US00D943736S

(12) United States Design Patent

Sloss et al.

(10) Patent No.: US D943,736 S
(45) Date of Patent: ** Feb. 15, 2022

(54) **APPARATUS TO CONTROL FLUID FLOW THROUGH A TUBE**

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

(21) Appl. No.: **29/575,316**

(22) Filed: **Aug. 24, 2016**

Related U.S. Application Data

(63) Continuation of application No. 29/553,094, filed on Jan. 28, 2016.

(51) **LOC (13) Cl.** **24-02**

(52) **U.S. Cl.**
USPC **D24/111**

(58) **Field of Classification Search**
USPC D24/107, 108, 111, 169, 185, 186
CPC A61M 5/142; A61M 2205/502; A61M 5/1452; A61M 2205/505; A61M 2205/3331; A61M 2205/3334; A61M 5/168; A61M 5/16886
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,880,764	A	4/1959	Pelavin
2,888,877	A	6/1959	Shellman
3,173,372	A	3/1965	Baldwin
3,384,336	A	5/1968	Pulman
3,609,379	A	9/1971	Hildebrandt
3,685,787	A	8/1972	Adelberg
3,733,149	A	5/1973	Jacobson
3,790,042	A	2/1974	McCormick

(Continued)

FOREIGN PATENT DOCUMENTS

AU	2247783	A	6/1985
CA	1213749	A1	11/1986

(Continued)

OTHER PUBLICATIONS

"The OpenCV Reference Manual Release 2.3", May 10, 2011, pp. 1-263.

(Continued)

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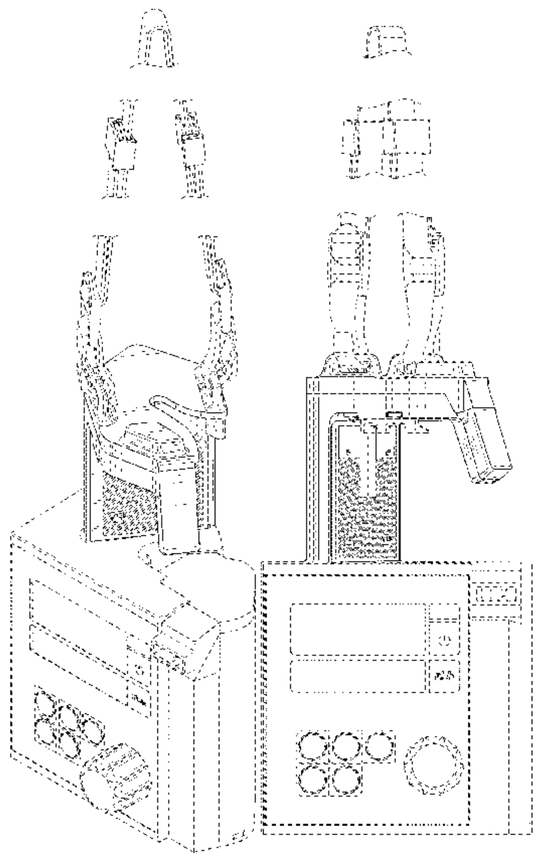
(57) **CLAIM**

The ornamental design for an apparatus to control fluid flow through a tube, as shown and described.

DESCRIPTION

FIG. **1** is a front, top, and right-side perspective view of an apparatus to control fluid flow through a tube, showing our new design;
FIG. **2** is a front elevational view thereof;
FIG. **3** is a right side elevational view thereof;
FIG. **4** is a back elevational view thereof;
FIG. **5** is a left-side elevational view thereof;
FIG. **6** is a bottom plan view thereof; and,
FIG. **7** is a top plan view thereof.
The broken lines in the drawings depict portions of the apparatus to control fluid flow through a tube that form no part of the claimed design.
The dash-dot broken lines define the bounds of the claimed design and form no part thereof.

1 Claim, 7 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

3,831,600	A	8/1974	Buckles	
4,038,982	A	8/1977	Burke	
4,105,028	A	8/1978	Sadlier	
4,155,362	A	5/1979	Jess	
4,247,077	A	1/1981	Banick et al.	
4,303,376	A	12/1981	Siekmann	
4,321,461	A	3/1982	Walter	
4,328,800	A	5/1982	Marx	
4,328,801	A	5/1982	Marx	
4,383,252	A	5/1983	Purcell	
4,397,642	A	8/1983	Lamadrid	
4,421,506	A	12/1983	Danby	
4,449,534	A	5/1984	Leibinsohn	
4,469,480	A	9/1984	Figler	
4,490,140	A	12/1984	Carr	
4,496,351	A	1/1985	Hillel et al.	
4,504,263	A	3/1985	Steuer	
4,525,163	A	6/1985	Slavik	
4,577,197	A	3/1986	Crean	
4,583,975	A	4/1986	Pekkarinen	
RE32,294	E	11/1986	Knute	
4,634,426	A	1/1987	Kamen	
4,635,281	A	1/1987	Jones	
4,648,869	A	3/1987	Bobo, Jr.	
4,662,829	A	5/1987	Nehring	
4,668,216	A	5/1987	Martin	
4,673,161	A	6/1987	Flynn et al.	
4,673,820	A	6/1987	Kamen	
4,680,977	A	7/1987	Conero	
4,703,314	A	10/1987	Spani	
4,718,896	A	1/1988	Arndt	
4,720,636	A	1/1988	Benner, Jr.	
4,722,224	A	2/1988	Scheller et al.	
4,775,368	A	10/1988	Iwatschenki	
4,778,451	A	10/1988	Kamen	
4,812,904	A	3/1989	Maring	
4,820,268	A	4/1989	Kawamura	
4,820,281	A	4/1989	Lawler	
4,834,744	A	5/1989	Ritson	
4,837,708	A	6/1989	Wright	
4,846,792	A	7/1989	Bobo, Jr.	
4,909,786	A *	3/1990	Gijselhart	A61M 5/1689 128/DIG. 13
4,920,336	A	4/1990	Meijer	
4,936,828	A	6/1990	Chiang	
4,959,050	A	9/1990	Bobo, Jr.	
4,979,940	A	12/1990	Bobo, Jr.	
4,981,467	A	1/1991	Bobo	
5,002,539	A	3/1991	Coble	
5,045,069	A	9/1991	Imparato	
5,047,014	A	9/1991	Mosebach et al.	
5,057,090	A	10/1991	Bessman	
5,154,693	A	10/1992	East et al.	
5,154,704	A	10/1992	Archibald	
5,181,910	A	1/1993	Scanlon	
5,186,057	A	2/1993	Everhart	
RE34,413	E	10/1993	McCullough	
5,267,980	A	12/1993	Dirr, Jr.	
5,278,626	A	1/1994	Poole	
5,279,558	A	1/1994	Kriesel	
D347,472	S *	5/1994	Sunderland	D24/111
5,314,316	A	5/1994	Shibamoto	
D348,730	S *	7/1994	Walker	D24/108
5,328,341	A	7/1994	Forni	
5,331,309	A	7/1994	Sakai	
D353,667	S *	12/1994	Tsubota	D24/111
D355,716	S *	2/1995	Nash	D24/111
5,411,052	A	5/1995	Murray	
5,415,641	A	5/1995	Yerlikaya	
5,439,442	A	8/1995	Bellifemine	
D362,721	S	9/1995	Peeler et al.	
5,482,446	A	1/1996	Williamson	
D367,527	S *	2/1996	Marston	D24/111
5,489,265	A *	2/1996	Montalvo	A61M 5/141 604/67
5,526,285	A	6/1996	Campo	
5,562,615	A	10/1996	Nassif	
5,588,963	A	12/1996	Roelofs	
5,601,980	A	2/1997	Gordon	
5,707,588	A	1/1998	Tsukishima	
5,718,562	A	2/1998	Lawless	
5,753,820	A	5/1998	Reed	
5,782,805	A	7/1998	Meinzer	
5,800,140	A	9/1998	Forni	
5,800,386	A	9/1998	Bellifemine	
5,814,015	A *	9/1998	Gargano	A61M 5/1456 604/67
5,843,045	A	12/1998	DuPont	
5,896,195	A	4/1999	Juvinall	
5,899,665	A	5/1999	Makino	
5,920,361	A	7/1999	Gibeau	
D416,999	S	11/1999	Miyamoto	
6,015,083	A	1/2000	Hayes	
6,049,381	A	4/2000	Reintjes	
6,050,713	A	4/2000	O'Donnell	
6,083,206	A	7/2000	Molko	
6,091,483	A	7/2000	Guirguis	
6,091,492	A	7/2000	Strickland	
6,110,153	A	8/2000	Davis	
6,144,453	A	11/2000	Hallerman	
6,149,631	A	11/2000	Haydel, Jr.	
6,159,186	A	12/2000	Wickham	
6,213,354	B1	4/2001	Kay	
6,213,739	B1	4/2001	Phallen et al.	
6,228,047	B1	5/2001	Dadson	
D446,860	S	8/2001	Mezière	
6,270,478	B1 *	8/2001	Mernø	A61M 5/142 604/122
6,305,908	B1	10/2001	Hermann	
6,328,712	B1	12/2001	Cartledge	
6,362,887	B1	3/2002	Meisberger	
6,491,659	B1	12/2002	Miyamoto	
6,500,151	B1	12/2002	Cobb	
6,503,221	B1	1/2003	Briggs	
6,523,414	B1	2/2003	Malmstrom	
D471,274	S	3/2003	Diaz et al.	
6,554,791	B1	4/2003	Cartledge et al.	
6,562,012	B1	5/2003	Brown	
6,574,050	B1	6/2003	Lin et al.	
6,599,282	B2	7/2003	Burko	
6,641,556	B1	11/2003	Shigezawa	
6,657,545	B1	12/2003	Lin	
6,736,801	B1	5/2004	Gallagher	
6,810,290	B2	10/2004	Lebel et al.	
6,814,547	B2	11/2004	Childers et al.	
6,975,898	B2	12/2005	Seibel	
6,984,052	B1	1/2006	Del Castillo	
7,001,365	B2	2/2006	Makkink	
7,068,831	B2	6/2006	Florent	
7,070,121	B2	7/2006	Schramm	
7,092,796	B2 *	8/2006	Vanderveen	G05D 7/0629 604/131
7,118,549	B2	10/2006	Chan	
7,163,740	B2	1/2007	Rosati	
7,190,275	B2	3/2007	Goldberg	
D564,087	S	3/2008	Yodfat et al.	
7,338,475	B2	3/2008	Brown	
7,420,151	B2	9/2008	Fengler et al.	
7,448,706	B2	11/2008	Yamanobe	
7,467,055	B2	12/2008	Seshimo et al.	
7,498,563	B2	3/2009	Mandro	
7,499,581	B2	3/2009	Tribble	
7,540,859	B2	6/2009	Claude	
7,677,689	B2	3/2010	Kim	
7,695,448	B2	4/2010	Cassidy	
7,767,991	B2	8/2010	Sacchetti	
7,776,927	B2	8/2010	Chu	
7,783,107	B2	8/2010	Zandifar	
D629,503	S	12/2010	Caffey et al.	
7,892,201	B1	2/2011	Laguna	
7,892,204	B2	2/2011	Kraus	
7,905,859	B2	3/2011	Bynum	
7,914,483	B2	3/2011	Simmons	
7,918,834	B2	4/2011	Mernoe	

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,924,424	B2	4/2011	Erickson et al.	
7,933,780	B2	4/2011	De La Huerga	
7,952,698	B2	5/2011	Friedrich	
8,004,683	B2	8/2011	Tokhtuev et al.	
8,025,634	B1	9/2011	Moubayed	
8,038,657	B2	10/2011	Davis	
8,038,663	B2	10/2011	Miner	
8,103,461	B2	1/2012	Glaser et al.	
8,112,814	B2	2/2012	Shimizu	
8,137,083	B2	3/2012	Zhou	
8,147,447	B2	4/2012	Sundar et al.	
8,147,448	B2	4/2012	Sundar	
8,147,464	B2	4/2012	Spohn	
8,184,848	B2	5/2012	Wu	
8,256,984	B2	9/2012	Fathallah	
8,257,779	B2	9/2012	Abernathy	
8,282,894	B2	10/2012	Lee	
D676,551	S	2/2013	Desai et al.	
D677,784	S	3/2013	Marguerie	
8,394,062	B2	3/2013	Powers	
8,439,880	B2	5/2013	Rondeau	
8,447,069	B2	5/2013	Huang et al.	
8,471,231	B2	6/2013	Paz	
8,523,797	B2	9/2013	Lowery et al.	
8,523,829	B2	9/2013	Miner et al.	
8,523,839	B2	9/2013	Siefert	
8,529,511	B2	9/2013	Boulanger	
8,531,517	B2	9/2013	Tao	
8,552,361	B2	10/2013	Mandro	
8,622,979	B2	1/2014	Hungerford	
8,638,358	B2	1/2014	Dabiri et al.	
8,647,074	B2	2/2014	Moberg et al.	
8,692,678	B2	4/2014	Warner et al.	
8,733,178	B2 *	5/2014	Bivans	A61M 5/14228 73/169
8,777,897	B2	7/2014	Butterfield	
D712,043	S	8/2014	Sliger	
8,834,429	B2	9/2014	Grant	
D720,449	S	12/2014	Galbraith et al.	
D728,779	S	5/2015	Sabin et al.	
D735,319	S	7/2015	Sabin et al.	
D736,370	S	8/2015	Sabin et al.	
9,095,652	B2	8/2015	Dewey	
9,128,051	B2	9/2015	Bui	
9,134,735	B2	9/2015	Lowery et al.	
9,134,736	B2	9/2015	Lowery et al.	
9,144,644	B2	9/2015	Hungerford	
9,151,646	B2	10/2015	Kamen et al.	
D745,661	S	12/2015	Collins et al.	
9,216,279	B2	12/2015	Travis et al.	
9,234,850	B2	1/2016	Hammond et al.	
D749,206	S	2/2016	Johnson et al.	
D751,689	S	3/2016	Peret et al.	
D751,690	S	3/2016	Peret et al.	
D752,209	S	3/2016	Peret et al.	
9,295,778	B2	3/2016	Kamen et al.	
D754,065	S	4/2016	Gray et al.	
D756,386	S	5/2016	Kendler et al.	
D756,505	S	5/2016	Park	
D758,399	S	6/2016	Kendler et al.	
D760,288	S	6/2016	Kendler et al.	
D760,289	S	6/2016	Kendler et al.	
9,364,394	B2	6/2016	Demers et al.	
9,372,486	B2	6/2016	Peret et al.	
D760,782	S	7/2016	Kendler et al.	
D760,888	S	7/2016	Gill et al.	
9,400,873	B2	7/2016	Kamen et al.	
D767,756	S	9/2016	Sabin	
9,435,455	B2	9/2016	Peret et al.	
D768,716	S	10/2016	Kendler et al.	
D770,034	S *	10/2016	McNall, III	D24/108
9,465,919	B2	10/2016	Kamen et al.	
9,468,716	B2 *	10/2016	Hariharesan	A61M 5/14232
9,488,200	B2	11/2016	Kamen et al.	
D799,025	S *	10/2017	Johnson	D24/111
D802,118	S *	11/2017	Peret	D24/111
D813,376	S *	3/2018	Peret	D24/111
D815,730	S *	4/2018	Collins	D24/111
D816,829	S *	5/2018	Peret	D24/111
D854,145	S *	7/2019	Collins	D24/111
10,758,669	B2 *	9/2020	Slaby	A61M 39/288
D905,848	S *	12/2020	Sloss	D24/111
2001/0026292	A1	10/2001	Ishizaki	
2001/0055462	A1	12/2001	Seibel	
2002/0194933	A1	12/2002	Roelofs	
2003/0045840	A1	3/2003	Burko	
2003/0055406	A1	3/2003	Lebel	
2003/0107819	A1	6/2003	Lin et al.	
2003/0217962	A1	11/2003	Childers	
2004/0044306	A1	3/2004	Lynch et al.	
2004/0171994	A1	9/2004	Goldberg	
2005/0096581	A1	5/2005	Chan	
2005/0171491	A1	8/2005	Minh Miner et al.	
2006/0096660	A1	5/2006	Diaz	
2006/0140466	A1	6/2006	Seshimo	
2006/0146077	A1	7/2006	Song	
2006/0291211	A1	12/2006	Rodriguez	
2007/0088269	A1	4/2007	Valego et al.	
2007/0102623	A1	5/2007	Fengler	
2007/0228071	A1	10/2007	Kamen et al.	
2007/0293817	A1	12/2007	Feng	
2008/0004574	A1	1/2008	Dyar	
2008/0051732	A1	2/2008	Chen	
2008/0147008	A1	6/2008	Lewis	
2008/0147016	A1	6/2008	Faries	
2008/0154214	A1	6/2008	Spohn	
2008/0235765	A1	9/2008	Shimizu	
2008/0237502	A1	10/2008	Fago	
2008/0252472	A1	10/2008	Su et al.	
2009/0097029	A1	4/2009	Tokhtuev	
2009/0112115	A1	4/2009	Huang	
2009/0180106	A1	7/2009	Friedrich	
2009/0224638	A1	9/2009	Weber	
2009/0254025	A1	10/2009	Simmons	
2009/0262351	A1	10/2009	Erickson	
2009/0276167	A1	11/2009	Glaser	
2009/0281460	A1	11/2009	Lowery	
2010/0021933	A1	1/2010	Okano	
2010/0097451	A1	4/2010	Bruce	
2010/0114027	A1	5/2010	Jacobson	
2010/0120601	A1	5/2010	Hayamizu	
2010/0168671	A1	7/2010	Faries, Jr.	
2010/0204650	A1	8/2010	Hungerford et al.	
2010/0211003	A1	8/2010	Sundar	
2010/0217229	A1	8/2010	Miner	
2010/0229978	A1	9/2010	Zhou	
2010/0292635	A1	11/2010	Sundar	
2010/0309005	A1	12/2010	Warner	
2011/0004186	A1	1/2011	Butterfield	
2011/0025826	A1	2/2011	Dabiri	
2011/0046899	A1	2/2011	Paz	
2011/0060284	A1	3/2011	Harr	
2011/0125103	A1	5/2011	Rondeau	
2011/0137239	A1 *	6/2011	DeBelser	A61M 5/14244 604/67
2011/0142283	A1	6/2011	Huang	
2011/0144595	A1	6/2011	Cheng	
2011/0166511	A1	7/2011	Sharvit	
2011/0178476	A1	7/2011	Lin	
2011/0190146	A1	8/2011	Boehm	
2011/0190637	A1	8/2011	Knobel	
2011/0196304	A1	8/2011	Kramer et al.	
2011/0196306	A1	8/2011	De La Huerga	
2011/0206247	A1	8/2011	Dachille	
2011/0208123	A1	8/2011	Gray	
2011/0231204	A1	9/2011	De La Huerga	
2011/0251557	A1	10/2011	Powers	
2011/0275063	A1	11/2011	Weitz	
2011/0313351	A1	12/2011	Kamen et al.	
2011/0313789	A1	12/2011	Kamen et al.	
2011/0316919	A1	12/2011	Baldy, Jr.	
2011/0317004	A1	12/2011	Tao	
2012/0013735	A1	1/2012	Tao	
2012/0059318	A1	3/2012	Dewey	

(56) **References Cited**

U.S. PATENT DOCUMENTS

2012/0059350	A1	3/2012	Siefert	
2012/0095415	A1	4/2012	Sharvit	
2012/0095433	A1	4/2012	Hungerford	
2012/0185267	A1	7/2012	Kamen	
2012/0197185	A1	8/2012	Tao	
2012/0238997	A1	9/2012	Dewey	
2012/0265166	A1	10/2012	Yodfat	
2012/0310153	A1	12/2012	Moberg	
2012/0310205	A1	12/2012	Lee et al.	
2013/0035659	A1	2/2013	Hungerford	
2013/0083191	A1	4/2013	Lowery et al.	
2013/0085443	A1	4/2013	Lowery	
2013/0177455	A1	7/2013	Kamen	
2013/0182381	A1	7/2013	Gray	
2013/0184676	A1	7/2013	Kamen	
2013/0188040	A1	7/2013	Kamen	
2013/0191513	A1	7/2013	Kamen	
2013/0197693	A1	8/2013	Kamen	
2013/0201471	A1	8/2013	Bui et al.	
2013/0201482	A1	8/2013	Munro	
2013/0204188	A1	8/2013	Kamen et al.	
2013/0253442	A1	9/2013	Travis	
2013/0272773	A1	10/2013	Kamen	
2013/0281965	A1	10/2013	Kamen	
2013/0297330	A1	11/2013	Kamen	
2013/0310990	A1	11/2013	Peret et al.	
2013/0317753	A1	11/2013	Kamen	
2013/0317837	A1	11/2013	Ballantyne	
2013/0336814	A1	12/2013	Kamen	
2013/0339049	A1	12/2013	Blumberg, Jr.	
2013/0346108	A1	12/2013	Kamen	
2014/0043469	A1	2/2014	Engel	
2014/0081233	A1	3/2014	Hungerford	
2014/0094753	A1*	4/2014	Mernoe	A61M 5/14216 604/135
2014/0121601	A1	5/2014	Hoenninger, III	
2014/0135695	A1	5/2014	Grant	
2014/0148757	A1	5/2014	Ambrosina	
2014/0165703	A1	6/2014	Wilt	
2014/0180711	A1	6/2014	Kamen	
2014/0188076	A1	7/2014	Kamen	
2014/0188516	A1	7/2014	Kamen	
2014/0194818	A1	7/2014	Yodfat	
2014/0195639	A1	7/2014	Kamen	
2014/0227021	A1	8/2014	Kamen	
2014/0228758	A1*	8/2014	Chi	A61M 5/148 604/132
2014/0257178	A1*	9/2014	Lee	A61M 5/16831 604/67
2014/0267709	A1	9/2014	Hammond	
2014/0276457	A1	9/2014	Munro	
2014/0309612	A1	10/2014	Smisson, III	
2014/0318639	A1	10/2014	Peret	
2014/0327759	A1	11/2014	Tao	
2014/0340512	A1	11/2014	Tao	
2014/0343492	A1	11/2014	Kamen	
2015/0002667	A1	1/2015	Peret	
2015/0002668	A1	1/2015	Peret	
2015/0002677	A1	1/2015	Peret et al.	
2015/0023808	A1	1/2015	Zhu	
2015/0033823	A1	2/2015	Blumberg, Jr.	
2015/0154364	A1	6/2015	Biasi et al.	
2015/0157791	A1	6/2015	Desch et al.	
2015/0219881	A1	8/2015	Munro	
2015/0238228	A1	8/2015	Langenfeld et al.	
2015/0257974	A1	9/2015	Demers et al.	
2015/0314083	A1	11/2015	Blumberg, Jr. et al.	
2015/0332009	A1	11/2015	Kane et al.	
2015/0361974	A1	12/2015	Hungerford et al.	
2016/0025641	A1	1/2016	Hammond et al.	
2016/0055397	A1	2/2016	Peret et al.	
2016/0055649	A1	2/2016	Peret et al.	
2016/0061641	A1	3/2016	Peret et al.	
2016/0063353	A1	3/2016	Peret et al.	
2016/0073063	A1	3/2016	Peret et al.	
2016/0084434	A1	3/2016	Janway et al.	
2016/0097382	A1	4/2016	Kamen et al.	
2016/0131272	A1	5/2016	Yoo et al.	
2016/0151564	A1*	6/2016	Magers	A61M 5/1452 604/152
2016/0158437	A1	6/2016	Biasi et al.	
2016/0179086	A1	6/2016	Peret et al.	
2016/0184510	A1	6/2016	Kamen et al.	
2016/0203292	A1	7/2016	Kamen et al.	
2016/0262977	A1	9/2016	Demers et al.	
2016/0287780	A1	10/2016	Lee et al.	
2016/0319850	A1	11/2016	Kamen et al.	
2016/0362234	A1	12/2016	Peret et al.	
2017/0296745	A1*	10/2017	Kamen	A61M 5/172
2018/0028745	A1*	2/2018	Amon	A61M 5/14244
2018/0243500	A1*	8/2018	McNall, III	A61M 5/142
2020/0001068	A1*	1/2020	Donze	A61M 39/20
2020/0338263	A1*	10/2020	Wollowitz	A61M 5/1411
2020/0397979	A1*	12/2020	Slaby	A61M 5/16831
2021/0113777	A1*	4/2021	Chen	A61M 5/31546

FOREIGN PATENT DOCUMENTS

DE	2023027	A1	11/1970
DE	2631951	A1	1/1978
DE	3617723	A1	12/1987
DE	3643276	A1	6/1988
DE	3822057	C2	1/1989
DE	69229832	T2	2/2000
EP	0112699	A2	7/1984
EP	0441323	A1	8/1991
EP	819495	A2	1/1998
EP	1722310	A1	11/2006
EP	2319551	A2	5/2011
EP	2793977	B1	11/2015
FR	2042606	A1	2/1971
FR	2273264	A1	12/1975
FR	2458804		1/1981
FR	2617593		1/1989
GB	1301033	A	12/1972
GB	2020735	A	11/1979
GB	2207239	B	1/1989
GB	2328982	A	3/1999
JP	58163843		9/1983
JP	04-280582	A	10/1992
JP	3110458	B2	11/2000
JP	2007229928	A	9/2007
JP	2009298012	A	12/2009
JP	2011062371	A	3/2011
KR	1020050039780	A	4/2005
KR	1020060111424	A	10/2006
KR	1020100037914	A	4/2010
NL	7006908		11/1970
NL	8801680	A	2/1989
NL	9101825	A	5/1993
SE	376843	B	6/1975
WO	WO1981002770	A1	10/1981
WO	WO1993009407	A1	5/1993
WO	WO2000072181	A3	11/2000
WO	W02002040084	A2	5/2002
WO	WO2002100262	A1	12/2002
WO	WO2004035116	A1	4/2004
WO	WO2005094919	A1	10/2005
WO	WO2006086723	A2	8/2006
WO	WO2008022880	A1	2/2008
WO	WO2008079023	A1	7/2008
WO	WO2009039203	A2	3/2009
WO	WO2009039214	A2	3/2009
WO	WO2009055639	A2	4/2009
WO	WO2010020397	A1	4/2010
WO	WO2010129720	A2	11/2010
WO	WO2011021098	A1	2/2011
WO	WO2011136667	A1	11/2011
WO	WO2012104779	A1	8/2012
WO	WO2013017949	A2	2/2013
WO	WO2013070337	A1	5/2013
WO	WO2013095459	A9	6/2013
WO	WO2013096713	A2	6/2013
WO	WO2013096718	A2	6/2013

(56) **References Cited**

FOREIGN PATENT DOCUMENTS

WO	WO2013096722	A2	6/2013
WO	WO2013096909	A2	6/2013
WO	WO2013176770	A2	11/2013
WO	WO2013177357	A1	11/2013
WO	WO2014100557	A2	6/2014
WO	WO2014100571	A2	6/2014
WO	WO2014100658	A1	6/2014
WO	WO2014100687	A2	6/2014
WO	WO2014100736	A2	6/2014
WO	WO2014100744	A2	6/2014
WO	WO2014144557	A2	9/2014
WO	WO2014025736	A1	10/2014
WO	WO2014160058	A2	10/2014
WO	WO2014160249	A1	10/2014
WO	WO2014160307	A1	10/2014
WO	WO2015116557	A1	8/2015

OTHER PUBLICATIONS

Invitation to Respond to Written Opinion from the Intellectual Property Office of Singapore for Application 11201507504S, dated Nov. 23, 2015.
First Examination Report from the Intellectual Property Office of New Zealand for Application 626382, dated Apr. 1, 2015.
Report of substantive examination from Superintendent of Industry and Commerce of Colombia for Patent Application 14155193, dated Nov. 19, 2015.
Notice of Preliminary Rejection (Non-Final) from the Korean Intellectual Property Office ("KIPO") for Korean Patent Application No. 10-2014-7019883, dated Dec. 15, 2015.
First Examination report from the New Zealand Intellectual Property Office for New Zealand IP No. 715098, dated Jan. 12, 2016.
"Microcomputer Intravenous Infusion Drip Controller", Longfian Scitech Co., Ltd., Mar. 18, 2016 (retrieved). Advertisement listed as having a valid price starting at Mar. 10, 2016, 2 pgs, http://marina.en.made-in-china.com/productimage/bKvQTtJcJEhs-2f1j00FZetfTSdnhcU/China-Microcomputer-Intravenous-Infusion-Drip-Controller.html.
"DripAssist Specificaiton", Shift Labs , Mar. 18, 2016 (retrieved). 2 pgs, http://www.shiftlabs.com/products/dripassist/specifications.
"DripAssist Product Overview", Shift Labs , Mar. 18, 2016 (retrieved). 2 pgs, http://www.shiftlabs.com/products/dripassist/overview.
"DripAssist Product Brochure", Shift Labs , Mar. 18, 2016 (retrieved). 1 pg., http://www.shiftlabs.com/sites/default/files/DripAssistOnesheet.pdf.
"IV Drip monitor", Allison Lipper, Mar. 18, 2016 (retrieved). 3 pgs., http://cnx.org/contents/W maFki2-@3/IV-Drip-Monitor.
"AutoClamp", Ace Medical, Mar. 18, 2016 (retrieved). 2 pgs., http://ace-medical.com/2014/en/product/product/view.asp?po_no=31.
Extended European Search Report dated Mar. 3, 2016, received in European patent application No. 15192051.9, 7 pgs.
Notice Of Eligibility For Grant from The Intellectual Property Office of Singapore for Application 11201507504S, dated Jun. 6, 2016, 12 pgs.
Second Office Action and Search Report dated Jun. 27, 2016, received in Republic of China patent application No. 201280069373.3, 6 pgs.
First Office Action dated Oct. 20, 2015, received in Republic of China patent application No. 201280069373.3, 4 pgs.
First Office Action dated Jul. 28, 2016, received in Australian patent application No. 2012358397, 3 pgs.
European Community Design Registration 002381699/0001-0005, Filed Jan. 8, 2014 and published on May 12, 2016, 42 pgs.
Notification from The Eurasian Patent Organization for Application 201491218, dated Apr. 27, 2015, 2 pgs.
Second Report of substantive examination from Superintendent of Industry and Commerce of Colombia for Patent Application 14.155.193, dated Sep. 8, 2016, 18 pgs.
First Examination Report from IP Australia for Patent Application 2012358397, dated Jul. 28, 2016, 3 pgs.
Notice of Acceptance from IP Australia for Patent Application 2012358397, dated Jan. 5, 2017, 3 pgs.
English Search Report from The People's Republic of China for Patent Application 201280069373.3, dated Jul. 12, 2016, 2 pgs.
Notice of Allowance from Korean Intellectual Property Office for Patent Application 10-2014-7019883, dated Jun. 28, 2016, 3 pgs.
First Examination Report from Mexican Patent Office for Patent Application MX/a/2014/007751, dated Sep. 8, 2016, 5 pgs.
Further Examination Report from the New Zealand Intellectual Property Office for Patent Application 626382, dated Jan. 12, 2016, 2 pgs.
Notice of Acceptance from the New Zealand Intellectual Property Office for Patent Application 626382, dated Feb. 9, 2016, 1 pg.
Rule 161 Communication from the European Patent Office for Patent Application 14720397.0-1662, dated Oct. 28, 2015, 2 pgs.
Decision to Grant from the European Patent Office for Patent Application 15192051.9-1664/3006010, dated Jan. 19, 2017, 3 pgs.
Further Examination Report from the New Zealand Intellectual Property Office for Patent Application 715098, dated Jun. 13, 2016, 2 pgs.
Notice of Acceptance from the New Zealand Intellectual Property Office for Patent Application 715098, dated Sep. 9, 2016, 3 pgs.
Notice of Acceptance from the New Zealand Intellectual Property Office for Patent Application 723930, dated Nov. 16, 2016, 3 pgs.
Examination Report from the European Patent Office for EPO Application No. 16 167 576.4-1662, dated Oct. 11, 2016, 6 pgs.
Search Report from the European Patent Office for EPO Application No. 16 167 576.4-1662, dated Sep. 19, 2016, 4 pgs.
Notice of Acceptance from IP Australia for Patent Application 2016225879, dated Oct. 26, 2016, 3 pgs.
First Examination Report from the New Zealand Intellectual Property Office for Patent Application 725469, dated Nov. 8, 2016, 2 pgs.
Darzynkiewicz, 'Cytometry', Methods in Cell Biology, 2011, Third Edition Part A, vol. 63, pp. 44-48, Academic Press, San Diego, 2001. And please see whole document generally.
Galambos et al., "Progressive Probabilistic Hough Transform for Line Detection", IEEE, 10 pgs, 1999.
International Search Report & Written Opinion dated Jun. 18, 2013, received in International patent application No. PCT/US2012/071142, 14 pgs.
International Search Report & Written Opinion dated Dec. 4, 2013, received in International patent application No. PCT/US2013/032445, 20 pgs.
International Search Report & Written Opinion dated Nov. 7, 2013, received in International patent application No. PCT/US2013/042350, 18 pgs.
Invitation to Pay Additional Fees and, Where Applicable, Protest Fee dated Sep. 9, 2013, received in International patent application No. PCT/US2013/032445, 10 pgs.
Invitation to Pay Additional Fees and, Where Applicable, Protest Fee dated Sep. 26, 2013, received in International patent application No. PCT/US2013/042350, 7 pgs.
International Preliminary Report on Patentability dated Jul. 3, 2014, received in International patent application No. PCT/US2012/071142, 9 pgs.
International Search Report dated Feb. 5, 2015, received in International patent application No. PCT/US2014/029020, 7 pgs.
International Preliminary Report on Patentability and Written Opinion, dated Sep. 15, 2015, received in International patent application No. PCT/US2014/029020, 11 pgs.
King et al. Prototyping closed loop physiologic control with the medical device coordination framework. In SEHC 2010: Proceedings of the 2010 ICSE Workshop on Software Engineering in Health Care (pp. 1-11). New York, NY: ACM. (2010).
Jetley et al., "Safety Requirements Based Analysis of Infusion Pump Software", Proceedings of the IEEE Real Time Systems Symposium, Tuscon, Dec. 2007 pp. 1-4.
Matas et al., 'Progressive Probabilistic Hough Transform', University of Surrey, Czech Technical University, 1998, pp. 1-10.

(56) **References Cited**

OTHER PUBLICATIONS

"Miscellaneous Image Transformations", OpenCV Wiki, 2011, 9 pgs., http://opencv.willowgarage.com/documentation/cpp/miscellaneous_image_transformations.
Electronic Infusion Devices, booklet, 2010, pp. 1-96, Edition 1, National Patient Safety Agency, London.
"Object Detection", OpenCV Wiki, 2011, 2 pgs., http://opencv.willowgarage.com/documentation/cpp/object_detection.html.
"The OpenCV Reference Manual Release 2.4.6.0", Jul. 1, 2013, pp. 1-813.
Leor at al., "A System for the Measurement of Drop Volume of Intravenous Solutions", Proceedings Computers in Cardiology 1990, pp. 405-406, Los Alamitos, California.
"Vista Basic: Instructions for Use: Software IFVB", manual, 2002, p. 3, B. Braun Medical Inc.
U.S. Appl. No. 29/553,094, filed Jan. 28, 2016.
U.S. Appl. No. 29/553,094, B1-B75, C1-C65.
DE2023027A1, English Abstract.
DE2631951A1, English Abstract.
DE3617723A1, English Abstract.
DE3643276A1, English Abstract, Description, and Claims.
DE3822057C2, English Abstract.
DE69229832T2, English Abstract.
FR2042606A1, English Abstract.
FR2273264A1, English Description and Claims.
FR2458804, English Abstract.
FR2617593, English Abstract.
JP04-280582A, English Abstract.
JP2007229928A, English Abstract.
JP2009298012A, English Abstract.
JP2011062371A, English Abstract.
JP3110458B2, English Abstract.
JP58163843, English Abstract.
KR1020050039780A, English Translation.
KR1020060111424A, English Translation.
KR1020100037914A, English Abstract.
NL7006908, English Abstract.
Report of substantive examination from Superintendent of Industry and Commerce of Colombia for Patent Application 14155193, dated Nov. 19, 2015, English Machine Translation.
Notice of Preliminary Rejection (Non-Final) from the Korean Intellectual Property Office ("KIPO") for Korean Patent Application No. 102014-7019883, dated Dec. 15, 2015, English Translation.
Second Office Action and Search Report dated Jun. 27, 2016, received in Republic of China patent application No. 201280069373.3, 6 pgs., English Translation.
First Office Action dated Oct. 20, 2015, received in Republic of China patent application No. 201280069373.3, 4 pgs., English Translation.
Notification from the Eurasian Patent Organization for Application 201491218, dated Apr. 27, 2015, 2 pgs., English Translation.
Second Report of substantive examination from Superintendent of Industry and Commerce of Colombia for Patent Application 14.155.193, dated Sep. 8, 2016, 18 pgs., English Translation.
Notice of Allowance from Korean Intellectual Property Office for Patent Application 10-2014-7019883, dated Jun. 28, 2016, 3 pgs., English Translation.
First Examination Report from Mexican Patent Office for Patent Application MX/a/2014/007751, dated Sep. 8, 2016, 5 pgs., English Tranlsation.

* cited by examiner

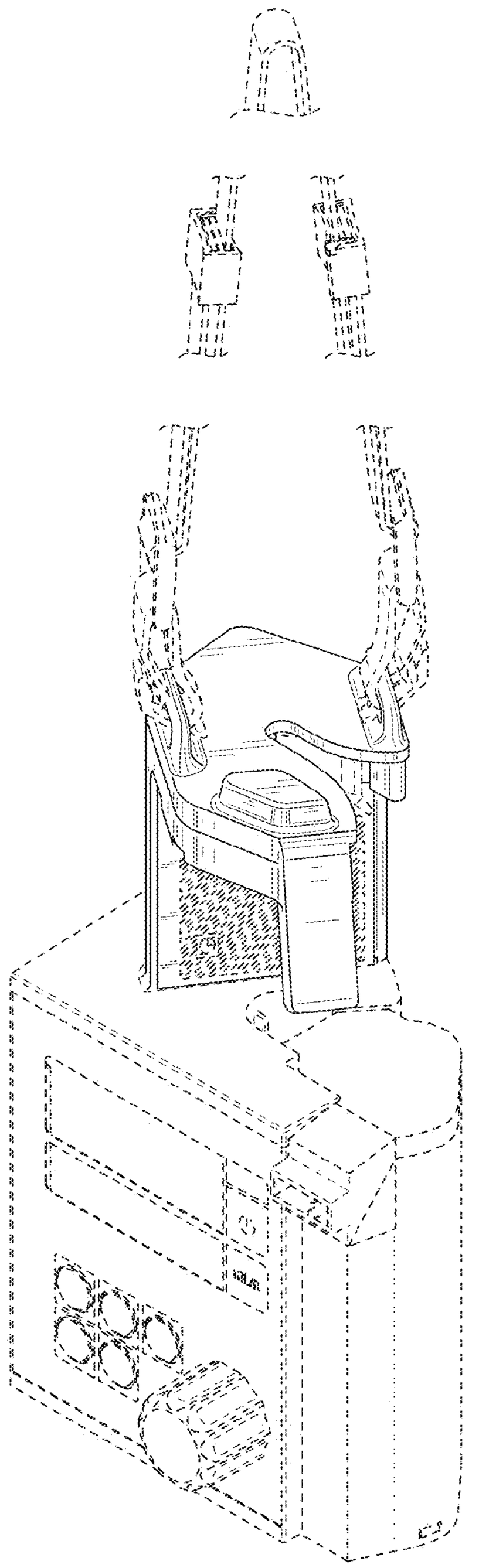


FIG. 1

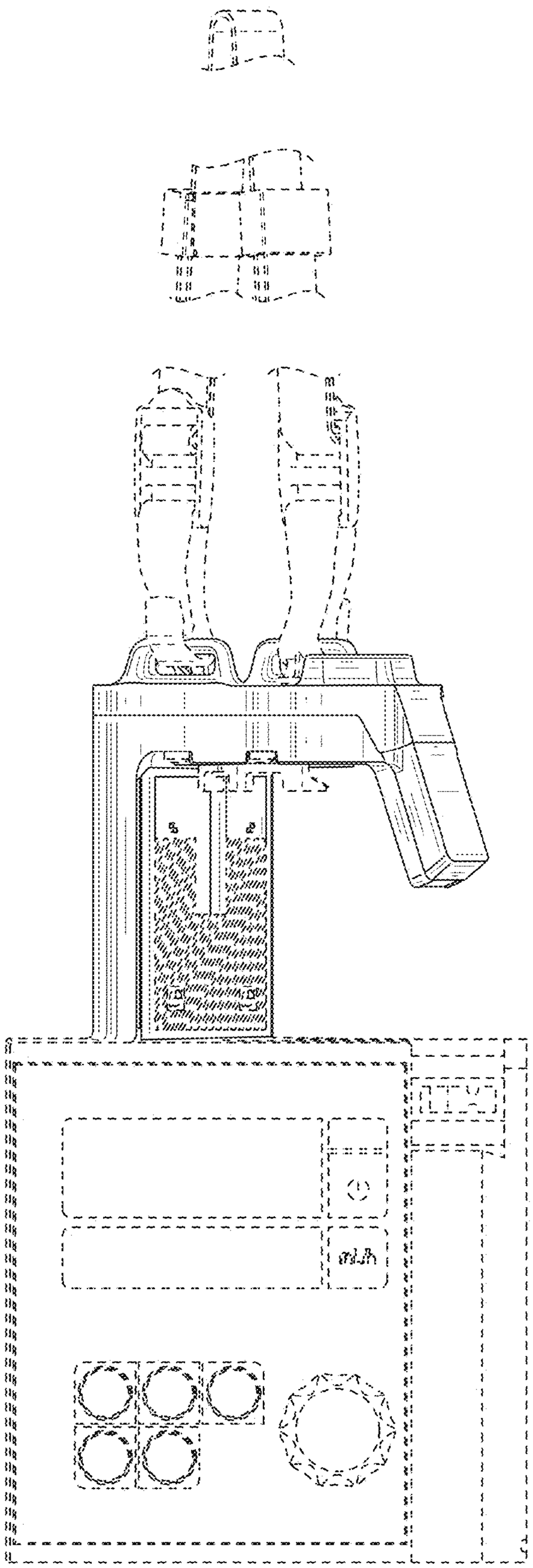


FIG. 2

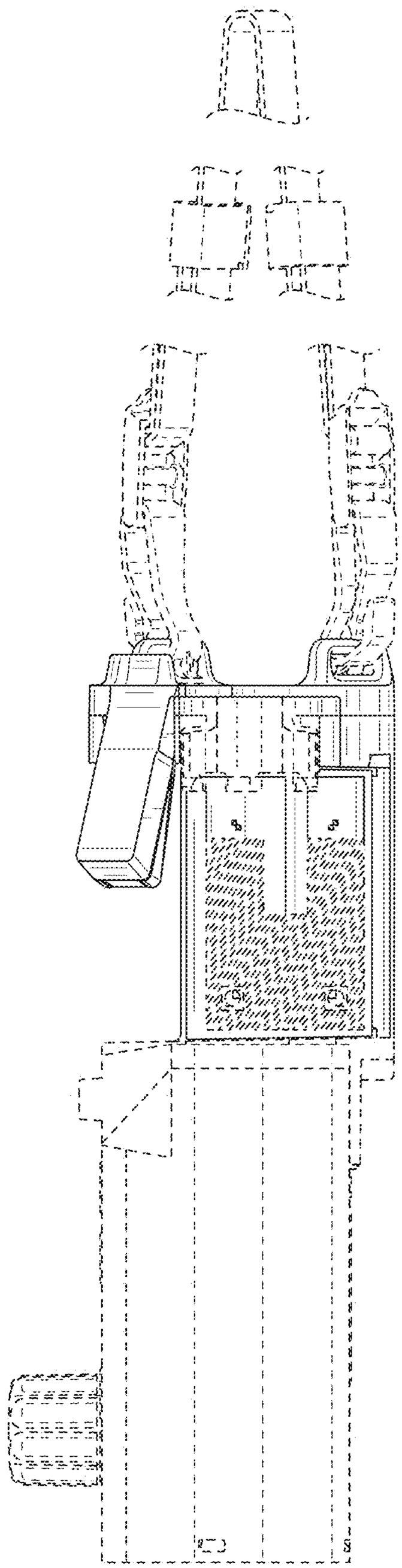


FIG. 3

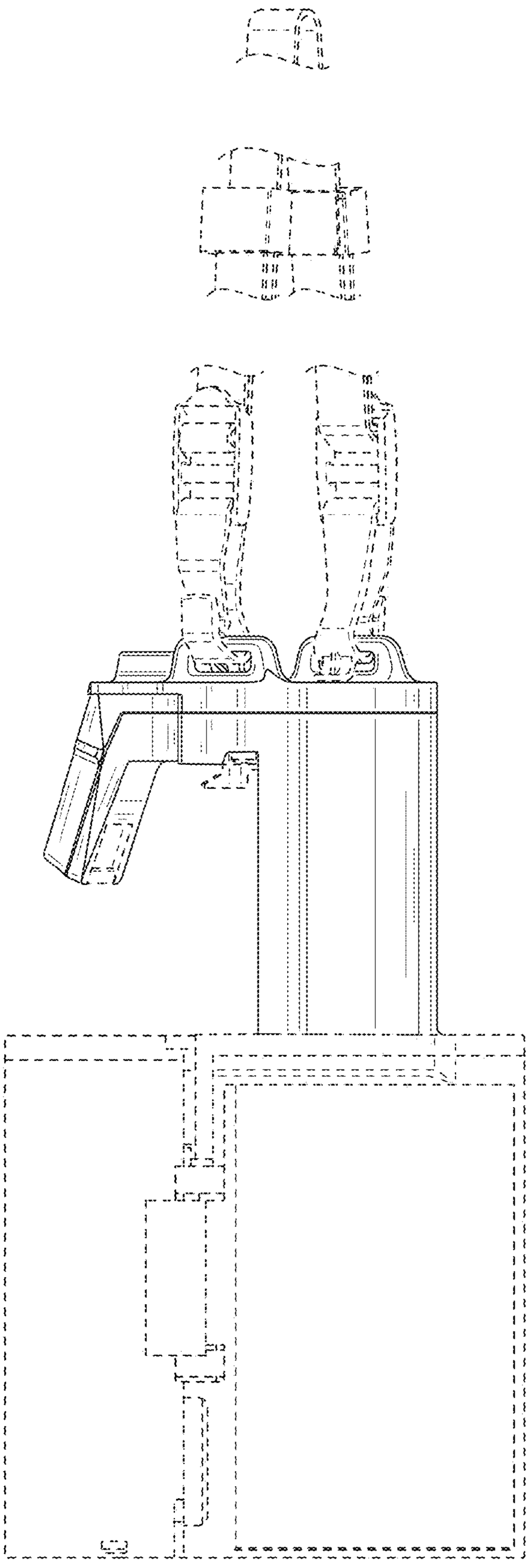


FIG. 4

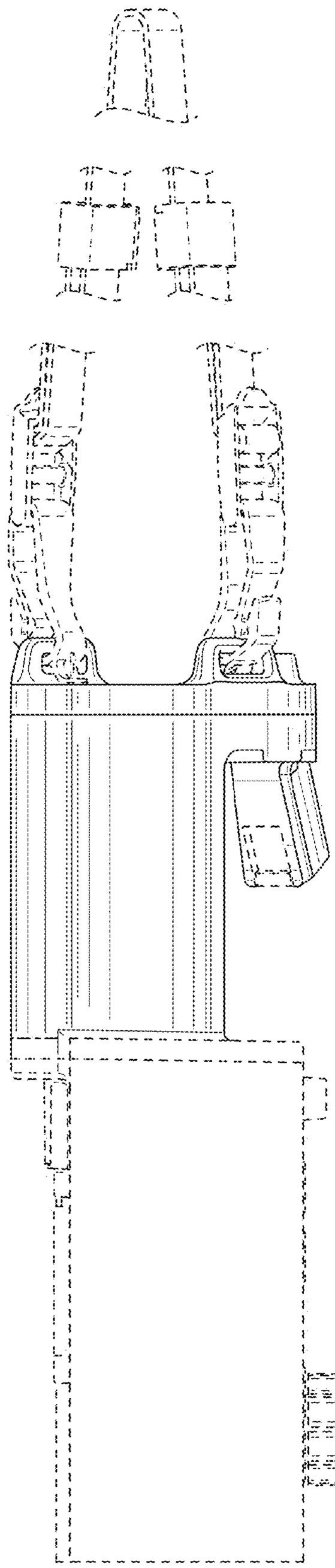


FIG. 5

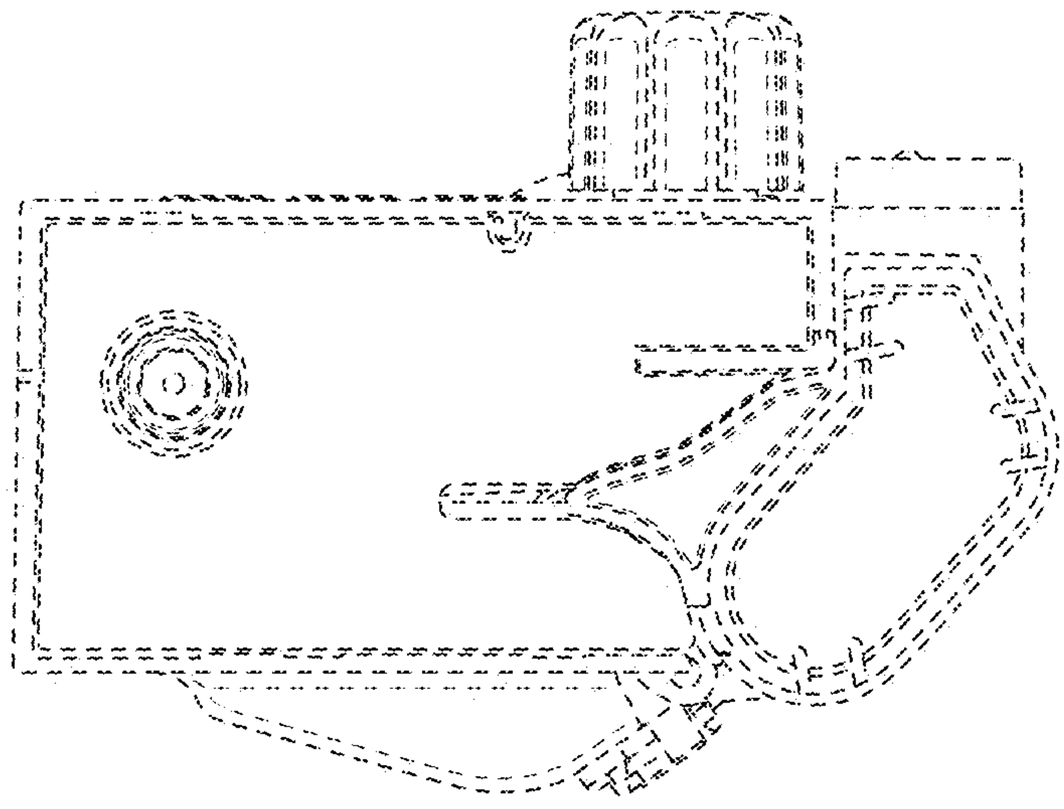


FIG. 6

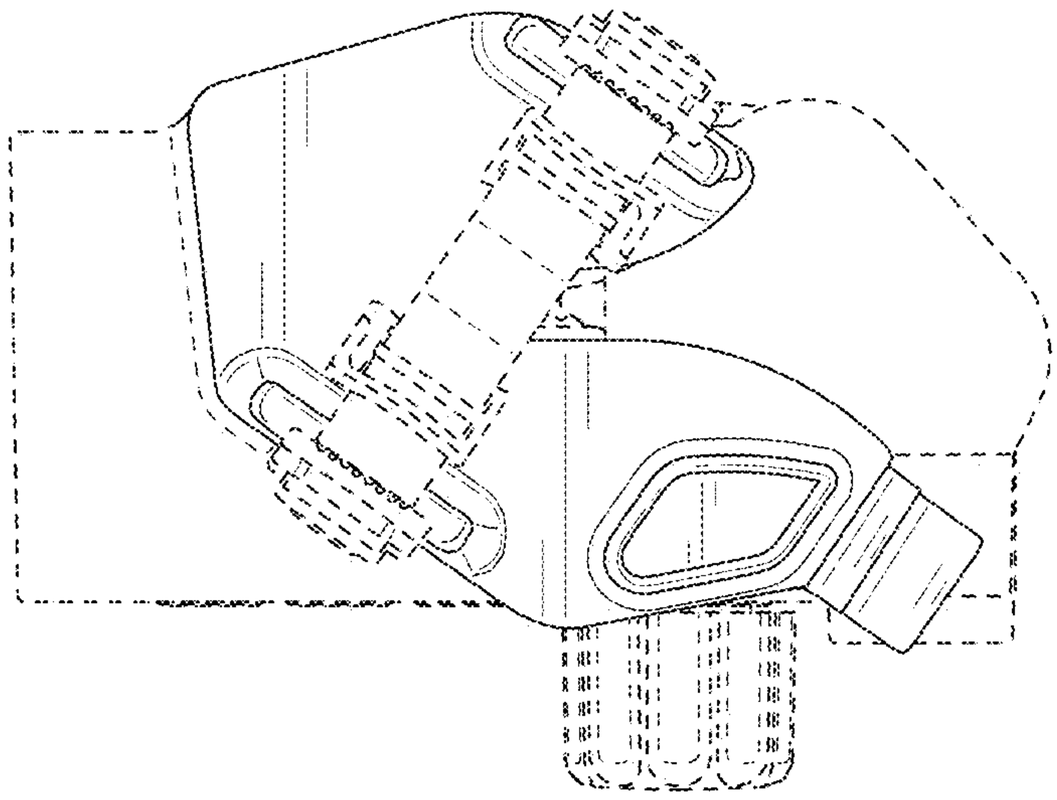


FIG. 7