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

			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

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

		"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

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

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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	/MARJAN FARDANESH/	Date Considered	02/19/2019

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.F/

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Receipt date: 12/20/2018 15/195,199 - GAU: 3791

PTO/SB/08 Equivalent

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

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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	/MARJAN FARDANESH/	Date Considered	02/19/2019

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Receipt date: 12/20/2018 15/195,199 - GAU: 3791

PTO/SB/08 Equivalent

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

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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	/MARJAN FARDANESH/	Date Considered	02/19/2019

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Receipt date: 12/20/2018 15/195,199 - GAU: 3791

PTO/SB/08 Equivalent

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

U.S. PATENT DOCUMENTS

Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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 *Country Code-Number-Kind Code* Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[1]

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[1]

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Examiner Signature	/MARJAN FARDANESH/	Date Considered	02/19/2019

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Receipt date: 11/07/2018 15/195,199 - GAU: 3791

PTO/SB/08 Equivalent

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

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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 *Country Code-Number-Kind Code* Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[1]
	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[1]
	7	Written Opinion received in International Application No. PCT/US2016/040190, dated January 2, 2018.	

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Examiner Signature /MARJAN FARDANESH/	Date Considered 02/19/2019

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Doc Code: ECOMM.AUTH/ECOMM.WTDW
Doc Description: Internet Communications Authorized/Internet Communications Authorization Withdrawn

PTO/SB/439 (11-15)

AUTHORIZATION FOR INTERNET COMMUNICATIONS IN A PATENT APPLICATION OR REQUEST TO WITHDRAW AUTHORIZATION FOR INTERNET COMMUNICATIONS

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.

Electronic Acknowledgement Receipt

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

Payment information:

Submitted with Payment	no

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 6eab7e9fef0f2acd92f92489933f37d90b78fc29	no	2
Warnings:					

Information:	
Total Files Size (in bytes):	80246

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.

New Applications Under 35 U.S.C. 111
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.
National Stage of an International Application under 35 U.S.C. 371
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.
New International Application Filed with the USPTO as a Receiving Office
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.

PTO/SB/08 Equivalent

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

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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 *Country Code-Number-Kind Code* Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[1]

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[1]

30349839

Examiner Signature	Date Considered
***Examiner:** 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.	

T[1] - Place a check mark in this area when an English language Translation is attached.

Electronic Patent Application Fee Transmittal

Application Number:	15195199
Filing Date:	28-Jun-2016
Title of Invention:	ADVANCED PULSE OXIMETRY SENSOR
First Named Inventor/Applicant Name:	Ammar Al-Ali
Filer:	Aaron Samuel Johnson/Daniel Escajeda
Attorney Docket Number:	MAS.1007A

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

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

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

File Listing:

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 83cda8fef969e81f4ca52c82dfd9748acc80f681	no	3
Warnings:					
Information:					
2		OAR_MAS1007A.pdf	105375 ffb3b6f510dea7fc0d22fc6b2d94a3410175551e	yes	18

Multipart Description/PDF files in .zip description

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

Warnings:					
Information:					
3	Drawings-only black and white line drawings	REPLACEMENT_MAS1007A.PDF	62541 b0ddcc7decf1ccea282255e2281e6eb1076926ab	no	1
Warnings:					
Information:					
4		IDS_MAS1007A.pdf	45114 69b001d1a295f70cb34ebdda200db3c36f1bcb30	yes	2

	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Transmittal Letter		1	1	
	Information Disclosure Statement (IDS) Form (SB08)		2	2	
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	32436 a60dc942d6d544c777de9302cfcca2c5b5ef07be	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1595409		

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.

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National Stage of an International Application under 35 U.S.C. 371
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.
New International Application Filed with the USPTO as a Receiving Office
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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

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

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		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
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

SUBMISSION REQUIRED UNDER 37 CFR 1.114

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).

☐ 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.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☒ Amendment/Reply
- ☒ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

☐ 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)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 111410

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

EFS - Web 2.1.16

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

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.

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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.

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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.

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

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.

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

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.

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

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~~a plurality of detectors.

20. **(Currently Amended)** The method of Claim 18, further comprising:

transmitting, from the ~~one or more~~a 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 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 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 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:

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. **(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

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.

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)**

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

AMENDMENTS TO THE DRAWINGS

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

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

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.

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

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

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.

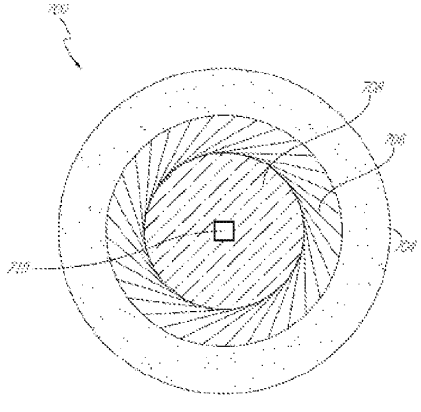

Figure 7B of Originally-filed Application

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. <u>The Pending Claims Are Patentable over the Cited Art</u>

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.

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

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***.

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***

> ***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,

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

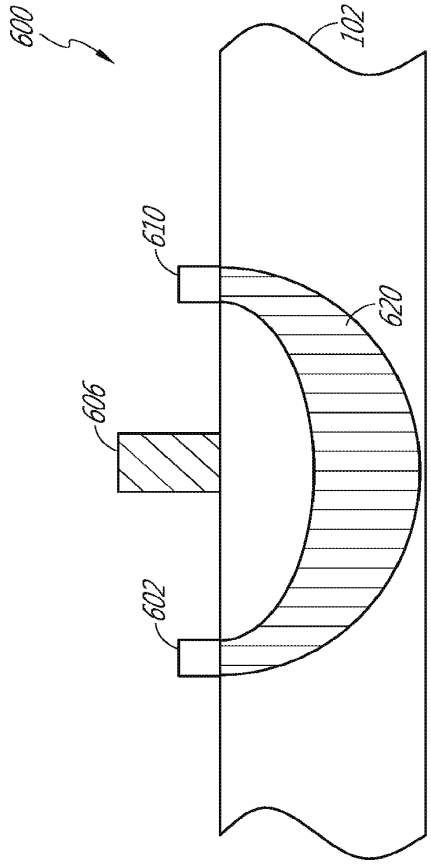

FIG. 6
(PRIOR ART)

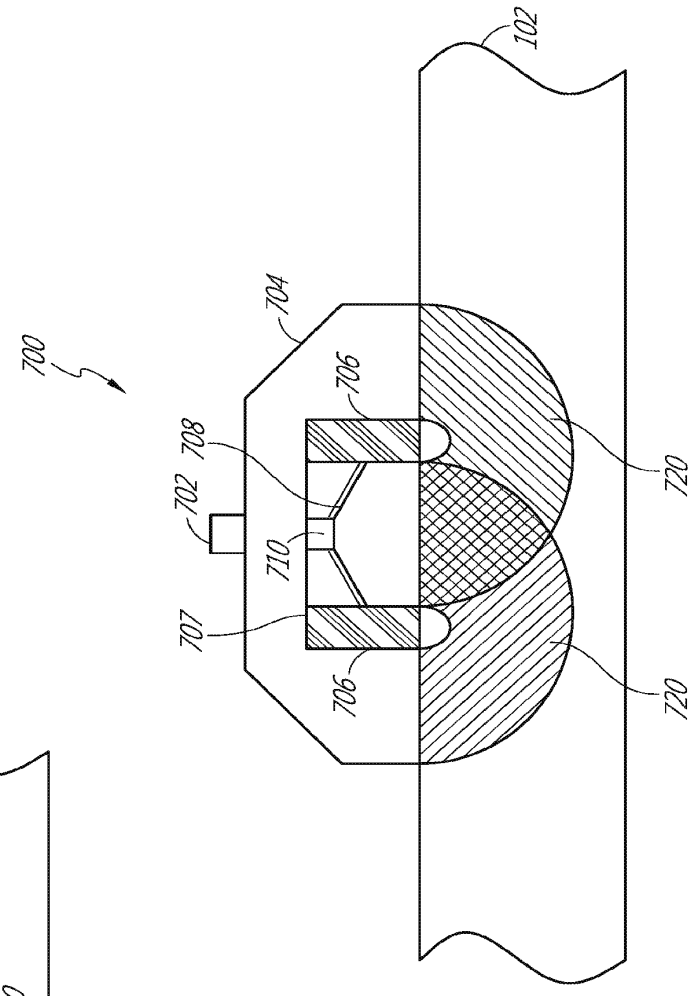

FIG. 7A

REPLACEMENT SHEET

Docket No.: MAS.1007A **Customer No. 64735**

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.

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

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PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/195,199	Filing Date 06/28/2016	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

	(Column 1)	(Column 2)			
FOR	NUMBER FILED	NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ 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 =	
☐ 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).				
☐ 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	

APPLICATION AS AMENDED - PART II

		(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
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ 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 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ 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.

Doc Code: DIST.E.FILE Document Description: Electronic Terminal Disclaimer - Filed	PTO/SB/25 U.S. Patent and Trademark Office Department of Commerce

Electronic Petition Request	**TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING REJECTION OVER A PENDING "REFERENCE" APPLICATION**
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

☒ Filing of terminal disclaimer does not obviate requirement for response under 37 CFR 1.111 to outstanding Office Action

☒ 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.

◉ Terminal disclaimer fee under 37 CFR 1.20(d) is included with Electronic Terminal Disclaimer request.

○ 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: ○ Small Entity ○ Micro Entity ◉ 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.
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 is of record in this application Registration Number 74164 ○ 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 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

Application Number:	15195199
Filing Date:	28-Jun-2016
Title of Invention:	ADVANCED PULSE OXIMETRY SENSOR
First Named Inventor/Applicant Name:	Ammar Al-Ali
Filer:	Aaron Samuel Johnson/Gustavo Lopez
Attorney Docket Number:	MAS.1007A

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
STATUTORY OR TERMINAL DISCLAIMER	1814	1	160	160
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**160**

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

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

File Listing:

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 cda8c5e4afb4b5813dda31470eed460dcccf e734	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30571 783c44517e23a2b5c784bf774b3cc110d60 25654	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	64593		

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.

New Applications Under 35 U.S.C. 111
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.
National Stage of an International Application under 35 U.S.C. 371
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.
New International Application Filed with the USPTO as a Receiving Office
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.

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

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)

Application Number	15/195199
Filing Date	June 28, 2016
First Named Inventor	Ammar Al-Ali
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

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

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
Registration number 74164

☐ attorney or agent acting under 37 CFR 1.34
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

Application Number:	15195199
Filing Date:	28-Jun-2016
Title of Invention:	ADVANCED PULSE OXIMETRY SENSOR
First Named Inventor/Applicant Name:	Ammar Al-Ali
Filer:	Aaron Samuel Johnson/Daniel Escajeda
Attorney Docket Number:	MAS.1007A

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
PROCESSING FEE, EXCEPT PROV. APPLS.	1830	1	140	140
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

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

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

File Listing:

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 d24319f47ce926f43e5e4265414a6e5cdb3bb2bf	no	2
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
2	Request under Rule 48 correcting inventorship	REQUEST_MAS1007A.pdf	166489 8f374be66d785648b710f26e2c4af72e32a65213	no	3
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	32283 22aeb7b7ddb570cf994ec67c1419de9550c7fbfa	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	234296		

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.

New Applications Under 35 U.S.C. 111
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.
National Stage of an International Application under 35 U.S.C. 371
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.
New International Application Filed with the USPTO as a Receiving Office
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.

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

Given Name:	Ammar
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City of Residence:	San Juan Capistrano
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City:	San Juan Capistrano
State or Province:	CA
Country:	US
Postal or Zip Code:	92675

Inventor Information 2

Given Name:	~~Stephen~~
Family Name:	~~Scruggs~~
City of Residence:	~~Newport Beach~~
State or Prov. of Residence:	~~CA~~
Country of Residence:	~~US~~
Street:	~~307 Snug Harbor Road~~
City:	~~Newport Beach~~
State or Province:	~~CA~~

Country: ~~US~~

Postal or Zip Code: ~~92663~~

Correspondence Information

Correspondence Customer Number: 64735

Phone Number: (949) 760-0404

Fax Number: (949) 760-9502

E-Mail Address: efiling@knobbe.com

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
(949) 760-0404

30951089

PTO/SB/08 Equivalent

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

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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
***Examiner:** 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.	

T[1] - Place a check mark in this area when an English language Translation is attached.

PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	15/195199
	Filing Date	June 28, 2016
	First Named Inventor	Ammar Al-Ali
	Art Unit	3791
(Multiple sheets used when necessary)	Examiner	Fardanesh, Marjan
SHEET 2 OF 12	Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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
***Examiner:** 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.	

T[1] - Place a check mark in this area when an English language Translation is attached.

PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	15/195199
	Filing Date	June 28, 2016
	First Named Inventor	Ammar Al-Ali
	Art Unit	3791
(Multiple sheets used when necessary)	Examiner	Fardanesh, Marjan
SHEET 3 OF 12	Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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
***Examiner:** 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.	

T[1] - Place a check mark in this area when an English language Translation is attached.

PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	15/195199
	Filing Date	June 28, 2016
	First Named Inventor	Ammar Al-Ali
	Art Unit	3791
(Multiple sheets used when necessary)	Examiner	Fardanesh, Marjan
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U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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
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U.S. PATENT DOCUMENTS					
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	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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U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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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	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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	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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U.S. PATENT DOCUMENTS					
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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.	
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	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.	

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	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 *Country Code-Number-Kind Code* Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[1]

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[1]

30950661

Examiner Signature	Date Considered
***Examiner:** 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.	

T[1] - Place a check mark in this area when an English language Translation is attached.

Docket No.: MAS.1007A **Customer No. 64735**

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

Electronic Acknowledgement Receipt

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

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		IDS_MAS1007A.pdf	156598 a12f001d7a269660078d1dc24e51d43382a e1c05	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
Warnings:			
Information:			
	Total Files Size (in bytes):	156598	

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.

New Applications Under 35 U.S.C. 111
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.
National Stage of an International Application under 35 U.S.C. 371
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.
New International Application Filed with the USPTO as a Receiving Office
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.

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

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

OC000000109831742

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).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

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 AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
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

CONFIRMATION NO. 3453

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

37 CFR 1.48 ACKNOWLEDGEMENT LETTER

OC000000109831743

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

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT5634478

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
AMMAR AL-ALI	07/19/2019

RECEIVING PARTY DATA

Name:	MASIMO CORPORATION
Street Address:	52 DISCOVERY
City:	IRVINE
State/Country:	CALIFORNIA
Postal Code:	92618

PROPERTY NUMBERS Total: 2

Property Type	Number
Application Number:	15195199
Application Number:	16226249

CORRESPONDENCE DATA

Fax Number: (949)760-9502

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.

Phone: 9497600404
Email: efiling@knobbe.com
Correspondent Name: KNOBBE, MARTENS, OLSON & BEAR, LLP
Address Line 1: 2040 MAIN STREET
Address Line 2: 14TH FLOOR
Address Line 4: IRVINE, CALIFORNIA 92614

ATTORNEY DOCKET NUMBER:	MAS.1007A/ MAS.1007C1
NAME OF SUBMITTER:	AARON S. JOHNSON
SIGNATURE:	/Aaron S. Johnson/
DATE SIGNED:	07/24/2019
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 3
source=Executed CDA - MAS.1007A#page1.tif
source=Executed CDA - MAS.1007A#page2.tif
source=Executed CDA - MAS.1007A#page3.tif

COMBINED DECLARATION & ASSIGNMENT (37 CFR 1.63(e))

Application Data Sheet filed previously or concurrently

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

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.

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

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

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

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 9th day of July, 20 19.

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
} ss.
COUNTY OF ORANGE

On 9JUL2019, 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.

_____
Notary Signature

[SEAL]

ELISA M. MULET
Notary Public - California
Orange County
Commission # 2173718
My Comm. Expires Dec 28, 2020

30945203

Docket No.: MAS.1007A

July 25, 2019
Page 1 of 2

Please Direct All Correspondence to Customer Number 64735

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.

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

Electronic Acknowledgement Receipt

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

Payment information:

Submitted with Payment	no

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:					

Information:	
Total Files Size (in bytes):	19482

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.

New Applications Under 35 U.S.C. 111
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National Stage of an International Application under 35 U.S.C. 371
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.
New International Application Filed with the USPTO as a Receiving Office
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.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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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.

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.

(Typed or printed name)
(Signature)
(Date)

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

EXAMINER	ART UNIT	CLASS-SUBCLASS
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 _____
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. _____

PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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

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

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

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.

Notice Requiring Inventor's Oath or Declaration	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.

Notice of Allowability	**Application No.** 15/195,199	**Applicant(s)** Al-Ali et al.	
	Examiner MARJAN FARDANESH	**Art Unit** 3791	**AIA (FITF) Status** 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** or send an inquiry to **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 areply 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. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 07/05/2019.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☑ Interview Summary (PTO-413), Paper No./Mail Date. 07/18/2019.
5. ☑ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

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

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

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,

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

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

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

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

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

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

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
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

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.

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

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/195,199	Al-Ali et al.
	Examiner	**Art Unit**
	MARJAN FARDANESH	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	18 July 2019	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	28	
/ERIC F WINAKUR/ Primary Examiner, Art Unit 3791	19 July 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	7

U.S. Patent and Trademark Office — Part of Paper No.: 20190717

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

INTERNATIONAL CLASSIFICATION				
CLAIMED				
A61B	/	5	/	1455

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**
600	310

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

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

U.S. Patent and Trademark Office — Part of Paper No.: 20190717

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

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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

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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
S6	0	"15676847"	US-PGPUB; USPAT	OR	OFF	2019/06/12 15:13
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

			USPAT			
S16	16	((("VERIFOOD") near3 ("LTD"))).AS,AANM.	USPAT	OR	OFF	2019/06/17 14:15
S17	42	((("GOLDRING") near3 ("Damian"))).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/17 14:15
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
S21	81	("0679577" | "20020039186" | "20020131047" | "20020163641" | "20020191127" | "20040019462" | "20040136577" | "20050151975" | "20050196046" | "20060086901" | "20060124656" | "20060146315" | "20070230932" | "20080061236" | "20080073510" | "20080137328" | "20080204578" | "20080277625" | "20090201577" | "20100085537" | "20100110442" | "20100128370" | "20100134794" | "20100191493" | "20100201979" | "20100271352" | "20100284005" | "20100309454" | "20110255745" | "20110261252" | "20110318717" | "20120018829" | "20120019819" | "20120053426" | "20120088486" | "20130021611" | "20130155402" | "20140052555" | "20140293091" | "20140320858" | "20150036138" | "20150055132" | "20150204833" | "20150292948" | "20150300879" | "20150369725" | "20160033328" | "5469252" | "6031233" | "6031619" | "6212312" | "6483583" | "7236243" | "7262839" | "7286233" | "7414724" | "7420663" | "7433042" | "7528957" | "7535617" | "7667740" | "7805319" | "7897923" | "7986193" | "8060383" | "8149415" | "8269174" | "8274739" | "8284401" | "8330945" | "8462420" | "8542359" | "8665440" | "9060113" | "9291504" | "9383258").PN. OR ("9562848").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/06/17 14:24
S22	1485	(tube catheter) same (block$4 actuator) and (spectroscopy spectrometer) and A61B5/$.cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2019/06/17 14:27
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

			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

		("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

		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

		"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

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

			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
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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

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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
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S116	1	"4809810".pn. and temperature and alcohol	US-PGPUB; USPAT	OR	OFF	2019/06/22 12:57
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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

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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
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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
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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
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S138	147	fardanesh.xa. and glucose	US-PGPUB; USPAT; USOCR	OR	OFF	2019/07/16 15:00
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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

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
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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.

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 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~~a plurality of detectors.

20. **(Currently Amended)** The method of Claim 18, further comprising:

transmitting, from the ~~one or more~~a 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 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 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 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:

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)**

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.

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 & 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

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

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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 *Country Code-Number-Kind Code* Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[1]

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[1]

30349839

Examiner Signature	/MARJAN FARDANESH/	Date Considered	07/17/2019

*Examiner: 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.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.F/

T[1] - 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

Please Direct All Correspondence to Customer Number 64735

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

PTO/AIA/01 (06-12)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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

Title of Invention	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.

Electronic Acknowledgement Receipt

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

Payment information:

Submitted with Payment	no

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 fcbebd217e3d372b7dc8c429e462492986d3a986	no	1
Warnings:					

Information:					
2	Oath or Declaration filed	Declaration_MAS1007.PDF	1166962 5427ae2c0bbbb118e58a49ee3844b8b6d5102148	no	1
Warnings:					
Information:					
		Total Files Size (in bytes):	1182437		

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.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

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.

(Typed or printed name)
(Signature)
(Date)

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

EXAMINER	ART UNIT	CLASS-SUBCLASS
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 ☒ 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. 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

PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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

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

Electronic Patent Application Fee Transmittal

Application Number:	15195199
Filing Date:	28-Jun-2016
Title of Invention:	ADVANCED PULSE OXIMETRY SENSOR
First Named Inventor/Applicant Name:	Ammar Al-Ali
Filer:	Aaron Samuel Johnson/Daniel Escajeda
Attorney Docket Number:	MAS.1007A

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	1501	1	1000	1000

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1000**

Electronic Acknowledgement Receipt	
EFS ID:	36786479
Application Number:	15195199
International Application Number:	
Confirmation Number:	3453
Title of Invention:	ADVANCED PULSE OXIMETRY SENSOR
First Named Inventor/Applicant Name:	Ammar Al-Ali
Customer Number:	64735
Filer:	Aaron Samuel Johnson/tony do
Filer Authorized By:	Aaron Samuel Johnson
Attorney Docket Number:	MAS.1007A
Receipt Date:	05-AUG-2019
Filing Date:	28-JUN-2016
Time Stamp:	18:07:19
Application Type:	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	E201985I07464880
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)	

File Listing:

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_MAS1007A.PDF	212290 c4745689cba88874f6e91eef6de7673bcf537a22	no	1
Warnings:					
Information:					
2	Post Allowance Communication - Incoming	COMMENTS_MAS1007A.pdf	19297 a6762e4a23c169e992c88f153d422af125e2aa89	no	2
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30224 54d523b19d30ead2916985d4a19aa456984c339c	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	261811		

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.

New Applications Under 35 U.S.C. 111
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.
National Stage of an International Application under 35 U.S.C. 371
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.
New International Application Filed with the USPTO as a Receiving Office
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.

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

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

7590 08/07/2019

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

EXAMINER	
FARDANESH, MARJAN	

ART UNIT	PAPER NUMBER
3791	

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.

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

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

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		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
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

SUBMISSION REQUIRED UNDER 37 CFR 1.114

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).

☐ 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.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☐ Amendment/Reply
- ☒ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

☐ 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)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 111410

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

EFS - Web 2.1.16

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

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**

INFORMATION DISCLOSURE STATEMENT

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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.

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Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

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U.S. PATENT DOCUMENTS

Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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	

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	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[1]
	6	Konig, V. et al., "REFLECTANCE PULSE OXIMETRY - PRINCIPLES AND OBSTETRIC APPLICATION IN THE ZURICH SYSTEM," J Clin Monit 1998; 14: 403-412.	

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Examiner Signature	Date Considered
***Examiner:** 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.	

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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

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

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.

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_2), 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_2). On the other hand, in the near-infrared region of the spectrum around 940nm, the optical absorption by deoxyhemoglobin (Hb) is lower than the optical absorption of oxyhemoglobin (HbO_2).

Prior art non-invasive optical sensors for measuring arterial oxyhemoglobin saturation (SaO_2) by a pulse oximeter (termed SpO_2) 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.

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_2 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_2, 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_2 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_2 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_2 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_2 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.

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 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 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 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 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 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 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 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 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, 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.

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 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. 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 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_2 from the forehead, forearm and the calf on humans. However, this sensor requires a means for heating the skin in order to increase 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 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).

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_2 is based on reflection photoplethysmograms measured by a single photodetector, regardless of whether one or multiple photodiodes chips are used to construct the 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 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 length changes arising from perturbations in tissue absorbance. This is disclosed in the following publications:

6. Mannheimer at 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

7. Mannheimer at 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_2 is maximal, with a wavelength emitting at 735nm, not only lowers 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 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 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.

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_2.

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 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 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 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 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_2, 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_2 absorbs slightly more light than Hb. The IR wavelengths are in the spectral regions where the extinction coefficients of both Hb and HbO_2 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_2 and Hb, which are used to calculate SaO_2, and the unknown variable fraction of blood-to-tissue volumes that effects the accurate determination of SaO_2), 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_2 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_2.

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_2) and "bad" information (i.e., AC and DC values which would result in inaccurate calculations of SpO_2).

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 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 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 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 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 $\lambda 1$, $\lambda 2$ and $\lambda 3$, the first wavelength $\lambda 1$ lying in a red (R) spectrum, and the at least

second and at least third wavelengths λ2 and λ3 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 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

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 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;

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;

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.

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.

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 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 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 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 $\lambda 1$ 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 $\lambda 3$ 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 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_2 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_2.

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_2 based on either of the two ratios W_1/W_2 and W_1/W_3 alone (as normally done in commercially available dual-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_2.

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 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_2 absorbs slightly more light than Hb, but in the spectral region, respectively, where the extinction coefficients of both Hb and HbO_2 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_2 are approximately equal to 0.29 and 0.21, respectively. Therefore, ideally, the ratio of W2/W3 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 W2/W3 to deviate from 1.

Fortunately, variations in the ratio W2/W3 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 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), 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 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 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 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 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 "lst" 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, 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 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) 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. 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 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 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 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 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 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 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, TH_1 and 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 $1\pm TH_1$ (TH_1 is for example 0.1), then this data point is rejected from the 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±TH1, 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_2 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 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 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:

(a) a light source for illuminating a measurement location with incident light of at least three wavelengths, the first wavelength λ1 lying in a red (R) spectrum, and the at least second and third wavelengths λ2 and λ3 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 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 λ2 and λ3 being selected to coincide with a spectral region of the optical absorption curve, where HbO_2 absorbs slightly more light than Hb, and where the extinction coefficients of Hb and 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 λ2 is in the IR spectral region around 940nm+/-20nm, and the third wavelength λ3 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.

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 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.

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. 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

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.

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 λ2 and λ3 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 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 wavelengths, a first wavelength λ1 lying in a red (R) spectrum, and at least second and third wavelengths λ2 and λ3 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 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:

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, λ1, λ2 and λ3; and

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:

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;

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,

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. 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.

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, 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 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.

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.

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.

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.

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.

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.

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;

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 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.

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.

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.

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.

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,

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;

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.

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.

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.

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.

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.

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.

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.

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.

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.

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;

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.

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.

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.

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 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.

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 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 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 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.

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.

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:

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.

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.

65. A method, as set forth in claim 62, wherein the first ratio is defined by the first signal divided by the second signal.

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.

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.

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.

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:

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,

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.

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 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.

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.

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 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, 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.

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 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.

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.

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.

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.

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.

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.

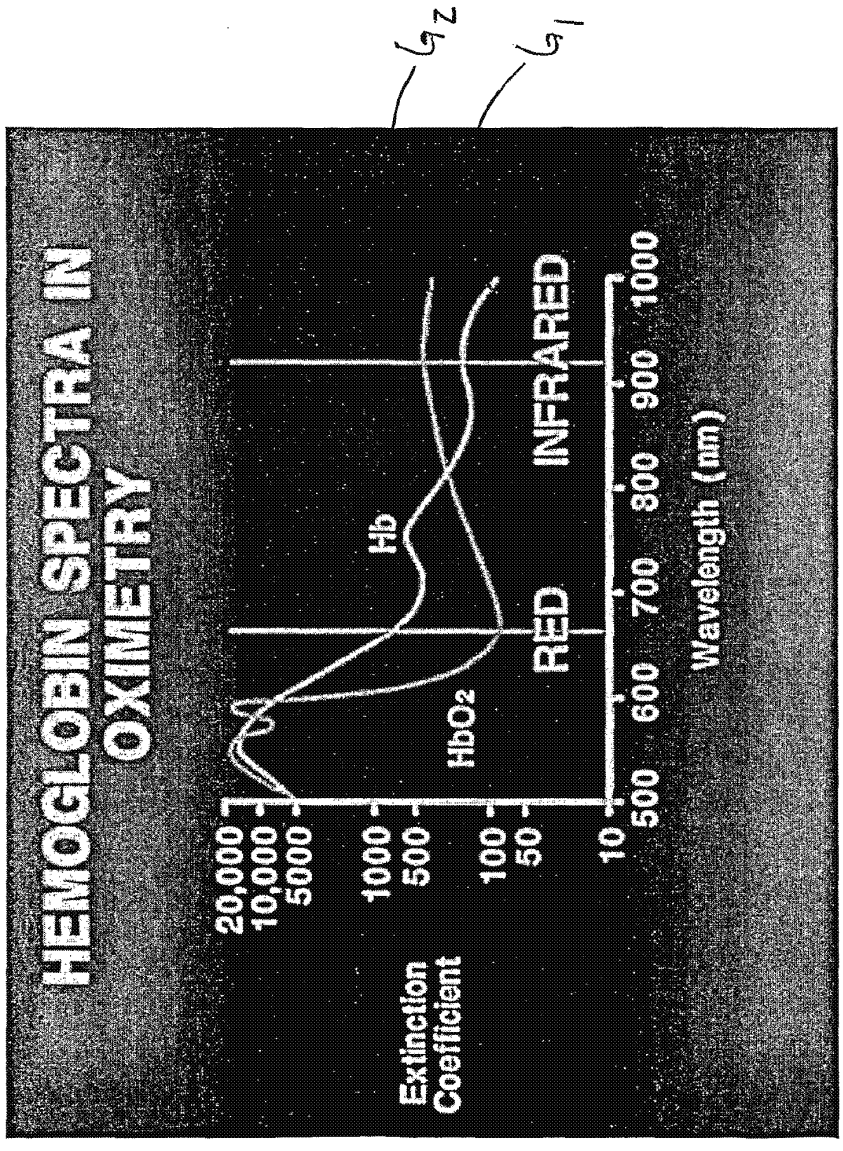
HEMOGLOBIN SPECTRA IN OXIMETRY
Extinction Coefficient
20,000
10,000
5000
1000
500
100
50
10
500
600
700
800
900
1000
Wavelength (nm)
RED
INFRARED
Hb
HbO2
G2
G1

Fig. 1

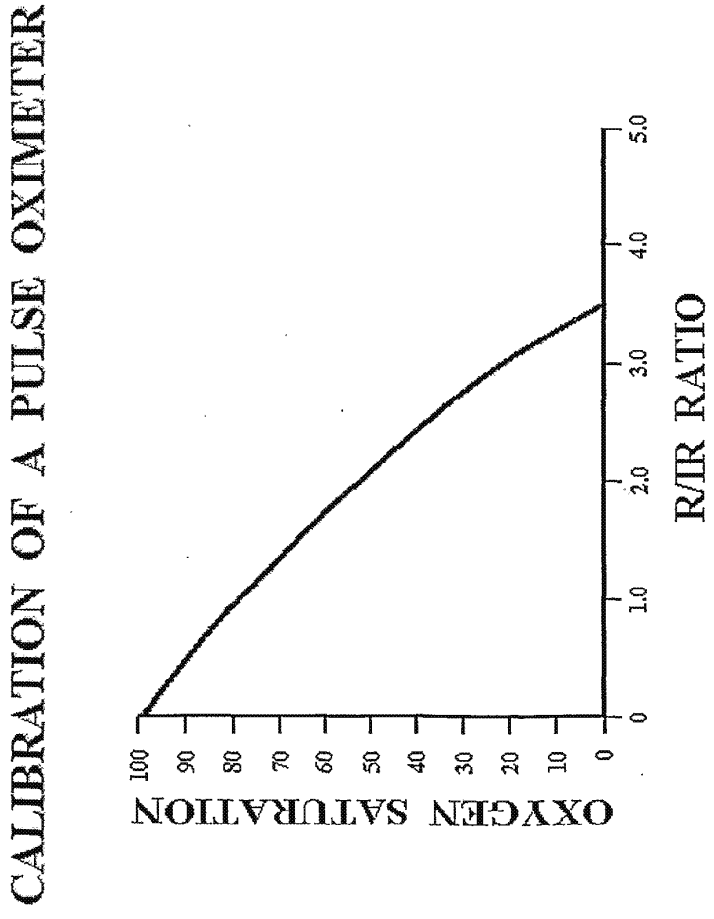
CALIBRATION OF A PULSE OXIMETER
OXYGEN SATURATION
100
90
80
70
60
50
40
30
20
10
0
R/IR RATIO
0
1.0
2.0
3.0
4.0
5.0

Fig. 2

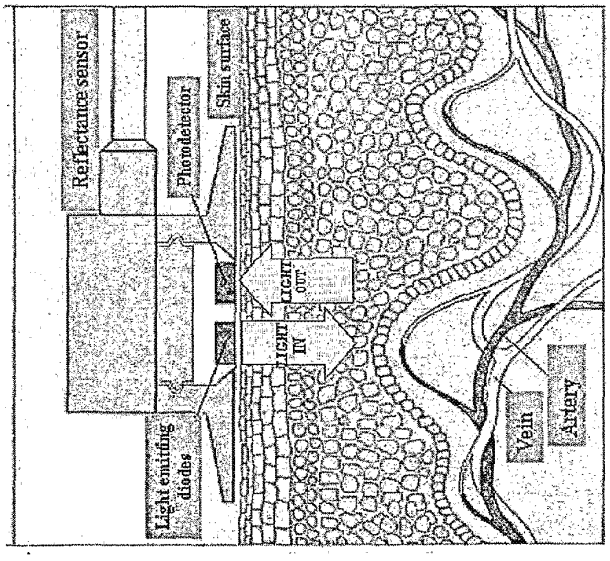
Reflectance sensor
Photodetector
Skin surface
Light out
Light in
Light emitting diodes
Vein
Artery

Fig. 3

FOUR DIFFERENT LIGHT PATHS

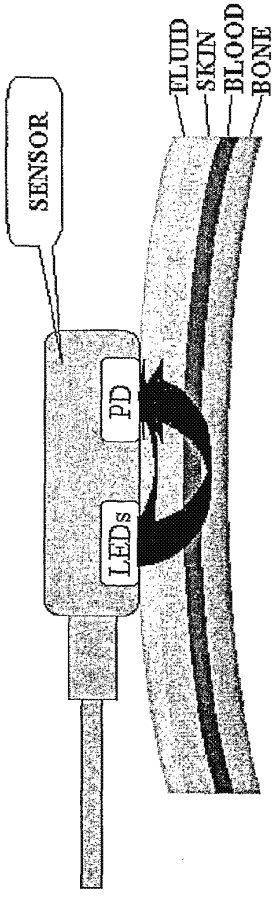

Fig. 4

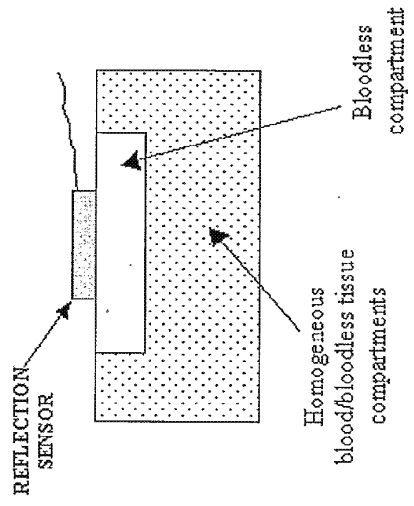
Bloodless compartment
REFLECTION SENSOR
Homogeneous blood/bloodless tissue compartments
(b)

Fig. 5b

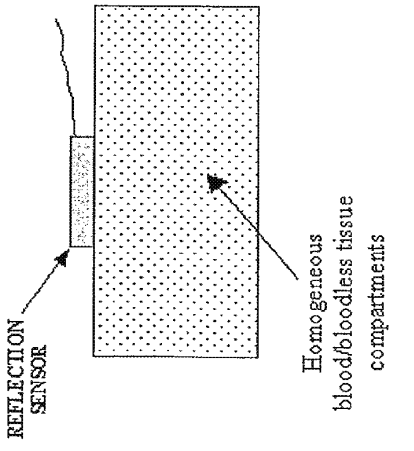
REFLECTION SENSOR
Homogeneous blood/bloodless tissue compartments
(a)

Fig. 5a

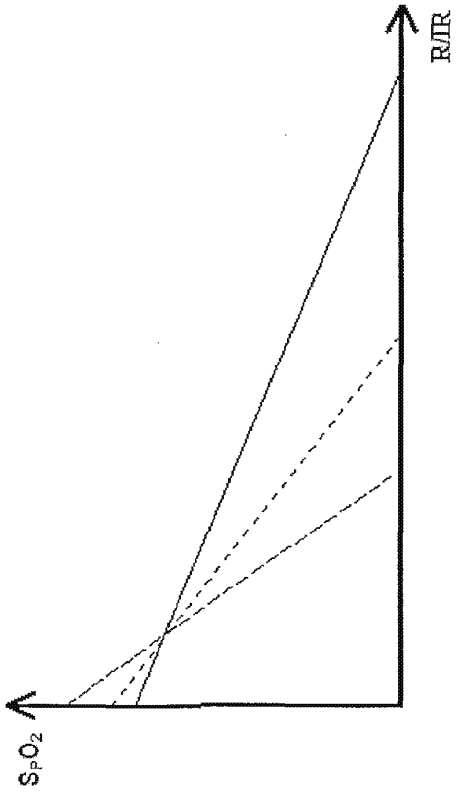

Fig. 6

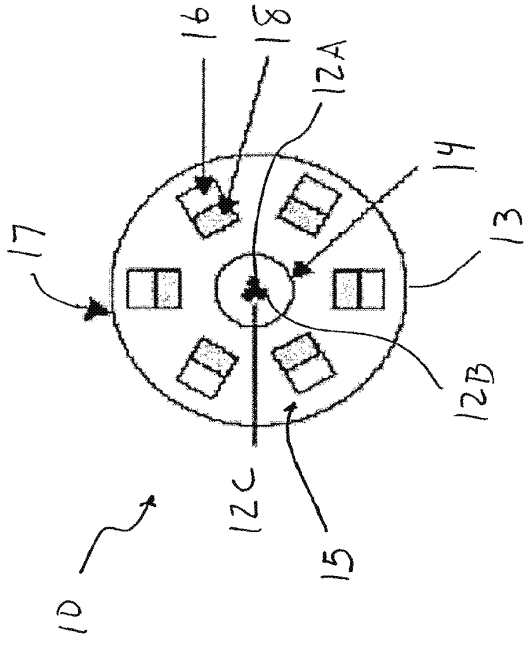

Fig. 7

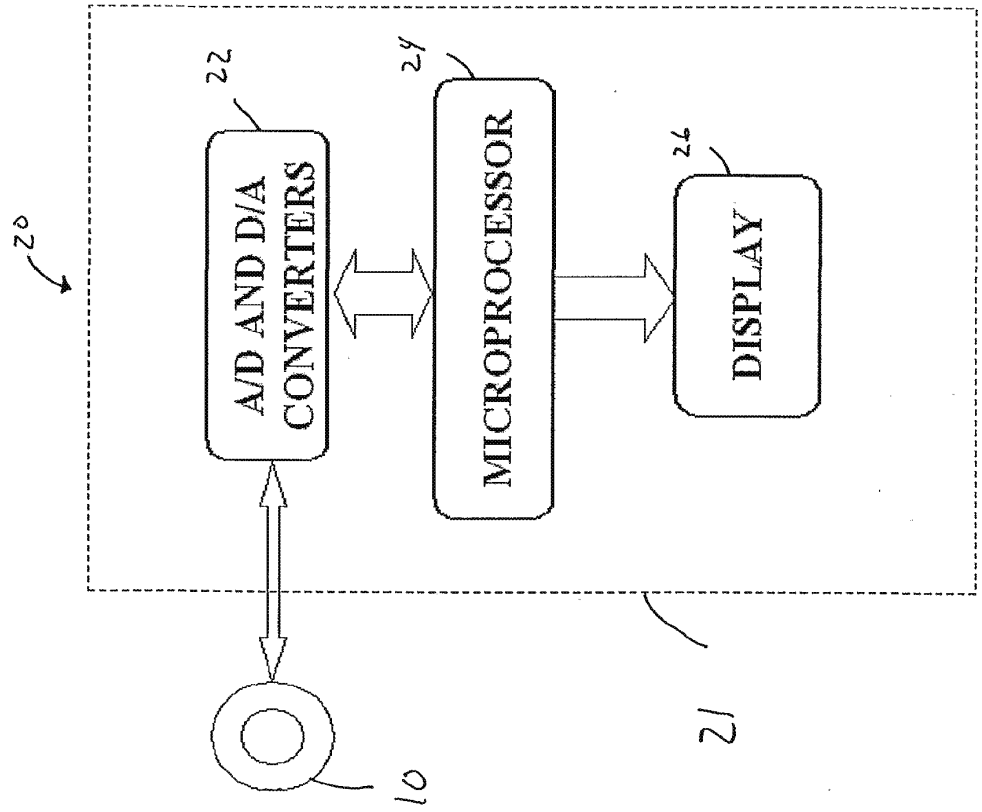
20
22
A/D AND D/A CONVERTERS
24
MICROPROCESSOR
24
DISPLAY
21
10

Fig. 8

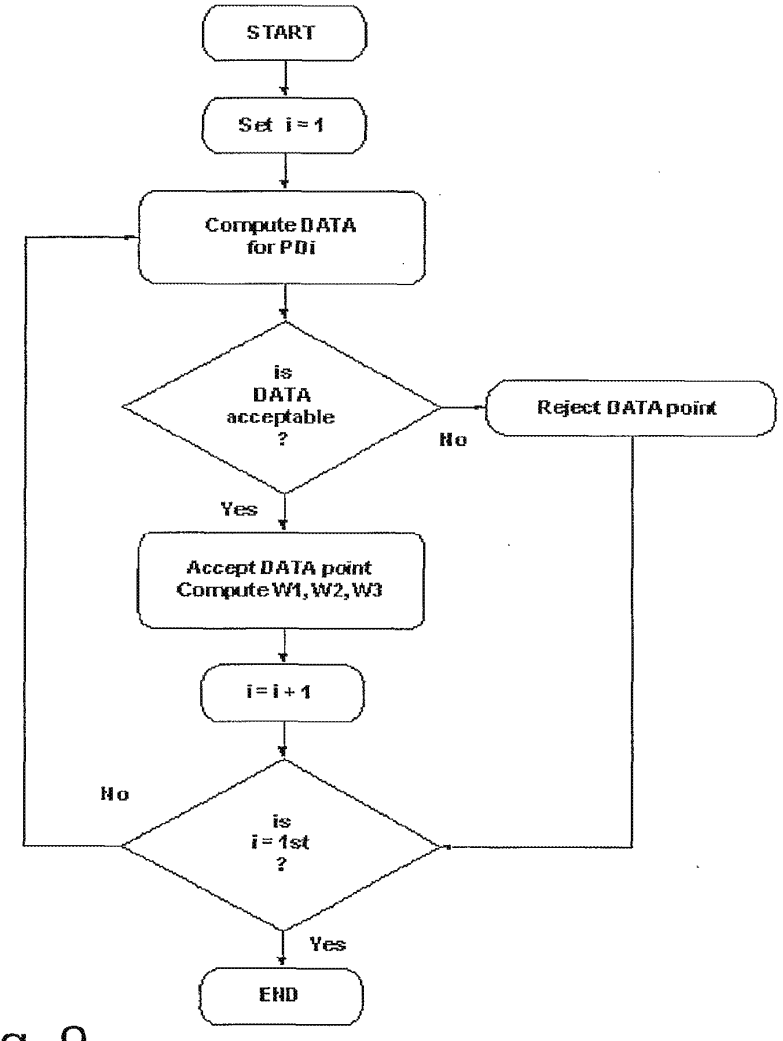
START
Set i = 1
Compute DATA for PDi
is DATA acceptable ?
No
Reject DATA point
Yes
Accept DATA point Compute W1, W2, W3
i = i + 1
No
is i = 1st ?
Yes
END

Fig. 9

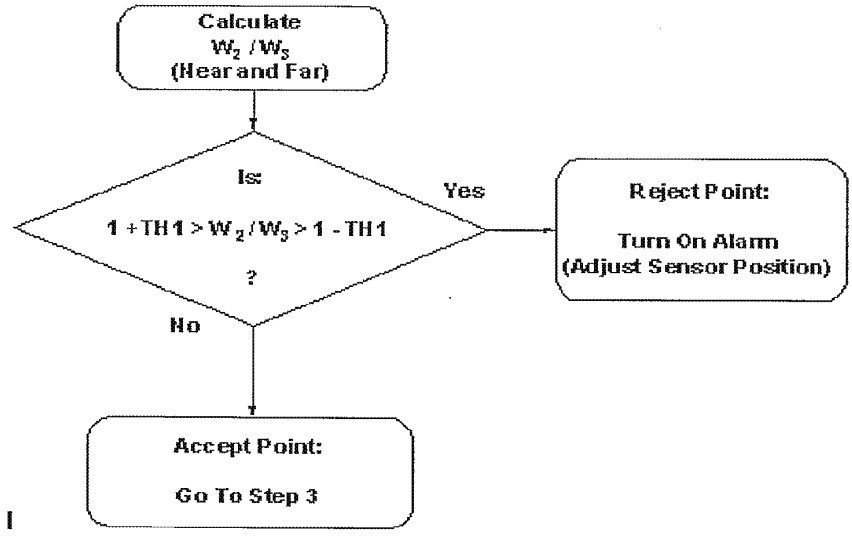
Calculate
W_2 / W_3
(Near and Far)
Is:
$1 + TH1 > W_2 / W_3 > 1 - TH1$
?
Yes
Reject Point:
Turn On Alarm
(Adjust Sensor Position)
No
Accept Point:
Go To Step 3

Fig. 10A

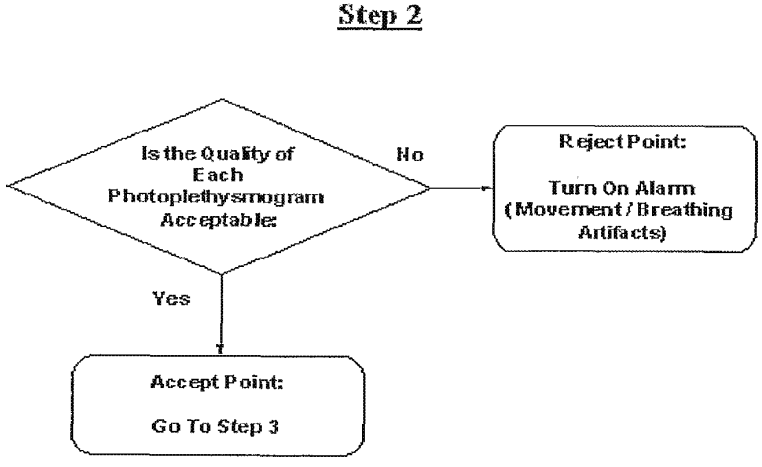
Step 2
Is the Quality of Each Photoplethysmogram Acceptable
No
Reject Point:
Turn On Alarm (Movement / Breathing Artifacts)
Yes
Accept Point:
Go To Step 3

Fig. 10B

Step 3

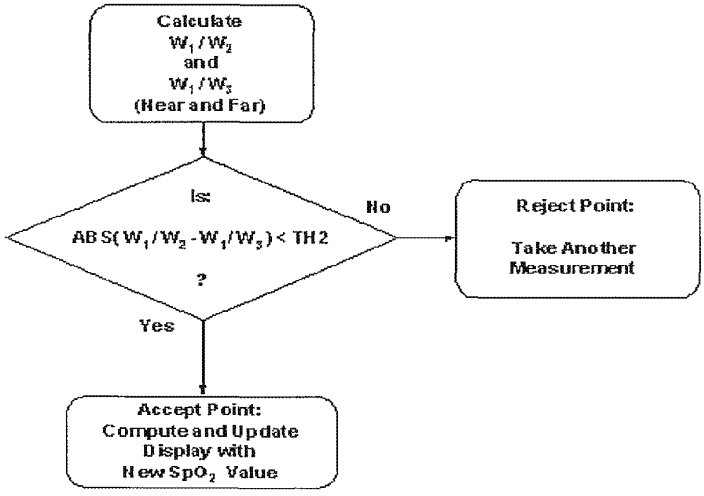

Fig. 10C

INTERNATIONAL SEARCH REPORT

In ial Application No
PCT/US 01/26642

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61B5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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

☐ Further documents are listed in the continuation of box C.

☒ 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

"E" earlier document but published on or after the international filing date

"L" 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	Authorized officer
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	Lemercier, D

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

nal 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	**PETITION TO WITHDRAW AN APPLICATION FROM ISSUE AFTER PAYMENT OF THE ISSUE FEE UNDER 37 CFR 1.313(c)**
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

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.

APPLICANT HEREBY PETITIONS TO WITHDRAW THIS APPLICATION FROM ISSUE UNDER 37 CFR 1.313(c).

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).

Petition Fee

- ○ Small Entity
- ○ Micro Entity
- ◉ 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

Application Number:	15195199
Filing Date:	28-Jun-2016
Title of Invention:	ADVANCED PULSE OXIMETRY SENSOR
First Named Inventor/Applicant Name:	Ammar Al-Ali
Filer:	Aaron Samuel Johnson/Evelyn Salcido
Attorney Docket Number:	MAS.1007A

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
PETITION FEE- 37 CFR 1.17(H) (GROUP III)	1464	1	140	140
RCE- 2ND AND SUBSEQUENT REQUEST	1820	1	1900	1900
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**2040**

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
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

Electronic Acknowledgement Receipt	
EFS ID:	36887011
Application Number:	15195199
International Application Number:	
Confirmation Number:	3453
Title of Invention:	ADVANCED PULSE OXIMETRY SENSOR
First Named Inventor/Applicant Name:	Ammar Al-Ali
Customer Number:	64735
Filer:	Aaron Samuel Johnson/Evelyn Salcido
Filer Authorized By:	Aaron Samuel Johnson
Attorney Docket Number:	MAS.1007A
Receipt Date:	15-AUG-2019
Filing Date:	28-JUN-2016
Time Stamp:	15:24:42
Application Type:	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
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)	

File Listing:

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 57ad2628aaa3d03caf90fa55044922283378 3a83	no	3
Warnings:					
Information:					
2		IDS_MAS1007A.pdf	48652 7e12c2253bbe59d5533a2ec27cbfb1020df 1e03d	yes	3

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Transmittal Letter	1	2
	Information Disclosure Statement (IDS) Form (SB08)	3	3

Warnings:					
Information:					
3	Foreign Reference	WO2002028274A1.pdf	2353491 1628218dfc9ac217b24ac3bd84b882e3111 b2f51	no	51
Warnings:					
Information:					
4	Non Patent Literature	KONIG_1998.pdf	242161 47173a0504b8c0f7a79d6e0323969cbb310 6c04c	no	10
Warnings:					
Information:					
5	Petition automatically granted by EFS	petition-request.pdf	31628 6de3fee2d1d80295c2f1ac2b9dc2594022a7 dc27	no	2
Warnings:					
Information:					

6	Fee Worksheet (SB06)	fee-info.pdf	32442 1f4f938b4fad08305033d5633c5bbc0dd7f51262	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	4058313	

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.

New Applications Under 35 U.S.C. 111
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.
National Stage of an International Application under 35 U.S.C. 371
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.
New International Application Filed with the USPTO as a Receiving Office
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.

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UNITED STATES DEPARTMENT OF COMMERCE
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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.

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)

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

EXAMINER	ART UNIT	CLASS-SUBCLASS
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 _____
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. _____

PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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

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

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

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.

Notice of Allowability	Application No. 15/195,199	Applicant(s) Al-Ali, Ammar	
	Examiner MARJAN FARDANESH	Art Unit 3791	AIA (FITF) Status 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** or send an inquiry to **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. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 07/19/2019, 08/15/2019.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☑ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

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

Continuation of 3. The allowed claim(s) is/are: 1-7,16,18-20,22-29,32-33,37-42 and 45

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

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

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/195,199	Al-Ali, Ammar
	Examiner	Art Unit
	MARJAN FARDANESH	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	

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/195,199	Al-Ali, Ammar
	Examiner	**Art Unit**
	MARJAN FARDANESH	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	22 August 2019	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	28	
/ERIC F WINAKUR/ Primary Examiner, Art Unit 3791	26 August 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	7

U.S. Patent and Trademark Office — Part of Paper No.: 20190822

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/195,199	Al-Ali, Ammar
	Examiner	**Art Unit**
	MARJAN FARDANESH	3791

INTERNATIONAL CLASSIFICATION				
CLAIMED				
A61B	/	5	/	1455

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**
600	310

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

/MARJAN FARDANESH/ Examiner, Art Unit 3791	22 August 2019	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	28	
/ERIC F WINAKUR/ Primary Examiner, Art Unit 3791	26 August 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	7

U.S. Patent and Trademark Office — Part of Paper No.: 20190822

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/195,199	Al-Ali, Ammar
	Examiner	**Art Unit**
	MARJAN FARDANESH	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	22 August 2019	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	28	
/ERIC F WINAKUR/ Primary Examiner, Art Unit 3791	26 August 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	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

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

U.S. PATENT DOCUMENTS

Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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

*Examiner: 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.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.F/

T[1] - 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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	15/195199
	Filing Date	June 28, 2016
	First Named Inventor	Ammar Al-Ali
	Art Unit	3791
(Multiple sheets used when necessary)	Examiner	Fardanesh, Marjan
SHEET 2 OF 12	Attorney Docket No.	MAS.1007A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	15/195199
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	First Named Inventor	Ammar Al-Ali
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Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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	

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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.	

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	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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	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	

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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.	

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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.	

Examiner Signature	/MARJAN FARDANESH/	Date Considered	08/22/2019

*Examiner: 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.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.F/

T[1] - 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

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

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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	/MARJAN FARDANESH/	Date Considered	08/22/2019

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Receipt date: 07/19/2019 15/195,199 - GAU: 3791

PTO/SB/08 Equivalent

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

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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 *Country Code-Number-Kind Code* Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[1]

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[1]

30950661

Examiner Signature	/MARJAN FARDANESH/	Date Considered	08/22/2019

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T[1] - Place a check mark in this area when an English language Translation is attached.

Receipt date: 08/15/2019 15/195,199 - GAU: 3791

PTO/SB/08 Equivalent

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

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* 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 *Country Code-Number-Kind Code* Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[1]
	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[1]
	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

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

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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.

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64735 7590 09/05/2019
KNOBBE, MARTENS, OLSON & BEAR, LLP
MASIMO CORPORATION (MASIMO)
2040 MAIN STREET
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IRVINE, CA 92614

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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)

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

EXAMINER	ART UNIT	CLASS-SUBCLASS
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 ☒ 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)*

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☒ 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.

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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 September 9, 2019

Typed or printed name Aaron S. Johnson Registration No. 74,164

PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Electronic Acknowledgement Receipt

EFS ID:	37119447
Application Number:	15195199
International Application Number:	
Confirmation Number:	3453
Title of Invention:	ADVANCED PULSE OXIMETRY SENSOR
First Named Inventor/Applicant Name:	Ammar Al-Ali
Customer Number:	64735
Filer:	Aaron Samuel Johnson/tony do
Filer Authorized By:	Aaron Samuel Johnson
Attorney Docket Number:	MAS.1007A
Receipt Date:	11-SEP-2019
Filing Date:	28-JUN-2016
Time Stamp:	15:11:48
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

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
Warnings:					

Information:	
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New Applications Under 35 U.S.C. 111
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.
National Stage of an International Application under 35 U.S.C. 371
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.
New International Application Filed with the USPTO as a Receiving Office
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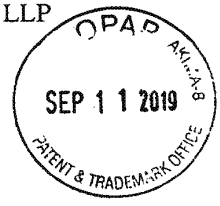
KNOBBE, MARTENS, OLSON & BEAR, LLP
MASIMO CORPORATION (MASIMO)
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614



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(Typed or printed name)
(Signature)
(Date)

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

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APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
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EXAMINER	ART UNIT	CLASS-SUBCLASS
FARDANESH, MARJAN	3791	600-323000

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1 Knobbe, Martens,
2 Olson & Bear, LLP
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3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

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(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 ☐ Government

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

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☐ Applicant certifying micro entity status. See 37 CFR 1.29

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Authorized Signature /Aaron S. Johnson/ Date September 9, 2019

Typed or printed name Aaron S. Johnson Registration No. 74,164

PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Office of the Chief Financial Officer

Document Code:WFEE

User :C46472

Sale Accounting Date:09/13/2019

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)
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

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.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

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APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Ammar Al-Ali, San Juan Capistrano, CA;
MASIMO CORPORATION, Irvine, CA;

Electronic Patent Application Fee Transmittal

Application Number:	15195199
Filing Date:	28-Jun-2016
Title of Invention:	ADVANCED PULSE OXIMETRY SENSOR
First Named Inventor/Applicant Name:	Ammar Al-Ali
Filer:	Jarom D. Kesler/Daniel Escajeda
Attorney Docket Number:	MAS.1007A

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
CERTIFICATE OF CORRECTION	1811	1	150	150

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**150**

Electronic Acknowledgement Receipt	
EFS ID:	39615469
Application Number:	15195199
International Application Number:	
Confirmation Number:	3453
Title of Invention:	ADVANCED PULSE OXIMETRY SENSOR
First Named Inventor/Applicant Name:	Ammar Al-Ali
Customer Number:	64735
Filer:	Jarom D. Kesler/Melanie Terrazas
Filer Authorized By:	Jarom D. Kesler
Attorney Docket Number:	MAS.1007A
Receipt Date:	03-JUN-2020
Filing Date:	28-JUN-2016
Time Stamp:	15:39:22
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$150
RAM confirmation Number	E202063F39585230
Deposit Account	111410
Authorized User	Melanie Terrazas
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)	

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	14970 e3685d8b754de195e6323b3b376bde89dd24bdaa	no	1
Warnings:					
Information:					
2	Request for Certificate of Correction	REQ-CERT_MAS1007A.pdf	23032 539479df7c5def1f9811a0950eeb786471579ff1	no	1
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30216 43a468d33a0ba66287ff5db49fa182f78af6b84c	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	68218		

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.

New Applications Under 35 U.S.C. 111
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.
National Stage of an International Application under 35 U.S.C. 371
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.
New International Application Filed with the USPTO as a Receiving Office
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.

REQUEST FOR CERTIFICATE OF CORRECTION

First Inventor	:	Ammar Al-Ali
App. No.	:	15/195199
Filed	:	June 28, 2016
Patent No.	:	10,448,871
Issue Date	:	October 22, 2019
Title	:	ADVANCED PULSE OXIMETRY SENSOR
Conf. No.	:	3453

Commissioner for Patents
Office of Data Management
Attention: Certificates of Correction Branch
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

Enclosed for filing is a Certificate of Correction in connection with the above-identified patent.

Some of the errors cited in the Certificate of Correction appear to have been incurred through the fault of the PTO (see 35 USC § 254, 37 CFR § 1.322, and MPEP § 1480). However, because this may not apply to each item in the Certificate of Correction, the $150 fee under 37 CFR § 1.20(a) is submitted herewith. Please charge any additional fees to our Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: June 3, 2020

By: /Jarom Kesler/
Jarom D. Kesler
Registration No. 57,046
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(949) 760-0404

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

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_{80}," and insert --d_{λ},--.

In Column 1, Line 37, Equation 1, delete "$\mu_{a,\lambda}$" and insert --$\mu_{\alpha,\lambda}$--.

In Column 1, Line 40, Equation 2, delete "$\mu_{a,\lambda}$" and insert --$\mu_{\alpha,\lambda}$--.

In Column 1, Line 43, delete "$\Xi_{\alpha,\lambda}$" and insert --$\mu_{\alpha,\lambda}$--.

In Column 7, Line 49, delete "(also" and insert --also--.

In Column 7, Line 65, delete "Gausian" 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

MAILING ADDRESS OF SENDER:

Aaron S. Johnson
KNOBBE, MARTENS, OLSON & BEAR, LLP
2040 Main Street, 14th Floor
Irvine, California 92614

DOCKET NO. MAS.1007A

PTO/SB/44 Equivalent

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

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_{80}," and insert --d_{λ},--.

In Column 1, Line 37, Equation 1, delete "$\mu_{a,\lambda}$" and insert --$\mu_{\alpha,\lambda}$--.

In Column 1, Line 40, Equation 2, delete "$\mu_{a,\lambda}$" and insert --$\mu_{\alpha,\lambda}$--.

In Column 1, Line 43, delete "$\Xi_{a,\lambda}$" and insert --$\mu_{\alpha,\lambda}$--.

In Column 7, Line 49, delete "(also" and insert --also--.

In Column 7, Line 65, delete "Gausian" 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