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Regarding claims 38, 40, 42, 45, Rosenheimer discloses that the emitter is positioned outside the annular ring when the optical physiological measurement device is placed on the patient at the tissue measurement site, and wherein the one or more detectors are positioned inside the annular ring when the optical physiological measurement device is placed on the patient at the tissue measurement site (as shown in figures 4-5, the photodiodes (emitters) 10 and 11 are positioned outside of the annular ring 28 and the photodetector 18 is positioned inside the annular ring).

4. Claim(s) 1-7, 16, 18-20, 22-29, 32-33, 37, 39, 41, 43-44,46-48 is/are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Cui et al. (USPN 5,584,296).

Regarding claims 1, 18, 26 and 32, Cui et al. discloses an optical physiological measurement device configured for placement on a patient at a tissue measurement site (figures 1 and 9), the device comprising: one or more emitters which emit light (elements 36a-b, figures 7, 9-10, Col.11 line 2-Col.12 line 5); one or more detectors configured to detect the emitted light after attenuation by and reflection from tissue of the patient at the tissue measurement site, the one or more detectors further configured to transmit a signal responsive to the detected light (elements 34,32, figures 7, 9-10, Col.11 line 2-Col.12 line 5); and a light block comprising an annular ring located between the emitted light at the tissue measurement site and the one or more detectors, the light block reducing an amount of incident light emitted from the one or more emitters from being detected by the one or more detectors (element 60a figures 9). See Col.8 line 35- Col.9 line 45.

Regarding claims 2, 27, Cui et al. discloses a concentrator which receives the spread light after attenuation by tissue of the patient, concentrates the received spread

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light and emits the concentrated light in the direction of the one or more detectors (combination of elements 50 and 60 enclosing the detectors 32, 34, figures 9-12). See Col.8 line 35- Col.9 line 45.

Regarding claims 3, 20, 28 and 33, Cui et al. discloses a processor configured to receive the transmitted signal responsive to the detected light and to determine a physiological parameter (processor 18, Col.4 lines 26-50).

Regarding claim 4, Cui et al. discloses the parameter is arterial oxygen saturation (Col.4 lines 15-50).

Regarding claims 5, 22, Cui et al. discloses the diffuser comprises at least one of a glass diffuser, ground glass diffuser, a glass bead diffuser, an opal glass diffuser, and an engineered diffuser (element 50 disposed on top of the emitter 36 figures 9-12, Col.8 line 35- Col.9 line 45).

Regarding claim 6, Cui et al. discloses the diffuser emits the spread light with a substantially uniform intensity profile (element 50 disposed on top of the emitter 36 figures 9-12, Col.8 line 35- Col.9 line 45).

Regarding claim 7, Cui et al. discloses that the diffuser defines a surface area shape by which the emitted spread light is distributed onto a surface of the tissue measurement site (element 50 disposed on top of the emitter 36 figures 9-12, Col.8 line 35- Col.9 line 45).

Regarding claim 16, Cui et al. discloses that the concentrator comprises a compound parabolic concentrator (combination of elements 50 and 60 enclosing the detectors 32, 34, figures 9-12). See Col.8 line 35- Col.9 line 45.

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Regarding claim 19, Cui et al. discloses receiving, by a concentrator, the emitted spread light after the spread light has been attenuated by and reflected from the tissue measurement site and concentrating, by the concentrator, the received light and emitting the concentrated light from the concentrator to the one or more detectors (combination of elements 50 and 60 enclosing the detectors 32, 34, figures 9-12). See Col.8 line 35- Col.9 line 45.

Regarding claim 23, Cui et al. discloses spreading, with a diffuser, the emitted light and emitting the spread light from the diffuser to a tissue measurement site further comprises spreading the emitted light with a substantially uniform intensity profile (element 50 disposed on top of the emitter 36 figures 9-12, Col.8 line 35- Col.9 line 45).

Regarding claim 24, Cui et al. discloses spreading, with a diffuser, the emitted light and emitting the spread light from the diffuser to a tissue measurement site further comprises spreading the emitted light so as to define a surface area shape by which the emitted spread light is distributed onto a surface of the tissue measurement site (element 50 disposed on top of the emitter 36 figures 9-12, Col.8 line 35- Col.9 line 45).

Regarding claim 25, Cui et al. discloses that concentrating, by the concentrator, the received light and emitting the concentrated light from the concentrator to the one or more detectors is performed by a compound parabolic concentrator (combination of elements 50 and 60 enclosing the detectors 32, 34, figures 9-12). See Col.8 line 35- Col.9 line 45.

Regarding claim 29, Cui et al. discloses the diffuser is further configured to define a surface area shape by which the emitted spread light is distributed onto a surface of

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the tissue measurement site (element 50 disposed on top of the emitter 36 figures 9-12, Col.8 line 35- Col.9 line 45).

Regarding claims 37, 39, 41, Cui et al. discloses a diffuser which receives, spreads and emits the spread light, wherein the emitted spread light is directed at the tissue measurement site (element 50 disposed on top of the emitter 36 figures 9-12, Col.8 line 35- Col.9 line 45).

Regarding claims 43, 46, 47 Cui et al. discloses that the plurality of detectors are arranged in an array with a special configuration corresponding to an irradiated surface area (figures 9-12, elements 32, 34).

Regarding claims 44, 48, Cui et al. discloses the irradiated surface area comprises an annular shape (figures 9-12).

#### ***Response to Arguments***

5. Applicant's arguments with respect to claims 1-7, 16, 18-20, 22-29, 32-33, 37-48 have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

#### ***Conclusion***

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARJAN FARDANESH whose telephone number is (571)270-5508. The examiner can normally be reached on Monday-Friday 9:00-17:00.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patricia Mallari can be reached on (571)272-4729. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

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USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ERIC F WINAKUR/  
Primary Examiner, Art Unit 3791

/MARJAN FARDANESH/  
Examiner, Art Unit 3791

<b>Notice of References Cited</b>	Application/Control No. 15/195,199	Applicant(s)/Patent Under Reexamination Al-Ali et al.	
	Examiner MARJAN FARDANESH	Art Unit 3791	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A US-5497771-A	03-1996	Rosenheimer; Michael N.	A61B5/14542	600/323
*	B US-5584296-A	12-1996	Cui; Weijia	A61B5/14552	356/41
C					
D					
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F					
G					
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K					
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M					


**FOREIGN PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
N					
O					
P					
Q					
R					
S					
T					

**NON-PATENT DOCUMENTS**

*	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
U	
V	
W	
X	


\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
 Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<b><i>Index of Claims</i></b> 	<b>Application/Control No.</b> 15/195,199	<b>Applicant(s)/Patent Under Reexamination</b> Al-Ali et al.
	<b>Examiner</b> MARJAN FARDANESH	<b>Art Unit</b> 3791


✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

CLAIMS									
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	41	✓							
	42	✓							



<p><i><b>Index of Claims</b></i></p> 	<p><b>Application/Control No.</b></p> <p>15/195,199</p>	<p><b>Applicant(s)/Patent Under Reexamination</b></p> <p>Al-Ali et al.</p>
	<p><b>Examiner</b></p> <p>MARJAN FARDANESH</p>	<p><b>Art Unit</b></p> <p>3791</p>

CLAIM		DATE								
Final	Original	09/19/2018								
	43	✓								
	44	✓								
	45	✓								
	46	✓								
	47	✓								
	48	✓								

<b>Search Notes</b> 	<b>Application/Control No.</b> 15/195,199	<b>Applicant(s)/Patent Under Reexamination</b> Al-Ali et al.
	<b>Examiner</b> MARJAN FARDANESH	<b>Art Unit</b> 3791

CPC - Searched*		
Symbol	Date	Examiner
EAST-See search history printout	02/19/2019	/mf/
EAST-See search history printout	02/19/2019	/mf/

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

\* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
"PALM" inventor name search	02/19/2019	/mf/

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/MARJAN FARDANESH/ Examiner, Art Unit 3791	
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## EAST Search History

## EAST Search History

## EAST Search History (Prior Art)

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S4	2	"2005192879".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/04 11:15
S5	1	"2006509574".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/04 11:16
S6	2	"20060155174".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/04 11:18
S7	2	"2002146368".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/04 11:20
S8	2	"20020146368".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/04 11:21
S9	0	"2002198470".pn.	US-PGPUB; USPAT	AND	ON	2011/01/04 13:38
S10	0	"US 2002198470".pn.	US-PGPUB; USPAT	AND	ON	2011/01/04 13:38

EAST Search History

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S13	139	whitman michael.in. and "2002"	US-PGPUB; USPAT	AND	ON	2011/01/04 13:39
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S21	0	JP 2004-560166	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/04 16:01
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S23	3	takizawa.in. and (600/309-310).ccls.	US-PGPUB; USPAT	AND	ON	2011/01/05 11:16
S24	4	kawano.in. and (600/309-310).ccls.	US-PGPUB; USPAT	AND	ON	2011/01/05 11:18
S25	3	uchiyama.in. and (600/309-310).ccls.	US-PGPUB; USPAT	AND	ON	2011/01/05 11:19
S26	2	segawa.in. and (600/309-310).ccls.	US-PGPUB; USPAT	AND	ON	2011/01/05 11:22
S27	3	homan.in. and (600/309-310).ccls.	US-PGPUB; USPAT	AND	ON	2011/01/05 11:24
S28	28	(600/309-310).ccls. and pill	US-PGPUB; USPAT	AND	ON	2011/01/05 11:26
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S41	71	(600/309,310,317,345,347,361).ccls. and (heat\$3 and dry\$3) and (recover\$3 or restore\$3 or reset\$3) and sensor same (heat or thermal or temperature) and usage	US-PGPUB; USPAT	AND	ON	2011/01/05 13:39
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S43	1328	emitter same detector same (distance offset) and A61B5/\$.cpc.	US-PGPUB; USPAT; USOCR;	OR	ON	2018/12/28 17:02

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S48	1	"15132279"	US-PGPUB; USPAT	OR	OFF	2019/01/02 15:33
S49	11	((("4699376") or ("4583555") or ("8282579") or ("7785232") or ("6436058") or ("8341850") or ("20060064044") or ("20120226199") or ("20080132818") or ("20070043308") or ("20160000369")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/01/02 17:04
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S55	1	("20110133730").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/01/03 13:46
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S61	3	((("7941199") or ("8224411") or ("8385996")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/01/21 14:54
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S63	426	(oximetry oximeter) and ratio same AC same wavelength\$1	US-PGPUB; USPAT	OR	ON	2019/01/21 15:13
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EAST Search History

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S75	771	AC and (alert\$4 alarm\$4) same (hyperglycem\$4 hypoglycem\$4)	US-PGPUB; USPAT	OR	ON	2019/01/22 13:52
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S80	4	newberry.in. and AC.clm.	US-PGPUB; USPAT	OR	ON	2019/01/22 14:03
S81	35060	(LED diode light adj source) same switch\$4 with frequenc\$4	US-PGPUB; USPAT	OR	ON	2019/01/22 14:43
S82	18125	(LED diode light adj source) with switch\$4 with frequenc\$4	US-PGPUB; USPAT	OR	ON	2019/01/22 14:44
S83	385	(LED diode light adj source) with switch\$4 with frequenc\$4 and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/01/22 14:45
S84	271	frequenc\$5 with depend\$5 with switch\$5 and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/01/22 14:52
S85	20	frequenc\$5 with depend\$5 with switch\$5 same (light adj source LED diode) and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/01/22 14:53
S86	1	"13985232" and encapsulat\$5	US-PGPUB; USPAT	OR	ON	2019/01/22 16:22
S87	1	"5217013".pn.	US-PGPUB; USPAT	OR	ON	2019/01/22 16:27
S88	220	("4321930"   "4380240"   "4510938"   "4819752"   "4825879"   "4865038"   "4880304"   "4928691"   "4964408"   "5094240"   "5111817").PN. OR ("5217013").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/01/22 16:53
S89	1	"20100049018".pn.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/01/22 17:01
S90	1	"20090182209".pn.	US-PGPUB;	OR	OFF	2019/01/22

EAST Search History

			USPAT; USOCR			17:22
S91	3	(("20110245686") or ("20020115918") or ("20100252721")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/01/24 11:10
S92	1	"14773755"	US-PGPUB; USPAT	OR	OFF	2019/01/24 11:18
S93	314	lens same fourier adj transform and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/01/24 11:43
S94	6	(("20110118571") or ("20070213607") or ("6921366") or ("20160356746") or ("20150005611") or ("7039446")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/01/29 09:34
S95	1	("5217013").PN.	USPAT; USOCR	OR	OFF	2019/01/29 15:46
S96	1	("20100298678").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/01/29 15:58
S97	0	("145309087").PN.	USPAT; USOCR	OR	OFF	2019/01/29 16:26
S98	0	("14309087").PN.	USPAT; USOCR	OR	OFF	2019/01/29 16:26
S99	1	"14309087"	USPAT	OR	OFF	2019/01/29 16:26
S100	1	"20100073669"	USPAT	OR	OFF	2019/01/29 16:34
S101	2	"20100073669"	US-PGPUB; USPAT	OR	OFF	2019/01/29 16:34
S102	2	"14108012"	US-PGPUB; USPAT	OR	OFF	2019/01/30 11:40
S103	3717	electrical\$5 with conductive\$4 same (copper carbon) and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/01/30 11:43
S104	254	electrical\$5 with conductive\$4 same (copper carbon) and A61B5/1455\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/01/30 11:51
S105	532	"6519487"	US-PGPUB; USPAT	OR	ON	2019/01/30 12:38
S106	1	("6519487").PN.	USPAT; USOCR	OR	OFF	2019/01/30 12:38
S107	0	("16030303").PN.	USPAT; USOCR	OR	OFF	2019/01/30 14:52
S108	1	"16030303"	US-PGPUB; USPAT	OR	OFF	2019/01/30 14:53
S109	1	"5217013".pn.	US-PGPUB; USPAT	OR	OFF	2019/01/30 15:01
S110	2	(("20100049018") or ("20090182209")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/01/30 15:04
S111	1	"13985232"	US-PGPUB; USPAT	OR	OFF	2019/01/30 15:06
S112	1	("20100041969").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/01/30 15:22
S113	51	weighted with subtract\$5 same reference and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/01/30 15:39
S114	1	("6097975").PN.	USPAT; USOCR	OR	OFF	2019/01/30 15:41



EAST Search History

S115	1	("6067463").PN.	USPAT; USOCR	OR	OFF	2019/01/30 15:42
S116	205	weighted same subtract\$5 same reference and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/01/30 15:49
S117	0	("20090253996").PN.	USPAT; USOCR	OR	OFF	2019/01/30 16:00
S118	1	("20090253996").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/01/30 16:01
S119	1	("20060264727").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/01/30 16:03
S120	2	"14108012"	US-PGPUB; USPAT	OR	OFF	2019/01/30 16:48
S121	7	lee.in. and lifescan.asn.	US-PGPUB; USPAT	OR	OFF	2019/01/30 16:49
S122	0	fardanesh.xa. and lifescan.asn.	US-PGPUB; USPAT	OR	OFF	2019/01/30 16:50
S123	2	((("6097975") or ("6067463")).PN.	USPAT; USOCR	OR	OFF	2019/01/31 10:43
S124	77	(remov\$4 filter\$4 subtract\$4) with weighted with reference and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/01/31 10:55
S125	276	(remov\$4 filter\$4 subtract\$4) with weighted same reference and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/01/31 11:01
S126	199	S125 not S124	US-PGPUB; USPAT	OR	OFF	2019/01/31 11:01
S127	1	("20100073669").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/01/31 12:35
S128	1	"12110994"	USPAT	OR	OFF	2019/01/31 17:54
S129	270	fardanesh.xa.	US-PGPUB; USPAT	OR	ON	2019/01/31 18:39
S130	1	("6067463").PN.	USPAT; USOCR	OR	OFF	2019/01/31 18:53
S131	1	("6097975").PN.	USPAT; USOCR	OR	OFF	2019/01/31 18:53
S132	1	("20130096403").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/01 12:30
S133	1	"15166702" and power adj sensor	US-PGPUB; USPAT	OR	OFF	2019/02/01 12:32
S134	3	"13651173"	US-PGPUB; USPAT	OR	OFF	2019/02/01 12:35
S135	1	("20080275317").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/01 12:37
S136	10	("20070203448"   "20080027330"   "20090105605"   "20100009328"   "20100298899"   "20110181422"   "7220220").PN. OR ("8996088").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/01 12:38
S137	2	((("20020151772") or ("20100202966")).PN.	US-PGPUB; USPAT;	OR	OFF	2019/02/05 09:24

EAST Search History

			USOCR			
S138	1	("20140051955").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/05 14:14
S139	2	((("20140187883") or ("20110112387")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/05 14:51
S140	1	("9314197").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/05 16:01
S141	1	"15606666" and detector and reader	US-PGPUB; USPAT	OR	OFF	2019/02/05 16:13
S142	2	("0569186").PN.	USPAT; USOCR	OR	OFF	2019/02/05 16:19
S143	1	("5569186").PN.	USPAT; USOCR	OR	OFF	2019/02/05 16:19
S145	1	("6561978").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/05 16:33
S146	273	fardanesh.xa.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/05 16:34
S147	1	("7275437").PN.	USPAT; USOCR	OR	OFF	2019/02/06 11:10
S148	2	((("7827537") or ("7827437")).PN.	USPAT; USOCR	OR	OFF	2019/02/06 11:11
S149	1	("7827543").PN.	USPAT; USOCR	OR	OFF	2019/02/06 11:11
S150	1	("7827547").PN.	USPAT; USOCR	OR	OFF	2019/02/06 11:12
S151	0	holker.in. and "7827"\$	USPAT	OR	OFF	2019/02/06 11:14
S152	21	holker.in.	USPAT	OR	OFF	2019/02/06 11:14
S153	1	("7003336").PN.	USPAT; USOCR	OR	OFF	2019/02/06 12:02
S154	0	((("20060249690") or ("20110133730")).PN.	USPAT; USOCR	OR	OFF	2019/02/06 13:21
S155	2	((("20060249690") or ("20110133730")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/06 13:21
S156	2172	tumor and (probe marker) same (circulation vessel) and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/02/06 14:01
S157	1127	tumor and (probe marker) with (circulation vessel) and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/02/06 14:02
S158	199	tumor same (probe marker) with (circulation vessel) and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/02/06 14:02
S163	1	("9314197").PN.	USPAT; USOCR	OR	OFF	2019/02/06 16:59
S164	1	("20140200423").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/06 17:00
S165	1	("20140051955").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/07 13:38

EAST Search History

S166	1	("5817012").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/07 14:51
S167	1	("20140046149").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/07 17:30
S168	1	("4880441").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/07 17:31
S169	7	"2003052865"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/07 17:32
S170	352	sweat and pump same permeable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/07 17:34
S171	78	sweat and pump same permeable same water	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/07 17:35
S172	61	sweat and pump same permeable same water and sensor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/07 17:35
S173	63	sweat and pump same permeable same water and sens\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/07 17:35
S174	1	("20020151772").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/15 14:16
S175	1	("6561978").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/15 15:39
S176	852	("4178916"   "4509531"   "4703756"   "5062841"   "5063081"   "5077753"   "5112614"   "5113869"   "5140985"   "5279543"   "5362307"   "5458140"   "5462051"   "5507288"   "5569186"   "5636632"   "5721783"   "5730714"   "5735273"   "5771890"   "5807375"   "5827183"   "5830132"   "5875186"   "5882300"   "5897033"   "5914701"   "5954685"   "5982297"   "5989409"	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/15 15:47

EAST Search History

		"5995860"   "6023629"   "6024699"   "6049727"   "6059736"   "6134461"   "6159147"   "6175752"   "6248067"   "6277067").PN. OR ("6561978").URPN.				
S177	2	"20100081906"	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/15 15:55
S178	0	(2002/0019587).CCLS.	USPAT; USOCR	OR	OFF	2019/02/18 10:26
S179	1	("20020019587").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/18 10:26
S180	2	((("20140148661") or ("5517987")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/19 09:27

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S44	86	emitter same detector same (distance offset).clm. and A61B5/\$.cpc.	USPAT	OR	ON	2018/12/28 17:02
S45	190	emitter same detector same (distance offset).clm. and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2018/12/28 17:02
S57	1	magnet\$4 same uniform with alignment and hydrogel and magnetometer	US-PGPUB; USPAT	OR	OFF	2019/01/04 15:23
S58	39	magnet\$4 same uniform and hydrogel and magnetometer	US-PGPUB; USPAT	OR	OFF	2019/01/04 15:25
S59	3	magnet\$4 same halbach and hydrogel and magnetometer	US-PGPUB; USPAT	OR	OFF	2019/01/04 15:25
S60	1	"20090316137".pn.	US-PGPUB; USPAT	OR	OFF	2019/01/04 17:00
S159	73	tumor same (probe marker) with (circulation vessel) and A61B5/\$.cpc.	USPAT	OR	ON	2019/02/06 14:04
S160	199	tumor same (probe marker) with (circulation vessel) and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/02/06 14:04
S161	231	tumor same (probe marker) with (circulation vessel vasculature) and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/02/06 14:05
S162	8	tumor same (probe marker) with (circulation vessel vasculature).clm. and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/02/06 14:07

2/ 19/ 2019 10:44:34 AM

C:\Users\mfardanesh\Documents\EAST\Workspaces\~ auto.07102015.115008.wsp

Receipt date: 12/20/2018

15/195,199 - GAU: 3791

PTO/SB/08 Equivalent

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3735	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 1 OF 4		Attorney Docket No.	MAS.1007A

**U.S. PATENT DOCUMENTS**

Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	7,519,327	4/14/2009	White	
	2	7,601,123	10/13/2009	Tweed, et al.	
	3	7,726,209	6/1/2010	Ruotoistenmäki	
	4	7,862,523	1/4/2011	Ruotoistenmaki	
	5	8,289,130	10/16/2012	Nakajima et al.	
	6	8,364,389	1/29/2013	Dorogusker et al.	
	7	8,615,290	12/24/2013	Lin et al.	
	8	8,655,004	2/18/2014	Prest et al.	
	9	8,760,517	6/24/2014	Sarwar et al.	
	10	9,072,437	7/7/2015	Paalasmaa	
	11	9,081,889	7/14/2015	Ingrassia, Jr. et al.	
	12	9,210,566	12/8/2015	Ziemianska et al.	
	13	9,311,382	4/12/2016	Varoglu et al.	
	14	9,357,665	5/31/2016	Myers et al.	
	15	9,489,081	11/8/2016	Anzures et al.	
	16	9,497,534	11/15/2016	Prest et al.	
	17	9,526,430	12/27/2016	Srinivas et al.	
	18	9,553,625	1/24/2017	Hatanaka et al.	
	19	9,593,969	3/14/2017	King	
	20	9,651,405	5/16/2017	Gowreesunker et al.	
	21	9,668,676	6/6/2017	Culbert	
	22	9,699,546	7/4/2017	Qian et al.	
	23	9,716,937	7/25/2017	Qian et al.	
	24	9,723,997	8/8/2017	Lamego	
	25	9,781,984	10/10/2017	Baranski et al.	
	26	9,838,775	12/5/2017	Qian et al.	
	27	9,848,823	12/26/2017	Raghuram et al.	
	28	9,866,671	1/9/2018	Thompson et al.	
	29	9,867,575	1/16/2018	Maani et al.	

Examiner Signature	<u>/MARJAN FARDANESH/</u>	Date Considered	02/19/2019
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p> <p style="text-align: center;"><del>ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.F./</del></p>			

T<sup>1</sup> - Place a check mark in this area when an English language Translation is attached.

Receipt date: 12/20/2018

15/195,199 - GAU: 3791

PTO/SB/08 Equivalent

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3735	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 2 OF 4		Attorney Docket No.	MAS.1007A

**U.S. PATENT DOCUMENTS**

Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	30	9,898,049	2/20/2018	Myers et al.	
	31	9,918,646	3/20/2018	Singh Alvarado et al.	
	32	9,952,095	4/24/2018	Hotelling et al.	
	33	10,039,080	7/31/2018	Miller et al.	
	34	10,055,121	8/21/2018	Chaudhri et al.	
	35	10,066,970	9/4/2018	Gowreesunker et al.	
	36	10,076,257	9/18/2018	Lin et al.	
	37	10,078,052	9/18/2018	Ness et al.	
	38	2014/0171146	6/19/2014	Ma et al.	
	39	2015/0173671	6/25/2015	Paalasmaa et al.	
	40	2015/0255001	9/10/2015	Haughav et al.	
	41	2015/0281424	10/1/2015	Vock et al.	
	42	2015/0318100	11/5/2015	Rothkopf et al.	
	43	2016/0019360	1/21/2016	PAHWA et al.	
	44	2016/0023245	1/28/2016	Zadesky et al.	
	45	2016/0038045	2/11/2016	Shapiro	
	46	2016/0051157	2/25/2016	Waydo	
	47	2016/0051158	2/25/2016	Silva	
	48	2016/0058302	3/3/2016	Raghuram et al.	
	49	2016/0058309	3/3/2016	Han	
	50	2016/0058312	3/3/2016	Han et al.	
	51	2016/0058356	3/3/2016	RAGHURAM et al.	
	52	2016/0058370	3/3/2016	RAGHURAM et al.	
	53	2016/0071392	3/10/2016	Hankey et al.	
	54	2016/0154950	6/2/2016	NAKAJIMA et al.	
	55	2016/0157780	6/9/2016	RIMMINEN et al.	
	56	2016/0213309	7/28/2016	SANNHOLM et al.	
	57	2016/0256058	9/8/2016	Pham et al.	
	58	2016/0256082	9/8/2016	Ely et al.	

Examiner Signature	<u>/MARJAN FARDANESH/</u>	Date Considered	02/19/2019
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p>			

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Receipt date: 12/20/2018

15/195,199 - GAU: 3791

PTO/SB/08 Equivalent

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3735	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 3 OF 4		Attorney Docket No.	MAS.1007A

**U.S. PATENT DOCUMENTS**

Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	59	2016/0267238	9/15/2016	Nag	
	60	2016/0287181	10/6/2016	Han et al.	
	61	2016/0296173	10/13/2016	Culbert	
	62	2016/0296174	10/13/2016	Isikman et al.	
	63	2016/0310027	10/27/2016	Han	
	64	2016/0378069	12/29/2016	Rothkopf	
	65	2016/0378071	12/29/2016	Rothkopf	
	66	2017/0007183	1/12/2017	Dusan et al.	
	67	2017/0010858	1/12/2017	Prest et al.	
	68	2017/0074897	3/16/2017	Mermel et al.	
	69	2017/0084133	3/23/2017	Cardinali et al.	
	70	2017/0086689	3/30/2017	Shui et al.	
	71	2017/0086742	3/30/2017	Harrison-Noonan et al.	
	72	2017/0086743	3/30/2017	Bushnell et al.	
	73	2017/0094450	3/30/2017	Tu et al.	
	74	2017/0164884	6/15/2017	Culbert et al.	
	75	2017/0248446	8/31/2017	Gowreesunker et al.	
	76	2017/0273619	9/28/2017	Alvarado et al.	
	77	2017/0281024	10/5/2017	Narasimhan et al.	
	78	2017/0293727	10/12/2017	Klaassen et al.	
	79	2017/0325698	11/16/2017	Allec et al.	
	80	2017/0325744	11/16/2017	Allec et al.	
	81	2017/0340209	11/30/2017	Klaassen et al.	
	82	2017/0340219	11/30/2017	Sullivan et al.	
	83	2017/0347885	12/7/2017	Tan et al.	
	84	2017/0354332	12/14/2017	Lamego	
	85	2017/0354795	12/14/2017	BLAHNIK et al.	
	86	2017/0358239	12/14/2017	Arney et al.	
	87	2017/0358240	12/14/2017	Blahnik et al.	

Examiner Signature	<u>/MARJAN FARDANESH/</u>	Date Considered	02/19/2019
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p> <p style="text-align: center;"><del>ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.F/</del></p>			

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Receipt date: 12/20/2018

15/195,199 - GAU: 3791

PTO/SB/08 Equivalent

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3735	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 4 OF 4		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	88	2017/0358242	12/14/2017	Thompson et al.	
	89	2017/0360306	12/14/2017	Narasimhan et al.	
	90	2017/0366657	12/21/2017	Thompson et al.	
	91	2018/0014781	1/18/2018	Clavelle et al.	
	92	2018/0025287	1/25/2018	Mathew et al.	
	93	2018/0042556	2/15/2018	SHAHPARNIA et al.	
	94	2018/0049694	2/22/2018	Singh Alvarado et al.	
	95	2018/0050235	2/22/2018	Tan et al.	
	96	2018/0055375	3/1/2018	MARTINEZ et al.	
	97	2018/0055439	3/1/2018	Pham et al.	
	98	2018/0056129	1/1/2018	NARASIMHA RAO et al.	
	99	2018/0078151	3/22/2018	ALLEC et al.	
	100	2018/0078182	3/22/2018	CHEN et al.	
	101	2018/0110469	4/26/2018	MAANI et al.	
	102	2018/0153418	6/7/2018	SULLIVAN et al.	
	103	2018/0164853	6/14/2018	Myers et al.	
	104	2018/0196514	7/12/2018	ALLEC et al.	
	105	2018/0228414	8/16/2018	SHAO et al.	
	106	2018/0238734	8/23/2018	Hotelling et al.	
	107	2018/0279956	10/4/2018	WAYDO et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document <i>Country Code-Number-Kind Code</i> Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>

29627918

Examiner Signature	<u>/MARJAN FARDANESH/</u>	Date Considered	02/19/2019
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p> <p style="text-align: center;"><del>ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.F./</del></p>			

T<sup>1</sup> - Place a check mark in this area when an English language Translation is attached.



Receipt date: 11/07/2018

15/195,199 - GAU: 3791

PTO/SB/08 Equivalent

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3735	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 1 OF 1		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	6,671,526 B1	12/30/2003	Aoyagi et al.	
	2	2004/0054290 A1	03/18/2004	Chance	
	3	2011/0004106 A1	01/06/2011	Iwamiya et al.	
	4	2011/0085721 A1	04/14/2011	Guyon et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document <i>Country Code-Number-Kind Code</i> Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>
	5	EP 0781527 A1	07/02/1997	INSTRUMENTARIUM OY		
	6	EP 2277440 A1	01/26/2011	PIONEER CORP		

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>
	7	Written Opinion received in International Application No. PCT/US2016/040190, dated January 2, 2018.	

29343450

Examiner Signature <i>/MARJAN FARDANESH/</i>	Date Considered <i>02/19/2019</i>
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p> <p style="text-align: center;"><del>ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.F/</del></p>	

T<sup>1</sup> - Place a check mark in this area when an English language Translation is attached.

Doc Code: ECOMM.AUTH/ECOMM.WTDW

Doc Description: Internet Communications Authorized/Internet Communications Authorization Withdrawn

PTO/SB/439 (11-15)

<b>AUTHORIZATION FOR INTERNET COMMUNICATIONS IN A PATENT APPLICATION OR REQUEST TO WITHDRAW AUTHORIZATION FOR INTERNET COMMUNICATIONS</b>	Application No.	15/195199
	Filing Date	June 28, 2016
	First Named Inventor	Ammar Al-Ali
	Art Unit	3791
	Examiner Name	Fardanesh, Marjan
	Practitioner Docket No.	MAS.1007A

To: Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**I. To authorize permission for Internet Communications.**

Recognizing that Internet communications are not secure, I hereby authorize the USPTO to communicate with the undersigned and practitioners in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via video conferencing, instant messaging, or electronic mail. I understand that a copy of these communications will be made of record in the application file. (MPEP 502.03)

**II. To withdraw authorization for Internet Communications.**

The authorization given on \_\_\_\_\_, to the USPTO to communicate with the undersigned and any practitioner in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via Internet communications such as video conferencing, instant messaging, or electronic mail is hereby withdrawn. I understand that the withdrawal is effective when approved rather than when received.

I am the

- applicant.
- attorney or agent of record. Registration number 74,164.
- attorney or agent acting under 37 CFR 1.34. Registration number \_\_\_\_\_.

/Aaron S. Johnson/  
Signature

4-18-2019  
Date

Aaron S. Johnson  
Typed or printed name

(949) 760-0404  
Telephone Number

**NOTE:** This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Juristic entities must be represented by a patent practitioner (see 37 CFR 1.31, which is applicable to any paper filed on or after September 16, 2012, that is presented on behalf of a juristic entity, regardless of application filing date). Submit multiple forms if more than one signature is required, see below\*.

\* Total of 1 forms are submitted.

## Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

<b>Electronic Acknowledgement Receipt</b>	
<b>EFS ID:</b>	35764607
<b>Application Number:</b>	15195199
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	3453
<b>Title of Invention:</b>	ADVANCED PULSE OXIMETRY SENSOR
<b>First Named Inventor/Applicant Name:</b>	Ammar Al-Ali
<b>Customer Number:</b>	64735
<b>Filer:</b>	Aaron Samuel Johnson/ThuyQuyen Nguyen
<b>Filer Authorized By:</b>	Aaron Samuel Johnson
<b>Attorney Docket Number:</b>	MAS.1007A
<b>Receipt Date:</b>	18-APR-2019
<b>Filing Date:</b>	28-JUN-2016
<b>Time Stamp:</b>	14:03:21
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	no
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**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Internet Communications Authorized	Internet-Comm-Autho_MAS1007A.pdf	80246 6eab7e9fe0f2acd92f92489933f37d90b78fc29	no	2

**Warnings:**

<b>Information:</b>	
<b>Total Files Size (in bytes):</b>	80246
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>	

PTO/SB/08 Equivalent

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 1 OF 1		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	5,830,137	11-03-1998	Scharf	
	2	8,452,364	05-28-2013	Hannula et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document <i>Country Code-Number-Kind Code</i> Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>

30349839

Examiner Signature	Date Considered
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p>	

T<sup>1</sup> - Place a check mark in this area when an English language Translation is attached.

Electronic Patent Application Fee Transmittal				
<b>Application Number:</b>	15195199			
<b>Filing Date:</b>	28-Jun-2016			
<b>Title of Invention:</b>	ADVANCED PULSE OXIMETRY SENSOR			
<b>First Named Inventor/Applicant Name:</b>	Ammar Al-Ali			
<b>Filer:</b>	Aaron Samuel Johnson/Daniel Escajeda			
<b>Attorney Docket Number:</b>	MAS.1007A			
Filed as Large Entity				
<b>Filing Fees for Utility under 35 USC 111(a)</b>				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 1 month with \$0 paid	1251	1	200	200
<b>Miscellaneous:</b>				
RCE- 1ST REQUEST	1801	1	1300	1300
<b>Total in USD (\$)</b>				<b>1500</b>



<b>Electronic Acknowledgement Receipt</b>	
<b>EFS ID:</b>	36505963
<b>Application Number:</b>	15195199
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	3453
<b>Title of Invention:</b>	ADVANCED PULSE OXIMETRY SENSOR
<b>First Named Inventor/Applicant Name:</b>	Ammar Al-Ali
<b>Customer Number:</b>	64735
<b>Filer:</b>	Aaron Samuel Johnson/ThuyQuyen Nguyen
<b>Filer Authorized By:</b>	Aaron Samuel Johnson
<b>Attorney Docket Number:</b>	MAS.1007A
<b>Receipt Date:</b>	05-JUL-2019
<b>Filing Date:</b>	28-JUN-2016
<b>Time Stamp:</b>	15:47:57
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 1500
RAM confirmation Number	070819INTEFSW15485800
Deposit Account	111410
Authorized User	ThuyQuyen Nguyen
<p>The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:</p> <p>37 CFR 1.16 (National application filing, search, and examination fees)</p> <p>37 CFR 1.17 (Patent application and reexamination processing fees)</p>	

<b>File Listing:</b>					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	RCE_MAS1007A.PDF	1349943	no	3
			83cda8fe969e81f4ca52c82df9748acc80f681		
<b>Warnings:</b>					
<b>Information:</b>					
2		OAR_MAS1007A.pdf	105375	yes	18
			ffa3b6f510dea7fc0d22fc6b2d94a3410175551e		
<b>Multipart Description/PDF files in .zip description</b>					
		Document Description	Start	End	
		Amendment Submitted/Entered with Filing of CPA/RCE	1	1	
		Specification	2	2	
		Claims	3	9	
		Drawings-only black and white line drawings	10	10	
		Applicant summary of interview with examiner	11	11	
		Applicant Arguments/Remarks Made in an Amendment	12	18	
<b>Warnings:</b>					
<b>Information:</b>					
3	Drawings-only black and white line drawings	REPLACEMENT_MAS1007A.PDF	62541	no	1
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<b>Warnings:</b>					
<b>Information:</b>					
4		IDS_MAS1007A.pdf	45114	yes	2
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Multipart Description/PDF files in .zip description					
Document Description			Start	End	
Transmittal Letter			1	1	
Information Disclosure Statement (IDS) Form (SB08)			2	2	
<b>Warnings:</b>					
<b>Information:</b>					
5	Fee Worksheet (SB06)	fee-info.pdf	32436	no	2
			a60dc942d6d544c777de9302cfcca2c5b5ef07be		
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			1595409		
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>            If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>            If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>            If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

Doc code: RCEX  
 Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (02-18)  
 Approved for use through 11/30/2020. OMB 0651-0031  
 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE  
 Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL (Submitted Only via EFS-Web)</b>							
Application Number	15195199	Filing Date	2016-06-28	Docket Number (if applicable)	MAS.1007A	Art Unit	3791
First Named Inventor	Al-Ali, Ammar			Examiner Name	Fardanesh, Marjan		
<p><b>This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.</b>                      Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV</p>							
<b>SUBMISSION REQUIRED UNDER 37 CFR 1.114</b>							
<p>Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).</p>							
<p><input type="checkbox"/> Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.</p> <p style="margin-left: 40px;"><input type="checkbox"/> Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____</p> <p style="margin-left: 40px;"><input type="checkbox"/> Other _____</p> <p><input checked="" type="checkbox"/> Enclosed</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> Amendment/Reply</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> Information Disclosure Statement (IDS)</p> <p style="margin-left: 40px;"><input type="checkbox"/> Affidavit(s)/ Declaration(s)</p> <p style="margin-left: 40px;"><input type="checkbox"/> Other _____</p>							
<b>MISCELLANEOUS</b>							
<p><input type="checkbox"/> Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____                      (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)</p> <p><input type="checkbox"/> Other _____</p>							
<b>FEES</b>							
<p><input checked="" type="checkbox"/> <b>The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.</b>                      The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to                      Deposit Account No <u>111410</u></p>							
<b>SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED</b>							
<p><input checked="" type="checkbox"/> Patent Practitioner Signature                      Applicant Signature</p>							

Doc code: RCEX  
 Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (02-18)  
 Approved for use through 11/30/2020. OMB 0651-0031  
 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE  
 Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	Aaron S. Johnson/	Date (YYYY-MM-DD)	2019-07-05
Name	Aaron S. Johnson	Registration Number	74164

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.  
 If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

MAS.1007A

PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

First Inventor	:	Ammar Al-Ali
App. No.	:	15/195199
Filed	:	June 28, 2016
For	:	ADVANCED PULSE OXIMETRY SENSOR
Examiner	:	Fardanesh, Marjan
Art Unit	:	3791
Conf. No.	:	3453

**RESPONSE TO FINAL OFFICE ACTION DATED MARCH 29, 2019****Mail Stop RCE**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Commissioner:

In response to the Final Office Action dated March 29, 2019, please consider the following:

**Amendments to the Specification** begin on page 2 of this paper.

**Amendments to the Claims** are reflected in the listing of claims which begins on page 3 of this paper.

**Amendments to the Drawings** begin on page 10. A "Replacement Sheet" for each sheet of drawings being amended can be found in the Appendix.

**Summary of Interview** begins on page 11 of this paper.

**Remarks/Arguments** begin on page 12 of this paper.

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#### AMENDMENTS TO THE SPECIFICATION

Please amend the originally-filed specification as set forth below.

**[0052]** Referring now to FIG. 7B, a top view of the 3D sensor 700 is illustrated with both the emitter 702 and the light blocker cover 707 removed for ease of illustration. The outer ring illustrates the footprint of the light diffuser 704. As light is emitted from the emitter 702 (not shown in FIG. 7B), it is diffused homogenously and directed to the tissue measurement site 102. The light blocker 706 forms the circular wall of a light isolation chamber to keep incident light from being sensed by the detector 710. The light blocker cover 707 blocks incidental light from entering the light isolation chamber from above. The light concentrator ~~710~~708 collects the reflected light from the tissue measurement site 102 and funnels it upward toward the detector 710 at the center of the 3D sensor 700.



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### AMENDMENTS TO THE CLAIMS

A complete listing of all claims is presented below with insertions underlined (e.g., insertion), and deletions struck through or in double brackets (e.g., ~~deletion~~ or ~~[[deletion]]~~).

1. **(Currently Amended)** An optical physiological measurement device configured for placement on a patient at a tissue measurement site, the device comprising:

one or more emitters ~~which~~ configured to emit light so as to irradiate a portion of the tissue measurement site, the portion of the tissue measurement site having an at least partially circular shape bounded by a light block, the tissue measurement site located on a wrist of the patient; and

~~one or more~~ a plurality of detectors configured to detect the emitted light after attenuation by and reflection from tissue of the patient at the tissue measurement site, the ~~one or more~~ plurality of detectors further configured to transmit a signal responsive to the detected light; ~~[[and]]~~

wherein ~~[[a ]]~~ the light block comprising comprises an annular ring having a circular shape located between the emitted light at the tissue measurement site and the ~~one or more~~ plurality of detectors, the light block reducing an amount of incident light emitted from the one or more emitters from being detected by the ~~one or more~~ plurality of detectors, wherein the plurality of detectors are arranged in an array having a spatial configuration corresponding to the shape of the irradiated portion of the tissue measurement site.

2. **(Currently Amended)** The optical physiological measurement device of Claim 37, further comprising a concentrator which receives the light after attenuation by tissue of the patient, concentrates the received light and emits the concentrated light in the direction of the ~~one or more~~ plurality of detectors.

3. **(Previously Presented)** The optical physiological measurement device of Claim 1, further comprising a processor configured to receive the transmitted signal responsive to the detected light and to determine a physiological parameter.

4. **(Previously Presented)** The optical physiological measurement device of Claim 3, wherein the parameter is arterial oxygen saturation.

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5. **(Previously Presented)** The optical physiological measurement device of Claim 37, wherein the diffuser comprises at least one of a glass diffuser, ground glass diffuser, a glass bead diffuser, an opal glass diffuser, and an engineered diffuser.

6. **(Previously Presented)** The optical physiological measurement device of Claim 37, wherein the diffuser emits the spread light with a substantially uniform intensity profile.

7. **(Previously Presented)** The optical physiological measurement system of Claim 37, wherein the diffuser defines a surface area shape by which the emitted spread light is distributed onto a surface of the tissue measurement site.

8. **(Cancelled)**

9. **(Cancelled)**

10. **(Cancelled)**

11. **(Cancelled)**

12. **(Cancelled)**

13. **(Cancelled)**

14. **(Cancelled)**

15. **(Cancelled)**

16. **(Previously Presented)** The optical physiological measurement device of Claim 2, wherein the concentrator comprises at least one of glass, ground glass, glass beads, opal glass, and a compound parabolic concentrator.

17. **(Cancelled)**

18. **(Currently Amended)** A method to determine a constituent or analyte in a patient's blood, the method comprising:

emitting, from at least one emitter of an optical sensor, light of one or more wavelengths so as to irradiate a portion of a tissue measurement site, the irradiated portion having an at least partially circular shape, wherein the tissue measurement site is located on a wrist of a patient;

detecting, with ~~one or more~~ a plurality of detectors, the emitted light after attenuation by and reflection from tissue of the patient at the tissue measurement site; and

providing an annular ring located between the emitted light at the tissue measurement site and the ~~one or more~~ plurality of detectors, wherein the annular ring

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reduces an amount of incident light emitted from the at least one emitter from arriving at the ~~one or more~~plurality of detectors, and wherein the plurality of detectors are arranged in an array having a spatial configuration corresponding to the shape of the irradiated portion of the tissue measurement site.

19. **(Currently Amended)** The method of Claim 39, further comprising receiving, by a concentrator, the emitted spread light after the spread light has been attenuated by and reflected from the tissue measurement site and concentrating, by the concentrator, the received light and emitting the concentrated light from the concentrator to the ~~one or more~~plurality of detectors.

20. **(Currently Amended)** The method of Claim 18, further comprising:  
transmitting, from the ~~one or more~~plurality of detectors, a signal responsive to the detected light;  
receiving, by a processor, the transmitted signal responsive to the detected light;  
and  
processing, by the processor, the received signal responsive to the detected light to determine a physiological parameter.

21. **(Cancelled)**

22. **(Currently Amended)** The method of Claim 39, wherein spreading, with a diffuser, the emitted light and emitting the spread light from the diffuser to ~~[[a]]the~~the tissue measurement site is performed by at least one of a glass diffuser, a glass bead diffuser, an opal glass diffuser, and an engineered diffuser.

23. **(Currently Amended)** The method of Claim 39, wherein spreading, with a diffuser, the emitted light and emitting the spread light from the diffuser to ~~[[a]]the~~the tissue measurement site further comprises spreading the emitted light with a substantially uniform intensity profile.

24. **(Currently Amended)** The method of Claim 39, wherein spreading, with a diffuser, the emitted light and emitting the spread light from the diffuser to ~~[[a]]the~~the tissue measurement site further comprises spreading the emitted light so as to define a surface area shape by which the emitted spread light is distributed onto a surface of the tissue measurement site.

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25. **(Currently Amended)** The method of Claim 19, wherein concentrating, by the concentrator, the received light and emitting the concentrated light from the concentrator to the ~~one or more~~ plurality of detectors is performed by at least one of a glass concentrator, a glass bead concentrator, an opal glass concentrator, and a compound parabolic concentrator.

26. **(Currently Amended)** A pulse oximeter sensor comprising:

one or more optical sources configured to emit light at one or more wavelengths, wherein, when the pulse oximeter sensor is placed on a patient at a tissue measurement site, the one or more optical sources are positioned in a reflectance measurement configuration on a first side of the tissue measurement site, and wherein the one or more optical sources are configured to irradiate a portion of the tissue measurement site, the portion of the tissue measurement site having an at least partially circular shape;

a plurality of detectors configured to detect light emitted from the one or more optical sources after attenuation by tissue of the patient at the tissue measurement site, the plurality of detectors arranged in an array having a spatial configuration corresponding to the shape of the irradiated portion of the tissue measurement site so as to capture the emitted light reflected from the tissue of the patient at the tissue measurement site, wherein the plurality of detectors are positioned in a reflectance measurement configuration on the first side of the tissue measurement site when the pulse oximeter sensor is placed on the patient, the plurality of detectors further configured to output a signal responsive to the detected light; and

a light block comprising an annular ring located between the emitted light at the tissue measurement site and the plurality of detectors, the light block reducing an amount of incident light emitted from the one or more optical sources from arriving at the plurality of detectors.

27. **(Previously Presented)** The pulse oximeter sensor of Claim 26, further comprising a concentrator which concentrates the emitted light after it has been attenuated by the tissue measurement site and directs the concentrated light toward the plurality of detectors.

28. **(Previously Presented)** The pulse oximeter sensor of Claim 26, wherein the plurality of detectors are further configured to output the signals response to the detected light to

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a processor configured to receive the signals responsive to the detected light and to determine a physiological parameter.

29. **(Previously Presented)** The pulse oximeter sensor of Claim 41, wherein the diffuser is further configured to define a surface area shape by which the emitted spread light is distributed onto a surface of the tissue measurement site.

30. **(Cancelled)**

31. **(Cancelled)**

32. **(Currently Amended)** A pulse oximeter sensor comprising:

one or more optical sources configured to emit light at one or more wavelengths, wherein, when the pulse oximeter sensor is placed on a patient at a tissue measurement site, the one or more optical sources are positioned in a reflectance measurement configuration on a first side of the tissue measurement site, and wherein the one or more optical sources are configured to irradiate a portion of the tissue measurement site, the portion of the tissue measurement site having an annular shape, and wherein the tissue measurement site is located on a wrist of the patient;

a plurality of detectors configured to detect light emitted from the one or more optical sources after attenuation by and reflection from tissue of the patient at the tissue measurement site, wherein the plurality of detectors are positioned in a reflectance measurement configuration on the first side of the tissue measurement site when the pulse oximeter sensor is placed on the patient, the plurality of detectors further configured to output signals responsive to the detected light; and

a light block comprising an annular ring located between the emitted light at the tissue measurement site and the plurality of detectors, the light block reducing an amount of incident light emitted from the one or more optical sources that does not enter the tissue measurement site arriving at the plurality of detectors, wherein the plurality of detectors are positioned in an array having a spatial configuration corresponding to the annular shape of the irradiated portion of the tissue measurement site.

33. **(Previously Presented)** The pulse oximeter sensor of Claim 32, wherein the plurality of detectors are further configured to transmit the output signals responsive to the

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detected light to a processor configured to receive the signals responsive to the detected light and to determine a physiological parameter.

34. (Cancelled)

35. (Cancelled)

36. (Cancelled)

37. (Previously Presented) The optical physiological measurement device of Claim 1, further comprising a diffuser which receives, spreads and emits the spread light, wherein the emitted spread light is directed at the tissue measurement site.

38. (Currently Amended) The optical physiological measurement device of Claim 1, wherein the one or more emitters ~~[[is]]~~are positioned outside the annular ring when the optical physiological measurement device is placed on the patient at the tissue measurement site, and wherein the ~~one or more~~plurality of detectors are positioned inside the annular ring when the optical physiological measurement device is placed on the patient at the tissue measurement site.

39. (Previously Presented) The method of Claim 18, further comprising spreading, with a diffuser, the emitted light and emitting the spread light from the diffuser to the tissue measurement site, wherein the diffuser spreads the light over a greater area of the tissue measurement site than would otherwise be illuminated by the emitter directly emitting light at the tissue measurement site.

40. (Currently Amended) The method of Claim 18, wherein the at least one emitter is positioned outside the annular ring when the optical sensor is placed on the patient at the tissue measurement site, and wherein the ~~one or more~~plurality of detectors are positioned inside the annular ring when the optical sensor is placed on the patient at the tissue measurement site.

41. (Previously Presented) The pulse oximeter sensor of Claim 26, further comprising a diffuser configured to receive the emitted light, to spread the received light, and to emit the spread light, wherein the emitted spread light is directed at the tissue measurement site.

42. (Previously Presented) The pulse oximeter sensor of Claim 26, wherein the one or more optical sources are positioned outside the annular ring when the pulse oximeter sensor is placed on the patient at the tissue measurement site, and wherein the plurality of detectors are positioned inside the annular ring when the pulse oximeter sensor is placed on the patient at the tissue measurement site.

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43. **(Cancelled)**

44. **(Cancelled)**

45. **(Previously Presented)** The pulse oximeter sensor of Claim 32, wherein the one or more optical sources are positioned outside the annular ring when the pulse oximeter sensor is placed on the patient at the tissue measurement site, and wherein the plurality of detectors are positioned inside the annular ring when the pulse oximeter sensor is placed on the patient at the tissue measurement site.

46. **(Cancelled)**

47. **(Cancelled)**

48. **(Cancelled)**

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**AMENDMENTS TO THE DRAWINGS**

Please replace Figure 7A with the enclosed *Replacement Sheet*.



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### SUMMARY OF INTERVIEW

#### Attendees, Date and Type of Interview

The interview was conducted on May 7, 2019 and attended by Examiner Fardanesh and Applicant's representatives Jarom D. Kesler (Reg. No. 57,046) and Aaron S. Johnson (Reg. No. 74,164).

#### Exhibits and/or Demonstrations

N/A.

#### Identification of Claims Discussed

Claims 1, 18, 26, and 32.

#### Identification of Cited/Disclosed Art

- U.S. Patent No. 5,830,137 to Scharf.
- U.S. Patent No. 5,584,296 to Cui et al.
- U.S. Patent No. 8,452,364 to Hannula et al.
- U.S. Patent Pub. No. 2003/0036690 to Geddes et al.
- U.S. Patent No. 5,497,771 to Rosenheimer.

#### Proposed Amendments

Amendments substantially as appearing herein.

#### Issues Discussed and Results of Interview

Applicant thanks Examiner Fardanesh for taking the time to conduct the Interview. During the interview, the claims were discussed in view of the cited prior art. Examiner Fardanesh acknowledged that the prior art did not teach three or more detectors arranged in a spatial configuration as recited in the claims.

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### REMARKS

This paper is filed in response to the Final Office Action mailed March 29, 2019 (“Office Action”), in connection with the above-referenced patent application. Claims 1-7, 16, 18-20, 22-29, 32-33, and 37-48 were pending prior to the submission of this paper. Claims 1-2, 18-20, 22-26, 32, 38, and 40 have been amended and Claims 43-44 and 46-48 have been cancelled without prejudice or disclaimer. Thus, Claims 1-7, 16, 18-20, 22-29, 32-33, 37-42, and 45 are pending. Applicant respectfully requests allowance of the pending claims in light of the present response.

**A. Information Disclosure Statement**

As discussed during the interview on May 7, 2019 (“Interview”), Applicant is submitting an Information Disclosure Statement (IDS) herewith. The IDS contains a reference that was discussed during the Interview.

**B. Claim Amendment Support**

Amended Claim 1 recites, among other things, “one or more emitters configured to emit light so as to irradiate a portion of the tissue measurement site, the portion of the tissue measurement site having an at least partially circular shape bounded by a light block” and a “plurality of detectors” “arranged in an array having a spatial configuration corresponding to the shape of the irradiated portion of the tissue measurement site.”

Amended Claim 18 recites, among other things, “emitting, from at least one emitter of an optical sensor, light of one or more wavelengths so as to irradiate a portion of a tissue measurement site, the irradiated portion having an at least partially circular shape” and a “plurality of detectors” “arranged in an array having a spatial configuration corresponding to the shape of the irradiated portion of the tissue measurement site.”

Amended Claim 26 recites, among other things, “one or more optical sources” “configured to irradiate a portion of the tissue measurement site, the portion of the tissue measurement site having an at least partially circular shape” and a “plurality of detectors arranged in an array having a spatial configuration corresponding to the shape of the irradiated portion of the tissue measurement site.”

Amended Claim 32 recites, among other things, “one or more optical sources” “configured to irradiate a portion of the tissue measurement site, the portion of the tissue measurement site having an annular shape” and “a plurality of detectors” “positioned in an array

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having a spatial configuration corresponding to the annular shape of the irradiated portion of the tissue measurement site.”

Support for these claim amendments can be found throughout the present disclosure. For example, in multiple locations, the originally-filed application discusses providing “a plurality of detectors” in an arrangement “corresponding” to an “irradiated surface area” so as to appropriately capture light attenuated from a tissue measurement site. For example, paragraph [0042] of the originally-filed application states:

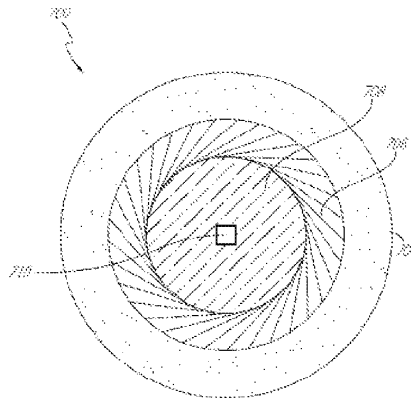
The detector 310 can be implemented using one or more photodiodes, phototransistors, or the like. In addition, a plurality of detectors 310 can be arranged in an array with a spatial configuration *corresponding to* the irradiated surface area 206 to capture the attenuated or reflected light from the tissue measurement site.

Originally-filed Specification, para. [0042] (emphasis added). The “irradiated surface area 206” is described in paragraph [0032] of the originally-filed specification, which discussed various exemplary shapes and dimensions that the irradiated surface area can have (for example, a rectangular shape). *See id.*, para. [0032], Figure 2.

As another example, paragraph [0051] of the originally-filed application states:

The detector 710 can be implemented using one or more photodiodes, phototransistors, or the like. In addition, a plurality of detectors 710 can be arranged in an array with a spatial configuration *corresponding to* the irradiated surface area depicted in FIG. 7B by the light concentrator 708 to capture the reflected light from the tissue measurement site.

*Id.*, para. [0051] (emphasis added). The “irradiated surface area depicted in FIG. 7B by the light concentrator 708” comprises a circular and/or annular shape. Figure 7B of the Application is shown below.



**Figure 7B of Originally-filed Application**

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The ordinary meaning of the claim term “correspond” means to “have a close similarity; match or agree almost exactly” or “be analogous or equivalent in character, form, or function” or “represent.” New Oxford American Dictionary, 390 (3rd Edition 2010). Consistent with this exemplary definition and the originally-filed application, the phrase “arranged in an array having a spatial configuration corresponding to the shape of the irradiated portion of the tissue measurement site” (see Claims 1, 18, and 26) would be understood by a person having ordinary skill in the art as requiring a sufficient number of detectors such that, when arranged together in an array, can “match,” “have a close similarity,” or “represent” the “at least partially circular shape” of the irradiated portion of the tissue measurement site. Similarly, the phrase “positioned in an array having a spatial configuration corresponding to the annular shape of the irradiated portion of the tissue measurement site” (see Claim 32) would be understood by a person having ordinary skill in the art as including a sufficient number of detectors such that the array matches or represents such annular shape.

In order for the claimed “plurality of detectors” to “match” or “represent” an “at least partially circular shape” or an “annular shape,” the “plurality of detectors” must include sufficient detectors to represent such shapes. For example, six or more detectors could be arranged in an annular shape and meet the recited limitation. However, two detectors, for example, can only be arranged in a spatial configuration representing a line and three detectors, for example, can only be arranged in a spatial configuration representing a line or a triangle. Thus, when read in view of the originally-filed application, the recited “plurality of detectors” would be understood by a person having ordinary skill in the art as including a sufficient number of detectors to represent the desired geometric shape.

**C. The Pending Claims Are Patentable over the Cited Art**

Claims 1, 18, 26, 32, 38, 40, 42, and 45 were rejected under 35 U.S.C. § 102(a)(1) as allegedly being anticipated by U.S. Patent No. 5,497,771 to Rosenheimer (hereinafter “Rosenheimer”). Claims 1-7, 16, 18-20, 22-29, 32-33, 37, 39, 41, 43-44, and 46-48 were rejected under 35 U.S.C. § 102(a)(1) as allegedly being anticipated by U.S. Patent No. 5,584,296 to Cui et al. (hereinafter “Cui”). Applicant respectfully disagrees and requests that the rejections of the pending claims be withdrawn for at least the following reasons.

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**1. Independent Claim 1**

Amended Claim 1 recites, in part (emphasis added):

one or more emitters configured to emit light so as to *irradiate a portion of the tissue measurement site, the portion of the tissue measurement site having an at least partially circular shape bounded by a light block*, the tissue measurement site located on a wrist of the patient; and

a plurality of detectors configured to detect the emitted light after attenuation by and reflection from tissue of the patient at the tissue measurement site, the plurality of detectors further configured to transmit a signal responsive to the detected light;

wherein the light block comprises an annular ring having a circular shape located between the emitted light at the tissue measurement site and the plurality of detectors, the light block reducing an amount of incident light emitted from the one or more emitters from being detected by the plurality of detectors, *wherein the plurality of detectors are arranged in an array having a spatial configuration corresponding to the shape of the irradiated portion of the tissue measurement site.*

Applicant respectfully submits that the cited art, alone or in combination, fails to teach or suggest at least the above-recited limitations of Claim 1. For example, as discussed during the Interview, none of the cited art, alone or in combination, teaches or suggests the utilization of more than three detectors arranged in the recited configuration. For at least these reasons, Applicant respectfully requests withdrawal of the rejection of independent Claim 1 and allowance of the claim.

**2. Independent Claim 18**

Amended Claim 18 recites, in part (emphasis added):

emitting, from at least one emitter of an optical sensor, light of one or more wavelengths so as to *irradiate a portion of a tissue measurement site, the irradiated portion having an at least partially circular shape*, wherein the tissue measurement site is located on a wrist of a patient;

detecting, with a plurality of detectors, the emitted light after attenuation by and reflection from tissue of the patient at the tissue measurement site; and

providing an annular ring located between the emitted light at the tissue measurement site and the plurality of detectors, wherein the annular ring reduces an amount of incident light emitted from the at least one emitter from arriving at the plurality of detectors, and *wherein the plurality of detectors are arranged in an array having a spatial configuration corresponding to the shape of the irradiated portion of the tissue measurement site.*

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Applicant respectfully submits that the cited art, alone or in combination, fails to teach or suggest at least the above-recited limitations of Claim 18. For example, as discussed during the Interview, none of the cited art, alone or in combination, teaches or suggests the utilization of more than three detectors arranged in the recited configuration. For at least these reasons, Applicant respectfully requests withdrawal of the rejection of independent Claim 18 and allowance of the claim.

**3. Independent Claim 26**

Amended Claim 26 recites, in part (emphasis added):

one or more optical sources configured to emit light at one or more wavelengths, wherein, when the pulse oximeter sensor is placed on a patient at a tissue measurement site, the one or more optical sources are positioned in a reflectance measurement configuration on a first side of the tissue measurement site, and wherein the one or more optical sources are configured to *irradiate a portion of the tissue measurement site, the portion of the tissue measurement site having an at least partially circular shape*;

a plurality of detectors configured to detect light emitted from the one or more optical sources after attenuation by tissue of the patient at the tissue measurement site, *the plurality of detectors arranged in an array having a spatial configuration corresponding to the shape of the irradiated portion of the tissue measurement site* so as to capture the emitted light reflected from the tissue of the patient at the tissue measurement site, wherein the plurality of detectors are positioned in a reflectance measurement configuration on the first side of the tissue measurement site when the pulse oximeter sensor is placed on the patient, the plurality of detectors further configured to output a signal responsive to the detected light

Applicant respectfully submits that the cited art, alone or in combination, fails to teach or suggest at least the above-recited limitations of Claim 26. For example, as discussed during the Interview, none of the cited art, alone or in combination, teaches or suggests the utilization of more than three detectors arranged in the recited configuration. For at least these reasons, Applicant respectfully requests withdrawal of the rejection of independent Claim 26 and allowance of the claim.

**4. Independent Claim 32**

Amended Claim 32 recites:

one or more optical sources configured to emit light at one or more wavelengths, wherein, when the pulse oximeter sensor is placed on a patient at a tissue measurement site, the one or more optical sources are positioned in a reflectance measurement configuration on a first side of the tissue measurement site, and wherein the one or more optical sources are configured to *irradiate a portion of the tissue measurement site, the*

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*portion of the tissue measurement site having an annular shape, and wherein the tissue measurement site is located on a wrist of the patient;*

a plurality of detectors configured to detect light emitted from the one or more optical sources after attenuation by and reflection from tissue of the patient at the tissue measurement site, wherein the plurality of detectors are positioned in a reflectance measurement configuration on the first side of the tissue measurement site when the pulse oximeter sensor is placed on the patient, the plurality of detectors further configured to output signals responsive to the detected light; and

a light block comprising an annular ring located between the emitted light at the tissue measurement site and the plurality of detectors, the light block reducing an amount of incident light emitted from the one or more optical sources that does not enter the tissue measurement site arriving at the plurality of detectors, *wherein the plurality of detectors are positioned in an array having a spatial configuration corresponding to the annular shape of the irradiated portion of the tissue measurement site.*

Applicant respectfully submits that the cited art, alone or in combination, fails to teach or suggest at least the above-recited limitations of Claim 32. For example, as discussed during the Interview, none of the cited art, alone or in combination, teaches or suggests the utilization of more than three detectors arranged in the recited configuration. For at least these reasons, Applicant respectfully requests withdrawal of the rejection of independent Claim 32 and allowance of the claim.

**5. Dependent Claims 2-7, 16, 19-20, 22-25, 27-29, 33, 37-42, and 45**

Claims 2-7, 16, 19-20, 22-25, 27-29, 33, 37-42, and 45 depend directly or indirectly from Claims 1, 18, 26, or 32 and are thus patentably distinct from the cited art of record for at least the reasons set forth above in regard to Claims 1, 18, 26, or 32. In addition, Applicant notes that these claims, when taken in the context of Claims 1, 18, 26, or 32, set forth a number of recitations not taught, disclosed, or suggested by the cited references, alone or in combination. For at least these additional reasons, Applicant respectfully requests that the rejections of Claims 2-7, 16, 19-20, 22-25, 27-29, 33, 37-42, and 45 be withdrawn and the claims allowed.

**D. No Disclaimers or Disavowals**

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, Applicant is not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. Applicant reserves the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure,

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**Filing Date: June 28, 2016**

including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that Applicant has made any disclaimers or disavowals of any subject matter supported by the present application.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: July 5, 2019

By: /Aaron S. Johnson/  
Aaron S. Johnson  
Registration No. 74,164  
Registered Practitioner  
Customer No. 64735  
(949) 760-0404



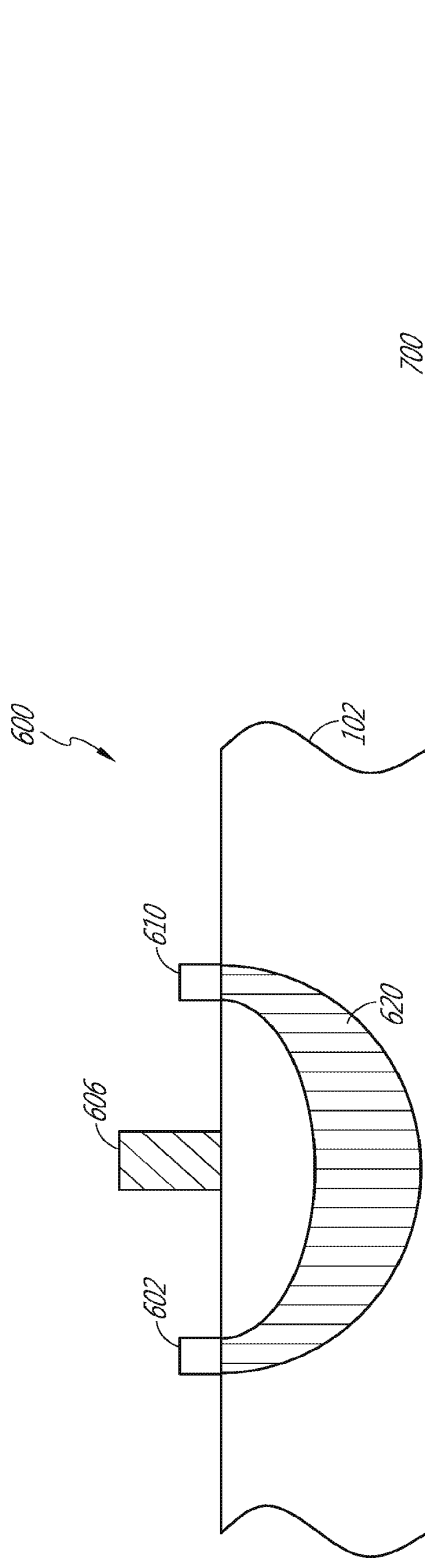


FIG. 6  
(PRIOR ART)

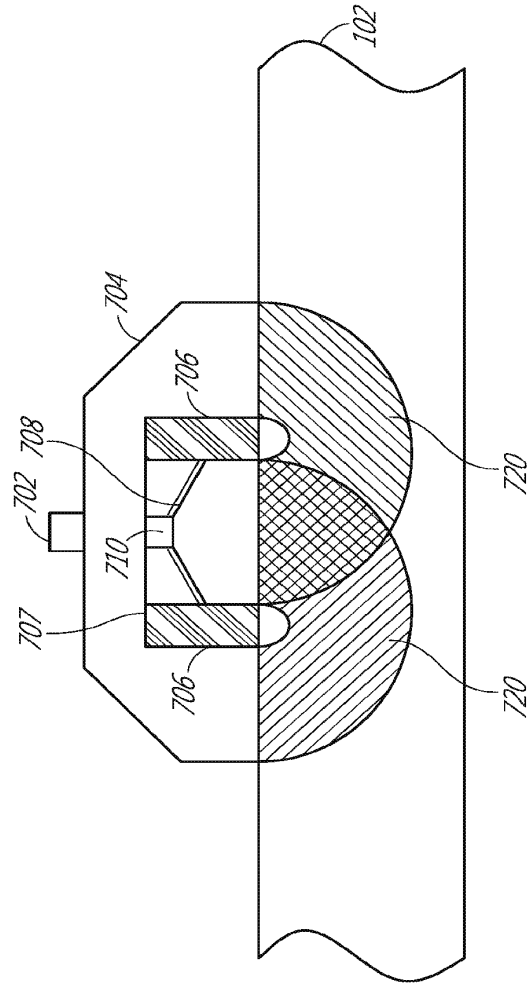


FIG. 7A

Docket No.: MAS.1007A

Customer No. 64735

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**INFORMATION DISCLOSURE STATEMENT**

First Inventor	: Ammar Al-Ali
App. No.	: 15/195199
Filed	: June 28, 2016
For	: ADVANCED PULSE OXIMETRY SENSOR
Examiner	: Fardanesh, Marjan
Art Unit	: 3791
Conf. No.	: 3453

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Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**References and Listing**

Pursuant to 37 CFR 1.56, an Information Disclosure Statement listing references is provided herewith. Copies of any listed foreign and non-patent literature references are being submitted.

**No Disclaimers**

To the extent that anything in the Information Disclosure Statement or the listed references could be construed as a disclaimer of any subject matter supported by the present application, Applicant hereby rescinds and retracts such disclaimer.

**Timing of Disclosure**

This Information Disclosure Statement is being filed within three months of the filing date or date of national phase entry, with an RCE or before receipt of a First Office Action after an RCE, and no fee is believed to be required.

The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment, to Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: July 5, 2019

By: /Aaron S. Johnson/  
Aaron S. Johnson  
Registration No. 74,164  
Registered Practitioner  
Customer No. 64735  
(949) 760-0404

30349890

APL\_MAS\_ITC\_00557287

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875			Application or Docket Number 15/195,199	Filing Date 06/28/2016	<input type="checkbox"/> To be Mailed	
ENTITY: <input checked="" type="checkbox"/> LARGE <input type="checkbox"/> SMALL <input type="checkbox"/> MICRO						
<b>APPLICATION AS FILED - PART I</b>						
	(Column 1)	(Column 2)				
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)		
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 = *		x \$80 =			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 = *		x \$420 =			
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).					
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))						
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL		
<b>APPLICATION AS AMENDED - PART II</b>						
	(Column 1)		(Column 2)	(Column 3)		
AMENDMENT	07/05/2019	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
Total (37 CFR 1.16(i))	* 28	Minus	** 36	= 0	x \$100 =	0
Independent (37 CFR 1.16(h))	* 4	Minus	*** 4	= 0	x \$460 =	0
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))						
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
TOTAL ADD'L FEE					0	
	(Column 1)		(Column 2)	(Column 3)		
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
Total (37 CFR 1.16(i))	*	Minus	**	=	x \$0 =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x \$0 =	
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))						
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
TOTAL ADD'L FEE						
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.					LIE	
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".					/THUY T TA/	
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".						
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.						

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

<b>Doc Code: DIST.E.FILE</b> <b>Document Description: Electronic Terminal Disclaimer - Filed</b>		PTO/SB/25 U.S. Patent and Trademark Office Department of Commerce
Electronic Petition Request	<b>TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING REJECTION OVER A PENDING "REFERENCE" APPLICATION</b>	
Application Number	15195199	
Filing Date	28-Jun-2016	
First Named Inventor	Ammar Al-Ali	
Attorney Docket Number	MAS.1007A	
Title of Invention	ADVANCED PULSE OXIMETRY SENSOR	
<input checked="" type="checkbox"/> Filing of terminal disclaimer does not obviate requirement for response under 37 CFR 1.111 to outstanding Office Action  <input checked="" type="checkbox"/> This electronic Terminal Disclaimer is not being used for a Joint Research Agreement.		
Owner	Percent Interest	
Masimo Corporation	100%	
The owner(s) of percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of any patent granted on pending reference Application Number(s)		
16226249 filed on 12/19/2018  as the term of any patent granted on said reference application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending reference application. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and any patent granted on the reference application are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.  In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term of any patent granted on said reference application, "as the term of any patent granted on said reference application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending reference application," in the event that any such patent granted on the pending reference application: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as shortened by any terminal disclaimer filed prior to its grant.		
<input checked="" type="radio"/> Terminal disclaimer fee under 37 CFR 1.20(d) is included with Electronic Terminal Disclaimer request.		

<input type="radio"/> I certify, in accordance with 37 CFR 1.4(d)(4), that the terminal disclaimer fee under 37 CFR 1.20(d) required for this terminal disclaimer has already been paid in the above-identified application.	
Applicant claims the following fee status:	
<input type="radio"/> Small Entity <input type="radio"/> Micro Entity <input checked="" type="radio"/> Regular Undiscounted	
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.	
<b>THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES</b>	
I certify, in accordance with 37 CFR 1.4(d)(4) that I am:	
<input checked="" type="radio"/> An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application  Registration Number <u>  74164  </u>	
<input type="radio"/> A sole inventor	
<input type="radio"/> A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application	
<input type="radio"/> A joint inventor; all of whom are signing this request	
Signature	/Aaron S. Johnson/
Name	Aaron S. Johnson

\*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).  
 Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

Electronic Patent Application Fee Transmittal				
<b>Application Number:</b>	15195199			
<b>Filing Date:</b>	28-Jun-2016			
<b>Title of Invention:</b>	ADVANCED PULSE OXIMETRY SENSOR			
<b>First Named Inventor/Applicant Name:</b>	Ammar Al-Ali			
<b>Filer:</b>	Aaron Samuel Johnson/Gustavo Lopez			
<b>Attorney Docket Number:</b>	MAS.1007A			
Filed as Large Entity				
<b>Filing Fees for Utility under 35 USC 111(a)</b>				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
STATUTORY OR TERMINAL DISCLAIMER	1814	1	160	160
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>160</b>

Doc Code: DISQ.E.FILE  
Document Description: Electronic Terminal Disclaimer – Approved

Application No.: 15195199

Filing Date: 28-Jun-2016

Applicant/Patent under Reexamination: Al-Ali

Electronic Terminal Disclaimer filed on July 18, 2019

APPROVED

**This patent is subject to a terminal disclaimer**

DISAPPROVED

Approved/Disapproved by: Electronic Terminal Disclaimer automatically approved by EFS-Web

U.S. Patent and Trademark Office



<b>Electronic Acknowledgement Receipt</b>	
<b>EFS ID:</b>	36626694
<b>Application Number:</b>	15195199
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	3453
<b>Title of Invention:</b>	ADVANCED PULSE OXIMETRY SENSOR
<b>First Named Inventor/Applicant Name:</b>	Ammar Al-Ali
<b>Customer Number:</b>	64735
<b>Filer:</b>	Aaron Samuel Johnson/Gustavo Lopez
<b>Filer Authorized By:</b>	Aaron Samuel Johnson
<b>Attorney Docket Number:</b>	MAS.1007A
<b>Receipt Date:</b>	18-JUL-2019
<b>Filing Date:</b>	28-JUN-2016
<b>Time Stamp:</b>	17:31:44
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 160
RAM confirmation Number	071919INTEFSW17314200
Deposit Account	111410
Authorized User	Gustavo Lopez
<p>The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:</p> <p>37 CFR 1.16 (National application filing, search, and examination fees)</p> <p>37 CFR 1.17 (Patent application and reexamination processing fees)</p>	

<b>File Listing:</b>					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Terminal Disclaimer-Filed (Electronic)	eTerminal-Disclaimer.pdf	34022 cda8c5e4afb4b5813dda31470eed460dccc e734	no	2
<b>Warnings:</b>					
<b>Information:</b>					
2	Fee Worksheet (SB06)	fee-info.pdf	30571 783c44517e23a2b5c784bf774b3cc110d60 25654	no	2
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			64593		
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>                      If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>                      If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>                      If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

Doc Code: R48.REQ  
 Document Description: Request under Rule 48 correcting inventorship

PTO/AIA/40 (04-18)  
 Approved for use through 11/30/2020. OMB 0651-0031  
 U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>REQUEST FOR CORRECTION IN A PATENT APPLICATION RELATING TO INVENTORSHIP OR AN INVENTOR NAME, OR ORDER OF NAMES, OTHER THAN IN A REISSUE APPLICATION (37 CFR 1.48)</b>	Application Number	15/195199
	Filing Date	June 28, 2016
	First Named Inventor	Ammar Al-Aji
	Art Unit	3791
	Examiner Name	Fardanesh, Marjan
	Practitioner Docket Number	MAS.1007A

To: Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, VA 22313-1450

Applicant hereby requests that the inventorship be corrected or changed, or that the name of the inventor or a joint inventor, or the order of the names of joint inventors, be changed, in the above-identified application. Note: 37 CFR 1.48 applies to any request to correct inventorship filed on or after September 16, 2012, regardless of the application filing date. Do not submit this form after payment of the issue fee or if the application has been patented. See 37 CFR 1.324 for correction of inventorship in a patent.

Please check the applicable box(es) below.

For a nonprovisional application:

- 1. This request is to correct or change the inventorship in a **nonprovisional** application (under 37 CFR 1.48(a)) and includes:
    - An application data sheet (ADS) in accordance with 37 CFR 1.76(c) with the corrected or updated information shown with markings (e.g., underlining for insertions, strikethrough for deletions). See the Manual of Patent Examining Procedure (MPEP) section 601.05(a) for information about filing an ADS in an application filed on/after September 16, 2012. For information about filing a Supplemental ADS in an application filed before September 16, 2012, see MPEP 601.05(b).
    - The processing fee set forth in 37 CFR 1.17(i). \$ 140
    - An inventor is being added. An inventor's oath or declaration by any actual inventor who has not yet executed an oath or declaration is required (see 37 CFR 1.48(b)). See MPEP 602.01(a) for information about an inventor's oath or declaration for an application filed on/after September 16, 2012 (e.g., form PTO/AIA/01). For information about an inventor's oath or declaration for an application filed before September 16, 2012 (e.g., form PTO/SB/01), see MPEP 602.01(b).
    - This request is being filed after the first Office action on the merits has been given or mailed (see 37 CFR 1.48(c) and 1.17(d)). Check one of the following:
      - This request to correct or change the inventorship is due solely to the cancellation of claims in the application.
- OR
- The fee set forth in 37 CFR 1.17(d) is due (in addition to the fee set forth in 37 CFR 1.17(i)). \$ 600

[Page 1 of 2]

This collection of information is required by 37 CFR 1.48. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**REQUEST FOR CORRECTION IN A PATENT APPLICATION RELATING TO INVENTORSHIP OR AN INVENTOR NAME, OR ORDER OF NAMES, OTHER THAN IN A REISSUE APPLICATION (37 CFR 1.48)**

2. This request is to correct or update the name of the inventor or a joint inventor, or the order of names of joint inventors, in a **nonprovisional** application (under 37 CFR 1.48(f)) and includes:

An application data sheet in accordance with 37 CFR 1.76(c) identifying the complete inventive entity, including the corrected or updated name of the inventor, or the new order of names shown with markings (e.g., underlining for insertions, strikethrough for deletions). See the MPEP 601.05(a) for information about filing an ADS in an application filed on/after September 16, 2012. For information about filing a Supplemental ADS in an application filed before September 16, 2012, see MPEP 601.05(b).

The processing fee set forth in 37 CFR 1.17(i). \$ \_\_\_\_\_

**For a provisional application:**

This request is to change or correct the inventorship, or correct or update the name of the inventor or a joint inventor, in a **provisional** application (under 37 CFR 1.48(d)) and includes:

**Attached hereto** is a document that is signed by a party set forth in 37 CFR 1.33(b) and identifies each inventor by his or her legal name, in the preferred order. Note: the document may be an application data sheet in accordance with 37 CFR 1.76(c) that identifies the changes with markings (underlining for insertions, strikethrough for deletions).

The processing fee set forth in 37 CFR 1.17(q). \$ \_\_\_\_\_

**Fee Payment Information:**

Applicant asserts small entity status. See 37 CFR 1.27.

Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously

A check in the amount of the fee is enclosed.

Payment by credit card. Form PTO-2038 is attached.

The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. 11-1410.

Payment made via EFS-Web.

**WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**

I am the

Applicant\*       attorney or agent of record       attorney or agent acting under 37 CFR 1.34

Registration number 74164      Registration number \_\_\_\_\_

Signature /Aaron S. Johnson/

Typed or printed name Aaron S. Johnson

Date July 19, 2019

**NOTE:** This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. \*Juristic entities must be represented by a patent practitioner (See 37 CFR 1.31, applicable to any paper filed on or after September 16, 2012 that is presented on behalf of a juristic entity, regardless of application filing date). Submit multiple forms if more than one signature is required, see below\*\*.

\*\* Total of 1 forms are submitted.

## Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal				
<b>Application Number:</b>	15195199			
<b>Filing Date:</b>	28-Jun-2016			
<b>Title of Invention:</b>	ADVANCED PULSE OXIMETRY SENSOR			
<b>First Named Inventor/Applicant Name:</b>	Ammar Al-Ali			
<b>Filer:</b>	Aaron Samuel Johnson/Daniel Escajeda			
<b>Attorney Docket Number:</b>	MAS.1007A			
Filed as Large Entity				
<b>Filing Fees for Utility under 35 USC 111(a)</b>				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
PROCESSING FEE, EXCEPT PROV. APPLS.	1830	1	140	140
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
CORRECTION OF INVENTORSHIP ON MERITS	1819	1	600	600
<b>Total in USD (\$)</b>				<b>740</b>

<b>Electronic Acknowledgement Receipt</b>	
<b>EFS ID:</b>	36637806
<b>Application Number:</b>	15195199
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	3453
<b>Title of Invention:</b>	ADVANCED PULSE OXIMETRY SENSOR
<b>First Named Inventor/Applicant Name:</b>	Ammar Al-Ali
<b>Customer Number:</b>	64735
<b>Filer:</b>	Aaron Samuel Johnson/ThuyQuyen Nguyen
<b>Filer Authorized By:</b>	Aaron Samuel Johnson
<b>Attorney Docket Number:</b>	MAS.1007A
<b>Receipt Date:</b>	19-JUL-2019
<b>Filing Date:</b>	28-JUN-2016
<b>Time Stamp:</b>	15:23:04
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 740
RAM confirmation Number	072219INTEFSW15274300
Deposit Account	111410
Authorized User	ThuyQuyen Nguyen
<p>The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:</p> <p>37 CFR 1.16 (National application filing, search, and examination fees)</p> <p>37 CFR 1.17 (Patent application and reexamination processing fees)</p>	



<b>File Listing:</b>					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	CORR-ADS_MAS1007A.pdf	35524	no	2
			d24319f47ce926f43e5e4265414a6e5cdb3bb2bf		
<b>Warnings:</b>					
<b>Information:</b>					
This is not an USPTO supplied ADS fillable form					
2	Request under Rule 48 correcting inventorship	REQUEST_MAS1007A.pdf	166489	no	3
			8f374be66d785648b710f26e2c4af72e32a65213		
<b>Warnings:</b>					
<b>Information:</b>					
3	Fee Worksheet (SB06)	fee-info.pdf	32283	no	2
			22aeb7b7ddb570cf994ec67c1419de9550c7f0fa		
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			234296		
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>            If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>            If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>            If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

Docket Number: MAS.1007A

**APPLICATION DATA SHEET****Application Information**

Application Number: 15/195199  
 Filing Date: June 28, 2016  
 Title: ADVANCED PULSE OXIMETRY SENSOR  
 Attorney Docket Number: MAS.1007A

**Inventor Information 1**

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 State or Province: CA  
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**Inventor Information 2**

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 State or Province: ~~CA~~

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15/195199

Filed: June 28, 2016

APL\_MAS\_ITC\_00557303

Docket Number: MAS.1007A

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**Representative Information**

Representative Customer Number: 64735

Dated: July 19, 2019

By: Aaron S. Johnson  
Aaron S. Johnson  
Registration No. 74,164  
Registered Practitioner  
Customer No. 64735  
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PTO/SB/08 Equivalent

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 1 OF 12		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	5,623,925	4/29/1997	Swenson et al.	
	2	5,987,343	11/16/1999	Kinast	
	3	6,308,089	10/23/2001	von der Ruhr et al.	
	4	7,048,687	5/23/2006	Reuss et al.	
	5	8,280,473	10/2/2012	Al-Ali	
	6	9,364,181	6/14/2016	Kiani et al.	
	7	9,368,671	6/14/2016	Wojtczuk et al.	
	8	9,370,325	6/21/2016	Al-Ali et al.	
	9	9,370,326	6/21/2016	McHale et al.	
	10	9,370,335	6/21/2016	Al-ali et al.	
	11	9,375,185	6/28/2016	Ali et al.	
	12	9,386,953	7/12/2016	Al-Ali	
	13	9,386,961	7/12/2016	Al-Ali et al.	
	14	9,392,945	7/19/2016	Al-Ali et al.	
	15	9,397,448	7/19/2016	Al-Ali et al.	
	16	9,408,542	8/9/2016	Kinast et al.	
	17	9,436,645	9/6/2016	Al-Ali et al.	
	18	9,445,759	9/20/2016	Lamego et al.	
	19	9,466,919	10/11/2016	Kiani et al.	
	20	9,474,474	10/25/2016	Lamego et al.	
	21	9,480,422	11/1/2016	Al-Ali	
	22	9,480,435	11/1/2016	Olsen	
	23	9,492,110	11/15/2016	Al-Ali et al.	
	24	9,510,779	12/6/2016	Poeze et al.	
	25	9,517,024	12/13/2016	Kiani et al.	
	26	9,532,722	1/3/2017	Lamego et al.	
	27	9,538,949	1/10/2017	Al-Ali et al.	
	28	9,538,980	1/10/2017	Telfort et al.	
	29	9,549,696	1/24/2017	Lamego et al.	

Examiner Signature	Date Considered
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p>	

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PTO/SB/08 Equivalent

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	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 2 OF 12		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	30	9,554,737	1/31/2017	Schurman et al.	
	31	9,560,996	2/7/2017	Kiani	
	32	9,560,998	2/7/2017	Al-Ali et al.	
	33	9,566,019	2/14/2017	Al-Ali et al.	
	34	9,579,039	2/28/2017	Jansen et al.	
	35	9,591,975	3/14/2017	Dalvi et al.	
	36	9,622,692	4/18/2017	Lamego et al.	
	37	9,622,693	4/18/2017	Diab	
	38	9,636,055	5/2/2017	Al-Ali et al.	
	39	9,636,056	5/2/2017	Al-Ali	
	40	9,649,054	5/16/2017	Lamego et al.	
	41	9,662,052	5/30/2017	Al-Ali et al.	
	42	9,668,679	6/6/2017	Schurman et al	
	43	9,668,680	6/6/2017	Bruinsma et al.	
	44	9,668,703	6/6/2017	Al-Ali	
	45	9,675,286	6/13/2017	Diab	
	46	9,687,160	6/27/2017	Kiani	
	47	9,693,719	7/4/2017	Al-Ali et al.	
	48	9,693,737	7/4/2017	Al-Ali	
	49	9,697,928	7/4/2017	Al-Ali et al.	
	50	9,717,425	8/1/2017	Kiani et al.	
	51	9,717,458	8/1/2017	Lamego et al.	
	52	9,724,016	8/8/2017	Al-Ali et al.	
	53	9,724,024	8/8/2017	Al-Ali	
	54	9,724,025	8/8/2017	Kiani et al.	
	55	9,730,640	8/15/2017	Diab et al.	
	56	9,743,887	8/29/2017	Al-Ali et al.	
	57	9,749,232	8/29/2017	Sampath et al.	
	58	9,750,442	9/5/2017	Olsen	

Examiner Signature	Date Considered
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p>	

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PTO/SB/08 Equivalent

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	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 3 OF 12		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	59	9,750,443	9/5/2017	Smith et al.	
	60	9,750,461	9/5/2017	Telfort	
	61	9,775,545	10/3/2017	Al-Ali et al.	
	62	9,775,546	10/3/2017	Diab et al.	
	63	9,775,570	10/3/2017	Al-Ali	
	64	9,778,079	10/3/2017	Al-Ali et al.	
	65	9,782,077	10/10/2017	Lamego et al.	
	66	9,782,110	10/10/2017	Kiani	
	67	9,787,568	10/10/2017	Lamego et al.	
	68	9,788,735	10/17/2017	Al-Ali	
	69	9,788,768	10/17/2017	Al-Ali et al.	
	70	9,795,300	10/24/2017	Al-Ali	
	71	9,795,310	10/24/2017	Al-Ali	
	72	9,795,358	10/24/2017	Telfort et al.	
	73	9,795,739	10/24/2017	Al-Ali et al.	
	74	9,801,556	10/31/2017	Kiani	
	75	9,801,588	10/31/2017	Weber et al.	
	76	9,808,188	11/7/2017	Perea et al.	
	77	9,814,418	11/14/2017	Weber et al.	
	78	9,820,691	11/21/2017	Kiani	
	79	9,833,152	12/5/2017	Kiani et al.	
	80	9,833,180	12/5/2017	Shakespeare et al.	
	81	9,839,379	12/12/2017	Al-Ali et al.	
	82	9,839,381	12/12/2017	Weber et al.	
	83	9,847,002	12/19/2017	Kiani et al.	
	84	9,847,749	12/19/2017	Kiani et al.	
	85	9,848,800	12/26/2017	Lee et al.	
	86	9,848,806	12/26/2017	Al-Ali et al.	
	87	9,848,807	12/26/2017	Lamego	

Examiner Signature	Date Considered
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PTO/SB/08 Equivalent

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	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 4 OF 12		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	88	9,861,298	1/9/2018	Eckerbom et al.	
	89	9,861,304	1/9/2018	Al-Ali et al.	
	90	9,861,305	1/9/2018	Weber et al.	
	91	9,867,578	1/16/2018	Al-Ali et al.	
	92	9,872,623	1/23/2018	Al-Ali	
	93	9,876,320	1/23/2018	Coverston et al.	
	94	9,877,650	1/30/2018	Muhsin et al.	
	95	9,877,686	1/30/2018	Al-Ali et al.	
	96	9,891,079	2/13/2018	Dalvi	
	97	9,895,107	2/20/2018	Al-Ali et al.	
	98	9,913,617	3/13/2018	Al-Ali et al.	
	99	9,924,893	3/27/2018	Schurman et al.	
	100	9,924,897	3/27/2018	Abdul-Hafiz	
	101	9,936,917	4/10/2018	Poeze et al.	
	102	9,943,269	4/17/2018	Muhsin et al.	
	103	9,949,676	4/24/2018	Al-Ali	
	104	9,955,937	5/1/2018	Telfort	
	105	9,965,946	5/8/2018	Al-Ali	
	106	9,980,667	5/29/2018	Kiani et al.	
	107	9,986,919	6/5/2018	Lamego et al.	
	108	9,986,952	6/5/2018	Dalvi et al.	
	109	9,989,560	6/5/2018	Poeze et al.	
	110	9,993,207	6/12/2018	Al-Ali et al.	
	111	10,007,758	6/26/2018	Al-Ali et al.	
	112	10,010,276	7/3/2018	Al-Ali et al.	
	113	10,032,002	7/24/2018	Kiani et al.	
	114	10,039,482	8/7/2018	Al-Ali et al.	
	115	10,052,037	8/21/2018	Kinast et al.	
	116	10,058,275	8/28/2018	Al-Ali et al.	

Examiner Signature	Date Considered
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p>	

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	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 5 OF 12		Attorney Docket No.	MAS.1007A

**U.S. PATENT DOCUMENTS**

Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	117	10,064,562	9/4/2018	Al-Ali	
	118	10,086,138	10/2/2018	Novak, Jr.	
	119	10,092,200	10/9/2018	Al-Ali et al.	
	120	10,092,249	10/9/2018	Kiani et al.	
	121	10,098,550	10/16/2018	Al-Ali et al.	
	122	10,098,591	10/16/2018	Al-Ali et al.	
	123	10,098,610	10/16/2018	Al-Ali et al.	
	124	10,123,726	11/13/2018	Al-Ali et al.	
	125	10,130,289	11/20/2018	Al-Ali et al.	
	126	10,130,291	11/20/2018	Schurman et al.	
	127	10,149,616	12/11/2018	Al-Ali et al.	
	128	10,154,815	12/18/2018	Al-Ali et al.	
	129	10,159,412	12/25/2018	Lamego et al.	
	130	10,188,296	1/29/2019	Al-Ali et al.	
	131	10,188,331	1/29/2019	Al-Ali et al.	
	132	10,188,348	1/29/2019	Kiani et al.	
	133	10,194,847	2/5/2019	Al-Ali	
	134	10,194,848	2/5/2019	Kiani et al.	
	135	10,201,298	2/12/2019	Al-Ali et al.	
	136	10,205,272	2/12/2019	Kiani et al.	
	137	10,205,291	2/12/2019	Scruggs et al.	
	138	10,213,108	2/26/2019	Al-Ali	
	139	10,219,706	3/5/2019	Al-Ali	
	140	10,219,746	3/5/2019	McHale et al.	
	141	10,226,187	3/12/2019	Al-Ali et al	
	142	10,226,576	3/12/2019	Kiani	
	143	10,231,657	3/19/2019	Al-Ali et al	
	144	10,231,670	3/19/2019	Blank et al.	
	145	10,231,676	3/19/2019	Al-Ali et al	

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	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 6 OF 12		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	146	10,251,585	4/9/2019	Al-Ali et al.	
	147	10,251,586	4/9/2019	Lamego	
	148	10,255,994	4/9/2019	Sampath et al.	
	149	10,258,265	4/16/2019	Poeze et al.	
	150	10,258,266	4/16/2019	Poeze et al.	
	151	10,271,748	4/30/2019	Al-Ali	
	152	10,278,626	5/7/2019	Schurman et al.	
	153	10,278,648	5/7/2019	Al-Ali et al.	
	154	10,279,247	5/7/2019	Kiani	
	155	10,292,628	5/21/2019	Poeze et al.	
	156	10,292,657	5/21/2019	Abdul-Hafiz et al.	
	157	10,292,664	5/21/2019	Al-Ali	
	158	10,299,708	5/28/2019	Poeze et al.	
	159	10,299,709	5/28/2019	Perea et al.	
	160	10,305,775	5/28/2019	Lamego et al.	
	161	10,307,111	6/4/2019	Muhsin et al.	
	162	10,325,681	6/18/2019	Sampath et al.	
	163	10,327,337	6/18/2019	Triman et al.	
	164	D788,312	5/30/2017	Al-Ali et al.	
	165	D820,865	6/19/2018	Muhsin et al.	
	166	D822,215	7/3/2018	Al-Ali et al.	
	167	D822,216	7/3/2018	Barker et al.	
	168	D833,624	11/13/2018	DeJong et al.	
	169	D835,282	12/4/2018	Barker et al.	
	170	D835,283	12/4/2018	Barker et al.	
	171	D835,284	12/4/2018	Barker et al.	
	172	D835,285	12/4/2018	Barker et al.	
	173	RE47,218	2/5/2019	Ali-Ali	
	174	RE47,244	2/19/2019	Kiani et al.	

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SHEET 7 OF 12		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	175	RE47,249	2/19/2019	Kiani et al.	
	176	RE47,353	4/16/2019	Kiani et al.	
	177	2003/0036690	2/20/2003	Geddes et al.	
	178	2006/0161054	7/20/2006	Reuss et al.	
	179	2016/0166182	6/16/2016	Al-Ali et al.	
	180	2016/0166183	6/16/2016	Poeze et al.	
	181	2016/0196388	7/7/2016	Lamego	
	182	2016/0197436	7/7/2016	Barker et al.	
	183	2016/0213281	7/28/2016	Eckerbom, et al.	
	184	2016/0228043	8/11/2016	O'Neil et al.	
	185	2016/0233632	8/11/2016	Scruggs et al.	
	186	2016/0234944	8/11/2016	Schmidt et al.	
	187	2016/0270735	9/22/2016	Diab et al.	
	188	2016/0283665	9/29/2016	Sampath et al.	
	189	2016/0287090	10/6/2016	Al-Ali et al.	
	190	2016/0287786	10/6/2016	Kiani	
	191	2016/0296169	10/13/2016	McHale et al.	
	192	2016/0310052	10/27/2016	Al-Ali et al.	
	193	2016/0314260	10/27/2016	Kiani	
	194	2016/0324488	11/10/2016	Olsen	
	195	2016/0327984	11/10/2016	Al-Ali et al.	
	196	2016/0331332	11/17/2016	Al-Ali	
	197	2016/0367173	12/22/2016	Dalvi et al.	
	198	2017/0000394	1/5/2017	Al-Ali et al.	
	199	2017/0007134	1/12/2017	Al-Ali et al.	
	200	2017/0007198	1/12/2017	Al-Ali et al.	
	201	2017/0014083	1/19/2017	Diab et al.	
	202	2017/0014084	1/19/2017	Al-Ali et al.	
	203	2017/0024748	1/26/2017	Haider	

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SHEET 8 OF 12		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
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	204	2017/0042488	2/16/2017	Muhsin	
	205	2017/0055851	3/2/2017	Al-Ali	
	206	2017/0055882	3/2/2017	Al-Ali et al.	
	207	2017/0055887	3/2/2017	Al-Ali	
	208	2017/0055896	3/2/2017	Al-Ali et al.	
	209	2017/0079594	3/23/2017	Telfort et al.	
	210	2017/0086723	3/30/2017	Al-Ali et al.	
	211	2017/0143281	5/25/2017	Olsen	
	212	2017/0147774	5/25/2017	Kiani	
	213	2017/0156620	6/8/2017	Al-Ali et al.	
	214	2017/0173632	6/22/2017	Al-Ali	
	215	2017/0187146	6/29/2017	Kiani et al.	
	216	2017/0188919	7/6/2017	Al-Ali et al.	
	217	2017/0196464	7/13/2017	Jansen et al.	
	218	2017/0196470	7/13/2017	Lamego et al.	
	219	2017/0224262	8/10/2017	Al-Ali	
	220	2017/0228516	8/10/2017	Sampath et al.	
	221	2017/0245790	8/31/2017	Al-Ali et al.	
	222	2017/0251974	9/7/2017	Shreim et al.	
	223	2017/0251975	9/7/2017	Shreim et al.	
	224	2017/0258403	9/14/2017	Abdul-Hafiz et al.	
	225	2017/0311851	11/2/2017	Schurman et al.	
	226	2017/0311891	11/2/2017	Kiani et al.	
	227	2017/0325728	11/16/2017	Al-Ali et al.	
	228	2017/0332976	11/23/2017	Al-Ali et al.	
	229	2017/0340293	11/30/2017	Al-Ali et al.	
	230	2017/0360310	12/21/2017	Kiani et al.	
	231	2017/0367632	12/28/2017	Al-Ali et al.	
	232	2018/0008146	1/11/2018	Al-Ali et al.	

Examiner Signature	Date Considered
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p>	

T<sup>1</sup> - Place a check mark in this area when an English language Translation is attached.

PTO/SB/08 Equivalent

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 9 OF 12		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	233	2018/0013562	1/11/2018	Haider et al.	
	234	2018/0014752	1/18/2018	Al-Ali et al.	
	235	2018/0028124	2/1/2018	Al-Ali et al.	
	236	2018/0055385	3/1/2018	Al-Ali	
	237	2018/0055390	3/1/2018	Kiani et al.	
	238	2018/0055430	3/1/2018	Diab et al.	
	239	2018/0064381	3/8/2018	Shakespeare et al.	
	240	2018/0069776	3/8/2018	Lamego et al.	
	241	2018/0070867	3/15/2018	Smith et al.	
	242	2018/0082767	3/22/2018	Al-Ali et al.	
	243	2018/0085068	3/29/2018	Telfort	
	244	2018/0087937	3/29/2018	Al-Ali et al.	
	245	2018/0103874	4/19/2018	Lee et al.	
	246	2018/0103905	4/19/2018	Kiani	
	247	2018/0110478	4/26/2018	Al-Ali	
	248	2018/0116575	5/3/2018	Perea et al.	
	249	2018/0125368	5/10/2018	Lamego et al.	
	250	2018/0125430	5/10/2018	Al-Ali et al.	
	251	2018/0125445	5/10/2018	Telfort et al.	
	252	2018/0130325	5/10/2018	Kiani et al.	
	253	2018/0132769	5/17/2018	Weber et al.	
	254	2018/0132770	5/17/2018	Lamego	
	255	2018/0146901	5/31/2018	Al-Ali et al.	
	256	2018/0146902	5/31/2018	Kiani et al.	
	257	2018/0153442	6/7/2018	Eckerbom, et al.	
	258	2018/0153446	6/7/2018	Kiani	
	259	2018/0153447	6/7/2018	Al-Ali et al.	
	260	2018/0153448	6/7/2018	Weber et al.	
	261	2018/0161499	6/14/2018	Al-Ali et al.	

Examiner Signature	Date Considered
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p>	

T<sup>1</sup> - Place a check mark in this area when an English language Translation is attached.

PTO/SB/08 Equivalent

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 10 OF 12		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	262	2018/0168491	6/21/2018	Al-Ali et al.	
	263	2018/0174679	6/21/2018	Sampath et al.	
	264	2018/0174680	6/21/2018	Sampath et al.	
	265	2018/0182484	6/28/2018	Sampath et al.	
	266	2018/0184917	7/5/2018	Kiani	
	267	2018/0192924	7/12/2018	Al-Ali	
	268	2018/0192953	7/12/2018	Shreim et al.	
	269	2018/0192955	7/12/2018	Al-Ali et al.	
	270	2018/0199871	7/19/2018	Pauley et al.	
	271	2018/0206795	7/26/2018	Al-Ali	
	272	2018/0206815	7/26/2018	Telfort	
	273	2018/0213583	7/26/2018	Al-Ali	
	274	2018/0214031	8/2/2018	Kiani et al.	
	275	2018/0214090	8/2/2018	Al-Ali et al.	
	276	2018/0218792	8/2/2018	Muhsin et al.	
	277	2018/0225960	8/9/2018	Al-Ali et al.	
	278	2018/0238718	8/23/2018	Dalvi	
	279	2018/0242853	8/30/2018	Al-Ali	
	280	2018/0242921	8/30/2018	Muhsin et al.	
	281	2018/0242923	8/30/2018	Al-Ali et al.	
	282	2018/0242924	8/30/2018	Barker et al.	
	283	2018/0242926	8/30/2018	Muhsin et al.	
	284	2018/0247353	8/30/2018	Al-Ali et al.	
	285	2018/0247712	8/30/2018	Muhsin et al.	
	286	2018/0249933	9/6/2018	Schurman, et al.	
	287	2018/0253947	9/6/2018	Muhsin et al.	
	288	2018/0256087	9/13/2018	Al-Ali et al.	
	289	2018/0256113	9/13/2018	Weber et al.	
	290	2018/0285094	10/4/2018	Housel et al.	

Examiner Signature	Date Considered
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p>	

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PTO/SB/08 Equivalent

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 11 OF 12		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	291	2018/0289325	10/11/2018	Poeze et al.	
	292	2018/0289337	10/11/2018	Al-Ali et al.	
	293	2018/0296161	10/18/2018	Shreim et al.	
	294	2018/0300919	10/18/2018	Muhsin et al.	
	295	2018/0310822	11/1/2018	Indorf et al.	
	296	2018/0310823	11/1/2018	Al-Ali et al.	
	297	2018/0317826	11/8/2018	Muhsin	
	298	2018/0317841	11/8/2018	Novak, Jr.	
	299	2018/0333055	11/22/2018	Lamego et al.	
	300	2018/0333087	11/22/2019	Al-Ali	
	301	2019/0000317	1/3/2019	Muhsin et al.	
	302	2019/0000362	1/3/2019	Kiani et al.	
	303	2019/0015023	1/17/2019	Monfre	
	304	2019/0021638	1/24/2019	Al-Ali et al.	
	305	2019/0029574	1/31/2019	Schurman et al.	
	306	2019/0029578	1/31/2019	Al-Ali et al.	
	307	2019/0038143	2/7/2019	Al-Ali	
	308	2019/0058280	2/21/2019	Al-Ali et al.	
	309	2019/0058281	2/21/2019	Al-Ali et al.	
	310	2019/0069813	3/7/2019	Al-Ali	
	311	2019/0069814	3/7/2019	Al-Ali	
	312	2019/0076028	3/14/2019	Al-Ali et al.	
	313	2019/0082979	3/21/2019	Al-Ali et al.	
	314	2019/0090748	3/28/2019	Al-Ali	
	315	2019/0090760	3/28/2019	Kinast et al.	
	316	2019/0090764	3/28/2019	Al-Ali	
	317	2019/0104973	04-11.2019	Poeze et al.	
	318	2019/0110719	4/18/2019	Poeze et al.	
	319	2019/0117070	4/25/2019	Muhsin et al.	

Examiner Signature	Date Considered
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p>	

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PTO/SB/08 Equivalent

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 12 OF 12		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	320	2019/0117139	4/25/2019	Al-Ali et al.	
	321	2019/0117140	4/25/2019	Al-Ali et al.	
	322	2019/0117141	4/25/2019	Al-Ali	
	323	2019/0117930	4/25/2019	Al-Ali	
	324	2019/0122763	4/25/2019	Sampath et al.	
	325	2019/0133525	5/9/2019	Al-Ali et al.	
	326	2019/0142283	5/16/2019	Lamego et al.	
	327	2019/0142344	5/16/2019	Telfort et al.	
	328	2019/0150800	5/23/2019	Poeze et al.	
	329	2019/0150856	5/23/2019	Kiani et al.	
	330	2019/0167161	6/6/2019	Al-Ali et al.	
	331	2019/0175019	6/13/2019	Al-Ali et al.	
	332	2019/0192076	6/27/2010	McHale et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document <i>Country Code-Number-Kind Code</i> Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>

30950661

Examiner Signature	Date Considered
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p>	

T<sup>1</sup> - Place a check mark in this area when an English language Translation is attached.

Docket No.: MAS.1007A

Customer No. 64735

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**INFORMATION DISCLOSURE STATEMENT**

First Inventor	:	Ammar Al-Ali
App. No.	:	15/195199
Filed	:	June 28, 2016
For	:	ADVANCED PULSE OXIMETRY SENSOR
Examiner	:	Fardanesh, Marjan
Art Unit	:	3791
Conf. No.	:	3453

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**References and Listing**

Pursuant to 37 CFR 1.56, an Information Disclosure Statement listing references is provided herewith. Copies of any listed foreign and non-patent literature references are being submitted.

**No Disclaimers**

To the extent that anything in the Information Disclosure Statement or the listed references could be construed as a disclaimer of any subject matter supported by the present application, Applicant hereby rescinds and retracts such disclaimer.

**Timing of Disclosure**

This Information Disclosure Statement is being filed within three months of the filing date or date of national phase entry, with an RCE or before receipt of a First Office Action after an RCE, and no fee is believed to be required.

The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment, to Account No. 11-1410.

Respectfully submitted,  
KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: July 19, 2019

By: /Aaron S. Johnson/  
Aaron S. Johnson  
Registration No. 74,164  
Registered Practitioner  
Customer No. 64735  
(949) 760-0404

30951014

APL\_MAS\_ITC\_00557317



<b>Electronic Acknowledgement Receipt</b>	
<b>EFS ID:</b>	36636331
<b>Application Number:</b>	15195199
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	3453
<b>Title of Invention:</b>	ADVANCED PULSE OXIMETRY SENSOR
<b>First Named Inventor/Applicant Name:</b>	Ammar Al-Ali
<b>Customer Number:</b>	64735
<b>Filer:</b>	Aaron Samuel Johnson/Daniel Escajeda
<b>Filer Authorized By:</b>	Aaron Samuel Johnson
<b>Attorney Docket Number:</b>	MAS.1007A
<b>Receipt Date:</b>	19-JUL-2019
<b>Filing Date:</b>	28-JUN-2016
<b>Time Stamp:</b>	13:19:36
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	no
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**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		IDS_MAS1007A.pdf	156598 a12f001d7a269660078d1dc24e51d43382ae1c05	yes	13

Multipart Description/PDF files in .zip description			
Document Description	Start	End	
Information Disclosure Statement (IDS) Form (SB08)	2	13	
Transmittal Letter	1	1	
<b>Warnings:</b>			
<b>Information:</b>			
<b>Total Files Size (in bytes):</b>		156598	
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>            If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>            If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>            If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>			



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
15/195,199	06/28/2016	3791	3440	MAS.1007A	36	4

**CONFIRMATION NO. 3453**  
**UPDATED FILING RECEIPT**

64735  
 KNOBBE, MARTENS, OLSON & BEAR, LLP  
 MASIMO CORPORATION (MASIMO)  
 2040 MAIN STREET  
 FOURTEENTH FLOOR  
 IRVINE, CA 92614



Date Mailed: 07/24/2019

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

**Please verify the accuracy of the data presented on this receipt.** If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

**Inventor(s)**  
 Ammar Al-Ali, San Juan Capistrano, CA;

**Applicant(s)**  
 MASIMO CORPORATION, Irvine, CA;

**Power of Attorney:** The patent practitioners associated with Customer Number 64735

**Domestic Priority data as claimed by applicant**  
 This appln claims benefit of 62/188,430 07/02/2015

**Foreign Applications** for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.  
*Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.*

**Permission to Access Application via Priority Document Exchange:** Yes

**Permission to Access Search Results:** Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

**Projected Publication Date:** Not Applicable

**Non-Publication Request:** No

**Early Publication Request:** No  
**Title**

ADVANCED PULSE OXIMETRY SENSOR

**Preliminary Class**

600

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:** No

### **PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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Title 35, United States Code, Section 184  
Title 37, Code of Federal Regulations, 5.11 & 5.15**

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/195,199	06/28/2016	Ammar Al-Ali	MAS.1007A

64735  
KNOBBE, MARTENS, OLSON & BEAR, LLP  
MASIMO CORPORATION (MASIMO)  
2040 MAIN STREET  
FOURTEENTH FLOOR  
IRVINE, CA 92614

**CONFIRMATION NO. 3453**  
**37 CFR 1.48 ACKNOWLEDGEMENT LETTER**



Date Mailed: 07/24/2019

**NOTICE OF ACCEPTANCE OF REQUEST UNDER 37 CFR 1.48(a)**

This is in response to the applicant's request under 37 CFR 1.48(a) submitted on 07/19/2019.

The request under 37 CFR 1.48(a) to correct the inventorship, to correct or update the name of an inventor, or to correct the order of names of joint inventors is accepted.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/mmasfaw/

505587679 07/24/2019

<b>PATENT ASSIGNMENT COVER SHEET</b>
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Electronic Version v1.1  
 Stylesheet Version v1.2

EPAS ID: PAT5634478

<b>SUBMISSION TYPE:</b>	NEW ASSIGNMENT
<b>NATURE OF CONVEYANCE:</b>	ASSIGNMENT
<b>CONVEYING PARTY DATA</b>	
<b>Name</b>	<b>Execution Date</b>
AMMAR AL-ALI	07/19/2019
<b>RECEIVING PARTY DATA</b>	
<b>Name:</b>	MASIMO CORPORATION
<b>Street Address:</b>	52 DISCOVERY
<b>City:</b>	IRVINE
<b>State/Country:</b>	CALIFORNIA
<b>Postal Code:</b>	92618
<b>PROPERTY NUMBERS Total: 2</b>	
<b>Property Type</b>	<b>Number</b>
<b>Application Number:</b>	15195199
<b>Application Number:</b>	16226249
<b>CORRESPONDENCE DATA</b>	
<b>Fax Number:</b>	(949)760-9502
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
<b>Phone:</b>	9497600404
<b>Email:</b>	efiling@knobbe.com
<b>Correspondent Name:</b>	KNOBBE, MARTENS, OLSON & BEAR, LLP
<b>Address Line 1:</b>	2040 MAIN STREET
<b>Address Line 2:</b>	14TH FLOOR
<b>Address Line 4:</b>	IRVINE, CALIFORNIA 92614
<b>ATTORNEY DOCKET NUMBER:</b>	MAS.1007A/ MAS.1007C1
<b>NAME OF SUBMITTER:</b>	AARON S. JOHNSON
<b>SIGNATURE:</b>	/Aaron S. Johnson/
<b>DATE SIGNED:</b>	07/24/2019
This document serves as an Oath/Declaration (37 CFR 1.63).	
<b>Total Attachments: 3</b>	
source=Executed CDA - MAS.1007A#page1.tif	
source=Executed CDA - MAS.1007A#page2.tif	
source=Executed CDA - MAS.1007A#page3.tif	

APL\_MAS\_ITC\_00557324

**COMBINED DECLARATION & ASSIGNMENT (37 CFR 1.63(e))***Application Data Sheet filed previously or concurrently***Docket Nos.:** MAS.1007A; MAS.1007C1

Page 1 of 3

**Title:** ADVANCED PULSE OXIMETRY SENSOR**Inventors:** Ammar Al-Ali***Declaration***

This Declaration is directed to U.S. Application Nos. **15/195199** and **16/226249**, filed June 28, 2016 and December 19, 2018, respectively, and incorporating any amendments made thereto prior to the signature date of this Declaration.

As a named inventor, I declare that:

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 USC 1001 by fine or imprisonment of not more than five (5) years, or both.

I have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

***Assignment from Inventors***

WHEREAS, **above-identified inventors** (individual(s) hereinafter "ASSIGNOR") invented certain new and useful improvements, technology, inventions, developments, ideas, ornamental designs, or discoveries related to **ADVANCED PULSE OXIMETRY SENSOR** (collectively hereinafter referred to as the "Work") for which an application for Letters Patent in the United States (identified above) has been filed or prepared for filing with the United States Patent and Trademark Office (hereinafter the "Application"), and ASSIGNOR desires to assign or confirm assignment of the Work and the Application to the below identified Assignee.

AND WHEREAS, **Masimo Corporation**, with its principal place of business at **52 Discovery, Irvine, California 92618** (hereinafter the "ASSIGNEE"), desires to acquire or confirm ownership of the entire right, title, and interest in and to the Application and the Work.

NOW, THEREFORE, for good and valuable consideration of which receipt is hereby acknowledged, ASSIGNOR hereby acknowledges that ASSIGNOR has sold, assigned, transferred, and set over, and by these presents does hereby sell, assign, transfer, and set over, unto said ASSIGNEE, **its** successors, legal representatives, and assigns, the entire right, title, and interest throughout the world in and to the Application and the Work, including:

all provisional applications relating to the Work and the Application (including but not limited to U.S. Provisional Application No(s). **62/188430**, filed **July 2, 2015** (respectively if plural applications));

all nonprovisional applications claiming priority to aforementioned provisional(s) and/or the Application, including, all divisions, continuations, continuations-in-part, and reissues, and all Letters Patent of the United States which may be granted thereon and all reissues and extensions thereof; and

all rights of priority under International Conventions and any related Letters Patent which may hereafter be granted or filed in any country or countries foreign to the United States, all extensions, renewals, and reissues thereof.

APL\_MAS\_ITC\_00557325



**COMBINED DECLARATION & ASSIGNMENT (37 CFR 1.63(e))***Application Data Sheet filed previously or concurrently***Docket Nos.:** MAS.1007A; MAS.1007C1

Page 2 of 3

**Title:** ADVANCED PULSE OXIMETRY SENSOR**Inventors:** Ammar Al-Ali

ASSIGNOR hereby authorizes and requests the Commissioner of Patents of the United States, and any Official of any country or countries foreign to the United States, whose duty it is to issue patents on applications as aforesaid, to issue all related Letters Patent to the ASSIGNEE, **its** successors, legal representatives, and assigns.

AND ASSIGNOR DOES HEREBY sell, assign, transfer, and convey to ASSIGNEE, **its** successors, legal representatives, and assigns all claims for damages and all remedies arising out of any violation of the rights assigned hereby that may have accrued prior to the date of assignment to ASSIGNEE, or may accrue hereafter, including, but not limited to, the right to sue for, collect, and retain damages for past infringements of said Letters Patent before or after issuance.

AND ASSIGNOR DOES HEREBY covenant and agree that ASSIGNOR will: communicate to said ASSIGNEE, **its** successors, legal representatives, and assigns any facts known to ASSIGNOR respecting the Work; testify in any legal proceeding; assist in the preparation of any other Patent Property relating to the Application and the Work or any improvements made thereto; sign/execute all lawful papers; authorize the filing of, execute, and make all rightful oaths and/or declarations in connection with the Application and the Work including any improvements made thereto, any patent applications filed therefrom, and any continuing application filed from any of the aforementioned applications; and generally do everything possible to aid the ASSIGNEE, **its** successors, legal representatives, and assigns, to obtain and enforce proper patent protection for the Work in all countries.

**COMBINED DECLARATION & ASSIGNMENT (37 CFR 1.63(e))**  
*Application Data Sheet filed previously or concurrently*

Docket Nos.: MAS.1007A; MAS.1007C1

Page 3 of 3

Title: ADVANCED PULSE OXIMETRY SENSOR

Inventors: Ammar Al-Ali

Legal Name of inventor: Ammar Al-Ali

IN TESTIMONY WHEREOF, I hereunto set my hand and seal this 7<sup>th</sup> day of JULY, 2019.

Signature: [Handwritten Signature]

A NOTARY PUBLIC OR OTHER OFFICER COMPLETING THIS CERTIFICATE VERIFIES ONLY THE IDENTITY OF THE INDIVIDUAL WHO SIGNED THE DOCUMENT TO WHICH THIS CERTIFICATE IS ATTACHED, AND NOT THE TRUTHFULNESS, ACCURACY, OR VALIDITY OF THAT DOCUMENT.

STATE OF CALIFORNIA }  
COUNTY OF ORANGE } ss.

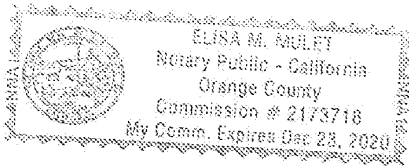
On 19 JUL 2019, before me, ELISA M MULET, notary public, personally appeared Ammar Al-Ali who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument, and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

[Handwritten Signature]  
Notary Signature

[SEAL]



30945203

Docket No.: MAS.1007A

July 25, 2019  
Page 1 of 2

Please Direct All Correspondence to Customer Number 64735

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor	: Ammar Al-Ali
App. No	: 15/195,199
Filed	: June 28, 2016
For	: ADVANCED PULSE OXIMETRY SENSOR
Examiner	: Fardanesh, Marjan
Art Unit	: 3791
Conf No.	: 3453

**SUMMARY OF INTERVIEW**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Commissioner:

A telephonic interview was conducted and attended by Examiner Fardanesh and Applicant’s representatives Jarom D. Kesler (Reg. No. 57,046) and Aaron S. Johnson (Reg. No. 74,164) on July 18, 2019. During the interview, proposed claim amendments were discussed to place the application in condition for allowance. Examiner Fardanesh and Applicant’s representatives reached an agreement that the pending claims were supported by the written description of the application and that the pending claims were patentably distinct over the prior art of record.

Examiner Fardanesh requested the filing of a Terminal Disclaimer with reference to co-pending Application Serial No. 16/226,249. Without commenting on the appropriateness of a Terminal Disclaimer, and solely in the interest of advancing prosecution, Applicant submitted a Terminal Disclaimer on July 18, 2019. Applicant notes that according to M.P.E.P § 804.02, the filing of a terminal disclaimer to obviate a rejection based on nonstatutory obviousness-type double patenting is not an admission regarding the propriety of the rejection. Applicant thanks Examiner Fardanesh for her time and consideration.

-1-

**Application No.: 15/195,199**  
**Filing Date: June 28, 2016**

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: July 25, 2019

By: /Aaron S. Johnson/  
Aaron S. Johnson  
Registration No. 74,164  
Registered Practitioner  
Customer No. 64735  
(949) 760-0404

<b>Electronic Acknowledgement Receipt</b>	
<b>EFS ID:</b>	36691065
<b>Application Number:</b>	15195199
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	3453
<b>Title of Invention:</b>	ADVANCED PULSE OXIMETRY SENSOR
<b>First Named Inventor/Applicant Name:</b>	Ammar Al-Ali
<b>Customer Number:</b>	64735
<b>Filer:</b>	Aaron Samuel Johnson/Wendi Manzanares
<b>Filer Authorized By:</b>	Aaron Samuel Johnson
<b>Attorney Docket Number:</b>	MAS.1007A
<b>Receipt Date:</b>	25-JUL-2019
<b>Filing Date:</b>	28-JUN-2016
<b>Time Stamp:</b>	18:11:17
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	no
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**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant summary of interview with examiner	Summary_MAS1007A.pdf	19482 1164e0791543eda193d407a7aff4c24d67e21b1b	no	2

**Warnings:**

<b>Information:</b>	
<b>Total Files Size (in bytes):</b>	19482
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>	



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
 United States Patent and Trademark Office  
 Address: COMMISSIONER FOR PATENTS  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 www.uspto.gov

**NOTICE OF ALLOWANCE AND FEE(S) DUE**

64735 7590 07/29/2019  
 KNOBBE, MARTENS, OLSON & BEAR, LLP  
 MASIMO CORPORATION (MASIMO)  
 2040 MAIN STREET  
 FOURTEENTH FLOOR  
 IRVINE, CA 92614

EXAMINER

FARDANESH, MARJAN

ART UNIT PAPER NUMBER

3791

DATE MAILED: 07/29/2019

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/195,199	06/28/2016	Ammar Al-Ali	MAS.1007A	3453

TITLE OF INVENTION: ADVANCED PULSE OXIMETRY SENSOR

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1000	\$0.00	\$0.00	\$1000	10/29/2019

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

**HOW TO REPLY TO THIS NOTICE:**

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at [www.uspto.gov/PatentMaintenanceFees](http://www.uspto.gov/PatentMaintenanceFees).**

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

64735 7590 07/29/2019
KNOBBE, MARTENS, OLSON & BEAR, LLP
MASIMO CORPORATION (MASIMO)
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

Form with fields for (Typed or printed name), (Signature), and (Date).

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Values: 15/195,199, 06/28/2016, Ammar Al-Ali, MAS.1007A, 3453

TITLE OF INVENTION: ADVANCED PULSE OXIMETRY SENSOR

Table with 7 columns: APPLN. TYPE, ENTITY STATUS, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE. Values: nonprovisional, UNDISCOUNTED, \$1000, \$0.00, \$0.00, \$1000, 10/29/2019

Table with 3 columns: EXAMINER, ART UNIT, CLASS-SUBCLASS. Values: FARDANESH, MARJAN, 3791, 600-323000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
[ ] Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
[ ] "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1 \_\_\_\_\_
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 \_\_\_\_\_
3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)
PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.
(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : [ ] Individual [ ] Corporation or other private group entity [ ] Government

4a. Fees submitted: [ ] Issue Fee [ ] Publication Fee (if required) [ ] Advance Order - # of Copies \_\_\_\_\_

4b. Method of Payment: (Please first reapply any previously paid fee shown above)
[ ] Electronic Payment via EFS-Web [ ] Enclosed check [ ] Non-electronic payment by credit card (Attach form PTO-2038)
[ ] The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. \_\_\_\_\_

5. Change in Entity Status (from status indicated above)
[ ] Applicant certifying micro entity status. See 37 CFR 1.29
[ ] Applicant asserting small entity status. See 37 CFR 1.27
[ ] Applicant changing to regular undiscounted fee status.
NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.
Authorized Signature \_\_\_\_\_ Date \_\_\_\_\_
Typed or printed name \_\_\_\_\_ Registration No. \_\_\_\_\_





UNITED STATES PATENT AND TRADEMARK OFFICE

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 United States Patent and Trademark Office  
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 Alexandria, Virginia 22313-1450  
 www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/195,199	06/28/2016	Ammar Al-Ali	MAS.1007A	3453
64735	7590	07/29/2019	EXAMINER FARDANESH, MARJAN	
KNOBBE, MARTENS, OLSON & BEAR, LLP MASIMO CORPORATION (MASIMO) 2040 MAIN STREET FOURTEENTH FLOOR IRVINE, CA 92614			ART UNIT	PAPER NUMBER
			3791	
DATE MAILED: 07/29/2019				

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**  
 (Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

<b><i>Notice Requiring Inventor's Oath or Declaration</i></b>	Application No. 15/195,199	Applicant(s) Ammar Al-Ali	
	Examiner FARDANESH, MARJAN	Art Unit 3791	

This notice is an attachment to the Notice of Allowability (PTOL-37), or the Notice of Allowability For A Design Application (PTOL-37D).

An inventor's oath or declaration in compliance with 37 CFR 1.63 or 1.64 executed by or with respect to each inventor has not yet been submitted.

An oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each inventor (for any inventor for which a compliant oath, declaration, or substitute statement has not yet been submitted) **MUST** be filed no later than the date on which the issue fee is paid. See 35 U.S.C. 115(f). Failure to timely comply will result in ABANDONMENT of this application.

A properly executed inventor's oath to declaration has not been received for the following inventor(s):

If applicant previously filed one or more oaths, declarations, or substitute statements, applicant may have received an informational notice regarding deficiencies therein.

The following deficiencies are noted:

**INFORMAL ACTION PROBLEMS**

- A properly executed inventor's oath or declaration has not been received for the following inventor(s): **Ammar Al-Ali**.  
Applicant may submit the inventor's oath or declaration at any time before the Notice of Allowance and Fee(s) Due, PTOL-85, is mailed.

Questions relating to this Notice should be directed to the Application Assistance Unit at 571-272-4200.

## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.** Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

### Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b) (2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

APL\_MAS\_ITC\_00557336

<b>Notice of Allowability</b>	<b>Application No.</b> 15/195,199	<b>Applicant(s)</b> Al-Ali et al.	
	<b>Examiner</b> MARJAN FARDANESH	<b>Art Unit</b> 3791	<b>AIA (FITF) Status</b> Yes

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.  This communication is responsive to amendments filed on 07/05/2019.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.

2.  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.

3.  The allowed claim(s) is/are 1-7, 16, 18-20, 22-29, 32-33, 37-42 and 45. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

4.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

a)  All      b)  Some      \*c)  None of the:

1.  Certified copies of the priority documents have been received.  
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5.  CORRECTED DRAWINGS (as "replacement sheets") must be submitted.  
 including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**

6.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. <input type="checkbox"/> Notice of References Cited (PTO-892)	5. <input checked="" type="checkbox"/> Examiner's Amendment/Comment
2. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date <u>07/05/2019</u> .	6. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance
3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.	7. <input type="checkbox"/> Other _____.
4. <input checked="" type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date. <u>07/18/2019</u> .	

/MARJAN FARDANESH/ Examiner, Art Unit 3791	/ERIC F WINAKUR/ Primary Examiner, Art Unit 3791
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 Art Unit: 3791

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## DETAILED ACTION

### *Notice of Pre-AIA or AIA Status*

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

### EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in an interview with Mr. Jarom Kesler on 07/18/2019. Applicant agreed to amend the claims, as set forth below, to clarify the relationship between the irradiated tissue portion, detected tissue portion, and the light block.

3. The application has been amended as follows:

Claim 1 was amended as follows:

1. An optical physiological measurement device configured for placement on a patient at a tissue measurement site, the device comprising:

one or more emitters configured to emit light so as to irradiate ~~a portion of the tissue measurement site, the portion of the tissue measurement site having an at least partially circular shape bounded by a light block, the tissue measurement site located on a wrist of the patient;~~ and

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 Art Unit: 3791

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a plurality of detectors configured to detect the emitted light after attenuation by and reflection from a portion of tissue of the patient at the tissue measurement site, the portion of the tissue measurement site having an at least partially circular shape bounded by a light block, the tissue measurement site located on a wrist of the patient, the plurality of detectors further configured to transmit a signal responsive to the detected light;

wherein the light block comprises an annular ring having a circular shape located between the emitted light at the tissue measurement site and the plurality of detectors, the light block reducing an amount of incident light emitted from the one or more emitters from being detected by the plurality of detectors, wherein the plurality of detectors are arranged in an array having a spatial configuration corresponding to the shape of the ~~irradiated~~ portion of the tissue measurement site.

Claim 18 was amended as follows:

18. A method to determine a constituent or analyte in a patient's blood, the method comprising:

emitting, from at least one emitter of an optical sensor, light of one or more wavelengths so as to irradiate ~~a portion of~~ a tissue measurement site, ~~the irradiated portion having an at least partially circular shape,~~ wherein the tissue measurement site is located on a wrist of a patient;

detecting, with a plurality of detectors, the emitted light after attenuation by and reflection from ~~tissue of the patient at~~ a portion of the tissue measurement site, the portion having an at least partially circular shape; and providing an annular ring located between the emitted light at the tissue measurement site and the plurality of detectors,

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 Art Unit: 3791

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wherein the annular ring reduces an amount of incident light emitted from the at least one emitter from arriving at the plurality of detectors, and wherein the plurality of detectors are arranged in an array having a spatial configuration corresponding to the shape of the ~~irradiated~~ portion of the tissue measurement site.

Claim 26 was amended as follows:

26. A pulse oximeter sensor comprising:

one or more optical sources configured to emit light at one or more wavelengths, wherein, when the pulse oximeter sensor is placed on a patient at a tissue measurement site, the one or more optical sources are positioned in a reflectance measurement configuration on a first side of the tissue measurement site, and wherein the one or more optical sources are configured to irradiate ~~a portion of~~ the tissue measurement site, ~~the portion of the tissue measurement site having an at least partially circular shape~~; a plurality of detectors configured to detect light emitted from the one or more optical sources after attenuation by a portion of tissue of the patient at the tissue measurement site, the portion of the tissue measurement site having an at least partially circular shape, the plurality of detectors arranged in an array having a spatial configuration corresponding to the shape of the ~~irradiated~~ portion of the tissue measurement site so as to capture the emitted light reflected from the ~~tissue of the patient at the~~ tissue measurement site, wherein the plurality of detectors are positioned in a reflectance measurement configuration on the first side of the tissue measurement site when the pulse oximeter sensor is placed on the patient, the plurality of detectors further configured to output a signal responsive to the detected light; and a light block comprising an annular ring located between the emitted light at the tissue measurement

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site and the plurality of detectors, the light block reducing an amount of incident light emitted from the one or more optical sources from arriving at the plurality of detectors.

Claim 32 was amended as follows:

32. A pulse oximeter sensor comprising:

one or more optical sources configured to emit light at one or more wavelengths, wherein, when the pulse oximeter sensor is placed on a patient at a tissue measurement site, the one or more optical sources are positioned in a reflectance measurement configuration on a first side of the tissue measurement site, and wherein the one or more optical sources are configured to irradiate ~~a portion of the tissue measurement site, the portion of the tissue measurement site having an annular shape,~~ and wherein the tissue measurement site is located on a wrist of the patient; a plurality of detectors configured to detect light emitted from the one or more optical sources after attenuation by and reflection from a portion of ~~tissue of the patient at the tissue measurement site, the portion of the tissue measurement site having an annular~~ shape, wherein the plurality of detectors are positioned in a reflectance measurement configuration on the first side of the tissue measurement site when the pulse oximeter sensor is placed on the patient, the plurality of detectors further configured to output signals responsive to the detected light; and a light block comprising an annular ring located between the emitted light at the tissue measurement site and the plurality of detectors, the light block reducing an amount of incident light emitted from the one or more optical sources that does not enter the tissue measurement site arriving at the plurality of detectors, wherein the plurality of detectors are positioned in an array having



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a spatial configuration corresponding to the annular shape of the ~~irradiated~~ portion of the tissue measurement site.

### **Conclusion**

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARJAN FARDANESH whose telephone number is (571)270-5508. The examiner can normally be reached on Monday-Friday 9:00-17:00.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patricia Mallari can be reached on (571)272-4729. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

Application/Control Number: 15/195,199  
Art Unit: 3791

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USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ERIC F WINAKUR/  
Primary Examiner, Art Unit 3791

/MARJAN FARDANESH/  
Examiner, Art Unit 3791

<b><i>Applicant-Initiated Interview Summary</i></b>	<b>Application No.</b> 15/195,199	<b>Applicant(s)</b> Al-Ali et al.		
	<b>Examiner</b> MARJAN FARDANESH	<b>Art Unit</b> 3791	<b>AIA (First Inventor to File) Status</b> Yes	<b>Page</b> 1 of 2

All participants (applicant, applicants representative, PTO personnel):

1. MARJAN FARDANESH (Examiner); Telephonic
2. Jarom Kesler (Attorney of Record); Telephonic
3. Aaron Johnson (Attorney of Record); Telephonic

**Date of Interview:** 07 May 2019

**Claims Discussed:** Claims 1, 18, 32 were discussed.

**Prior Art Discussed:** Rosenheimer and Cui were discussed.

**Amendment proposed:** Applicant proposed to amend the claims to include plurality of detectors and capturing the subject matter of figure 7 in order to overcome the prior art.

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**Issues Discussed:**

**Item(s) under 35 U.S.C. 102:**  
Applicant argued that the prior art fails to disclose 3 or more detectors in addition to plurality of detectors arranged in an array within the light block. Examiner agreed that the prior art does not teach 3 or more detectors, and the subject matter of figure 7 is different than prior art. Applicant will take the discussions into consideration while filing the formal response.

**Attachment(s):** Proposed Amendments,

/MARJAN FARDANESH/ Examiner, Art Unit 3791	/ERIC F WINAKUR/ Primary Examiner, Art Unit 3791
<p><b>Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04</b></p> <p>Please further see:  MPEP 713.04  Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)  37 CFR § 1.2 Business to be transacted in writing</p>	


U.S. Patent and Trademark Office  
PTOL-413/413b (Rev. 01/01/2015)

**Interview Summary**

Paper No. 20190717

**Applicant recordation instructions:** The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview.

**Examiner recordation instructions:** Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

<b>Search Notes</b> 	<b>Application/Control No.</b> 15/195,199	<b>Applicant(s)/Patent Under Reexamination</b> Al-Ali et al.
	<b>Examiner</b> MARJAN FARDANESH	<b>Art Unit</b> 3791

CPC - Searched*		
Symbol	Date	Examiner
EAST-See search history printout	02/19/2019	/mf/
EAST-See search history printout	02/19/2019	/mf/
EAST-See search history printout	07/18/2019	/mf/

CPC Combination Sets - Searched*		
Symbol	Date	Examiner


US Classification - Searched*			
Class	Subclass	Date	Examiner

\* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
"PALM" inventor name search	02/19/2019	/mf/

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
EAST-	See search history printout	07/18/2019	/mf/


/MARJAN FARDANESH/ Examiner, Art Unit 3791	
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<b>Issue Classification</b> 	<b>Application/Control No.</b> 15/195,199	<b>Applicant(s)/Patent Under Reexamination</b> Al-Ali et al.
	<b>Examiner</b> MARJAN FARDANESH	<b>Art Unit</b> 3791

CPC						
Symbol				Type	Version	
A61B	/	5	/	14552	F	2013-01-01
A61B	/	5	/	6826	I	2013-01-01
A61B	/	5	/	0002	I	2013-01-01
A61B	/	5	/	02416	I	2013-01-01
A61B	/	5	/	14532	I	2013-01-01
A61B	/	5	/	14546	I	2013-01-01
A61B	/	5	/	4875	I	2013-01-01
A61B	/	5	/	7278	I	2013-01-01
A61B	/	5	/	742	I	2013-01-01
A61B	/	2562	/	04	A	2013-01-01

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

/MARJAN FARDANESH/ Examiner, Art Unit 3791 (Assistant Examiner)	18 July 2019 (Date)	<b>Total Claims Allowed:</b> 28	
/ERIC F WINAKUR/ Primary Examiner, Art Unit 3791 (Primary Examiner)	19 July 2019 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 7

<b>Issue Classification</b> 	<b>Application/Control No.</b> 15/195,199	<b>Applicant(s)/Patent Under Reexamination</b> Al-Ali et al.
	<b>Examiner</b> MARJAN FARDANESH	<b>Art Unit</b> 3791

<b>INTERNATIONAL CLASSIFICATION</b>		
<b>CLAIMED</b>		
A61B	5	1455

<b>NON-CLAIMED</b>		

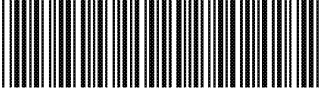
<b>US ORIGINAL CLASSIFICATION</b>	
<b>CLASS</b>	<b>SUBCLASS</b>
600	310

<b>CROSS REFERENCES(S)</b>					
<b>CLASS</b>	<b>SUBCLASS (ONE SUBCLASS PER BLOCK)</b>				

/MARJAN FARDANESH/ Examiner, Art Unit 3791 (Assistant Examiner)	18 July 2019 (Date)	<b>Total Claims Allowed:</b> 28	
/ERIC F WINAKUR/ Primary Examiner, Art Unit 3791 (Primary Examiner)	19 July 2019 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 7

U.S. Patent and Trademark Office

Part of Paper No.: 20190717

<b>Issue Classification</b> 	<b>Application/Control No.</b> 15/195,199	<b>Applicant(s)/Patent Under Reexamination</b> Al-Ali et al.
	<b>Examiner</b> MARJAN FARDANESH	<b>Art Unit</b> 3791

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

CLAIMS															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1		10	14	19	22	28	4	37						
5	2		11	12	20	24	29	10	38						
2	3		12		21		30	13	39						
3	4		13	16	22		31	19	40						
7	5		14	17	23	26	32	23	41						
8	6		15	18	24	27	33	25	42						
9	7	6	16	15	25		34		43						
	8		17	20	26		35		44						
	9	11	18	21	27		36	28	45						

/MARJAN FARDANESH/ Examiner, Art Unit 3791 (Assistant Examiner)	18 July 2019 (Date)	<b>Total Claims Allowed:</b> 28	
/ERIC F WINAKUR/ Primary Examiner, Art Unit 3791 (Primary Examiner)	19 July 2019 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 7

U.S. Patent and Trademark Office

Part of Paper No.: 20190717



**Bibliographic Data**

Application No: 15/195,199

Foreign Priority claimed:  Yes  No

35 USC 119 (a-d) conditions met:  Yes  No  Met After Allowance

Verified and Acknowledged: /MARJAN FARDANESH/

Examiner's Signature

Initials

Title: ADVANCED PULSE OXIMETRY SENSOR

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
06/28/2016	600	3791	MAS.1007A
<b>RULE</b>			

**APPLICANTS**

MASIMO CORPORATION, Irvine, CA,

**INVENTORS**

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Stephen Scruggs Newport Beach, CA, UNITED STATES

**CONTINUING DATA**

This application has PRO of 62188430 07/02/2015

**FOREIGN APPLICATIONS**

**IF REQUIRED, FOREIGN LICENSE GRANTED\*\***

07/12/2016

**STATE OR COUNTRY**

UNITED STATES

**ADDRESS**

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UNITED STATES

**FILING FEE RECEIVED**

\$3,440

**EAST Search History**

**EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	9	((("7809441") or ("9364662") or ("20070270675") or ("20090076353") or ("20130131765") or ("20140018644") or ("20140266776") or ("20140316482") or ("20160038743") or ("20160038743")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/12 13:26
S2	1	("2014/0018644").URPN.	USPAT	OR	OFF	2019/06/12 13:27
S3	5	fluorescen\$4 and palti.in. and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/06/12 13:37
S4	44	palti.in. and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/06/12 13:37
S5	87	IAS and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/06/12 13:38
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S7	2	((("20020026108") or ("20080146890")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/12 15:51
S8	218	semiconductor with ceramic and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/06/12 15:56
S9	86	semiconductor with ceramic with substrate and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/06/12 16:01
S10	1	("20030208113").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/12 16:09
S11	1	"15663107"	US-PGPUB; USPAT	OR	OFF	2019/06/13 12:49
S12	1253	threshold with (hyperglycemia hypoglycemia) and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/06/13 14:29
S13	69	threshold with (hyperglycemia hypoglycemia) with compar\$5 and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/06/13 14:29
S14	16	scalar with (activity acceleration) with threshold and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/06/14 11:53
S15	2	"15697311"	US-PGPUB;	OR	ON	2019/06/17 12:06

EAST Search History

			USPAT			
S16	16	((("VERIFOOD") near3 ("LTD"))).AS.AANM.	USPAT	OR	OFF	2019/06/17 14:15
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S18	49	((("VERIFOOD") near3 ("LTD"))).AS.AANM.	US-PGPUB; USPAT	OR	OFF	2019/06/17 14:15
S19	1	((("VERIFOOD") near3 ("LTD"))).AS.AANM. and catheter	US-PGPUB; USPAT	OR	OFF	2019/06/17 14:20
S20	42	((("VERIFOOD") near3 ("LTD"))).AS.AANM. and block\$4	US-PGPUB; USPAT	OR	OFF	2019/06/17 14:23
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S23	89	(tube catheter) same (block\$4 actuator) same (spectroscopy spectrometer) and A61B5/\$.cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2019/06/17 14:27
S24	61	(tube catheter) same (block\$4 actuator) same (spectroscopy spectrometer) and A61B5/\$.cpc. and (fluid urine)	US-PGPUB; USPAT;	OR	ON	2019/06/17 14:28

EAST Search History

			USOCR			
S25	1225	(tube catheter) same (block\$4 actuator) and (spectroscopy spectrometer) and A61B5/\$.cpc. and (fluid urine)	US-PGPUB; USPAT; USOCR	OR	ON	2019/06/17 14:29
S26	637	(tube catheter) with (block\$4 actuator) and (spectroscopy spectrometer) and A61B5/\$.cpc. and (fluid urine)	US-PGPUB; USPAT; USOCR	OR	ON	2019/06/17 14:29
S27	158	(tube catheter) with (block\$4 actuator) and (spectroscopy spectrometer) and A61B5/\$.cpc. and (urine)	US-PGPUB; USPAT; USOCR	OR	ON	2019/06/17 14:33
S28	18	((("6069696") or ("6072576") or ("6333501") or ("6441375") or ("6456373") or ("6615142") or ("6639666") or ("6700661") or ("6717669") or ("6836325") or ("6864978") or ("7009702") or ("7038774") or ("7068366") or ("7075643") or ("7084974") or ("7145650") or ("7151600")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/17 14:39
S29	2	((("7158225") or ("7235766")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/17 14:41
S30	21	((("7245372") or ("7248370") or ("7251037") or ("7339665") or ("7426446") or ("7436511") or ("7489396") or ("7528957") or ("7649627") or ("7697136") or ("7767969") or ("7817273") or ("7868296") or ("7876435") or ("7881892") or ("7907282") or ("7929130") or ("7999933") or ("8125633") or ("8144322") or ("8169607")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/17 14:43
S31	21	((("8169608") or ("8247774") or ("8477305") or ("8526002") or ("8593628") or ("8604412") or ("8654327") or ("8675188") or ("8711360") or ("8711362") or ("8735820") or ("8742320") or ("8760645") or ("8773659") or ("8786854") or ("8848187") or ("8862445") or ("8867033") or ("8868387") or ("8873046") or ("8937717")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/17 14:46
S32	21	((("8976357") or ("9030662") or ("9063011") or ("9074933") or ("9128055") or ("9163986") or ("9173508") or ("9182280") or ("9234800") or ("9239264") or ("9297821") or ("9301626") or ("9310564") or ("9383308") or ("9395244") or ("9417180") or ("9448165") or ("9453794") or ("9464934") or ("9464934") or ("9488468") or ("9488523")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/17 14:48
S33	19	((("9508765") or ("9518917") or ("9546902") or ("9546904") or	US-PGPUB;	OR	OFF	2019/06/17 14:51

EAST Search History

		("9557220") or ("9568363") or ("20050117151") or ("20050128477") or ("20060132760") or ("20080265146") or ("20080297791") or ("20090051910") or ("20100165337") or ("20110037975") or ("20130107260") or ("20130182250") or ("20140046630") or ("20140046630") or ("20140168636") or ("20140333932").PN.	USPAT; USOCR			
S34	22	((("20150062577") or ("20160103354") or ("20150108333") or ("20150116707") or ("20150119661") or ("20150153225") or ("20150323383") or ("20160018260") or ("20160091369") or ("20160103069") or ("20160223400") or ("20160231171") or ("20160245700") or ("20160258813") or ("20160263910") or ("20160282182") or ("20160299004") or ("20160305820") or ("20160313184") or ("20160334274") or ("20160356646") or ("20160356647")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/17 14:53
S35	2	S33 and (tube catheter)	US-PGPUB; USPAT	OR	OFF	2019/06/17 14:55
S36	0	S28 and S29 and S30 and S31 and S32 and S33 and S34	US-PGPUB; USPAT	OR	OFF	2019/06/17 14:56
S37	3	S28 and (tube catheter) and (spectroscopy spectrometer spectrograph\$4)	US-PGPUB; USPAT	OR	OFF	2019/06/17 15:03
S38	0	S29 and (tube catheter) and (spectroscopy spectrometer spectrograph\$4)	US-PGPUB; USPAT	OR	OFF	2019/06/17 15:04
S39	6	S30 and (tube catheter) and (spectroscopy spectrometer spectrograph\$4)	US-PGPUB; USPAT	OR	OFF	2019/06/17 15:04
S40	7	S31 and (tube catheter) and (spectroscopy spectrometer spectrograph\$4)	US-PGPUB; USPAT	OR	OFF	2019/06/17 15:04
S41	3	S32 and (tube catheter) and (spectroscopy spectrometer spectrograph\$4)	US-PGPUB; USPAT	OR	OFF	2019/06/17 15:04
S42	2	S33 and (tube catheter) and (spectroscopy spectrometer spectrograph\$4)	US-PGPUB; USPAT	OR	OFF	2019/06/17 15:04
S43	5	S34 and (tube catheter) and (spectroscopy spectrometer spectrograph\$4)	US-PGPUB; USPAT	OR	OFF	2019/06/17 15:04
S44	2	S28 and (tube catheter) and (spectroscopy spectrometer spectrograph\$4) and (block\$4 actuat\$4)	US-PGPUB; USPAT	OR	OFF	2019/06/17 15:08
S45	0	S29 and (tube catheter) and (spectroscopy spectrometer spectrograph\$4) and (block\$4 actuat\$4)	US-PGPUB; USPAT	OR	OFF	2019/06/17 15:13
S46	6	S30 and (tube catheter) and (spectroscopy spectrometer spectrograph\$4) and (block\$4 actuat\$4)	US-PGPUB; USPAT	OR	OFF	2019/06/17 15:13
S47	6	S31 and (tube catheter) and (spectroscopy spectrometer	US-PGPUB;	OR	OFF	2019/06/17 15:14

EAST Search History

		spectrograph\$4) and (block\$4 actuat\$4)	USPAT			
S48	1	"15660573" and (block\$4 actuat\$4)	US-PGPUB; USPAT	OR	OFF	2019/06/17 15:16
S49	0	S31 and (tube catheter) with (blocker block\$2 actuator actuat\$2) with (urine drain fluid) and (spectroscopy spectrometer spectrograph\$4)	US-PGPUB; USPAT	OR	ON	2019/06/17 15:18
S50	0	S32 and (tube catheter) with (blocker block\$2 actuator actuat\$2) with (urine drain fluid) and (spectroscopy spectrometer spectrograph\$4)	US-PGPUB; USPAT	OR	ON	2019/06/17 15:18
S51	0	S33 and (tube catheter) with (blocker block\$2 actuator actuat\$2) with (urine drain fluid) and (spectroscopy spectrometer spectrograph\$4)	US-PGPUB; USPAT	OR	ON	2019/06/17 15:18
S52	0	S34 and (tube catheter) with (blocker block\$2 actuator actuat\$2) with (urine drain fluid) and (spectroscopy spectrometer spectrograph\$4)	US-PGPUB; USPAT	OR	ON	2019/06/17 15:18
S53	791	(tube catheter) with (blocker block\$2 actuator actuat\$2) with (urine drain fluid) and (spectroscopy spectrometer spectrograph\$4)	US-PGPUB; USPAT	OR	ON	2019/06/17 15:18
S54	179	(tube catheter) with (blocker block\$2 actuator actuat\$2) with (urine drain fluid) and (spectroscopy spectrometer spectrograph\$4) and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/06/17 15:19
S55	95	fardanesh.xa. and (tube catheter)	US-PGPUB; USPAT	OR	ON	2019/06/17 15:31
S56	28	("20020016536"   "20020080368"   "20030084906"   "20040186468"   "20060281992"   "3814081"   "4223680"   "4281645"   "4510938"   "4782819"   "4907876"   "5221255"   "5433216"   "5476434"   "5728092"   "5769791"   "5788647"   "5807261"   "5853005"   "5916153"   "6010453"   "6334064"   "6406431"   "6447462"   "6505074"   "6519487"   "6690958"   "6699175").PN. OR ("8412294"),URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/17 15:41
S57	114	("20010016699"   "20010021817"   "20010037079"   "20010041892"   "20020103453"   "20020147423"   "20030009123"   "20030045784"   "20030070969"   "20030097087"   "20030143116"   "20030196949"   "20030210390"   "20030212316"   "20040087845"   "20050094127"   "20060036185"   "20060144776"   "20060226079"   "20060290625"   "20070015963"   "20070100219"   "20070149871"   "20070179433"   "20080081970"   "20080129047"   "20080300570"   "20090054751"   "20090247850"   "20090322861"   "20100004518"   "20100072280"   "20100110416"   "20100113891"   "20100168531"   "20100298677"	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/17 15:47

EAST Search History

		"20110004082"   "20110022077"   "20110160679"   "20120120384"   "20120154789"   "20160296687"   "2357238"   "3507951"   "3580683"   "3728032"   "3740156"   "4243883"   "4444498"   "4759369"   "4784768"   "4936993"   "5073171"   "5126686"   "5171456"   "5222948"   "5231464"   "5247434"   "5312535"   "5351686"   "5366630"   "5372136"   "5456253"   "5458566"   "5476764"   "5670050"   "5674390"   "5676644"   "5729333"   "5730712"   "5762805"   "5769815"   "5779529"   "5792052"   "6018673"   "6069687"   "6090061"   "6284131"   "6284142"   "6510330"   "6554788"   "6654621"   "6746415"   "6784820"   "7018353"   "7241825"   "7247143"   "7671974"   "8133194"   "8287739"   "8315682"   "8328748"   "8333724"   "8517968"   "8518247"   "9002655"   "9212988"   "D206714"   "D212218"   "D270281"   "D335096"   "D409750"   "D518573"   "D623302"   "D625824"   "D630536"   "D654999"   "D684695"   "D684697"   "D698440").PN. OR ("9801993").URPN.				
S58	13	("20010034479"   "20060167405"   "20080097288"   "4215940"   "4830013"   "4989606"   "5249584"   "5453248"   "5462052"   "5871627"   "5944660"   "6144444"   "7018353").PN. OR ("9091660").URPN.	US- PGPUB; USPAT; USOCR	OR	OFF	2019/06/17 15:50
S59	153	(urine urinary) with infection and (spectrometer spectroscopy spectrograph\$4) and A61B5/\$.cpc.	US- PGPUB; USPAT	OR	OFF	2019/06/17 16:15
S60	77	(compress\$4) with (tube catheter) with (stop\$4 prevent\$4) with flow\$4 and (spectroscopy and spectrometer spectrograph\$4)	US- PGPUB; USPAT	OR	ON	2019/06/17 16:34
S61	2	(compress\$4) with (tube catheter) with (stop\$4 prevent\$4) with flow\$4 same (urine urinary) with infection	US- PGPUB; USPAT	OR	ON	2019/06/17 16:42
S62	11	(compress\$4) with (tube catheter) with (stop\$4 prevent\$4) with flow\$4 and (urine urinary) with infection	US- PGPUB; USPAT	OR	ON	2019/06/17 16:43
S67	0	((("2013021153") or ("2014165697") or ("2013035602") or ("2009182216") or ("2009182216") or ("2010251804") or ("2014365142") or ("2014081106")).PN.	US- PGPUB; USPAT; USOCR	OR	OFF	2019/06/18 15:53
S68	7	((("20130021153") or ("20140165697") or ("20130035602") or ("20090182216") or ("20090182216") or ("20100251804") or ("20140365142") or ("20140081106")).PN.	US- PGPUB; USPAT; USOCR	OR	OFF	2019/06/18 15:53
S69	1	"15557319"	US- PGPUB; USPAT	OR	OFF	2019/06/18 16:03
S70	2	"14745180" and determin\$4 adj dT	US- PGPUB; USPAT	OR	OFF	2019/06/18 17:29

EAST Search History

S71	2	"14745180" and determin\$4 with dT	US-PGPUB; USPAT	OR	OFF	2019/06/18 17:29
S72	3	((("5439002") or ("5033471") or ("20150105676"))).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/19 11:25
S73	6962	A61B5/02\$.cpc. and wrist and (screen display) and pressure	US-PGPUB; USPAT	OR	ON	2019/06/19 11:30
S74	6962	A61B5/02\$.cpc. and wrist and (screen display) and pressure and (cuff press\$4)	US-PGPUB; USPAT	OR	ON	2019/06/19 11:31
S75	2559	A61B5/02\$.cpc. and wrist same (screen display) and pressure and (cuff press\$4)	US-PGPUB; USPAT	OR	ON	2019/06/19 11:31
S76	867	A61B5/02\$.cpc. and wrist same (screen display) same pressure and (cuff press\$4)	US-PGPUB; USPAT	OR	ON	2019/06/19 11:32
S77	867	A61B5/02\$.cpc. and wrist same (screen display) same pressure same (cuff press\$4)	US-PGPUB; USPAT	OR	ON	2019/06/19 11:32
S78	57	A61B5/02\$.cpc. and wrist same (first and second) with (screen display) same pressure same (cuff press\$4)	US-PGPUB; USPAT	OR	ON	2019/06/19 11:32
S79	2	A61B5/02\$.cpc. and (wrist wristwatch wrist adj watch) adj (second two) adj display	US-PGPUB; USPAT	OR	ON	2019/06/19 11:39
S80	783	A61B5/02\$.cpc. and (second two) adj display	US-PGPUB; USPAT	OR	ON	2019/06/19 11:42
S81	3	((("20150378312") or ("20160267310") or ("20150186092"))).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/19 11:47
S82	1	("20110213212").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/19 12:02
S83	1	"14947688"	US-PGPUB; USPAT	OR	OFF	2019/06/19 12:07
S84	2	((("20100137695") or ("20080114280"))).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/19 13:36
S85	1	"15592451" and processor	US-PGPUB; USPAT	OR	OFF	2019/06/19 14:03
S86	120	(handheld mobile) with alcohol and strap and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/06/19 20:29
S87	0	(handheld mobile) with alcohol and strap and G01N33/49.cpc.	US-PGPUB; USPAT	OR	OFF	2019/06/19 20:29
S88	17	(handheld mobile) with alcohol and strap and A61B5/\$.cpc. and breath	US-PGPUB;	OR	OFF	2019/06/19 20:34



EAST Search History

			USPAT			
S89	1	("6853304").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/19 20:42
S90	10	alcohol and breath and (inside with mouth) with camera	US-PGPUB; USPAT	OR	OFF	2019/06/19 21:30
S91	10	(identification biometric) with (inside with mouth) with camera	US-PGPUB; USPAT	OR	OFF	2019/06/19 21:34
S92	1	breath and alcohol and (micro adj camera)	US-PGPUB; USPAT	OR	OFF	2019/06/19 21:39
S93	216	breath and alcohol and (camera) with mouth	US-PGPUB; USPAT	OR	OFF	2019/06/19 21:40
S94	216	breath and alcohol and (identification biometric) and (second two) adj camera	US-PGPUB; USPAT	OR	ON	2019/06/19 22:00
S95	232	breath and alcohol and (identification identif\$4 biometric) and (second two) adj camera	US-PGPUB; USPAT	OR	ON	2019/06/19 22:00
S96	1	"15674434" and center	US-PGPUB; USPAT	OR	OFF	2019/06/20 16:59
S97	2	"20130222271"	US-PGPUB; USPAT	OR	OFF	2019/06/20 17:39
S98	4	((("20130271350") or ("20070158376") or ("20130222270") or ("20130222271")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/20 17:41
S99	5	((("20160267310") or ("20150186092") or ("4896676") or ("20150213580") or ("20150182147")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/20 17:45
S100	1	"15674434"	US-PGPUB; USPAT	OR	OFF	2019/06/20 18:19
S101	864	(blood) adj pressure and (cuff) same press\$4 same (artery pulse) same wrist and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/06/20 21:09
S102	8	((("6216490") or ("4896676") or ("20170367649") or ("20150186092") or ("20150213580") or ("20150182147") or ("20130245391") or ("20070208258")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/20 21:11
S103	3	((("20140371552") or ("20090259407") or ("20110098542")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/21 10:24
S104	5	"14745180"	US-PGPUB; USPAT	OR	OFF	2019/06/21 10:27
S105	78	"5900632"	US-PGPUB; USPAT	OR	OFF	2019/06/21 11:18

EAST Search History

S106	85	("4429999"   "5040539"   "5070242"   "5075552"   "5191215"   "5313941"   "5360004"   "5361758"   "5370114"   "5372135"   "5372136"   "5383452"   "5451787"   "5461229"   "5471056"   "5473162"   "5515847"   "5666956").PN. OR ("5900632").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/21 11:19
S107	1	"15388672" and hemoglobin and diuretic	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/21 13:13
S108	1	("5335659").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/21 17:58
S109	1	("20150182147").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/22 11:30
S110	19	alcohol same temperature with exhaled with breath and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/06/22 12:34
S111	94	alcohol same temperature with breath and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/06/22 12:37
S112	75	S111 not S110	US-PGPUB; USPAT	OR	OFF	2019/06/22 12:38
S113	1	"15557319" and temperature	US-PGPUB; USPAT	OR	OFF	2019/06/22 12:45
S114	15	breath with temperature same compar\$4 same threshold and alcohol	US-PGPUB; USPAT	OR	OFF	2019/06/22 12:47
S115	0	"4809810".pn. and refrence and temperature and alcohol	US-PGPUB; USPAT	OR	OFF	2019/06/22 12:57
S116	1	"4809810".pn. and temperature and alcohol	US-PGPUB; USPAT	OR	OFF	2019/06/22 12:57
S117	1	"15557319"	US-PGPUB; USPAT	OR	OFF	2019/06/22 14:08
S118	1	("20120276549").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/23 14:21
S119	1	("20020026108").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/24 14:09
S120	3268	implant\$4 and substrate with semiconductor with ceramic	US-PGPUB; USPAT	OR	ON	2019/06/24 14:11
S121	122	implant\$4 and substrate with semiconductor with ceramic and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/06/24 14:11
S122	98	implant\$4 and substrate with	US-	OR	ON	2019/06/24

EAST Search History

		semiconductor with ceramic and A61B5/\$.cpc. and glucose	PGPUB; USPAT			14:15
S123	2069	EMR and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/06/26 15:28
S124	1059832	blood aj pressure same (ppg photopleth\$7) same (ECG electrocardio\$4) and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/06/27 13:41
S125	988	blood adj pressure same (ppg photopleth\$7) same (ECG electrocardio\$4) and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/06/27 13:41
S126	676	blood adj pressure with (ppg photopleth\$7) same (ECG electrocardio\$4) and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/06/27 13:41
S127	611	blood adj pressure with (ppg photopleth\$7) with (ECG electrocardio\$4) and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/06/27 13:42
S128	1	("20120162438").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/28 13:35
S129	1	"16195624"	US-PGPUB; USPAT	OR	OFF	2019/07/16 14:35
S130	39	((("3649964") or ("3721233") or ("3736927") or ("3822698") or ("3998213") or ("4019508") or ("4037595") or ("4206644") or ("4233972") or ("4297999") or ("7381267") or ("4425501") or ("4430995") or ("4549542") or ("4588425") or ("4590951") or ("4644947") or ("4765316") or ("4782832") or ("4802485") or ("4829998") or ("4836219") or ("5035239") or ("5046492") or ("5054480") or ("5054484") or ("5104430") or ("5113853") or ("5154168") or ("5273036") or ("5284160") or ("5303701") or ("5318020") or ("5349946") or ("5353788") or ("5372130") or ("20150021535") or ("20160015916") or ("20150367092")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/07/16 14:49
S131	9	((("HANCOCK") near3 ("MEDICAL") near3 ("INC"))).AS.AANM.	USPAT	OR	OFF	2019/07/16 14:50
S132	57	((("GOFF") near3 ("Thomas") near3 ("G"))).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/07/16 14:51
S133	9	((("CHIANG") near3 ("Kirby"))).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/07/16 14:51
S134	230	("20020078958"   "20020104541"   "20030062045"   "20030079749"   "20040079373"   "20040163648"   "20040186681"   "20040226562"   "20050005937"   "20050034724"   "20050068639"   "20050131288"	US-PGPUB; USPAT; USOCR	OR	OFF	2019/07/16 14:52

EAST Search History

"20050133039"	"20050188991"
"20060037613"	"20060081250"
"20060096596"	"20060150973"
"20060150978"	"20060180149"
"20060231097"	"20070000493"
"20070113854"	"20070163592"
"20070169781"	"20070208269"
"20070221220"	"20070240716"
"20070247009"	"20070251527"
"20070277825"	"20080006275"
"20080053451"	"20080091090"
"20080127976"	"20080178879"
"20080185002"	"20080202527"
"20080216831"	"20080251079"
"20080304986"	"20090044810"
"20090065005"	"20090078255"
"20090078258"	"20090078259"
"20090194101"	"20100024811"
"20100180895"	"20100191076"
"20100229867"	"20100240982"
"20100312513"	"20100319687"
"20110056489"	"20110100366"
"20110105915"	"20110192400"
"20110295083"	"20120146251"
"20120152239"	"20120152255"
"20120266873"	"20120298099"
"20120304985"	"20130060098"
"20130104883"	"20130146054"
"20130239966"	"20130298908"
"20130306074"	"20130333701"
"20140000600"	"20140007881"
"20140102456"	"20140127996"
"20140144445"	"20150040908"
"20150096565"	"20150197378"
"20160015916"	"3649964"   "3721233"
"3736927"	"3822698"   "3881198"
"3998213"	"4019508"   "4233972"
"4297999"	"4381267"   "4430995"
"4549542"	"4588425"   "4590951"
"4644947"	"4765316"   "4782832"). PN.
OR ("4802485"   "4829998"   "4836219"	
"4944310"	"5035239"   "5046492"
"5054480"	"5054484"   "5104430"
"5113853"	"5154168"   "5303701"
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"6973929"	"6990980"   "7019652"
"7069932"	"7089941"   "7096864"

EAST Search History

		"7118608"   "7156090"   "7178525"   "7195014"   "7200873"   "7204250"   "7255103"   "7297119"   "7357136"   "7382247"   "7406966"   "7406996"   "7471290"   "7478635"   "7487778"   "7516743"   "7575005"   "7588033"   "7664546"   "7681575"   "7766841"   "7887492"   "7913692"   "7934500"   "7942824"   "7975687"   "8020557"   "8061354"   "8172766"   "8316848"   "8327846"   "8336546"   "8353290"   "8453640"   "8475370"   "8517017"   "8688187"   "8720439"   "8903467"   "8919344"   "8925546"   "D421298"   "D570473"   "D643929"   "D659235"   "D683444"   "D683445"   "D696393"   "D696394"   "D710989"   "D732158"   "D734446"   "D740929").PN. OR ("D740930"   "RE35339").PN. OR ("D776802").URPN.				
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S136	178	("3505993"   "4537197"   "4859057"   "4880304").PN. OR ("5099842").URPN.	US- PGPUB; USPAT; USOCR	OR	OFF	2019/07/16 14:56
S137	30	("20050197550"   "20050228299"   "20070142715"   "20070244378"   "5099842"   "5999834"   "6006120"   "6377829"   "6725075"   "6839585"   "6920345"   "7225007"   "7486977"   "7736310"   "D452318"   "D463561"   "D492783"   "D557423"   "D603966").PN. OR ("D643929").URPN.	US- PGPUB; USPAT; USOCR	OR	OFF	2019/07/16 14:58
S138	147	fardanesh.xa. and glucose	US- PGPUB; USPAT; USOCR	OR	OFF	2019/07/16 15:00
S139	17	("20020072681"   "20020173709"   "4017756"   "4859057"   "5224478"   "5345935"   "6461305").PN. OR ("6839585").URPN.	US- PGPUB; USPAT; USOCR	OR	OFF	2019/07/16 15:03
S140	6	"15404117" and vasodilator	US- PGPUB; USPAT	OR	OFF	2019/07/16 19:15
S141	541	vasodilat\$5 with (measur\$5 calculat\$5) and A61B5/\$.cpc.	US- PGPUB; USPAT	OR	OFF	2019/07/16 19:24
S142	209	vasodilat\$5 with (measur\$5 calculat\$5) with blood and A61B5/\$.cpc.	US- PGPUB; USPAT	OR	OFF	2019/07/16 19:24
S143	92	vasodilat\$5 with (measur\$5 calculat\$5) and (ppg photoplethysm\$6) and A61B5/\$.cpc.	US- PGPUB; USPAT	OR	OFF	2019/07/16 19:28

EAST Search History

S144	5	((("5830137") or ("5584296") or ("8452364") or ("20030036690") or ("5497771")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/07/17 13:37
S145	1	"16195624" and instruction\$4	US-PGPUB; USPAT	OR	OFF	2019/07/17 15:14
S146	1	"16226249"	US-PGPUB; USPAT	OR	OFF	2019/07/17 16:22
S147	2	((("5833603") or ("20020026108")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/07/17 17:41
S148	2794	apnea and accelerometer and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/07/18 07:48
S149	1543	apnea and (sleep position\$1) same accelerometer and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/07/18 07:49
S150	481	apnea and (sleep and position\$1) same accelerometer and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/07/18 07:49
S151	191	apnea and accelerometer and (position\$4 same (PPG photoplethysm\$6)) and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/07/18 07:51
S152	406	apnea and accelerometer and (position same (PPG photoplethysm\$6 saturation)) and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/07/18 07:54
S153	128	accelerometer and (position same (PPG photoplethysm\$6 saturation)) and A61B5/4818.cpc.	US-PGPUB; USPAT	OR	ON	2019/07/18 08:04
S154	14	correlat\$4 with (oxygen saturation) with position and A61B5/4818.cpc.	US-PGPUB; USPAT	OR	ON	2019/07/18 08:38

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S63	607	hemoglobin and IVI	US-PGPUB; USPAT	OR	ON	2019/06/17 18:47
S64	582	hemoglobin and IVI and (light intensity)	US-PGPUB; USPAT	OR	ON	2019/06/17 18:47
S65	33	hemoglobin and IVI and (light intensity) and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/06/17 18:48
S66	2	temperature and (heat\$4 cool\$4) and glucose and oscilat\$4 and A61B5/\$.cpc.	US-PGPUB; USPAT	OR	ON	2019/06/18 10:59

7/ 18/ 2019 9:42:18 PM  
 C:\Users\mfardanesh\Desktop\new.wsp



**FOR DISCUSSION PURPOSES ONLY – NOT FOR ENTRY****IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

First Inventor	: Ammar Al-Ali
App. Nos.	: 16/226249; 15/195199
Filed	: December 19, 2018; June 28, 2016
For	: ADVANCED PULSE OXIMETRY SENSOR
Examiner	: Fardanesh, Marjan
Art Unit	: 3791; 3791
Conf. No.	: 1002; 3453
Docket Nos.	: MAS.1007C1; MAS.1007A

**INTERVIEW AGENDA**

**Type:** Telephone

**Date and Time:** May 7, 2019, 2:00PM EST, 11:00AM PST

**Participants:** Examiner Fardanesh and Applicant's representatives Jarom Kesler (Reg. No. 57,046) and Aaron Johnson (Reg. No. 74,164)

- A. Discuss disclosed embodiments and claimed invention**
- B. Review references cited in Office Action**
- C. Discuss differences between references and claimed invention**



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**PROPOSED CLAIM AMENDMENTS FOR APP. NO. 15/195199**

1. **(Currently Amended)** An optical physiological measurement device configured for placement on a patient at a tissue measurement site, the device comprising:

one or more emitters ~~which~~ configured to emit light so as to irradiate a portion of the tissue measurement site, the portion of the tissue measurement site having an at least partially circular shape bounded by a light block, the tissue measurement site located on a wrist of the patient;

~~one or more~~ a plurality of detectors configured to detect the emitted light after attenuation by and reflection from tissue of the patient at the tissue measurement site, the ~~one or more~~ plurality of detectors further configured to transmit a signal responsive to the detected light; and

[[a ]] the light block comprising an annular ring having a circular shape located between the emitted light at the tissue measurement site and the ~~one or more~~ plurality of detectors, the light block reducing an amount of incident light emitted from the one or more emitters from being detected by the ~~one or more~~ plurality of detectors, wherein the plurality of detectors are arranged in an array having a spatial configuration corresponding to the shape of the irradiated portion of the tissue measurement site.

2. **(Currently Amended)** The optical physiological measurement device of Claim 37, further comprising a concentrator which receives the light after attenuation by tissue of the patient, concentrates the received light and emits the concentrated light in the direction of the ~~one or more~~ plurality of detectors.

3. **(Previously Presented)** The optical physiological measurement device of Claim 1, further comprising a processor configured to receive the transmitted signal responsive to the detected light and to determine a physiological parameter.

4. **(Previously Presented)** The optical physiological measurement device of Claim 3, wherein the parameter is arterial oxygen saturation.

5. **(Previously Presented)** The optical physiological measurement device of Claim 37, wherein the diffuser comprises at least one of a glass diffuser, ground glass diffuser, a glass bead diffuser, an opal glass diffuser, and an engineered diffuser.

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6. **(Previously Presented)** The optical physiological measurement device of Claim 37, wherein the diffuser emits the spread light with a substantially uniform intensity profile.

7. **(Previously Presented)** The optical physiological measurement system of Claim 37, wherein the diffuser defines a surface area shape by which the emitted spread light is distributed onto a surface of the tissue measurement site.

8. **(Cancelled)**

9. **(Cancelled)**

10. **(Cancelled)**

11. **(Cancelled)**

12. **(Cancelled)**

13. **(Cancelled)**

14. **(Cancelled)**

15. **(Cancelled)**

16. **(Previously Presented)** The optical physiological measurement device of Claim 2, wherein the concentrator comprises at least one of glass, ground glass, glass beads, opal glass, and a compound parabolic concentrator.

17. **(Cancelled)**

18. **(Currently Amended)** A method to determine a constituent or analyte in a patient's blood, the method comprising:

emitting, from at least one emitter of an optical sensor, light of one or more wavelengths so as to irradiate a portion of a tissue measurement site, the irradiated portion having an at least partially circular shape, wherein the tissue measurement site is located on a wrist of a patient;

detecting, with ~~one or more~~ plurality of detectors, the emitted light after attenuation by and reflection from tissue of the patient at the tissue measurement site; and

providing an annular ring located between the emitted light at the tissue measurement site and the ~~one or more~~ plurality of detectors, wherein the annular ring reduces an amount of incident light emitted from the at least one emitter from arriving at the ~~one or more~~ plurality of detectors, and wherein the plurality of detectors are arranged in an array having a spatial configuration corresponding to the shape of the irradiated portion of the tissue measurement site.

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19. **(Currently Amended)** The method of Claim 39, further comprising receiving, by a concentrator, the emitted spread light after the spread light has been attenuated by and reflected from the tissue measurement site and concentrating, by the concentrator, the received light and emitting the concentrated light from the concentrator to the ~~one or more~~ plurality of detectors.

20. **(Currently Amended)** The method of Claim 18, further comprising:  
 transmitting, from the ~~one or more~~ plurality of detectors, a signal responsive to the detected light;  
 receiving, by a processor, the transmitted signal responsive to the detected light;  
 and  
 processing, by the processor, the received signal responsive to the detected light to determine a physiological parameter.

21. **(Cancelled)**

22. **(Currently Amended)** The method of Claim 39, wherein spreading, with a diffuser, the emitted light and emitting the spread light from the diffuser to ~~[[a]]the~~ the tissue measurement site is performed by at least one of a glass diffuser, a glass bead diffuser, an opal glass diffuser, and an engineered diffuser.

23. **(Currently Amended)** The method of Claim 39, wherein spreading, with a diffuser, the emitted light and emitting the spread light from the diffuser to ~~[[a]]the~~ the tissue measurement site further comprises spreading the emitted light with a substantially uniform intensity profile.

24. **(Currently Amended)** The method of Claim 39, wherein spreading, with a diffuser, the emitted light and emitting the spread light from the diffuser to ~~[[a]]the~~ the tissue measurement site further comprises spreading the emitted light so as to define a surface area shape by which the emitted spread light is distributed onto a surface of the tissue measurement site.

25. **(Currently Amended)** The method of Claim 19, wherein concentrating, by the concentrator, the received light and emitting the concentrated light from the concentrator to the ~~one or more~~ plurality of detectors is performed by at least one of a glass concentrator, a glass bead concentrator, an opal glass concentrator, and a compound parabolic concentrator.

26. **(Currently Amended)** A pulse oximeter sensor comprising:

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one or more optical sources configured to emit light at one or more wavelengths, wherein, when the pulse oximeter sensor is placed on a patient at a tissue measurement site, the one or more optical sources are positioned in a reflectance measurement configuration on a first side of the tissue measurement site, and wherein the one or more optical sources are configured to irradiate a portion of the tissue measurement site, the portion of the tissue measurement site having an at least partially circular shape;

a plurality of detectors configured to detect light emitted from the one or more optical sources after attenuation by tissue of the patient at the tissue measurement site, the plurality of detectors arranged in an array having a spatial configuration corresponding to the shape of the irradiated portion of the tissue measurement site so as to capture the emitted light reflected from the tissue of the patient at the tissue measurement site, wherein the plurality of detectors are positioned in a reflectance measurement configuration on the first side of the tissue measurement site when the pulse oximeter sensor is placed on the patient, the plurality of detectors further configured to output a signal responsive to the detected light; and

a light block comprising an annular ring located between the emitted light at the tissue measurement site and the plurality of detectors, the light block reducing an amount of incident light emitted from the one or more optical sources from arriving at the plurality of detectors.

27. **(Previously Presented)** The pulse oximeter sensor of Claim 26, further comprising a concentrator which concentrates the emitted light after it has been attenuated by the tissue measurement site and directs the concentrated light toward the plurality of detectors.

28. **(Previously Presented)** The pulse oximeter sensor of Claim 26, wherein the plurality of detectors are further configured to output the signals response to the detected light to a processor configured to receive the signals responsive to the detected light and to determine a physiological parameter.

29. **(Currently Amended)** The pulse oximeter sensor of Claim 41, wherein the diffuser is further configured to define a surface area shape by which the emitted spread light is distributed onto a surface of the tissue measurement site.

30. **(Cancelled)**

31. **(Cancelled)**

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32. **(Currently Amended)** A pulse oximeter sensor comprising:

one or more optical sources configured to emit light at one or more wavelengths, wherein, when the pulse oximeter sensor is placed on a patient at a tissue measurement site, the one or more optical sources are positioned in a reflectance measurement configuration on a first side of the tissue measurement site, and wherein the one or more optical sources are configured to irradiate a portion of the tissue measurement site, the portion of the tissue measurement site having an annular shape, and wherein the tissue measurement site is located on a wrist of the patient;

a plurality of detectors configured to detect light emitted from the one or more optical sources after attenuation by and reflection from tissue of the patient at the tissue measurement site, wherein the plurality of detectors are positioned in a reflectance measurement configuration on the first side of the tissue measurement site when the pulse oximeter sensor is placed on the patient, the plurality of detectors further configured to output signals responsive to the detected light; and

a light block comprising an annular ring located between the emitted light at the tissue measurement site and the plurality of detectors, the light block reducing an amount of incident light emitted from the one or more optical sources that does not enter the tissue measurement site arriving at the plurality of detectors, wherein the plurality of detectors are positioned in an array having a spatial configuration corresponding to the annular shape of the irradiated portion of the tissue measurement site.

33. **(Previously Presented)** The pulse oximeter sensor of Claim 32, wherein the plurality of detectors are further configured to transmit the output signals responsive to the detected light to a processor configured to receive the signals responsive to the detected light and to determine a physiological parameter.

34. **(Cancelled)**

35. **(Cancelled)**

36. **(Cancelled)**

37. **(Previously Presented)** The optical physiological measurement device of Claim 1, further comprising a diffuser which receives, spreads and emits the spread light, wherein the emitted spread light is directed at the tissue measurement site.

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38. **(Currently Amended)** The optical physiological measurement device of Claim 1, wherein the one or more emitters ~~[[is]]are~~ positioned outside the annular ring when the optical physiological measurement device is placed on the patient at the tissue measurement site, and wherein the ~~one or more~~plurality of detectors are positioned inside the annular ring when the optical physiological measurement device is placed on the patient at the tissue measurement site.

39. **(Previously Presented)** The method of Claim 18, further comprising spreading, with a diffuser, the emitted light and emitting the spread light from the diffuser to the tissue measurement site, wherein the diffuser spreads the light over a greater area of the tissue measurement site than would otherwise be illuminated by the emitter directly emitting light at the tissue measurement site.

40. **(Currently Amended)** The method of Claim 18, wherein the at least one emitter is positioned outside the annular ring when the optical sensor is placed on the patient at the tissue measurement site, and wherein the ~~one or more~~plurality of detectors are positioned inside the annular ring when the optical sensor is placed on the patient at the tissue measurement site.

41. **(Previously Presented)** The pulse oximeter sensor of Claim 26, further comprising a diffuser configured to receive the emitted light, to spread the received light, and to emit the spread light, wherein the emitted spread light is directed at the tissue measurement site.

42. **(Previously Presented)** The pulse oximeter sensor of Claim 26, wherein the one or more optical sources are positioned outside the annular ring when the pulse oximeter sensor is placed on the patient at the tissue measurement site, and wherein the plurality of detectors are positioned inside the annular ring when the pulse oximeter sensor is placed on the patient at the tissue measurement site.

43. **(Cancelled)**

44. **(Cancelled)**

45. **(Previously Presented)** The pulse oximeter sensor of Claim 32, wherein the one or more optical sources are positioned outside the annular ring when the pulse oximeter sensor is placed on the patient at the tissue measurement site, and wherein the plurality of detectors are positioned inside the annular ring when the pulse oximeter sensor is placed on the patient at the tissue measurement site.

46. **(Cancelled)**

47. **(Cancelled)**

**FOR DISCUSSION PURPOSES ONLY – NOT FOR ENTRY**

48. (Cancelled)

Thank you in advance for taking time to consider this case in a telephonic interview. If the above-noted date and time for the interview no longer work for you, please contact me at (949) 721-7631 to reschedule. Otherwise, we will call you at the appointed time at (571) 270-5508.

Respectfully submitted,

KNOBBE, MARTENS, OLSON &amp; BEAR, LLP

Dated: May 6, 2019

By: /Aaron Johnson/

Aaron Johnson

Registration No. 74,164

Attorney of Record

Customer No. 20995

(949) 760-0404

Receipt date: 07/05/2019

15/195,199 - GAU: 3791

PTO/SB/08 Equivalent

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 1 OF 1		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	5,830,137	11-03-1998	Scharf	
	2	8,452,364	05-28-2013	Hannula et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document <i>Country Code-Number-Kind Code</i> Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>

30349839

Examiner Signature	<u>/MARJAN FARDANESH/</u>	Date Considered	07/17/2019
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p> <p style="text-align: center;"><del>ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.F./</del></p>			

T<sup>1</sup> - Place a check mark in this area when an English language Translation is attached.



Docket No.: MAS.1007A

August 5, 2019

Page 1 of 1

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Please Direct All Correspondence to Customer Number 64735

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**TRANSMITTAL OF DECLARATION**

First Inventor	:	Ammar Al-Ali
App. No.	:	15/195199
Filed	:	June 28, 2016
For	:	ADVANCED PULSE OXIMETRY SENSOR
Art Unit	:	3791
Conf No.	:	3453

**Commissioner for Patents**  
**P.O. Box 1450**  
**Alexandria, VA 22313-1450**

Dear Sir:

The above-captioned application was filed without a Declaration and/or Substitute Statement. Enclosed in compliance with 37 CFR 1.53(f) are the following.

(X) Declaration(s) for:

Ammar Al-Ali

The Commissioner is hereby authorized to charge any additional fees which may be required, now or in the future, or credit any overpayment, to Account No. 11-1410.

/Aaron S. Johnson/  
Aaron S. Johnson  
Registration No. 74,164  
Registered Practitioner  
Customer No. 64735  
(949) 760-0404

APL\_MAS\_ITC\_00557374

PAGE 415 OF 530

**MASIMO 2057**  
**Apple v. Masimo**  
**IPR2022-01291**

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)**

<b>Title of Invention</b>	ADVANCED PULSE OXIMETRY SENSOR
---------------------------	--------------------------------

As the below named inventor, I hereby declare that:

This declaration is directed to:  The attached application, or  United States application or PCT international application number 15/195199  
 filed on June 28, 2016

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

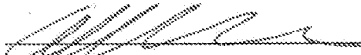
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

**WARNING:**

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

**LEGAL NAME OF INVENTOR**

Inventor: Ammar Al-Ali Date (Optional): 8/2/19

Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.  
 If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

<b>Electronic Acknowledgement Receipt</b>	
<b>EFS ID:</b>	36784470
<b>Application Number:</b>	15195199
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	3453
<b>Title of Invention:</b>	ADVANCED PULSE OXIMETRY SENSOR
<b>First Named Inventor/Applicant Name:</b>	Ammar Al-Ali
<b>Customer Number:</b>	64735
<b>Filer:</b>	Aaron Samuel Johnson/Aimee Kazan
<b>Filer Authorized By:</b>	Aaron Samuel Johnson
<b>Attorney Docket Number:</b>	MAS.1007A
<b>Receipt Date:</b>	05-AUG-2019
<b>Filing Date:</b>	28-JUN-2016
<b>Time Stamp:</b>	16:04:54
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	no
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**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	TRANSMITTAL_MAS1007A.pdf	15475 fcb6ebd217e3d372b7dc8c429e462492986d3a986	no	1

**Warnings:**

<b>Information:</b>					
2	Oath or Declaration filed	Declaration_MAS1007.PDF	1166962	no	1
			5427ae2c0bbbb118e58a49ec3844b8b6d5102148		
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			1182437		
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>          If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>          If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>          If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

64735 7590 07/29/2019
KNOBBE, MARTENS, OLSON & BEAR, LLP
MASIMO CORPORATION (MASIMO)
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

Form with fields for (Typed or printed name), (Signature), and (Date).

Table with columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Values: 15/195,199, 06/28/2016, Ammar Al-Ali, MAS.1007A, 3453

TITLE OF INVENTION: ADVANCED PULSE OXIMETRY SENSOR

Table with columns: APPLN. TYPE, ENTITY STATUS, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE. Values: nonprovisional, UNDISCOUNTED, \$1000, \$0.00, \$0.00, \$1000, 10/29/2019

Table with columns: EXAMINER, ART UNIT, CLASS-SUBCLASS. Values: FARDANESH, MARJAN, 3791, 600-323000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
[ ] Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
[ ] "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 Knobbe, Martens,
2 Olson & Bear, LLP
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)
PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.
(A) NAME OF ASSIGNEE MASIMO CORPORATION (B) RESIDENCE: (CITY and STATE OR COUNTRY) Irvine, CA

Please check the appropriate assignee category or categories (will not be printed on the patent): [ ] Individual [X] Corporation or other private group entity [ ] Government

4a. Fees submitted: [X] Issue Fee [ ] Publication Fee (if required) [ ] Advance Order - # of Copies
4b. Method of Payment: (Please first reapply any previously paid fee shown above)
[X] Electronic Payment via EFS-Web [ ] Enclosed check [ ] Non-electronic payment by credit card (Attach form PTO-2038)
[X] The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 11-1410

5. Change in Entity Status (from status indicated above)
[ ] Applicant certifying micro entity status. See 37 CFR 1.29
[ ] Applicant asserting small entity status. See 37 CFR 1.27
[ ] Applicant changing to regular undiscounted fee status.
NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.
Authorized Signature /Aaron S. Johnson/ Date 8/5/2019
Typed or printed name Aaron S. Johnson Registration No. 74,164

MAS.1007A

PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

First Inventor :	Ammar Al-Ali
App. No. :	15/195199
Filed :	June 28, 2016
For :	ADVANCED PULSE OXIMETRY SENSOR
Examiner :	Fardanesh, Marjan
Art Unit :	3791
Conf. No. :	3453

**COMMENTS ON NOTICE OF ALLOWANCE****Mail Stop Issue Fee**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Commissioner:

Applicant thanks the Examiner for acknowledging allowability of each of the pending claims in the Notice of Allowance mailed July 29, 2019. It appears that the Examiner's Amendment to Claim 32 should have underlined the phrase "a portion of" appearing in Line 13 on Page 5 of the Notice of Allowance.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: August 5, 2019

By: /Aaron S. Johnson/  
Aaron S. Johnson  
Registration No. 74,164  
Registered Practitioner  
Customer No. 64735  
(949) 760-0404

-1-

APL\_MAS\_ITC\_00557379

**Application No.:** 15/195,199  
**Filed:** June 28, 2016

Electronic Patent Application Fee Transmittal				
<b>Application Number:</b>	15195199			
<b>Filing Date:</b>	28-Jun-2016			
<b>Title of Invention:</b>	ADVANCED PULSE OXIMETRY SENSOR			
<b>First Named Inventor/Applicant Name:</b>	Ammar Al-Ali			
<b>Filer:</b>	Aaron Samuel Johnson/Daniel Escajeda			
<b>Attorney Docket Number:</b>	MAS.1007A			
Filed as Large Entity				
<b>Filing Fees for Utility under 35 USC 111(a)</b>				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
UTILITY APPL ISSUE FEE	1501	1	1000	1000



Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>1000</b>

<b>Electronic Acknowledgement Receipt</b>	
<b>EFS ID:</b>	36786479
<b>Application Number:</b>	15195199
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	3453
<b>Title of Invention:</b>	ADVANCED PULSE OXIMETRY SENSOR
<b>First Named Inventor/Applicant Name:</b>	Ammar Al-Ali
<b>Customer Number:</b>	64735
<b>Filer:</b>	Aaron Samuel Johnson/tony do
<b>Filer Authorized By:</b>	Aaron Samuel Johnson
<b>Attorney Docket Number:</b>	MAS.1007A
<b>Receipt Date:</b>	05-AUG-2019
<b>Filing Date:</b>	28-JUN-2016
<b>Time Stamp:</b>	18:07:19
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 1000
RAM confirmation Number	E201985107464880
Deposit Account	111410
Authorized User	tony do
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

<b>File Listing:</b>					
<b>Document Number</b>	<b>Document Description</b>	<b>File Name</b>	<b>File Size(Bytes)/ Message Digest</b>	<b>Multi Part /.zip</b>	<b>Pages (if appl.)</b>
1	Issue Fee Payment (PTO-85B)	ISSUE-FEE_MAS1007A.PDF	212290 c4745689cba88874f6e91eef6de7673bcf537a22	no	1
<b>Warnings:</b>					
<b>Information:</b>					
2	Post Allowance Communication - Incoming	COMMENTS_MAS1007A.pdf	19297 a6762e4a23c169e992c88f153d422af125e2aa89	no	2
<b>Warnings:</b>					
<b>Information:</b>					
3	Fee Worksheet (SB06)	fee-info.pdf	30224 54d523b19d30ead2916985d4a19aa456984c339c	no	2
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			261811		
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>            If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>            If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>            If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 15/195,199, 06/28/2016, Ammar Al-Ali, MAS.1007A, 3453
Row 2: 7590, 08/07/2019, KNOBBE, MARTENS, OLSON & BEAR, LLP, MASIMO CORPORATION (MASIMO), 2040 MAIN STREET, FOURTEENTH FLOOR, IRVINE, CA 92614
Row 3: EXAMINER, FARDANESH, MARJAN
Row 4: ART UNIT, PAPER NUMBER, 3791
Row 5: NOTIFICATION DATE, DELIVERY MODE, 08/07/2019, ELECTRONIC

Letter Withdrawing a Notice Requiring Inventor's Oath or Declaration

The Notice Requiring Inventor's Oath or Declaration mailed on 7-29-19 was sent in error, and is hereby withdrawn. The time period set forth in the Notice of Allowance and Fee(s) Due to file a reply and pay the required fees continues to run from the mailing date of the Notice of Allowance and Fee(s) Due. Any time period set forth in the Notice of Allowability continues to run from the mailing date of the Notice of Allowability.

Questions relating to this Notice should be directed to the Application Assistance Unit at 571-272-4200.

Handwritten signature: Kimberly D. Williams
(571)-272-4200 or 1(888)-786-0101
Patent Publication Branch
Office of Data Management

Doc code: RCEX  
 Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (02-18)  
 Approved for use through 11/30/2020. OMB 0651-0031  
 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE  
 Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL (Submitted Only via EFS-Web)</b>							
Application Number	15195199	Filing Date	2016-06-28	Docket Number (if applicable)	MAS.1007A	Art Unit	3791
First Named Inventor	Al-Ali, Ammar			Examiner Name	Fardanesh, Marjan		
<p><b>This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.</b>                      Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV</p>							
<b>SUBMISSION REQUIRED UNDER 37 CFR 1.114</b>							
<p>Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).</p>							
<p><input type="checkbox"/> Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.</p> <p style="margin-left: 40px;"><input type="checkbox"/> Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____</p> <p style="margin-left: 40px;"><input type="checkbox"/> Other _____</p> <p><input checked="" type="checkbox"/> Enclosed</p> <p style="margin-left: 40px;"><input type="checkbox"/> Amendment/Reply</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> Information Disclosure Statement (IDS)</p> <p style="margin-left: 40px;"><input type="checkbox"/> Affidavit(s)/ Declaration(s)</p> <p style="margin-left: 40px;"><input type="checkbox"/> Other _____</p>							
<b>MISCELLANEOUS</b>							
<p><input type="checkbox"/> Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____                      (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)</p> <p><input type="checkbox"/> Other _____</p>							
<b>FEES</b>							
<p><input checked="" type="checkbox"/> <b>The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.</b>                      The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to                      Deposit Account No <u>111410</u></p>							
<b>SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED</b>							
<p><input checked="" type="checkbox"/> Patent Practitioner Signature                      Applicant Signature</p>							

Doc code: RCEX  
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (02-18)  
Approved for use through 11/30/2020. OMB 0651-0031  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE  
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	Aaron S. Johnson/	Date (YYYY-MM-DD)	2019-08-15
Name	Aaron S. Johnson	Registration Number	74164

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Docket No.: MAS.1007A

Customer No. 64735

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**INFORMATION DISCLOSURE STATEMENT**

First Inventor :	Ammar Al-Ali
App. No. :	15/195199
Filed :	June 28, 2016
For :	ADVANCED PULSE OXIMETRY SENSOR
Examiner :	Fardanesh, Marjan
Art Unit :	3791
Conf. No. :	3453

**Mail Stop RCE**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**References and Listing**

Pursuant to 37 CFR 1.56, an Information Disclosure Statement listing references is provided herewith. Copies of any listed foreign and non-patent literature references are being submitted.

**No Disclaimers**

To the extent that anything in the Information Disclosure Statement or the listed references could be construed as a disclaimer of any subject matter supported by the present application, Applicant hereby rescinds and retracts such disclaimer.

**Timing of Disclosure**

This Information Disclosure Statement is being filed within three months of the filing date or date of national phase entry, with an RCE or before receipt of a First Office Action after an RCE, and no fee is believed to be required.

APL\_MAS\_ITC\_00557389



**Application No.: 15/195199**  
**Filing Date: June 28, 2016**

The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment, to Account No. 11-1410.

Respectfully submitted,  
KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: August 15, 2019

By: /Aaron S. Johnson/  
Aaron S. Johnson  
Registration No. 74,164  
Registered Practitioner  
Customer No. 64735  
(949) 760-0404

IDS  
31137847

PTO/SB/08 Equivalent

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 1 OF 1		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	5,099,842	03-31-1992	Mannheimer et al.	
	2	5,601,079	02-11-1997	Wong et al.	
	3	6,223,063	04-24-2001	Chaiken et al.	
	4	2002/0042558	04-11-2002	Mendelson	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document <i>Country Code-Number-Kind Code</i> Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>
	5	WO 02/028274	04-11-2002	CYBRO MEDICAL LTD.		

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>
	6	Konig, V. et al., "REFLECTANCE PULSE OXIMETRY - PRINCIPLES AND OBSTETRIC APPLICATION IN THE ZURICH SYSTEM," J Clin Monit 1998; 14: 403-412.	

31137795

Examiner Signature	Date Considered
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p>	

T<sup>1</sup> - Place a check mark in this area when an English language Translation is attached.

## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau(43) International Publication Date  
11 April 2002 (11.04.2002)

PCT

(10) International Publication Number  
WO 02/28274 A1

- (51) International Patent Classification<sup>7</sup>: A61B 5/00
- (21) International Application Number: PCT/US01/26642
- (22) International Filing Date: 27 August 2001 (27.08.2001)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
138884 5 October 2000 (05.10.2000) IL
- (71) Applicant (for all designated States except US): CYBRO MEDICAL LTD. [IL/IL]; Matam Building 30, 31905 Haifa (IL).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): MENDELSON, Yizhak [US/US]; 31 Whisper Drive, Worcester, MA 01609 (US).
- (74) Agents: YEE, James, R. et al.; Howard & Howard Attorneys, P.C., Suite 101, The Pinehurst Office Center, 39400 Woodward Avenue, Bloomfield Hills, MI 48304-5151 (US).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
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(54) Title: A PULSE OXIMETER AND A METHOD OF ITS OPERATION

(57) Abstract: A sensor for use in an optical measurement device and a method for non-invasive measurement of a blood parameter. The sensor includes sensor housing, a source of radiation coupled to the housing, and a detector assembly coupled to the housing. The source of radiation is adapted to emit radiation at predetermined frequencies. The detector assembly is adapted to detect reflected radiation at least one predetermined frequency and to generate respective signals. The signals are use to determine the parameter of the blood.

## A PULSE OXIMETER AND A METHOD OF ITS OPERATION

### BACKGROUND OF THE INVENTION

#### Field of the Invention

5 This invention is generally in the field of pulse oximetry, and relates to a sensor for use in a pulse oximeter, and a method for the pulse oximeter operation.

#### Background of the Invention

10 Oximetry is based on spectrophotometric measurements of changes in the color of blood, enabling the non-invasive determination of oxygen saturation in the patient's blood. Generally, oximetry is based on the fact that the optical property of blood in the visible (between 500 and 700nm) and near-infrared (between 700 and 1000nm) spectra depends strongly on the amount of oxygen in blood.

15 Referring to Fig. 1, there is illustrated a hemoglobin spectra measured by oximetry based techniques. Graphs G1 and G2 correspond, respectively, to reduced hemoglobin, or deoxyhemoglobin (Hb), and oxygenated hemoglobin, or oxyhemoglobin (HbO<sub>2</sub>), spectra. As shown, deoxyhemoglobin (Hb) has a higher optical extinction (i.e., absorbs more light) in the red region of spectrum around 660nm, as compared to that of oxyhemoglobin (HbO<sub>2</sub>). On the other hand, in the near-infrared 20 region of the spectrum around 940nm, the optical absorption by deoxyhemoglobin (Hb) is lower than the optical absorption of oxyhemoglobin (HbO<sub>2</sub>).

25 Prior art non-invasive optical sensors for measuring arterial oxyhemoglobin saturation (SaO<sub>2</sub>) by a pulse oximeter (termed SpO<sub>2</sub>) are typically comprised of a pair of small and inexpensive light emitting diodes (LEDs), and a single highly sensitive silicon photodetector. A red (R) LED centered on a peak emission wavelength around 660nm and an infrared (IR) LED centered on a peak emission wavelength around 940nm are used as light sources.

30 Pulse oximetry relies on the detection of a photoplethysmographic signal caused by variations in the quantity of arterial blood associated with periodic contraction and relaxation of a patient's heart. The magnitude of this signal depends on

the amount of blood ejected from the heart into the peripheral vascular bed with each systolic cycle, the optical absorption of the blood, absorption by skin and tissue components, and the specific wavelengths that are used to illuminate the tissue. SaO<sub>2</sub> is determined by computing the relative magnitudes of the R and IR photoplethysmograms. Electronic circuits inside the pulse oximeter separate the R and IR photoplethysmograms into their respective pulsatile (AC) and non-pulsatile (DC) signal components. An algorithm inside the pulse oximeter performs a mathematical normalization by which the time-varying AC signal at each wavelength is divided by the corresponding time-invariant DC component which results mainly from the light absorbed and scattered by the bloodless tissue, residual arterial blood when the heart is in diastole, venous blood and skin pigmentation.

Since it is assumed that the AC portion results only from the arterial blood component, this scaling process provides a normalized R/IR ratio (i.e., the ratio of AC/DC values corresponding to R- and IR-spectrum wavelengths, respectively), which is highly dependent on SaO<sub>2</sub>, but is largely independent of the volume of arterial blood entering the tissue during systole, skin pigmentation, skin thickness and vascular structure. Hence, the instrument does not need to be re-calibrated for measurements on different patients. Typical calibration of a pulse oximeter is illustrated in Fig. 2 by presenting the empirical relationship between SaO<sub>2</sub> and the normalized R/IR ratio, which is programmed by the pulse oximeters' manufacturers.

Pulse oximeters are of two kinds operating, respectively, in transmission and reflection modes. In transmission-mode pulse oximetry, an optical sensor for measuring SaO<sub>2</sub> is usually attached across a fingertip, foot or earlobe, such that the tissue is sandwiched between the light source and the photodetector.

In reflection-mode or backscatter type pulse oximetry, as shown in Fig. 3, the LEDs and photodetector are both mounted side-by-side next to each other on the same planar substrate. This arrangement allows for measuring SaO<sub>2</sub> from multiple convenient locations on the body (e.g. the head, torso, or upper limbs), where conventional transmission-mode measurements are not feasible. For this reason, non-invasive reflectance pulse oximetry has recently become an important new clinical technique

with potential benefits in fetal and neonatal monitoring. Using reflectance oximetry to monitor SaO<sub>2</sub> in the fetus during labor, where the only accessible location is the fetal scalp or cheeks, or on the chest in infants with low peripheral perfusion, provides several more convenient locations for sensor attachment.

5 Reflection pulse oximetry, while being based on similar spectrophotometric principles as the transmission one, is more challenging to perform and has unique problems that can not always be solved by solutions suitable for solving the problems associated with the transmission-mode pulse oximetry. Generally, comparing transmission and reflection pulse oximetry, the problems associated with reflection  
10 pulse oximetry consist of the following:

In reflection pulse oximetry, the pulsatile AC signals are generally very small and, depending on sensor configuration and placement, have larger DC components as compared to those of transmission pulse oximetry. As illustrated in Fig. 4, in addition to the optical absorption and reflection due to blood, the DC signal of the R and IR photoplethysmograms in reflection pulse oximetry can be adversely affected by strong  
15 reflections from a bone. This problem becomes more apparent when applying measurements at such body locations as the forehead and the scalp, or when the sensor is mounted on the chest over the ribcage. Similarly, variations in contact pressure between the sensor and the skin can cause larger errors in reflection pulse oximetry (as  
20 compared to transmission pulse oximetry) since some of the blood near the superficial layers of the skin may be normally displaced away from the sensor housing towards deeper subcutaneous structures. Consequently, the highly reflective bloodless tissue compartment near the surface of the skin can cause large errors even at body locations where the bone is located too far away to influence the incident light generated by the  
25 sensor.

Another problem with currently available reflectance sensors is the potential for specular reflection caused by the superficial layers of the skin, when an air gap exists between the sensor and the skin, or by direct shunting of light between the LEDs and the photodetector through a thin layer of fluid which may be due to excessive  
30 sweating or from amniotic fluid present during delivery.

It is important to keep in mind the two fundamental assumptions underlying the conventional dual-wavelength pulse oximetry, which are as follows:

(1) the path of light rays with different illuminating wavelengths in tissue are substantially equal and, therefore, cancel each other; and (2) each light source  
5 illuminates the same pulsatile change in arterial blood volume.

Furthermore, the correlation between optical measurements and tissue absorptions in pulse oximetry are based on the fundamental assumption that light propagation is determined primarily by absorbance due to Lambert-Beer's law neglecting multiple scattering effects in biological tissues. In practice, however, the  
10 optical paths of different wavelengths in biological tissues is known to vary more in reflectance oximetry compared to transmission oximetry, since it strongly depends on the light scattering properties of the illuminated tissue and sensor mounting.

Several human validation studies, backed by animal investigations, have suggested that uncontrollable physiological and physical parameters can cause large  
15 variations in the calibration curve of reflectance pulse oximeters primarily at low oxygen saturation values below 70%. It was observed that the accuracy of pulse oximeters in clinical use might be adversely affected by a number of physiological parameters when measurements are made from sensors attached to the forehead, chest, or the buttock area. While the exact sources of these variations are not fully understood,  
20 it is generally believed that there are a few physiological and anatomical factors that may be the major source of these errors. It is also well known for example that changes in the ratio of blood to bloodless tissue volumes may occur through venous congestion, vasoconstriction/vasodilatation, or through mechanical pressure exerted by the sensor on the skin.

25 Additionally, the empirically derived calibration curve of a pulse oximeter can be altered by the effects of contact pressure exerted by the probe on the skin. This is associated with the following. The light paths in reflectance oximetry are not well defined (as compared to transmission oximetry), and thus may differ between the red and infrared wavelengths. Furthermore, the forehead and scalp areas consist of a  
30 relatively thin subcutaneous layer with the cranium bone underneath, while the tissue

of other anatomical structures, such as the buttock and limbs, consists of a much thicker layer of skin and subcutaneous tissues without a nearby bony support that acts as a strong light reflector.

Several in vivo and in vitro studies have confirmed that uncontrollable physiological and physical parameters (e.g., different amounts of contact pressure applied by the sensor on the skin, variation in the ratio of bloodless tissue-to-blood content, or site-to-site variations) can often cause large errors in the oxygen saturation readings of a pulse oximeter, which are normally derived based on a single internally-programmed calibration curve. The relevant in vivo studies are disclosed in the following publications:

1. Dassel, et al., "Effect of location of the sensor on reflectance pulse oximetry", *British Journal of Obstetrics and Gynecology*, vol. 104, pp. 910-916, (1997);
2. Dassel, et al., "Reflectance pulse oximetry at the forehead of newborns: The influence of varying pressure on the probe", *Journal of Clinical Monitoring*, vol. 12, pp. 421-428, (1996).]

The relevant in vitro studies are disclosed, for example in the following publication:

3. Edrich et al., "Fetal pulse oximetry: influence of tissue blood content and hemoglobin concentration in a new in-vitro model", *European Journal of Obstetrics and Gynecology and Reproductive Biology*, vol. 72, suppl. 1, pp. S29-S34, (1997).

Improved sensors for application in dual-wavelength reflectance pulse oximetry have been developed. As disclosed in the following publication: Mendelson, et al., "Noninvasive pulse oximetry utilizing skin reflectance photoplethysmography", *IEEE Transactions on Biomedical Engineering*, vol. 35, no. 10, pp. 798-805 (1988), the total amount of backscattered light that can be detected by a reflectance sensor is directly proportional to the number of photodetectors placed around the LEDs. Additional improvements in signal-to-noise ratio were achieved by increasing the active area of the photodetector and optimizing the separation distance between the light sources and photodetectors.



Another approach is based on the use of a sensor having six photodiodes arranged symmetrically around the LEDs that is disclosed in the following publications:

4. Mendelson, et al., "Design and evaluation of a new reflectance pulse oximeter sensor", *Medical Instrumentation*, vol. 22, no. 4, pp. 167-173 (1988); and

5 5. Mendelson, et al., "Skin reflectance pulse oximetry: in vivo measurements from the forearm and calf", *Journal of Clinical Monitoring*, vol. 7, pp. 7-12, (1991).

According to this approach, in order to maximize the fraction of backscattered light collected by the sensor, the currents from all six photodiodes are summed electronically by internal circuitry in the pulse oximeter. This configuration essentially  
10 creates a large area photodetector made of six discrete photodiodes connected in parallel to produce a single current that is proportional to the amount of light backscattered from the skin. Several studies showed that this sensor configuration could be used successfully to accurately measure SaO<sub>2</sub> from the forehead, forearm and the calf on humans. However, this sensor requires a means for heating the skin in order to increase  
15 local blood flow, which has practical limitations since it could cause skin burns.

Yet another prototype reflectance sensor is based on eight dual-wavelength LEDs and a single photodiode, and is disclosed in the following publication: Takatani et al., "Experimental and clinical evaluation of a noninvasive reflectance pulse oximeter sensor", *Journal of Clinical Monitoring*, vol. 8, pp. 257-266 (1992). Here, four R and  
20 four IR LEDs are spaced at 90-degree intervals around the substrate and at an equal radial distance from the photodiode.

A similar sensor configuration based on six photodetectors mounted in the center of the sensor around the LEDs is disclosed in the following publication: Konig, et al., "Reflectance pulse oximetry – principles and obstetric application in the Zurich system", *Journal of Clinical Monitoring*, vol. 14, pp. 403-412 (1998).  
25

According to the techniques disclosed in all of the above publications, only LEDs of two wavelengths, R and IR, are used as light sources, and the computation of SaO<sub>2</sub> is based on reflection photoplethysmograms measured by a single photodetector, regardless of whether one or multiple photodiodes chips are used to construct the  
30 sensor. This is because of the fact that the individual signals from the photodetector

elements are all summed together electronically inside the pulse oximeter. Furthermore, while a radially-symmetric photodetector array can help to maximize the detection of backscattered light from the skin and minimize differences from local tissue inhomogeneity, human and animal studies confirmed that this configuration can not  
5 completely eliminate errors caused by pressure differences and site-to-site variations.

The use of a nominal dual-wavelength pair of 735/890nm was suggested as providing the best choice for optimizing accuracy, as well as sensitivity in dual-wavelength reflectance pulse oximetry, in US 5,782,237 and 5,421,329. This approach minimizes the effects of tissue heterogeneity and enables to obtain a balance in path  
10 length changes arising from perturbations in tissue absorbance. This is disclosed in the following publications:

6. Mannheimer et al., "Physio-optical considerations in the design of fetal pulse oximetry sensors", European Journal of Obstetrics and Gynecology and Reproductive Biology, vol. 72, suppl. 1, pp. S9-S19, (1997); and

15 7. Mannheimer et al., "Wavelength selection for low-saturation pulse oximetry", IEEE Transactions on Biomedical Engineering, vol. 44, no. 3, pp. 48-158 (1997)].

However, replacing the conventional R wavelength at 660nm, which coincides with the region of the spectrum where the difference between the extinction coefficient of Hb and HbO<sub>2</sub> is maximal, with a wavelength emitting at 735nm, not only lowers  
20 considerably the overall sensitivity of a pulse oximeter, but does not completely eliminate errors due to sensor placement and varying contact pressures.

Pulse oximeter probes of a type comprising three or more LEDs for filtering noise and monitoring other functions, such as carboxyhemoglobin or various indicator  
25 dyes injected into the blood stream, have been developed and are disclosed, for example, in WO 00/32099 and US 5,842,981. The techniques disclosed in these publications are aimed at providing an improved method for direct digital signal formation from input signals produced by the sensor and for filtering noise.

None of the above prior art techniques provides a solution to overcome the  
30 most essential limitation in reflectance pulse oximetry, which requires the automatic

correction of the internal calibration curve from which accurate and reproducible oxygen saturation values are derived, despite variations in contact pressure or site-to-site tissue heterogeneity.

5 In practice, most sensors used in reflection pulse oximetry rely on closely spaced LED wavelengths in order to minimize the differences in the optical path lengths of the different wavelengths. Nevertheless, within the wavelength range required for oximetry, even closely spaced LEDs with closely spaced wavelengths mounted on the same substrate can lead to large random error in the final determination of SaO<sub>2</sub>.

10 SUMMARY OF THE INVENTION AND ADVANTAGES

The object of the invention is to provide a novel sensor design and method that functions to correct the calibration relationship of a reflectance pulse oximeter, and reduce measurement inaccuracies in general. Another object of the invention is to provide a novel sensor and method that functions to correct the calibration relationship  
15 of a reflectance pulse oximeter, and reduce measurement inaccuracies in the lower range of oxygen saturation values (typically below 70%), which is the predominant range in neonatal and fetal applications.

Yet another object of the present invention is to provide automatic correction of the internal calibration curve from which oxygen saturation is derived inside the  
20 oximeter in situations where variations in contact pressure or site-to-site tissue heterogeneity may cause large measurement inaccuracies.

Another object of the invention is to eliminate or reduce the effect of variations in the calibration of a reflectance pulse oximeter between subjects, since perturbations caused by contact pressure remain one of the major sources of errors in  
25 reflectance pulse oximetry. In fetal pulse oximetry, there are additional factors, which must be properly compensated for in order to produce an accurate and reliable measurement of oxygen saturation. For example, the fetal head is usually the presenting part, and is a rather easily accessible location for application of reflectance pulse oximetry. However, uterine contractions can cause large and unpredictable variations  
30 in the pressure exerted on the head and by the sensor on the skin, which can lead to

large errors in the measurement of oxygen saturation by a dual-wavelength reflectance pulse oximeter. Another object of the invention is to provide accurate measurement of oxygen saturation in the fetus during delivery.

The basis for the errors in the oxygen saturation readings of a dual-wavelength pulse oximeter is the fact that, in practical situations, the reflectance sensor applications affect the distribution of blood in the superficial layers of the skin. This is different from an ideal situation, when a reflectance sensor measures light backscattered from a homogenous mixture of blood and bloodless tissue components. Therefore, the R and IR DC signals practically measured by photodetectors contain a relatively larger proportion of light absorbed by and reflected from the bloodless tissue compartments. In these uncontrollable practical situations, the changes caused are normally not compensated for automatically by calculating the normalized R/IR ratio since the AC portions of each photoplethysmogram, and the corresponding DC components, are affected differently by pressure or site-to-site variations. Furthermore, these changes depend not only on wavelength, but depend also on the sensor geometry, and thus cannot be eliminated completely by computing the normalized R/IR ratio, as is typically the case in dual-wavelength pulse oximeters.

The inventor has found that the net result of this nonlinear effect is to cause large variations in the slope of the calibration curves. Consequently, if these variations are not compensated automatically, they will cause large errors in the final computation of SpO<sub>2</sub>, particularly at low oxygen saturation levels normally found in fetal applications.

Another object of the present invention is to compensate for these variations and to provide accurate measurement of oxygen saturation. The invention consists of, in addition to two measurement sessions typically carried out in pulse oximetry based on measurements with two wavelengths centered around the peak emission values of 660nm (red spectrum) and 940nm ± 20nm (IR spectrum), one additional measurement session is carried out with an additional wavelength. At least one additional wavelength is preferably chosen to be substantially in the IR region of the electromagnetic spectrum, i.e., in the NIR-IR spectrum (having the peak emission value above 700nm).

In a preferred embodiment the use of at least three wavelengths enables the calculation of an at least one additional ratio formed by the combination of the two IR wavelengths, which is mostly dependent on changes in contact pressure or site-to-site variations. In a preferred embodiment, slight dependence of the ratio on variations in arterial oxygen saturation that may occur, is easily minimized or eliminated completely, by the proper selection and matching of the peak emission wavelengths and spectral characteristics of the at least two IR-light sources.

Preferably, the selection of the IR wavelengths is based on certain criteria. The IR wavelengths are selected to coincide with the region of the optical absorption curve where HbO<sub>2</sub> absorbs slightly more light than Hb. The IR wavelengths are in the spectral regions where the extinction coefficients of both Hb and HbO<sub>2</sub> are nearly equal and remain relatively constant as a function of wavelength, respectively.

In a preferred embodiment, tracking changes in the ratio formed by the two IR wavelengths, in real-time, permits automatic correction of errors in the normalized ratio obtained from the R-wavelength and each of the IR-wavelengths. The term "ratio" signifies the ratio of two values of AC/DC corresponding to two different wavelengths. This is similar to adding another equation to solve a problem with at least three unknowns (i.e., the relative concentrations of HbO<sub>2</sub> and Hb, which are used to calculate SaO<sub>2</sub>, and the unknown variable fraction of blood-to-tissue volumes that effects the accurate determination of SaO<sub>2</sub>), which otherwise must rely on only two equations in the case of only two wavelengths used in conventional dual-wavelength pulse oximetry. In a preferred embodiment, a third wavelength provides the added ability to compute SaO<sub>2</sub> based on the ratio formed from the R-wavelength and either of the IR-wavelengths. In a preferred embodiment, changes in these ratios are tracked and compared in real-time to determine which ratio produces a more stable or less noisy signal. That ratio is used predominantly for calculating SaO<sub>2</sub>.

The present invention utilizes collection of light reflected from the measurement location at different detection locations arranged along a closed path around light emitting elements, which can be LEDs or laser sources. Preferably, these detection locations are arranged in two concentric rings, the so-called "near" and "far"

rings, around the light emitting elements. This arrangement enables optimal positioning of the detectors for high quality measurements, and enables discrimination between photodetectors receiving “good” information (i.e., AC and DC values which would result in accurate calculations of SpO<sub>2</sub>) and “bad” information (i.e., AC and DC values  
5 which would result in inaccurate calculations of SpO<sub>2</sub>).

There is thus provided according to one aspect of the present invention, a sensor for use in an optical measurement device for non-invasive measurements of blood parameters, the sensor comprising:

(1) a light source for illuminating a measurement location with incident light  
10 of at least three wavelengths, the first wavelength lying in a red (R) spectrum, and the at least second and third wavelengths lying substantially in the infrared (IR) spectrum; and

(2) a detector assembly for detecting light returned from the illuminated location, the detector assembly being arranged so as to define a plurality of detection  
15 locations along at least one closed path around the light source.

The term “closed path” used herein signifies a closed curve, like a ring, ellipse, or polygon, and the like.

The detector assembly is comprised of at least one array of discrete detectors (e.g., photodiodes) accommodated along at least one closed path, or at least one  
20 continuous photodetector defining the closed path.

The term “substantially IR spectrum” used herein signifies a spectrum range including near infrared and infrared regions.

According to another aspect of the present invention, there is provided a pulse oximeter utilizing a sensor constructed as defined above, and a control unit for  
25 operating the sensor and analyzing data generated thereby.

According to yet another aspect of the present invention, there is provided a method for non-invasive determination of a blood parameter, the method comprising the steps of:

illuminating a measurement location with at least three different wavelengths  
30  $\lambda_1$ ,  $\lambda_2$  and  $\lambda_3$ , the first wavelength  $\lambda_1$  lying in a red (R) spectrum, and the at least

second and at least third wavelengths  $\lambda_2$  and  $\lambda_3$  lying substantially in the infrared (IR) spectrum;

detecting light returned from the measurement location at different detection locations and generating data indicative of the detected light, wherein said different  
5 detection locations are arranged so as to define at least one closed path around the measurement location; and

analyzing the generated data and determining the blood parameter.

#### BRIEF DESCRIPTION OF THE DRAWINGS

10 Other advantages of the present invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 illustrates hemoglobin spectra as measured by oximetry based techniques;

Fig. 2 illustrates a calibration curve used in pulse oximetry as typically  
15 programmed by the pulse oximeters manufacturers;

Fig. 3 illustrates the relative disposition of light source and detector in reflection-mode or backscatter type pulse oximetry;

Fig. 4 illustrates light propagation in reflection pulse oximetry;

20 Figs. 5A and 5B illustrate a pulse oximeter reflectance sensor operating under ideal and practical conditions, respectively;

Fig. 6 illustrates variations of the slopes of calibration curves in reflectance pulse oximetry measurements;

Fig. 7 illustrates an optical sensor according to the invention;

25 Fig. 8 is a block diagram of the main components of a pulse oximeter utilizing the sensor of Fig. 7;

Fig. 9 is a flow chart of a selection process used in the signal processing technique according to the invention; and

Figs. 10A to 10C are flow charts of three main steps, respectively, of the signal processing method according to the invention.

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## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the Figures, wherein like numerals indicate like or corresponding parts throughout the several views, Figs. 1 and 2 illustrate typical hemoglobin spectra and calibrations curve utilized in the pulse oximetry measurements.

5 The present invention provides a sensor for use in a reflection-mode or backscatter type pulse oximeter. The relative disposition of light source and detector in the reflection-mode pulse oximeter are illustrated in Fig. 3.

Fig. 4 shows light propagation in the reflection-mode pulse oximeter where, in addition to the optical absorption and reflection due to blood, the DC signal of the R and IR photoplethysmograms can be adversely affected by strong reflections from the bone.

Figs. 5A and 5B illustrate a pulse oximeter reflectance sensor operating under, respectively, ideal and practical conditions. Referring now to Fig. 5A, it is shown that, under ideal conditions, reflectance sensor measures light backscattered from a homogenous mixture of blood and bloodless tissue components. Accordingly, the normalized R/IR ratio in dual-wavelength reflection type pulse oximeters, which relies on proportional changes in the AC and DC components in the photoplethysmograms, only reflect changes in arterial oxygen saturation.

Referring now to Fig. 5B, in practical situations, the sensor applications affect the distribution of blood in the superficial layers of the skin. Accordingly, the R and IR DC signals measured by photodetectors contain a relatively larger proportion of light absorbed by and reflected from the bloodless tissue compartments. As such, the changes in DC signals depend not only on wavelength but also sensor geometry and thus cannot be eliminated completely by computing the normalized R/IR ratio, as is typically the case in dual-wavelength pulse oximeters. The result is large variations in the slope of the calibration curves, as illustrated in Fig. 6. Referring now to Fig. 6, graphs C1, C2 and C3 show three calibration curves, presenting the variation of the slope for oxygen saturation values between 50% and 100%.

Referring to Fig. 7, there is illustrated an optical sensor 10 designed according to the invention aimed at minimizing some of the measurement inaccuracies in a



reflectance pulse oximeter. The sensor 10 comprises such main constructional parts as a light source 12 composed of three closely spaced light emitting elements (e.g., LEDs or laser sources) 12a, 12b and 12c generating light of three different wavelengths, respectively; an array of discrete detectors (e.g., photodiodes), a “far” detector 16 and  
5 a “near” detector 18, arranged in two concentric ring-like arrangements (constituting closed paths) surrounding the light emitting elements; and a light shield 14. In the present example, six photodiodes form each ring. All these elements are accommodated in a sensor housing 17. The light shield 14 is positioned between the photodiodes and the light emitting elements, and prevents direct optical coupling between them, thereby  
10 maximizing the fraction of backscattered light passing through the arterially perfused vascular tissue in the detected light.

It should be noted that more than three wavelengths can be utilized in the sensor. The actual numbers of wavelengths used as a light source and the number of photodetectors in each ring are not limited and depend only on the electronic circuitry  
15 inside the oximeter. The array of discrete photodiodes can be replaced by one or more continuous photodetector rings.

In addition to the R and IR light emitting elements 12a and 12b as used in the conventional pulse oximeter sensors, the sensor 10 incorporates the third, reference, light emitting element 12c, which emits light in the NIR-IR spectrum. Wavelength  $\lambda_1$   
20 and  $\lambda_2$  of the R and IR light emitting elements 12a and 12b are centered, respectively, around the peak emission values of 660nm and 940nm, and wavelength  $\lambda_3$  of the third light emitting element 12c has the peak emission value above 700nm (typically ranging between 800nm and 900nm). In the description below, the light emitting elements 12b and 12c are referred to as two IR light emitting elements, and wavelengths  $\lambda_2$  and  $\lambda_3$   
25 are referred to as two IR wavelengths.

During the operation of the sensor 10, different light emitting elements are selectively operated for illuminating a measurement location (not shown) with different wavelengths. Each of the photodetectors detects reflected light of different wavelengths and generates data indicative of the intensity I of the detected light of different  
30 wavelengths.

It should be noted that the sensor can be of a compact design utilizing an integrated circuit manufactured by CMOS technology. This technique is disclosed in a co-pending application assigned to the assignee of the present application. According to this technique, the sensor comprises a package including the light source, a block of two tubular optical waveguides of different diameters concentrically dislocated one inside the other and surrounding the light source, and an integrated circuit plate comprising two ring-like areas of photodiodes positioned concentrically one inside the other. The integrated circuit is also provided with a plurality of printed contact areas and electric conductors intended for mounting the light source thereon, controlling the light source, and transmitting electric signals produced by the photodiodes areas for further processing.

Fig. 8 illustrates a block diagram of a pulse oximeter 20 utilizing the above-described sensor 10. The pulse oximeter typically includes a control unit 21, which is composed of an electronic block 22 including A/D and D/A converters connectable to the sensor 10, a microprocessor 24 for analyzing measured data, and a display 26 for presenting measurement results. The measured data (i.e., electrical output of the sensor 10 indicative of the detected light) is directly processed in the block 22, and the converted signal is further processed by the microprocessor 24. The microprocessor 24 is operated by a suitable software model for analyzing the measured data and utilizing reference data (i.e., calibration curve stored in a memory) to compute the oxygen saturation value, which is then presented on the display 26. The analysis of the measured data utilizes the determination of AC- and DC-components in the detected light for each wavelength,  $\lambda_1$ ,  $\lambda_2$ , and  $\lambda_3$ , respectively, i.e.,  $I_1^{(AC)}$ ,  $I_1^{(DC)}$ ,  $I_2^{(AC)}$ ,  $I_2^{(DC)}$ ,  $I_3^{(AC)}$ , and  $I_3^{(DC)}$ , and the calculation of AC/DC ratio for each wavelength, namely,  $W_1=I_1^{(AC)}/I_1^{(DC)}$ ,  $W_2=I_2^{(AC)}/I_2^{(DC)}$ , and  $W_3=I_3^{(AC)}/I_3^{(DC)}$ , as will be described more specifically further below with reference to Figs. 9 and 10A-10C.

The pulse oximeter 20 with the sensor arrangement shown in Fig. 7 provides the following three possible ratio values:  $W_1/W_2$ ,  $W_1/W_3$  and  $W_2/W_3$ . It should be noted that  $W_1/W_2$  and  $W_1/W_3$  are the ratios that typically have the highest sensitivity to oxygen saturation. This is due to the fact that  $\lambda_1$  is chosen in the red region of the

electromagnetic spectrum, where the changes in the absorption between Hb and HbO<sub>2</sub> are the largest, as described above with reference to Fig. 1. Therefore, in principle, the absorption ratios formed by either wavelength pair  $\lambda_1$  and  $\lambda_2$  or wavelength pair  $\lambda_1$  and  $\lambda_3$  can be used to compute the value of SaO<sub>2</sub>.

5           The inventor conducted extensive human and animal studies, and confirmed that either of the two ratios  $W_1/W_2$  and  $W_1/W_3$  can be affected not only by changes in arterial oxygen saturation, but also by sensor placement and by the amount of pressure applied by the sensor on the skin. Any calculation of SaO<sub>2</sub> based on either of the two ratios  $W_1/W_2$  and  $W_1/W_3$  alone (as normally done in commercially available dual-  
10 wavelength pulse oximeters) could result in significant errors. Furthermore, since at least two wavelengths are necessary for the calculation of arterial oxygen saturation, it is not feasible to self-correct the calibration curve for variations due to contact pressure or site-to-site variations utilizing the same two wavelengths used already to compute SaO<sub>2</sub>.

15           The inventor has found that the third ratio  $W_2/W_3$  formed by the combination of the two IR wavelengths is mostly dependent on changes in contact pressure or site-to-site variations. Furthermore, this ratio can depend, but to a much lesser degree, on variations in arterial oxygen saturation. The dependency on arterial oxygen saturation, however, is easily minimized or eliminated completely, for example by selection and  
20 matching of the peak emission wavelengths and spectral characteristics of the two IR light emitting elements 12b and 12c.

          Generally, the two IR wavelengths  $\lambda_2$  and  $\lambda_3$  are selected to coincide with the region of the optical absorption curve where HbO<sub>2</sub> absorbs slightly more light than Hb, but in the spectral region, respectively, where the extinction coefficients of both Hb and  
25 HbO<sub>2</sub> are nearly equal and remain relatively constant as a function of wavelength. For example, at 940nm and 880nm, the optical extinction coefficients of Hb and HbO<sub>2</sub> are approximately equal to 0.29 and 0.21, respectively. Therefore, ideally, the ratio of  $W_2/W_3$  should be close to 1, except for situations when the AC/DC signals measured from  $\lambda_2$  and  $\lambda_3$  are affected unequally causing the ratio  $W_2/W_3$  to deviate from 1.

Fortunately, variations in the ratio  $W_2/W_3$  mimic changes in the ratios  $W_1/W_2$  and  $W_1/W_3$  since these ratios are all affected by similar variations in sensor positioning or other uncontrollable factors that normally can cause large errors in the calibration curve from which oxygen saturation is typically derived. Thus, by tracking in real-time  
5 changes in the ratio formed by wavelengths  $\lambda_2$  and  $\lambda_3$ , it is possible to automatically correct for errors in the normalized ratios obtained from wavelengths  $\lambda_1$  and  $\lambda_2$ , or from  $\lambda_1$  and  $\lambda_3$ .

The use of an additional third wavelength in the sensor serves another important function (not available in conventional dual-wavelength pulse oximeters),  
10 which is associated with the following. Reflectance pulse oximeters have to be capable of detecting and relying on the processing of relatively low quality photoplethysmographic signals. Accordingly, electronic or optical noise can cause large inaccuracies in the final computation of  $SaO_2$ . Although the amount of electronic or optical noise pickup from the sensor can be minimized to some extent, it is impossible  
15 to render the signals measured by the pulse oximeter completely noise free. Therefore, pulse oximeters rely on the assumption that any noise picked up during the measurement would be cancelled by calculating the ratio between the R- and IR-light intensities measured by the photodetector. Practically, however, the amount of noise that is superimposed on the R- and IR-photoplethysmograms cannot be cancelled  
20 completely and, thus, can lead to significant errors in the final computation of  $SaO_2$  which, in dual-wavelength pulse oximeters, is based only on the ratio between two wavelengths.

By utilizing a third wavelength, the invention has the added ability to compute  $SaO_2$  based on the ratio formed from either  $W_1/W_2$  or  $W_1/W_3$ . An algorithm utilized in  
25 the pulse oximeter according to the invention has the ability to track and compare in real-time changes between  $W_1/W_2$  and  $W_1/W_3$  to determine which ratio produces a more stable or less noisy signal and selectively choose the best ratio for calculating  $SaO_2$ .

The method according to the invention utilizes the so-called "selection process" as part of the signal processing technique based on the measured data obtained  
30 with the multiple photodetectors. The main steps of the selection process are shown in

Fig. 9 in a self-explanatory manner. Here, the symbol  $i$  corresponds to a single photodetector element in the array of multiple discrete photodetector elements, the term “ $i$ st” signifies the last photodetector element in the array, and the term “DATA” signify three ratios (AC/DC) computed separately for each of the three wavelengths, namely,  
5  $W_1$ ,  $W_2$  and  $W_3$ .

The selection process is associated with the following: Practically, each time one of the light emitting elements is in its operative position (i.e., switched on), all of the photodetectors in the sensor receiving backscattered light from the skin. However, the intensity of the backscattered light measured by each photodetector may be different  
10 from that measured by the other photodetectors, depending on the anatomical structures underneath the sensor and its orientation relative to these structures.

Thus, the selection process is used to discriminate between photodetectors receiving “good” signals (i.e., “good” signal meaning that the calculation of  $SpO_2$  from the pulsating portion of the electro-optic signal (AC) and the constant portion (DC)  
15 would result in accurate value) and “bad” signals (i.e., having AC and DC values which would result in inaccurate calculations of  $SpO_2$ ). Accordingly, each data point (i.e., ratio  $W_{1i}$ ,  $W_{2i}$  or  $W_{3i}$  detected at the corresponding  $i^{th}$  detector) is either accepted, if it meets a certain criteria based for example on a certain ratio of AC to DC values (e.g., such that the intensity of AC signal is about 0.05-2.0% of the intensity of DC signal), or rejected.  
20 All of the accepted data points (data from accepted detection locations) are then used to calculate the ratios  $W_1/W_2$ ,  $W_1/W_3$  and  $W_2/W_3$ , and to calculate the  $SpO_2$  value, in conjunction with the signal processing technique, as will be described further below with reference to Figs. 10A-10C.

Besides the use of the third IR-wavelength to compensate for changes in the  
25 internal calibration curve of the pulse oximeter, the pulse oximeter utilizing the sensor according to the invention provides a unique new method to compensate for errors due to sensor positioning and pressure variability. This method is based on multiple photodetector elements, instead of the conventional approach that relies on a single photodetector.

While optical sensors with multiple photodetectors for application in reflectance pulse oximetry have been described before, their main limitation relates to the way the information derived from these photodetectors is processed. Although the primary purpose of utilizing multiple photodetectors is to collect a larger portion of the backscattered light from the skin, practically, summing the individual intensities of each photodetector and using the resulting value to compute  $\text{SaO}_2$  can introduce large errors into the calculations. These errors can be caused, for example, by situations where the sensor is placed over inhomogeneous tissue structures such as when the sensor is mounted on the chest. The case may be such that, when using a continuous photodetector ring to collect the backscattered light, a portion of the photodetector ring lies over a rib, which acts as a strongly reflecting structure that contributes to a strong DC component, and the remaining part of the photodetector is positioned over the intercostals space, where the DC signal is much smaller. In this case, the final calculation of  $\text{SaO}_2$  would be inaccurate, if the current produced by this photodetector is used indiscriminately to compute the DC value before the final computation of  $\text{SaO}_2$  is performed. Therefore, in addition to automatically correcting errors in the calibration curve as outlined above using three different LEDs (one R and two different IR wavelengths), the sensor 10 has the optional ability to track automatically and compare changes in the R/IR ratios obtained from each of the discrete photodiodes individually. For example, if some of either the near or the far photodetectors in the two concentrically arranged arrays detect larger than normal DC signals during the operation of one of the photodiodes compared to the other photodiodes in the sensor, it could be indicative of one of the following situations: the sensor is positioned unevenly, the sensor is partially covering a bony structure, or uneven pressure is exerted by the sensor on the skin causing partial skin “blanching” and therefore the blood-to-bloodless tissue ratio might be too high to allow accurate determination of  $\text{SaO}_2$ . If such a situation is detected, the oximeter has the ability to selectively disregard the readings obtained from the corresponding photodetectors. Otherwise, if the DC and AC signals measured from each photodetector in the array are similar in magnitude, which is an indication that the

sensor is positioned over a homogeneous area on the skin, the final computation of  $\text{SaO}_2$  can be based on equal contributions from every photodetector in the array.

Turning now to Figs. 10A, 10B and 10C, there are illustrated three main steps of the signal processing technique utilized in the present invention. Here,  $\text{TH}_1$  and  $\text{TH}_2$  are two different threshold values (determined experimentally) related respectively to  $W_2/W_3$  and  $(W_1/W_2 - W_1/W_3)$ .

During step 1 (Fig. 10A), measured data generated by the “near” and “far” photodetectors indicative of the detected (backscattered) light of wavelength  $\lambda_2$  and  $\lambda_3$  is analyzed to calculate the two ratios  $W_2/W_3$  (far and near). If one of the calculated ratios (far or near) is not in the range of  $1 \pm \text{TH}_1$  ( $\text{TH}_1$  is for example 0.1), then this data point is rejected from the  $\text{SpO}_2$  calculation, but if both of them are not in the mentioned range, a corresponding alarm is generated indicative of that the sensor position should be adjusted. Only if there are calculated ratios which are in the range of  $1 \pm \text{TH}_1$ , they are accepted and the process (data analysis) proceeds by performing step 2.

Step 2 (Fig. 10B) consists of determining whether the quality of each photoplethysmogram is acceptable or not. The quality determination is based on the relative magnitude of each AC component compared to its corresponding DC component. If the quality is not acceptable (e.g., the signal shape detected by any detector varies within a time frame of the measurement session, which may for example be 3.5 sec), the data point is rejected and a corresponding alarm signal is generated. If the AC/DC ratio of  $W_1$ ,  $W_2$  and  $W_3$  are within an acceptable range, the respective data point is accepted, and the process proceeds through performing step 3.

In step 3 (Fig. 10C), the measured data is analyzed to calculate ratios  $W_1/W_2$  and  $W_1/W_3$  from data generated by far and near photodetectors, and to calculate the differences  $(W_1/W_2 - W_1/W_3)$ .

In a perfect situation,  $W_1/W_2$  (far) is very close to  $W_1/W_3$  (far), and  $W_1/W_2$  (near) is very close to  $W_1/W_3$  (near). In a practical situation, this condition is not precisely satisfied, but all the ratios are close to each other if the measurement situation is “good”.

Then, the calculated differences are analyzed to determine the values (corresponding to far and near photodetectors) that are accepted and to use them in the SpO<sub>2</sub> calculation. For each detector that satisfied the condition  $ABS(W_1/W_2 - W_1/W_3) < TH_2$ , where ABS signifies the absolute value, its respective data point is  
5 accepted and used to calculate the oxygen saturation value that will be displayed. If the condition is not satisfied, the data point is rejected. If all data points are rejected, another measurement session is carried out.

It should be noted that, although the steps 1-3 above are exemplified with respect to signal detection by both near and far photodetectors, each of these steps can  
10 be implemented by utilizing only one array of detection locations along the closed path. The provision of two such arrays, however, provides higher accuracy of measurements.



## CLAIMS

What is claimed is:

1. A sensor for use in an optical measurement device for non-invasive measurement of a blood parameter, the sensor comprising:
  - 5 (a) a light source for illuminating a measurement location with incident light of at least three wavelengths, the first wavelength  $\lambda_1$  lying in a red (R) spectrum, and the at least second and third wavelengths  $\lambda_2$  and  $\lambda_3$  lying substantially in the infrared (IR) spectrum; and
  - (b) a detector assembly for detecting light returned from the illuminated  
10 location, the detector assembly being arranged so as to define a plurality of detection locations along at least one closed path around the light source.
  
2. A sensor as set forth in claim 1, for use in a pulse oximeter, the at least second and third wavelengths  $\lambda_2$  and  $\lambda_3$  being selected to coincide with a spectral  
15 region of the optical absorption curve, where  $\text{HbO}_2$  absorbs slightly more light than Hb, and where the extinction coefficients of Hb and  $\text{HbO}_2$  are nearly equal and remain relatively constant as a function of wavelength.
  
3. A sensor, as set forth in claim 2, wherein the second wavelength  $\lambda_2$  is in the  
20 IR spectral region around 940nm $\pm$ 20nm, and the third wavelength  $\lambda_3$  is above 700nm.
  
4. A sensor, as set forth in claim 1, wherein the detector assembly comprises at least one array of detector elements arranged in a spaced-apart relationship along the  
at least one closed path.  
25
  
5. A sensor, as set forth in claim 1, wherein the detector assembly comprises at least one ring-shaped detector element.
  
6. A sensor according to claim 1, wherein the plurality of the detection  
30 locations are arranged along two concentric closed paths around the light source.

7. A sensor, as set forth in claim 6, wherein the detector assembly comprises two arrays of detector elements, the detector elements of each array being arranged in a spaced apart relationship along the corresponding one of the closed paths.

5

8. A sensor, as set forth in claim 6, wherein the detector assembly comprises two concentric ring-shaped detector elements.

9. A sensor, as set forth in claim 1, manufactured by CMOS technology, the sensor comprising a package including said light source, and an integrated circuit plate, which comprises said at least one closed path of the detector assembly positioned around the light source, and a plurality of printed contact areas and electric conductors for mounting the light source thereon, controlling the light source, and transmitting electric signals produced by the detector assembly for further processing.

10  
15

10. A sensor for use in an optical measurement device for non-invasive measurement of a blood parameter, the sensor comprising:

a light source for illuminating a measurement location with incident light of at least three wavelengths, the first wavelength  $\lambda_1$  lying in a red (R) spectrum, and the at least second and third wavelengths  $\lambda_2$  and  $\lambda_3$  lying substantially in the infrared (IR) spectrum; and

20

a detector assembly for detecting light returned from the illuminated location, the detector assembly being arranged so as to define a plurality of detection locations along two concentric closed path around the light source.

25

11. A pulse oximeter comprising a sensor and a control unit for operating the sensor and analyzing data generated thereby, the sensor comprising:

(a) a light source for illuminating a measurement location with incident light of at least three wavelengths, the first wavelength  $\lambda_1$  lying in a red (R) spectrum,

and the at least second and third wavelengths  $\lambda_2$  and  $\lambda_3$  lying substantially in the infrared (IR) spectrum; and

- (b) a detector assembly for detecting light returned from the illuminated location, the detector assembly being arranged so as to define a plurality of detection  
5 locations along at least one closed path around the light source.

12. A method for non-invasive determination of a blood parameter, the method comprising the steps of:

- (i) illuminating a measurement location with at least three different  
10 wavelengths, a first wavelength  $\lambda_1$  lying in a red (R) spectrum, and at least second and third wavelengths  $\lambda_2$  and  $\lambda_3$  lying substantially in the infrared (IR) spectrum;

- (ii) detecting light returned from the measurement location at different detection locations and generating data indicative of the detected light, wherein said different detection locations are arranged so as to define at least one closed path around  
15 the measurement location; and

- (iii) analyzing the generated data and determining the blood parameter.

13. The method according to claim 12, wherein the analysis of the generated data comprises the steps of:

- 20 calculating data indicative of an AC/DC ratio in the light detected at each of the detection locations for the at least three wavelengths;

analyzing the calculated data and determining accepted detection locations to select corresponding AC/DC ratios for each of the at least three wavelengths,  $\lambda_1$ ,  $\lambda_2$  and  $\lambda_3$ ; and

- 25 utilizing the selected ratios for determining the blood parameter.

14. The method according to claim 13, wherein the determination of the blood parameter comprises the steps of:

- 30 calculating values of the ratio  $W_2/W_3$  for the accepted detection locations in at least one closed path;

analyzing each of the calculated values to determine whether it satisfies a first predetermined condition, so as to generate a signal indicative of that a sensor position is to be adjusted, if the condition is not satisfied;

5 if the condition is satisfied, determining whether the quality of a photoplethysmogram is acceptable;

if the quality is acceptable, analyzing the selected ratios for calculating ratios  $W_1/W_2$  and  $W_1/W_3$  from the data detected in at least one closed path, and calculating the differences ABS ( $W_1/W_2 - W_1/W_3$ ); and,

10 analyzing the calculated differences for determining whether each of the differences satisfies a second predetermined condition for determining the blood parameter if the condition is satisfied.

15 15. The method according to claim 14, wherein said first predetermined condition consists of that the calculated value of  $W_2/W_3$  is inside a predetermined range around the value one, said predetermined range being defined by the first threshold value, and the second predetermined condition consists of that the calculated difference ABS ( $W_1/W_2 - W_1/W_3$ ) is less than certain, second threshold value.

20 16. A pulse oximeter for detecting a value of a parameter of blood, comprising:  
a sensor housing;  
a source of radiation coupled to the housing and being adapted to emit radiation at predetermined frequencies;

a detector assembly coupled to the housing and being adapted to detect reflected radiation at first, second, and third frequencies and to generate respective first, second, 25 and third signals, wherein the first, second, and third signals are indicative of a value of the reflected radiation at the respective first, second, and third frequencies; and,

a control unit coupled to the detector assembly and adapted to receive the first, second, and third signals, to calculate first, second and third ratios of the first, second, and third signals and to responsively determine the parameter of the blood as a function 30 of the first, second and third ratios.

17. A pulse oximeter, as set forth in claim 16, wherein the control unit is adapted to determine the parameter of the blood as a function of the first and second ratios and a calibration curve.

5

18. A pulse oximeter, as set forth in claim 17, wherein the calibration curve is adjusted as a function of the third ratio.

19. A pulse oximeter, as set forth in claim 16, wherein the first ratio is defined by the first signal divided by the second signal.

10

20. A pulse oximeter, as set forth in claim 16, wherein the second ratio is defined by the first signal divided by the third signal.

21. A pulse oximeter, as set forth in claim 16, wherein the third ratio is defined by the second signal divided by the third signal.

15

22. A pulse oximeter, as set forth in claim 16, wherein the first frequency is in a red frequency range, the second frequency is in a near-infrared frequency range, and the third frequency is in an infrared frequency range.

20

23. A pulse oximeter, as set forth in claim 22, wherein the first ratio is defined by the first signal divided by the second signal, the second ratio is defined by the first signal divided by the third signal, and the third ratio is defined by the second signal divided by the third signal.

25

24. A pulse oximeter, as set forth in claim 16, wherein the control unit is adapted to determine the parameter of the blood as a function of a more stable one of the first and second ratios.

30

25. A pulse oximeter for detecting a value of a parameter of blood, comprising:  
a sensor housing;  
a source of radiation coupled to the housing and being adapted to emit radiation  
at predetermined frequencies;
- 5 a detector assembly coupled to the housing and being adapted to detect reflected  
radiation at first, second, and third frequencies and to generate respective first, second,  
and third signals, wherein the first, second, and third signals are indicative of a value  
of the reflected radiation at the respective first, second, and third frequencies; and,  
a control unit coupled to the detector assembly and being adapted to calculate
- 10 first and second ratios of the first, second, and third signals, wherein the first ratio is  
defined by the first signal divided by the second signal and the second ratio is defined  
by the first signal divided by the third signal, and wherein the control unit is adapted to  
determine the parameter of the blood as a function of a more stable one of the first and  
second ratios.
- 15
26. A pulse oximeter, as set forth in claim 25, wherein the control unit is  
adapted to determine the parameter of the blood as a function of the more stable one of  
the first and second ratios and a calibration curve.
- 20
27. A pulse oximeter, as set forth in claim 26, wherein the calibration curve  
is adjusted as a function of a third ratio.
28. A pulse oximeter, as set forth in claim 27, wherein the third ratio is  
defined by the second signal divided by the third signal.
- 25
29. A pulse oximeter, as set forth in claim 25, wherein the first frequency  
is in a red frequency range, the second frequency is in a near-infrared frequency range,  
and the third frequency is in an infrared frequency range.

30. A pulse oximeter, as set forth in claim 25, wherein the control unit is adapted to track the first and second ratios and determine which one of the first and second ratios is more stable in real-time.

5 31. A pulse oximeter for detecting a value of a parameter of blood, comprising:

a sensor housing;

a source of radiation coupled to the housing and being adapted to emit radiation at predetermined frequencies; and,

10 a plurality of detectors coupled to the housing and being adapted to detect reflected radiation at first, second, and third frequencies and to responsively generate a plurality of first sensor signals indicative of the reflected radiation at the first frequency, a plurality of second sensor signals indicative of the reflected radiation at the second frequency, and a plurality of third sensor signals indicative of the reflected radiation at the third frequency;

15 a control unit being coupled to the plurality of detectors and adapted to receive the plurality of first, second and third sensor signals, to analyze the first, second and third sensor signals and determine which of the first, second and third sensor signals are valid and to generate first, second, and third frequency signals as a function of valid first sensor signals, valid second sensor signals, and valid third sensor signals, respectively and to determine the parameter of the blood as a function of the valid first, second, and third sensor signals.

20 32. A pulse oximeter, as set forth in claim 31, wherein the control unit is adapted to calculate first, second and third ratios of the valid first, second, and third signals and to responsively determine the parameter of the blood as a function of the first, second and third ratios.

25 33. A pulse oximeter, as set forth in claim 32, wherein the control unit is adapted to determine the parameter of the blood as a function of the first and second ratios and a calibration curve.

34. A pulse oximeter, as set forth in claim 33, wherein the calibration curve is adjusted as a function of the third ratio.

5 35. A pulse oximeter, as set forth in claim 32, wherein the first ratio is defined by the valid first signals divided by the valid second signals.

36. A pulse oximeter, as set forth in claim 32, wherein the second ratio is defined by the valid first signals divided by the valid third signals.

10

37. A pulse oximeter, as set forth in claim 32, wherein the third ratio is defined by the valid second signals divided by the valid third signals.

15 38. A pulse oximeter, as set forth in claim 31, wherein the first frequency is in a red frequency range, the second frequency is in a near-infrared frequency range, and the third frequency is in an infrared frequency range.

20 39. A pulse oximeter, as set forth in claim 32, wherein the first ratio is defined by the valid first signals divided by the valid second signals, the second ratio is defined by the valid first signals divided by the valid third signals, and the third ratio is defined by the valid second signals divided by the valid third signals.

40. A pulse oximeter, as set forth in claim 32, wherein the control unit is adapted to determine the parameter of the blood as a function of a more stable one of the first and second ratios.

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41. A pulse oximeter, as set forth in claim 31, wherein the plurality of first, second, and third sensor signals having an AC portion and a DC portion.

30 42. A pulse oximeter, as set forth in claim 41, wherein a sensor signal is valid if it a ratio of the AC portion to the DC portion is within a predetermined range.



43. A pulse oximeter, as set forth in claim 42, wherein the predetermined range is 0.05 to 2.0 percent.

5 44. A sensor for use in an optical measurement device for non-invasive measurement of a blood parameter, comprising:

a sensor housing;

a source of radiation coupled to the housing and being adapted to emit radiation at predetermined frequencies;

10 a detector assembly coupled to the housing and being adapted to detect reflected radiation at least one predetermined frequency and to generate respective signals, wherein the detector assembly is ring shaped.

15 45. A sensor, as set forth in claim 44, wherein the detector assembly includes a plurality of detectors arranged along a closed loop path.

46. A sensor, as set forth in claim 45, wherein the closed loop path has a circular shape.

20 47. A sensor, as set forth in claim 45, wherein the closed loop path has an elliptical shape.

48. A sensor, as set forth in claim 45, wherein the closed loop path has a polygonal shape.

25 49. A sensor, as set forth in claim 44, wherein the detector assembly includes a continuous photodetector ring.

50. A sensor, as set forth in claim 49, wherein the continuous photodetector ring has a circular shape.

51. A sensor, as set forth in claim 49, wherein the continuous photo detector ring has an elliptical shape.

52. A sensor, as set forth in claim 49, wherein the continuous photo detector  
5 ring has a polygonal shape.

53. A sensor, as set forth in claim 44, wherein the detector assembly includes a first plurality of detectors arranged along an inner closed loop path and a second plurality of detectors arranged along an outer closed loop path.  
10

54. A sensor, as set forth in claim 53, wherein the inner and outer closed loop paths have a circular shape.

55. A sensor, as set forth in claim 49, wherein the inner and outer closed  
15 loop paths have an elliptical shape.

56. A sensor, as set forth in claim 49, wherein the inner and outer closed loop paths have a polygonal shape.

57. A sensor for use in an optical measurement device for non-invasive  
20 measurement of a blood parameter, comprising:

a sensor housing;

a source of radiation coupled to the housing and being adapted to emit radiation at predetermined frequencies;

a detector assembly coupled to the housing and being adapted to detect reflected  
25 radiation at least one predetermined frequency and to generate respective signals, wherein the detector assembly includes a plurality of pairs of detectors, each pair of detectors including a near detector and a far detector.

58. A sensor, as set forth in claim 57, wherein the near detectors are arranged along an inner closed loop path and the far detectors are arranged along an outer closed loop paths.

5 59. A sensor, as set forth in claim 58, wherein the inner and outer closed loop paths have a circular shape.

60. A sensor, as set forth in claim 58, wherein the inner and outer closed loop paths have an elliptical shape.

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61. A sensor, as set forth in claim 58, wherein the inner and outer closed loop paths have a polygonal shape.

62. A method for detecting a value of a parameter of blood using a sensor adapted to emit radiation at predetermined frequencies, to detect reflected radiation at first, second, and third frequencies and to generate respective first, second, and third signals, wherein the first, second, and third signals are indicative of a value of the reflected radiation at the respective first, second, and third frequencies, the method including the steps of:

20

receiving the first, second, and third signals;

calculating first, second and third ratios of the first, second, and third signals;

and,

responsively determining the parameter of the blood as a function of the first, second and third ratios.

25

63. A method, as set forth in claim 62, wherein the parameter of the blood is determined as a function of the first and second ratios and a calibration curve.

64. A method, as set forth in claim 63, including the step of adjusting the calibration curve as a function of the third ratio.

30

65. A method, as set forth in claim 62, wherein the first ratio is defined by the first signal divided by the second signal.

5 66. A method, as set forth in claim 62, wherein the second ratio is defined by the first signal divided by the third signal.

67. A method, as set forth in claim 62, wherein the third ratio is defined by the second signal divided by the third signal.

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68. A method, as set forth in claim 62, wherein the first frequency is in a red frequency range, the second frequency is in a near-infrared frequency range, and the third frequency is in an infrared frequency range.

15 69. A method, as set forth in claim 62, wherein the first ratio is defined by the first signal divided by the second signal, the second ratio is defined by the first signal divided by the third signal, and the third ratio is defined by the second signal divided by the third signal.

20 70. A method, as set forth in claim 62, including the step of determining a more stable of the first and second ratios, wherein the parameter of the blood is determined using the more stable one of the first and second ratios.

71. A method for detecting a value of a parameter of blood using a sensor adapted to emit radiation at predetermined frequencies, to detect reflected radiation at first, second, and third frequencies and to generate respective first, second, and third signals, wherein the first, second, and third signals are indicative of a value of the reflected radiation at the respective first, second, and third frequencies, the method including the steps of:

30 receiving the first, second and third signals;

calculate first and second ratios of the first, second and third signals, wherein the first ratio is defined by the first signal divided by the second signal and the second ratio is defined by the first signal divided by the third signal; and,

5 determining the parameter of the blood as a function of a more stable one of the first and second ratios.

72. A method, as set forth in claim 71, wherein the parameter of the blood as a function of the more stable one of the first and second ratios and a calibration curve.

10

73. A method, as set forth in claim 72, including the step of adjusted the calibration curve as a function of a third ratio.

74. A method, as set forth in claim 73, wherein the third ratio is defined by  
15 the second signal divided by the third signal.

75. A method, as set forth in claim 71, wherein the first frequency is in a red frequency range, the second frequency is in an infrared frequency range, and the third frequency is in a near-infrared frequency range.

20

76. A method, as set forth in claim 71, including the step of tracking the first and second ratios and determining which one of the first and second ratios is more stable in real-time.

25 77. A method for detecting a value of a parameter of blood using a sensor adapted to emit radiation at predetermined frequencies, to detect reflected radiation at first, second, and third frequencies and to responsively generate a plurality of first sensor signals indicative of the reflected radiation at the first frequency, a plurality of second sensor signals indicative of the reflected radiation at the second frequency, and

a plurality of third sensor signals indicative of the reflected radiation at the third frequency, the method comprising:

receiving the plurality of first, second and third sensor signals;

analyzing the first, second and third sensor signals and determining which of the  
5 first, second and third sensor signals are valid;

generating first, second, and third frequency signals as a function of valid first  
sensor signals, valid second sensor signals, and valid third sensor signals, respectively;  
and,

determining the parameter of the blood as a function of the valid first, second,  
10 and third sensor signals.

78. A method, as set forth in claim 77, including the step of calculating first,  
second and third ratios of the first, second, and third valid signals and responsively  
determining the parameter of the blood as a function of the first, second and third ratios.

15

79. A method, as set forth in claim 78, wherein the parameter of the blood  
is determined as a function of the first and second ratios and a calibration curve.

80. A method, as set forth in claim 79, including the step of adjusting the  
20 calibration curve as a function of the third ratio.

81. A method, as set forth in claim 78, wherein the first ratio is defined by  
the valid first signals divided by the valid second signals.

25 82. A method, as set forth in claim 78, wherein the second ratio is defined  
by the valid first signals divided by the valid third signals.

83. A method, as set forth in claim 78, wherein the third ratio is defined by  
the valid second signals divided by the valid third signals.

30

84. A method, as set forth in claim 78, wherein the first frequency is in a red frequency range, the second frequency is in an infrared frequency range, and the third frequency is in a near-infrared frequency range.

5 85. A method, as set forth in claim 78, wherein the first ratio is defined by the valid first signals divided by the valid second signals, the second ratio is defined by the valid first signals divided by the valid third signals, and the third ratio is defined by the valid second signals divided by the valid third signals.

10 86. A method, as set forth in claim 78, including the step of determining the parameter of the blood as a function of a more stable one of the first and second ratios.

87. A method, as set forth in claim 77, wherein the plurality of first, second, and third sensor signals have an AC portion and a DC portion.

15 88. A method, as set forth in claim 87, wherein a sensor signal is valid if a ratio of the AC portion to the DC portion is within a predetermined range.

89. A method, as set forth in claim 88, wherein the predetermined range is 0.05 to 2.0 percent.

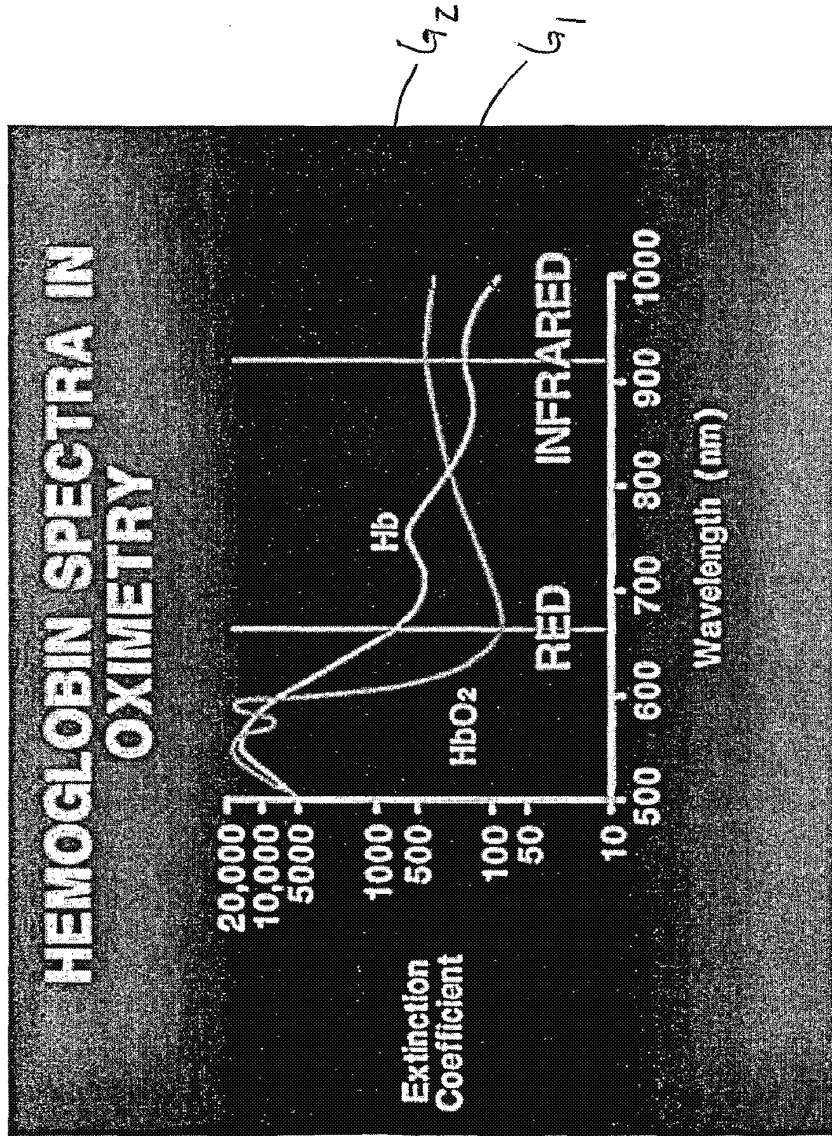
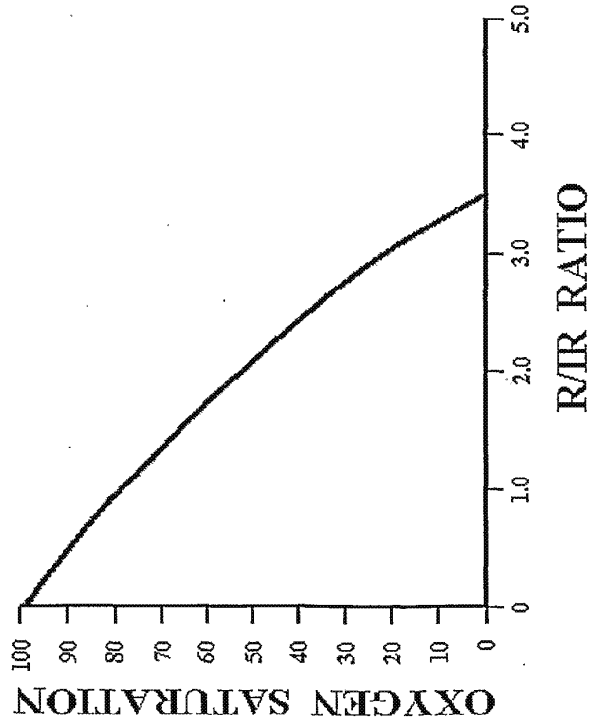


Fig. 1



**CALIBRATION OF A PULSE OXIMETER**



**Fig. 2**

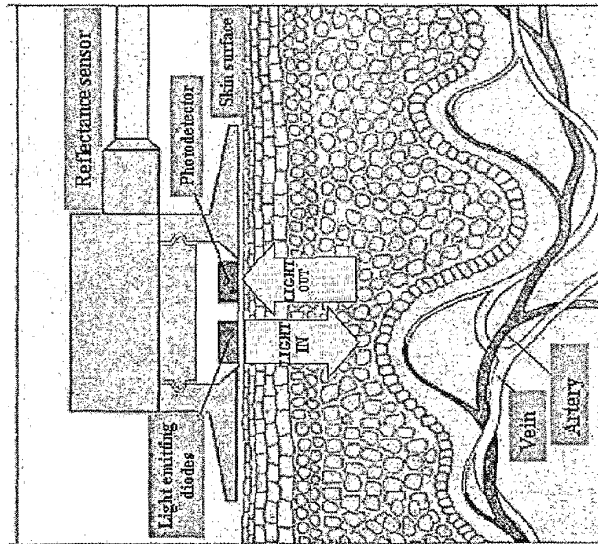


Fig. 3

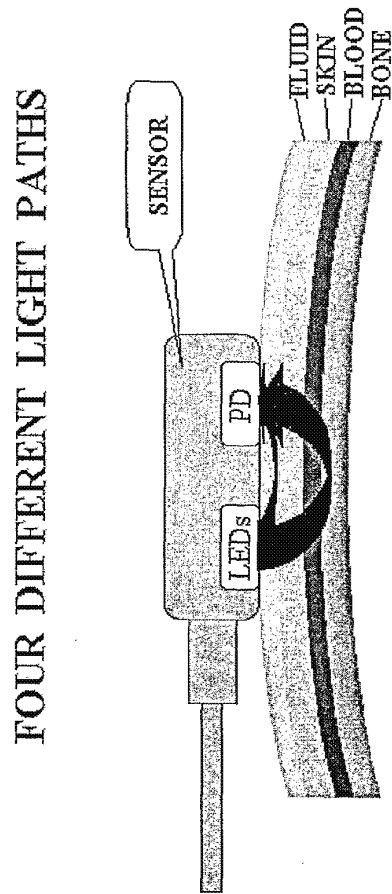
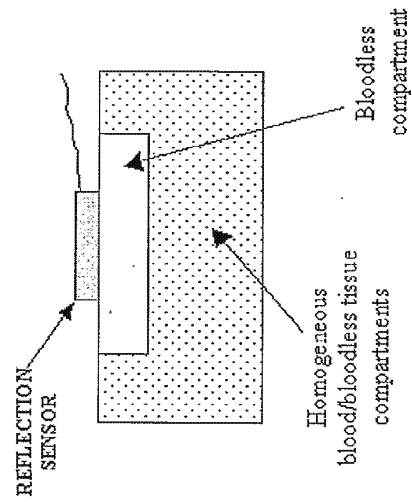
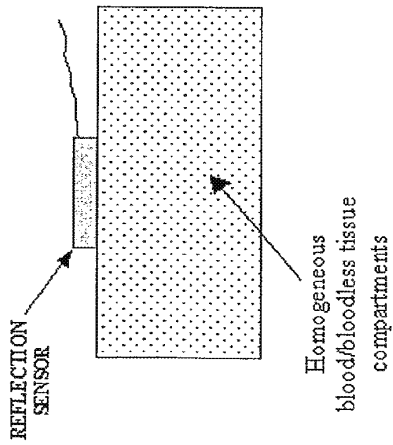


Fig. 4



(b)

Fig. 5b



(a)

Fig. 5a

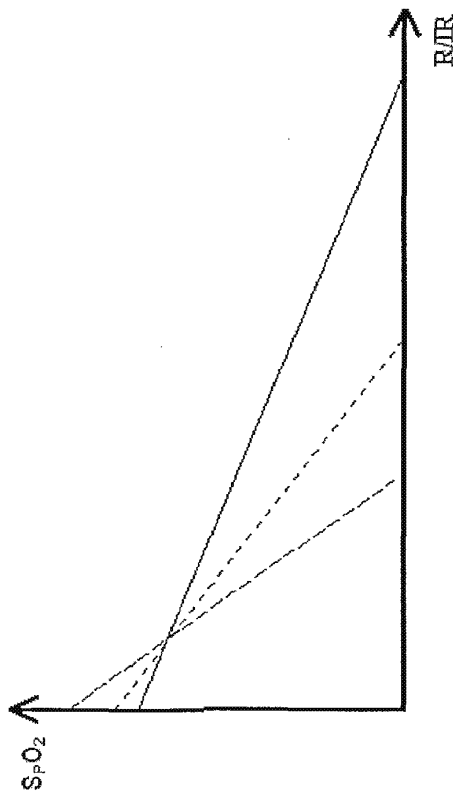


Fig. 6

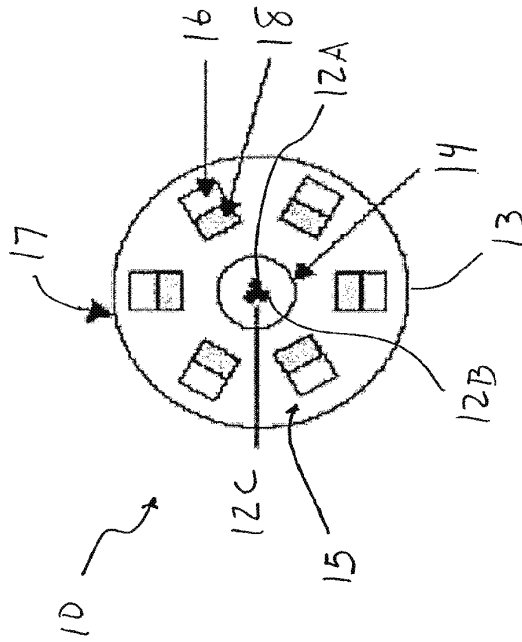


Fig. 7

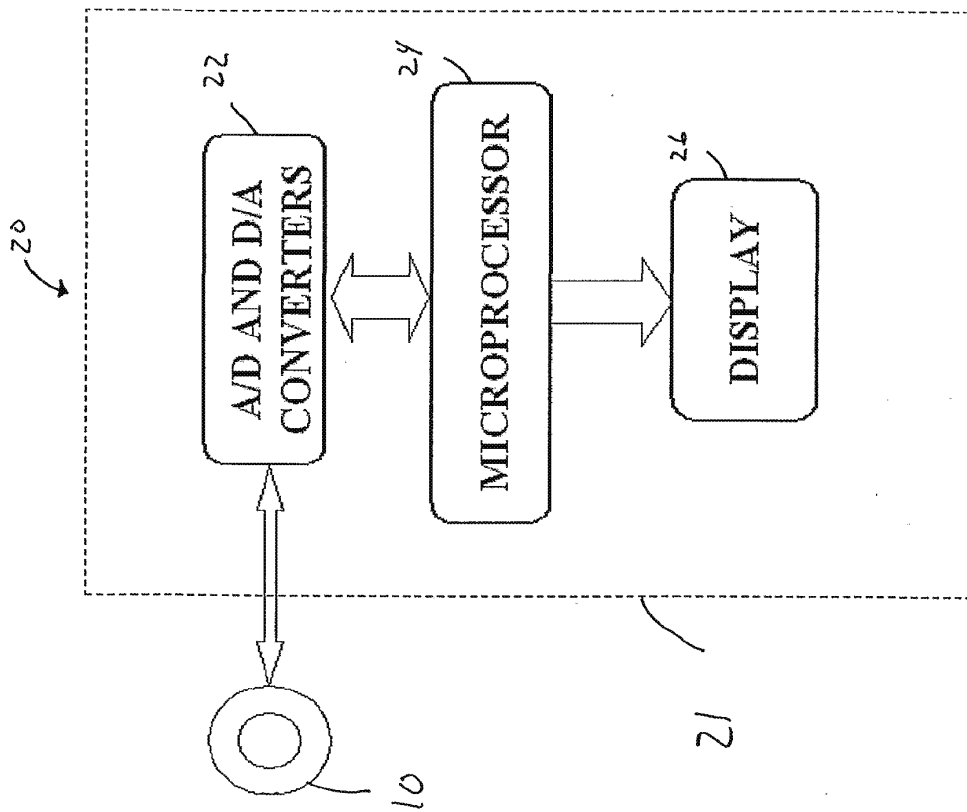


Fig. 8

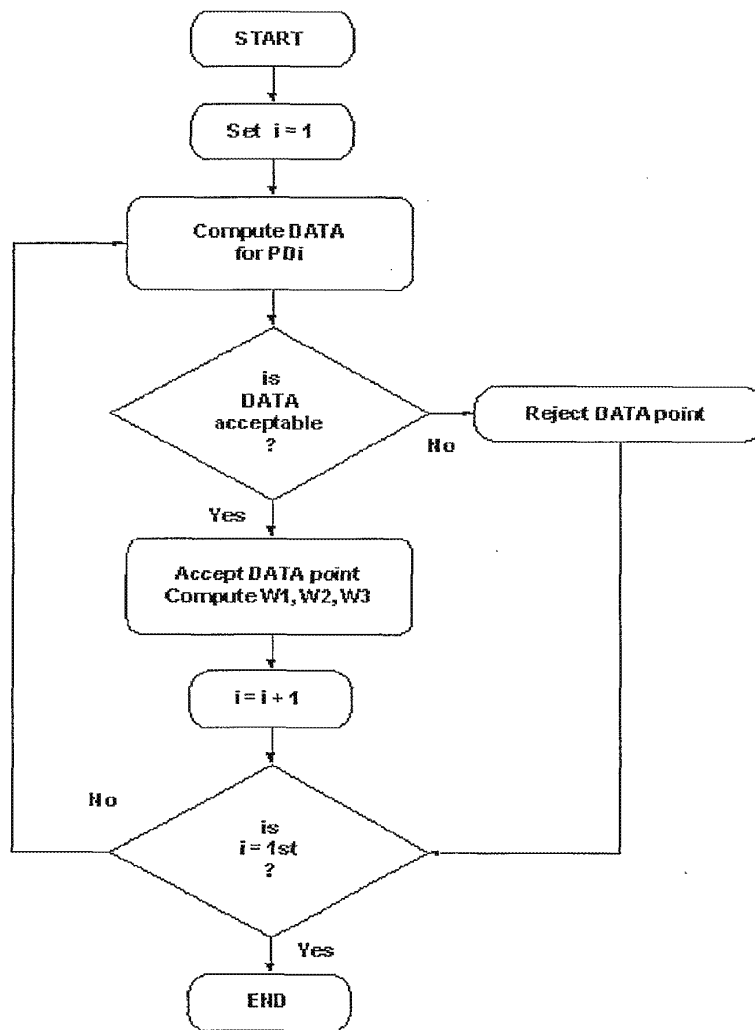


Fig. 9



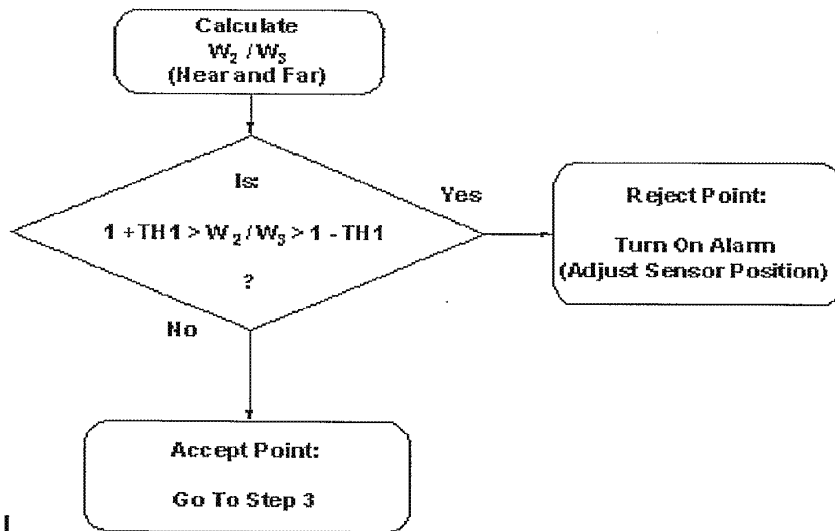


Fig. 10A

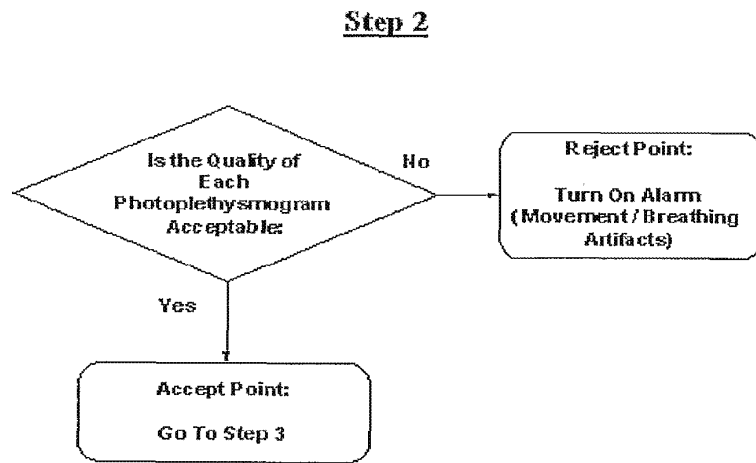


Fig. 10B

Step 3

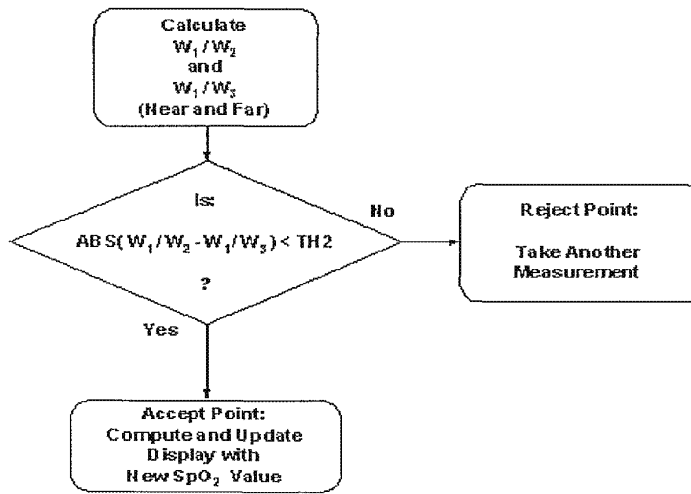


Fig. 10C

INTERNATIONAL SEARCH REPORT

In International Application No  
PCT/US 01/26642

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 7 A61B5/00  According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) IPC 7 A61B  Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 385 143 A (AOYAGI) 31 January 1995 (1995-01-31)  the whole document	1, 2, 11, 12, 16-40, 62-86
X	WO 00 32099 A (CRITICARE) 8 June 2000 (2000-06-08) page 5	1, 13, 41, 42, 87, 88
A	WO 96 41566 A (CYBRO) 27 December 1996 (1996-12-27) page 15, line 17 -page 16, line 30	1, 4-8, 10, 44-61
<input type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
Special categories of cited documents : *A* document defining the general state of the art which is not considered to be of particular relevance *I* earlier document but published on or after the international filing date *I* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
14 March 2002		21/03/2002
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer  Lemercier, D

Form PCT/ISA/210 (second sheet) (July 1992)

APL\_MAS\_ITC\_00557441

INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 01/26642

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5385143 A	31-01-1995	JP 2608828 B2	14-05-1997
		JP 5212016 A	24-08-1993
		JP 2613832 B2	28-05-1997
		JP 6030916 A	08-02-1994
		JP 2608830 B2	14-05-1997
		JP 6030915 A	08-02-1994
WO 0032099 A	08-06-2000	US 6163715 A	19-12-2000
		AU 1839300 A	19-06-2000
		CN 1335756 T	13-02-2002
		EP 1146812 A1	24-10-2001
		WO 0032099 A1	08-06-2000
		US 2001005773 A1	28-06-2001
WO 9641566 A	27-12-1996	IL 114082 A	28-10-1999
		AU 708051 B2	29-07-1999
		AU 5909696 A	09-01-1997
		CA 2221968 A1	27-12-1996
		EP 0957747 A2	24-11-1999
		WO 9641566 A2	27-12-1996
		IL 122515 A	28-10-1999
		JP 11507568 T	06-07-1999
		US 6031603 A	29-02-2000

Form PCT/ISA/210 (patent family annex) (July 1992)

Doc Code: PET.AUTO Document Description: Petition automatically granted by EFS-Web		PTO/SB/140 U.S. Patent and Trademark Office Department of Commerce
Electronic Petition Request	<b>PETITION TO WITHDRAW AN APPLICATION FROM ISSUE AFTER PAYMENT OF THE ISSUE FEE UNDER 37 CFR 1.313(c)</b>	
Application Number	15195199	
Filing Date	28-Jun-2016	
First Named Inventor	Ammar Al-Ali	
Art Unit	3791	
Examiner Name	MARJAN FARDANESH	
Attorney Docket Number	MAS.1007A	
Title	ADVANCED PULSE OXIMETRY SENSOR	
<p>An application may be withdrawn from issue for further action upon petition by the applicant. To request that the Office withdraw an application from issue, applicant must file a petition under this section including the fee set forth in § 1.17(h) and a showing of good and sufficient reasons why withdrawal of the application from issue is necessary.</p> <p>APPLICANT HEREBY PETITIONS TO WITHDRAW THIS APPLICATION FROM ISSUE UNDER 37 CFR 1.313(c).</p> <p>A grantable petition requires the following items:                  (1) Petition fee; and                  (2) One of the following reasons:                  (a) Unpatentability of one or more claims, which must be accompanied by an unequivocal statement that one or more claims are unpatentable, an amendment to such claim or claims, and an explanation as to how the amendment causes such claim or claims to be patentable;                  (b) Consideration of a request for continued examination in compliance with § 1.114 (for a utility or plant application only); or                  (c) Express abandonment of the application. Such express abandonment may be in favor of a continuing application, but not a CPA under 37 CFR 1.53(d).</p>		
Petition Fee		
<input type="radio"/> Small Entity		
<input type="radio"/> Micro Entity		
<input checked="" type="radio"/> Regular Undiscounted		
Reason for withdrawal from issue		

One or more claims are unpatentable

Consideration of a request for continued examination (RCE) (List of Required Documents and Fees)

Applicant hereby expressly abandons the instant application (any attorney/agent signing for this reason must have power of attorney pursuant to 37 CFR 1.32(b)).

---

RCE request, submission, and fee.

I certify, in accordance with 37 CFR 1.4(d)(4) that :  
The RCE request ,submission, and fee have already been filed in the above-identified application on

Are attached.

---

THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES

I certify, in accordance with 37 CFR 1.4(d)(4) that I am:

An attorney or agent registered to practice before the Patent and Trademark Office who has been given power of attorney in this application.

An attorney or agent registered to practice before the Patent and Trademark Office, acting in a representative capacity.

A sole inventor

A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application

A joint inventor; all of whom are signing this e-petition

Signature	/Aaron S. Johnson/
Name	Aaron S. Johnson
Registration Number	74164

Electronic Patent Application Fee Transmittal				
<b>Application Number:</b>	15195199			
<b>Filing Date:</b>	28-Jun-2016			
<b>Title of Invention:</b>	ADVANCED PULSE OXIMETRY SENSOR			
<b>First Named Inventor/Applicant Name:</b>	Ammar Al-Ali			
<b>Filer:</b>	Aaron Samuel Johnson/Evelyn Salcido			
<b>Attorney Docket Number:</b>	MAS.1007A			
Filed as Large Entity				
<b>Filing Fees for Utility under 35 USC 111(a)</b>				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
PETITION FEE- 37 CFR 1.17(H) (GROUP III)	1464	1	140	140
RCE- 2ND AND SUBSEQUENT REQUEST	1820	1	1900	1900
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				



Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>2040</b>




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Commissioner for Patents  
 United States Patent and Trademark Office  
 P.O. Box 1450  
 Alexandria, VA 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

Decision Date : August 15, 2019

In re Application of :

Ammar Al-Ali

DECISION ON PETITION

UNDER CFR 1.313(c)(2)

Application No : 15195199

Filed : 28-Jun-2016

Attorney Docket No : MAS.1007A

This is an electronic decision on the petition under 37 CFR 1.313(c)(2), filed August 15, 2019 , to withdraw the above-identified application from issue after payment of the issue fee.

The petition is **GRANTED**.

The above-identified application is withdrawn from issue for consideration of a submission under 37 CFR 1.114 (request for continued examination). See 37 CFR 1.313(c)(2).

**Petitioner is advised that the issue fee paid in this application cannot be refunded. If, however, this application is again allowed, petitioner may request that it be applied towards the issue fee required by the new Notice of Allowance.**

Telephone inquiries concerning this decision should be directed to the Patent Electronic Business Center (EBC) at 866-217-9197.

This application file is being referred to Technology Center AU 3791 for processing of the request for continuing examination under 37 CFR 1.114 .

Office of Petitions

APL\_MAS\_ITC\_00557447

<b>Electronic Acknowledgement Receipt</b>	
<b>EFS ID:</b>	36887011
<b>Application Number:</b>	15195199
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	3453
<b>Title of Invention:</b>	ADVANCED PULSE OXIMETRY SENSOR
<b>First Named Inventor/Applicant Name:</b>	Ammar Al-Ali
<b>Customer Number:</b>	64735
<b>Filer:</b>	Aaron Samuel Johnson/Evelyn Salcido
<b>Filer Authorized By:</b>	Aaron Samuel Johnson
<b>Attorney Docket Number:</b>	MAS.1007A
<b>Receipt Date:</b>	15-AUG-2019
<b>Filing Date:</b>	28-JUN-2016
<b>Time Stamp:</b>	15:24:42
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$2040
RAM confirmation Number	E20198EF24387896
Deposit Account	111410
Authorized User	Evelyn Salcido
<p>The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:</p> <p>37 CFR 1.16 (National application filing, search, and examination fees)</p> <p>37 CFR 1.17 (Patent application and reexamination processing fees)</p>	

<b>File Listing:</b>					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	RCE_MAS1007A.pdf	1349939	no	3
			57ad2628aaa3d03caf90fa550449222833783a83		
<b>Warnings:</b>					
<b>Information:</b>					
2		IDS_MAS1007A.pdf	48652	yes	3
			7e12c2253bbe59d5533a2ec27c7c7bfb1020df1e03d		
<b>Multipart Description/PDF files in .zip description</b>					
<b>Document Description</b>			<b>Start</b>	<b>End</b>	
Transmittal Letter			1	2	
Information Disclosure Statement (IDS) Form (SB08)			3	3	
<b>Warnings:</b>					
<b>Information:</b>					
3	Foreign Reference	WO2002028274A1.pdf	2353491	no	51
			1628218dfc9ac217b24ac3bd84b882a3111b2f51		
<b>Warnings:</b>					
<b>Information:</b>					
4	Non Patent Literature	KONIG_1998.pdf	242161	no	10
			47173a0504b8c0f7a79d6e0323969cbb3106c04c		
<b>Warnings:</b>					
<b>Information:</b>					
5	Petition automatically granted by EFS	petition-request.pdf	31628	no	2
			6de3fee2fd1d80295c2f1ac2b9dc2594022a7dc27		
<b>Warnings:</b>					
<b>Information:</b>					

6	Fee Worksheet (SB06)	fee-info.pdf	32442	no	2
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<b>Warnings:</b>					
<b>Information:</b>					
			<b>Total Files Size (in bytes):</b>	4058313	
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>					



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**NOTICE OF ALLOWANCE AND FEE(S) DUE**

64735 7590 09/05/2019  
 KNOBBE, MARTENS, OLSON & BEAR, LLP  
 MASIMO CORPORATION (MASIMO)  
 2040 MAIN STREET  
 FOURTEENTH FLOOR  
 IRVINE, CA 92614

EXAMINER  
 FARDANESH, MARJAN

ART UNIT	PAPER NUMBER
3791	

DATE MAILED: 09/05/2019

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/195,199	06/28/2016	Ammar Al-Ali	MAS.1007A	3453

TITLE OF INVENTION: ADVANCED PULSE OXIMETRY SENSOR

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1000	\$0.00	\$1000.00	\$0	12/05/2019

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

**HOW TO REPLY TO THIS NOTICE:**

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at [www.uspto.gov/PatentMaintenanceFees](http://www.uspto.gov/PatentMaintenanceFees).**

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

64735 7590 09/05/2019
KNOBBE, MARTENS, OLSON & BEAR, LLP
MASIMO CORPORATION (MASIMO)
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Values: 15/195,199, 06/28/2016, Ammar Al-Ali, MAS.1007A, 3453

TITLE OF INVENTION: ADVANCED PULSE OXIMETRY SENSOR

Table with 7 columns: APPLN. TYPE, ENTITY STATUS, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE
Values: nonprovisional, UNDISCOUNTED, \$1000, \$0.00, \$1000.00, \$0, 12/05/2019

Table with 3 columns: EXAMINER, ART UNIT, CLASS-SUBCLASS
Values: FARDANESH, MARJAN, 3791, 600-323000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
[ ] Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
[ ] "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): [ ] Individual [ ] Corporation or other private group entity [ ] Government

4a. Fees submitted: [ ] Issue Fee [ ] Publication Fee (if required) [ ] Advance Order - # of Copies

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

[ ] Electronic Payment via EFS-Web [ ] Enclosed check [ ] Non-electronic payment by credit card (Attach form PTO-2038)
[ ] The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No.

5. Change in Entity Status (from status indicated above)

[ ] Applicant certifying micro entity status. See 37 CFR 1.29
[ ] Applicant asserting small entity status. See 37 CFR 1.27
[ ] Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature Date
Typed or printed name Registration No.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/195,199	06/28/2016	Ammar Al-Ali	MAS.1007A	3453
64735	7590	09/05/2019	EXAMINER FARDANESH, MARJAN	
KNOBBE, MARTENS, OLSON & BEAR, LLP MASIMO CORPORATION (MASIMO) 2040 MAIN STREET FOURTEENTH FLOOR IRVINE, CA 92614			ART UNIT	PAPER NUMBER
			3791	
DATE MAILED: 09/05/2019				

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**  
 (Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.



## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.** Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

### Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b) (2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

APL\_MAS\_ITC\_00557454

<b>Notice of Allowability</b>	<b>Application No.</b> 15/195,199	<b>Applicant(s)</b> Al-Ali, Ammar	
	<b>Examiner</b> MARJAN FARDANESH	<b>Art Unit</b> 3791	<b>AIA (FITF) Status</b> Yes

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.  This communication is responsive to request for continued examination filed on 08/15/2019.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.

2.  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.

3.  The allowed claim(s) is/are See Continuation Sheet. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

4.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**  
a)  All      b)  Some      \*c)  None of the:

1.  Certified copies of the priority documents have been received.  
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5.  CORRECTED DRAWINGS (as "replacement sheets") must be submitted.  
 including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**

6.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. <input type="checkbox"/> Notice of References Cited (PTO-892)	5. <input checked="" type="checkbox"/> Examiner's Amendment/Comment
2. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date <u>07/19/2019, 08/15/2019.</u>	6. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance
3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.	7. <input type="checkbox"/> Other _____.
4. <input type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date _____.	

/MARJAN FARDANESH/ Examiner, Art Unit 3791	/ERIC F WINAKUR/ Primary Examiner, Art Unit 3791
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Continuation Sheet (PTOL-37)

Application No. 15/195,199

Continuation of 3. The allowed claim(s) is/are: 1-7,16,18-20,22-29,32-33,37-42 and 45

Application/Control Number: 15/195,199  
Art Unit: 3791

Page 2

***Notice of Pre-AIA or AIA Status***

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.
2. The IDS(s) filed on 07/19/2019 and 08/15/2019 have been fully considered. Claims remain allowable for the reasons of record.

***Conclusion***

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARJAN FARDANESH whose telephone number is (571)270-5508. The examiner can normally be reached on Monday-Friday 9:00-17:00.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patricia Mallari can be reached on (571)272-4729. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

APL\_MAS\_ITC\_00557457


Application/Control Number: 15/195,199  
Art Unit: 3791

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ERIC F WINAKUR/  
Primary Examiner, Art Unit 3791

/MARJAN FARDANESH/  
Examiner, Art Unit 3791

<b>Search Notes</b> 	<b>Application/Control No.</b> 15/195,199	<b>Applicant(s)/Patent Under Reexamination</b> Al-Ali, Ammar
	<b>Examiner</b> MARJAN FARDANESH	<b>Art Unit</b> 3791

CPC - Searched*		
Symbol	Date	Examiner
EAST-See search history printout	02/19/2019	/mf/
EAST-See search history printout	02/19/2019	/mf/
EAST-See search history printout	07/18/2019	/mf/

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

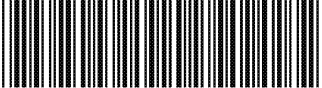
US Classification - Searched*			
Class	Subclass	Date	Examiner

\* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
"PALM" inventor name search	02/19/2019	/mf/

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
EAST-	See search history printout	07/18/2019	/mf/

/MARJAN FARDANESH/ Examiner, Art Unit 3791	
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<b>Issue Classification</b> 	<b>Application/Control No.</b> 15/195,199	<b>Applicant(s)/Patent Under Reexamination</b> Al-Ali, Ammar
	<b>Examiner</b> MARJAN FARDANESH	<b>Art Unit</b> 3791


CPC						
Symbol				Type	Version	
A61B	/	5	/	14552	F	2013-01-01
A61B	/	5	/	6826	I	2013-01-01
A61B	/	5	/	0002	I	2013-01-01
A61B	/	5	/	02416	I	2013-01-01
A61B	/	5	/	14532	I	2013-01-01
A61B	/	5	/	14546	I	2013-01-01
A61B	/	5	/	4875	I	2013-01-01
A61B	/	5	/	7278	I	2013-01-01
A61B	/	5	/	742	I	2013-01-01
A61B	/	2562	/	04	A	2013-01-01

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

/MARJAN FARDANESH/ Examiner, Art Unit 3791 (Assistant Examiner)	22 August 2019 (Date)	<b>Total Claims Allowed:</b> 28	
/ERIC F WINAKUR/ Primary Examiner, Art Unit 3791 (Primary Examiner)	26 August 2019 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 7

U.S. Patent and Trademark Office

Part of Paper No.: 20190822

<b>Issue Classification</b> 	<b>Application/Control No.</b> 15/195,199	<b>Applicant(s)/Patent Under Reexamination</b> Al-Ali, Ammar
	<b>Examiner</b> MARJAN FARDANESH	<b>Art Unit</b> 3791

<b>INTERNATIONAL CLASSIFICATION</b>		
<b>CLAIMED</b>		
A61B	5	1455

<b>NON-CLAIMED</b>		

<b>US ORIGINAL CLASSIFICATION</b>	
<b>CLASS</b>	<b>SUBCLASS</b>
600	310


<b>CROSS REFERENCES(S)</b>					
<b>CLASS</b>	<b>SUBCLASS (ONE SUBCLASS PER BLOCK)</b>				

/MARJAN FARDANESH/ Examiner, Art Unit 3791 (Assistant Examiner)	22 August 2019 (Date)	<b>Total Claims Allowed:</b> 28	
/ERIC F WINAKUR/ Primary Examiner, Art Unit 3791 (Primary Examiner)	26 August 2019 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 7

U.S. Patent and Trademark Office

Part of Paper No.: 20190822



<b>Issue Classification</b> 	<b>Application/Control No.</b> 15/195,199	<b>Applicant(s)/Patent Under Reexamination</b> Al-Ali, Ammar
	<b>Examiner</b> MARJAN FARDANESH	<b>Art Unit</b> 3791

Claims renumbered in the same order as presented by applicant  
  CPA  
  T.D.  
  R.1.47

CLAIMS															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1		10	14	19	22	28	4	37						
5	2		11	12	20	24	29	10	38						
2	3		12		21		30	13	39						
3	4		13	16	22		31	19	40						
7	5		14	17	23	26	32	23	41						
8	6		15	18	24	27	33	25	42						
9	7	6	16	15	25		34		43						
	8		17	20	26		35		44						
	9	11	18	21	27		36	28	45						

/MARJAN FARDANESH/ Examiner, Art Unit 3791 (Assistant Examiner)	22 August 2019 (Date)	<b>Total Claims Allowed:</b> 28	
/ERIC F WINAKUR/ Primary Examiner, Art Unit 3791 (Primary Examiner)	26 August 2019 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 7

U.S. Patent and Trademark Office

Part of Paper No.: 20190822

Receipt date: 07/19/2019

15/195,199 - GAU: 3791

PTO/SB/08 Equivalent

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 1 OF 12		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	5,623,925	4/29/1997	Swenson et al.	
	2	5,987,343	11/16/1999	Kinast	
	3	6,308,089	10/23/2001	von der Ruhr et al.	
	4	7,048,687	5/23/2006	Reuss et al.	
	5	8,280,473	10/2/2012	Al-Ali	
	6	9,364,181	6/14/2016	Kiani et al.	
	7	9,368,671	6/14/2016	Wojtczuk et al.	
	8	9,370,325	6/21/2016	Al-Ali et al.	
	9	9,370,326	6/21/2016	McHale et al.	
	10	9,370,335	6/21/2016	Al-ali et al.	
	11	9,375,185	6/28/2016	Ali et al.	
	12	9,386,953	7/12/2016	Al-Ali	
	13	9,386,961	7/12/2016	Al-Ali et al.	
	14	9,392,945	7/19/2016	Al-Ali et al.	
	15	9,397,448	7/19/2016	Al-Ali et al.	
	16	9,408,542	8/9/2016	Kinast et al.	
	17	9,436,645	9/6/2016	Al-Ali et al.	
	18	9,445,759	9/20/2016	Lamego et al.	
	19	9,466,919	10/11/2016	Kiani et al.	
	20	9,474,474	10/25/2016	Lamego et al.	
	21	9,480,422	11/1/2016	Al-Ali	
	22	9,480,435	11/1/2016	Olsen	
	23	9,492,110	11/15/2016	Al-Ali et al.	
	24	9,510,779	12/6/2016	Poeze et al.	
	25	9,517,024	12/13/2016	Kiani et al.	
	26	9,532,722	1/3/2017	Lamego et al.	
	27	9,538,949	1/10/2017	Al-Ali et al.	
	28	9,538,980	1/10/2017	Telfort et al.	
	29	9,549,696	1/24/2017	Lamego et al.	

Examiner Signature /MARJAN FARDANESH/	Date Considered 08/22/2019
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p> <p style="text-align: center;"><del>ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.F./</del></p>	

T<sup>1</sup> - Place a check mark in this area when an English language Translation is attached.

Receipt date: 07/19/2019

15/195,199 - GAU: 3791

PTO/SB/08 Equivalent

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 2 OF 12		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	30	9,554,737	1/31/2017	Schurman et al.	
	31	9,560,996	2/7/2017	Kiani	
	32	9,560,998	2/7/2017	Al-Ali et al.	
	33	9,566,019	2/14/2017	Al-Ali et al.	
	34	9,579,039	2/28/2017	Jansen et al.	
	35	9,591,975	3/14/2017	Dalvi et al.	
	36	9,622,692	4/18/2017	Lamego et al.	
	37	9,622,693	4/18/2017	Diab	
	38	9,636,055	5/2/2017	Al-Ali et al.	
	39	9,636,056	5/2/2017	Al-Ali	
	40	9,649,054	5/16/2017	Lamego et al.	
	41	9,662,052	5/30/2017	Al-Ali et al.	
	42	9,668,679	6/6/2017	Schurman et al	
	43	9,668,680	6/6/2017	Bruinsma et al.	
	44	9,668,703	6/6/2017	Al-Ali	
	45	9,675,286	6/13/2017	Diab	
	46	9,687,160	6/27/2017	Kiani	
	47	9,693,719	7/4/2017	Al-Ali et al.	
	48	9,693,737	7/4/2017	Al-Ali	
	49	9,697,928	7/4/2017	Al-Ali et al.	
	50	9,717,425	8/1/2017	Kiani et al.	
	51	9,717,458	8/1/2017	Lamego et al.	
	52	9,724,016	8/8/2017	Al-Ali et al.	
	53	9,724,024	8/8/2017	Al-Ali	
	54	9,724,025	8/8/2017	Kiani et al.	
	55	9,730,640	8/15/2017	Diab et al.	
	56	9,743,887	8/29/2017	Al-Ali et al.	
	57	9,749,232	8/29/2017	Sampath et al.	
	58	9,750,442	9/5/2017	Olsen	

Examiner Signature /MARJAN FARDANESH/	Date Considered 08/22/2019
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p> <p style="text-align: center;"><del>ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.F./</del></p>	

T<sup>1</sup> - Place a check mark in this area when an English language Translation is attached.

Receipt date: 07/19/2019

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 3 OF 12		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	59	9,750,443	9/5/2017	Smith et al.	
	60	9,750,461	9/5/2017	Telfort	
	61	9,775,545	10/3/2017	Al-Ali et al.	
	62	9,775,546	10/3/2017	Diab et al.	
	63	9,775,570	10/3/2017	Al-Ali	
	64	9,778,079	10/3/2017	Al-Ali et al.	
	65	9,782,077	10/10/2017	Lamego et al.	
	66	9,782,110	10/10/2017	Kiani	
	67	9,787,568	10/10/2017	Lamego et al.	
	68	9,788,735	10/17/2017	Al-Ali	
	69	9,788,768	10/17/2017	Al-Ali et al.	
	70	9,795,300	10/24/2017	Al-Ali	
	71	9,795,310	10/24/2017	Al-Ali	
	72	9,795,358	10/24/2017	Telfort et al.	
	73	9,795,739	10/24/2017	Al-Ali et al.	
	74	9,801,556	10/31/2017	Kiani	
	75	9,801,588	10/31/2017	Weber et al.	
	76	9,808,188	11/7/2017	Perea et al.	
	77	9,814,418	11/14/2017	Weber et al.	
	78	9,820,691	11/21/2017	Kiani	
	79	9,833,152	12/5/2017	Kiani et al.	
	80	9,833,180	12/5/2017	Shakespeare et al.	
	81	9,839,379	12/12/2017	Al-Ali et al.	
	82	9,839,381	12/12/2017	Weber et al.	
	83	9,847,002	12/19/2017	Kiani et al.	
	84	9,847,749	12/19/2017	Kiani et al.	
	85	9,848,800	12/26/2017	Lee et al.	
	86	9,848,806	12/26/2017	Al-Ali et al.	
	87	9,848,807	12/26/2017	Lamego	

Examiner Signature	<u>/MARJAN FARDANESH/</u>	Date Considered	08/22/2019
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Receipt date: 07/19/2019

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
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**U.S. PATENT DOCUMENTS**

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	88	9,861,298	1/9/2018	Eckerbom et al.	
	89	9,861,304	1/9/2018	Al-Ali et al.	
	90	9,861,305	1/9/2018	Weber et al.	
	91	9,867,578	1/16/2018	Al-Ali et al.	
	92	9,872,623	1/23/2018	Al-Ali	
	93	9,876,320	1/23/2018	Coverston et al.	
	94	9,877,650	1/30/2018	Muhsin et al.	
	95	9,877,686	1/30/2018	Al-Ali et al.	
	96	9,891,079	2/13/2018	Dalvi	
	97	9,895,107	2/20/2018	Al-Ali et al.	
	98	9,913,617	3/13/2018	Al-Ali et al.	
	99	9,924,893	3/27/2018	Schurman et al.	
	100	9,924,897	3/27/2018	Abdul-Hafiz	
	101	9,936,917	4/10/2018	Poeze et al.	
	102	9,943,269	4/17/2018	Muhsin et al.	
	103	9,949,676	4/24/2018	Al-Ali	
	104	9,955,937	5/1/2018	Telfort	
	105	9,965,946	5/8/2018	Al-Ali	
	106	9,980,667	5/29/2018	Kiani et al.	
	107	9,986,919	6/5/2018	Lamego et al.	
	108	9,986,952	6/5/2018	Dalvi et al.	
	109	9,989,560	6/5/2018	Poeze et al.	
	110	9,993,207	6/12/2018	Al-Ali et al.	
	111	10,007,758	6/26/2018	Al-Ali et al.	
	112	10,010,276	7/3/2018	Al-Ali et al.	
	113	10,032,002	7/24/2018	Kiani et al.	
	114	10,039,482	8/7/2018	Al-Ali et al.	
	115	10,052,037	8/21/2018	Kinast et al.	
	116	10,058,275	8/28/2018	Al-Ali et al.	

Examiner Signature	<u>/MARJAN FARDANESH/</u>	Date Considered	08/22/2019
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Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	117	10,064,562	9/4/2018	Al-Ali	
	118	10,086,138	10/2/2018	Novak, Jr.	
	119	10,092,200	10/9/2018	Al-Ali et al.	
	120	10,092,249	10/9/2018	Kiani et al.	
	121	10,098,550	10/16/2018	Al-Ali et al.	
	122	10,098,591	10/16/2018	Al-Ali et al.	
	123	10,098,610	10/16/2018	Al-Ali et al.	
	124	10,123,726	11/13/2018	Al-Ali et al.	
	125	10,130,289	11/20/2018	Al-Ali et al.	
	126	10,130,291	11/20/2018	Schurman et al.	
	127	10,149,616	12/11/2018	Al-Ali et al.	
	128	10,154,815	12/18/2018	Al-Ali et al.	
	129	10,159,412	12/25/2018	Lamego et al.	
	130	10,188,296	1/29/2019	Al-Ali et al.	
	131	10,188,331	1/29/2019	Al-Ali et al.	
	132	10,188,348	1/29/2019	Kiani et al.	
	133	10,194,847	2/5/2019	Al-Ali	
	134	10,194,848	2/5/2019	Kiani et al.	
	135	10,201,298	2/12/2019	Al-Ali et al.	
	136	10,205,272	2/12/2019	Kiani et al.	
	137	10,205,291	2/12/2019	Scruggs et al.	
	138	10,213,108	2/26/2019	Al-Ali	
	139	10,219,706	3/5/2019	Al-Ali	
	140	10,219,746	3/5/2019	McHale et al.	
	141	10,226,187	3/12/2019	Al-Ali et al.	
	142	10,226,576	3/12/2019	Kiani	
	143	10,231,657	3/19/2019	Al-Ali et al.	
	144	10,231,670	3/19/2019	Blank et al.	
	145	10,231,676	3/19/2019	Al-Ali et al.	

Examiner Signature /MARJAN FARDANESH/	Date Considered 08/22/2019
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	146	10,251,585	4/9/2019	Al-Ali et al.	
	147	10,251,586	4/9/2019	Lamego	
	148	10,255,994	4/9/2019	Sampath et al.	
	149	10,258,265	4/16/2019	Poeze et al.	
	150	10,258,266	4/16/2019	Poeze et al.	
	151	10,271,748	4/30/2019	Al-Ali	
	152	10,278,626	5/7/2019	Schurman et al.	
	153	10,278,648	5/7/2019	Al-Ali et al.	
	154	10,279,247	5/7/2019	Kiani	
	155	10,292,628	5/21/2019	Poeze et al.	
	156	10,292,657	5/21/2019	Abdul-Hafiz et al.	
	157	10,292,664	5/21/2019	Al-Ali	
	158	10,299,708	5/28/2019	Poeze et al.	
	159	10,299,709	5/28/2019	Perea et al.	
	160	10,305,775	5/28/2019	Lamego et al.	
	161	10,307,111	6/4/2019	Muhsin et al.	
	162	10,325,681	6/18/2019	Sampath et al.	
	163	10,327,337	6/18/2019	Triman et al.	
	164	D788,312	5/30/2017	Al-Ali et al.	
	165	D820,865	6/19/2018	Muhsin et al.	
	166	D822,215	7/3/2018	Al-Ali et al.	
	167	D822,216	7/3/2018	Barker et al.	
	168	D833,624	11/13/2018	DeJong et al.	
	169	D835,282	12/4/2018	Barker et al.	
	170	D835,283	12/4/2018	Barker et al.	
	171	D835,284	12/4/2018	Barker et al.	
	172	D835,285	12/4/2018	Barker et al.	
	173	RE47,218	2/5/2019	Ali-Ali	
	174	RE47,244	2/19/2019	Kiani et al.	

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	175	RE47,249	2/19/2019	Kiani et al.	
	176	RE47,353	4/16/2019	Kiani et al.	
	177	2003/0036690	2/20/2003	Geddes et al.	
	178	2006/0161054	7/20/2006	Reuss et al.	
	179	2016/0166182	6/16/2016	Al-Ali et al.	
	180	2016/0166183	6/16/2016	Poeze et al.	
	181	2016/0196388	7/7/2016	Lamego	
	182	2016/0197436	7/7/2016	Barker et al.	
	183	2016/0213281	7/28/2016	Eckerbom, et al.	
	184	2016/0228043	8/11/2016	O'Neil et al.	
	185	2016/0233632	8/11/2016	Scruggs et al.	
	186	2016/0234944	8/11/2016	Schmidt et al.	
	187	2016/0270735	9/22/2016	Diab et al.	
	188	2016/0283665	9/29/2016	Sampath et al.	
	189	2016/0287090	10/6/2016	Al-Ali et al.	
	190	2016/0287786	10/6/2016	Kiani	
	191	2016/0296169	10/13/2016	McHale et al.	
	192	2016/0310052	10/27/2016	Al-Ali et al.	
	193	2016/0314260	10/27/2016	Kiani	
	194	2016/0324488	11/10/2016	Olsen	
	195	2016/0327984	11/10/2016	Al-Ali et al.	
	196	2016/0331332	11/17/2016	Al-Ali	
	197	2016/0367173	12/22/2016	Dalvi et al.	
	198	2017/0000394	1/5/2017	Al-Ali et al.	
	199	2017/0007134	1/12/2017	Al-Ali et al.	
	200	2017/0007198	1/12/2017	Al-Ali et al.	
	201	2017/0014083	1/19/2017	Diab et al.	
	202	2017/0014084	1/19/2017	Al-Ali et al.	
	203	2017/0024748	1/26/2017	Haider	

Examiner Signature	<u>/MARJAN FARDANESH/</u>	Date Considered	08/22/2019
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<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
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U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	204	2017/0042488	2/16/2017	Muhsin	
	205	2017/0055851	3/2/2017	Al-Ali	
	206	2017/0055882	3/2/2017	Al-Ali et al.	
	207	2017/0055887	3/2/2017	Al-Ali	
	208	2017/0055896	3/2/2017	Al-Ali et al.	
	209	2017/0079594	3/23/2017	Telfort et al.	
	210	2017/0086723	3/30/2017	Al-Ali et al.	
	211	2017/0143281	5/25/2017	Olsen	
	212	2017/0147774	5/25/2017	Kiani	
	213	2017/0156620	6/8/2017	Al-Ali et al.	
	214	2017/0173632	6/22/2017	Al-Ali	
	215	2017/0187146	6/29/2017	Kiani et al.	
	216	2017/0188919	7/6/2017	Al-Ali et al.	
	217	2017/0196464	7/13/2017	Jansen et al.	
	218	2017/0196470	7/13/2017	Lamego et al.	
	219	2017/0224262	8/10/2017	Al-Ali	
	220	2017/0228516	8/10/2017	Sampath et al.	
	221	2017/0245790	8/31/2017	Al-Ali et al.	
	222	2017/0251974	9/7/2017	Shreim et al.	
	223	2017/0251975	9/7/2017	Shreim et al.	
	224	2017/0258403	9/14/2017	Abdul-Hafiz et al.	
	225	2017/0311851	11/2/2017	Schurman et al.	
	226	2017/0311891	11/2/2017	Kiani et al.	
	227	2017/0325728	11/16/2017	Al-Ali et al.	
	228	2017/0332976	11/23/2017	Al-Ali et al.	
	229	2017/0340293	11/30/2017	Al-Ali et al.	
	230	2017/0360310	12/21/2017	Kiani et al.	
	231	2017/0367632	12/28/2017	Al-Ali et al.	
	232	2018/0008146	1/11/2018	Al-Ali et al.	

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	233	2018/0013562	1/11/2018	Haider et al.	
	234	2018/0014752	1/18/2018	Al-Ali et al.	
	235	2018/0028124	2/1/2018	Al-Ali et al.	
	236	2018/0055385	3/1/2018	Al-Ali	
	237	2018/0055390	3/1/2018	Kiani et al.	
	238	2018/0055430	3/1/2018	Diab et al.	
	239	2018/0064381	3/8/2018	Shakespeare et al.	
	240	2018/0069776	3/8/2018	Lamego et al.	
	241	2018/0070867	3/15/2018	Smith et al.	
	242	2018/0082767	3/22/2018	Al-Ali et al.	
	243	2018/0085068	3/29/2018	Telfort	
	244	2018/0087937	3/29/2018	Al-Ali et al.	
	245	2018/0103874	4/19/2018	Lee et al.	
	246	2018/0103905	4/19/2018	Kiani	
	247	2018/0110478	4/26/2018	Al-Ali	
	248	2018/0116575	5/3/2018	Perea et al.	
	249	2018/0125368	5/10/2018	Lamego et al.	
	250	2018/0125430	5/10/2018	Al-Ali et al.	
	251	2018/0125445	5/10/2018	Telfort et al.	
	252	2018/0130325	5/10/2018	Kiani et al.	
	253	2018/0132769	5/17/2018	Weber et al.	
	254	2018/0132770	5/17/2018	Lamego	
	255	2018/0146901	5/31/2018	Al-Ali et al.	
	256	2018/0146902	5/31/2018	Kiani et al.	
	257	2018/0153442	6/7/2018	Eckerbom, et al.	
	258	2018/0153446	6/7/2018	Kiani	
	259	2018/0153447	6/7/2018	Al-Ali et al.	
	260	2018/0153448	6/7/2018	Weber et al.	
	261	2018/0161499	6/14/2018	Al-Ali et al.	

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	262	2018/0168491	6/21/2018	Al-Ali et al.	
	263	2018/0174679	6/21/2018	Sampath et al.	
	264	2018/0174680	6/21/2018	Sampath et al.	
	265	2018/0182484	6/28/2018	Sampath et al.	
	266	2018/0184917	7/5/2018	Kiani	
	267	2018/0192924	7/12/2018	Al-Ali	
	268	2018/0192953	7/12/2018	Shreim et al.	
	269	2018/0192955	7/12/2018	Al-Ali et al.	
	270	2018/0199871	7/19/2018	Pauley et al.	
	271	2018/0206795	7/26/2018	Al-Ali	
	272	2018/0206815	7/26/2018	Telfort	
	273	2018/0213583	7/26/2018	Al-Ali	
	274	2018/0214031	8/2/2018	Kiani et al.	
	275	2018/0214090	8/2/2018	Al-Ali et al.	
	276	2018/0218792	8/2/2018	Muhsin et al.	
	277	2018/0225960	8/9/2018	Al-Ali et al.	
	278	2018/0238718	8/23/2018	Dalvi	
	279	2018/0242853	8/30/2018	Al-Ali	
	280	2018/0242921	8/30/2018	Muhsin et al.	
	281	2018/0242923	8/30/2018	Al-Ali et al.	
	282	2018/0242924	8/30/2018	Barker et al.	
	283	2018/0242926	8/30/2018	Muhsin et al.	
	284	2018/0247353	8/30/2018	Al-Ali et al.	
	285	2018/0247712	8/30/2018	Muhsin et al.	
	286	2018/0249933	9/6/2018	Schurman, et al.	
	287	2018/0253947	9/6/2018	Muhsin et al.	
	288	2018/0256087	9/13/2018	Al-Ali et al.	
	289	2018/0256113	9/13/2018	Weber et al.	
	290	2018/0285094	10/4/2018	Housel et al.	

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	291	2018/0289325	10/11/2018	Poeze et al.	
	292	2018/0289337	10/11/2018	Al-Ali et al.	
	293	2018/0296161	10/18/2018	Shreim et al.	
	294	2018/0300919	10/18/2018	Muhsin et al.	
	295	2018/0310822	11/1/2018	Indorf et al.	
	296	2018/0310823	11/1/2018	Al-Ali et al.	
	297	2018/0317826	11/8/2018	Muhsin	
	298	2018/0317841	11/8/2018	Novak, Jr.	
	299	2018/0333055	11/22/2018	Lamego et al.	
	300	2018/0333087	11/22/2019	Al-Ali	
	301	2019/0000317	1/3/2019	Muhsin et al.	
	302	2019/0000362	1/3/2019	Kiani et al.	
	303	2019/0015023	1/17/2019	Monfre	
	304	2019/0021638	1/24/2019	Al-Ali et al.	
	305	2019/0029574	1/31/2019	Schurman et al.	
	306	2019/0029578	1/31/2019	Al-Ali et al.	
	307	2019/0038143	2/7/2019	Al-Ali	
	308	2019/0058280	2/21/2019	Al-Ali et al.	
	309	2019/0058281	2/21/2019	Al-Ali et al.	
	310	2019/0069813	3/7/2019	Al-Ali	
	311	2019/0069814	3/7/2019	Al-Ali	
	312	2019/0076028	3/14/2019	Al-Ali et al.	
	313	2019/0082979	3/21/2019	Al-Ali et al.	
	314	2019/0090748	3/28/2019	Al-Ali	
	315	2019/0090760	3/28/2019	Kinast et al.	
	316	2019/0090764	3/28/2019	Al-Ali	
	317	2019/0104973	04-11.2019	Poeze et al.	
	318	2019/0110719	4/18/2019	Poeze et al.	
	319	2019/0117070	4/25/2019	Muhsin et al.	

Examiner Signature	<u>/MARJAN FARDANESH/</u>	Date Considered	08/22/2019
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p> <p style="text-align: center;"><del>ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.F./</del></p>			

T<sup>1</sup> - Place a check mark in this area when an English language Translation is attached.

Receipt date: 07/19/2019

15/195,199 - GAU: 3791

PTO/SB/08 Equivalent

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 12 OF 12		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	320	2019/0117139	4/25/2019	Al-Ali et al.	
	321	2019/0117140	4/25/2019	Al-Ali et al.	
	322	2019/0117141	4/25/2019	Al-Ali	
	323	2019/0117930	4/25/2019	Al-Ali	
	324	2019/0122763	4/25/2019	Sampath et al.	
	325	2019/0133525	5/9/2019	Al-Ali et al.	
	326	2019/0142283	5/16/2019	Lamego et al.	
	327	2019/0142344	5/16/2019	Telfort et al.	
	328	2019/0150800	5/23/2019	Poeze et al.	
	329	2019/0150856	5/23/2019	Kiani et al.	
	330	2019/0167161	6/6/2019	Al-Ali et al.	
	331	2019/0175019	6/13/2019	Al-Ali et al.	
	332	2019/0192076	6/27/2010	McHale et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document <i>Country Code-Number-Kind Code</i> Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>

30950661

Examiner Signature	<u>/MARJAN FARDANESH/</u>	Date Considered	08/22/2019
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p> <p style="text-align: center;"><del>ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.F./</del></p>			

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Receipt date: 08/15/2019

15/195,199 - GAU: 3791

PTO/SB/08 Equivalent

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	15/195199	
	Filing Date	June 28, 2016	
	First Named Inventor	Ammar Al-Ali	
	Art Unit	3791	
<i>(Multiple sheets used when necessary)</i>		Examiner	Fardanesh, Marjan
SHEET 1 OF 1		Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	5,099,842	03-31-1992	Mannheimer et al.	
	2	5,601,079	02-11-1997	Wong et al.	
	3	6,223,063	04-24-2001	Chaiken et al.	
	4	2002/0042558	04-11-2002	Mendelson	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document <i>Country Code-Number-Kind Code</i> Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>
	5	WO 02/028274	04-11-2002	CYBRO MEDICAL LTD.		

NON PATENT LITERATURE DOCUMENTS			
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	6	Konig, V. et al., "REFLECTANCE PULSE OXIMETRY - PRINCIPLES AND OBSTETRIC APPLICATION IN THE ZURICH SYSTEM," J Clin Monit 1998; 14: 403-412.	

31137795

Examiner Signature	/MARJAN FARDANESH/	Date Considered	08/22/2019
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p> <p style="text-align: center;"><del>ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.F/</del></p>			

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(Typed or printed name)
(Signature)
(Date)

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Values: 15/195,199, 06/28/2016, Ammar Al-Ali, MAS.1007A, 3453

TITLE OF INVENTION: ADVANCED PULSE OXIMETRY SENSOR

Table with 7 columns: APPLN. TYPE, ENTITY STATUS, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE
Values: nonprovisional, UNDISCOUNTED, \$1000, \$0.00, \$1000.00, \$0, 12/05/2019

Table with 3 columns: EXAMINER, ART UNIT, CLASS-SUBCLASS
Values: FARDANESH, MARJAN, 3791, 600-323000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

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- 1. Knobbe, Martens,
2. Olson & Bear, LLP
3.

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

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(A) NAME OF ASSIGNEE
Masimo Corporation

(B) RESIDENCE: (CITY and STATE OR COUNTRY)
Irvine, CA

Please check the appropriate assignee category or categories (will not be printed on the patent): Individual [ ] Corporation or other private group entity [x] Government [ ]

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[ ] Applicant asserting small entity status. See 37 CFR 1.27
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NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Aaron S. Johnson/ Date September 9, 2019
Typed or printed name Aaron S. Johnson Registration No. 74,164

<b>Electronic Acknowledgement Receipt</b>	
<b>EFS ID:</b>	37119447
<b>Application Number:</b>	15195199
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	3453
<b>Title of Invention:</b>	ADVANCED PULSE OXIMETRY SENSOR
<b>First Named Inventor/Applicant Name:</b>	Ammar Al-Ali
<b>Customer Number:</b>	64735
<b>Filer:</b>	Aaron Samuel Johnson/tony do
<b>Filer Authorized By:</b>	Aaron Samuel Johnson
<b>Attorney Docket Number:</b>	MAS.1007A
<b>Receipt Date:</b>	11-SEP-2019
<b>Filing Date:</b>	28-JUN-2016
<b>Time Stamp:</b>	15:11:48
<b>Application Type:</b>	Utility under 35 USC 111(a)

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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	ISSUE-FEE-TRANSMITTAL_MAS1007A.pdf	115443 5745ff1c51025f71c7bdd0e1c6efd717aa4bd772	no	1

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<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>	

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(B) RESIDENCE: (CITY and STATE OR COUNTRY) Irvine, CA

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Sale Item Reference Number	Effective Date
15195199	09/11/2019

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I20199C959000560	1501	UTILITY APPL ISSUE FEE	\$1,000.00	Salea

Change(s) applied  
to document,

/M.W.J./  
9/13/2019

**Application No.: 15/195199**  
**Filing Date: June 28, 2016**

#### AMENDMENTS TO THE SPECIFICATION

Please amend the originally-filed specification as set forth below.

[0053]  
~~[0052]~~ Referring now to FIG. 7B, a top view of the 3D sensor 700 is illustrated with both the emitter 702 and the light blocker cover 707 removed for ease of illustration. The outer ring illustrates the footprint of the light diffuser 704. As light is emitted from the emitter 702 (not shown in FIG. 7B), it is diffused homogenously and directed to the tissue measurement site 102. The light blocker 706 forms the circular wall of a light isolation chamber to keep incident light from being sensed by the detector 710. The light blocker cover 707 blocks incidental light from entering the light isolation chamber from above. The light concentrator ~~710~~708 collects the reflected light from the tissue measurement site 102 and funnels it upward toward the detector 710 at the center of the 3D sensor 700.



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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/195,199	10/22/2019	10448871	MAS.1007A	3453

64735 7590 10/02/2019  
 KNOBBE, MARTENS, OLSON & BEAR, LLP  
 MASIMO CORPORATION (MASIMO)  
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**ISSUE NOTIFICATION**

The projected patent number and issue date are specified above.

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**  
 (application filed on or after May 29, 2000)

The Patent Term Adjustment is 409 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

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APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

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IR103 (Rev. 10/09)

Electronic Patent Application Fee Transmittal				
<b>Application Number:</b>	15195199			
<b>Filing Date:</b>	28-Jun-2016			
<b>Title of Invention:</b>	ADVANCED PULSE OXIMETRY SENSOR			
<b>First Named Inventor/Applicant Name:</b>	Ammar Al-Ali			
<b>Filer:</b>	Jarom D. Kesler/Daniel Escajeda			
<b>Attorney Docket Number:</b>	MAS.1007A			
Filed as Large Entity				
<b>Filing Fees for Utility under 35 USC 111(a)</b>				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
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<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
CERTIFICATE OF CORRECTION	1811	1	150	150

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
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<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>150</b>

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<b>Application Number:</b>	15195199
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	3453
<b>Title of Invention:</b>	ADVANCED PULSE OXIMETRY SENSOR
<b>First Named Inventor/Applicant Name:</b>	Ammar Al-Ali
<b>Customer Number:</b>	64735
<b>Filer:</b>	Jarom D. Kesler/Melanie Terrazas
<b>Filer Authorized By:</b>	Jarom D. Kesler
<b>Attorney Docket Number:</b>	MAS.1007A
<b>Receipt Date:</b>	03-JUN-2020
<b>Filing Date:</b>	28-JUN-2016
<b>Time Stamp:</b>	15:39:22
<b>Application Type:</b>	Utility under 35 USC 111(a)

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Payment Type	CARD
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RAM confirmation Number	E202063F39585230
Deposit Account	111410
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1	Transmittal Letter	TRANSMITTAL_MAS1007A.pdf	14970 e3685d8b754de195e6323b3b376bde89dd24bdad	no	1
<b>Warnings:</b>					
<b>Information:</b>					
2	Request for Certificate of Correction	REQ-CERT_MAS1007A.pdf	23032 539479df7c5def1f9811a0950eeb786471579ff1	no	1
<b>Warnings:</b>					
<b>Information:</b>					
3	Fee Worksheet (SB06)	fee-info.pdf	30216 43a468d33a0ba66287ff5db49fa182f78af6c84c	no	2
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			68218		
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**UNITED STATES PATENT AND TRADEMARK OFFICE  
CERTIFICATE OF CORRECTION**

**PATENT NO.** : 10,448,871  
**APPLICATION NO.** : 15/195199  
**ISSUE DATE** : October 22, 2019  
**INVENTOR(S)** : Ammar Al-Ali

Page 1 of 1

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In Column 1, Line 31, delete “d<sub>80</sub>,” and insert --d<sub>λ</sub>--.

In Column 1, Line 37, Equation 1, delete “μ<sub>a, λ</sub>” and insert --μ<sub>α, λ</sub>--.

In Column 1, Line 40, Equation 2, delete “μ<sub>a, λ</sub>” and insert --μ<sub>α, λ</sub>--.

In Column 1, Line 43, delete “Ξ<sub>α, λ</sub>” and insert --μ<sub>α, λ</sub>--.

In Column 7, Line 49, delete “(also” and insert --also--.

In Column 7, Line 65, delete “Gaussian” and insert --Gaussian--.

In Column 16, Line 8, Claim 9, delete “system” and insert --device--.

In Column 16, Line 39, Claim 12, delete “the a” and insert --the--.

In Column 16, Line 58, Claim 14, delete “the a” and insert --the--.

32078625

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DOCKET NO. MAS.1007A

PTO/SB/44 Equivalent

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**MASIMO 2057**  
**Apple v. Masimo**  
**IPR2022-01291**

UNITED STATES PATENT AND TRADEMARK OFFICE  
**CERTIFICATE OF CORRECTION**

PATENT NO. : 10,448,871 B2  
 APPLICATION NO. : 15/195199  
 DATED : October 22, 2019  
 INVENTOR(S) : Ammar Al-Ali

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

**In the Specification**

In Column 1, Line 31, delete “d<sub>80</sub>,” and insert --d<sub>λ</sub>--.

In Column 1, Line 37, Equation 1, delete “μ<sub>a,λ</sub>” and insert --μ<sub>a,λ</sub>--.

In Column 1, Line 40, Equation 2, delete “μ<sub>a,λ</sub>” and insert --μ<sub>a,λ</sub>--.

In Column 1, Line 43, delete “ $\bar{\mu}_{a,\lambda}$ ” and insert --μ<sub>a,λ</sub>--.

In Column 7, Line 49, delete “(also” and insert --also--.

In Column 7, Line 65, delete “Gaussian” and insert --Gaussian--.

**In the Claims**

In Column 16, Line 8, Claim 9, delete “system” and insert --device--.

In Column 16, Line 39, Claim 12, delete “the a” and insert --the--.

In Column 16, Line 58, Claim 14, delete “the a” and insert --the--.

Signed and Sealed this  
 Seventh Day of July, 2020



Andrei Iancu  
 Director of the United States Patent and Trademark Office

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**MASIMO 2057**  
**Apple v. Masimo**  
**IPR2022-01291**