



US00D835285S

(12) **United States Design Patent** (10) **Patent No.:** **US D835,285 S**  
**Barker et al.** (45) **Date of Patent:** **\*\* Dec. 4, 2018**

(54) **MEDICAL MONITORING DEVICE**  
(71) Applicant: **MASIMO CORPORATION**, Irvine, CA (US)  
(72) Inventors: **Nicholas Evan Barker**, Laguna Beach, CA (US); **Ammar Al-Ali**, San Juan Capistrano, CA (US); **Chad A. DeJong**, Los Angeles, CA (US); **Sujin Hwang**, Irvine, CA (US); **Massie Joe E. Kiani**, Laguna Niguel, CA (US); **Bilal Muhsin**, San Clemente, CA (US)

5,319,355 A 6/1994 Russek  
5,337,744 A 8/1994 Branigan  
5,341,805 A 8/1994 Stavridi et al.  
D353,195 S 12/1994 Savage et al.  
D353,196 S 12/1994 Savage et al.  
5,377,676 A 1/1995 Vari et al.  
D359,546 S 6/1995 Savage et al.  
5,431,170 A 7/1995 Mathews  
D361,840 S 8/1995 Savage et al.  
D362,063 S 9/1995 Savage et al.  
5,452,717 A 9/1995 Branigan et al.  
D363,120 S 10/1995 Savage et al.  
5,456,252 A 10/1995 Vari et al.  
5,479,934 A 1/1996 Imran  
5,482,036 A 1/1996 Diab et al.  
5,490,505 A 2/1996 Diab et al.  
5,494,043 A 2/1996 O'Sullivan et al.  
5,533,511 A 7/1996 Kaspari et al.  
5,534,851 A 7/1996 Russek  
5,561,275 A 10/1996 Savage et al.

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

(\*\*) Term: **15 Years**

(21) Appl. No.: **29/602,287**

(22) Filed: **Apr. 28, 2017**

(51) **LOC (11) Cl.** ..... **24-01**

(52) **U.S. Cl.**  
USPC ..... **D24/186**

(58) **Field of Classification Search**  
USPC .... D24/164-168, 186, 107; D10/75, 70, 98, D10/103; D14/344, 138 R, 138 AA  
CPC ..... A61B 5/0002; A61B 5/02055; A61B 5/02438; A61B 5/6898; A61B 5/002; A61B 5/7455; A61B 5/7445; A61B 2560/0205; A61B 2560/0462; A61B 2560/045; G01F 1/1654  
See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

4,960,128 A 10/1990 Gordon et al.  
4,964,408 A 10/1990 Hink et al.  
5,041,187 A 8/1991 Hink et al.  
5,069,213 A 12/1991 Polczynski  
5,163,438 A 11/1992 Gordon et al.

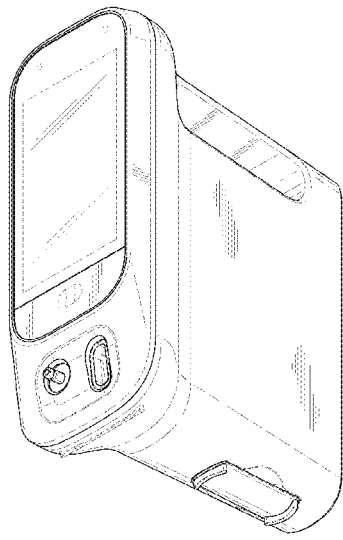
(Continued)  
*Primary Examiner* — Anhdao Doan  
(74) *Attorney, Agent, or Firm* — Knobbe, Martens, Olson & Bear, LLP

(57) **CLAIM**  
The ornamental design for a medical monitoring device, as shown and described.

**DESCRIPTION**

FIG. 1 is a front, side, and bottom perspective view of a medical monitoring device embodying our new design; FIG. 2 is a front view thereof; FIG. 3 is a rear view thereof; FIG. 4 is a first side view thereof; FIG. 5 is a second side view thereof; FIG. 6 is a top view thereof; and, FIG. 7 is a bottom view thereof. Broken lines are used to illustrate portions of the medical monitoring device that form no part of the claimed design.

**1 Claim, 7 Drawing Sheets**



(56)

## References Cited

## U.S. PATENT DOCUMENTS

5,562,002	A	10/1996	Lalin	6,470,199	B1	10/2002	Kopotic et al.
5,590,649	A	1/1997	Caro et al.	6,501,975	B2	12/2002	Diab et al.
5,602,924	A	2/1997	Durand et al.	6,505,059	B1	1/2003	Kollias et al.
5,632,272	A	5/1997	Diab et al.	6,515,273	B2	2/2003	Al-Ali
5,638,816	A	6/1997	Kiani-Azarbayjany et al.	6,519,487	B1	2/2003	Parker
5,638,818	A	6/1997	Diab et al.	6,525,386	B1	2/2003	Mills et al.
5,645,440	A	7/1997	Tobler et al.	6,526,300	B1	2/2003	Kiani et al.
5,685,299	A	11/1997	Diab et al.	6,541,756	B2	4/2003	Schulz et al.
D393,830	S	4/1998	Tobler et al.	6,542,764	B1	4/2003	Al-Ali et al.
5,743,262	A	4/1998	Lepper, Jr. et al.	6,580,086	B1	6/2003	Schulz et al.
5,758,644	A	6/1998	Diab et al.	6,584,336	B1	6/2003	Ali et al.
5,760,910	A	6/1998	Lepper, Jr. et al.	6,595,316	B2	7/2003	Cybulski et al.
5,769,785	A	6/1998	Diab et al.	6,597,932	B2	7/2003	Tian et al.
5,782,757	A	7/1998	Diab et al.	6,597,933	B2	7/2003	Kiani et al.
5,785,659	A	7/1998	Caro et al.	6,606,511	B1	8/2003	Ali et al.
5,791,347	A	8/1998	Flaherty et al.	6,632,181	B2	10/2003	Flaherty et al.
5,810,734	A	9/1998	Caro et al.	6,639,668	B1	10/2003	Trepagnier
5,823,950	A	10/1998	Diab et al.	6,640,116	B2	10/2003	Diab
5,830,131	A	11/1998	Caro et al.	6,643,530	B2	11/2003	Diab et al.
5,833,618	A	11/1998	Caro et al.	6,650,917	B2	11/2003	Diab et al.
5,860,919	A	1/1999	Kiani-Azarbayjany et al.	6,654,624	B2	11/2003	Diab et al.
5,890,929	A	4/1999	Mills et al.	6,658,276	B2	12/2003	Kiani et al.
5,904,654	A	5/1999	Wohltmann et al.	6,661,161	B1	12/2003	Lanzo et al.
5,919,134	A	7/1999	Diab	6,671,531	B2	12/2003	Al-Ali et al.
5,934,925	A	8/1999	Tobler et al.	6,678,543	B2	1/2004	Diab et al.
5,940,182	A	8/1999	Lepper, Jr. et al.	6,684,090	B2	1/2004	Ali et al.
5,987,343	A	11/1999	Kinast	6,684,091	B2	1/2004	Parker
5,995,855	A	11/1999	Kiani et al.	6,697,656	B1	2/2004	Al-Ali
5,997,343	A	12/1999	Mills et al.	6,697,657	B1	2/2004	Shehada et al.
6,002,952	A	12/1999	Diab et al.	6,697,658	B2	2/2004	Al-Ali
6,011,986	A	1/2000	Diab et al.	RE38,476	E	3/2004	Diab et al.
6,027,452	A	2/2000	Flaherty et al.	6,699,194	B1	3/2004	Diab et al.
6,036,642	A	3/2000	Diab et al.	6,714,804	B2	3/2004	Al-Ali et al.
6,045,509	A	4/2000	Caro et al.	RE38,492	E	4/2004	Diab et al.
6,067,462	A	5/2000	Diab et al.	6,721,582	B2	4/2004	Trepagnier et al.
6,081,735	A	6/2000	Diab et al.	6,721,585	B1	4/2004	Parker
6,088,607	A	7/2000	Diab et al.	6,725,075	B2	4/2004	Al-Ali
6,110,522	A	8/2000	Lepper, Jr. et al.	6,728,560	B2	4/2004	Kollias et al.
6,124,597	A	9/2000	Shehada	6,735,459	B2	5/2004	Parker
6,128,521	A	10/2000	Marro et al.	6,745,060	B2	6/2004	Diab et al.
6,129,675	A	10/2000	Jay	6,760,607	B2	7/2004	Al-Ali
6,144,868	A	11/2000	Parker	6,770,028	B1	8/2004	Ali et al.
6,151,516	A	11/2000	Kiani-Azarbayjany et al.	6,771,994	B2	8/2004	Kiani et al.
6,152,754	A	11/2000	Gerhardt et al.	6,792,300	B1	9/2004	Diab et al.
6,157,850	A	12/2000	Diab et al.	6,813,511	B2	11/2004	Diab et al.
6,165,005	A	12/2000	Mills et al.	6,816,741	B2	11/2004	Diab
6,184,521	B1	2/2001	Coffin, IV et al.	6,822,564	B2	11/2004	Al-Ali
6,206,830	B1	3/2001	Diab et al.	6,826,419	B2	11/2004	Diab et al.
6,229,856	B1	5/2001	Diab et al.	6,830,711	B2	12/2004	Mills et al.
6,232,609	B1	5/2001	Snyder et al.	6,850,787	B2	2/2005	Weber et al.
6,236,872	B1	5/2001	Diab et al.	6,850,788	B2	2/2005	Al-Ali
6,241,683	B1	6/2001	MacKlem et al.	6,852,083	B2	2/2005	Caro et al.
6,253,097	B1	6/2001	Aronow et al.	6,861,639	B2	3/2005	Al-Ali
6,256,523	B1	7/2001	Diab et al.	6,898,452	B2	5/2005	Al-Ali et al.
6,263,222	B1	7/2001	Diab et al.	6,920,345	B2	7/2005	Al-Ali et al.
6,278,522	B1	8/2001	Lepper, Jr. et al.	6,931,268	B1	8/2005	Kiani-Azarbayjany et al.
6,280,213	B1	8/2001	Tobler et al.	6,934,570	B2	8/2005	Kiani et al.
6,285,896	B1	9/2001	Tobler et al.	6,939,305	B2	9/2005	Flaherty et al.
6,301,493	B1	10/2001	Marro et al.	6,943,348	B1	9/2005	Coffin, IV
6,308,089	B1	10/2001	von der Ruhr et al.	6,950,687	B2	9/2005	Al-Ali
6,317,627	B1	11/2001	Ennen et al.	6,961,598	B2	11/2005	Diab
6,321,100	B1	11/2001	Parker	6,970,792	B1	11/2005	Diab
6,325,761	B1	12/2001	Jay	6,979,812	B2	12/2005	Al-Ali
6,334,065	B1	12/2001	Al-Ali et al.	6,985,764	B2	1/2006	Mason et al.
6,343,224	B1	1/2002	Parker	6,993,371	B2	1/2006	Kiani et al.
6,349,228	B1	2/2002	Kiani et al.	6,996,427	B2	2/2006	Ali et al.
6,360,114	B1	3/2002	Diab et al.	6,999,904	B2	2/2006	Weber et al.
6,368,283	B1	4/2002	Xu et al.	7,003,338	B2	2/2006	Weber et al.
6,371,921	B1	4/2002	Caro et al.	7,003,339	B2	2/2006	Diab et al.
6,377,829	B1	4/2002	Al-Ali	7,015,451	B2	3/2006	Dalke et al.
6,388,240	B2	5/2002	Schulz et al.	7,024,233	B2	4/2006	Ali et al.
6,397,091	B2	5/2002	Diab et al.	7,027,849	B2	4/2006	Al-Ali
6,430,437	B1	8/2002	Marro	7,030,749	B2	4/2006	Al-Ali
6,430,525	B1	8/2002	Weber et al.	7,039,449	B2	5/2006	Al-Ali
6,463,311	B1	10/2002	Diab	7,041,060	B2	5/2006	Flaherty et al.
				7,044,918	B2	5/2006	Diab
				7,048,687	B1	5/2006	Reuss et al.
				7,067,893	B2	6/2006	Mills et al.
				7,096,052	B2	8/2006	Mason et al.

(56)

## References Cited

## U.S. PATENT DOCUMENTS

7,096,054	B2	8/2006	Abdul-Hafiz et al.	7,761,127	B2	7/2010	Al-Ali et al.
7,132,641	B2	11/2006	Schulz et al.	7,761,128	B2	7/2010	Al-Ali et al.
7,142,901	B2	11/2006	Kiani et al.	7,764,982	B2	7/2010	Dalke et al.
7,149,561	B2	12/2006	Diab	D621,516	S	8/2010	Kiani et al.
7,186,966	B2	3/2007	Al-Ali	7,791,155	B2	9/2010	Diab
7,190,261	B2	3/2007	Al-Ali	7,801,581	B2	9/2010	Diab
7,215,984	B2	5/2007	Diab	7,822,452	B2	10/2010	Schurman et al.
7,215,986	B2	5/2007	Diab	RE41,912	E	11/2010	Parker
7,221,971	B2	5/2007	Diab	7,844,313	B2	11/2010	Kiani et al.
7,225,006	B2	5/2007	Al-Ali et al.	7,844,314	B2	11/2010	Al-Ali
7,225,007	B2	5/2007	Al-Ali	7,844,315	B2	11/2010	Al-Ali
RE39,672	E	6/2007	Shehada et al.	7,865,222	B2	1/2011	Weber et al.
7,239,905	B2	7/2007	Kiani-Azarbayjany et al.	7,873,497	B2	1/2011	Weber et al.
7,245,953	B1	7/2007	Parker	7,880,606	B2	2/2011	Al-Ali
7,254,429	B2	8/2007	Schurman et al.	7,880,626	B2	2/2011	Al-Ali et al.
7,254,431	B2	8/2007	Al-Ali	7,891,355	B2	2/2011	Al-Ali et al.
7,254,433	B2	8/2007	Diab et al.	7,894,868	B2	2/2011	Al-Ali et al.
7,254,434	B2	8/2007	Schulz et al.	7,899,507	B2	3/2011	Al-Ali et al.
7,272,425	B2	9/2007	Al-Ali	7,899,518	B2	3/2011	Trepagnier et al.
7,274,955	B2	9/2007	Kiani et al.	7,904,132	B2	3/2011	Weber et al.
D554,263	S *	10/2007	Al-Ali ..... D24/186	7,909,772	B2	3/2011	Popov et al.
7,280,858	B2	10/2007	Al-Ali et al.	7,910,875	B2	3/2011	Al-Ali
7,289,835	B2	10/2007	Mansfield et al.	7,919,713	B2	4/2011	Al-Ali et al.
7,292,883	B2	11/2007	De Felice et al.	7,937,128	B2	5/2011	Al-Ali
7,295,866	B2	11/2007	Al-Ali	7,937,129	B2	5/2011	Mason et al.
7,328,053	B1	2/2008	Diab et al.	7,937,130	B2	5/2011	Diab et al.
7,332,784	B2	2/2008	Mills et al.	7,941,199	B2	5/2011	Kiani
7,340,287	B2	3/2008	Mason et al.	7,951,086	B2	5/2011	Flaherty et al.
7,341,559	B2	3/2008	Schulz et al.	7,957,780	B2	6/2011	Lamego et al.
7,343,186	B2	3/2008	Lamego et al.	7,962,188	B2	6/2011	Kiani et al.
D566,282	S	4/2008	Al-Ali et al.	7,962,190	B1	6/2011	Diab et al.
7,355,512	B1	4/2008	Al-Ali	7,976,472	B2	7/2011	Kiani
7,356,365	B2	4/2008	Schurman	D643,126	S *	8/2011	Barker ..... D24/186
7,371,981	B2	5/2008	Abdul-Hafiz	7,988,637	B2	8/2011	Diab
7,373,193	B2	5/2008	Al-Ali et al.	7,990,382	B2	8/2011	Kiani
7,373,194	B2	5/2008	Weber et al.	7,991,446	B2	8/2011	Ali et al.
7,376,453	B1	5/2008	Diab et al.	8,000,761	B2	8/2011	Al-Ali
7,377,794	B2	5/2008	Al Ali et al.	8,008,088	B2	8/2011	Bellott et al.
7,377,899	B2	5/2008	Weber et al.	RE42,753	E	9/2011	Kiani-Azarbayjany et al.
7,383,070	B2	6/2008	Diab et al.	8,019,400	B2	9/2011	Diab et al.
7,415,297	B2	8/2008	Al-Ali et al.	8,028,701	B2	10/2011	Al-Ali et al.
7,428,432	B2	9/2008	Ali et al.	8,029,765	B2	10/2011	Bellott et al.
7,438,683	B2	10/2008	Al-Ali et al.	8,036,727	B2	10/2011	Schurman et al.
7,440,787	B2	10/2008	Diab	8,036,728	B2	10/2011	Diab et al.
7,454,240	B2	11/2008	Diab et al.	8,046,040	B2	10/2011	Ali et al.
7,467,002	B2	12/2008	Weber et al.	8,046,041	B2	10/2011	Diab et al.
7,469,157	B2	12/2008	Diab et al.	8,046,042	B2	10/2011	Diab et al.
7,471,969	B2	12/2008	Diab et al.	8,048,040	B2	11/2011	Kiani
7,471,971	B2	12/2008	Diab et al.	8,050,728	B2	11/2011	Al-Ali et al.
7,483,729	B2	1/2009	Al-Ali et al.	RE43,169	E	2/2012	Parker
7,483,730	B2	1/2009	Diab et al.	8,118,620	B2	2/2012	Al-Ali et al.
7,489,958	B2	2/2009	Diab et al.	8,126,528	B2	2/2012	Diab et al.
7,496,391	B2	2/2009	Diab et al.	8,128,572	B2	3/2012	Diab et al.
7,496,393	B2	2/2009	Diab et al.	8,130,105	B2	3/2012	Al-Ali et al.
D587,657	S	3/2009	Al-Ali et al.	8,145,287	B2	3/2012	Diab et al.
7,499,741	B2	3/2009	Diab et al.	8,150,487	B2	4/2012	Diab et al.
7,499,835	B2	3/2009	Weber et al.	8,175,672	B2	5/2012	Parker
7,500,950	B2	3/2009	Al-Ali et al.	8,180,420	B2	5/2012	Diab et al.
7,509,154	B2	3/2009	Diab et al.	8,182,443	B1	5/2012	Kiani
7,509,494	B2	3/2009	Al-Ali	8,185,180	B2	5/2012	Diab et al.
7,510,849	B2	3/2009	Schurman et al.	8,190,223	B2	5/2012	Al-Ali et al.
7,526,328	B2	4/2009	Diab et al.	8,190,227	B2	5/2012	Diab et al.
7,530,942	B1	5/2009	Diab	8,203,438	B2	6/2012	Kiani et al.
7,530,949	B2	5/2009	Al Ali et al.	8,203,704	B2	6/2012	Merritt et al.
7,530,955	B2	5/2009	Diab et al.	8,204,566	B2	6/2012	Schurman et al.
7,563,110	B2	7/2009	Al-Ali et al.	8,219,172	B2	7/2012	Schurman et al.
7,596,398	B2	9/2009	Al-Ali et al.	8,224,411	B2	7/2012	Al-Ali et al.
7,618,375	B2	11/2009	Flaherty	8,228,181	B2	7/2012	Al-Ali
D606,659	S	12/2009	Kiani et al.	8,229,533	B2	7/2012	Diab et al.
7,647,083	B2	1/2010	Al-Ali et al.	8,233,955	B2	7/2012	Al-Ali et al.
D609,193	S	2/2010	Al-Ali et al.	8,244,325	B2	8/2012	Al-Ali et al.
D614,305	S	4/2010	Al-Ali et al.	8,255,026	B1	8/2012	Al-Ali
RE41,317	E	5/2010	Parker	8,255,027	B2	8/2012	Al-Ali et al.
7,729,733	B2	6/2010	Al-Ali et al.	8,255,028	B2	8/2012	Al-Ali et al.
7,734,320	B2	6/2010	Al-Ali	8,260,577	B2	9/2012	Weber et al.
				8,265,723	B1	9/2012	McHale et al.
				8,274,360	B2	9/2012	Sampath et al.
				8,280,473	B2	10/2012	Al-Ali
				8,301,217	B2	10/2012	Al-Ali et al.

(56)

## References Cited

## U.S. PATENT DOCUMENTS

8,306,596	B2	11/2012	Schurman et al.	8,702,627	B2	4/2014	Telfort et al.
8,310,336	B2	11/2012	Muhsin et al.	8,706,179	B2	4/2014	Parker
8,315,683	B2	11/2012	Al-Ali et al.	8,712,494	B1	4/2014	MacNeish, III et al.
RE43,860	E	12/2012	Parker	8,715,206	B2	5/2014	Telfort et al.
8,337,403	B2	12/2012	Al-Ali et al.	8,718,735	B2	5/2014	Lamego et al.
8,346,330	B2	1/2013	Lamego	8,718,737	B2	5/2014	Diab et al.
8,353,842	B2	1/2013	Al-Ali et al.	8,718,738	B2	5/2014	Blank et al.
8,355,766	B2	1/2013	MacNeish, III et al.	8,720,249	B2	5/2014	Al-Ali
8,359,080	B2	1/2013	Diab et al.	8,721,541	B2	5/2014	Al-Ali et al.
8,364,223	B2	1/2013	Al-Ali et al.	8,721,542	B2	5/2014	Al-Ali et al.
8,364,226	B2	1/2013	Diab et al.	8,723,677	B1	5/2014	Kiani
8,374,665	B2	2/2013	Lamego	8,740,792	B1	6/2014	Kiani et al.
8,385,995	B2	2/2013	Al-Ali et al.	8,754,776	B2	6/2014	Poeze et al.
8,385,996	B2	2/2013	Smith et al.	8,755,535	B2	6/2014	Telfort et al.
8,388,353	B2	3/2013	Kiani et al.	8,755,856	B2	6/2014	Diab et al.
8,399,822	B2	3/2013	Al-Ali	8,755,872	B1	6/2014	Marinow
8,401,602	B2	3/2013	Kiani	8,761,850	B2	6/2014	Lamego
8,405,608	B2	3/2013	Al-Ali et al.	8,764,671	B2	7/2014	Kiani
8,414,499	B2	4/2013	Al-Ali et al.	8,768,423	B2	7/2014	Shakespeare et al.
8,418,524	B2	4/2013	Al-Ali	8,771,204	B2	7/2014	Telfort et al.
8,423,106	B2	4/2013	Lamego et al.	8,777,634	B2	7/2014	Kiani et al.
8,428,967	B2	4/2013	Olsen et al.	8,781,543	B2	7/2014	Diab et al.
8,430,817	B1	4/2013	Al-Ali et al.	8,781,544	B2	7/2014	Al-Ali et al.
8,437,825	B2	5/2013	Dalvi et al.	8,781,549	B2	7/2014	Al-Ali et al.
8,455,290	B2	6/2013	Siskavich	8,788,003	B2	7/2014	Schurman et al.
8,457,703	B2	6/2013	Al-Ali	8,790,268	B2	7/2014	Al-Ali
8,457,707	B2	6/2013	Kiani	8,801,613	B2	8/2014	Al-Ali et al.
8,463,349	B2	6/2013	Diab et al.	8,821,397	B2	9/2014	Al-Ali et al.
8,466,286	B2	6/2013	Bellot et al.	8,821,415	B2	9/2014	Al-Ali et al.
8,471,713	B2	6/2013	Poeze et al.	8,830,449	B1	9/2014	Lamego et al.
8,473,020	B2	6/2013	Kiani et al.	8,831,700	B2	9/2014	Schurman et al.
8,483,787	B2	7/2013	Al-Ali et al.	8,840,549	B2	9/2014	Al-Ali et al.
8,489,364	B2	7/2013	Weber et al.	8,847,740	B2	9/2014	Kiani et al.
8,498,684	B2	7/2013	Weber et al.	8,849,365	B2	9/2014	Smith et al.
8,504,128	B2	8/2013	Blank et al.	8,852,094	B2	10/2014	Al-Ali et al.
8,509,867	B2	8/2013	Workman et al.	8,852,994	B2	10/2014	Wojtczuk et al.
8,515,509	B2	8/2013	Bruinsma et al.	8,868,147	B2	10/2014	Stippick et al.
8,523,781	B2	9/2013	Al-Ali	8,868,150	B2	10/2014	Al-Ali et al.
8,529,301	B2	9/2013	Al-Ali et al.	8,870,792	B2	10/2014	Al-Ali et al.
8,532,727	B2	9/2013	Ali et al.	8,886,271	B2	11/2014	Kiani et al.
8,532,728	B2	9/2013	Diab et al.	8,888,539	B2	11/2014	Al-Ali et al.
D692,145	S	10/2013	Al-Ali et al.	8,888,708	B2	11/2014	Diab et al.
8,547,209	B2	10/2013	Kiani et al.	8,892,180	B2	11/2014	Weber et al.
8,548,548	B2	10/2013	Al-Ali	8,897,847	B2	11/2014	Al-Ali
8,548,549	B2	10/2013	Schurman et al.	8,909,310	B2	12/2014	Lamego et al.
8,548,550	B2	10/2013	Al-Ali et al.	8,911,377	B2	12/2014	Al-Ali
8,560,032	B2	10/2013	Al-Ali et al.	8,912,909	B2	12/2014	Al-Ali et al.
8,560,034	B1	10/2013	Diab et al.	8,920,317	B2	12/2014	Al-Ali et al.
8,570,167	B2	10/2013	Al-Ali	8,921,699	B2	12/2014	Al-Ali et al.
8,570,503	B2	10/2013	Vo et al.	8,922,382	B2	12/2014	Al-Ali et al.
8,571,617	B2	10/2013	Reichgott et al.	8,929,964	B2	1/2015	Al-Ali et al.
8,571,618	B1	10/2013	Lamego et al.	8,942,777	B2	1/2015	Diab et al.
8,571,619	B2	10/2013	Al-Ali et al.	8,948,834	B2	2/2015	Diab et al.
8,577,431	B2	11/2013	Lamego et al.	8,948,835	B2	2/2015	Diab
8,581,732	B2	11/2013	Al-Ali et al.	8,965,471	B2	2/2015	Lamego
8,584,345	B2	11/2013	Al-Ali et al.	8,983,564	B2	3/2015	Al-Ali
8,588,880	B2	11/2013	Abdul-Hafiz et al.	8,989,831	B2	3/2015	Al-Ali et al.
8,600,467	B2	12/2013	Al-Ali et al.	8,996,085	B2	3/2015	Kiani et al.
8,606,342	B2	12/2013	Diab	8,998,809	B2	4/2015	Kiani
8,626,255	B2	1/2014	Al-Ali et al.	9,028,429	B2	5/2015	Telfort et al.
8,630,691	B2	1/2014	Lamego et al.	9,037,207	B2	5/2015	Al-Ali et al.
8,634,889	B2	1/2014	Al-Ali et al.	9,060,721	B2	6/2015	Reichgott et al.
8,641,631	B2	2/2014	Sierra et al.	9,066,666	B2	6/2015	Kiani
8,652,060	B2	2/2014	Al-Ali	9,066,680	B1	6/2015	Al-Ali et al.
8,663,107	B2	3/2014	Kiani	9,072,474	B2	7/2015	Al-Ali et al.
8,666,468	B1	3/2014	Al-Ali	9,078,560	B2	7/2015	Schurman et al.
8,667,967	B2	3/2014	Al-Ali et al.	9,084,569	B2	7/2015	Weber et al.
8,670,811	B2	3/2014	O'Reilly	9,095,316	B2	8/2015	Welch et al.
8,670,814	B2	3/2014	Diab et al.	9,106,038	B2	8/2015	Telfort et al.
8,676,286	B2	3/2014	Weber et al.	9,107,625	B2	8/2015	Telfort et al.
8,682,407	B2	3/2014	Al-Ali	9,107,626	B2	8/2015	Al-Ali et al.
RE44,823	E	4/2014	Parker	9,113,831	B2	8/2015	Al-Ali
RE44,875	E	4/2014	Kiani et al.	9,113,832	B2	8/2015	Al-Ali
8,690,799	B2	4/2014	Telfort et al.	9,119,595	B2	9/2015	Lamego
8,700,112	B2	4/2014	Kiani	9,131,881	B2	9/2015	Diab et al.
				9,131,882	B2	9/2015	Al-Ali et al.
				9,131,883	B2	9/2015	Al-Ali
				9,131,917	B2	9/2015	Telfort et al.
				9,138,180	B1	9/2015	Coverston et al.

(56)

References Cited

U.S. PATENT DOCUMENTS

9,138,182 B2	9/2015	Al-Ali et al.	9,687,160 B2	6/2017	Kiani
9,138,192 B2	9/2015	Weber et al.	9,693,719 B2	7/2017	Al-Ali et al.
9,142,117 B2	9/2015	Muhsin et al.	9,693,737 B2	7/2017	Al-Ali
9,153,112 B1	10/2015	Kiani et al.	9,697,928 B2	7/2017	Al-Ali et al.
9,153,121 B2	10/2015	Kiani et al.	9,717,425 B2	8/2017	Kiani et al.
9,161,696 B2	10/2015	Al-Ali et al.	9,717,458 B2	8/2017	Lamego et al.
9,161,713 B2	10/2015	Al-Ali et al.	9,724,016 B1	8/2017	Al-Ali et al.
9,167,995 B2	10/2015	Lamego et al.	9,724,024 B2	8/2017	Al-Ali
9,176,141 B2	11/2015	Al-Ali et al.	9,724,025 B1	8/2017	Kiani et al.
9,186,102 B2	11/2015	Bruinsma et al.	9,730,640 B2	8/2017	Diab et al.
9,192,312 B2	11/2015	Al-Ali	9,743,887 B2	8/2017	Al-Ali et al.
9,192,329 B2	11/2015	Al-Ali	9,749,232 B2	8/2017	Sampath et al.
9,192,351 B1	11/2015	Telfort et al.	9,750,442 B2	9/2017	Olsen
9,195,385 B2	11/2015	Al-Ali et al.	9,750,443 B2	9/2017	Smith et al.
9,211,072 B2	12/2015	Kiani	9,750,461 B1	9/2017	Telfort
9,211,095 B1	12/2015	Al-Ali	9,775,545 B2	10/2017	Al-Ali et al.
9,218,454 B2	12/2015	Kiani et al.	9,775,546 B2	10/2017	Diab et al.
9,226,696 B2	1/2016	Kiani	9,775,570 B2	10/2017	Al-Ali
9,241,662 B2	1/2016	Al-Ali et al.	9,778,079 B1	10/2017	Al-Ali et al.
9,245,668 B1	1/2016	Vo et al.	9,782,077 B2	10/2017	Lamego et al.
9,259,185 B2	2/2016	Abdul-Hafiz et al.	9,782,110 B2	10/2017	Kiani
9,267,572 B2	2/2016	Barker et al.	9,787,568 B2	10/2017	Lamego et al.
9,277,880 B2	3/2016	Poeze et al.	9,788,735 B2	10/2017	Al-Ali
9,289,167 B2	3/2016	Diab et al.	9,788,768 B2	10/2017	Al-Ali et al.
9,295,421 B2	3/2016	Kiani et al.	9,795,300 B2	10/2017	Al-Ali
9,307,928 B1	4/2016	Al-Ali et al.	9,795,310 B2	10/2017	Al-Ali
9,323,894 B2	4/2016	Kiani	9,795,358 B2	10/2017	Telfort et al.
D755,392 S	5/2016	Hwang et al.	9,795,739 B2	10/2017	Al-Ali et al.
9,326,712 B1	5/2016	Kiani	9,801,556 B2	10/2017	Kiani
9,333,316 B2	5/2016	Kiani	9,801,588 B2	10/2017	Weber et al.
9,339,220 B2	5/2016	Lamego et al.	9,808,188 B1	11/2017	Perea et al.
9,341,565 B2	5/2016	Lamego et al.	9,814,418 B2	11/2017	Weber et al.
9,351,673 B2	5/2016	Diab et al.	9,820,691 B2	11/2017	Kiani
9,351,675 B2	5/2016	Al-Ali et al.	9,833,152 B2	12/2017	Kiani et al.
9,364,181 B2	6/2016	Kiani et al.	9,833,180 B2	12/2017	Shakespeare et al.
9,368,671 B2	6/2016	Wojtczuk et al.	9,839,379 B2	12/2017	Al-Ali et al.
9,370,325 B2	6/2016	Al-Ali et al.	9,839,381 B1	12/2017	Weber et al.
9,370,326 B2	6/2016	McHale et al.	9,847,002 B2 *	12/2017	Kiani ..... A61B 5/6898
9,370,335 B2	6/2016	Al-Ali et al.	9,847,749 B2	12/2017	Kiani et al.
9,375,185 B2	6/2016	Ali et al.	9,848,800 B1	12/2017	Lee et al.
9,386,953 B2	7/2016	Al-Ali	9,848,806 B2	12/2017	Al-Ali et al.
9,386,961 B2	7/2016	Al-Ali et al.	9,848,807 B2	12/2017	Lamego
9,392,945 B2	7/2016	Al-Ali et al.	9,861,298 B2	1/2018	Eckerbom et al.
9,397,448 B2	7/2016	Al-Ali et al.	9,861,304 B2	1/2018	Al-Ali et al.
9,408,542 B1	8/2016	Kinast et al.	9,861,305 B1	1/2018	Weber et al.
9,436,645 B2 *	9/2016	Al-Ali ..... A61B 5/002	9,867,578 B2	1/2018	Al-Ali et al.
9,445,759 B1	9/2016	Lamego et al.	9,872,623 B2	1/2018	Al-Ali
9,466,919 B2	10/2016	Kiani et al.	9,876,320 B2	1/2018	Coverston et al.
9,474,474 B2	10/2016	Lamego et al.	9,877,650 B2	1/2018	Muhsin et al.
9,480,422 B2	11/2016	Al-Ali	9,877,686 B2	1/2018	Al-Ali et al.
9,480,435 B2	11/2016	Olsen	9,891,079 B2	2/2018	Dalvi
9,492,110 B2	11/2016	Al-Ali et al.	9,895,107 B2	2/2018	Al-Ali et al.
9,510,779 B2	12/2016	Poeze et al.	9,924,893 B2	3/2018	Schurman et al.
9,517,024 B2	12/2016	Kiani et al.	9,924,897 B1	3/2018	Abdul-Hafiz
9,532,722 B2	1/2017	Lamego et al.	2006/0161054 A1	7/2006	Reuss et al.
9,538,949 B2	1/2017	Al-Ali et al.	2007/0282478 A1	12/2007	Al-Ali et al.
9,538,980 B2	1/2017	Telfort et al.	2009/0247984 A1	10/2009	Lamego et al.
9,549,696 B2	1/2017	Lamego et al.	2009/0275813 A1	11/2009	Davis
9,554,737 B2	1/2017	Schurman et al.	2009/0275844 A1	11/2009	Al-Ali
9,560,996 B2	2/2017	Kiani	2010/0004518 A1	1/2010	Vo et al.
9,560,998 B2	2/2017	Al-Ali et al.	2010/0030040 A1	2/2010	Poeze et al.
9,566,019 B2	2/2017	Al-Ali et al.	2011/0054267 A1 *	3/2011	Fidacaro ..... A61B 5/0002 600/300
9,579,039 B2	2/2017	Jansen et al.	2011/0082711 A1	4/2011	Poeze et al.
9,591,975 B2	3/2017	Dalvi et al.	2011/0105854 A1	5/2011	Kiani et al.
9,622,692 B2	4/2017	Lamego et al.	2011/0125060 A1	5/2011	Telfort et al.
9,622,693 B2	4/2017	Diab	2011/0208015 A1	8/2011	Welch et al.
D788,312 S *	5/2017	Al-Ali ..... D24/186	2011/0230733 A1	9/2011	Al-Ali
9,636,055 B2	5/2017	Al-Ali et al.	2012/0165629 A1	6/2012	Merritt et al.
9,636,056 B2	5/2017	Al-Ali	2012/0209082 A1	8/2012	Al-Ali
9,649,054 B2	5/2017	Lamego et al.	2012/0209084 A1	8/2012	Olsen et al.
9,662,052 B2	5/2017	Al-Ali et al.	2012/0283524 A1	11/2012	Kiani et al.
9,668,679 B2	6/2017	Schurman et al.	2012/0319816 A1	12/2012	Al-Ali
9,668,680 B2	6/2017	Bruinsma et al.	2013/0023775 A1	1/2013	Lamego et al.
9,668,703 B2	6/2017	Al-Ali	2013/0041591 A1	2/2013	Lamego
9,675,286 B2	6/2017	Diab	2013/0060147 A1	3/2013	Welch et al.
			2013/0096405 A1	4/2013	Garfio
			2013/0096936 A1	4/2013	Sampath et al.
			2013/0243021 A1	9/2013	Siskavich

(56)

References Cited

U.S. PATENT DOCUMENTS

2013/0253334	A1	9/2013	Al-Ali et al.		2016/0058347	A1	3/2016	Reichgott et al.
2013/0262730	A1*	10/2013	Al-Ali .....	A61B 5/0002 710/303	2016/0066824	A1	3/2016	Al-Ali et al.
2013/0296672	A1	11/2013	O'Neil et al.		2016/0081552	A1	3/2016	Wojtczuk et al.
2013/0296713	A1	11/2013	Al-Ali et al.		2016/0095543	A1	4/2016	Telfort et al.
2013/0324808	A1	12/2013	Al-Ali et al.		2016/0095548	A1	4/2016	Al-Ali et al.
2013/0331660	A1	12/2013	Al-Ali et al.		2016/0103598	A1	4/2016	Al-Ali et al.
2014/0012100	A1	1/2014	Al-Ali et al.		2016/0143548	A1	5/2016	Al-Ali
2014/0051953	A1	2/2014	Lamego et al.		2016/0166182	A1	6/2016	Al-Ali et al.
2014/0081175	A1	3/2014	Telfort		2016/0166183	A1	6/2016	Poeze et al.
2014/0120564	A1	5/2014	Workman et al.		2016/0192869	A1	7/2016	Kiani et al.
2014/0121482	A1	5/2014	Merritt et al.		2016/0196388	A1	7/2016	Lamego
2014/0127137	A1	5/2014	Bellott et al.		2016/0197436	A1	7/2016	Barker et al.
2014/0135588	A1	5/2014	Al-Ali et al.		2016/0213281	A1	7/2016	Eckerbom et al.
2014/0163344	A1	6/2014	Al-Ali		2016/0228043	A1	8/2016	O'Neil et al.
2014/0163402	A1	6/2014	Lamego et al.		2016/0233632	A1	8/2016	Scruggs et al.
2014/0166076	A1	6/2014	Kiani et al.		2016/0234944	A1	8/2016	Schmidt et al.
2014/0171763	A1	6/2014	Diab		2016/0270735	A1	9/2016	Diab et al.
2014/0180038	A1	6/2014	Kiani		2016/0283665	A1	9/2016	Sampath et al.
2014/0180154	A1	6/2014	Sierra et al.		2016/0287090	A1	10/2016	Al-Ali et al.
2014/0180160	A1	6/2014	Brown et al.		2016/0287786	A1	10/2016	Kiani
2014/0187973	A1	7/2014	Brown et al.		2016/0296169	A1	10/2016	McHale et al.
2014/0213864	A1	7/2014	Abdul-Hafiz et al.		2016/0310052	A1	10/2016	Al-Ali et al.
2014/0266790	A1	9/2014	Al-Ali et al.		2016/0314260	A1	10/2016	Kiani
2014/0275808	A1	9/2014	Poeze et al.		2016/0324486	A1	11/2016	Al-Ali et al.
2014/0275835	A1	9/2014	Lamego et al.		2016/0324488	A1	11/2016	Olsen
2014/0275871	A1	9/2014	Lamego et al.		2016/0327984	A1	11/2016	Al-Ali et al.
2014/0275872	A1	9/2014	Merritt et al.		2016/0328528	A1	11/2016	Al-Ali et al.
2014/0276115	A1	9/2014	Dalvi et al.		2016/0331332	A1	11/2016	Al-Ali
2014/0288400	A1	9/2014	Diab et al.		2016/0367173	A1	12/2016	Dalvi et al.
2014/0316217	A1	10/2014	Purdon et al.		2017/0000394	A1	1/2017	Al-Ali et al.
2014/0316218	A1	10/2014	Purdon et al.		2017/0007134	A1	1/2017	Al-Ali et al.
2014/0316228	A1	10/2014	Blank et al.		2017/0007198	A1	1/2017	Al-Ali et al.
2014/0323825	A1	10/2014	Al-Ali et al.		2017/0014083	A1	1/2017	Diab et al.
2014/0323897	A1	10/2014	Brown et al.		2017/0014084	A1	1/2017	Al-Ali et al.
2014/0323898	A1	10/2014	Purdon et al.		2017/0027456	A1	2/2017	Kinast et al.
2014/0330092	A1	11/2014	Al-Ali et al.		2017/0042488	A1	2/2017	Muhsin
2014/0330098	A1	11/2014	Merritt et al.		2017/0055851	A1	3/2017	Al-Ali
2014/0357966	A1	12/2014	Al-Ali et al.		2017/0055882	A1	3/2017	Al-Ali et al.
2015/0005600	A1	1/2015	Blank et al.		2017/0055887	A1	3/2017	Al-Ali
2015/0011907	A1	1/2015	Purdon et al.		2017/0055896	A1	3/2017	Al-Ali et al.
2015/0012231	A1	1/2015	Poeze et al.		2017/0079594	A1	3/2017	Telfort et al.
2015/0032029	A1	1/2015	Al-Ali et al.		2017/0086723	A1	3/2017	Al-Ali et al.
2015/0038859	A1	2/2015	Dalvi et al.		2017/0143281	A1	5/2017	Olsen
2015/0080754	A1	3/2015	Purdon et al.		2017/0147774	A1	5/2017	Kiani
2015/0087936	A1	3/2015	Al-Ali et al.		2017/0156620	A1	6/2017	Al-Ali et al.
2015/0094546	A1	4/2015	Al-Ali		2017/0173632	A1	6/2017	Al-Ali
2015/0097701	A1*	4/2015	Al-Ali .....	A61B 5/0002 340/870.7	2017/0187146	A1	6/2017	Kiani et al.
2015/0099950	A1	4/2015	Al-Ali et al.		2017/0188919	A1	7/2017	Al-Ali et al.
2015/0099955	A1	4/2015	Al-Ali et al.		2017/0196464	A1	7/2017	Jansen et al.
2015/0101844	A1	4/2015	Al-Ali et al.		2017/0196470	A1	7/2017	Lamego et al.
2015/0106121	A1	4/2015	Muhsin et al.		2017/0202490	A1	7/2017	Al-Ali et al.
2015/0112151	A1	4/2015	Muhsin et al.		2017/0224262	A1	8/2017	Al-Ali
2015/0116076	A1	4/2015	Al-Ali et al.		2017/0228516	A1	8/2017	Sampath et al.
2015/0165312	A1	6/2015	Kiani		2017/0245790	A1	8/2017	Al-Ali et al.
2015/0196249	A1	7/2015	Brown et al.		2017/0251974	A1	9/2017	Shreim et al.
2015/0216459	A1	8/2015	Al-Ali et al.		2017/0251975	A1	9/2017	Shreim et al.
2015/0238722	A1	8/2015	Al-Ali		2017/0258403	A1	9/2017	Abdul-Hafiz et al.
2015/0245773	A1	9/2015	Lamego et al.		2017/0311891	A1	11/2017	Kiani et al.
2015/0245794	A1	9/2015	Al-Ali		2017/0325728	A1	11/2017	Al-Ali et al.
2015/0257689	A1	9/2015	Al-Ali et al.		2017/0332976	A1	11/2017	Al-Ali et al.
2015/0272514	A1	10/2015	Kiani et al.		2017/0340293	A1	11/2017	Al-Ali et al.
2015/0351697	A1	12/2015	Weber et al.		2017/0360310	A1	12/2017	Kiani et al.
2015/0359429	A1	12/2015	Al-Ali et al.		2017/0367632	A1	12/2017	Al-Ali et al.
2015/0366507	A1	12/2015	Blank		2018/0008146	A1	1/2018	Al-Ali et al.
2016/0029932	A1	2/2016	Al-Ali		2018/0014752	A1	1/2018	Al-Ali et al.
2016/0055740	A1*	2/2016	Fuchs .....	A61B 5/7495 340/8.1	2018/0028124	A1	2/2018	Al-Ali et al.
					2018/0055385	A1	3/2018	Al-Ali
					2018/0055390	A1	3/2018	Kiani et al.
					2018/0055430	A1	3/2018	Diab et al.
					2018/0064381	A1	3/2018	Shakespeare et al.
					2018/0069776	A1	3/2018	Lamego et al.

\* cited by examiner

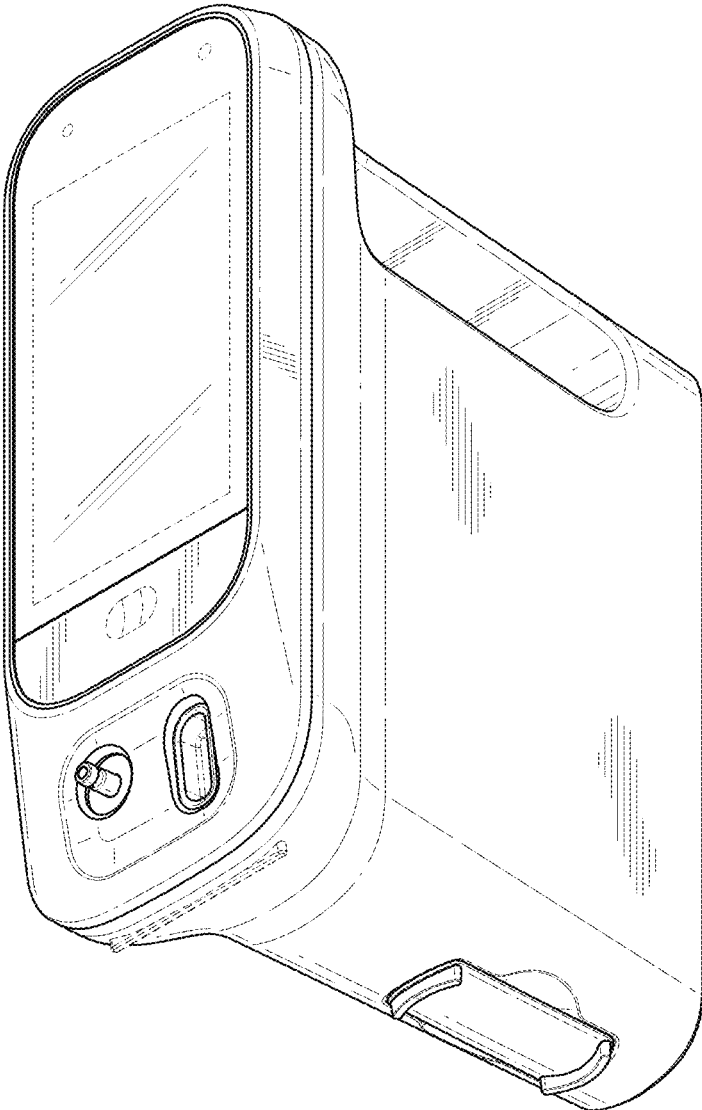


FIG. 1

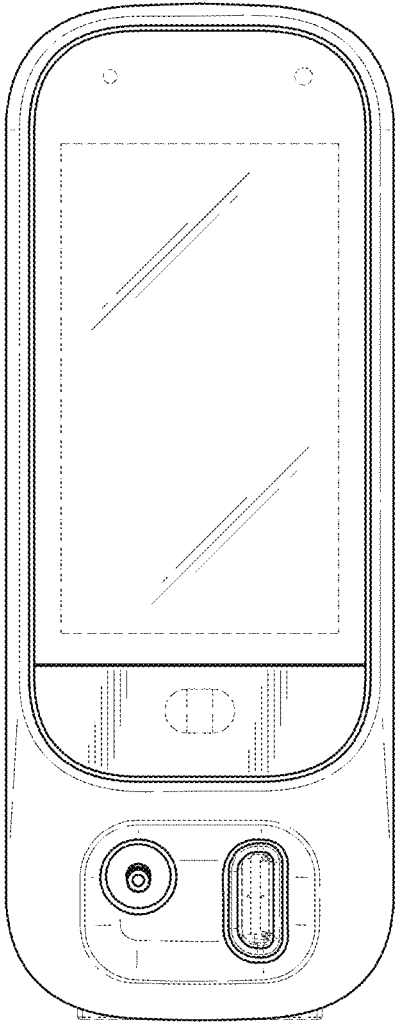


FIG. 2



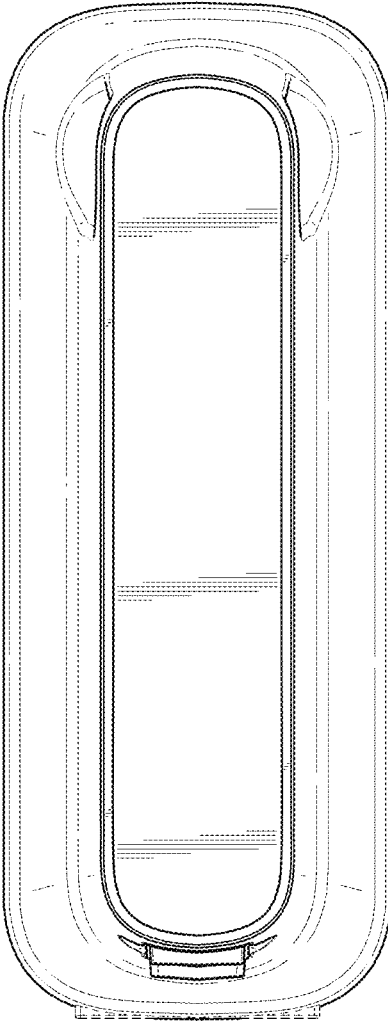


FIG. 3

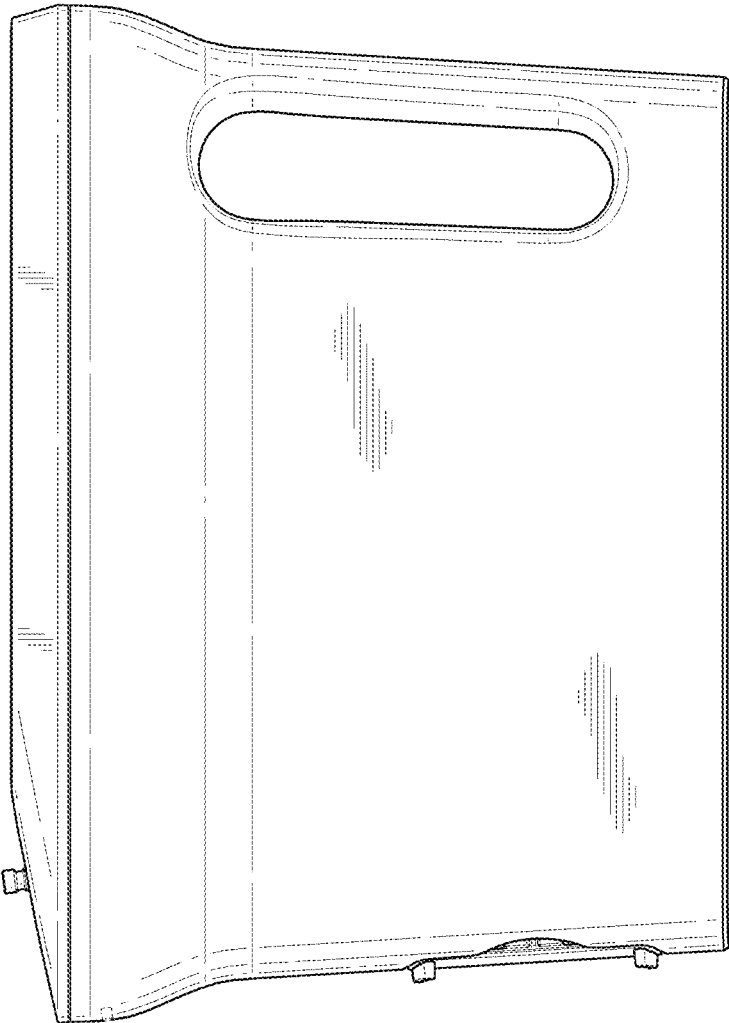


FIG. 4

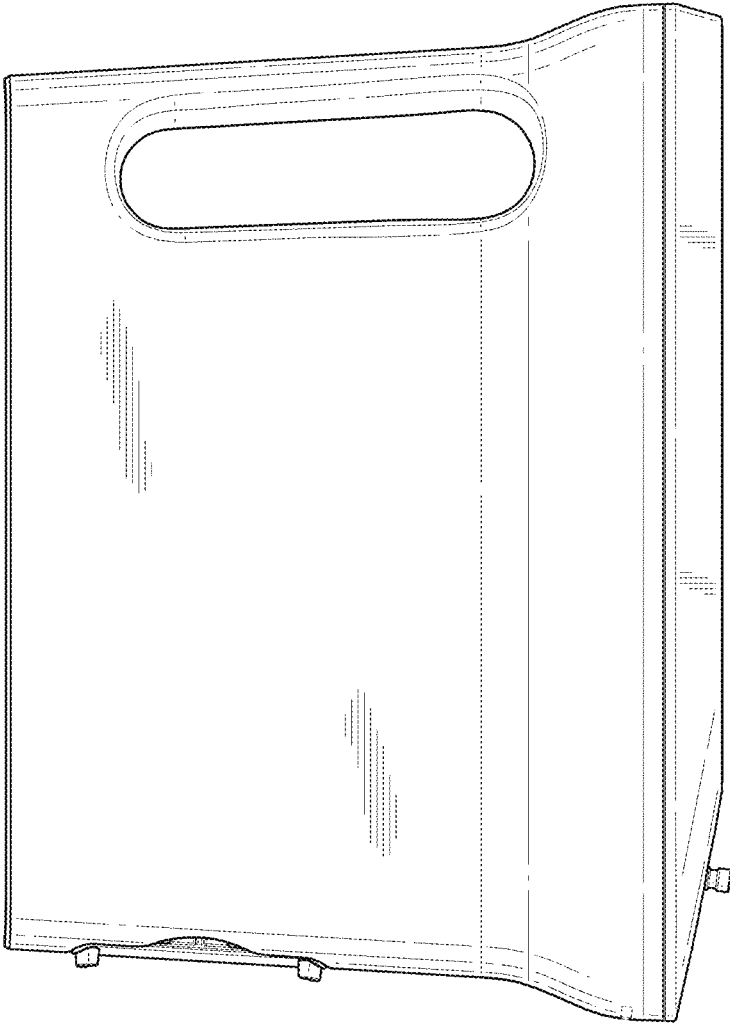


FIG. 5

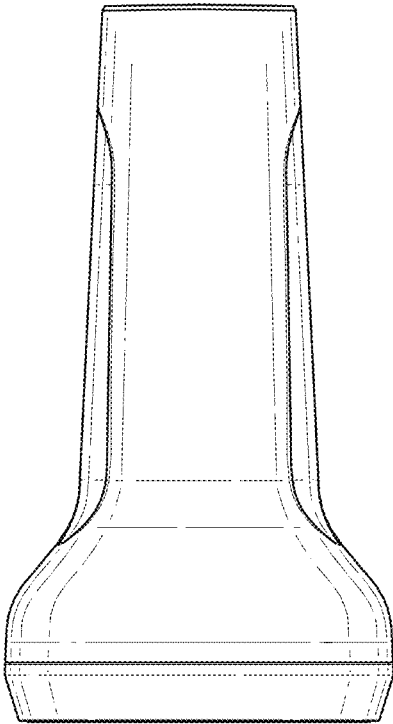


FIG. 6

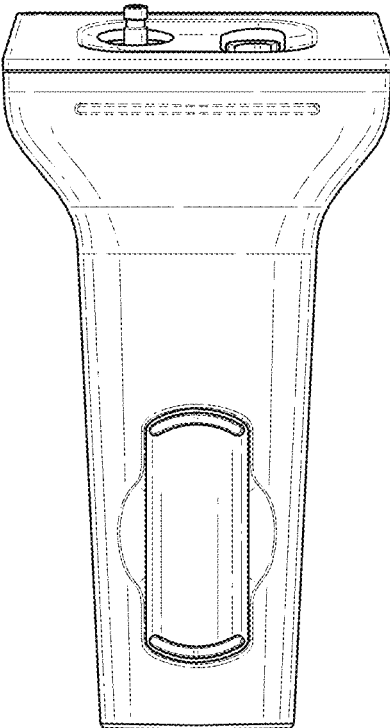


FIG. 7