

US00D854145S

(12) **United States Design Patent**  
**Collins**

(10) **Patent No.:** **US D854,145 S**  
(45) **Date of Patent:** **\*\* Jul. 16, 2019**

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

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  
(Continued)

(71) Applicant: **DEKA Products Limited Partnership**,  
Manchester, NH (US)

(72) Inventor: **David E. Collins**, Merrimac, MA (US)

**FOREIGN PATENT DOCUMENTS**

(73) Assignee: **DEKA Products Limited Partnership**,  
Manchester, NH (US)

AU 2247783 A 6/1985  
CA 1213749 A1 11/1986  
(Continued)

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

**OTHER PUBLICATIONS**

(21) Appl. No.: **29/565,908**

(22) Filed: **May 25, 2016**

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

(51) **LOC (11) Cl.** ..... **24-02**

(Continued)

(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.

*Primary Examiner* — Lilyana Bekic

(74) *Attorney, Agent, or Firm* — James D. Wyninegar, Jr.

(57) **CLAIM**

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

**DESCRIPTION**

(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  
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.

FIG. 1 is a front, top, and right side perspective view of the apparatus to control fluid flow through a tube, showing my new design;

FIG. 2 is a front side elevational view thereof;

FIG. 3 is a back side elevational view thereof;

FIG. 4 is a left side elevational view thereof;

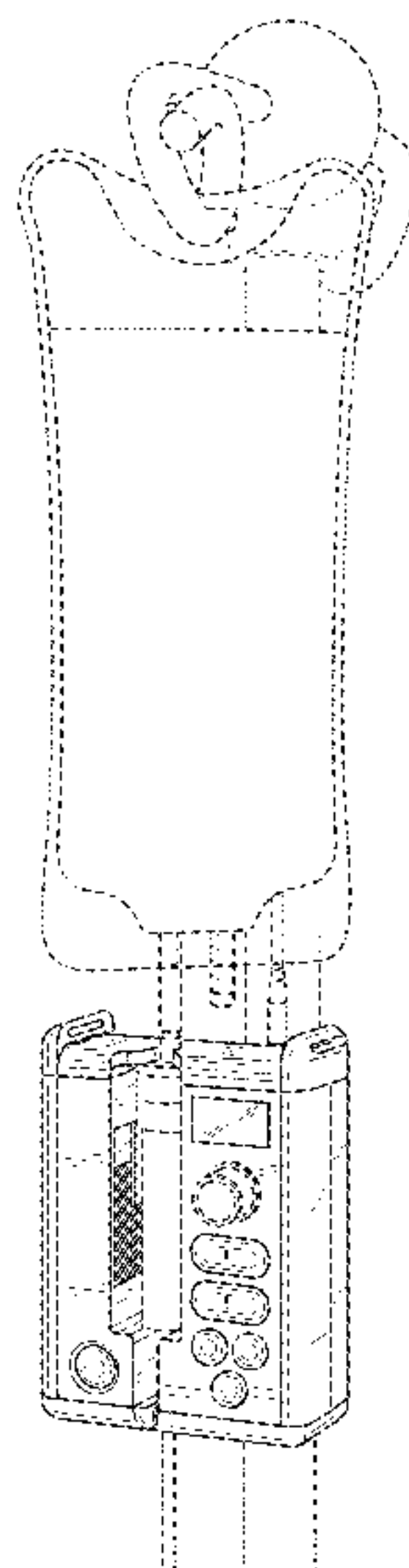
FIG. 5 is a right side elevational view thereof;

FIG. 6 is a top plan view thereof; and,

FIG. 7 is a bottom 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.

**1 Claim, 7 Drawing Sheets**



# US D854,145 S

(56)	<p style="text-align: center;"><b>References Cited</b></p> <p style="text-align: center;">U.S. PATENT DOCUMENTS</p>				
		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	Mernøe ..... 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
		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



(56)

References Cited

U.S. PATENT DOCUMENTS

8,147,447 B2	4/2012	Sundar et al.	2004/0044306 A1	3/2004	Lynch et al.
8,147,448 B2	4/2012	Sundar	2004/0044309 A1	3/2004	Lynch et al.
8,147,464 B2	4/2012	Spohn	2004/0171994 A1	9/2004	Goldberg
8,184,848 B2	5/2012	Wu	2005/0096581 A1	5/2005	Chan
8,256,984 B2	9/2012	Fathallah	2005/0171491 A1	8/2005	Minh Miner et al.
8,257,779 B2	9/2012	Abernathy	2006/0096660 A1	5/2006	Diaz
8,282,894 B2	10/2012	Lee	2006/0140466 A1	6/2006	Seshimo
D676,551 S	2/2013	Desai et al.	2006/0146077 A1	7/2006	Song
D677,784 S	3/2013	Marguerie	2006/0291211 A1	12/2006	Rodriguez
8,394,062 B2	3/2013	Powers	2007/0088269 A1	4/2007	Valego et al.
8,439,880 B2	5/2013	Rondeau	2007/0102623 A1	5/2007	Fengler et al.
8,447,069 B2	5/2013	Huang et al.	2007/0228071 A1	10/2007	Kamen et al.
8,471,231 B2	6/2013	Paz	2007/0293817 A1	12/2007	Feng
8,523,797 B2	9/2013	Lowery et al.	2008/0004574 A1	1/2008	Dyar
8,523,829 B2	9/2013	Miner et al.	2008/0051732 A1	2/2008	Chen
8,523,839 B2	9/2013	Siefert	2008/0147008 A1	6/2008	Lewis
8,529,511 B2	9/2013	Boulanger	2008/0147016 A1	6/2008	Faries
8,531,517 B2	9/2013	Tao	2008/0154214 A1	6/2008	Spohn
8,552,361 B2	10/2013	Mandro	2008/0235765 A1	9/2008	Shimizu
8,622,979 B2	1/2014	Hungerford	2008/0237502 A1	10/2008	Fago
8,638,358 B2	1/2014	Dabiri et al.	2008/0252472 A1	10/2008	Su et al.
8,647,074 B2	2/2014	Moberg et al.	2009/0097029 A1	4/2009	Tokhtuev
8,692,678 B2	4/2014	Warner et al.	2009/0112115 A1	4/2009	Huang
8,733,178 B2 *	5/2014	Bivans ..... A61M 5/14228	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
8,777,897 B2	7/2014	Butterfield	2010/0021933 A1	1/2010	Okano
D712,043 S	8/2014	Sliger	2010/0097451 A1	4/2010	Bruce
8,834,429 B2	9/2014	Grant	2010/0114027 A1	5/2010	Jacobson
D720,449 S	12/2014	Galbraith et al.	2010/0120601 A1	5/2010	Hayamizu
D728,779 S	5/2015	Sabin et al.	2010/0168671 A1	7/2010	Faries, Jr.
D735,319 S	7/2015	Sabin et al.	2010/0204650 A1	8/2010	Hungerford et al.
D736,370 S	8/2015	Sabin et al.	2010/0211003 A1	8/2010	Sundar
9,095,652 B2	8/2015	Dewey	2010/0217229 A1	8/2010	Miner
9,128,051 B2	9/2015	Bui	2010/0229978 A1	9/2010	Zhou
9,134,735 B2	9/2015	Lowery et al.	2010/0292635 A1	11/2010	Sundar
9,134,736 B2	9/2015	Lowery et al.	2010/0309005 A1	12/2010	Warner
9,144,644 B2	9/2015	Hungerford	2011/0004186 A1	1/2011	Butterfield
9,151,646 B2	10/2015	Kamen	2011/0025826 A1	2/2011	Dabiri
D745,661 S	12/2015	Collins et al.	2011/0046899 A1	2/2011	Paz
9,216,279 B2	12/2015	Travis et al.	2011/0060284 A1	3/2011	Harr
9,234,850 B2	1/2016	Hammond et al.	2011/0125103 A1	5/2011	Rondeau
D749,206 S	2/2016	Johnson et al.	2011/0137239 A1 *	6/2011	Debelser ..... A61M 5/14244
D751,689 S	3/2016	Peret et al.			604/67
D751,690 S	3/2016	Peret et al.	2011/0142283 A1	6/2011	Huang
D752,209 S	3/2016	Peret et al.	2011/0144595 A1	6/2011	Cheng
9,295,778 B2	3/2016	Kamen et al.	2011/0166511 A1	7/2011	Sharvit
D754,065 S	4/2016	Gray et al.	2011/0178476 A1	7/2011	Lin
D756,386 S	5/2016	Kendler et al.	2011/0190146 A1	8/2011	Boehm
D756,505 S	5/2016	Park	2011/0190637 A1	8/2011	Knobel
D758,399 S	6/2016	Kendler et al.	2011/0196304 A1	8/2011	Kramer et al.
D760,288 S	6/2016	Kendler et al.	2011/0196306 A1	8/2011	De La Huerga
D760,289 S	6/2016	Kendler et al.	2011/0206247 A1	8/2011	Dachille
9,364,394 B2	6/2016	Demers et al.	2011/0208123 A1	8/2011	Gray
9,372,486 B2	6/2016	Peret et al.	2011/0231204 A1	9/2011	De La Huerga
D760,782 S	7/2016	Kendler et al.	2011/0251557 A1	10/2011	Powers
D760,888 S	7/2016	Gill et al.	2011/0275063 A1	11/2011	Weitz
9,400,873 B2	7/2016	Kamen et al.	2011/0313351 A1	12/2011	Kamen et al.
D767,756 S	9/2016	Sabin	2011/0313789 A1	12/2011	Kamen
9,435,455 B2	9/2016	Peret et al.	2011/0316919 A1	12/2011	Baldy, Jr.
D768,716 S	10/2016	Kendler et al.	2011/0317004 A1	12/2011	Tao
9,465,919 B2	10/2016	Kamen et al.	2012/0013735 A1	1/2012	Tao
9,468,716 B2 *	10/2016	Hariharsan ..... A61M 5/14232	2012/0059318 A1	3/2012	Dewey
9,488,200 B2	11/2016	Kamen et al.	2012/0059350 A1	3/2012	Siefert
D799,025 S *	10/2017	Johnson ..... D24/111	2012/0095415 A1	4/2012	Sharvit
D802,118 S *	11/2017	Peret ..... D24/111	2012/0095433 A1	4/2012	Hungerford
D813,376 S *	3/2018	Peret ..... D24/111	2012/0185267 A1	7/2012	Kamen
D815,730 S *	4/2018	Collins ..... D24/111	2012/0197185 A1	8/2012	Tao
D816,829 S *	5/2018	Peret ..... D24/111	2012/0238997 A1	9/2012	Dewey
2001/0026292 A1	10/2001	Ishizaki	2012/0265166 A1	10/2012	Yodfat
2001/0055462 A1	12/2001	Seibel	2012/0310153 A1	12/2012	Moberg
2002/0194933 A1	12/2002	Roelofs	2012/0310205 A1	12/2012	Lee et al.
2003/0045840 A1	3/2003	Burko	2013/0035659 A1	2/2013	Hungerford
2003/0055406 A1	3/2003	Lebel	2013/0083191 A1	4/2013	Lowery et al.
2003/0107819 A1	6/2003	Lin et al.	2013/0085443 A1	4/2013	Lowery
2003/0217962 A1	11/2003	Childers	2013/0177455 A1	7/2013	Kamen



(56)

References Cited

U.S. PATENT DOCUMENTS

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  
 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 Merno ..... 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 et al.  
 2015/0002668 A1 1/2015 Peret  
 2015/0002677 A1 1/2015 Peret  
 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

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 WO2002040084 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  
 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 WO2015017275 A1 2/2015  
 WO WO2015116557 A1 8/2015



(56)

**References Cited**

## FOREIGN PATENT DOCUMENTS

## OTHER PUBLICATIONS

Invitation to Respond to Written Opinion from the Intellectual Property Office of Singapore for Application 11201507504S (L83SG), dated Nov. 23, 2015.

First Examination Report from the Intellectual Property Office of New Zealand for Application 626382 (J79NZ), dated Apr. 1, 2015. Report of substantive examination from Superintendent of Industry and Commerce of Colombia for Patent Application 14155193 (J79CO), 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, <https://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>.

“IUV Drip monitor”, Allison Lipper, Mar. 18, 2016 (retrieved). 3 pgs., <http://cnx.org/contents/WmaFki2-@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](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 (Q59EP), 7 pgs.

AAMI and FDA, Infusing Patients Safely: Priority Issues from the AAMI/FDA Infusion Device Summit, Symposium, Oct. 5-6, 2010, pp. 1-48, AAMI, Arlington, VA, USA.

Conway, “Analytical Analysis of Tip Travel in a Bourdon Tube”, Master’s Thesis, Naval Postgraduate School Monterey, Dec. 1995, pp. i-89.

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.

“Feature Detection”, OpenCV Wiki, Oct. 31, 2011 (retrieved), 7 pgs, [http://opencv.willowgarage.com/documentation/cpp/imgproc\\_feature\\_detection.html](http://opencv.willowgarage.com/documentation/cpp/imgproc_feature_detection.html).

Galambos et al., “Progressive Probabilistic Hough Transform for Line Detection”, IEEE, 10 pgs, 1999.

International Search Report & Written Opinion dated May 14, 2012, received in International patent application No. PCT/US2011/066588 (197WO), 9 pgs.

International Search Report & Written Opinion dated Jun. 18, 2013, received in International patent application No. PCT/US2012/071142 (J79WO), 14 pgs.

International Search Report & Written Opinion dated Oct. 1, 2013, received in International patent application No. PCT/US2012/071490 (J76WO), 19 pgs.

International Search Report & Written Opinion dated Dec. 4, 2013, received in International patent application No. PCT/US2013/032445 (K14WO), 20 pgs.

International Search Report & Written Opinion dated Nov. 7, 2013, received in International patent application No. PCT/US2013/042350 (K66WO), 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 (K14WO), 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 (K66WO), 7 pgs.

International Preliminary Report on Patentability dated Jul. 3, 2014, received in International patent application No. PCT/US2012/071142 (J79WO), 9 pgs.

International Search Report dated Feb. 5, 2015, received in International patent application No. PCT/US2014/029020 (L83WO), 7 pgs.

International Preliminary Report on Patentability and Written Opinion, dated Sep. 15, 2015, received in International patent application No. PCT/US2014/029020 (L83WO), 11 pgs.

Hofmann, “Modeling Medical Devices for Plug-and-Play Interoperability”, MIT Department of Electrical Engineering and Computer Science, Jun. 2007, pp. 1-187.

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.

FDA US Food and Drug Administration, “SEDASYS ® Computer-Assisted Personalized Sedation System P08000”, Jul. 16, 2013, pp. 1-2, [www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/DeviceApprovalsandClearances/Recently-ApprovedDevices/ucm353950.htm](http://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/DeviceApprovalsandClearances/Recently-ApprovedDevices/ucm353950.htm).

Luerkens, David W. “Theory and Application of Morphological Analysis: Fine Particles and Surfaces”. Boca Raton: CRC, 1991. 5-7.

Matas et al., ‘Progressive Probabilistic Hough Transform’, University of Surrey, Czech Technical University, 1998, pp. 1-10.

“Miscellaneous Image Transformations”, OpenCV Wiki, 2011, 9 pgs., [http://opencv.willowgarage.com/documentation/cpp/miscellaneous\\_image\\_transformations](http://opencv.willowgarage.com/documentation/cpp/miscellaneous_image_transformations).

National Patient Safety Agency, Design for Patient Safety: A Guide to the Design of 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](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.

Butterfield, “Alaris SE Pump, Monitoring and Detection of IV Line Occlusions.”, CareFusion Corporation, 2010, 4 pgs.

“Vista Basic: Instructions for Use: Software IFVB”, manual, 2002, pp. 3, B. Braun Medical Inc.

Hugli et al., “Drop volume measurement by vision.” Proceedings of SPIE Electronic Imaging Conference, San Diego, Jan. 2000. SPIE vol. 3866-11, pp. 60-66.

Notice of Eligibility for Grant from the Intellectual Property Office of Singapore for Application 11201507504S (L83SG), 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 (J79CN), 6 pgs.

First Office Action dated Oct. 20, 2015, received in Republic of China patent application No. 201280069373.3 (J79CN), 4 pgs.

First Office Action dated Jul. 28, 2016, received in Australian patent application No. 2012358397 (J79AU), 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 (J79EA), 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 (J79CO), dated Sep. 8, 2016, 18 pgs.

First Examination Report from IP Australia for Patent Application 2012358397 (J79AU), dated Jul. 28, 2016, 3 pgs.

Notice of Acceptance from IP Australia for Patent Application 2012358397 (J79AU), dated Jan. 5, 2017, 3 pgs.

(56)

**References Cited**

OTHER PUBLICATIONS

English Search Report from The People's Republic of China for Patent Application 201280069373.3 (J79CN), dated Jul. 12, 2016, 2 pgs.

First Examination Report from Mexican Patent Office for Patent Application MX/A/2014/007751 (J79MX), dated Sep. 8, 2016, 5 pgs.

Further Examination Report from the New Zealand Intellectual Property Office for Patent Application 626382 (J79NZ), dated Jan. 12, 2016, 2 pgs.

Notice of Acceptance from the New Zealand Intellectual Property Office for Patent Application 626382 (J79NZ), dated Feb. 9, 2016, 1 pg.

Rule 161 Communication from the European Patent Office for Patent Application 14720397.0-1662 (L83EP), dated Oct. 28, 2015, 2 pgs.

Decision to Grant from the European Patent Office for Patent Application 15192051.9-1664/3006010, dated January 19, 2017, 3 pgs.

Further Examination Report from the New Zealand Intellectual Property Office for Patent Application 715098 (R23NZ), dated Jun. 13, 2016, 2 pgs.

Notice of Acceptance from the New Zealand Intellectual Property Office for Patent Application 715098 (R23NZ), dated Sep. 9, 2016, 3 pgs.

Notice of Acceptance from the New Zealand Intellectual Property Office for Patent Application 723930 (R72NZ), dated Nov. 16, 2016, 3 pgs.

Examination Report from the European Patent Office for EPO Application No. 16 167 576.4-1662 (R92EP), dated Oct. 11, 2016, 6 pgs.

Search Report from the European Patent Office for EPO Application No. 16 167 576.4-1662 (R92EP), dated Sep. 19, 2016, 4 pgs.

Notice of Acceptance from IP Australia for Patent Application 2016225879 (U04AU), dated Oct. 26, 2016, 3 pgs.

First Examination Report from the New Zealand Intellectual Property Office for Patent Application 725469 (U15NZ), dated Nov. 8, 2016, 2 pgs.

\* cited by examiner



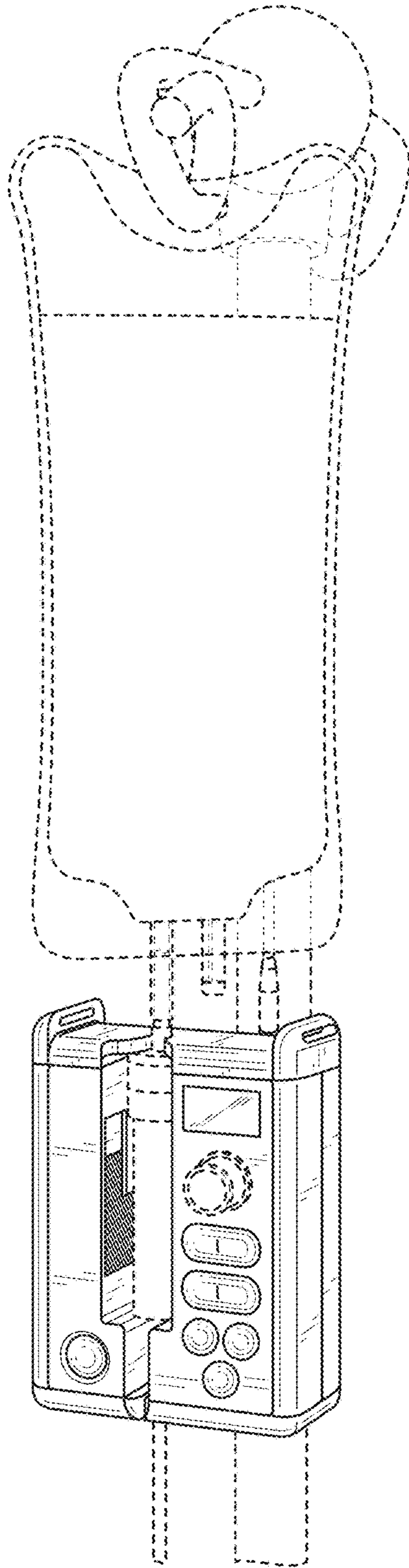


FIG. 1

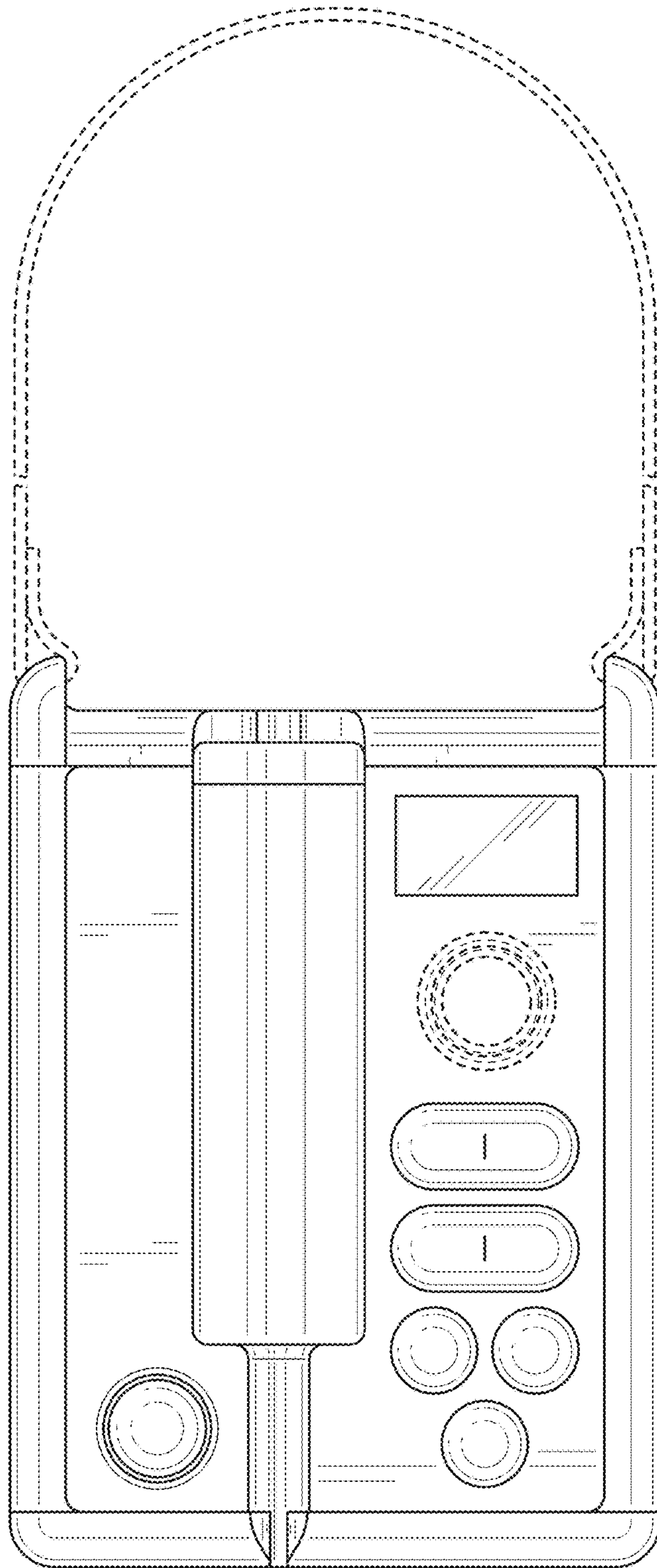


FIG. 2



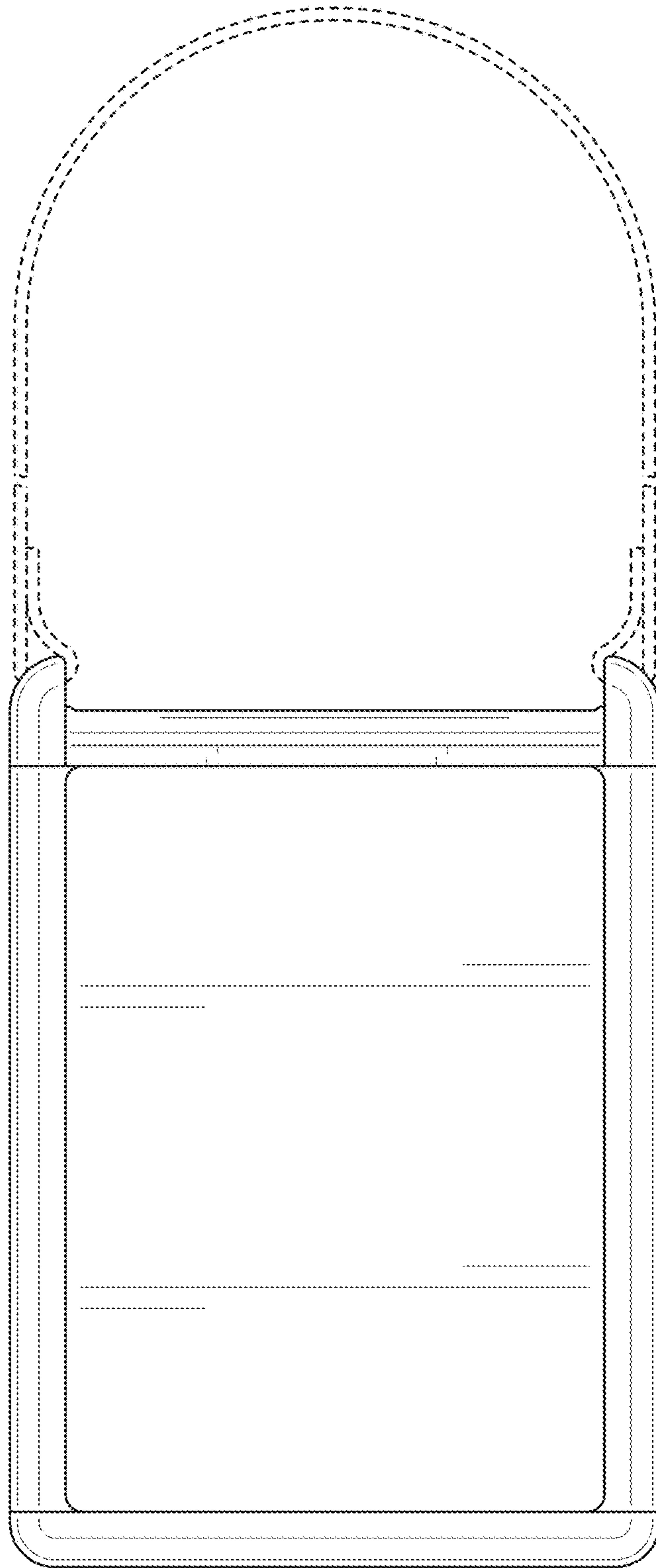


FIG. 3

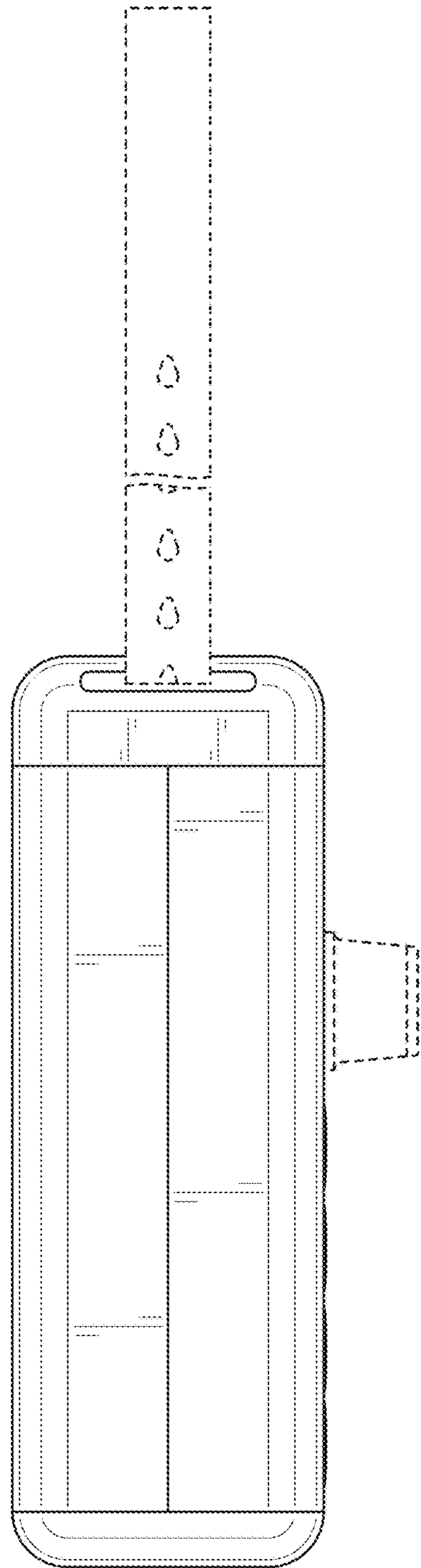


FIG. 4



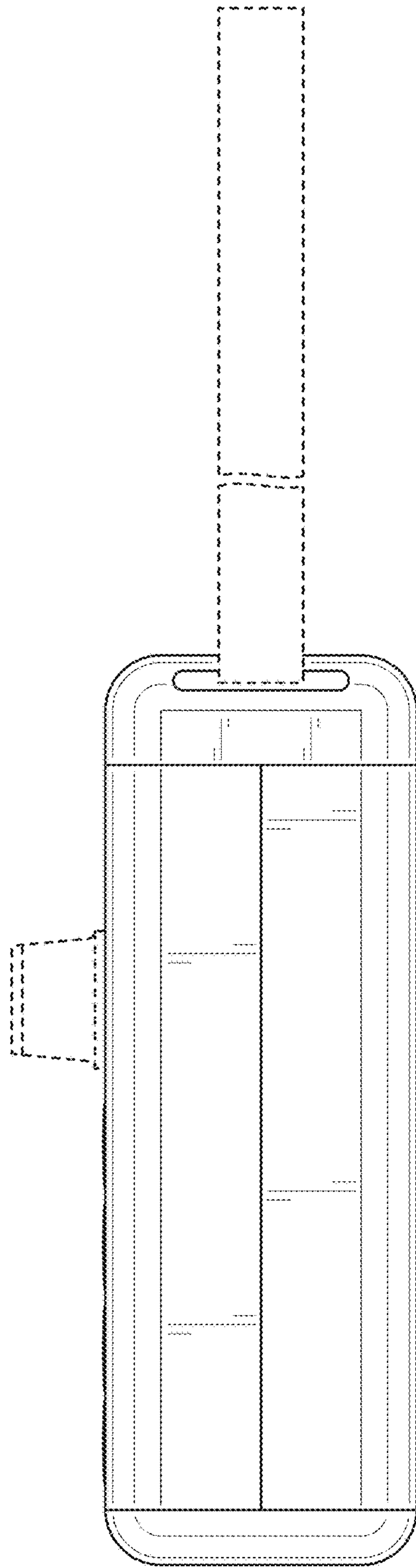


FIG. 5

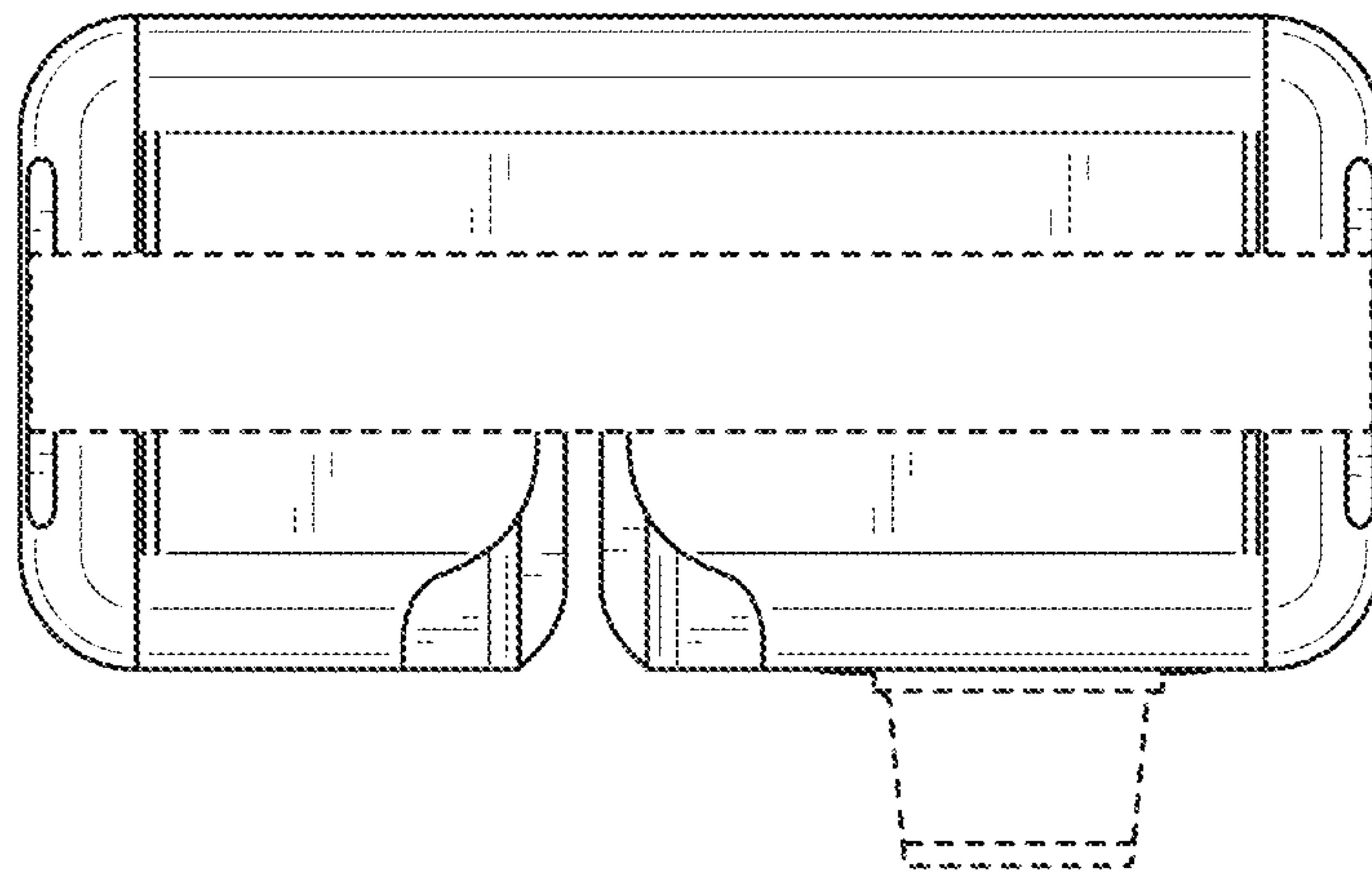


FIG. 6



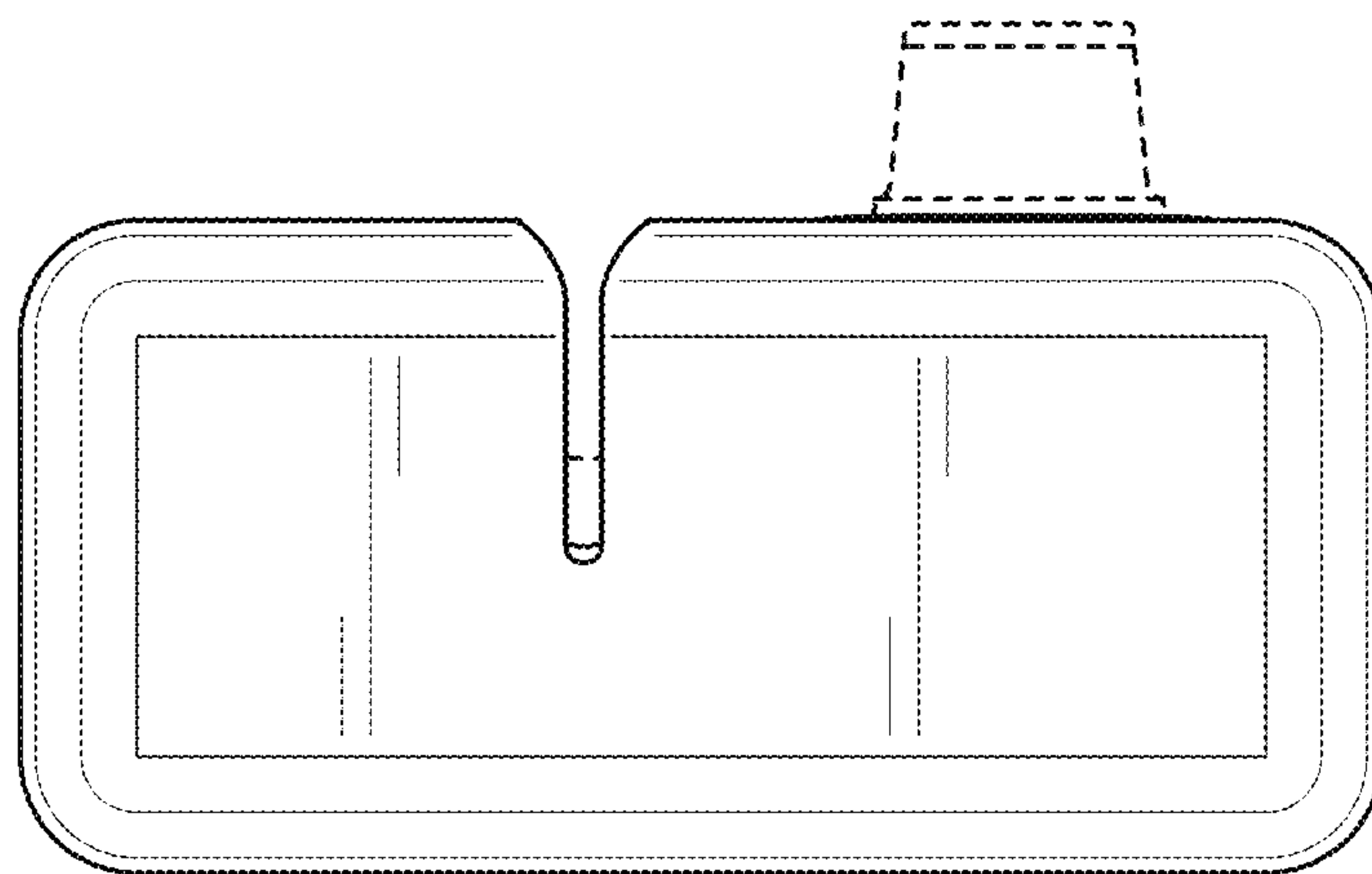


FIG. 7