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(54) WEARABLE SENSOR

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(Continued)

(56) References Cited

U.S. PATENT DOCUMENTS

3,646,606 A 2/1972 Buxton et al.
3,690,313 A 9/1972 Weppner et al.
(Continued)

FOREIGN PATENT DOCUMENTS

CN 101401313 4/2009
CN 101534706 9/2009
(Continued)

OTHER PUBLICATIONS

US 9,167,986 B2, 10/2015, Aga et al. (withdrawn)
(Continued)

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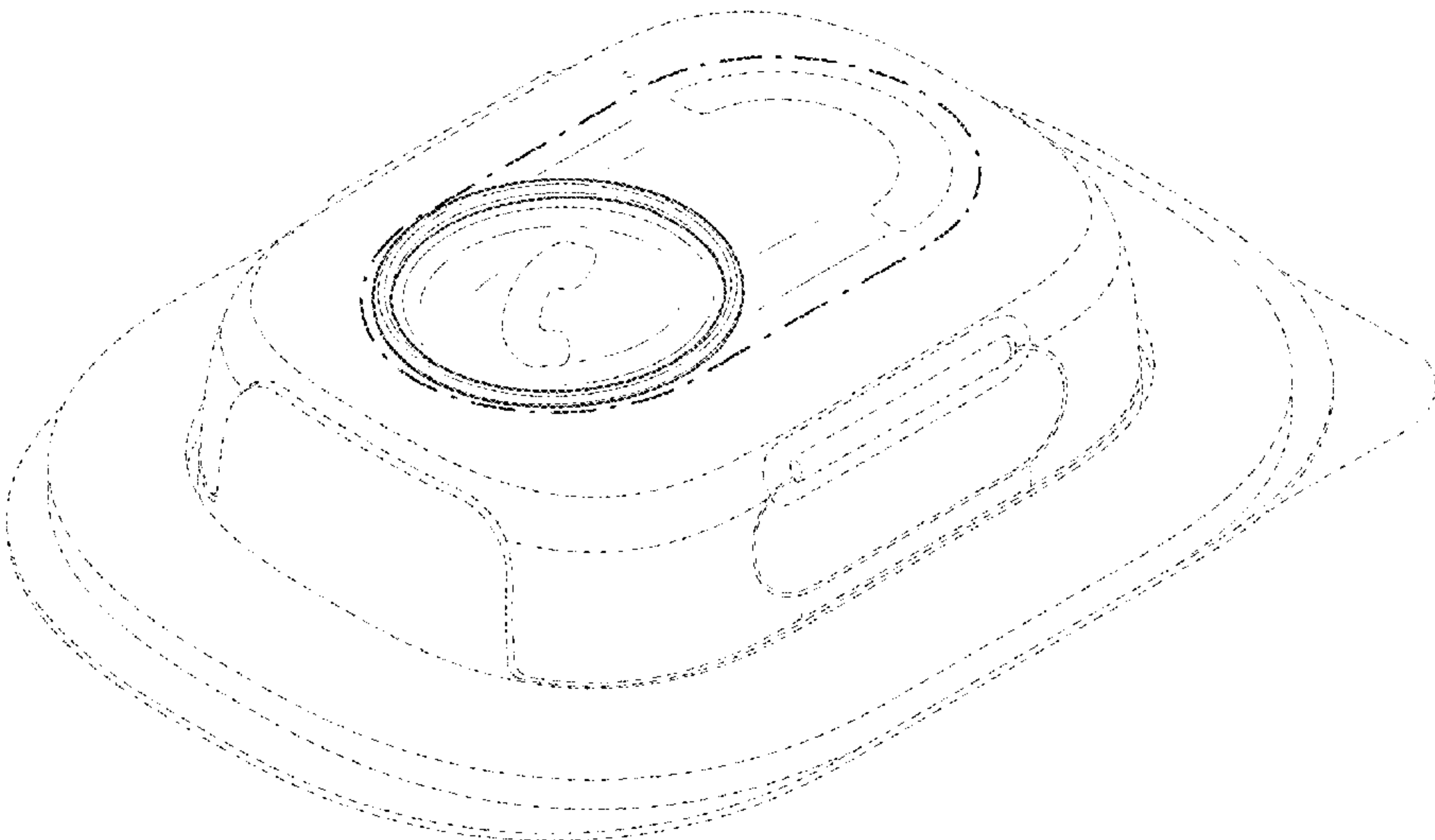
(57) CLAIM

The ornamental design for a wearable sensor, as shown and described.

DESCRIPTION

FIG. 1 is a perspective view of a wearable sensor embodying our new design;
FIG. 2 is another perspective view thereof;
FIG. 3 is a top view thereof;
FIG. 4 is a left side view thereof;
FIG. 5 is a right side view thereof;
FIG. 6 is a front view thereof; and,
FIG. 7 is a back view thereof.
Broken lines, where shown, are used to illustrate portions of the wearable sensor that form no part of the claimed design. The dot-dash-dot lines form bounds of the claimed design and are not part of the claimed design.

1 Claim, 5 Drawing Sheets



(58) **Field of Classification Search**

CPC 2037/0007; B33Y 80/00; A61K 9/0004;
 G01K 1/20; G01K 13/20; G01K 7/22
 See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,978,849	A	9/1976	Geneen	5,726,440	A	3/1998	Kalkhoran et al.
4,108,166	A	8/1978	Schmid	5,732,146	A	3/1998	Yamada et al.
4,129,125	A	12/1978	Lester et al.	5,734,739	A	3/1998	Sheehan et al.
4,231,354	A	11/1980	Kurtz et al.	D393,830	S	4/1998	Tobler et al.
D278,363	S	4/1985	Schenkel et al.	5,743,262	A	4/1998	Lepper, Jr. et al.
4,589,415	A	5/1986	Haaga	5,747,806	A	5/1998	Khalil et al.
4,662,378	A	5/1987	Thomis	5,750,994	A	5/1998	Schlager
D297,460	S	8/1988	Inoue et al.	5,758,079	A	5/1998	Ludwig et al.
4,838,275	A	6/1989	Lee	5,758,644	A	6/1998	Diab et al.
4,852,570	A	8/1989	Levine	5,760,910	A	6/1998	Lepper, Jr. et al.
4,960,128	A	10/1990	Gordon et al.	5,772,585	A	6/1998	Lavin et al.
4,964,408	A	10/1990	Hink et al.	5,782,805	A	7/1998	Meinzer
4,966,154	A	10/1990	Cooper et al.	5,801,637	A	9/1998	Lomholt
5,092,340	A	3/1992	Yamaguchi et al.	5,813,403	A	9/1998	Soller et al.
5,140,519	A	8/1992	Friesdorf et al.	5,822,544	A	10/1998	Chaco et al.
5,159,932	A	11/1992	Zanetti et al.	5,822,546	A	10/1998	George
5,161,539	A	11/1992	Evans et al.	5,855,550	A	1/1999	Lai et al.
5,262,944	A	11/1993	Weisner et al.	5,890,929	A	4/1999	Mills et al.
5,277,189	A	1/1994	Jacobs	5,910,139	A	6/1999	Cochran et al.
5,278,627	A	1/1994	Aoyagi et al.	5,919,134	A	7/1999	Diab
5,282,474	A	2/1994	Valdes Sosa et al.	5,921,920	A	7/1999	Marshall et al.
5,296,688	A	3/1994	Hamilton et al.	5,924,074	A	7/1999	Evans
5,318,037	A	6/1994	Evans et al.	5,931,160	A	8/1999	Gilmore et al.
5,319,355	A	6/1994	Russek	5,941,836	A	8/1999	Friedman
5,331,549	A	7/1994	Crawford, Jr.	5,942,986	A	8/1999	Shabot et al.
5,333,106	A	7/1994	Lanpher et al.	5,950,189	A	9/1999	Cohen et al.
5,337,744	A	8/1994	Branigan	5,987,343	A	11/1999	Kinast
5,341,805	A	8/1994	Stavridi et al.	5,987,519	A	11/1999	Peifer et al.
5,348,008	A	9/1994	Bornn et al.	5,997,343	A	12/1999	Mills et al.
5,358,519	A	10/1994	Grandjean	6,002,952	A	12/1999	Diab et al.
5,375,599	A	12/1994	Shimizu	6,006,119	A	12/1999	Soller et al.
5,377,676	A	1/1995	Vari et al.	6,010,937	A	1/2000	Karam et al.
5,400,794	A	3/1995	Gorman	6,014,346	A	1/2000	Malone
5,416,695	A	5/1995	Stutman et al.	6,018,673	A	1/2000	Chin et al.
D360,596	S	7/1995	Moritz et al.	6,024,699	A	2/2000	Surwit et al.
5,431,170	A	7/1995	Mathews	6,027,452	A	2/2000	Flaherty et al.
5,434,611	A	7/1995	Tamura	6,032,063	A	2/2000	Hoar et al.
5,436,499	A	7/1995	Namavar et al.	6,032,678	A	3/2000	Rottem
5,456,252	A	10/1995	Vari et al.	6,035,230	A	3/2000	Kang et al.
5,479,934	A	1/1996	Imran	6,036,718	A	3/2000	Ledford et al.
5,482,036	A	1/1996	Diab et al.	6,040,578	A	3/2000	Malin et al.
5,483,968	A	1/1996	Adam et al.	6,066,204	A	5/2000	Haven
5,494,041	A	2/1996	Wilk	6,093,146	A	7/2000	Filangeri
5,494,043	A	2/1996	O'Sullivan et al.	6,101,478	A	8/2000	Brown
5,503,149	A	4/1996	Beavin	6,106,463	A	8/2000	Wilk
5,505,202	A	4/1996	Mogi et al.	6,115,673	A	9/2000	Malin et al.
5,523,534	A	6/1996	Meister et al.	6,124,597	A	9/2000	Shehada
5,533,511	A	7/1996	Kaspari et al.	6,128,521	A	10/2000	Marro et al.
D372,787	S	8/1996	Dozier et al.	6,129,675	A	10/2000	Jay
5,544,649	A	8/1996	David et al.	6,129,686	A	10/2000	Friedman
5,553,609	A	9/1996	Chen et al.	6,132,218	A	10/2000	Benja-Athon
5,558,638	A	9/1996	Evers et al.	6,139,494	A	10/2000	Cairnes
5,566,676	A	10/1996	Rosenfeldt et al.	6,144,868	A	11/2000	Parker
5,576,952	A	11/1996	Stutman et al.	6,152,754	A	11/2000	Gerhardt et al.
5,579,001	A	11/1996	Dempsey et al.	6,167,258	A	12/2000	Schmidt et al.
5,590,649	A	1/1997	Caro et al.	D437,058	S	1/2001	Gozani
5,602,924	A	2/1997	Durand et al.	6,168,563	B1	1/2001	Brown
5,619,991	A	4/1997	Sloane	6,171,237	B1	1/2001	Avitall et al.
5,638,816	A	6/1997	Kiani-Azarbayjany et al.	6,183,417	B1	2/2001	Gehab et al.
5,638,818	A	6/1997	Diab et al.	6,184,521	B1	2/2001	Coffin, IV et al.
5,640,967	A	6/1997	Fine et al.	6,185,448	B1	2/2001	Borovsky
5,645,440	A	7/1997	Tobler et al.	6,195,576	B1	2/2001	John
5,671,914	A	9/1997	Kalkhoran et al.	6,221,012	B1	4/2001	Maschke et al.
5,685,314	A	11/1997	Geheb et al.	6,224,553	B1	5/2001	Nevo
5,687,717	A	11/1997	Halpern et al.	6,230,142	B1	5/2001	Benigno et al.
5,694,020	A	12/1997	Lang et al.	6,232,609	B1	5/2001	Snyder et al.
5,724,580	A	3/1998	Levin et al.	6,241,683	B1	6/2001	Macklem et al.
5,724,983	A	3/1998	Selker et al.	6,253,097	B1	6/2001	Aronow et al.
5,725,308	A	3/1998	Smith et al.	6,255,708	B1	7/2001	Sudharsanan et al.
				6,267,723	B1	7/2001	Matsumura et al.
				6,269,262	B1	7/2001	Kandori et al.
				6,280,381	B1	8/2001	Malin et al.
				6,285,896	B1	9/2001	Tobler et al.
				6,304,767	B1	10/2001	Soller et al.
				6,308,089	B1	10/2001	von der Ruhr et al.
				6,312,378	B1	11/2001	Bardy
				6,317,627	B1	11/2001	Ennen et al.
				6,321,100	B1	11/2001	Parker
				6,322,502	B1	11/2001	Schoenberg et al.

(56)

References Cited

U.S. PATENT DOCUMENTS

6,329,139 B1	12/2001	Nova et al.	6,907,237 B1	6/2005	Dorenbosch et al.
6,334,065 B1	12/2001	Al-Ali et al.	6,915,149 B2	7/2005	Ben-haim
6,338,039 B1	1/2002	Lonski et al.	6,920,345 B2	7/2005	Al-Ali et al.
6,354,235 B1	3/2002	Davies	6,934,570 B2	8/2005	Kiani et al.
6,360,114 B1	3/2002	Diab et al.	6,943,348 B1	9/2005	Coffin, IV.
6,364,834 B1	4/2002	Reuss et al.	D511,004 S	10/2005	Masuda
6,368,283 B1	4/2002	Xu et al.	6,952,340 B2	10/2005	Son et al.
6,385,476 B1	5/2002	Osadchy et al.	6,956,649 B2	10/2005	Acosta et al.
6,385,589 B1	5/2002	Trusheim et al.	D511,384 S	11/2005	Masuda
6,411,373 B1	6/2002	Garside et al.	6,961,598 B2	11/2005	Diab
6,415,167 B1	7/2002	Blank et al.	6,970,792 B1	11/2005	Diab
6,430,437 B1	8/2002	Marro	6,980,419 B2	12/2005	Smith et al.
6,430,525 B1	8/2002	Weber et al.	6,983,179 B2	1/2006	Ben-haim
6,463,311 B1	10/2002	Diab	6,985,764 B2	1/2006	Mason et al.
6,470,199 B1	10/2002	Kopotic et al.	6,988,989 B2	1/2006	Weiner et al.
6,470,893 B1	10/2002	Boesen	6,990,087 B2	1/2006	Rao et al.
6,487,429 B2	11/2002	Hockersmith et al.	6,990,364 B2	1/2006	Ruchti et al.
6,505,059 B1	1/2003	Kollias et al.	6,997,884 B2	2/2006	Ulmsten
6,524,240 B1	2/2003	Thede	6,998,247 B2	2/2006	Monfre et al.
6,525,386 B1	2/2003	Mills et al.	7,003,338 B2	2/2006	Weber et al.
6,526,300 B1	2/2003	Kiani et al.	7,004,907 B2	2/2006	Banet et al.
6,534,012 B1	3/2003	Hazen et al.	7,015,451 B2	3/2006	Dalke et al.
6,542,764 B1	4/2003	Al-Ali et al.	7,025,729 B2	4/2006	De Chazal et al.
6,544,173 B2	4/2003	West et al.	7,027,849 B2	4/2006	Al-Ali
6,544,174 B2	4/2003	West et al.	7,033,761 B2	4/2006	Shafer
6,551,243 B2	4/2003	Bocionek et al.	7,035,686 B2	4/2006	Hogan
6,578,428 B1	6/2003	Dromms et al.	7,063,666 B2	6/2006	Weng et al.
6,580,086 B1	6/2003	Schulz et al.	7,079,035 B2	7/2006	Bock et al.
6,582,393 B2	6/2003	Sage, Jr.	D526,719 S	8/2006	Richie, Jr. et al.
6,584,336 B1	6/2003	Ali et al.	7,096,052 B2	8/2006	Mason et al.
6,587,196 B1	7/2003	Stippick et al.	7,096,054 B2	8/2006	Abdul-Hafiz et al.
6,587,199 B1	7/2003	Luu	D529,616 S	10/2006	Deros et al.
6,597,932 B2	7/2003	Tian et al.	7,133,710 B2	11/2006	Acosta et al.
6,606,511 B1	8/2003	Ali et al.	7,142,901 B2	11/2006	Kiani et al.
6,616,606 B1	9/2003	Peterson et al.	7,179,228 B2	2/2007	Banet
6,635,559 B2	10/2003	Greenwald et al.	7,188,621 B2	3/2007	DeVries et al.
6,639,668 B1	10/2003	Trepagnier	7,208,119 B1	4/2007	Kurtock et al.
6,640,116 B2	10/2003	Diab	7,225,006 B2	5/2007	Al-Ali et al.
6,640,117 B2	10/2003	Makarewicz et al.	RE39,672 E	6/2007	Shehada et al.
6,641,533 B2	11/2003	Causey et al.	7,229,415 B2	6/2007	Schwartz
6,646,556 B1	11/2003	Smith et al.	7,238,159 B2	7/2007	Banet et al.
6,650,939 B2	11/2003	Takpke et al.	7,241,287 B2	7/2007	Shehada et al.
D483,872 S	12/2003	Cruz et al.	7,244,251 B2	7/2007	Shehada et al.
6,658,276 B2	12/2003	Kianl et al.	7,245,373 B2	7/2007	Soller et al.
6,661,161 B1	12/2003	Lanzo et al.	7,248,172 B2	7/2007	Clifford et al.
6,694,180 B1	2/2004	Boesen	7,252,659 B2	8/2007	Shehada et al.
6,697,656 B1	2/2004	Al-Ali	7,254,429 B2	8/2007	Schurman et al.
6,697,658 B2	2/2004	Al-Ali	7,254,431 B2	8/2007	Al-Ali
RE38,476 E	3/2004	Diab et al.	7,254,434 B2	8/2007	Schulz et al.
RE38,492 E	4/2004	Diab et al.	7,256,708 B2	8/2007	Rosenfeld
6,719,694 B2	4/2004	Weng et al.	7,261,697 B2	8/2007	Berstein
6,735,379 B2	5/2004	Salmon et al.	7,264,616 B2	9/2007	Shehada et al.
6,738,652 B2	5/2004	Mattu et al.	7,267,671 B2	9/2007	Shehada et al.
6,746,406 B2	6/2004	Lia et al.	7,268,859 B2	9/2007	Sage, Jr. et al.
6,751,492 B2	6/2004	Ben-haim	7,274,955 B2	9/2007	Kiani et al.
6,760,607 B2	7/2004	Al-Ali	D554,263 S	10/2007	Al-Ali
6,766,188 B2	7/2004	Soller	7,280,858 B2	10/2007	Al-Ali et al.
6,783,492 B2	8/2004	Dominguez	7,285,090 B2	10/2007	Stivoric et al.
6,788,965 B2	9/2004	Ruchti et al.	7,289,835 B2	10/2007	Mansfield et al.
6,790,178 B1	9/2004	Mault et al.	7,292,883 B2	11/2007	De Felice et al.
6,795,724 B2	9/2004	Hogan	7,307,543 B2	12/2007	Rosenfeld
6,796,186 B2	9/2004	Lia et al.	7,313,423 B2	12/2007	Griffin et al.
6,804,656 B1	10/2004	Rosenfeld	D558,882 S	1/2008	Brady
6,807,050 B1	10/2004	Whitehorn et al.	7,314,446 B2	1/2008	Byrd et al.
6,816,241 B2	11/2004	Grubisic	7,315,825 B2	1/2008	Rosenfeld
6,817,979 B2	11/2004	Nihtila et al.	7,321,862 B2	1/2008	Rosenfeld
6,822,564 B2	11/2004	Al-Ali	7,322,971 B2	1/2008	Shehada et al.
6,837,848 B2	1/2005	Bonner et al.	7,336,187 B2	2/2008	Hubbard, Jr. et al.
6,841,535 B2	1/2005	Divita et al.	7,341,559 B2	3/2008	Schulz et al.
6,850,787 B2	2/2005	Weber et al.	7,343,186 B2	3/2008	Lamego et al.
6,850,788 B2	2/2005	Al-Ali	D566,282 S	4/2008	Al-Ali et al.
6,855,112 B2	2/2005	Kao et al.	7,356,178 B2	4/2008	Ziel et al.
6,860,266 B2	3/2005	Blike	7,356,365 B2	4/2008	Schurman
6,876,931 B2	4/2005	Lorenz et al.	7,361,155 B2	4/2008	Sage, Jr. et al.
6,897,788 B2	5/2005	Khair et al.	D569,280 S	5/2008	Chen
			7,371,981 B2	5/2008	Abdul-Hafiz
			7,373,193 B2	5/2008	Al-Ali et al.
			7,377,794 B2	5/2008	Ali et al.
			7,378,975 B1	5/2008	Smith et al.

(56)

References Cited

U.S. PATENT DOCUMENTS

7,382,247 B2	6/2008	Welch et al.	7,774,060 B2	8/2010	Westenskow et al.
7,390,299 B2	6/2008	Weiner et al.	7,778,851 B2	8/2010	Schoenberg et al.
7,395,158 B2	7/2008	Monfre et al.	7,783,879 B2	8/2010	Krummel et al.
7,395,216 B2	7/2008	Rosenfeld	7,791,155 B2	9/2010	Diab
7,396,330 B2	7/2008	Banet et al.	7,794,407 B2	9/2010	Rothenberg
7,411,509 B2	8/2008	Rosenfeld	7,803,120 B2	9/2010	Banet et al.
7,413,546 B2	8/2008	Agutter et al.	7,806,830 B2	10/2010	Bernstein
7,415,297 B2	8/2008	Al-Ali et al.	7,820,184 B2	10/2010	Strizker et al.
7,419,483 B2	9/2008	Shehada	RE41,912 E	11/2010	Parker
7,433,827 B2	10/2008	Rosenfeld	7,831,450 B2	11/2010	Schoenberg
7,438,683 B2	10/2008	Al-Ali et al.	7,841,986 B2	11/2010	He et al.
7,439,856 B2	10/2008	Weiner et al.	D629,524 S	12/2010	Zeller et al.
7,454,359 B2	11/2008	Rosenfeld	7,848,935 B2	12/2010	Gotlib
7,454,360 B2	11/2008	Rosenfeld	7,858,322 B2	12/2010	Tymianski et al.
7,462,151 B2	12/2008	Childre et al.	7,865,232 B1	1/2011	Krishnaswamy et al.
7,467,094 B2	12/2008	Rosenfeld	7,880,626 B2	2/2011	Al-Ali et al.
7,475,019 B2	1/2009	Rosenfeld	7,881,892 B2	2/2011	Soyemi et al.
7,481,772 B2	1/2009	Banet	7,890,156 B2	2/2011	Ooi et al.
7,483,729 B2	1/2009	Al-Ali et al.	D634,017 S	3/2011	Tokumoto et al.
7,489,250 B2	2/2009	Bock et al.	7,909,772 B2	3/2011	Popov et al.
D587,657 S	3/2009	Al-Ali et al.	7,914,514 B2	3/2011	Calderon
7,497,828 B1	3/2009	Wilk et al.	7,919,713 B2	4/2011	Al-Ali et al.
7,500,950 B2	3/2009	Al-Ali et al.	7,937,128 B2	5/2011	Al-Ali
7,509,494 B2	3/2009	Al-Ali	7,937,129 B2	5/2011	Mason et al.
7,510,849 B2	3/2009	Schurman et al.	7,941,199 B2	5/2011	Kiani
7,514,725 B2	4/2009	Wojtczuk et al.	7,957,780 B2	6/2011	Lamego et al.
7,515,043 B2	4/2009	Welch et al.	7,962,188 B2	6/2011	Kiani et al.
7,515,044 B2	4/2009	Welch et al.	7,963,927 B2	6/2011	Kelleher et al.
7,519,406 B2	4/2009	Blank et al.	7,967,749 B2	6/2011	Hutchinson et al.
D592,507 S	5/2009	Wachman et al.	7,976,472 B2	7/2011	Kiani
7,530,942 B1	5/2009	Diab	7,987,069 B2	7/2011	Rodgers et al.
7,532,919 B2	5/2009	Soyemi et al.	7,988,639 B2	8/2011	Starks
7,549,961 B1	6/2009	Hwang	7,990,382 B2	8/2011	Kiani
7,551,717 B2	6/2009	Tome et al.	7,991,463 B2	8/2011	Kelleher et al.
7,559,520 B2	7/2009	Quijano et al.	7,991,625 B2	8/2011	Rosenfeld
7,577,475 B2	8/2009	Consentino et al.	7,993,275 B2	8/2011	Banet et al.
7,588,558 B2	9/2009	Sage, Jr. et al.	8,008,088 B2	8/2011	Bellott et al.
7,590,950 B2	9/2009	Collins et al.	RE42,753 E	9/2011	Kiani-Azarbayjany et al.
7,593,230 B2	9/2009	Abul-Haj et al.	8,027,846 B2	9/2011	Schoenberg
7,596,398 B2	9/2009	Al-Ali et al.	8,028,701 B2	10/2011	Al-Ali et al.
7,597,665 B2	10/2009	Wilk et al.	8,033,996 B2	10/2011	Behar
7,606,608 B2	10/2009	Blank et al.	8,036,736 B2	10/2011	Snyder et al.
7,612,999 B2	11/2009	Clark et al.	8,038,625 B2	10/2011	Afonso et al.
7,616,303 B2	11/2009	Yang et al.	8,048,040 B2	11/2011	Kiani
7,620,674 B2	11/2009	Ruchti et al.	8,050,728 B2	11/2011	Al-Ali et al.
D606,659 S	12/2009	Kiani et al.	8,068,104 B2	11/2011	Rampersad
7,629,039 B2	12/2009	Eckerbom et al.	8,073,707 B2	12/2011	Teller et al.
7,639,145 B2	12/2009	Lawson et al.	8,094,013 B1	1/2012	Lee et al.
7,640,140 B2	12/2009	Ruchti et al.	RE43,169 E	2/2012	Parker
7,647,083 B2	1/2010	Al-Ali et al.	8,118,620 B2	2/2012	Al-Ali et al.
7,650,291 B2	1/2010	Rosenfeld	8,130,105 B2	3/2012	Al-Ali et al.
D609,193 S	2/2010	Al-Ali et al.	D659,836 S	5/2012	Bensch et al.
D610,690 S	2/2010	Tokumoto et al.	8,170,887 B2	5/2012	Rosenfeld
7,654,966 B2	2/2010	Westinskow et al.	8,175,895 B2	5/2012	Rosenfeld
7,658,716 B2	2/2010	Banet et al.	8,180,440 B2	5/2012	McCombie et al.
7,684,845 B2	3/2010	Juan	8,182,443 B1	5/2012	Kiani
7,689,437 B1	3/2010	Teller et al.	8,190,223 B2	5/2012	Al-Ali et al.
RE41,236 E	4/2010	Seely	8,200,321 B2	6/2012	McCombie et al.
D614,305 S	4/2010	Al-Ali et al.	8,203,438 B2	6/2012	Kiani et al.
7,693,697 B2	4/2010	Westinskow et al.	8,203,704 B2	6/2012	Merritt et al.
7,697,966 B2	4/2010	Monfre et al.	8,206,312 B2	6/2012	Farquhar
7,698,105 B2	4/2010	Ruchti et al.	8,214,007 B2	7/2012	Baker et al.
RE41,317 E	5/2010	Parker	8,219,172 B2	7/2012	Schurman et al.
RE41,333 E	5/2010	Blank et al.	8,224,411 B2	7/2012	Al-Ali et al.
7,722,542 B2	5/2010	Lia et al.	8,229,532 B2	7/2012	Davis
D617,463 S	6/2010	Tokumoto et al.	8,233,955 B2	7/2012	Al-Ali et al.
7,729,733 B2	6/2010	Al-Ali et al.	D665,085 S	8/2012	Strother et al.
7,736,318 B2	6/2010	Consentino et al.	8,235,907 B2	8/2012	Wilk et al.
7,740,590 B2	6/2010	Bernstein	8,239,010 B2	8/2012	Banet et al.
7,761,127 B2	7/2010	Al-Ali et al.	8,239,780 B2	8/2012	Manetta et al.
7,763,420 B2	7/2010	Strizker et al.	8,241,213 B2	8/2012	Lynn et al.
7,764,982 B2	7/2010	Dalke et al.	8,249,815 B2	8/2012	Taylor
D621,515 S	8/2010	Chua et al.	8,255,026 B1	8/2012	Al-Ali
D621,516 S	8/2010	Kiani et al.	8,265,723 B1	9/2012	McHale et al.
7,766,818 B2	8/2010	Iketani et al.	8,274,360 B2	9/2012	Sampath et al.
			8,280,473 B2	10/2012	Al-Ali
			8,294,588 B2	10/2012	Fisher et al.
			8,294,716 B2	10/2012	Lord et al.
			8,311,747 B2	11/2012	Taylor

(56)

References Cited

U.S. PATENT DOCUMENTS

8,311,748 B2	11/2012	Taylor et al.	8,738,118 B2	5/2014	Moon et al.
8,315,683 B2	11/2012	Al-Ali et al.	8,740,792 B1	6/2014	Kiani et al.
8,315,812 B2	11/2012	Taylor	8,740,802 B2	6/2014	Banet et al.
8,315,813 B2	11/2012	Taylor et al.	8,740,807 B2	6/2014	Banet et al.
8,315,814 B2	11/2012	Taylor et al.	8,747,330 B2	6/2014	Banet et al.
8,321,004 B2	11/2012	Moon et al.	8,755,535 B2	6/2014	Telfort et al.
8,321,150 B2	11/2012	Taylor	8,755,872 B1	6/2014	Marinow
RE43,860 E	12/2012	Parker	D709,846 S	7/2014	Oswaks
8,326,649 B2	12/2012	Rosenfeld	8,764,671 B2	7/2014	Kiani
8,346,330 B2	1/2013	Lamego	8,768,423 B2	7/2014	Shakespeare et al.
8,348,840 B2	1/2013	Heit et al.	8,771,204 B2	7/2014	Telfort et al.
8,353,842 B2	1/2013	Al-Ali et al.	8,781,544 B2	7/2014	Al-Ali et al.
8,355,766 B2	1/2013	Macneish, III et al.	8,790,268 B2	7/2014	Al-Ali
8,360,936 B2	1/2013	Dibenedetto et al.	8,801,613 B2	8/2014	Al-Ali et al.
8,364,250 B2	1/2013	Moon et al.	8,808,188 B2	8/2014	Banet et al.
8,374,665 B2	2/2013	Lamego	8,818,477 B2	8/2014	Soller
D679,018 S	3/2013	Fullerton et al.	8,821,397 B2	9/2014	Al-Ali et al.
8,388,353 B2	3/2013	Kiani	8,821,415 B2	9/2014	Al-Ali et al.
8,401,602 B2	3/2013	Kiani	8,830,449 B1	9/2014	Lamego et al.
8,401,874 B2	3/2013	Rosenfeld	8,840,549 B2	9/2014	Al-Ali et al.
8,414,499 B2	4/2013	Al-Ali et al.	8,852,094 B2	10/2014	Al-Ali et al.
8,418,524 B2	4/2013	Al-Ali	8,852,994 B2	10/2014	Wojtczuk et al.
8,419,649 B2	4/2013	Banet et al.	8,866,620 B2	10/2014	Amir
8,428,967 B2	4/2013	Olsen et al.	8,873,035 B2	10/2014	Yang et al.
8,430,817 B1	4/2013	Al-Ali et al.	8,878,888 B2	11/2014	Rosenfeld
8,437,824 B2	5/2013	Moon et al.	8,888,700 B2	11/2014	Banet et al.
8,437,825 B2	5/2013	Dalvi et al.	8,897,847 B2	11/2014	Al-Ali
8,442,607 B2	5/2013	Banet et al.	8,898,369 B1	11/2014	Yang
8,449,469 B2	5/2013	Banet et al.	D719,267 S	12/2014	Vaccarella et al.
8,455,290 B2	6/2013	Siskavich	8,907,287 B2	12/2014	Vanderpohl
8,457,707 B2	6/2013	Kiani	8,909,330 B2	12/2014	McCombie et al.
8,471,713 B2	6/2013	Poeze et al.	8,911,377 B2	12/2014	Al-Ali
8,473,020 B2	6/2013	Kiani et al.	8,956,293 B2	2/2015	McCombie et al.
8,475,370 B2	7/2013	McCombie et al.	8,956,294 B2	2/2015	McCombie et al.
8,506,480 B2	8/2013	Banet et al.	8,974,115 B2	3/2015	Segal et al.
8,509,867 B2	8/2013	Workman et al.	8,979,765 B2	3/2015	Banet et al.
8,515,509 B2	8/2013	Bruinsma et al.	8,989,831 B2	3/2015	Al-Ali et al.
8,523,781 B2	9/2013	Al-Ali	8,998,809 B2	4/2015	Kiani
8,527,038 B2	9/2013	Moon et al.	9,035,794 B2	5/2015	Narasimhan et al.
D692,145 S	10/2013	Al-Ali et al.	9,055,928 B2	6/2015	McCombie et al.
8,545,417 B2	10/2013	Banet et al.	9,057,689 B2	6/2015	Soller
8,554,297 B2	10/2013	Moon et al.	9,066,666 B2	6/2015	Kiani
8,571,617 B2	10/2013	Reichgott et al.	9,066,680 B1	6/2015	Al-Ali et al.
8,571,618 B1	10/2013	Lamego et al.	9,095,291 B2	8/2015	Soller
8,571,619 B2	10/2013	Al-Ali et al.	9,095,316 B2	8/2015	Welch et al.
8,574,161 B2	11/2013	Banet et al.	9,106,038 B2	8/2015	Telfort et al.
8,577,431 B2	11/2013	Lamego et al.	9,107,625 B2	8/2015	Telfort et al.
8,579,813 B2	11/2013	Causey, III et al.	9,131,881 B2	9/2015	Diab et al.
8,584,345 B2	11/2013	Al-Ali et al.	9,138,180 B1	9/2015	Coverston et al.
8,588,880 B2	11/2013	Abdul-Hafiz et al.	9,149,192 B2	10/2015	Banet et al.
8,588,924 B2	11/2013	Dion	9,153,112 B1	10/2015	Kiani et al.
8,591,411 B2	11/2013	Banet et al.	9,161,700 B2	10/2015	Banet et al.
8,594,776 B2	11/2013	McCombie et al.	D743,817 S	11/2015	Singh et al.
8,600,777 B2	12/2013	Schoenberg	9,173,593 B2	11/2015	Banet et al.
8,602,997 B2	12/2013	Banet et al.	9,173,594 B2	11/2015	Banet et al.
8,614,630 B2	12/2013	Narasimhan et al.	9,183,738 B1	11/2015	Allen, Sr. et al.
8,620,678 B2	12/2013	Gotlib	9,192,329 B2	11/2015	Al-Ali
8,622,922 B2	1/2014	Banet et al.	9,192,351 B1	11/2015	Telfort et al.
8,630,691 B2	1/2014	Lamego et al.	9,195,385 B2	11/2015	Al-Ali et al.
8,641,631 B2	2/2014	Sierra et al.	D745,167 S	12/2015	Canas et al.
8,652,060 B2	2/2014	Al-Ali	D746,161 S	12/2015	Vardi
8,663,106 B2	3/2014	Stivoric et al.	9,204,816 B2	12/2015	Aga et al.
8,666,468 B1	3/2014	Al-Ali	9,211,095 B1	12/2015	Al-Ali
8,670,811 B2	3/2014	O'Reilly	9,214,196 B2	12/2015	Aga et al.
8,672,854 B2	3/2014	McCombie et al.	9,215,986 B2	12/2015	Banet et al.
RE44,823 E	4/2014	Parker	9,218,454 B2	12/2015	Kiani et al.
RE44,875 E	4/2014	Kiani et al.	9,245,668 B1	1/2016	Vo et al.
D701,964 S	4/2014	Yoneta et al.	9,247,004 B2	1/2016	Azimi
8,688,183 B2	4/2014	Bruinsma et al.	9,267,572 B2	2/2016	Barker et al.
8,690,799 B2	4/2014	Telfort et al.	9,277,864 B2	3/2016	Yang et al.
8,702,627 B2	4/2014	Telfort et al.	9,277,880 B2	3/2016	Poeze et al.
8,712,494 B1	4/2014	MacNeish, III et al.	9,307,908 B2	4/2016	Chan et al.
8,715,206 B2	5/2014	Telfort et al.	9,307,915 B2	4/2016	McCombie et al.
8,723,677 B1	5/2014	Kiani	9,307,928 B1	4/2016	Al-Ali et al.
8,727,977 B2	5/2014	Banet et al.	9,323,894 B2	4/2016	Kiani
			D755,392 S	5/2016	Hwang et al.
			9,326,712 B1	5/2016	Kiani
			9,339,209 B2	5/2016	Banet et al.
			9,339,211 B2	5/2016	Banet et al.

(56)

References Cited

U.S. PATENT DOCUMENTS

D759,828 S	6/2016	Riedle	9,936,917 B2	4/2018	Poeze et al.
9,364,158 B2	6/2016	Banet et al.	9,955,937 B2	5/2018	Telfort
9,378,450 B1	6/2016	Mei et al.	9,965,946 B2	5/2018	Al-Ali et al.
9,380,952 B2	7/2016	Banet et al.	9,980,678 B2	5/2018	Chan et al.
9,392,945 B2	7/2016	Al-Ali et al.	D820,865 S	6/2018	Muhsin et al.
9,408,542 B1	8/2016	Kinast et al.	D821,593 S *	6/2018	Perez D24/200
9,408,573 B2	8/2016	Welch et al.	9,986,951 B1	6/2018	Ferdosi et al.
D766,113 S	9/2016	Dohi et al.	9,986,952 B2	6/2018	Dalvi et al.
9,436,645 B2	9/2016	Al-Ali et al.	9,993,203 B2	6/2018	Mei et al.
9,439,574 B2	9/2016	McCombie et al.	9,999,376 B2	6/2018	Chan et al.
9,445,759 B1	9/2016	Lamego et al.	D822,215 S	7/2018	Al-Ali et al.
9,471,541 B1	10/2016	Chan et al.	D822,216 S	7/2018	Barker et al.
9,474,474 B2	10/2016	Lamego et al.	10,010,276 B2	7/2018	Al-Ali et al.
9,480,435 B2	11/2016	Olsen	10,020,075 B2	7/2018	Perlman et al.
9,483,726 B2	11/2016	Mei et al.	10,039,463 B1	8/2018	Selvaraj et al.
9,486,138 B2	11/2016	Simpson et al.	10,080,524 B1	9/2018	Xi
9,492,092 B2	11/2016	McCombie et al.	10,086,138 B1	10/2018	Novak, Jr.
9,510,779 B2	12/2016	Poeze et al.	10,111,591 B2	10/2018	Dyell et al.
9,517,024 B2	12/2016	Kiani et al.	D833,305 S	11/2018	Jang et al.
9,532,722 B2	1/2017	Lamego et al.	D833,624 S	11/2018	DeJong et al.
9,545,227 B2	1/2017	Selvaraj et al.	10,123,716 B2	11/2018	Narasimhan et al.
9,560,996 B2	2/2017	Kiani	10,123,729 B2	11/2018	Dyell et al.
9,563,836 B2	2/2017	Mei et al.	10,140,837 B2	11/2018	Shen et al.
9,566,007 B2	2/2017	McCombie et al.	D835,282 S	12/2018	Barker et al.
9,579,039 B2	2/2017	Jansen et al.	D835,283 S	12/2018	Barker et al.
9,588,135 B1	3/2017	Narasimhan et al.	D835,284 S	12/2018	Barker et al.
9,593,985 B2	3/2017	Segal et al.	D835,285 S	12/2018	Barker et al.
9,622,692 B2	4/2017	Lamego et al.	10,143,383 B2	12/2018	Tseng et al.
9,632,533 B2	4/2017	Li et al.	10,149,616 B2	12/2018	Al-Ali et al.
9,632,981 B2	4/2017	Chan et al.	10,154,815 B2	12/2018	Al-Ali et al.
D788,312 S	5/2017	Al-Ali et al.	10,159,412 B2	12/2018	Lamego et al.
9,636,029 B1	5/2017	Narasimhan et al.	D838,372 S	1/2019	Goering et al.
9,649,054 B2	5/2017	Lamego et al.	10,182,750 B1	1/2019	Philippine et al.
9,655,546 B2	5/2017	Shen et al.	10,188,348 B2	1/2019	Kiani et al.
9,655,559 B2	5/2017	Chan et al.	RE47,218 E	2/2019	Ali-Ali
D789,809 S	6/2017	Kang	RE47,244 E	2/2019	Kiani et al.
9,681,205 B1	6/2017	Yang	RE47,249 E	2/2019	Kiani et al.
9,697,928 B2	7/2017	Al-Ali et al.	10,194,834 B2	2/2019	Selvaraj et al.
D795,100 S	8/2017	Alla	10,205,291 B2	2/2019	Scruggs et al.
D795,252 S	8/2017	Chung et al.	10,212,165 B1	2/2019	Petersen et al.
D795,713 S	8/2017	Griffin et al.	10,213,146 B2	2/2019	Aga et al.
D795,714 S	8/2017	Pugmire et al.	10,213,163 B2	2/2019	Ferdosi et al.
9,717,458 B2	8/2017	Lamego et al.	D842,136 S	3/2019	Jang et al.
9,724,016 B1	8/2017	Al-Ali et al.	10,226,187 B2	3/2019	Al-Ali et al.
9,724,024 B2	8/2017	Ai-Ali	10,231,657 B2	3/2019	Al-Ali et al.
9,724,025 B1	8/2017	Kiani et al.	10,231,670 B2	3/2019	Blank et al.
9,728,061 B2	8/2017	Shen et al.	RE47,353 E	4/2019	Kiani et al.
9,749,232 B2	8/2017	Sampath et al.	D846,746 S	4/2019	Lee
D796,350 S	9/2017	Bone	10,262,506 B2	4/2019	Aga et al.
9,750,442 B2	9/2017	Olsen	10,279,247 B2	5/2019	Kiani
9,750,461 B1	9/2017	Telfort	10,292,664 B2	5/2019	Al-Ali
9,762,673 B2	9/2017	Azimi	10,299,720 B2	5/2019	Brown et al.
9,775,545 B2	10/2017	Al-Ali et al.	10,317,427 B2	6/2019	Chan et al.
9,778,079 B1	10/2017	Al-Ali et al.	10,321,872 B2	6/2019	Li
9,782,077 B2	10/2017	Lamego et al.	10,324,109 B2	6/2019	Chan et al.
9,787,568 B2	10/2017	Lamego et al.	10,327,337 B2	6/2019	Triman et al.
9,788,778 B2	10/2017	Chan et al.	10,327,713 B2	6/2019	Barker et al.
9,808,188 B1	11/2017	Perea et al.	10,332,630 B2	6/2019	Al-Ali
9,814,405 B2	11/2017	Yang et al.	10,357,163 B1	7/2019	Selvaraj et al.
9,818,281 B2	11/2017	Narasimhan	10,373,714 B1	8/2019	Selvaraj et al.
D805,926 S	12/2017	Im et al.	10,383,520 B2	8/2019	Wojtczuk et al.
9,839,379 B2	12/2017	Al-Ali et al.	10,383,527 B2	8/2019	Al-Ali
9,839,381 B1	12/2017	Weber et al.	10,383,562 B2	8/2019	Chan et al.
9,847,749 B2	12/2017	Kiani et al.	10,388,120 B2	8/2019	Muhsin et al.
9,848,800 B1	12/2017	Lee et al.	10,420,473 B2	9/2019	Shi
9,855,003 B2	1/2018	Chan et al.	10,422,814 B2	9/2019	Chan et al.
9,861,289 B2	1/2018	Li et al.	D861,508 S	10/2019	Ejiri et al.
9,861,298 B2	1/2018	Eckerbom et al.	D864,120 S	10/2019	Forrest et al.
9,861,305 B1	1/2018	Weber et al.	10,433,781 B2	10/2019	Chan et al.
9,872,619 B2	1/2018	Lee	10,441,181 B1	10/2019	Telfort et al.
9,872,634 B2	1/2018	Chan et al.	10,441,196 B2	10/2019	Eckerbom et al.
9,877,650 B2	1/2018	Muhsin et al.	10,448,844 B2	10/2019	Al-Ali et al.
9,891,079 B2	2/2018	Dalvi	10,448,849 B2	10/2019	Ferdosi et al.
9,924,897 B1	3/2018	Abdul-Hafiz	10,448,871 B2	10/2019	Al-Ali
9,936,382 B2	4/2018	Yang et al.	10,456,038 B2	10/2019	Lamego et al.
			D867,906 S	11/2019	Chang
			10,463,340 B2	11/2019	Telfort et al.
			10,471,159 B1	11/2019	Lapotko et al.
			10,505,311 B2	12/2019	Al-Ali et al.

(56)

References Cited

U.S. PATENT DOCUMENTS

10,524,738 B2	1/2020	Olsen	11,147,518 B1	10/2021	Al-Ali et al.
10,532,174 B2	1/2020	Al-Ali	11,185,262 B2	11/2021	Al-Ali et al.
10,537,285 B2	1/2020	Sherim et al.	11,191,484 B2	12/2021	Kiani et al.
10,542,903 B2	1/2020	Al-Ali et al.	11,234,623 B2	2/2022	Frick
10,554,756 B2	2/2020	Azimi	11,253,190 B2	2/2022	Ortiz et al.
10,555,678 B2	2/2020	Dalvi et al.	D946,425 S	3/2022	Chang et al.
10,568,553 B2	2/2020	O'Neil et al.	D946,596 S	3/2022	Ahmed
10,582,854 B2	3/2020	Liou et al.	D946,597 S	3/2022	Ahmed
10,582,862 B1	3/2020	Selvaraj et al.	D946,598 S	3/2022	Ahmed
10,588,565 B2	3/2020	Larson et al.	D946,617 S	3/2022	Ahmed
10,595,776 B1	3/2020	Selvaraj et al.	11,272,839 B2	3/2022	Al-Ali et al.
10,608,817 B2	3/2020	Haider et al.	11,289,199 B2	3/2022	Al-Ali
D880,477 S	4/2020	Forrest et al.	RE49,034 E	4/2022	Al-Ali
10,617,302 B2	4/2020	Al-Ali et al.	11,298,021 B2	4/2022	Muhsin et al.
10,617,325 B2	4/2020	Chan et al.	D950,580 S	5/2022	Ahmed
10,617,335 B2	4/2020	Al-Ali et al.	D950,599 S	5/2022	Ahmed
10,631,732 B2	4/2020	Larson et al.	D950,738 S	5/2022	Al-Ali et al.
10,637,181 B2	4/2020	Al-Ali et al.	D957,648 S	7/2022	Al-Ali
D883,819 S	5/2020	Singh et al.	11,382,567 B2	7/2022	O'Brien et al.
D884,165 S	5/2020	deBock	11,389,093 B2	7/2022	Triman et al.
D886,303 S	6/2020	Huang et al.	11,406,286 B2	8/2022	Al-Ali et al.
D886,849 S	6/2020	Muhsin et al.	11,417,426 B2	8/2022	Muhsin et al.
D887,548 S	6/2020	Abdul-Hafiz et al.	11,439,329 B2	9/2022	Lamego
D887,549 S	6/2020	Abdul-Hafiz et al.	11,445,948 B2	9/2022	Scruggs et al.
10,667,764 B2	6/2020	Ahmed et al.	D965,789 S	10/2022	Al-Ali et al.
D890,708 S	7/2020	Forrest et al.	D966,914 S *	10/2022	Abellera D12/174
10,721,785 B2	7/2020	Al-Ali	D967,433 S	10/2022	Al-Ali et al.
10,736,518 B2	8/2020	Al-Ali et al.	11,457,810 B2	10/2022	Van Tassel et al.
10,739,205 B2	8/2020	Jang et al.	11,464,410 B2	10/2022	Muhsin
10,750,951 B1	8/2020	Prachar	11,504,058 B1	11/2022	Sharma et al.
10,750,984 B2	8/2020	Pauley et al.	11,504,066 B1	11/2022	Dalvi et al.
D897,098 S	9/2020	Al-Ali	D971,933 S	12/2022	Ahmed
10,772,522 B2	9/2020	Zadig	D973,072 S	12/2022	Ahmed
10,779,098 B2	9/2020	Iswanto et al.	D973,685 S	12/2022	Ahmed
D898,924 S *	10/2020	Hinds D24/189	D973,686 S	12/2022	Ahmed
10,827,958 B2	11/2020	Biederman et al.	11,517,229 B2	12/2022	Huang et al.
10,827,961 B1	11/2020	Iyengar et al.	11,534,086 B2	12/2022	Garai et al.
10,828,007 B1	11/2020	Telfort et al.	D974,193 S *	1/2023	Forrest D10/57
10,832,818 B2	11/2020	Muhsin et al.	D979,516 S	2/2023	Al-Ali et al.
10,849,554 B2	12/2020	Shreim et al.	D980,091 S	3/2023	Forrest et al.
10,856,741 B2	12/2020	Damania et al.	11,596,363 B2	3/2023	Lamego
10,856,750 B2	12/2020	Indorf	11,627,919 B2	4/2023	Kiani et al.
D906,970 S	1/2021	Forrest et al.	11,637,437 B2	4/2023	Al-Ali et al.
D907,219 S	1/2021	Neri	D985,498 S	5/2023	Al-Ali et al.
D908,213 S	1/2021	Abdul-Hafiz et al.	11,653,862 B2	5/2023	Dalvi et al.
10,918,281 B2	2/2021	Al-Ali et al.	D989,112 S	6/2023	Muhsin et al.
10,932,705 B2	3/2021	Muhsin et al.	D989,327 S	6/2023	Al-Ali et al.
10,932,729 B2	3/2021	Kiani et al.	11,678,829 B2	6/2023	Al-Ali et al.
10,939,878 B2	3/2021	Kiani et al.	11,679,579 B2	6/2023	Al-Ali
10,956,950 B2	3/2021	Al-Ali et al.	11,684,296 B2	6/2023	Vo et al.
D916,135 S	4/2021	Indorf et al.	11,692,934 B2	7/2023	Normand et al.
D917,046 S	4/2021	Abdul-Hafiz et al.	11,701,043 B2	7/2023	Al-Ali et al.
D917,550 S	4/2021	Indorf et al.	D997,365 S	8/2023	Hwang
D917,564 S	4/2021	Indorf et al.	11,721,105 B2	8/2023	Ranasinghe et al.
D917,704 S	4/2021	Al-Ali et al.	11,730,379 B2	8/2023	Ahmed et al.
10,987,066 B2	4/2021	Chandran et al.	D998,625 S	9/2023	Indorf et al.
10,991,135 B2	4/2021	Al-Ali et al.	D998,630 S	9/2023	Indorf et al.
D919,094 S	5/2021	Al-Ali et al.	D998,631 S	9/2023	Indorf et al.
D919,100 S	5/2021	Al-Ali et al.	D999,244 S	9/2023	Indorf et al.
D920,138 S	5/2021	Kuwashiro et al.	D999,245 S	9/2023	Indorf et al.
11,006,867 B2	5/2021	Al-Ali	D999,246 S	9/2023	Indorf et al.
D921,202 S	6/2021	Al-Ali et al.	11,766,198 B2	9/2023	Pauley et al.
11,024,064 B2	6/2021	Muhsin et al.	D1,000,975 S *	10/2023	Al-Ali D10/57
11,026,604 B2	6/2021	Chen et al.	11,803,623 B2	10/2023	Kiani et al.
D925,597 S	7/2021	Chandran et al.	11,832,940 B2	12/2023	Diab et al.
11,064,948 B2	7/2021	Peabody	D1,010,816 S	1/2024	Cook
D927,699 S	8/2021	Al-Ali et al.	D1,011,730 S	1/2024	Jagroop
11,076,777 B2	8/2021	Lee et al.	D1,013,179 S	1/2024	Al-Ali et al.
11,083,371 B1	8/2021	Szabados et al.	11,872,156 B2	1/2024	Telfort et al.
11,114,188 B2	9/2021	Poeze et al.	11,872,369 B1 *	1/2024	Schiff A61K 31/4015
D933,232 S	10/2021	Al-Ali et al.	11,879,960 B2	1/2024	Ranasinghe et al.
D933,233 S	10/2021	Al-Ali et al.	11,883,129 B2	1/2024	Olsen
D933,234 S	10/2021	Al-Ali et al.	D1,022,729 S *	4/2024	Forrest D10/57
D933,508 S	10/2021	Wolff	11,951,186 B2	4/2024	Krishnamani et al.
11,145,408 B2	10/2021	Sampath et al.	11,974,833 B2	5/2024	Forrest et al.
			2001/0011355 A1	8/2001	Kawai
			2001/0034477 A1	10/2001	Mansfield et al.
			2001/0039483 A1	11/2001	Brand et al.
			2001/0046366 A1	11/2001	Susskind

(56)

References Cited

U.S. PATENT DOCUMENTS

2002/0010401 A1	1/2002	Bushmakina et al.	2006/0253042 A1	11/2006	Stahmann et al.
2002/0045836 A1	4/2002	Alkawwas	2006/0279426 A1	12/2006	Bonnet et al.
2002/0052311 A1	5/2002	Solomon et al.	2006/0282021 A1	12/2006	DeVaul et al.
2002/0058864 A1	5/2002	Mansfield et al.	2006/0286861 A1	12/2006	Avevor et al.
2002/0063690 A1	5/2002	Chung et al.	2007/0000490 A1	1/2007	DeVries et al.
2002/0133080 A1	9/2002	Apruzzese et al.	2007/0021675 A1	1/2007	Childre et al.
2002/0177758 A1	11/2002	Schoenberg	2007/0027368 A1	2/2007	Collins et al.
2003/0013975 A1	1/2003	Kiani	2007/0032733 A1	2/2007	Burton et al.
2003/0018243 A1	1/2003	Gerhardt et al.	2007/0032748 A1	2/2007	McNeil et al.
2003/0027326 A1	2/2003	Ulmsten et al.	2007/0055116 A1	3/2007	Clark et al.
2003/0052787 A1	3/2003	Zerhusen et al.	2007/0055544 A1	3/2007	Jung et al.
2003/0058838 A1	3/2003	Wengrovitz	2007/0060798 A1	3/2007	Krupnik et al.
2003/0144582 A1	7/2003	Cohen et al.	2007/0073116 A1	3/2007	Kiani et al.
2003/0156288 A1	8/2003	Barnum et al.	2007/0088406 A1	4/2007	Bennett et al.
2003/0158466 A1	8/2003	Lynn et al.	2007/0096897 A1	5/2007	Weiner
2003/0212312 A1	11/2003	Coffin, IV et al.	2007/0100222 A1	5/2007	Mastrototaro et al.
2003/0216670 A1	11/2003	Beggs	2007/0118399 A1	5/2007	Avinash et al.
2004/0013647 A1	1/2004	Solomon et al.	2007/0132597 A1	6/2007	Rodgers
2004/0015103 A1	1/2004	Aminian et al.	2007/0140475 A1	6/2007	Kurtock et al.
2004/0064072 A1	4/2004	Shapira	2007/0142715 A1	6/2007	Banet et al.
2004/0090742 A1	5/2004	Son et al.	2007/0156033 A1	7/2007	Causey et al.
2004/0106163 A1	6/2004	Workman, Jr. et al.	2007/0157285 A1	7/2007	Frank et al.
2004/0122787 A1	6/2004	Avinash et al.	2007/0159332 A1	7/2007	Koblasz
2004/0126007 A1	7/2004	Ziel et al.	2007/0163589 A1	7/2007	DeVries et al.
2004/0147818 A1	7/2004	Levy et al.	2007/0180140 A1	8/2007	Welch et al.
2004/0179332 A1	9/2004	Smith et al.	2007/0185390 A1	8/2007	Perkins et al.
2004/0186357 A1	9/2004	Soderberg et al.	2007/0185393 A1	8/2007	Zhou et al.
2004/0230179 A1	11/2004	Shehada et al.	2007/0232941 A1	10/2007	Rabinovich
2004/0243017 A1	12/2004	Causevic	2007/0244377 A1	10/2007	Cozad et al.
2004/0254431 A1	12/2004	Shehada et al.	2007/0244724 A1	10/2007	Pendergast et al.
2004/0254432 A1	12/2004	Shehada et al.	2007/0250286 A1	10/2007	Duncan et al.
2005/0005710 A1	1/2005	Sage, Jr.	2007/0254593 A1	11/2007	Jollota et al.
2005/0009926 A1	1/2005	Kreye et al.	2007/0255114 A1	11/2007	Ackermann et al.
2005/0020918 A1	1/2005	Wilk et al.	2007/0255116 A1	11/2007	Mehta et al.
2005/0038332 A1	2/2005	Saidara et al.	2007/0255250 A1	11/2007	Moberg et al.
2005/0038680 A1	2/2005	McMahon	2007/0276261 A1	11/2007	Banet et al.
2005/0055276 A1	3/2005	Kiani et al.	2007/0276262 A1	11/2007	Banet et al.
2005/0080336 A1	4/2005	Byrd et al.	2007/0276632 A1	11/2007	Banet et al.
2005/0096542 A1	5/2005	Weng et al.	2007/0288263 A1	12/2007	Rodgers
2005/0113653 A1	5/2005	Fox et al.	2008/0000479 A1	1/2008	Elaz et al.
2005/0124864 A1	6/2005	Mack et al.	2008/0003200 A1	1/2008	Arap et al.
2005/0125256 A1	6/2005	Schoenberg	2008/0021731 A1	1/2008	Rodgers
2005/0148882 A1	7/2005	Banet et al.	2008/0021854 A1	1/2008	Jung et al.
2005/0164933 A1	7/2005	Tymianski et al.	2008/0033661 A1	2/2008	Syroid et al.
2005/0191294 A1	9/2005	Arap et al.	2008/0051670 A1	2/2008	Banet et al.
2005/0208648 A1	9/2005	Sage, Jr. et al.	2008/0053438 A1	3/2008	DeVries et al.
2005/0209518 A1	9/2005	Sage, Jr. et al.	2008/0058614 A1	3/2008	Banet et al.
2005/0228244 A1	10/2005	Banet	2008/0058657 A1	3/2008	Schwartz et al.
2005/0228299 A1	10/2005	Banet	2008/0064965 A1	3/2008	Jay et al.
2005/0234317 A1	10/2005	Kiani	2008/0077026 A1	3/2008	Banet et al.
2005/0242946 A1	11/2005	Hubbard, Jr. et al.	2008/0082004 A1	4/2008	Banet et al.
2005/0245831 A1	11/2005	Banet	2008/0090626 A1	4/2008	Griffin et al.
2005/0245839 A1	11/2005	Stivoric et al.	2008/0091089 A1	4/2008	Guillory et al.
2005/0261594 A1	11/2005	Banet	2008/0091090 A1	4/2008	Guillory et al.
2005/0261598 A1	11/2005	Banet et al.	2008/0091471 A1	4/2008	Michon et al.
2005/0268401 A1	12/2005	Dixon et al.	2008/0094228 A1	4/2008	Welch et al.
2005/0277872 A1	12/2005	Colby, Jr. et al.	2008/0097167 A1	4/2008	Yudkovitch et al.
2006/0009697 A1	1/2006	Banet et al.	2008/0099366 A1	5/2008	Niemiec et al.
2006/0009698 A1	1/2006	Banet et al.	2008/0103375 A1	5/2008	Kiani
2006/0049936 A1	3/2006	Collins, Jr. et al.	2008/0114220 A1	5/2008	Banet et al.
2006/0056487 A1	3/2006	Kuroda et al.	2008/0119412 A1	5/2008	Tymianski et al.
2006/0058647 A1	3/2006	Strommer et al.	2008/0129518 A1	6/2008	Carlton-Foss
2006/0064037 A1	3/2006	Shalon et al.	2008/0138278 A1	6/2008	Scherz et al.
2006/0073719 A1	4/2006	Kiani	2008/0169922 A1	7/2008	Issokson
2006/0084878 A1	4/2006	Banet et al.	2008/0171919 A1	7/2008	Stivoric et al.
2006/0089543 A1	4/2006	Kim et al.	2008/0188795 A1	8/2008	Katz et al.
2006/0094936 A1	5/2006	Russ	2008/0194918 A1	8/2008	Kulik et al.
2006/0149393 A1	7/2006	Calderon	2008/0208912 A1	8/2008	Garibaldi
2006/0155175 A1	7/2006	Ogino et al.	2008/0214949 A1	9/2008	Stivoric et al.
2006/0189871 A1	8/2006	Al-Ali et al.	2008/0221396 A1	9/2008	Garces et al.
2006/0200009 A1	9/2006	Wekell et al.	2008/0221399 A1	9/2008	Zhou et al.
2006/0217684 A1	9/2006	Shehada et al.	2008/0221418 A1	9/2008	Al-Ali et al.
2006/0217685 A1	9/2006	Shehada et al.	2008/0221461 A1	9/2008	Zhou et al.
2006/0224413 A1	10/2006	Kim et al.	2008/0228077 A1	9/2008	Wilk et al.
2006/0235300 A1	10/2006	Weng et al.	2008/0275309 A1	11/2008	Stivoric et al.
			2008/0281167 A1	11/2008	Soderberg et al.
			2008/0281168 A1	11/2008	Gibson et al.
			2008/0281181 A1	11/2008	Manzione et al.
			2008/0287751 A1	11/2008	Stivoric et al.

(56)

References Cited

U.S. PATENT DOCUMENTS

2008/0292172	A1	11/2008	Assmann et al.	2010/0298655	A1	11/2010	McCombie et al.
2008/0300020	A1	12/2008	Nishizawa et al.	2010/0298656	A1	11/2010	McCombie et al.
2008/0312542	A1	12/2008	Banet et al.	2010/0298657	A1	11/2010	McCombie et al.
2008/0319275	A1	12/2008	Chiu et al.	2010/0298658	A1	11/2010	McCombie et al.
2008/0319282	A1	12/2008	Tran	2010/0298659	A1	11/2010	McCombie et al.
2008/0319327	A1	12/2008	Banet et al.	2010/0298660	A1	11/2010	McCombie et al.
2008/0319354	A1	12/2008	Bell et al.	2010/0298661	A1	11/2010	McCombie et al.
2009/0005651	A1	1/2009	Ward et al.	2010/0298742	A1	11/2010	Perlman et al.
2009/0018409	A1	1/2009	Banet et al.	2010/0305412	A1	12/2010	Darrah et al.
2009/0018422	A1	1/2009	Banet et al.	2010/0312103	A1	12/2010	Gorek et al.
2009/0018453	A1	1/2009	Banet et al.	2010/0317951	A1	12/2010	Rutkowski et al.
2009/0018808	A1	1/2009	Bronstein et al.	2010/0324384	A1	12/2010	Moon et al.
2009/0024008	A1	1/2009	Brunner et al.	2010/0324385	A1	12/2010	Moon et al.
2009/0036759	A1	2/2009	Ault et al.	2010/0324386	A1	12/2010	Moon et al.
2009/0044334	A1	2/2009	Parsell et al.	2010/0324387	A1	12/2010	Moon et al.
2009/0052623	A1	2/2009	Tome et al.	2010/0324388	A1	12/2010	Moon et al.
2009/0054735	A1	2/2009	Higgins et al.	2010/0324389	A1	12/2010	Moon et al.
2009/0054743	A1	2/2009	Wekell et al.	2011/0021930	A1	1/2011	Mazzeo et al.
2009/0062682	A1	3/2009	Bland et al.	2011/0023130	A1	1/2011	Gudgel et al.
2009/0069642	A1	3/2009	Gao et al.	2011/0028806	A1	2/2011	Merritt et al.
2009/0069868	A1	3/2009	Bengtsson et al.	2011/0028809	A1	2/2011	Goodman
2009/0093687	A1	4/2009	Telfort et al.	2011/0040197	A1	2/2011	Welch et al.
2009/0095926	A1	4/2009	MacNeish, III	2011/0046495	A1	2/2011	Osyka
2009/0099480	A1	4/2009	Salgo et al.	2011/0046498	A1	2/2011	Klap et al.
2009/0112072	A1	4/2009	Banet et al.	2011/0066051	A1	3/2011	Moon et al.
2009/0118628	A1	5/2009	Zhou et al.	2011/0077473	A1	3/2011	Lisogurski
2009/0119843	A1	5/2009	Rodgers et al.	2011/0077488	A1	3/2011	Buxton et al.
2009/0124867	A1	5/2009	Hirsch et al.	2011/0078596	A1	3/2011	Rawlins et al.
2009/0131759	A1	5/2009	Sims et al.	2011/0080294	A1	4/2011	Tanishima et al.
2009/0143832	A1	6/2009	Saba	2011/0082711	A1	4/2011	Poeze et al.
2009/0157058	A1	6/2009	Ferren et al.	2011/0087081	A1	4/2011	Kiani et al.
2009/0171170	A1	7/2009	Li et al.	2011/0087084	A1	4/2011	Jeong et al.
2009/0171225	A1	7/2009	Gadodia et al.	2011/0087117	A1	4/2011	Tremper et al.
2009/0177090	A1	7/2009	Grunwald et al.	2011/0087756	A1	4/2011	Biondi
2009/0182287	A1	7/2009	Kassab	2011/0098583	A1	4/2011	Pandia et al.
2009/0221937	A1	9/2009	Smith	2011/0105956	A1	5/2011	Hirth
2009/0226372	A1	9/2009	Ruoslahti et al.	2011/0110560	A1	5/2011	Adhikari
2009/0247984	A1	10/2009	Lamego et al.	2011/0118561	A1	5/2011	Tari et al.
2009/0254003	A1	10/2009	Buckman	2011/0118573	A1	5/2011	Mckenna
2009/0264778	A1	10/2009	Markowitz et al.	2011/0137297	A1	6/2011	Kiani et al.
2009/0275844	A1	11/2009	Al-Ali	2011/0152629	A1	6/2011	Eaton et al.
2009/0281462	A1	11/2009	Heliot et al.	2011/0172498	A1	7/2011	Olsen et al.
2009/0309755	A1	12/2009	Williamson	2011/0172967	A1	7/2011	Al-Ali et al.
2009/0322540	A1	12/2009	Richardson et al.	2011/0184252	A1	7/2011	Archer et al.
2010/0004518	A1	1/2010	Vo et al.	2011/0184253	A1	7/2011	Archer et al.
2010/0010385	A1	1/2010	Skelton et al.	2011/0201972	A1	8/2011	Ten Kate
2010/0030040	A1	2/2010	Poeze et al.	2011/0208073	A1	8/2011	Matsukawa et al.
2010/0030094	A1	2/2010	Lundback	2011/0212090	A1	9/2011	Pedersen et al.
2010/0036209	A1	2/2010	Ferren et al.	2011/0213225	A1	9/2011	Bernstein et al.
2010/0063365	A1	3/2010	Pisani et al.	2011/0224498	A1	9/2011	Banet et al.
2010/0099964	A1	4/2010	O'Reilly et al.	2011/0224499	A1	9/2011	Banet et al.
2010/0113894	A1	5/2010	Padiy	2011/0224500	A1	9/2011	Banet et al.
2010/0121217	A1	5/2010	Padiy et al.	2011/0224506	A1	9/2011	Moon et al.
2010/0121226	A1	5/2010	Ten Kate et al.	2011/0224507	A1	9/2011	Banet et al.
2010/0125217	A1	5/2010	Kuo et al.	2011/0224508	A1	9/2011	Moon et al.
2010/0130875	A1	5/2010	Banet et al.	2011/0224556	A1	9/2011	Moon et al.
2010/0144627	A1	6/2010	Vitek et al.	2011/0224557	A1	9/2011	Banet et al.
2010/0160794	A1	6/2010	Banet et al.	2011/0224564	A1	9/2011	Moon et al.
2010/0160795	A1	6/2010	Banet et al.	2011/0227739	A1	9/2011	Gilham et al.
2010/0160796	A1	6/2010	Banet et al.	2011/0230791	A1	9/2011	Ten Kate et al.
2010/0160797	A1	6/2010	Banet et al.	2011/0257489	A1	10/2011	Banet et al.
2010/0160798	A1	6/2010	Banet et al.	2011/0257544	A1	10/2011	Kaasinen et al.
2010/0168536	A1	7/2010	Banet et al.	2011/0257551	A1	10/2011	Banet et al.
2010/0168589	A1	7/2010	Banet et al.	2011/0257552	A1	10/2011	Banet et al.
2010/0185101	A1	7/2010	Sakai et al.	2011/0257553	A1	10/2011	Banet et al.
2010/0198622	A1	8/2010	Gajic et al.	2011/0257554	A1	10/2011	Banet et al.
2010/0210958	A1	8/2010	Manwaring et al.	2011/0257555	A1	10/2011	Banet et al.
2010/0234718	A1	9/2010	Sampath et al.	2011/0263950	A1	10/2011	Larson et al.
2010/0261982	A1	10/2010	Noury et al.	2011/0264035	A1	10/2011	Yodfat et al.
2010/0270257	A1	10/2010	Wachman et al.	2011/0288421	A1	11/2011	Banet et al.
2010/0298650	A1	11/2010	Moon et al.	2011/0295094	A1	12/2011	Doyle et al.
2010/0298651	A1	11/2010	Moon et al.	2012/0001751	A1	1/2012	Baker et al.
2010/0298652	A1	11/2010	McCombie et al.	2012/0004579	A1	1/2012	Luo et al.
2010/0298653	A1	11/2010	McCombie et al.	2012/0029300	A1	2/2012	Paquet
2010/0298654	A1	11/2010	McCombie et al.	2012/0029304	A1	2/2012	Medina et al.
				2012/0029879	A1	2/2012	Sing et al.
				2012/0059230	A1	3/2012	Teller et al.
				2012/0059283	A1	3/2012	Gravem et al.
				2012/0071771	A1	3/2012	Behar

(56)

References Cited

U.S. PATENT DOCUMENTS

2012/0075464 A1	3/2012	Derenne et al.	2014/0166076 A1	6/2014	Kiani et al.
2012/0088999 A1	4/2012	Bishay et al.	2014/0180160 A1	6/2014	Brown et al.
2012/0095352 A1	4/2012	Tran	2014/0187973 A1	7/2014	Brown et al.
2012/0095778 A1	4/2012	Gross et al.	2014/0200415 A1	7/2014	McCombie et al.
2012/0101353 A1	4/2012	Reggiardo et al.	2014/0200474 A1	7/2014	Selvaraj et al.
2012/0101411 A1	4/2012	Hausdorff et al.	2014/0228692 A1	8/2014	Chan et al.
2012/0101770 A1	4/2012	Grabiner et al.	2014/0235964 A1	8/2014	Banet et al.
2012/0108983 A1	5/2012	Banet et al.	2014/0249431 A1	9/2014	Banet et al.
2012/0117209 A1	5/2012	Sinha	2014/0249432 A1	9/2014	Banet et al.
2012/0123231 A1	5/2012	O'Reilly	2014/0249433 A1	9/2014	Banet et al.
2012/0123799 A1	5/2012	Nolen et al.	2014/0249434 A1	9/2014	Banet et al.
2012/0136221 A1	5/2012	Killen et al.	2014/0249435 A1	9/2014	Banet et al.
2012/0165629 A1	6/2012	Merritt et al.	2014/0249440 A1	9/2014	Banet et al.
2012/0179011 A1	7/2012	Moon et al.	2014/0249441 A1	9/2014	Banet et al.
2012/0184120 A1	7/2012	Basta et al.	2014/0249442 A1	9/2014	Banet et al.
2012/0190949 A1	7/2012	McCombie et al.	2014/0257056 A1	9/2014	Moon et al.
2012/0197619 A1	8/2012	Namer Yelin et al.	2014/0257057 A1	9/2014	Reis Cunha et al.
2012/0203078 A1	8/2012	Sze et al.	2014/0257850 A1	9/2014	Walker et al.
2012/0209084 A1	8/2012	Olsen et al.	2014/0266690 A1	9/2014	McKinley
2012/0226117 A1	9/2012	Lamego et al.	2014/0266787 A1	9/2014	Tran
2012/0226160 A1	9/2012	Kudoh	2014/0275845 A1	9/2014	Eagon et al.
2012/0239434 A1	9/2012	Breslow et al.	2014/0275871 A1	9/2014	Lamego et al.
2012/0242501 A1	9/2012	Tran et al.	2014/0275872 A1	9/2014	Merritt et al.
2012/0282583 A1	11/2012	Thaler et al.	2014/0275888 A1	9/2014	Wegerich et al.
2012/0283524 A1	11/2012	Kiani et al.	2014/0275932 A1	9/2014	Zadig
2012/0284053 A1	11/2012	Rosenfeld	2014/0276127 A1	9/2014	Ferdosi et al.
2012/0294801 A1	11/2012	Scherz et al.	2014/0276145 A1	9/2014	Banet et al.
2012/0314901 A1	12/2012	Hanson	2014/0276175 A1	9/2014	Banet et al.
2012/0315867 A1	12/2012	Davis et al.	2014/0276238 A1	9/2014	Osorio
2013/0006131 A1	1/2013	Narayan et al.	2014/0288947 A1	9/2014	Simpson et al.
2013/0006151 A1	1/2013	Main et al.	2014/0301893 A1	10/2014	Stroup et al.
2013/0023775 A1	1/2013	Lamego et al.	2014/0316217 A1	10/2014	Purdon et al.
2013/0035603 A1	2/2013	Jarausch et al.	2014/0316218 A1	10/2014	Purdon et al.
2013/0046197 A1	2/2013	Dlugos, Jr. et al.	2014/0323897 A1	10/2014	Brown et al.
2013/0054180 A1	2/2013	Barfield	2014/0323898 A1	10/2014	Purdon et al.
2013/0060147 A1	3/2013	Welch et al.	2014/0343889 A1	11/2014	Ben Shalom et al.
2013/0096405 A1	4/2013	Garfio	2014/0375428 A1	12/2014	Park
2013/0099936 A1	4/2013	Azimi	2015/0005600 A1	1/2015	Blank et al.
2013/0099937 A1	4/2013	Azimi	2015/0011907 A1	1/2015	Purdon et al.
2013/0109929 A1	5/2013	Menzel	2015/0020571 A1	1/2015	Chan et al.
2013/0109937 A1	5/2013	Banet et al.	2015/0045628 A1	2/2015	Moghadam et al.
2013/0116515 A1	5/2013	Banet et al.	2015/0055681 A1	2/2015	Tsuchida
2013/0120147 A1	5/2013	Narasimhan et al.	2015/0057562 A1	2/2015	Linders et al.
2013/0120152 A1	5/2013	Narasimhan et al.	2015/0073241 A1	3/2015	Lamego
2013/0122849 A1	5/2013	Doezema	2015/0080754 A1	3/2015	Purdon et al.
2013/0130622 A1	5/2013	Yang et al.	2015/0087923 A1	3/2015	Bardy et al.
2013/0138395 A1	5/2013	Baggen et al.	2015/0094559 A1	4/2015	Russell
2013/0155889 A1	6/2013	Brownworth et al.	2015/0094618 A1	4/2015	Russell et al.
2013/0214850 A1	8/2013	Aga et al.	2015/0099950 A1	4/2015	Al-Ali et al.
2013/0245487 A1	9/2013	Aga et al.	2015/0109442 A1	4/2015	Derenne et al.
2013/0261494 A1	10/2013	Bloom et al.	2015/0112264 A1	4/2015	Kamen et al.
2013/0281875 A1	10/2013	Narasimhan et al.	2015/0126822 A1	5/2015	Chavan et al.
2013/0296672 A1	11/2013	O'Neil et al.	2015/0126882 A1	5/2015	Chavan et al.
2013/0317333 A1	11/2013	Yun et al.	2015/0130613 A1	5/2015	Fullam
2013/0317393 A1	11/2013	Weiss et al.	2015/0164410 A1	6/2015	Selvaraj et al.
2013/0340176 A1	12/2013	Stevens et al.	2015/0164411 A1	6/2015	Selvaraj et al.
2013/0342691 A1	12/2013	Lewis et al.	2015/0164417 A1	6/2015	Tupin, Jr.
2013/0345921 A1	12/2013	Al-Ali et al.	2015/0164437 A1	6/2015	McCombie et al.
2014/0005502 A1	1/2014	Klap et al.	2015/0173654 A1	6/2015	Bélanger et al.
2014/0015687 A1	1/2014	Narasimhan et al.	2015/0190086 A1	7/2015	Chan et al.
2014/0019080 A1	1/2014	Chan et al.	2015/0219542 A1	8/2015	Kent
2014/0022081 A1	1/2014	Ribble et al.	2015/0221202 A1	8/2015	Russell et al.
2014/0025010 A1	1/2014	Stroup et al.	2015/0254956 A1	9/2015	Shen et al.
2014/0046674 A1	2/2014	Rosenfeld	2015/0272481 A1	10/2015	Glaser et al.
2014/0051946 A1	2/2014	Arne	2015/0282717 A1	10/2015	McCombie et al.
2014/0066795 A1	3/2014	Ferdosi et al.	2015/0320339 A1	11/2015	Larson et al.
2014/0073982 A1	3/2014	Yang et al.	2016/0004952 A1	1/2016	Mei
2014/0081099 A1	3/2014	Banet et al.	2016/0022224 A1	1/2016	Banet et al.
2014/0088385 A1	3/2014	Moon et al.	2016/0038061 A1	2/2016	Kechichian et al.
2014/0121543 A1	5/2014	Chan et al.	2016/0045163 A1	2/2016	Weisner et al.
2014/0128778 A1	5/2014	Chan et al.	2016/0095549 A1	4/2016	Chang
2014/0129178 A1	5/2014	Meduna et al.	2016/0100776 A1	4/2016	Najafi
2014/0142445 A1	5/2014	Banet et al.	2016/0143546 A1	5/2016	McCombie et al.
2014/0152673 A1	6/2014	Lynn et al.	2016/0183794 A1	6/2016	Gannon et al.
2014/0163393 A1	6/2014	McCombie et al.	2016/0183875 A1	6/2016	Yang et al.
			2016/0206277 A1	7/2016	Bidichandani et al.
			2016/0228050 A1	8/2016	Sugla et al.
			2016/0242654 A1	8/2016	Quinlan
			2016/0242681 A1	8/2016	Shen et al.

(56)

References Cited

U.S. PATENT DOCUMENTS

2016/0256080 A1	9/2016	Shen et al.	2020/0138314 A1	5/2020	Doctor et al.
2016/0275776 A1	9/2016	Shen et al.	2020/0138368 A1	5/2020	Kiani et al.
2016/0278652 A1	9/2016	Kaib et al.	2020/0138399 A1	5/2020	Li et al.
2016/0278691 A1	9/2016	Larson et al.	2020/0163597 A1	5/2020	Dalvi et al.
2016/0278692 A1	9/2016	Larson et al.	2020/0253474 A1	8/2020	Muhsin et al.
2016/0296159 A1	10/2016	Larson et al.	2020/0253544 A1	8/2020	Belur Nagaraj et al.
2016/0296160 A1	10/2016	Larson et al.	2020/0275841 A1	9/2020	Telfort et al.
2016/0302698 A1	10/2016	Perlman	2020/0288983 A1	9/2020	Telfort et al.
2016/0302715 A1	10/2016	Larson et al.	2020/0329983 A1	10/2020	Al-Ali et al.
2016/0338640 A1	11/2016	Chan et al.	2020/0329993 A1	10/2020	Al-Ali et al.
2016/0338641 A1	11/2016	Chan et al.	2020/0390336 A1	12/2020	Mensch et al.
2016/0367170 A1	12/2016	Larson et al.	2021/0022628 A1	1/2021	Telfort et al.
2017/0000410 A1	1/2017	Chan et al.	2021/0104173 A1	4/2021	Pauley et al.
2017/0020429 A1	1/2017	Chan et al.	2021/0117525 A1	4/2021	Kiani et al.
2017/0024748 A1	1/2017	Haider	2021/0121582 A1	4/2021	Krishnamani et al.
2017/0027498 A1	2/2017	Larson et al.	2021/0161465 A1	6/2021	Barker et al.
2017/0049365 A1	2/2017	Perlman et al.	2021/0177305 A1	6/2021	Shen et al.
2017/0053083 A1	2/2017	Perlman	2021/0186337 A1	6/2021	Matsunaga et al.
2017/0150893 A1	6/2017	McCombie et al.	2021/0236729 A1	8/2021	Kiani et al.
2017/0156618 A1	6/2017	Narasimhan et al.	2021/0275095 A1	9/2021	Sarussi et al.
2017/0184630 A1	6/2017	Chan et al.	2021/0275101 A1	9/2021	Vo et al.
2017/0202473 A1	7/2017	Narasimhan et al.	2021/0290072 A1	9/2021	Forrest
2017/0238812 A1	8/2017	Atlas	2021/0290080 A1	9/2021	Ahmed
2017/0251974 A1	9/2017	Shreim et al.	2021/0290120 A1	9/2021	Al-Ali
2017/0311116 A1	10/2017	Aga et al.	2021/0290177 A1	9/2021	Novak, Jr.
2017/0311862 A1	11/2017	Aga et al.	2021/0290184 A1	9/2021	Ahmed
2017/0366615 A1	12/2017	Azimi	2021/0296008 A1	9/2021	Novak, Jr.
2018/0028072 A1	2/2018	Shi	2021/0321917 A1	10/2021	Choi et al.
2018/0035889 A1	2/2018	Liou et al.	2021/0330228 A1	10/2021	Olsen et al.
2018/0035909 A1	2/2018	Hadley et al.	2021/0386368 A1	12/2021	Carlsson et al.
2018/0064348 A1	3/2018	Tsuchimoto	2021/0386382 A1	12/2021	Olsen et al.
2018/0064361 A1	3/2018	Yang et al.	2021/0402110 A1	12/2021	Pauley et al.
2018/0064595 A1	3/2018	Srinivasan	2022/0026946 A1	1/2022	Wen
2018/0078174 A1	3/2018	Chan et al.	2022/0031171 A1	2/2022	van der Linden et al.
2018/0078189 A1	3/2018	Chan et al.	2022/0039707 A1	2/2022	Sharma et al.
2018/0078190 A1	3/2018	Chan et al.	2022/0053892 A1	2/2022	Al-Ali et al.
2018/0078219 A1	3/2018	Selvaraj	2022/0071562 A1	3/2022	Kiani
2018/0103874 A1	4/2018	Lee et al.	2022/0095930 A1	3/2022	Li et al.
2018/0146862 A1	5/2018	Moon et al.	2022/0096603 A1	3/2022	Kiani et al.
2018/0160909 A1	6/2018	Damania et al.	2022/0133184 A1 *	5/2022	Garai A61B 5/6833 600/365
2018/0189235 A1	7/2018	Chan et al.	2022/0151521 A1	5/2022	Krishnamani et al.
2018/0220966 A1	8/2018	Cohen	2022/0218244 A1	7/2022	Kiani et al.
2018/0242926 A1	8/2018	Muhsin et al.	2022/0273924 A1 *	9/2022	Kamen A61B 17/205
2018/0247712 A1	8/2018	Muhsin et al.	2022/0287574 A1	9/2022	Telfort et al.
2018/0249961 A1	9/2018	Ferdosi et al.	2022/0296161 A1	9/2022	Al-Ali et al.
2018/0289289 A1	10/2018	Chan et al.	2022/0361819 A1	11/2022	Al-Ali et al.
2018/0303365 A1	10/2018	Selvaraj et al.	2022/0370012 A1 *	11/2022	Golenberg A61B 5/6833
2018/0303434 A1	10/2018	Selvaraj et al.	2022/0379059 A1	12/2022	Yu et al.
2018/0310879 A1	11/2018	Chan et al.	2022/0392610 A1	12/2022	Kiani et al.
2018/0338708 A1	11/2018	Chan et al.	2022/0395402 A1 *	12/2022	Trabish A61B 5/6833
2019/0038455 A1	2/2019	Heitz et al.	2023/0028745 A1	1/2023	Al-Ali
2019/0042614 A1	2/2019	Wickenhauser	2023/0038389 A1	2/2023	Vo
2019/0059777 A1	2/2019	Aga et al.	2023/0045647 A1	2/2023	Vo
2019/0082968 A1	3/2019	Karnik et al.	2023/0058052 A1	2/2023	Al-Ali
2019/0090781 A1	3/2019	Selvaraj et al.	2023/0058342 A1	2/2023	Kiani
2019/0150788 A1	5/2019	Selvaraj et al.	2023/0069789 A1	3/2023	Koo et al.
2019/0183425 A1	6/2019	Ferdosi et al.	2023/0087671 A1 *	3/2023	Telfort A61B 5/6833 600/549
2019/0221803 A1	7/2019	Moore et al.	2023/0110152 A1	4/2023	Forrest et al.
2019/0223722 A1	7/2019	Xi	2023/0111198 A1	4/2023	Yu et al.
2019/0238546 A1	8/2019	Petersen et al.	2023/0115397 A1	4/2023	Vo et al.
2019/0272916 A1	9/2019	Selvaraj et al.	2023/0116371 A1	4/2023	Mills et al.
2019/0320906 A1	10/2019	Olsen	2023/0135297 A1	5/2023	Kiani et al.
2019/0336010 A1	11/2019	Selvaraj et al.	2023/0138098 A1	5/2023	Telfort et al.
2019/0350665 A1	11/2019	Furutani et al.	2023/0145155 A1	5/2023	Krishnamani et al.
2019/0388013 A1	12/2019	Achmann et al.	2023/0147750 A1	5/2023	Barker et al.
2019/0388030 A1	12/2019	Colliou et al.	2023/0148928 A1 *	5/2023	Odane A61B 5/257 600/391
2020/0011746 A1	1/2020	Allen et al.	2023/0210417 A1	7/2023	Al-Ali et al.
2020/0046231 A1	2/2020	Ferdosi et al.	2023/0222805 A1	7/2023	Muhsin et al.
2020/0054218 A1	2/2020	Xi	2023/0222887 A1	7/2023	Muhsin et al.
2020/0054246 A1	2/2020	Banet et al.	2023/0226331 A1	7/2023	Kiani et al.
2020/0069252 A1	3/2020	Upadhya et al.	2023/0284916 A1	9/2023	Telfort
2020/0077951 A1	3/2020	Nallathambi et al.	2023/0284943 A1	9/2023	Scruggs et al.
2020/0085310 A1	3/2020	Zahner et al.	2023/0293047 A1 *	9/2023	Chun A61B 5/746 600/595
2020/0111552 A1	4/2020	Ahmed	2023/0301562 A1	9/2023	Scruggs et al.
2020/0113520 A1	4/2020	Abdul-Hafiz et al.	2023/0346993 A1	11/2023	Kiani et al.

(56)

References Cited

U.S. PATENT DOCUMENTS

2023/0368221 A1 11/2023 Haider
2023/0371893 A1 11/2023 Al-Ali et al.
2023/0389837 A1 12/2023 Krishnamani et al.
2024/0016418 A1 1/2024 Devadoss et al.
2024/0016419 A1 1/2024 Devadoss et al.
2024/0047061 A1 2/2024 Al-Ali et al.
2024/0049310 A1 2/2024 Al-Ali et al.
2024/0049986 A1 2/2024 Al-Ali et al.
2024/0081656 A1 3/2024 DeJong et al.
2024/0122486 A1 4/2024 Kiani

FOREIGN PATENT DOCUMENTS

CN 104127181 11/2014
CN 203914879 11/2014
CN 104586398 5/2015
CN 103308069 6/2015
CN 104688196 6/2015
CN 204394477 6/2015
CN 104739420 7/2015
CN 204468059 7/2015
CN 106934444 7/2017
EP 0 735 499 10/1996
GB 6115451 * 1/2021
JP 10-336064 12/1998
JP 2002-513602 5/2002
JP 2002-542493 12/2002
JP 2003-521985 7/2003
JP 2003-322569 11/2003
JP 2005-218036 8/2005
JP 2005-237479 9/2005
JP 2005-295375 10/2005
JP 2007-095365 4/2007
JP 2007-174051 7/2007
JP 2007-296266 11/2007
JP 2008-027030 2/2008
JP 2008-519635 6/2008
JP 2009-017959 1/2009
JP 2009-529930 8/2009
JP 2010-000286 1/2010
JP 2010-524510 7/2010
JP 2011-510363 3/2011
JP 2012-502671 2/2012
JP 2012-237670 12/2012
JP 2013-034511 2/2013
JP 2013-526900 6/2013
JP 2013-544616 12/2013
JP D1531996 7/2015
JP D1700151 * 1/2021
JP 2002-065640 3/2022
JP D1751168 * 10/2022
KR 301000495.0000 * 10/2018
KR 301222494.0000 * 10/2022
WO WO 98/029790 7/1998
WO WO 99/013766 3/1999
WO WO 00/063713 10/2000
WO WO 2004/056266 7/2004
WO WO 2004/059551 7/2004
WO WO 2009/036313 3/2009
WO WO 2010/125096 11/2010
WO WO 2010/135518 11/2010
WO WO 2011/002904 1/2011
WO WO 2013/120014 8/2013
WO WO 2014/047205 3/2014
WO WO 2014/083888 6/2014
WO WO 2015/074007 5/2015
WO WO 2015/123157 8/2015
WO WO 2015/172246 11/2015
WO WO 2016/058032 4/2016
WO WO 2016/185905 11/2016
WO WO 2018/152566 8/2018
WO WO 2019/161277 8/2019
WO WO 2023/049712 3/2023
WO WO 2024/036327 2/2024

OTHER PUBLICATIONS

US 9,241,629 B2, 01/2016, Yang et al. (withdrawn)
US 2024/0016391 A1, 01/2024, Lapotko et al. (withdrawn)
Carol Milberger, The Best Continuous Glucose Monitors, Date first available Nov. 27, 2023, [online]retrieved Jan. 24, 2023, available from <https://www.wired.com/gallery/the-best-continuous-glucose-monitors/> (Year: 2023).*
NS Team Nutrisense, The 4 Best CGM Devices ForMeasuring Blood Sugar in 2024, Date first available Jan. 5, 2024, [online] retrieved Jan. 24, 2023, available from https://www.nutrisense.io/blog/best-continuous-glucose-monitors?utm_source=google&utm_medium=cpc&utm_campaign=ggl_search_us_dsa_purchas (Year: 2024).*
Aminian et al., “Spatio-Temporal Parameters of Gait Measured by an Ambulatory System Using Miniature Gyroscopes”, Journal of Biomechanics, 2002, vol. 35, pp. 689-699.
Anliker et al., “AMON: A Wearable Multiparameter Medical Monitoring and Alert System”, IEEE Transactions on Information Technology in Biomedicine, vol. 8, No. 4, Dec. 2004, pp. 415-427.
Asada et al., “Mobile Monitoring with Wearable Photoplethysmographic Biosensors”, IEEE Engineering in Medicine and Biology Magazine, May/Jun. 2003, pp. 28-40.
Ayello et al., “How and Why to Do Pressure Ulcer Risk Assessment”, Advances in Skin & Wound Care, May/Jun. 2002, vol. 15, No. 3, pp. 125-133.
Bergstrom et al., “A Prospective Study of Pressure Sore Risk Among Institutionalized Elderly”, Journal of the American Geriatrics Society, Aug. 1992, vol. 40, No. 8, pp. 747-758.
Bourke et al., “Evaluation of a Threshold-Based Tri-Axial Accelerometer Fall Detection Algorithm”, Gait & Posture, vol. 26, 2007, pp. 194-199.
Campo et al., “Wireless Fall Sensor with GPS Location for Monitoring the Elderly”, 30th Annual International IEEE Embs Conference Vancouver, British Columbia, Canada, Aug. 20-24, 2008, pp. 498-501.
Caporusso et al., “A Pervasive Solution for Risk Awareness in the Context of Fall Prevention”, Pervasive Health, 2009, p. 8.
Capuano et al., “Remote Telemetry—New Twists for Old Technology”, Nursing Management, Jul. 1995, vol. 26, No. 7, pp. 26-32.
Chen et al., “In-Bed Fibre Optic Breathing and Movement Sensor for Non-Intrusive Monitoring”, Proceedings of SPIE vol. 7173, 2009, p. 6.
Chen et al., “Wearable Sensors for Reliable Fall Detection”, Proceedings of the 2005 IEEE Engineering in Medicine and Biology 27th Annual Conference, Shanghai, China, Sep. 1-4, 2005, pp. 3551-3554.
Degen et al., “Speedy: A Fall Detector in a Wrist Watch”, Proceedings of the Seventh IEEE International Symposium on Wearable Computers, 2003, pp. 184-187.
Dhillon et al., “Towards the Prevention of Pressure Ulcers with a Wearable Patient Posture Monitor Based on Adaptive Accelerometer Alignment”, 34th Annual International Conference of the IEEE EMBS, San Diego, CA, Aug. 28-Sep. 1, 2012, pp. 4513-4516.
Di Rienzo et al., “MagIC System: a New Textile-Based Wearable Device for Biological Signal Monitoring. Applicability in Daily Life and Clinical Setting”, Proceedings of the 2005 IEEE Engineering in Medicine and Biology 27th Annual Conference Shanghai, China, Sep. 1-4, 2005, pp. 7167-7169.
Dinh et al., “A Fall and Near-Fall Assessment and Evaluation System”, The Open Biomedical Engineering Journal, 2009, vol. 3, pp. 1-7.
Elmer-DeWitt, Philip, “Apple’s iWatch: The killer apps may be in hospitals, not health clubs”, Fortune.com, Feb. 3, 2014, <http://fortune.com/2014/02/03/apples-iwatch-the-killer-apps-may-be-in-hospitals-not-health-clubs/>, 4 pages.
Giansanti et al., “Assessment of Fall-Risk by Means of a Neural Network Based on Parameters Assessed by a Wearable Device During Posturography”, Medical Engineering & Physics, vol. 30, 2008, pp. 367-372.

(56)

References Cited

OTHER PUBLICATIONS

Giansanti, Daniele, "Investigation of Fall-Risk Using a Wearable Device with Accelerometers and Rate Gyroscopes", Institute of Physics Publishing, Physiological Measurement, vol. 27, 2006, pp. 1081-1090.

Grundy et al., "Telemedicine in Critical Care: An Experiment in Health Care Delivery", JACEP, Oct. 1977, vol. 6, No. 10, pp. 439-444.

Grundy et al., "Telemedicine in Critical Care: Problems in Design, Implementation and Assessment", Jul. 1982, vol. 10, No. 7, pp. 471-475.

Gunningberg et al., "Accuracy in the Recording of Pressure Ulcers and Prevention after Implementing an Electronic Health Record in Hospital Care", Quality Safe Health Care, 2008, vol. 17, pp. 281-285.

Gunningberg et al., "Improved Quality and Comprehensiveness in Nursing Documentation of Pressure Ulcers after Implementing an Electronic Health Record in Hospital Care", Journal of Clinical Nursing, 2009, vol. 18, pp. 1557-1564.

Harada et al., "Portable Orientation Estimation Device Based on Accelerometers, Magnetometers and Gyroscope Sensors for Sensor Network", IEEE Conference on Multisensor Fusion and Integration for Intelligent Systems 2003, 2003, pp. 191-196.

Hwang et al., "Development of Novel Algorithm and Real-time Monitoring Ambulatory System Using Bluetooth Module for Fall Detection in the Elderly", Proceedings of the 26th Annual International Conference of the IEEE EMBS, Sep. 1-5, 2004, pp. 2204-2207.

Kang et al., "A Wrist-Worn Integrated Health Monitoring Instrument with a Tele-Reporting Device for Telemedicine and Telecare", IEEE Transaction on Instrumentation and Measurement, vol. 55, No. 5, Oct. 2006, pp. 1655-1661.

Kärki et al., "Pressure Mapping System for Physiological Measurements", Xviii Imeko World Congress, Metrology for a Sustainable Development, Sep. 17-22, 2006, Rio de Janeiro, Brazil, p. 5.

Li et al., "Accurate, Fast Fall Detection Using Gyroscopes and Accelerometer-Derived Posture Information", Conference Paper, Sixth International Workshop on Wearable and Implantable Body Sensor Networks, BSN 2009, Berkeley, CA, USA, Jun. 3-5, 2009, p. 6.

Lindemann et al., "Evaluation of a Fall Detector Based on Accelerometers: A Pilot Study", Medical & Biological Engineering & Computing, vol. 43, 2005, pp. 548-551.

Linder-Ganz et al., "Real-Time Continuous Monitoring of Sub-Dermal Tissue Stresses Under the Ischial Tuberosities in Individuals with Spinal Cord Injury", Proceedings of the ASME 2008 Summer Bioengineering Conference, Jun. 25-29, 2008, Marriott Resort, Marco Island, Florida, p. 2.

Luo et al., "A Dynamic Motion Pattern Analysis Approach to Fall Detection", 2004 IEEE International Workshop on Biomedical Circuits & Systems, Dec. 1-3, 2004, pp. S2.1-5-S2.1-8.

"Masimo Announces FDA Clearance of Centroid™", Business Wire, Jun. 25, 2020, p. 3.

Mathie et al., "A System for Monitoring Posture and Physical Activity Using Accelerometers", Engineering in Medicine and Biology Society, 2001. Proceedings of the 23rd Annual International Conference of the IEEE, Oct. 25-28, 2001, pp. 3654-3657.

McInerney, Joan A., "Reducing Hospital-Acquired Pressure Ulcer Prevalence Through a Focused Prevention Program", Advances in Skin & Wound Care, vol. 21, No. 2, Feb. 2008, pp. 75-78.

Merbitz et al., "Wheelchair Push-ups: Measuring Pressure Relief Frequency", Archives of Physical Medicine and Rehabilitation, vol. 66, No. 7, Jul. 1985, pp. 433-438.

Narayanan et al., "Falls Management: Detection and Prevention, Using a Waist-Mounted Triaxial Accelerometer", Proceedings of the 29th Annual International Conference of the IEEE EMBS Cité Internationale, Lyon, France, Aug. 23-26, 2007, pp. 4037-4040.

Noury, Norbert, "A Smart Sensor for the Remote Follow Up of Activity and Fall Detection of the Elderly", 2nd Annual International IEEE-EMBS Special Topic Conference on Microtechnologies in Medicine & Biology, May 2-4, 2002, pp. 314-317.

Nyan et al., "A Wearable System for Pre-Impact Fall Detection", Journal of Biomechanics, vol. 41, 2008, pp. 3475-3481.

Nyan et al., "Garment-Based Detection of Falls and Activities of Daily Living Using 3-Axis MEMS Accelerometer", Institute of Physics Publishing, International MEMS Conference 2006, Journal of Physics: Conference Series 34, 2006, pp. 1059-1067.

O'Donovan et al., "A Context Aware Wireless Body Area Network", Pervasive Health, 2009, p. 8.

Pannurat et al., "Automatic Fall Monitoring: A Review", Sensors, 2014, vol. 14, pp. 12900-12936.

Pérolle et al., "Automatic Fall Detection and Activity Monitoring for Elderly", Jan. 2007, p. 5.

Po et al., "Overview of MEMSWear II—Incorporating MEMS Technology Into Smart Shirt for Geriatric Care", Institute of Physics Publishing, International MEMS Conference 2006, Journal of Physics: Conference Series 34, 2006, pp. 1079-1085.

Prado et al., "Distributed Intelligent Architecture for Falling Detection and Physical Activity Analysis in the Elderly", Proceedings of the Second Joint EMBS/BMES Conference, Oct. 23-26, 2002, pp. 1910-1911.

Rithalia et al., "Quantification of Pressure Relief Using Interface Pressure and Tissue Perfusion in Alternating Pressure Air Mattresses", Archives of Physical Medicine and Rehabilitation, vol. 81, Oct. 2000, pp. 1364-1369.

Rysavy, Peter, "Making the Call with Two-Way Paging", Network Computing, Published Jan. 15, 1997, www.rysavy.com/Articles/twoway.htm, p. 5.

Sakai et al., "Continuous Monitoring of Interface Pressure Distribution in Intensive Care Patients for Pressure Ulcer Prevention", Journal of Advanced Nursing, vol. 65, No. 4, 2009, pp. 809-817.

Spillman Jr., et al., "A 'Smart' Bed for Non-Intrusive Monitoring of Patient Physiological Factors", Measurement Science and Technology, Aug. 2004, vol. 15, No. 8, pp. 1614-1620.

Lötters et al., "Procedure for in-use Calibration of Triaxial Accelerometers in Medical Applications", Sensors and Actuators A: Physical, Jun. 15, 1998, vol. 68, No. 1-3, pp. 221-228.

Virtual Expo Group, Home Page. in 1 page.

Wachter et al., "The Employment of an Iterative Design Process to Develop a Pulmonary Graphical Display", Journal of the American Medical Informatics Association, vol. 10, No. 4, Jul./Aug. 2003, pp. 363-372.

Webster, John G., "A Pressure Mat for Preventing Pressure Sores", IEEE Engineering in Medicine & Biology Society 11th Annual International Conference, 1989, p. 2.

Williams et al., "A Remote Electronic Monitoring System for the Prevention of Pressure Sores", Proceedings of the 19th International Conference, IEEE/EMBS Oct. 30-Nov. 2, 1997, Chicago, IL, pp. 1076-1079.

Wu et al., "Portable Preimpact Fall Detector with Inertial Sensors", IEEE Transactions on Neural Systems and Rehabilitation Engineering, vol. 16, No. 2, Apr. 2008, pp. 178-183.

International Search Report & Written Opinion in PCT Application No. PCT/US2013/025384, dated Aug. 6, 2013.

International Preliminary Report on Patentability & Written Opinion in PCT Application No. PCT/US2013/025384, dated Aug. 21, 2014.

International Search Report & Written Opinion in PCT Application No. PCT/US2016/049751, dated Mar. 13, 2017.

International Preliminary Report on Patentability & Written Opinion in PCT Application No. PCT/US2016/049751, dated Mar. 6, 2018.

International Search Report & Written Opinion in PCT Application No. PCT/US2017/056405, dated Jan. 26, 2018.

International Preliminary Report on Patentability & Written Opinion in PCT Application No. PCT/US2017/056405, dated Apr. 25, 2019.

International Search Report & Written Opinion in PCT Application No. PCT/US2021/023331, dated Jun. 22, 2021.

International Search Report & Written Opinion in PCT Application No. PCT/US2022/076733, dated Dec. 16, 2022.

International Preliminary Report on Patentability & Written Opinion in PCT Application No. PCT/US2022/076733, dated Apr. 4, 2024.

(56)

References Cited

OTHER PUBLICATIONS

Invitation to Pay Additional Fees in PCT Application No. PCT/
US2023/072117, dated Nov. 29, 2023.
International Search Report & Written Opinion in PCT Application
No. PCT/US2023/072117, dated Jan. 30, 2024.

* cited by examiner

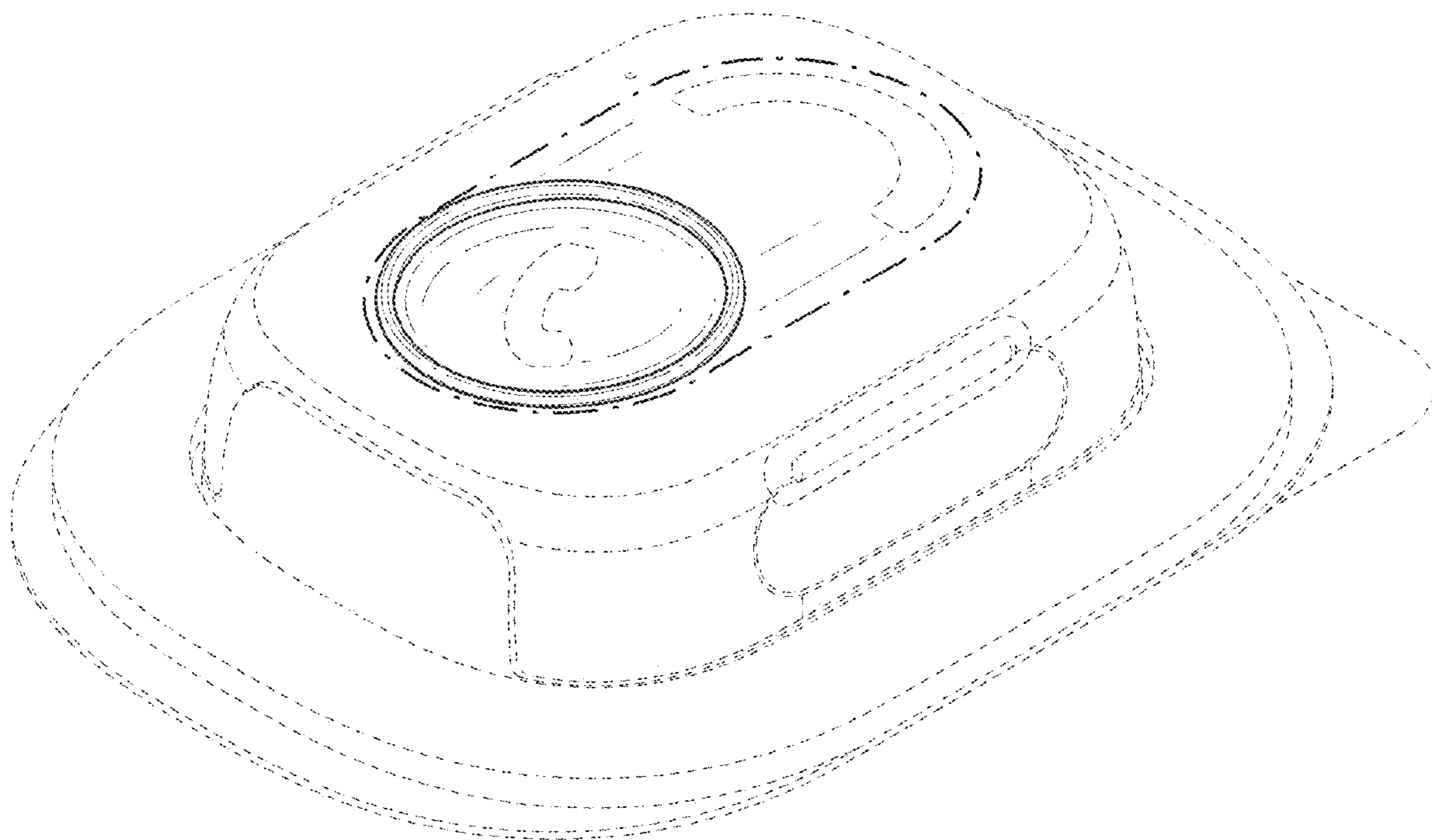


FIG. 1

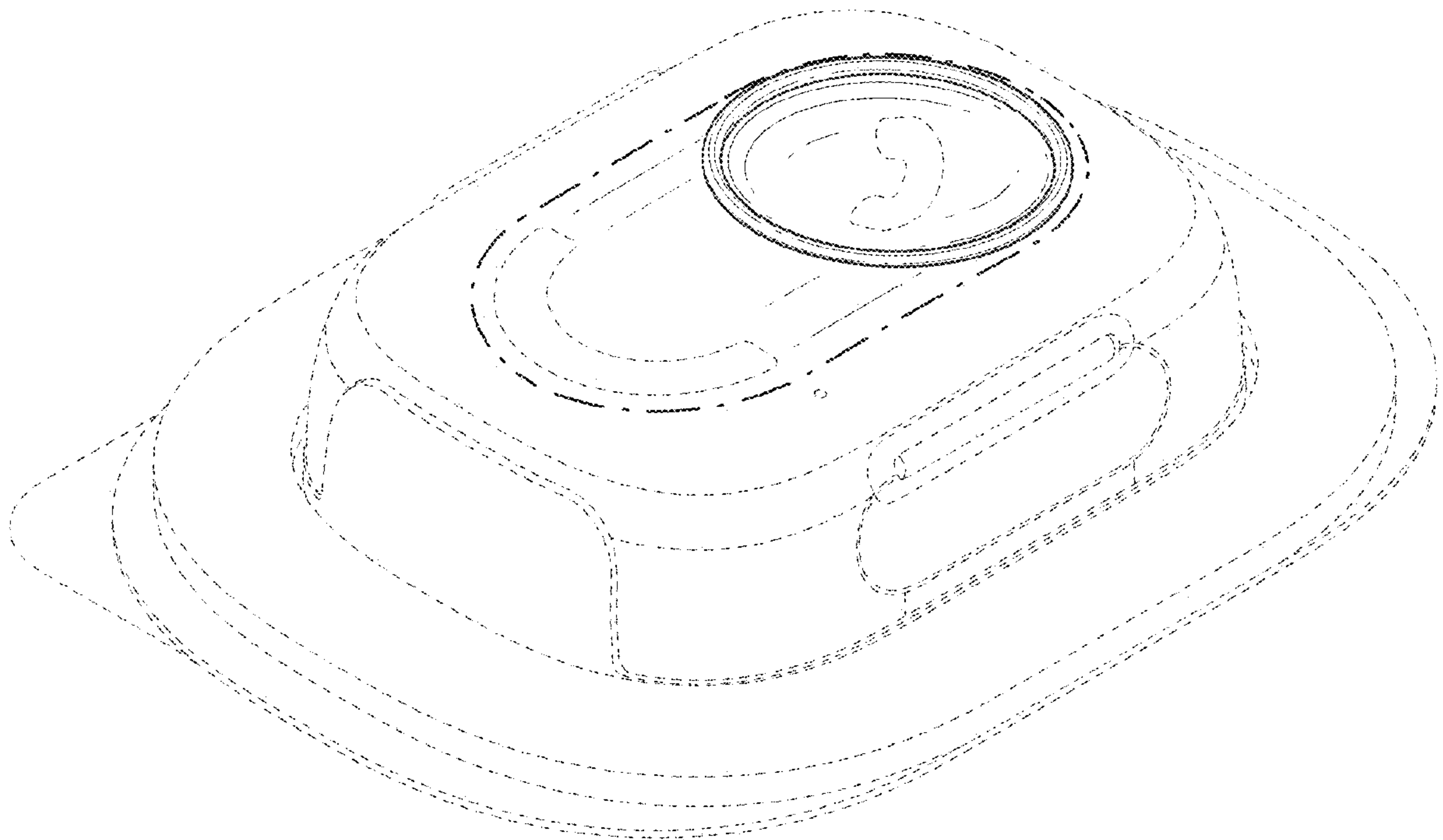


FIG. 2

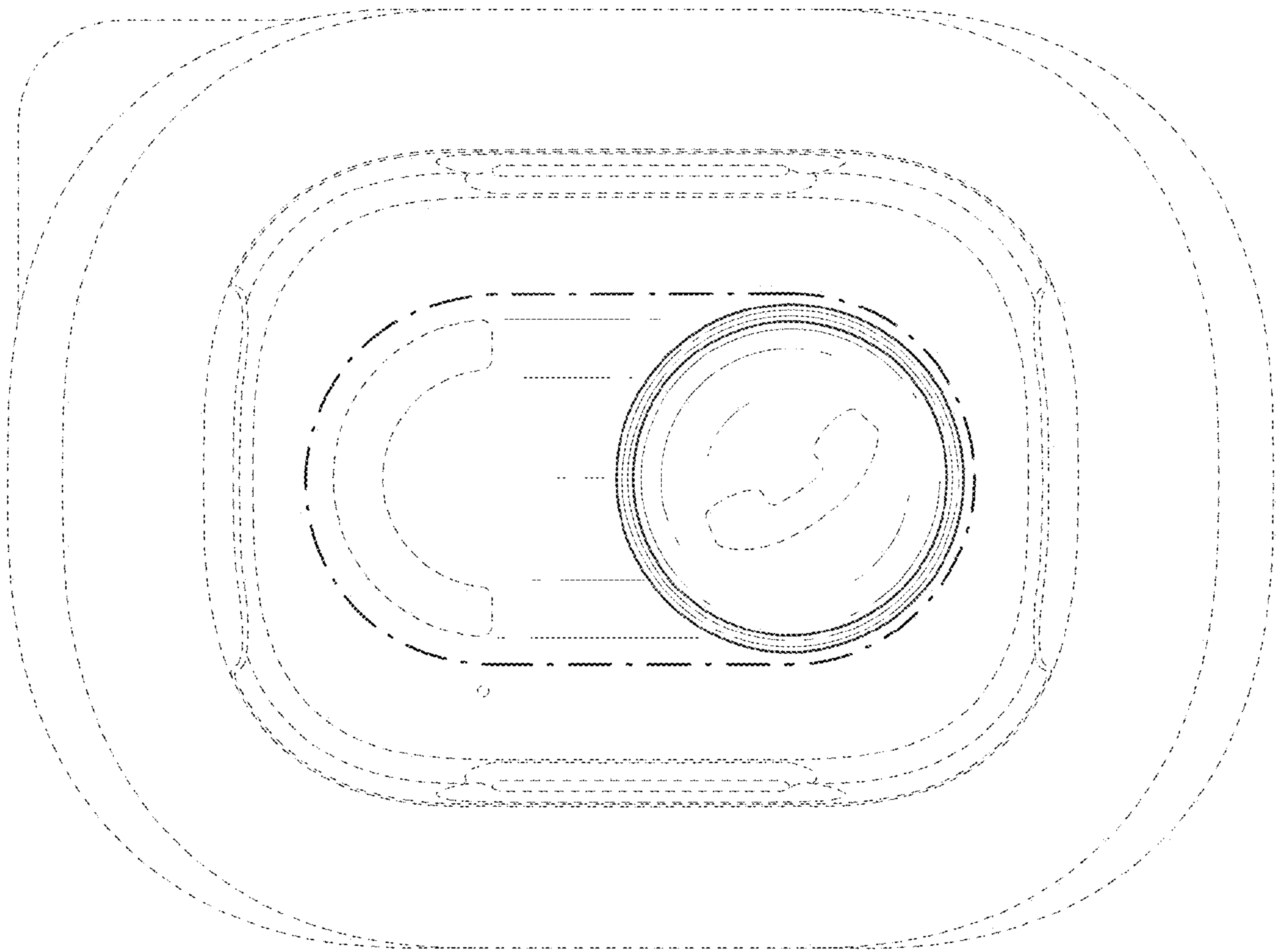


FIG. 3

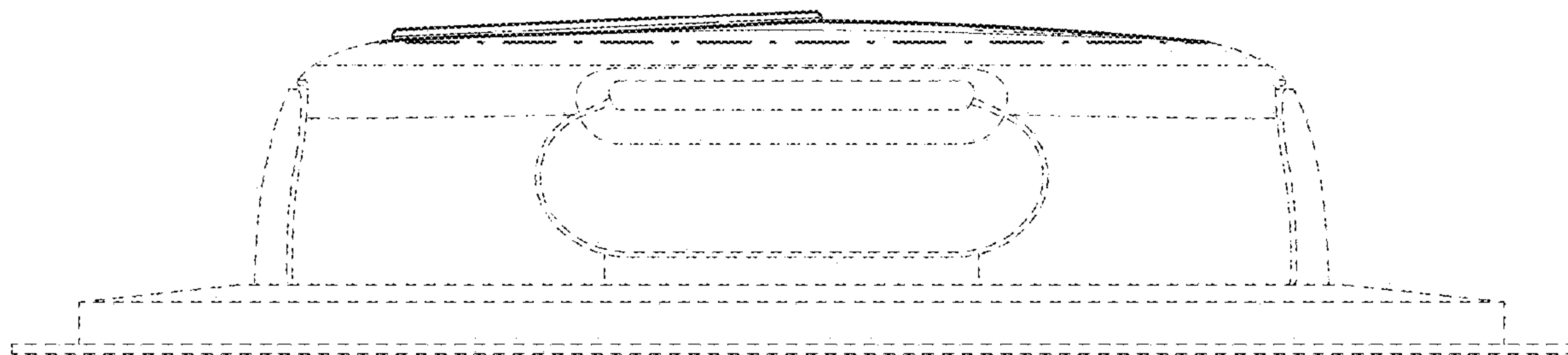


FIG. 4

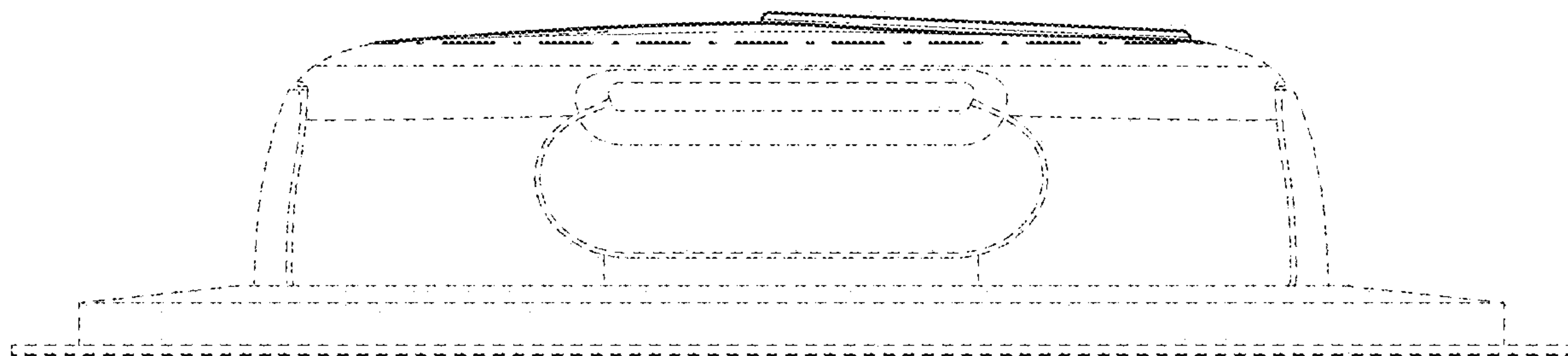


FIG. 5

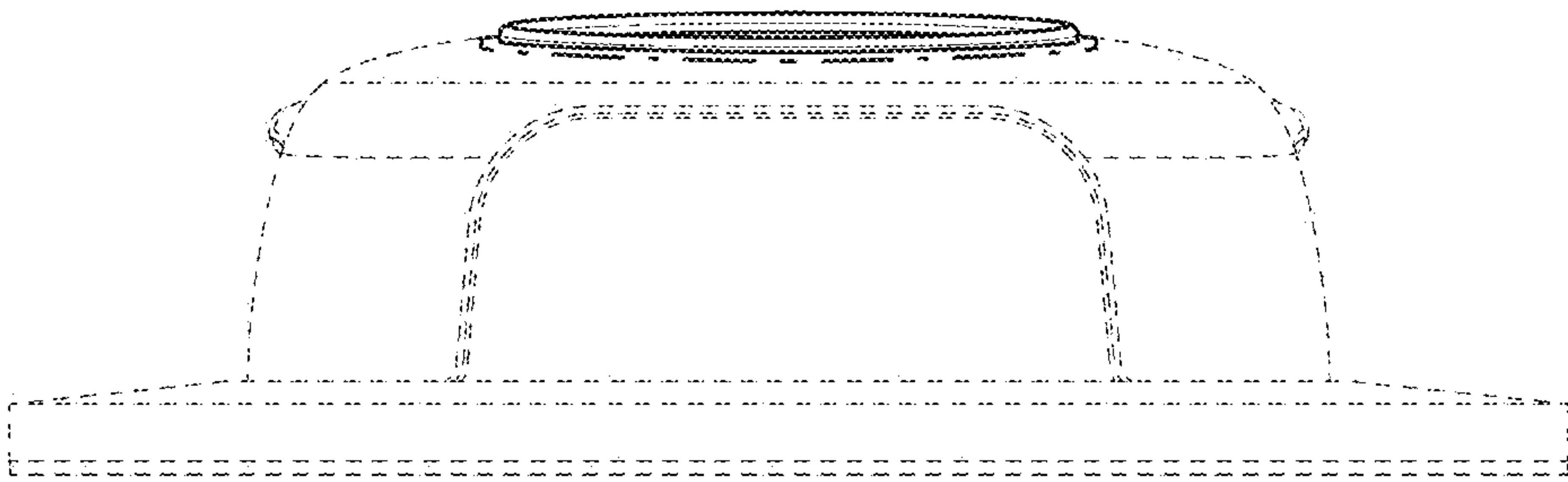


FIG. 6

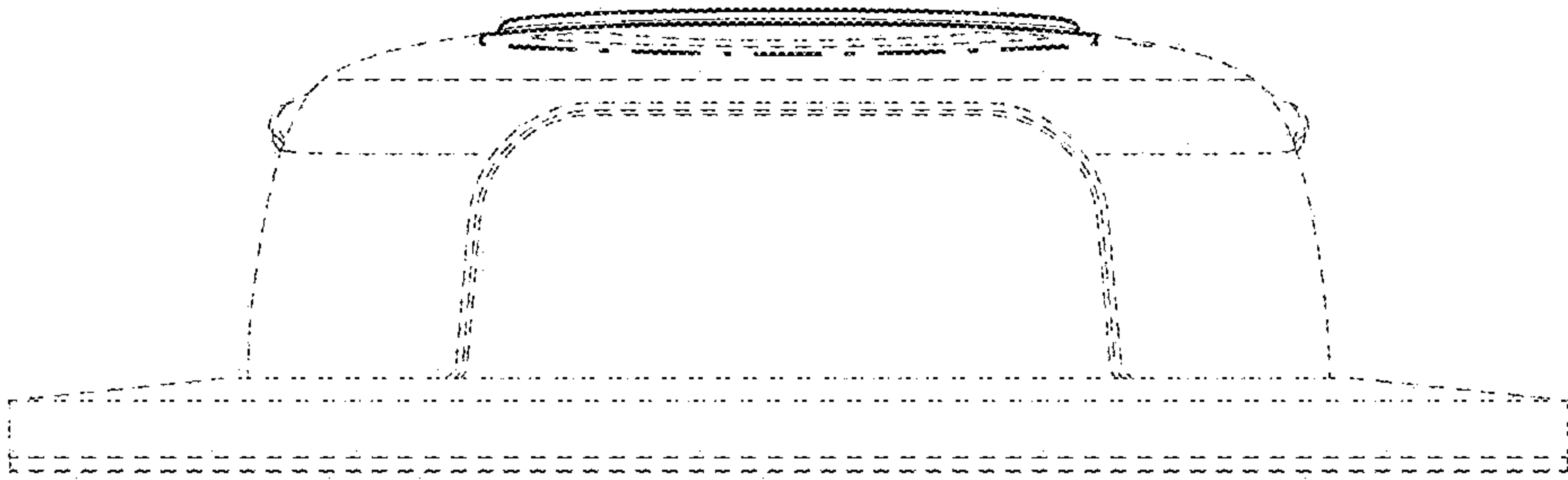


FIG. 7