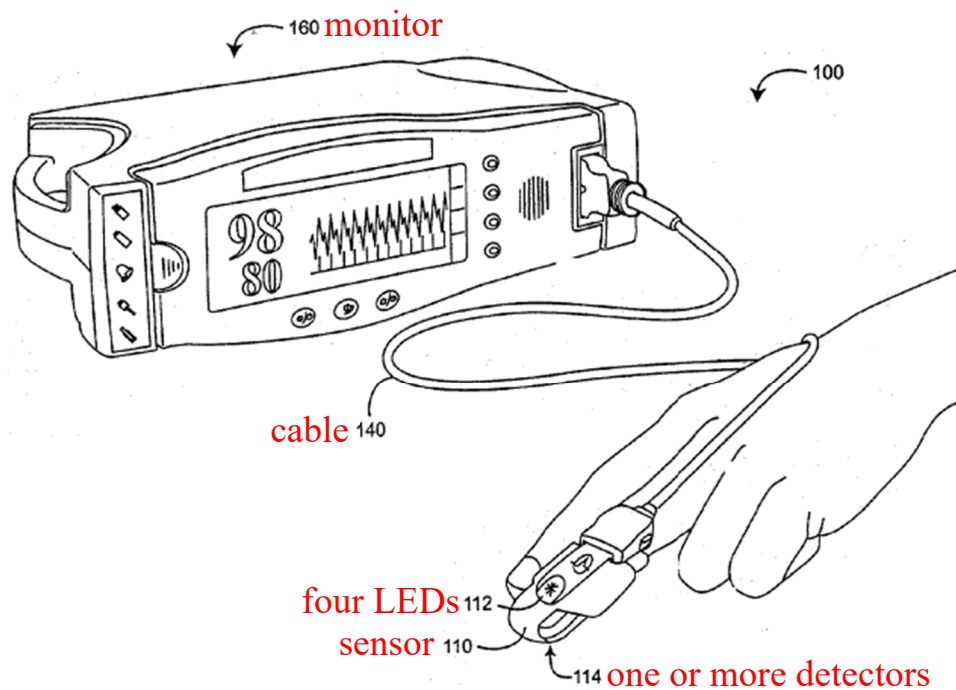


FIG. 1 (Prior Art)

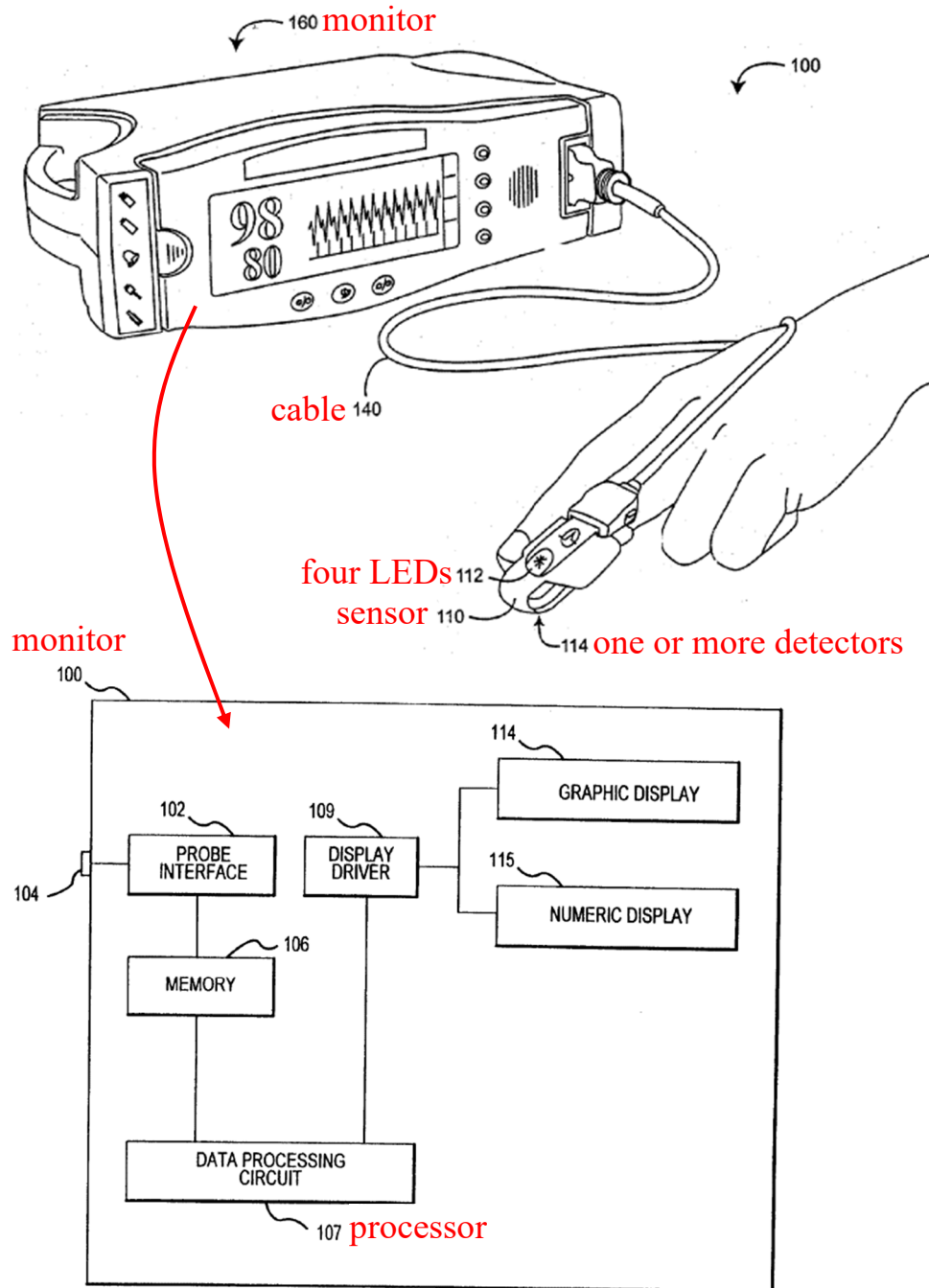
APPLE-1004, FIG. 1

Raley further discloses that this “signal is then electrically routed back to **the monitor 100** through cable 28, plug 42 and socket 104 to the probe interface 102.”

APPLE-1005, 4:29-44. “In the monitor the analog received intensity signals, I_{λ_1} ,

$I_{\lambda 2}$, $I_{\lambda 3}$ and $I_{\lambda 4}$ are converted into digital signals,” “**stored in memory 106 and manipulated in data processing circuit 107 of the monitor 100 according to data processing instructions stored in memory 106 and executed by the data processing circuit 107 in order to determine an estimate of the blood analyte levels output as a percentage concentration.**” *Id.* Accordingly, in the combined pulse oximetry system of Abdul-Hafiz+Raley, a data processing circuit 107 (processor) of the monitor receives and processes the received intensity signals (signals responsive to the outputted signal from the detector) and **determines oxygen saturation and blood analyte levels (a physiological parameter) of a user responsive to the received signals.** APPLE-1003, ¶109.

Abdul-Hafiz+Raley physiological monitoring device



APPLE-1004, FIG. 1; APPLE-1005, FIG. 5

For a physiological monitoring device such as Abdul-Hafiz+Raley's, a POSITA would have understood or at least considered using at least four

wavelengths (λ_1 , λ_2 , λ_3 , and λ_4) provided by the four LEDs to measure at least four of the physiological parameters, such as oxygen saturation, oxyhemoglobin, deoxyhemoglobin, carboxyhemoglobin, and methemoglobin, and that such use would have been obvious. APPLE-1003, ¶110. Indeed, using at least four LEDs to measure at least four of oxygen saturation, oxyhemoglobin, deoxyhemoglobin, carboxyhemoglobin, and methemoglobin was common practice well before the Critical Date. *Id.* Raley explicitly discloses the use of four wavelengths (λ_1 , λ_2 , λ_3 , and λ_4) provided by four LEDs, and explains: “Such an embodiment would be useful in a photoplethysmographic monitor for measuring three or four blood analytes such as oxyhemoglobin, deoxyhemoglobin, carboxyhemoglobin and methemoglobin.” APPLE-1005, 5:66-6:2.

Jarman provides more detailed explanation of how to determine four parameters from optical measurements at four or more wavelengths. APPLE-1007, 3:21-27, 5:21-6:16; APPLE-1003, ¶¶111-113. In this case, the four signals (I_{λ_1} , I_{λ_2} , I_{λ_3} , and I_{λ_4}) are captured from the four light measurements at four wavelengths (λ_1 , λ_2 , λ_3 , and λ_4). *Id.* Each of the individual measurements at a single specific wavelength is influenced by the concentration of all four of the species of interest. *Id.* The concentration of each species of interest causes some change in the light signal at that wavelength, which can be described as differential absorptions (dAs) of the transmitted light by each species of absorber in the blood.

Id. By capturing signals at four different wavelengths and knowing the effects of each species of interest on the optical signal at each of the four wavelengths, Jarman explains that it is possible to produce an estimation of the four blood analyte levels. *Id.*

As another example, Aoyagi describes measuring oxyhemoglobin and reduced hemoglobin using four light wavelengths and the following simultaneous equations with three unknowns:

$$\Phi_{12} = [\{(Eo_1So + Er_1Sr + Ew_1CW/Hb) (Eo_1So + Er_1Sr + Ew_1CW/Hb + F)\}^{1/2} - Ex_1] / [\{(Eo_2So + Er_2Sr + Ew_2CW/Hb) (Eo_2So + Er_2Sr + Ew_2CW/Hb + F)\}^{1/2} - Ex_2] \quad (1)$$

$$\Phi_{32} = [\{(Eo_3So + Er_3Sr + Ew_3CW/Hb) (Eo_3So + Er_3Sr + Ew_3CW/Hb + F)\}^{1/2} - Ex_3] / [\{(Eo_2So + Er_2Sr + Ew_2CW/Hb) (Eo_2So + Er_2Sr + Ew_2CW/Hb + F)\}^{1/2} - Ex_2] \quad (2)$$

$$\Phi_{42} = [\{(Eo_4So + Er_4Sr + Ew_4CW/Hb) (Eo_4So + Er_4Sr + Ew_4CW/Hb + F)\}^{1/2} - Ex_4] / [\{(Eo_2So + Er_2Sr + Ew_2CW/Hb) (Eo_2So + Er_2Sr + Ew_2CW/Hb + F)\}^{1/2} - Ex_2] \quad (3)$$

where

Substance:	Symbol of concentration in blood:	Absorption coefficient
Oxyhemoglobin (O ₂ Hb)	SoHb	E _o
Reduced hemoglobin (RHb)	SrHb	E _r
Carboxyhemoglobin (COHb)	ScHb	E _c
Methemoglobin (MetHb)	SmHb	E _m
Total hemoglobin (Hb)	Hb	
Water	Cw	E _w

$$\text{Hb} = \text{O}_2\text{Hb} + \text{RHb} + \text{COHb} + \text{MetHb} = (\text{So} + \text{Sr} + \text{Sc} + \text{Sm})\text{Hb},$$

and

$$\text{So} + \text{Sr} + \text{Sc} + \text{Sm} = 1$$

APPLE-1010, 3:66-6:22, 8:26-31. Aoyagi also describes measuring oxyhemoglobin, reduced hemoglobin, and carboxyhemoglobin or methemoglobin using five light wavelengths and four simultaneous equations with four unknowns.

APPLE-1010, 6:22-7:32, 8:36-46. Aoyagi further describes measuring oxyhemoglobin, reduced hemoglobin, carboxyhemoglobin, and methemoglobin using six light wavelengths and five simultaneous equations with five unknowns.

APPLE-1010, 7:33-8:22, 8:47-51. Jarman and Aoyagi are describing the generic method for solving N equations in N or fewer unknowns as applied to a situation to determine four concentrations from four optical measurements at four different wavelengths. APPLE-1003, ¶114.

As yet another example, Kuenster explains the overall, well-established basic understanding that “the concentration of known hemoglobin species including oxyhemoglobin, deoxyhemoglobin, carboxyhemoglobin,

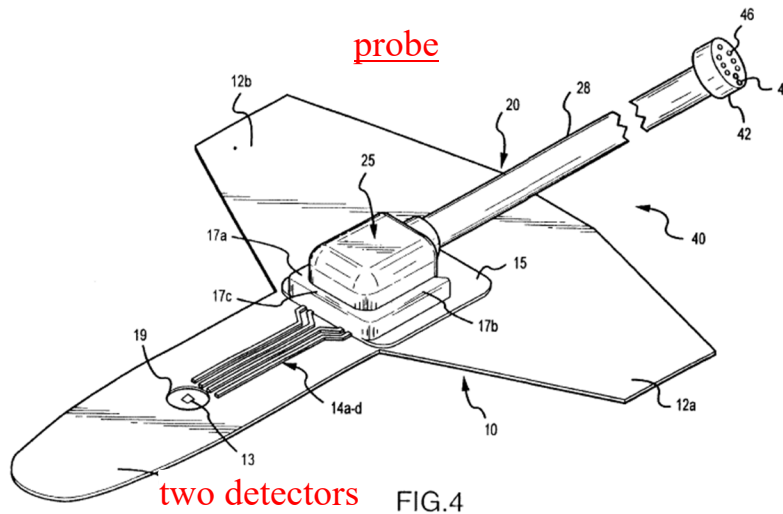
methemoglobin, and sulphemoglobin may be determined through the solution of a set of N equations with N unknowns where each unknown is a concentration of a particular hemoglobin species,” the “total number of hemoglobin species whose concentration is to be determined equals N ,” and using “absorbance data at five different wavelengths, the concentration of five species of hemoglobin may be determined.” APPLE-1012, 4:30-38, 5:27-29, 4:5-17. References like Jarman, Aoyagi, and Kuenster each describe a particular approach to constructing the N equations (measurements) in N or fewer unknowns (concentrations), and solving the equations to determine estimates of the N or fewer concentrations. APPLE-1003, ¶115. These independent yet similar descriptions of the approach to the solution of a standard algebra problem provide evidence of the background knowledge that a POSITA would have brought to bear in an evaluation of the teachings of Abdul-Hafiz and Raley. *Id.* These examples confirm the notion that a POSITA would have been aware that using at least four LEDs to measure optical absorbance at four wavelengths was a well-known method for determining four of the concentrations of oxygen, oxyhemoglobin, deoxyhemoglobin, carboxyhemoglobin, and methemoglobin. *Id.*

As explained above in Section I.A.3, a POSITA would have found it obvious and would have been motivated to use at least four wavelengths (λ_1 , λ_2 , λ_3 , and λ_4) provided by four LEDs to measure at least four of oxygen saturation,

oxyhemoglobin, deoxyhemoglobin, carboxyhemoglobin, and methemoglobin to compensate for errors in the measurement of oxygen saturation due to the presence of carboxyhemoglobin and methemoglobin in the blood in above normal levels. APPLE-1007, 1:63-2:14; APPLE-1008, 3:25-37; APPLE-1003, ¶116. A POSITA understood that if carboxyhemoglobin or methemoglobin is present in the blood in above normal levels, a conventional two-wavelength pulse oximeter will give falsely high readings for the arterial oxygen saturation. *Id.*

(b) Claim 6

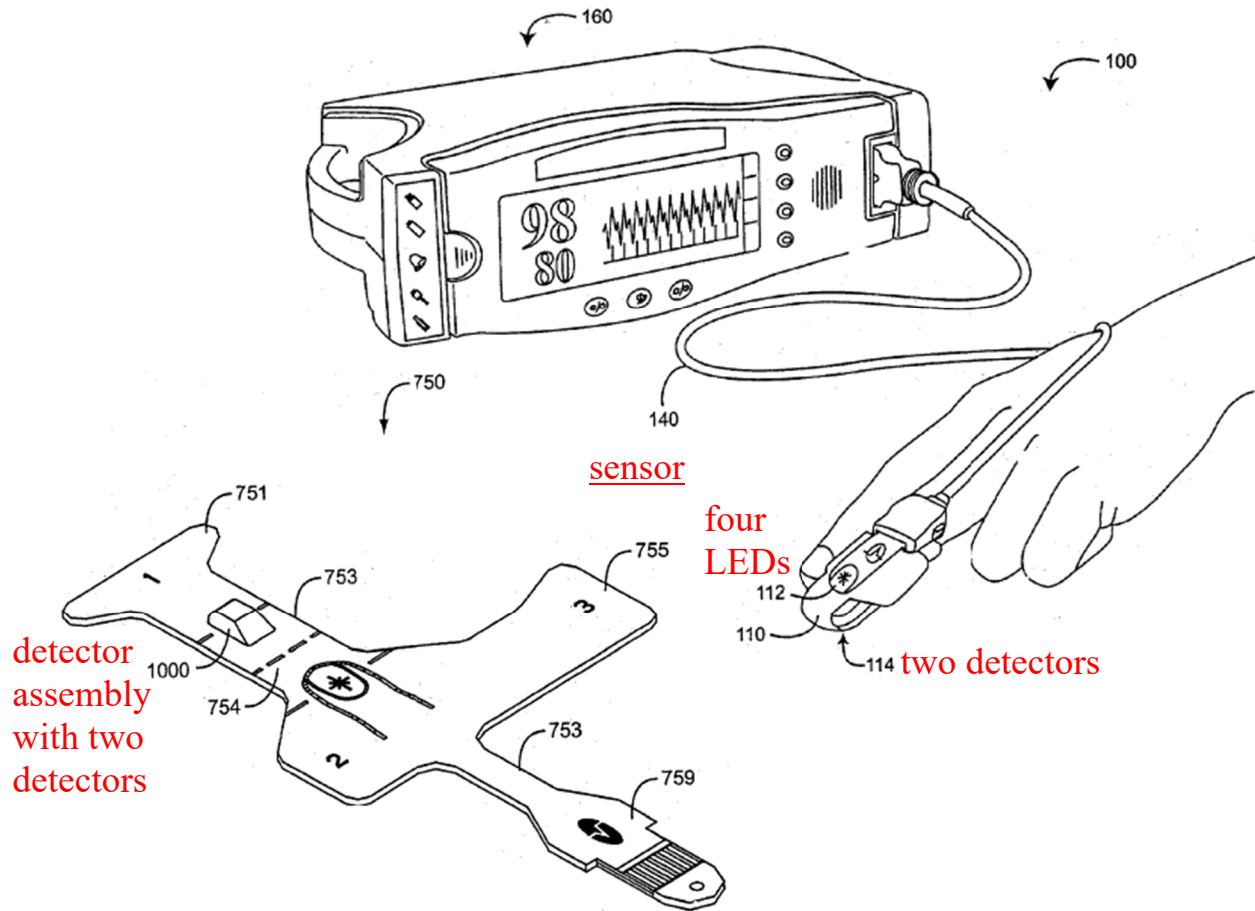
As discussed above in 1[b], Raley discloses that the “intensity of light transmitted through the tissue under test is measured by **one or more photodetectors 13** which are located in the disposable probe-end 10.” APPLE-1005, 4:29-44. “Photodetector 13 provides a signal corresponding to the intensity of light received denoted $I_{\lambda 1}$, $I_{\lambda 2}$, $I_{\lambda 3}$ and $I_{\lambda 4}$.” *Id.* Based on Raley’s explicit disclosure of “**one or more photodetectors**,” a POSITA would have understood that Raley’s probe can include two detectors. APPLE-1003, ¶117.



APPLE-1005, FIGS. 3, 4

Based on Raley's explicit disclosure of "**one or more photodetectors**," a POSITA would have understood that the Abdul-Hafiz+Raley sensor can include two detectors surrounded by and recessed in the light block. APPLE-1003, ¶118.

Abdul-Hafiz+Raley's pulse oximetry system



APPLE-1004, FIGS. 1, 7C

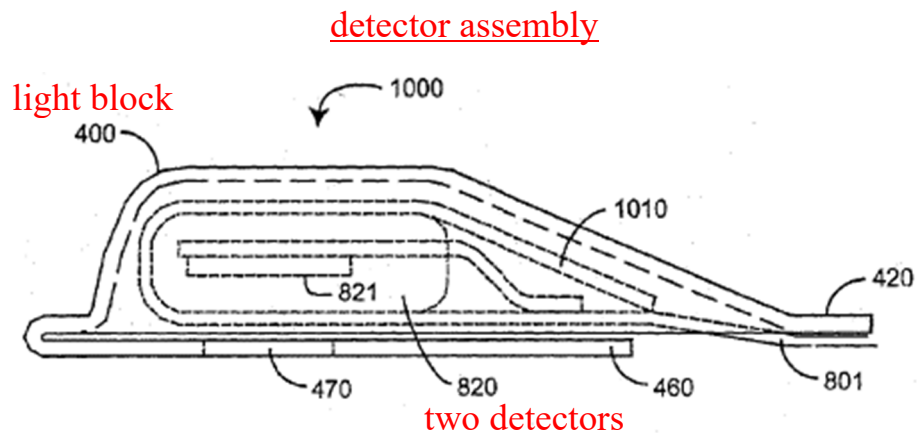


FIG. 6A

APPLE-1004, FIGS. 1, 6A

(c) Claim 8

Supra elements 1[b] and 1[d2]. APPLE-1003, ¶119.

(d) Claim 10

(i) Element 10[p]

To the extent the preamble is limiting, the Abdul-Hafiz+Raley combination satisfies element 10[p] for similar reasons as discussed above in element 1[p].

APPLE-1003, ¶120.

(ii) Element 10[a]

Supra element 1[a]. APPLE-1003, ¶121.

(iii) Element 10[b]

Supra elements 1[b] and 1[d2]. APPLE-1003, ¶122.

(iv) Element 10[c]

As discussed above in elements 1[a], 1[b], and 1[d2], the combined pulse oximetry system of Abdul-Hafiz+Raley would include four LEDs emitting light at different wavelengths to measure additional blood analytes (APPLE-1005, 1:39-45, 3:52-4:9, 5:63-6:2), and the detector would measure the intensity of light transmitted through the tissue by the four LEDs and provide a signal corresponding to the intensity of light received denoted by $I_{\lambda 1}$, $I_{\lambda 2}$, $I_{\lambda 3}$, and $I_{\lambda 4}$ (APPLE-1004, [0002], [0003]; APPLE-1005, 4:29-44).

Abdul-Hafiz+Raley's physiological monitoring device

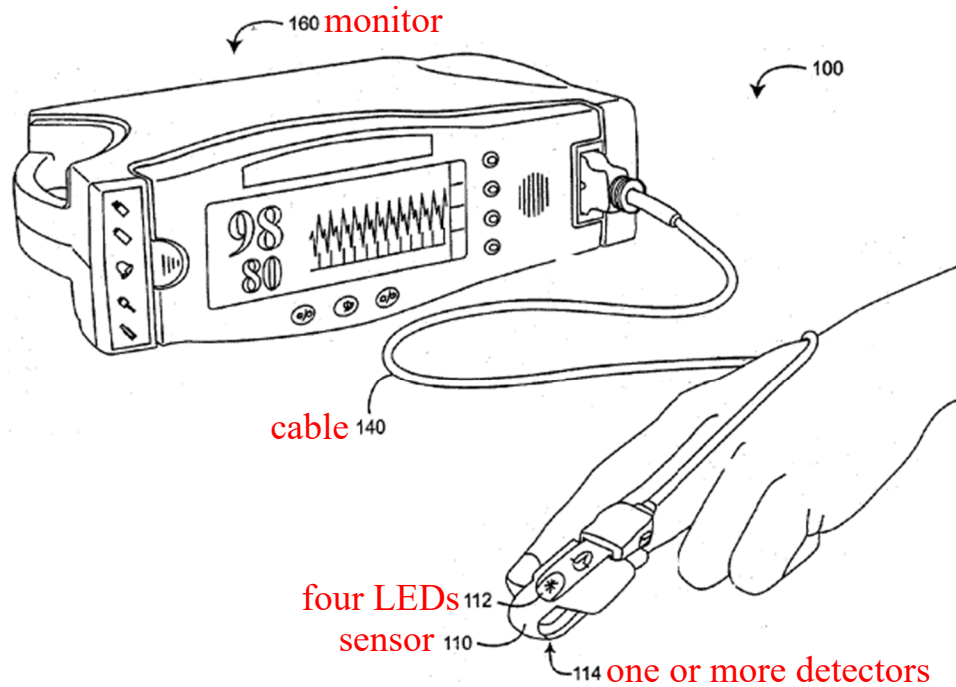


FIG. 1 (Prior Art)

APPLE-1004, FIG. 1

Abdul-Hafiz's FIG. 2 shows "the placement of the sensor LEDs 112 and detector 114 on a finger." APPLE-1004, [0003].

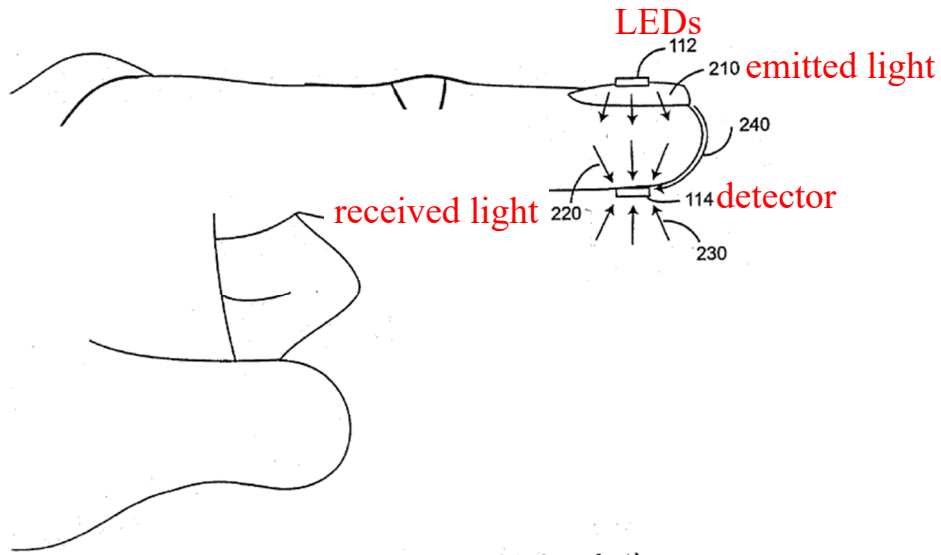


FIG. 2 (Prior Art)

APPLE-1004, FIG. 2

Abdul-Hafiz further describes “shielded detector assemblies 1000” where an “EMI shield 1010” “encloses the detector 820.” APPLE-1004, [0039].

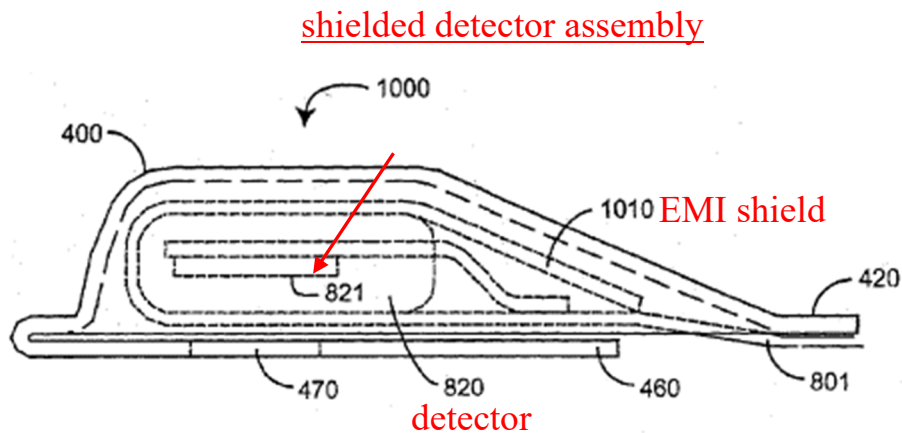
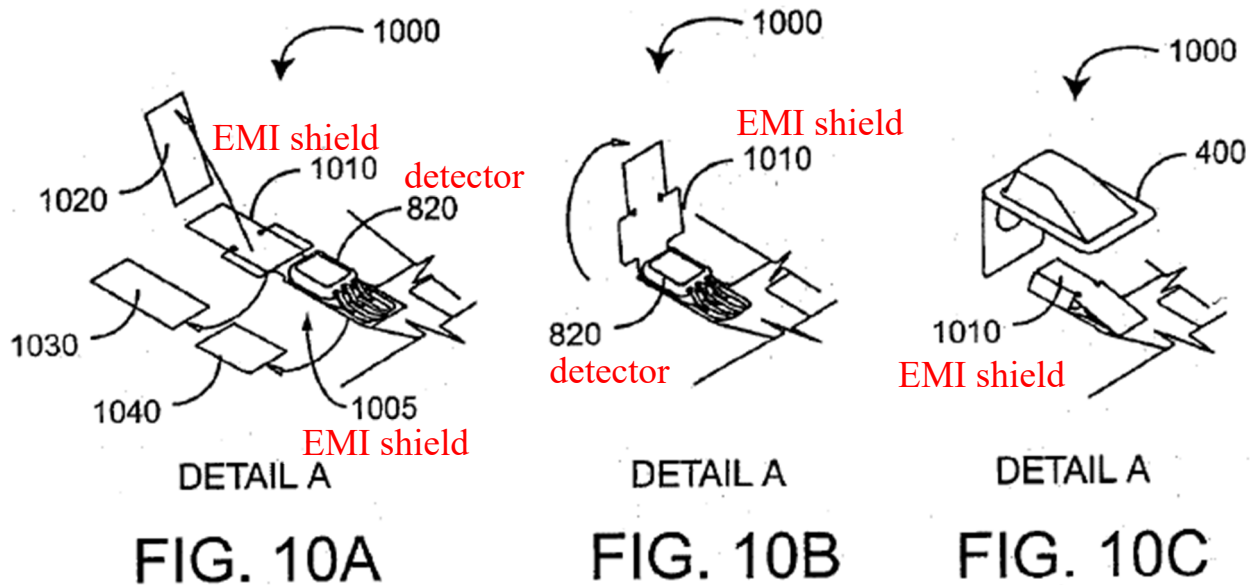


FIG. 6A

APPLE-1004, FIG. 6A

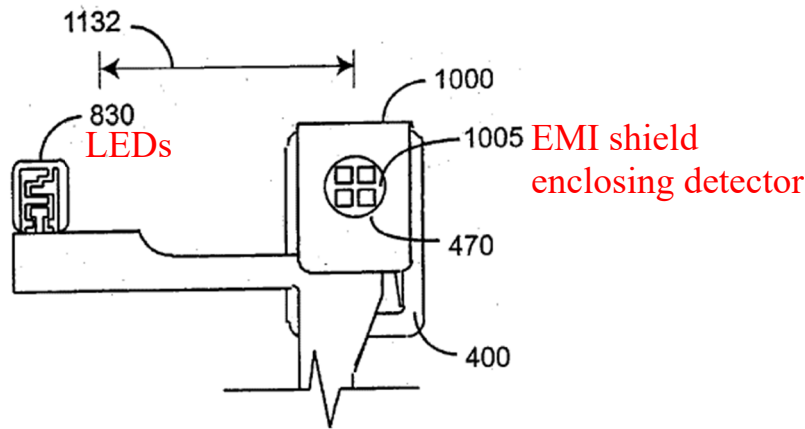
Abdul-Hafiz’s “FIGS. 10A-C illustrate a shielded detector assembly 1000” that includes “a foldable shield 1010” and “a fixed shield 1005.” APPLE-1004,

[0046]. “As shown in FIG. 10B, the shield 1010 is next folded toward the detector 820.” *Id.* “As shown in FIG. 10C, the shield 1010 is then folded over the back and sides of the detector 820, enclosing the detector 820.” *Id.* “Next, the EMI shielded detector 820 is placed into the optical housing 400.” *Id.*



APPLE-1004, FIGS. 10A-10C

Abdul-Hafiz’s “FIGS. 11A-B illustrate one embodiment of the optical portion 1100 of a sensor assembly 900 (FIGS. 9A-B) having a detector assembly 1000 and an emitter 830 connected to a pad 1110.” APPLE-1004, [0047]. In the FIG. 11B embodiment, “**the detector 820 (FIGS. 10A-B) is not visible in FIG. 11B as it is behind the fixed shield 1005.**” *Id.*



APPLE-1004, FIG. 11B

A POSITA would have understood, from Abdul-Hafiz's disclosure that the EMI shield encloses the detector (APPLE-1004, [0046]) and that the detector is behind the EMI shield (APPLE-1004, [0047]), that the EMI shield is positioned between the LEDs and the detector (APPLE-1004, FIG. 2). APPLE-1003, ¶¶123-128.

(v) **Element 10[d1]**

As discussed in element 1[c], at least under Patent Owner's apparent application of element 1[c] in its complaint for infringement and proposed construction in the litigation, Abdul-Hafiz's optical housing 400 is **a light block** that has **a shoebox structure**. APPLE-1003, ¶129.

As also discussed in element 1[c], to the extent the structure of Abdul-Hafiz's optical housing 400 were deemed to **not** correspond to that of a **light block** or a **shoebox structure**, a POSITA would have found it obvious to implement

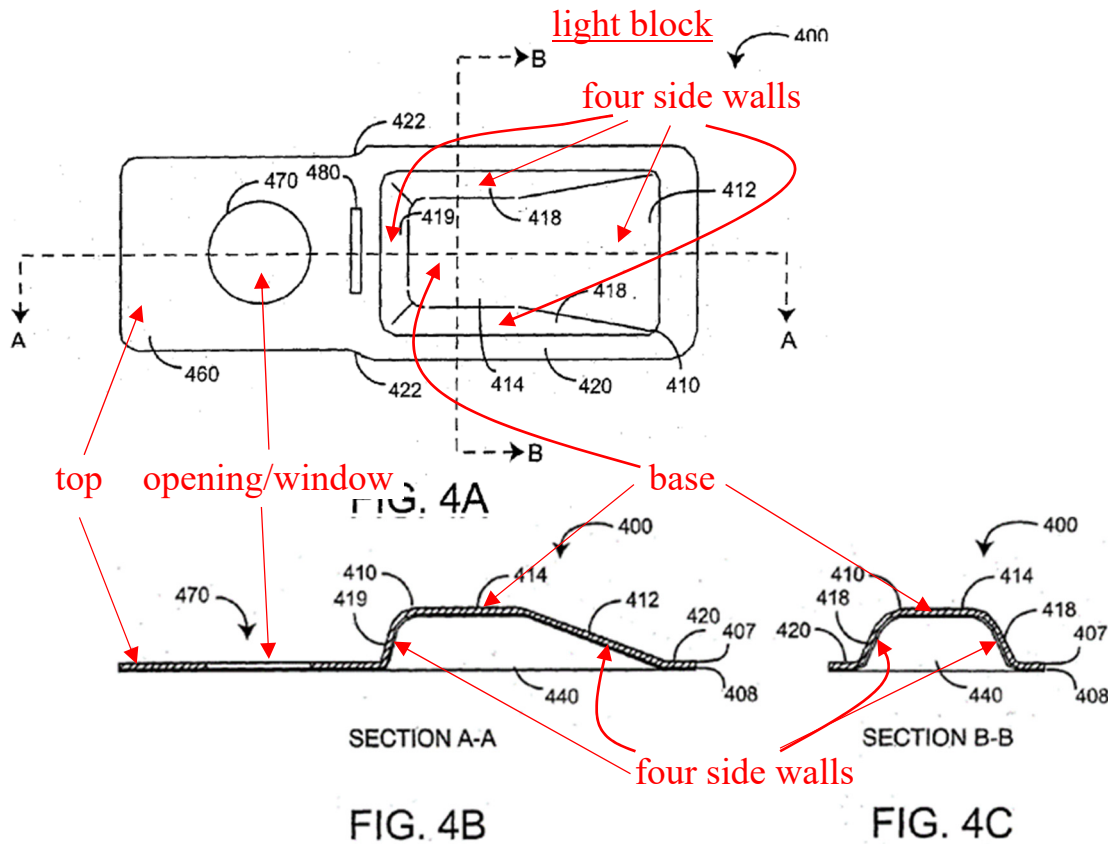
Abdul-Hafiz's optical housing 400 using a differently shaped optical housing, e.g., one with the shape of a light block and shoebox structure. APPLE-1003, ¶130. A POSITA would have been aware that a differently shaped optical housing for housing a detector of a physiological sensor was a known option and would have found it to be simply a matter of design choice to use different shapes for Abdul-Hafiz's optical housing. *Id.* A POSITA would have simply recognized that the light block shape is a non-inventive feature and that it would have been quite routine to use a differently shaped structure surrounding the at least one detector. *Id.*

(vi) **Element 10[d2]**

Supra element 1[d1]. APPLE-1003, ¶131.

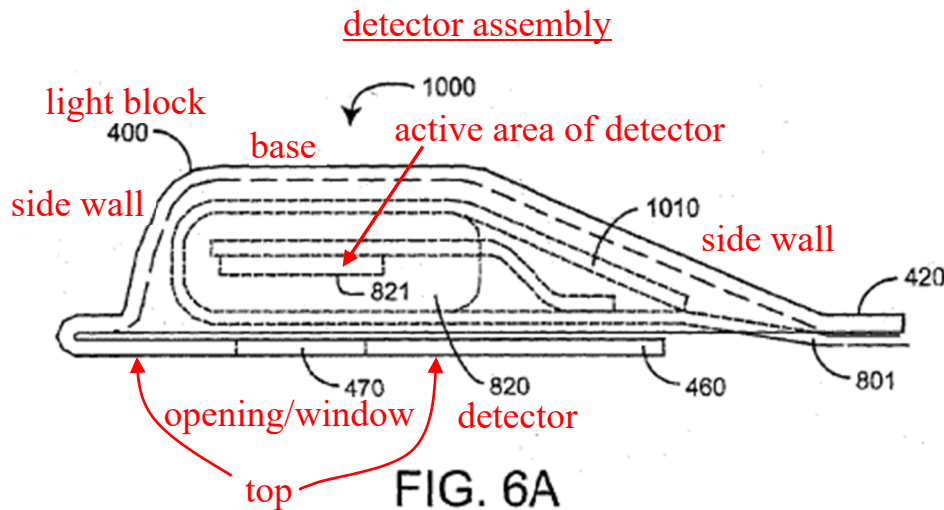
(vii) **Element 10[d3]**

Abdul-Hafiz's "**optical housing 400**" (**light block**) includes a "cover 410" and a "**base 460**" (**top**). APPLE-1004, [0033]. "As shown in FIGS. 4A-C, the cover 410 has a **ramp 412**" (**side wall**) "sloping from the flange 420 to a generally level **platform 414**" (**base**) "raised above the flange 420." APPLE-1004, [0036]. "The cover 410 also has **beveled sides 418** and a **beveled back 419**" (**three side walls**) "that slope from the flange 420 inward to the platform 414." *Id.*



APPLE-1004, FIGS. 4A-4C

As shown in FIG. 6A, the “detector 820 is **enclosed** in the optical housing 400.” APPLE-1004, [0039]. At least under Patent Owner’s apparent application of “light block” in its complaint for infringement and proposed construction in the litigation, the optical housing (light block) forms an enclosure with the detector positioned in the enclosure. APPLE-1003, ¶¶132-133.



APPLE-1004, FIG. 6A

As also discussed in element 1[c], to the extent the structure of Abdul-Hafiz's optical housing 400 were deemed to **not** correspond to that of a **light block**, a POSITA would have found it obvious to implement Abdul-Hafiz's optical housing 400 using a differently shaped optical housing, e.g., one with the shape of a light block and shoebox structure. APPLE-1003, ¶134. A POSITA would have been aware that a differently shaped optical housing for housing a detector of a physiological sensor was a known option and would have found it to be simply a matter of design choice to use different shapes for Abdul-Hafiz's optical housing. *Id.* A POSITA would have simply recognized that the light block shape is a non-inventive feature and that it would have been quite routine to use a differently shaped structure surrounding the at least one detector. *Id.*

(viii) **Element 10[d4]**

Supra elements 1[d2] and 1[d3]. APPLE-1003, ¶135.

(ix) **Element 10[e]**

Supra element 1[e]. APPLE-1003, ¶136.

(e) **Claim 15**

Supra claim 6. APPLE-1003, ¶137.

(f) **Claim 17**

Supra claim 8. APPLE-1003, ¶138.

(g) **Claim 19**

(i) **Element 19[p]**

To the extent the preamble is limiting, Abdul-Hafiz discloses that “[p]ulse oximetry is a widely accepted noninvasive **procedure for measuring the oxygen saturation level of arterial blood**, an indicator of a person’s oxygen supply” and describes “a pulse oximetry system 100 having a sensor 110 applied to **a patient**, a monitor 160 and a patient cable 140 connecting the sensor 110 and the monitor 160.” APPLE-1004, [0002]; APPLE-1003, ¶139.

Abdul-Hafiz+Raley's physiological monitoring device

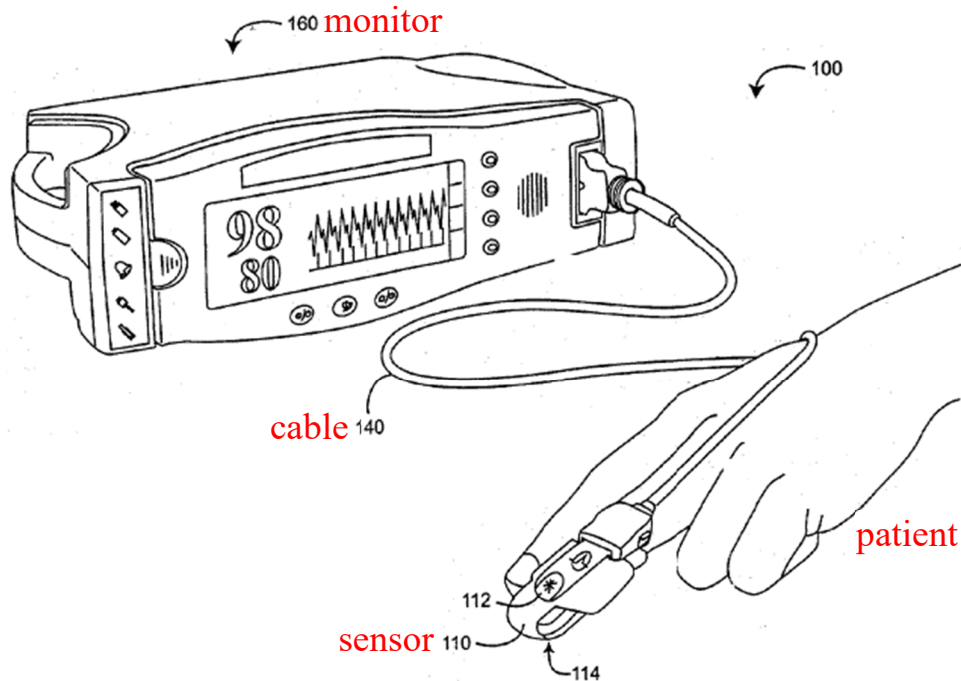


FIG. 1 (Prior Art)

APPLE-1004, FIG. 1

(ii) **Element 19[a]**

As discussed above in element 19[p], Abdul-Hafiz describes “a pulse oximetry system 100 having a **sensor 110 applied to a patient**, a monitor 160 and a patient cable 140 connecting the sensor 110 and the monitor 160.” APPLE-1004, [0002]. “The **sensor 110 is attached to a tissue site**, such as an adult patient’s finger (as shown).” *Id.*; APPLE-1003, ¶140.

Abdul-Hafiz+Raley's physiological monitoring device

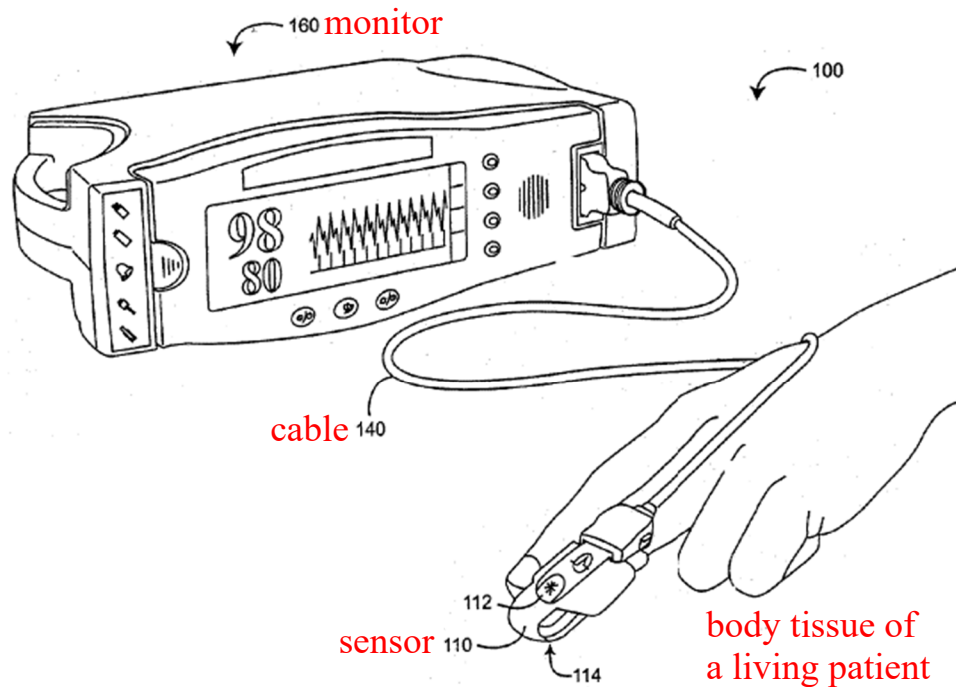


FIG. 1 (Prior Art)

APPLE-1004, FIG. 1

(iii) **Element 19[b]**

Supra element 1[a]. APPLE-1003, ¶141.

(iv) **Element 19[c]**

Supra element 1[b]. APPLE-1003, ¶142.

(v) **Element 19[d1]**

As discussed in elements 1[c] and 19[d1], at least under Patent Owner's apparent application of element 1[c] in its complaint for infringement and proposed construction in the litigation, Abdul-Hafiz's optical housing 400 is **a light block** that has **a shoebox structure**. APPLE-1003, ¶143.

As also discussed in element 1[c], to the extent the structure of Abdul-Hafiz's optical housing 400 were deemed to **not** correspond to that of a **light block** or a **shoebox structure**, a POSITA would have found it obvious to implement Abdul-Hafiz's optical housing 400 using a differently shaped optical housing, e.g., one with the shape of a light block and shoebox structure. APPLE-1003, ¶144. A POSITA would have been aware that a differently shaped optical housing for housing a detector of a physiological sensor was a known option and would have found it to be simply a matter of design choice to use different shapes for Abdul-Hafiz's optical housing. *Id.* A POSITA would have simply recognized that the light block shape is a non-inventive feature and that it would have been quite routine to use a differently shaped structure surrounding the at least one detector. *Id.*

(vi) **Element 19[d2]**

Supra element 1[d2]. APPLE-1003, ¶145.

(vii) **Element 19[e]**

Supra element 1[a]. APPLE-1003, ¶146.

(viii) **Element 19[f]**

Supra elements 1[b] and 1[d2]. APPLE-1003, ¶147.

(ix) **Element 19[g]**

Supra element 1[e]. APPLE-1003, ¶148.

(h) Claim 20

Supra element 1[d3]. APPLE-1003, ¶149.

(i) Claim 21

(i) Element 21[a]

Supra element 1[d1]. APPLE-1003, ¶150.

(ii) Element 21[b]

Supra element 10[d3]. APPLE-1003, ¶151.

(j) Claim 26

Supra claim 6. APPLE-1003, ¶152.

(k) Claim 28

Supra elements 1[b] and 1[d2]. APPLE-1003, ¶153.

B. GROUND 1B—Claims 2-4, 11-13, and 23-25 are obvious over Abdul-Hafiz, Raley, and Secker

1. Secker

Secker “relates to an apparatus for non-invasive measurement of oxygen saturation.” APPLE-1006, 5:1-14, APPLE-1003, ¶¶59-61. Secker’s “sensor may be used to operate precisely with patients of different tissue characteristics.” APPLE-1006, 6:4-20. Secker discloses that its sensor can include “three, four, five etc. second transmitters in order to provide a greater variety of sensor application/tissue characteristics” and that “a multiplicity of first transmitters may be used.” *Id.* For example, Secker discloses a sensor with “2n first transmitters

and 2n second transmitters.” *Id.*

Secker discloses that this type of sensor “with at least more than one light path of a certain wavelength through human tissue, where one of these light paths can be selected dependent on the application or structure of the tissue, may also be adapted for application to a specific part of the human body (e.g. a limb).”

APPLE-1006, 6:38-43, 14:52-63. Secker further discloses selecting “certain transmitter(s) and/or certain receiver(s) depending on the place of application,” which “allows very precise adaptation conditions of measurement by selecting the appropriate transmitters/receivers and therefore of the light paths.” APPLE-1006, 6:54-7:40, 14:64-15:29.

Secker describes a sensor with “a multiplicity of transmitter LEDs of one wavelength and a further multiplicity of transmitter LEDs of a second wavelength” shown in FIG. 8 below. APPLE-1006, 15:35-46. In one example, the sensor includes “red LEDs 70a to 70d and 71a to 71d as well as infrared LEDs 72a to 72d and 73a to 73d.” *Id.* According to Secker, such “a sensor may be used, in conjunction with an appropriate oximeter, for very precise manual or automatic adaptation to different kinds of measurement by selecting an appropriate red LED/infrared LED combination.” *Id.*

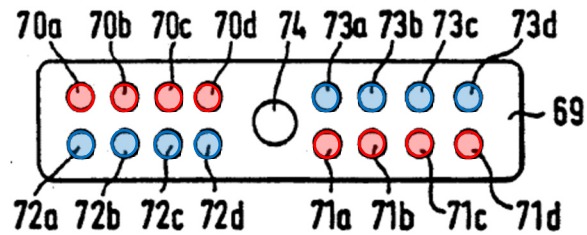


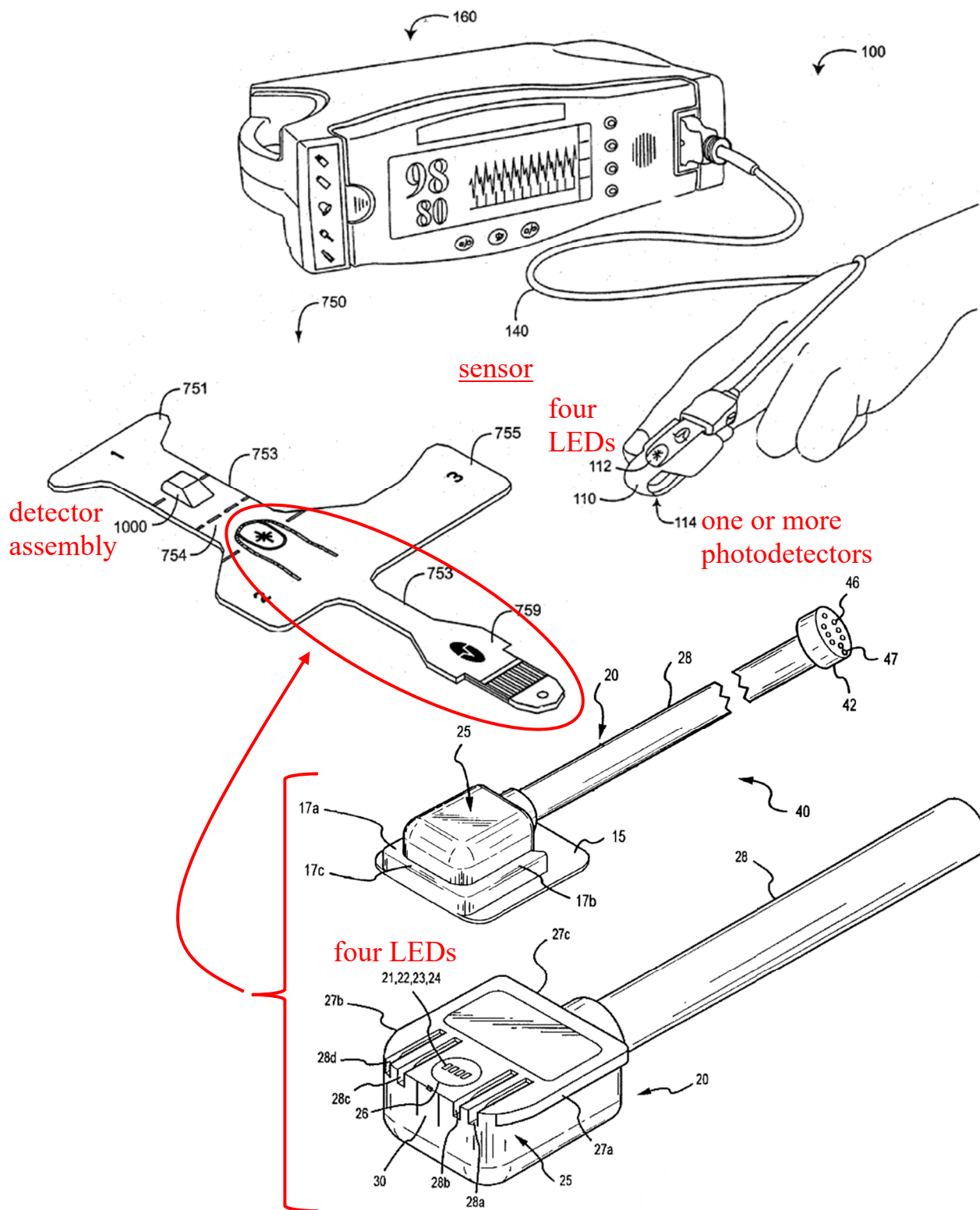
FIG. 8

APPLE-1006, FIG. 8

2. Abdul-Hafiz+Raley+Secker Combination

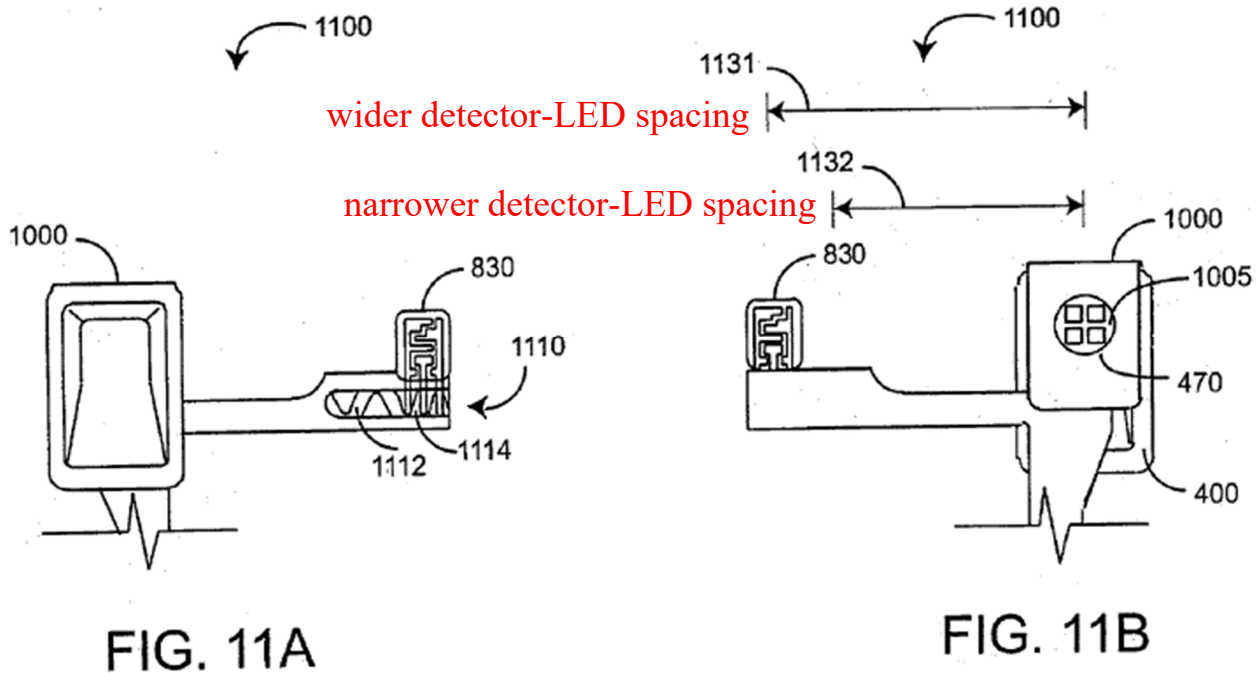
As discussed above in Section I.A.3, the Abdul-Hafiz+Raley combination provides a pulse oximetry system (an example shown below) having a sensor with at least four LEDs with distinct center wavelengths for measuring three or four blood analyte levels. APPLE-1005, 3:52-4:9, 4:29-44, 5:63-6:2; APPLE-1003, ¶155.

Abdul-Hafiz+Raley's pulse oximetry system



APPLE-1004, FIGS. 1, 7C; APPLE-1005, FIGS. 3, 4 (partial)

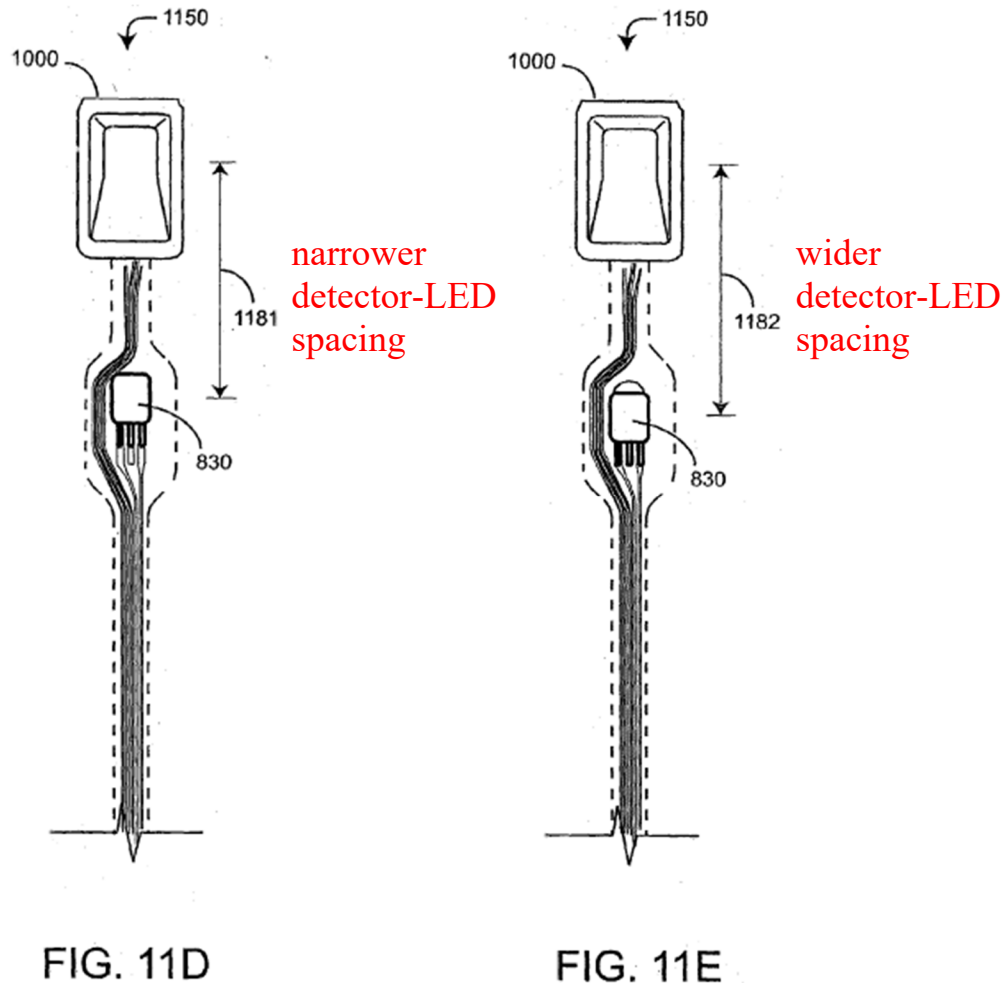
Additionally, Abdul-Hafiz describes an emitter that can be attached at multiple different positions of the sensor assembly to accommodate different sized patients or different tissue site thicknesses. APPLE-1004, [0047], [0049]-[0050], FIG. 11A-E; APPLE-1003, ¶¶156-157. For example, Abdul-Hafiz describes with respect to FIGS. 11A-11B that the “emitter 830 may be attached and electrically connected in a first position to the inner contact set 1112 or in a second position to the outer contact set 1114,” which “advantageously provides two different detector-emitter spacings 1131, 1132 on the same flexible circuit substrate.” APPLE-1004, [0047].



APPLE-1004, FIGS. 11A-11B

As another example, Abdul-Hafiz describes with respect to FIGS. 11D-11E that “contacts are extended along the direction between the detector assembly 1000

and the emitter 830, allowing the emitter to be mounted on the same pad 1160 in multiple positions,” which “advantageously provides for different detector-emitter spacings 1181, 1182 (FIGS. 11D-E) on the same flexible circuit substrate.”
APPLE-1004, [0049].



APPLE-1004, FIGS. 11C-11E

To further Abdul-Hafiz’s goal, a POSITA would have been motivated to pursue known solutions for providing a sensor with multiple detector-LED spacings that automatically accommodates different sized patients or different

tissue site thicknesses, such as described by Secker. APPLE-1003, ¶¶154-158; *KSR*, 550 U.S. at 418; *accord Norgren Inc. v. Int’l Trade Comm’n*, 699 F.3d 1317, 1322 (Fed. Cir. 2012).

Secker describes a sensor with “a multiplicity of transmitter LEDs of one wavelength and a further multiplicity of transmitter LEDs of a second wavelength” shown in FIG. 8 below. APPLE-1006, 15:35-46. In one example, the sensor includes “red LEDs 70a to 70d and 71a to 71d as well as infrared LEDs 72a to 72d and 73a to 73d.” *Id.*

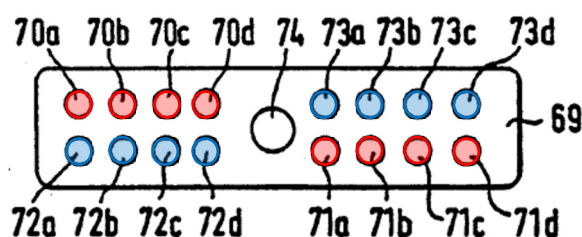


FIG. 8

APPLE-1006, FIG. 8

According to Secker, such “a sensor may be used, in conjunction with an appropriate oximeter, for very precise manual or automatic adaptation to different kinds of measurement by selecting an appropriate red LED/infrared LED combination.” *Id.* Secker’s “oximeter may also provide automatic selection of those transmitters which are best suited for a certain application or tissue” so that the “sensor may be used to operate precisely with patients of different tissue characteristics” and to “provide a greater variety of sensor application/tissue

characteristics.” APPLE-1006, 15:12-29, 6:4-20. Secker discloses that this type of sensor “with at least more than one light path of a certain wavelength through human tissue, where one of these light paths can be selected dependent on the application or structure of the tissue, may also be adapted for application to a specific part of the human body (e.g. a limb).” APPLE-1006, 6:38-43, 14:52-63. Secker further discloses selecting “certain transmitter(s) and/or certain receiver(s) depending on the place of application,” which “allows very precise adaptation conditions of measurement by selecting the appropriate transmitters/receivers and therefore of the light paths.” APPLE-1006, 6:54-7:40, 14:64-15:29.

While Secker describes other methods that are “more important for application in reflection oximetry” and illustrates reflection oximetry sensors, Secker discloses that its technique for selection of functions and signals “is even very useful for transmission oximetry.” APPLE-1006, 8:67-68. A POSITA would have understood that Secker teaches methods that improve transmission oximetry such as that taught by Abdul-Hafiz and Raley. APPLE-1003, ¶¶159-160.

A POSITA seeking to implement the Abdul-Hafiz+Raley pulse oximetry system would have been motivated to integrate Secker’s teachings regarding multiple selectable LEDs for each wavelength into the Abdul-Hafiz+Raley sensor to arrive at a predictable configuration of a sensor with multiple selectable LEDs for each of the four wavelengths used for determining an estimate of three or four

blood analyte levels to achieve the benefits described by Secker above. APPLE-1004, [0047], [0049]-[0050], FIG. 11A-E; APPLE-1006, 6:4-20, 6:38-7:40, 8:67-68, 14:52-15:29, 15:35-46; APPLE-1003, ¶161.

As shown in Secker's FIG. 8, Secker provides four LEDs of the same wavelength on one side of a detector. APPLE-1006, 15:35-46, FIG. 8. The figure below shows an example of applying Secker's teachings of four LEDs of the same wavelength on one side of a detector to the Abdul-Hafiz+Raley sensor to result in sixteen LEDs including four sets of four LEDs for each of four wavelengths arranged on the sensor that are selectable by the oximeter to accommodate different detector-LED spacings for different sized patients or different tissue site thicknesses, as suggested by Abdul-Hafiz and Secker. APPLE-1004, [0047], [0049]-[0050], FIG. 11A-E; APPLE-1006, 6:4-20, 6:38-7:40, 8:67-68, 14:52-15:29, 15:35-46; APPLE-1003, ¶162.

Abdul-Hafiz+Raley's emitter assembly modified in view of Secker

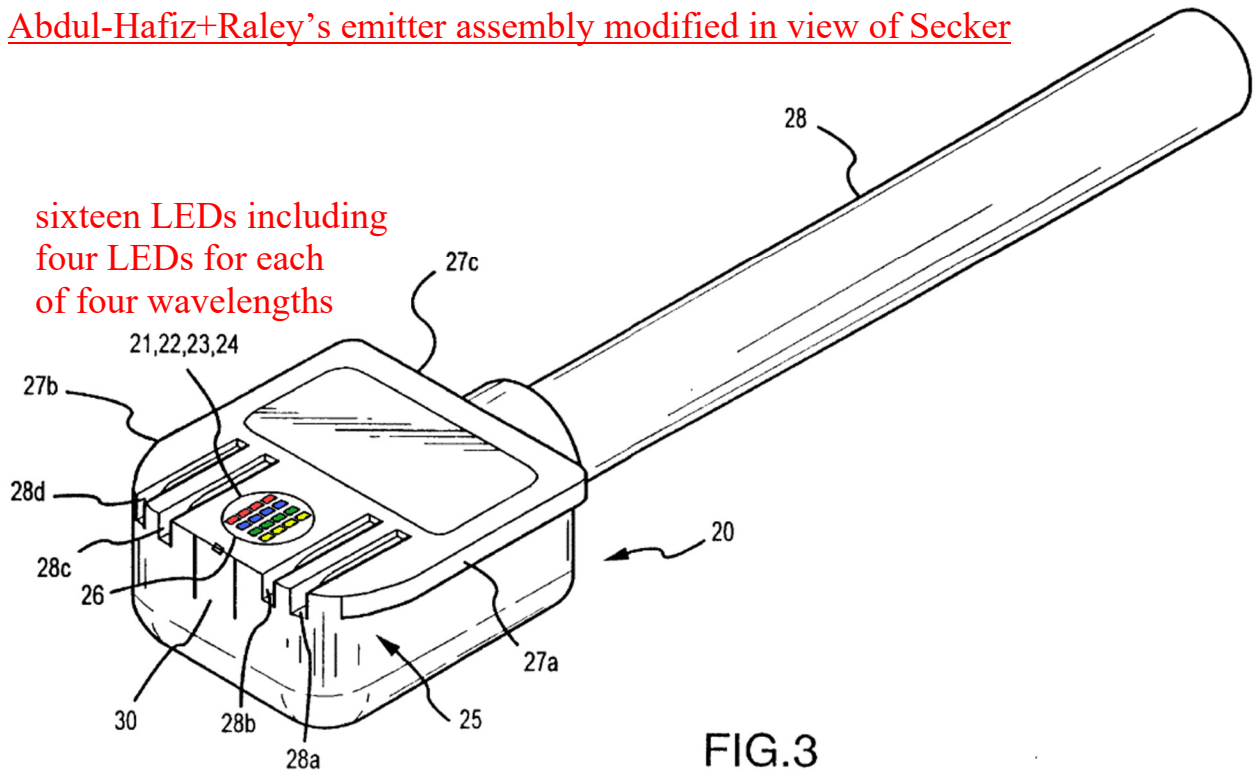
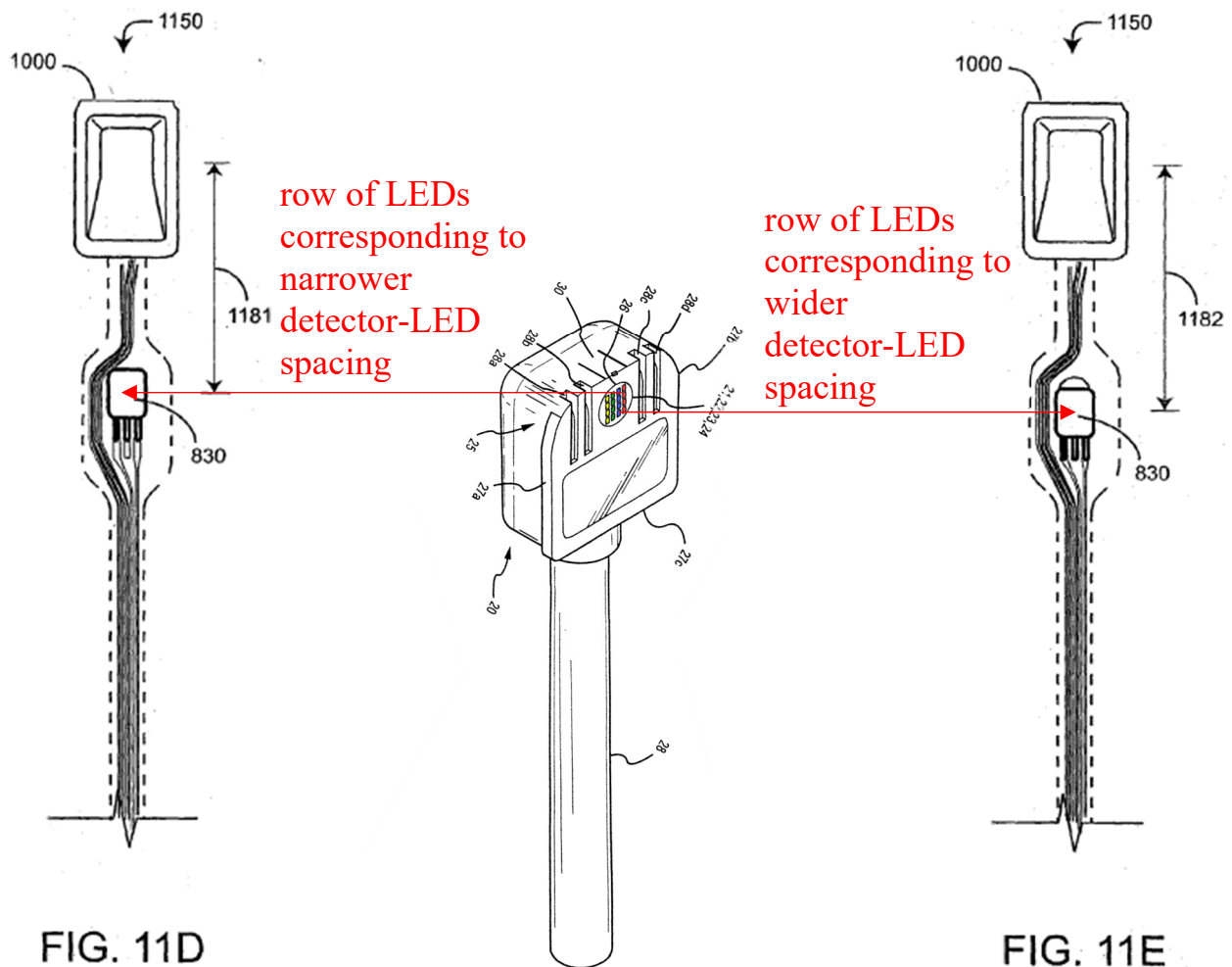


FIG.3

APPLE-1005, FIG. 3

This example corresponds to detector-LED configuration and spacings as shown in Abdul-Hafiz's FIGS. 11D-11E. APPLE-1003, ¶163.



Abdul-Hafiz+Raley+Secker's
emitter assembly

APPLE-1004, FIGS. 11C-11E; APPLE-1005, FIG. 3

A POSITA would have understood that other LED arrangements are possible, e.g., with the LEDs of the same wavelength arranged horizontally rather than vertically as shown below, to correspond to detector-LED configuration and spacings shown in Abdul-Hafiz's FIGS. 11A-11B. APPLE-1003, ¶164.

Such a sensor estimates the three or four blood analyte levels using automatically selected LEDs with appropriate detector-LED spacings that

accommodate different sized patients or different tissue site thicknesses. APPLE-1004, [0047], [0049]-[0050], FIG. 11A-E; APPLE-1006, 6:4-20, 6:38-7:40, 8:67-68, 14:52-15:29, 15:35-46. A POSITA would have been motivated to integrate Secker's teachings into the Abdul-Hafiz+Raley sensor to achieve these benefits. APPLE-1003, ¶165.

A POSITA would have understood that Secker's teaching regarding multiple LEDs for each wavelength that are selectable by the oximeter to accommodate different detector-LED spacings for different sized patients or different tissue site thicknesses (APPLE-1004, [0047], [0049]-[0050], FIG. 11A-E; APPLE-1006, 6:4-20, 6:38-7:40, 8:67-68, 14:52-15:29, 15:35-46) is applicable to a photoplethysmographic monitor such as Abdul-Hafiz+Raley's pulse oximetry system and would be implemented in Abdul-Hafiz+Raley's system in a manner that is similar to its implementation in Secker's system, with Secker's suggestions merely improving/adding to Abdul-Hafiz+Raley's system. APPLE-1011, 75; APPLE-1003, ¶166. A POSITA would have been capable of employing ordinary creativity to carry out an implementation of the sensor in a manner necessary to achieve the advantages taught by Secker by, for example, varying the size and shape of the cavity and window to accommodate the sixteen LEDs. *Id.*; *Facebook, Inc. v. Windy City Innovations, LLC*, 973 F.3d 1321, 1343 (Fed. Cir. 2020).

Moreover, a POSITA would have viewed the implementation of Abdul-

Hafiz+Raley's pulse oximetry system in a manner that applied Secker's teachings as merely the predictable result (e.g., a sensor with four sets of four LEDs that are selectable by the oximeter to accommodate different detector-LED spacings for different sized patients or different tissue site thicknesses) of combining known prior art elements according to known methods, and would have expected success in enhancing Abdul-Hafiz+Raley's system in this way. APPLE-1003, ¶167; *KSR*, 550 U.S. at 405. Secker provides teachings for achieving more accurate transmission measurements, which apply to measurements of transmission pulse oximeters. *Id.* Given the similarities between Abdul-Hafiz+Raley and Secker, a POSITA would have appreciated that the benefits provided by Secker's teachings would apply to Abdul-Hafiz+Raley's system. *Id.* A POSITA would have been motivated and would have found it obvious and straightforward to implement the system of Abdul-Hafiz+Raley with the teachings of Secker to achieve such benefits. APPLE-1004, [0047], [0049]-[0050], FIG. 11A-E; APPLE-1006, 6:4-20, 6:38-7:40, 8:67-68, 14:52-15:29, 15:35-46; APPLE-1003, ¶167.

3. Analysis

(a) Claims 2, 4, 11, 13, 23, 25

As discussed above in Section I.A.2, Secker describes a sensor with “a multiplicity of transmitter LEDs of one wavelength and a further multiplicity of transmitter LEDs of a second wavelength” shown in FIG. 8 below. APPLE-1006,

15:35-46. In one example, the sensor includes “red LEDs 70a to 70d and 71a to 71d as well as infrared LEDs 72a to 72d and 73a to 73d.” *Id.*; APPLE-1003, ¶168. As shown in Secker’s FIG. 8, Secker provides four LEDs of the same wavelength on one side of a detector. APPLE-1006, 15:35-46, FIG. 8.

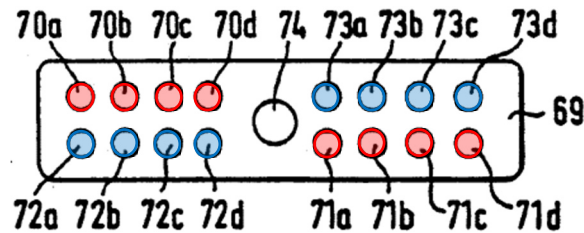


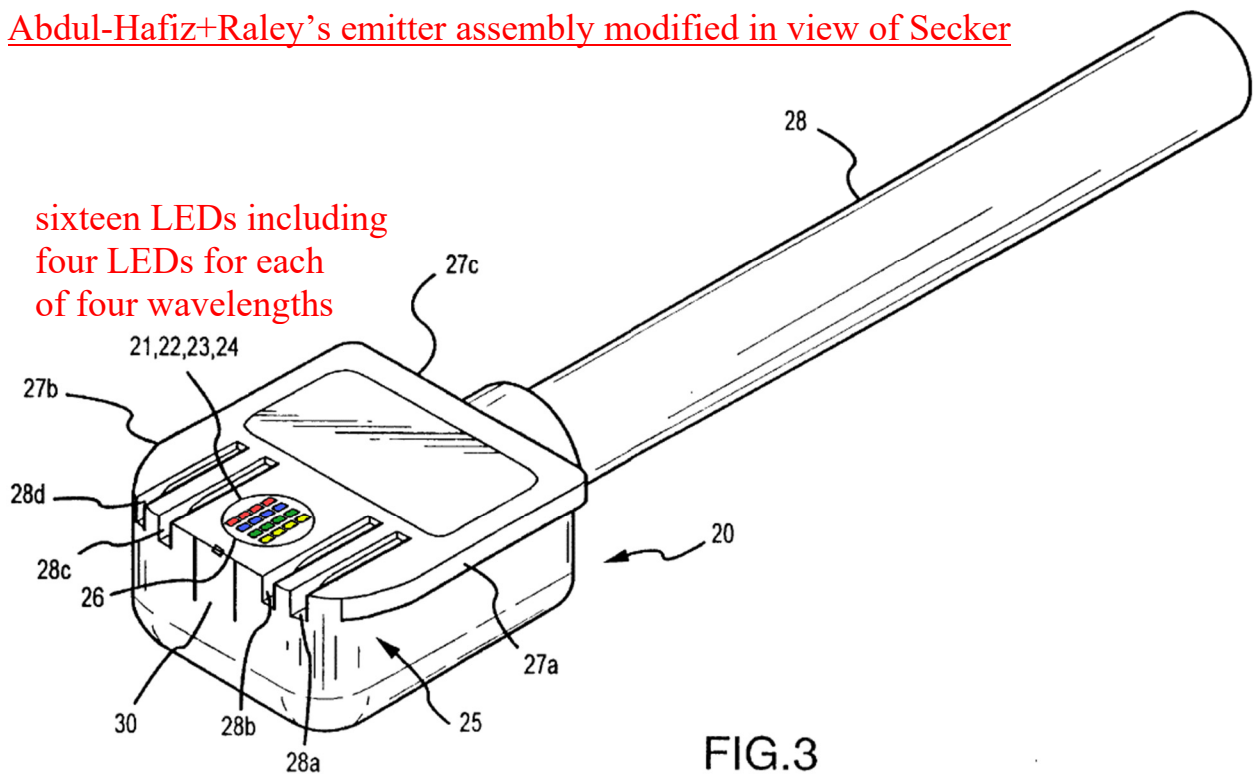
FIG. 8

APPLE-1006, FIG. 8

As also discussed above in Section I.A.2, the Abdul-Hafiz+Raley+Secker combination incorporates Secker’s teachings of four LEDs of the same wavelength on one side of a detector to the Abdul-Hafiz+Raley sensor to result in a sensor with **sixteen LEDs (at least eight/twelve LEDs)** including four sets of four LEDs that are selectable by the oximeter to accommodate different detector-LED spacings for different sized patients or different tissue site thicknesses, as suggested by Abdul-Hafiz and Secker. APPLE-1004, [0047], [0049]-[0050], FIG. 11A-E; APPLE-1006, 6:4-20, 6:38-7:40, 8:67-68, 14:52-15:29, 15:35-46. The figure below shows an example of **sixteen LEDs (at least eight/twelve LEDs)** including four sets of four LEDs arranged on the sensor and selectable by the oximeter to accommodate different detector-LED spacings for different sized patients or different tissue site

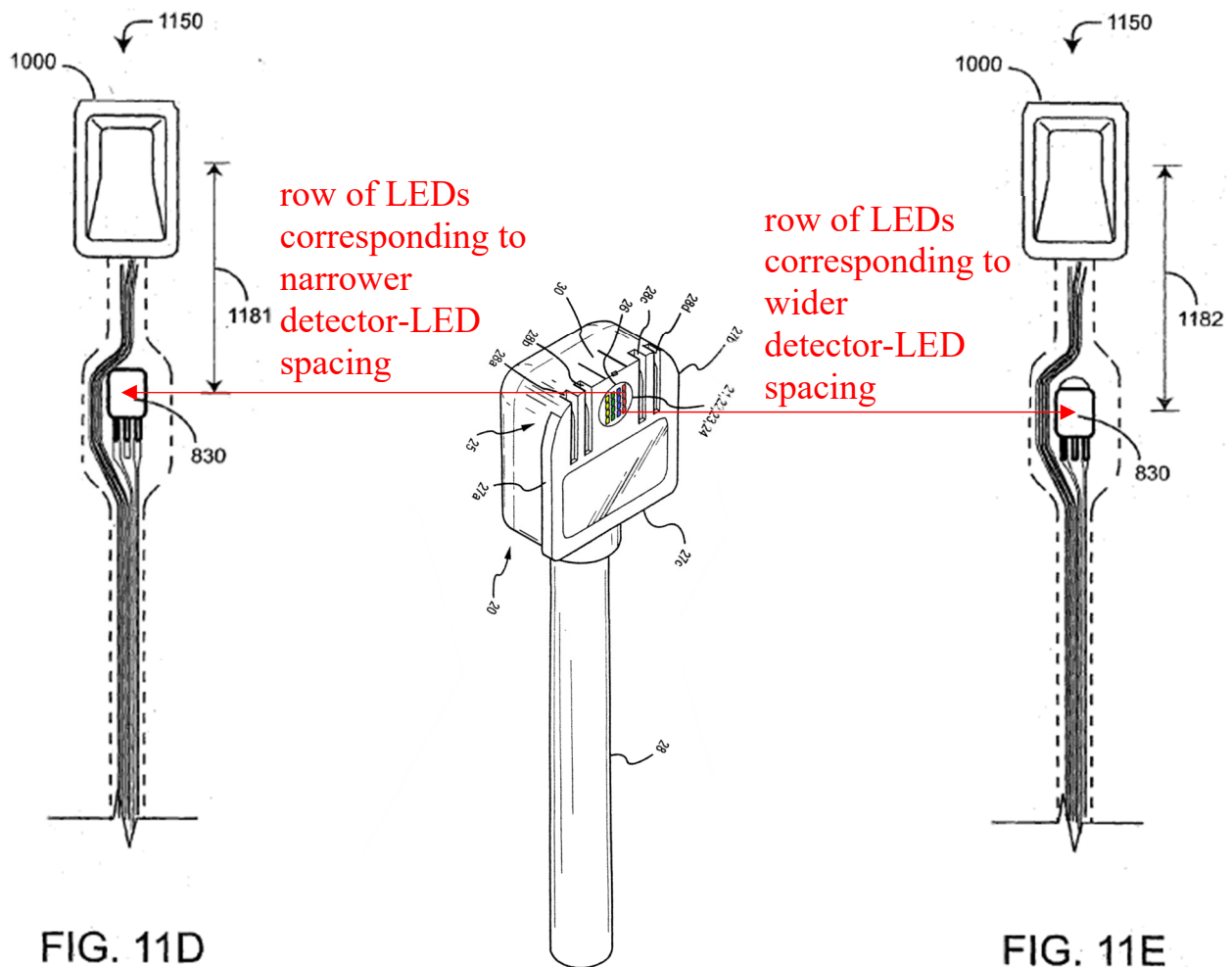
thicknesses, as suggested by Abdul-Hafiz and Secker. APPLE-1004, [0047], [0049]-[0050], FIG. 11A-E; APPLE-1006, 6:4-20, 6:38-7:40, 8:67-68, 14:52-15:29, 15:35-46; APPLE-1003, ¶169.

Abdul-Hafiz+Raley's emitter assembly modified in view of Secker



APPLE-1005, FIG. 3

This example corresponds to detector-LED configuration and spacings as shown in Abdul-Hafiz's FIGS. 11D-11E. APPLE-1003, ¶170.



Abdul-Hafiz+Raley+Secker's
emitter assembly

APPLE-1004, FIGS. 11C-11E; APPLE-1005, FIG. 3

A POSITA would have understood that other LED arrangements are possible, e.g., with the LEDs of the same wavelength arranged horizontally rather than vertically as shown below, to correspond to detector-LED configuration and spacings shown in Abdul-Hafiz's FIGS. 11A-11B. APPLE-1003, ¶171.

(b) Claims 3, 12, 24

As discussed above in Section I.A.2 and claims 2, 4, 11, 13, 23, and 25, the

Abdul-Hafiz+Raley+Secker combination provides a sensor with **sixteen LEDs (at least eight LEDs)** including four sets of **four LEDs for each of four wavelengths (at least two LEDs of the same wavelength)** arranged on the sensor that are selectable by the oximeter to accommodate different detector-LED spacings for different sized patients or different tissue site thicknesses, as suggested by Abdul-Hafiz and Secker. APPLE-1004, [0047], [0049]-[0050], FIG. 11A-E; APPLE-1006, 6:4-20, 6:38-7:40, 8:67-68, 14:52-15:29, 15:35-46; APPLE-1003, ¶172.

IV. DISCRETIONARY CONSIDERATIONS

A. The *Advanced Bionics* Test Favors Institution—§325(d)

Advanced Bionics and the Becton factors strongly favor institution.

Advanced Bionics LLC v. MED-EL Elektromedizinische Gerate GmbH, IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020)(precedential); *Becton, Dickinson and Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (PTAB Dec. 15, 2017)(precedential).

During prosecution, the Examiner allowed the claims with the following stated reasons for allowance:

However, the combination of Schultz et al. in view of Thomas et al. fails to disclose a light block surrounding the at least one detector, the light block comprising a shoebox structure configured to recess the at least one detector into the shoebox structure, wherein the shoebox structure is formed of a black material, the

shoebox structure further comprising a window on a top portion of the shoebox structure, the window comprising an area smaller than a detection surface area of the at least one detector, in combination with remaining claimed features.

APPLE-1002, 314-320. The Examiner also stated in an Applicant-Initiated Interview Summary that “the differentiating aspect of top of the shoe box having only one opening is not claimed” in claims pending during prosecution. APPLE-1002, 310.

However, the Examiner committed material error by failing to appreciate that independent claim 10 does not require “only one opening” and independent claim 19 does not require that the light block be “formed of a black material” and does not require a “window comprising an area smaller than a detection surface area of the at least one detector.” APPLE-1001, 20:7-29, 20:46-67. The Examiner’s failure to appreciate the differences in the claim language of the independent claims constitutes Office error in a manner material to patentability of at least claims 10-13, 15, 17, 19-21, 23-26, and 28.

Further, as discussed above in Section III.A, the Petition establishes that Abdul-Hafiz renders obvious the features referred to by the Examiner in the reasons for allowance. Abdul-Hafiz was not a basis for any rejection during prosecution. The Examiner erred by not applying Abdul-Hafiz in the manner set forth in the Petition and as supported by Dr. Kenny’s testimony. *See, e.g., Apple*

Inc. v. MPH Techs. OY, IPR2019-00820, Paper 10, 16-17 (PTAB Oct. 7, 2019); *see also Advanced Bionics*, Paper 6, 8-9, n.9 (stating that “[a]n example of a material error may include misapprehending or overlooking specific teachings of the relevant prior art where those teachings impact patentability of the challenged claims”). The Examiner’s lack of substantive consideration of the obviousness of a low noise optical housing that provides an opaque enclosure for a detector, provides a light barrier for ambient light and piped light reduction, provides only one opening through which light passes to the detector, and provides the opening width having an area smaller than the detection surface area of the detector to reduce erroneous measurements caused by extraneous light (APPLE-1004, Abstract, [0005]-[0007], [0033]-[0039], FIGS. 3, 6A) in view of Abdul-Hafiz was a material error that deserves additional consideration. The Examiner’s failure to appreciate the obviousness of such features in view of Abdul-Hafiz constitutes Office error in a manner material to patentability of the Challenged Claims.

B. The *Fintiv* Factors Favor Institution—§314(a)

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

holistic analysis of the *Fintiv* framework favors institution.

The concerns addressed by *Fintiv* are simply not present. Not only will the Final Written Decision (“FWD”) be rendered well in advance of trial in co-pending District Court proceedings based on median time-to-trial statistics, but Apple has doubled-down with a comprehensive institution-invoked stipulation to ensure that there can be no redundancy between art considered in this IPR and art asserted in the District Court. APPLE-1061, 9; APPLE-1060, 14; APPLE-1066, 1.

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

1. Factor 1: Neither Party has yet Requested a Stay with Respect to the ’911 Patent

Factor 1 does not favor denial. Neither party has indicated a lack of intent to request a stay of the related litigation with respect to the ’911 patent², and the

² Notably, Judge Noreika granted a stay of Masimo counterclaims asserting U.S. Patent Nos. 10,912,501, 10,912,502, 10,945,648, 10,687,745, and 7,761,127, until

Board has indicated that it “will not attempt to predict” how a district court might adjudicate a future motion to stay, if/when filed. *See Fintiv*, 12; *Sand Revolution II, LLC v. Cont’l Intermodal Group – Trucking LLC*, IPR2019-01393, Paper 24, 7 (June 16, 2020)(“*Sand Revolution*”)(informative); *Sotera Wireless Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12, 14 (PTAB Dec. 1, 2020)(“*Sotera*”)(precedential).

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

As the Director recognizes, “scheduled trial dates are unreliable and often change.” APPLE-1061, 8. Thus, the “PTAB will weigh this factor against exercising discretion to deny institution...if the median time-to-trial is...after the projected statutory deadline for the PTAB’s [FWD].” *Id.*, 9. Indeed, the Delaware District Court, which presides over the related litigation and which is one of the country’s busiest patent courts, recently granted a joint motion to amend the case schedule that moved the case management conference back by approximately two months, but has not yet set an estimated trial date. *See* APPLE-1065, 3 (indicating a “New Deadline” for “Trial” of “TBD”).

conclusion of an ongoing ITC matter, including all appeals. APPLE-1069, 1.

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

Accordingly, Factor 2 disfavors denial. APPLE-1061, 9; *see also Masimo Corp. v. Apple Inc.*, IPR2023-00634, Paper 1, 108 (Feb. 27, 2023)(Petition)(arguing against denial based on “published statistics indicat[ing] that the median time to trial for a civil action in the District of Delaware is almost three years”).

More, in this case, several factors contribute to uncertainty with respect to the yet-scheduled trial date, including, for example, whether a single trial will be conducted to address all 6 of Apple’s asserted utility patents, all 4 of Apple’s asserted design patents, and all 5 of Masimo’s counter-asserted utility patents (including the ’911 patent). *See, generally*, APPLE-1062-1065, APPLE-1069. For example, it remains unclear whether the 5 Masimo patents that are subject to stay until conclusion of the related ITC matter, including all appeals, will eventually be tried together with the 5 additional Masimo patents that are not subject to stay, or if separate trials addressing those two sets of patents might instead be conducted in sequence. *See* APPLE-1069, 1.

For at least these reasons, Factor 2 disfavors denial.³ APPLE-1061, 9.

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

Factor 3 disfavors denial. Apple’s substantial investment in petitions addressing the 10 patents asserted by Patent Owner in District Court Litigation (including the 5 patents reasserted from ITC litigation) should counterbalance—and frankly outweigh—the resources invested in the co-pending District Court

³ Moreover, Apple has been diligent. Patent Owner filed its D. Del. counterclaims asserting 10 patents, including the ’911 Patent, in the context of ongoing complex litigation, initiated by Masimo on January 9, 2020 by its C. D. Cal. complaint, that has thus far involved 37 patents and, in addition to the PTAB, forums including C.D. Cal., ITC, D. Del., and the Fed. Cir. In addition to today’s filings, Apple has demonstrated at least a reasonable likelihood of success in proving unpatentability of 22 of these patents at the PTAB, and has indeed been found to have demonstrated unpatentability of claims in 18 of the corresponding 20 FWDs that have issued thus far. For at least that additional reason, Factor 2 favors institution. *See Apple Inc. v. Seven Networks, LLC*, IPR2020-00156, Paper 10, 9 & n.8 (June 15, 2020) (“*Seven Networks*”) (factor 2 should be analyzed on a sliding scale based on petitioner diligence and relative trial dates).

Litigation. It would be unjust to consider resources expended in District Court (equally by both parties), without considering Apple resources expended to prepare petitions that would be irretrievably lost without consideration on the merits.

For example, as explained below with respect to Factor 4, to ensure that an IPR proceeding instituted on the basis of this Petition will be a true alternative to district court litigation that might otherwise address overlapping issues, Apple stipulates that, if the Board institutes this IPR, Apple will not, for the instituted claims, seek resolution in the co-pending Delaware District Court proceeding of any ground of invalidity that utilizes any of the prior art asserted in this petition, i.e., Abdul-Hafiz, Raley, or Secker. APPLE-1066. Consistent with Apple's stipulation, Apple's district court expert invalidity report does not include any of Abdul-Hafiz, Raley, or Secker. APPLE-1068. As such, discretionary denial of the instant petition would prevent Apple from being heard, not only by the PTAB, but also by the District Court, both with respect to the compellingly meritorious grounds presented within this petition, and also with respect to any ground of invalidity utilizing any of Abdul-Hafiz, Raley, or Secker. *Id.*

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

instituted IPR petitions.⁴

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

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

Factor 4 strongly disfavors denial. First, Patent Owner asserts only ’911

⁴ For example, the Board instituted Masimo’s *Sotera*-backed petition challenging Apple’s D. Del.-asserted ’257 patent, and Masimo has since revealed that it relies for its district court invalidity grounds on the same Markel and Mills references applied in that petition, further combined with product art. *Masimo Corp. v. Apple Inc.*, IPR2023-00745, Paper 1, 12-13, 85 (Mar. 22, 2023); APPLE-1067, 1.

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

Patent claims 2, 3, 4, 8, 20, 21, 24, and 25, and this Petition challenges '911 Patent claims 1-4, 6, 8, 10-13, 15, 17, 19-21, 23-26, and 28. Accordingly, a majority of the Challenged Claims (claims 6, 10-13, 15, 17, 23, 26, and 28) will be left unaddressed in District Court Litigation. *See Seven Networks*, 21.

Second, to eliminate any doubt as to the absence of meaningful overlap between the District Court Litigation and IPR, Apple stipulates that, if the Board institutes this IPR, Apple will not, for the instituted claims, seek resolution in the co-pending District Court proceeding of any ground of invalidity that utilizes any of Abdul-Hafiz, Raley, or Secker. APPLE-1066.

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

Notably, Apple's stipulation is substantially more robust than a *Sand Revolution* stipulation, by which a petitioner pledges not to pursue the same grounds of invalidity in district court litigation, while leaving open the possibility of the same references applied within a petition being reasserted by the same petitioner in different district court invalidity grounds. *See Sand Revolution*, 11-

12. For at least that reason, Apple respectfully submits that *Apple's stipulation*, which *guarantees that there will be no overlap* between the prior art relied on in this IPR and the prior art relied on in the District Court proceeding, should be accorded substantially more weight than a *Sand Revolution* stipulation. *Cf. Sand Revolution*, 12.

Further, and as noted above with respect to Factor 3, Apple's stipulation is also broader than a *Sotera* stipulation, at least insofar as it is apparently Masimo's position that a *Sotera* stipulation leaves open the possibility of the same references applied within an instituted IPR petition being reasserted by the same petitioner in district court invalidity grounds that could not reasonably have been raised in that petition. *See Sotera*, 13-14, 19; 35 U.S.C §315(e)(2). More specifically, Masimo's District Court invalidity positions with respect to Apple's '257, '352, and '783 patents rely on many of the same references already applied within Masimo's *Sotera*-backed and earlier-instituted IPR petitions, further combined with product art that is not eligible for PTAB consideration. *See* APPLE-1067, 1; IPR2023-00745, Paper 1, 12-13, 85; IPR2023-00664, Paper 1, 33, 94; IPR2023-00634, Paper 1, 6, 109.

Whether the District of Delaware will allow Masimo to proceed in this manner remains to be seen, but recent decisions treating language of the §315(e)(2) estoppel provision that is co-extensive with *Sotera* suggest that it might. *See*

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

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

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

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

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

Factor 5 should, at worst, be neutral. The Litigation involves the same parties. However, the *Fintiv* decision says nothing about weighing Factor 5 in favor of denial when the petitioner and the defendant in the parallel proceeding are the same; with respect to Factor 5, *Fintiv* instead notes that “if a petitioner is unrelated” the Board has weighed that “fact against exercising discretion to deny institution.” *Fintiv*, 13-14; *see also Cisco Systems, Inc. v. Ramot at Tel Aviv University Ltd.*, IPR2020-00122, Paper 15, 10 (Crumbley, dissenting).

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

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

Factor 6 strongly disfavors denial. Here, the strength of the merits alone outweighs any potential inefficiencies, regardless of whether the timing of the District Court Litigation is thought relevant (it is not, as demonstrated with respect to Factors 1-5). *Fintiv*, 14-15 (noting under Factor 6 that “if the merits of a ground

raised in the petition seem particularly strong...institution of a trial may serve...overall system efficiency and integrity”).

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

Moreover, Director Vidal has further explained that “where the PTAB determines that the information presented at the institution stage presents a compelling unpatentability challenge, that determination alone demonstrates that the PTAB should not discretionarily deny institution under *Fintiv*.” APPLE-1061, 4-5. More specifically, the PTAB will not discretionarily deny institution if “the Petition presents challenges ‘in which the evidence, if unrebutted in trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence.’” *Commscope*, 3 (quoting APPLE-1061, 4); APPLE-1061, 3-5, 9.

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

Both because a holistic analysis of the *Fintiv* factors disfavors denial, and

because the merits of the instant Petition are compelling, Apple respectfully submits that the Board should not discretionarily deny institution under *Fintiv*.⁵ *Fintiv*, 19; APPLE-1061, 3-5, 9; *Commscope*, 3.

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

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

VI. MANDATORY NOTICES UNDER 37 C.F.R § 42.8(a)(1)

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

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

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

Petitioner is not aware of any disclaimers, reexamination certificates, or petitions for *inter partes* review for the '911 patent. The '911 patent is the subject of a civil action *Masimo Corporation et al. v. Apple Inc.*, Case No. 1:22-cv-01378 (D. Del.).

⁵ Apart from Petitioners' showing that *Fintiv* favors institution, the *Fintiv* framework should not be followed because it is legally invalid. The framework (1) exceeds the Director's authority, (2) is arbitrary and capricious, and (3) was adopted without notice-and-comment rulemaking.

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

Lead Counsel	Backup counsel
W. Karl Renner, Reg. No. 41,265 Fish & Richardson P.C. 60 South Sixth Street Minneapolis, MN 55402 Tel: 202-783-5070 Fax: 877-769-7945 Email: IPR50095-0136IP2@fr.com	Roberto J. Devoto, Reg. No. 55,108 Kim H. Leung, Reg. No. 64,399 Fish & Richardson P.C. 60 South Sixth Street Minneapolis, MN 55402 Tel: 202-783-5070 Fax: 877-769-7945 IPR50095-0136IP2@fr.com

D. Service Information

Please address correspondence/service to the above-listed address.

Petitioner consents to email service at IPR50095-0136IP2@fr.com.

Respectfully submitted,

Dated: December 12, 2023

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CERTIFICATION UNDER 37 CFR § 42.24

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter Partes* Review totals 13,331 words, which is less than the 14,000 allowed under 37 CFR § 42.24.

Dated: December 12, 2023

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CERTIFICATE OF SERVICE

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

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