



US00D749206S

(12) **United States Design Patent**
Johnson et al.

(10) **Patent No.:** **US D749,206 S**
(45) **Date of Patent:** **** Feb. 9, 2016**

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

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

(72) Inventors: **Matthew J. Johnson**, Dunbarton, NH
(US); **Christopher C. Langenfeld**,
Nashua, NH (US); **Michael J. Slate**,
Merrimack, NH (US); **Michael S. Place**,
Manchester, NH (US); **David E. Collins**,
Groveland, MA (US)

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

(**) Term: **14 Years**

(21) Appl. No.: **29/471,861**

(22) Filed: **Nov. 6, 2013**

(51) **LOC (10) Cl.** **24-02**

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

(58) **Field of Classification Search**
USPC D24/111, 107, 112, 169; 604/7-9, 19,
604/67, 123-125, 143, 151-152, 154-156,
604/218, 246, 256, 253, 250-251, 108,
604/169; 417/234; 206/363-368; D9/526,
D9/529, 668
CPC A61M 5/14232; A61M 5/16831;
A61M 5/172; A61M 5/14228; A61M
2205/3365; A61M 2205/3313; A61M 5/145;
A61M 5/1689; A61M 5/1413; A61M 5/1415;
A61M 2205/3569; G01D 5/2451; G01D
5/3473; Y10S 128/13

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,888,877 A 6/1959 Shellman et al.
3,173,372 A 3/1965 Baldwin
3,384,336 A 5/1968 Pulman
3,609,379 A 9/1971 Hildebrandt

(Continued)

FOREIGN PATENT DOCUMENTS

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

(Continued)

OTHER PUBLICATIONS

"Principles of Flow Cytometry: An Overview." Methods in Cell Biology: Cytometry. Ed. Zbigniew Darzynkiewicz. 3rd ed. vol. 63. Academic, 2000. 44-48.

(Continued)

Primary Examiner — Wan Laymon

Assistant Examiner — Mark Booker

(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

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 back, top, and left side perspective view thereof;

FIG. 3 is a front elevational view thereof;

FIG. 4 is a back elevational view thereof;

FIG. 5 is a left side elevational view thereof;

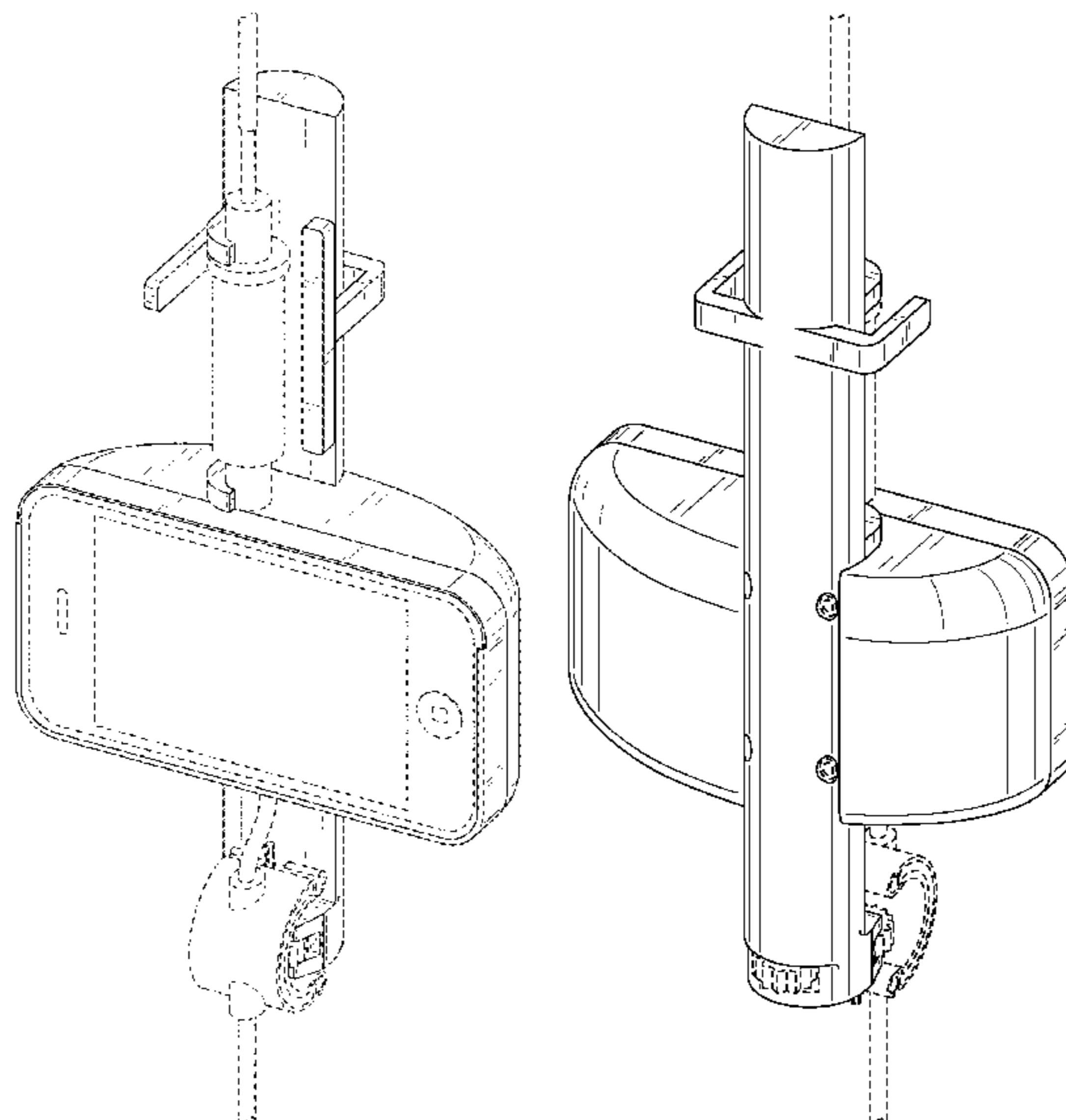
FIG. 6 is a right side elevational view thereof;

FIG. 7 is a top plan view thereof; and,

FIG. 8 is a bottom plan view thereof.

The ornamental design which is claimed is shown in solid lines in the drawings. The broken lines shown in the figures represent portions of the apparatus to control fluid flow through a tube that form no part of the claimed design.

1 Claim, 6 Drawing Sheets



(56)	References Cited				
	U.S. PATENT DOCUMENTS				
3,685,787 A	8/1972 Adelberg	6,503,221 B1 *	1/2003 Briggs	.....	F04B 43/08 604/151
3,733,149 A	5/1973 Jacobson	6,523,414 B1	2/2003 Malmstrom et al.		
3,790,042 A	2/1974 McCormick et al.	6,562,012 B1	5/2003 Brown et al.		
3,831,600 A	8/1974 Yum et al.	6,599,282 B2	7/2003 Burko		
4,038,982 A	8/1977 Burke et al.	6,641,556 B1	11/2003 Shigezawa		
4,105,028 A	8/1978 Sadlier et al.	6,657,545 B1	12/2003 Lin et al.		
4,155,362 A	5/1979 Jess	6,736,801 B1	5/2004 Gallagher		
4,303,376 A	12/1981 Siekmann	6,984,052 B1	1/2006 Del Castillo		
4,321,461 A	3/1982 Walter, Jr. et al.	7,001,365 B2	2/2006 Makkink		
4,328,800 A	5/1982 Marx et al.	7,190,275 B2	3/2007 Goldberg et al.		
4,328,801 A	5/1982 Marx et al.	7,338,475 B2	3/2008 Brown		
4,397,642 A	8/1983 Lamadrid	7,498,563 B2	3/2009 Mandro et al.		
4,421,506 A	12/1983 Danby et al.	7,499,581 B2	3/2009 Tribble et al.		
4,449,534 A	5/1984 Saul	7,540,859 B2	6/2009 Claude et al.		
4,469,480 A	9/1984 Figler et al.	7,695,448 B2	4/2010 Cassidy et al.		
4,504,263 A	3/1985 Steuer et al.	7,767,991 B2	8/2010 Sacchetti		
4,525,163 A	6/1985 Slavik et al.	7,892,204 B2	2/2011 Kraus		
4,583,975 A	4/1986 Pekkarinen et al.	7,905,859 B2 *	3/2011 Bynum	.....	A61M 5/14244 604/131
RE32,294 E	11/1986 Knute	7,918,834 B2	4/2011 Mernoe et al.		
4,634,426 A	1/1987 Kamen	7,933,780 B2	4/2011 De La Huerga		
4,648,869 A	3/1987 Bobo, Jr.	8,025,634 B1	9/2011 Moubayed et al.		
4,662,829 A	5/1987 Nehring	8,038,657 B2	10/2011 Davis et al.		
4,668,216 A	5/1987 Martin et al.	8,147,448 B2	4/2012 Sundar et al.		
4,673,820 A	6/1987 Kamen	8,147,464 B2	4/2012 Spohn et al.		
4,680,977 A	7/1987 Conero et al.	8,256,984 B2 *	9/2012 Fathallah	.....	A61M 5/1413 403/380
4,703,314 A	10/1987 Spani	8,529,511 B2 *	9/2013 Boulanger	.....	A61M 5/14232 604/151
4,718,896 A	1/1988 Arndt et al.	8,552,361 B2 *	10/2013 Mandro	.....	A61M 5/145 250/231.13
4,720,636 A	1/1988 Benner, Jr.	8,622,979 B2	1/2014 Hungerford et al.		
4,820,281 A	4/1989 Lawler, Jr.	8,834,429 B2 *	9/2014 Grant	.....	A61M 5/1456 604/131
4,834,744 A	5/1989 Ritson	2002/0194933 A1	12/2002 Roelofs		
4,837,708 A	6/1989 Wright	2003/0045840 A1	3/2003 Burko		
4,846,792 A	7/1989 Bobo, Jr. et al.	2003/0055406 A1 *	3/2003 Lebel	.....	A61N 1/37211 604/891.1
4,909,786 A	3/1990 Gijssels et al.	2003/0217962 A1	11/2003 Childers et al.		
4,920,336 A	4/1990 Meijer	2004/0171994 A1	9/2004 Goldberg et al.		
4,936,828 A	6/1990 Chiang	2005/0171491 A1	8/2005 Miner et al.		
4,959,050 A	9/1990 Bobo, Jr.	2006/0140466 A1	6/2006 Seshimo et al.		
4,979,940 A	12/1990 Bobo, Jr. et al.	2006/0291211 A1	12/2006 Rodriguez et al.		
4,981,467 A	1/1991 Bobo, Jr. et al.	2008/0004574 A1	1/2008 Dyar et al.		
5,002,539 A	3/1991 Coble et al.	2008/0051732 A1	2/2008 Chen		
5,045,069 A	9/1991 Imparato	2008/0147008 A1	6/2008 Lewis et al.		
5,057,090 A	10/1991 Bessman	2008/0147016 A1	6/2008 Faries et al.		
5,154,704 A	10/1992 Archibald	2008/0154214 A1 *	6/2008 Spohn	.....	A61M 5/007 604/247
5,181,910 A *	1/1993 Scanlon	2008/0235765 A1	9/2008 Shimizu		
		2009/0112115 A1	4/2009 Huang et al.		
		2009/0224638 A1	9/2009 Weber		
5,186,057 A	2/1993 Everhart	2009/0254025 A1 *	10/2009 Simmons	.....	A61M 5/1456 604/67
RE34,413 E	10/1993 McCullough	2009/0276167 A1	11/2009 Glaser et al.		
5,267,980 A	12/1993 Dirr, Jr. et al.	2009/0281460 A1	11/2009 Lowery et al.		
5,314,316 A	5/1994 Shibamoto et al.	2010/0097451 A1	4/2010 Bruce et al.		
5,328,341 A	7/1994 Forni	2010/0114027 A1	5/2010 Jacobson et al.		
5,331,309 A	7/1994 Sakai	2010/0168671 A1	7/2010 Faries, Jr. et al.		
5,415,641 A	5/1995 Yerlikaya et al.	2010/0211003 A1	8/2010 Sundar et al.		
5,482,446 A	1/1996 Williamson et al.	2010/0292635 A1	11/2010 Sundar		
5,562,615 A	10/1996 Nassif	2010/0309005 A1	12/2010 Warner et al.		
5,588,963 A	12/1996 Roelofs	2011/0004186 A1	1/2011 Butterfield		
5,718,562 A *	2/1998 Lawless	2011/0125103 A1	5/2011 Rondeau		
		2011/0166511 A1	7/2011 Sharvit et al.		
		2011/0196306 A1	8/2011 De La Huerga		
		2011/0208123 A1 *	8/2011 Gray	.....	A61M 5/14244 604/151
5,753,820 A	5/1998 Reed et al.	2011/0231204 A1	9/2011 De La Huerga		
5,782,805 A *	7/1998 Meinzer	2011/0251557 A1 *	10/2011 Powers	.....	A61M 5/168 604/151
		2011/0313789 A1	12/2011 Kamen et al.		
5,800,140 A	9/1998 Forni	2012/0013735 A1	1/2012 Tao		
5,899,665 A	5/1999 Makino et al.	2012/0059318 A1	3/2012 Dewey		
6,049,381 A	4/2000 Reintjes et al.	2012/0059350 A1	3/2012 Siefert		
6,050,713 A	4/2000 O'Donnell et al.	2012/0095415 A1	4/2012 Sharvit et al.		
6,083,206 A	7/2000 Molko	2012/0095433 A1	4/2012 Hungerford et al.		
6,110,153 A	8/2000 Davis et al.	2012/0185267 A1	7/2012 Kamen et al.		
6,149,631 A	11/2000 Haydel, Jr.				
6,159,186 A	12/2000 Wickham et al.				
6,213,354 B1	4/2001 Kay				
6,228,047 B1	5/2001 Dadson				
D446,860 S *	8/2001 Meziere				D24/169
6,305,908 B1 *	10/2001 Hermann				A61M 5/14244 417/234
6,328,712 B1	12/2001 Cartledge				
6,362,887 B1	3/2002 Meisberger				
6,500,151 B1	12/2002 Cobb et al.				

(56)

References Cited

U.S. PATENT DOCUMENTS

2012/0197185 A1 8/2012 Tao
 2012/0238997 A1 9/2012 Dewey
 2012/0265166 A1* 10/2012 Yodfat A61M 5/1413
 604/506
 2012/0310153 A1* 12/2012 Moberg A61M 5/14566
 604/67
 2013/0035659 A1 2/2013 Hungerford et al.
 2013/0177455 A1 7/2013 Kamen et al.
 2013/0182381 A1 7/2013 Gray et al.
 2013/0184676 A1 7/2013 Kamen et al.
 2013/0188040 A1 7/2013 Kamen et al.
 2013/0191513 A1 7/2013 Kamen et al.
 2013/0197693 A1 8/2013 Kamen et al.
 2013/0201482 A1 8/2013 Munro
 2013/0204188 A1 8/2013 Kamen et al.
 2013/0253442 A1* 9/2013 Travis A61M 39/28
 604/250
 2013/0272773 A1 10/2013 Kamen et al.
 2013/0281965 A1 10/2013 Kamen et al.
 2013/0297330 A1 11/2013 Kamen et al.
 2013/0310990 A1 11/2013 Peret et al.
 2013/0317753 A1 11/2013 Kamen et al.
 2013/0317837 A1 11/2013 Ballantyne et al.
 2013/0336814 A1 12/2013 Kamen et al.
 2013/0339049 A1 12/2013 Blumberg, Jr. et al.
 2013/0346108 A1 12/2013 Kamen et al.
 2014/0081233 A1 3/2014 Hungerford et al.
 2014/0135695 A1* 5/2014 Grant A61M 5/14244
 604/111
 2014/0148757 A1* 5/2014 Ambrosina A61M 5/38
 604/67
 2014/0165703 A1 6/2014 Wilt et al.
 2014/0180711 A1 6/2014 Kamen et al.
 2014/0188076 A1 7/2014 Kamen et al.
 2014/0188516 A1 7/2014 Kamen et al.
 2014/0194818 A1* 7/2014 Yodfat A61M 5/1413
 604/151
 2014/0195639 A1 7/2014 Kamen et al.
 2014/0227021 A1 8/2014 Kamen et al.
 2014/0309612 A1* 10/2014 Smisson, III A61M 1/0281
 604/500
 2014/0318639 A1 10/2014 Peret et al.
 2015/0002667 A1 1/2015 Peret et al.
 2015/0002668 A1 1/2015 Peret et al.
 2015/0002677 A1 1/2015 Peret et al.

FOREIGN PATENT DOCUMENTS

DE 2023027 11/1970
 DE 3617723 A1 12/1987
 DE 3822057 C2 1/1989
 DE 69229832 T2 2/2000
 EP 0112699 A2 7/1984
 EP 1722310 A1 4/2005
 EP 2319551 A2 10/2008
 FR 2042606 A1 2/1971
 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 B 3/1999
 JP 558163843 9/1983
 JP 3110458 B2 11/2000
 JP 2011 062371 A 3/2011
 NL 7006908 11/1970
 NL 8801680 2/1989
 NL 9101825 A 5/1993
 SE 376843 6/1975
 WO WO 81/02770 A1 10/1981
 WO WO 93/09407 A1 5/1993
 WO WO 00/72181 A2 11/2000
 WO WO 2004/035116 A1 4/2002
 WO WO 02/40084 A2 5/2002

WO WO 02/100262 A1 12/2002
 WO WO 2005/094919 A1 10/2005
 WO WO 2006/086723 A2 8/2006
 WO WO 2008/022880 A1 2/2008
 WO WO 2008/079023 A1 7/2008
 WO WO 2009/039203 A2 3/2009
 WO WO 2009/039214 A2 3/2009
 WO WO 2009/055639 A2 4/2009
 WO WO 2010/129720 A2 11/2010
 WO WO 2011/021098 A1 2/2011
 WO WO 2011/136667 A1 11/2011
 WO PCT/US11/66588 12/2011
 WO PCT/US12/7131 12/2012
 WO PCT/US12/71112 12/2012
 WO PCT/US12/71142 12/2012
 WO PCT/US12/71490 12/2012
 WO PCT/US13/32445 3/2013
 WO PCT/US13/42350 5/2013
 WO WO 2013/095459 A9 6/2013
 WO WO 2013/096713 A2 6/2013
 WO WO 2013/096718 A2 6/2013
 WO WO 2013/096722 A2 6/2013
 WO WO 2013/096909 A2 6/2013
 WO WO 2013/176770 A2 11/2013
 WO WO 2013/177357 A1 11/2013
 WO PCT/US13/76851 12/2013
 WO PCT/US13/76886 12/2013
 WO PCT/US13/77077 12/2013
 WO PCT/US13/77135 12/2013
 WO PCT/US13/77258 12/2013
 WO PCT/US13/77270 12/2013
 WO PCT/US14/29020 3/2014
 WO WO 2014/100557 A2 6/2014
 WO WO 2014/100571 A2 6/2014
 WO WO 2014/100658 A1 6/2014
 WO WO 2014/100687 A2 6/2014
 WO WO 2014/100736 A2 6/2014
 WO WO 2014/100744 A2 6/2014
 WO WO 2014/144557 A2 9/2014

OTHER PUBLICATIONS

“Feature Detection”, *OpenCV Wiki*, 2010, 7 pgs, http://opencv.willowgarage.com/documentation/cpp/imgproc_feature_detection.html.
 “Miscellaneous Image Transformations”, *OpenCV Wiki*, 2011, 9 pgs., http://opencv.willowgarage.com/documentation/cpp/miscellaneous_image_transformations.
 “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.
 “Vista Basic: Instructions for Use: Software IFVB”, manual, 2002, pp. 3, B. Braun Medical Inc.
 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.
 Butterfield, “Alaris SE Pump, Monitoring and Detection of IV Line Occlusions”, CareFusion Corporation, 2010, 4 pgs.
 Conway, “Analytical Analysis of Tip Travel in a Bourdon Tube”, Master’s Thesis, Naval Postgraduate School Monterey, Dec. 1995, pp. i-89.
 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.
 Galambos et al., “Progressive Probabilistic Hough Transform for Line Detection”, *IEEE*, 7 pgs, 1999.
 Hofmann, “Modeling Medical Devices for Plug-and-Play Interoperability”, MIT Department of Electrical Engineering and Computer Science, Jun. 2007, pp. 1-187.
International Search Report & Written Opinion dated Nov. 7, 2013, received in International patent application No. PCT/US2013/042350, 18 pgs.

(56)

References Cited

OTHER PUBLICATIONS

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

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

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.

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.

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.

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).

Leor et al., "A System for the Measurement of Drop Volume of Intravenous Solutions", Proceedings Computers in Cardiology 1990, pp. 405-406, Los Alamitos, California.

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" IEEE Computer Society Conference on Computer Vision and Pattern Recognition, Fort Collins, CO (1999) 10 pgs.

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.

U.S. Appl. No. 61/297,544, filed Jan. 22, 2010.

U.S. Appl. No. 13/011,543, filed Jan. 21, 2011.

U.S. Appl. No. 13/333,574, filed Dec. 21, 2011.

U.S. Appl. No. 61/578,649, filed Dec. 21, 2011.

U.S. Appl. No. 61/578,658, filed Dec. 21, 2011.

U.S. Appl. No. 61/578,674, filed Dec. 21, 2011.

U.S. Appl. No. 61/679,117, filed Aug. 3, 2012.

U.S. Appl. No. 61/651,322, filed May 24, 2012.

U.S. Appl. No. 61/738,447, filed Dec. 18, 2012.

U.S. Appl. No. 61/860,398, filed Jul. 31, 2013.
 U.S. Appl. No. 13/723,238, filed Dec. 21, 2012.
 U.S. Appl. No. 13/723,235, filed Dec. 21, 2012.
 U.S. Appl. No. 13/724,568, filed Dec. 21, 2012.
 U.S. Appl. No. 13/725,790, filed Dec. 21, 2012.
 U.S. Appl. No. 13/723,239, filed Dec. 21, 2012.
 U.S. Appl. No. 13/723,242, filed Dec. 21, 2012.
 U.S. Appl. No. 13/723,244, filed Dec. 21, 2012.
 U.S. Appl. No. 61/740,474, filed Dec. 21, 2012.
 U.S. Appl. No. 13/723,251, filed Dec. 21, 2012.
 U.S. Appl. No. 13/723,253, filed Dec. 21, 2012.
 U.S. Appl. No. 13/840,339, filed Mar. 15, 2013.
 U.S. Appl. No. 13/833,432, filed Mar. 15, 2013.
 U.S. Appl. No. 13/836,497, filed Mar. 15, 2013.
 U.S. Appl. No. 13/833,712, filed Mar. 15, 2013.
 U.S. Appl. No. 29/457,516, filed Jun. 11, 2013.
 U.S. Appl. No. 29/457,520, filed Jun. 11, 2013.
 U.S. Appl. No. 29/457,521, filed Jun. 11, 2013.
 U.S. Appl. No. 29/457,522, filed Jun. 11, 2013.
 U.S. Appl. No. 13/834,030, filed Mar. 15, 2013.
 U.S. Appl. No. 14/137,421, filed Dec. 20, 2013.
 U.S. Appl. No. 61/987,742, filed May 2, 2014.
 U.S. Appl. No. 61/900,431, filed Nov. 6, 2013.
 U.S. Appl. No. 13/900,655, filed May 23, 2012.
 U.S. Appl. No. 61/843,574, filed Jul. 8, 2013.
 U.S. Appl. No. 13/971,258, filed Aug. 20, 2013.
 U.S. Appl. No. 61/894,801, filed Oct. 23, 2013.
 U.S. Appl. No. 14/101,848, filed Dec. 10, 2013.
 U.S. Appl. No. 29/471,856, filed Nov. 6, 2013.
 U.S. Appl. No. 29/471,858, filed Nov. 6, 2013.
 U.S. Appl. No. 29/471,859, filed Nov. 6, 2013.
 U.S. Appl. No. 29/471,864, filed Nov. 6, 2013.
 U.S. Appl. No. 61/904,123, filed Nov. 14, 2013.
 U.S. Appl. No. 29/477,249, filed Dec. 20, 2013.
 U.S. Appl. No. 14/135,809, filed Dec. 20, 2013.
 U.S. Appl. No. 14/135,784, filed Dec. 20, 2013.
 U.S. Appl. No. 14/137,562, filed Dec. 20, 2013.
 U.S. Appl. No. 14/136,243, filed Dec. 20, 2013.
 U.S. Appl. No. 29/477,231, filed Dec. 20, 2013.
 U.S. Appl. No. 29/477,232, filed Dec. 20, 2013.
 U.S. Appl. No. 29/477,233, filed Dec. 20, 2013.
 U.S. Appl. No. 29/477,236, filed Dec. 20, 2013.
 U.S. Appl. No. 29/477,237, filed Dec. 20, 2013.
 U.S. Appl. No. 29/477,242, filed Dec. 20, 2013.
 U.S. Appl. No. 61/942,986, filed Feb. 21, 2014.
 U.S. Appl. No. 14/213,373, filed Mar. 14, 2014.
 U.S. Appl. No. 61/990,330, filed May 8, 2014.

* cited by examiner

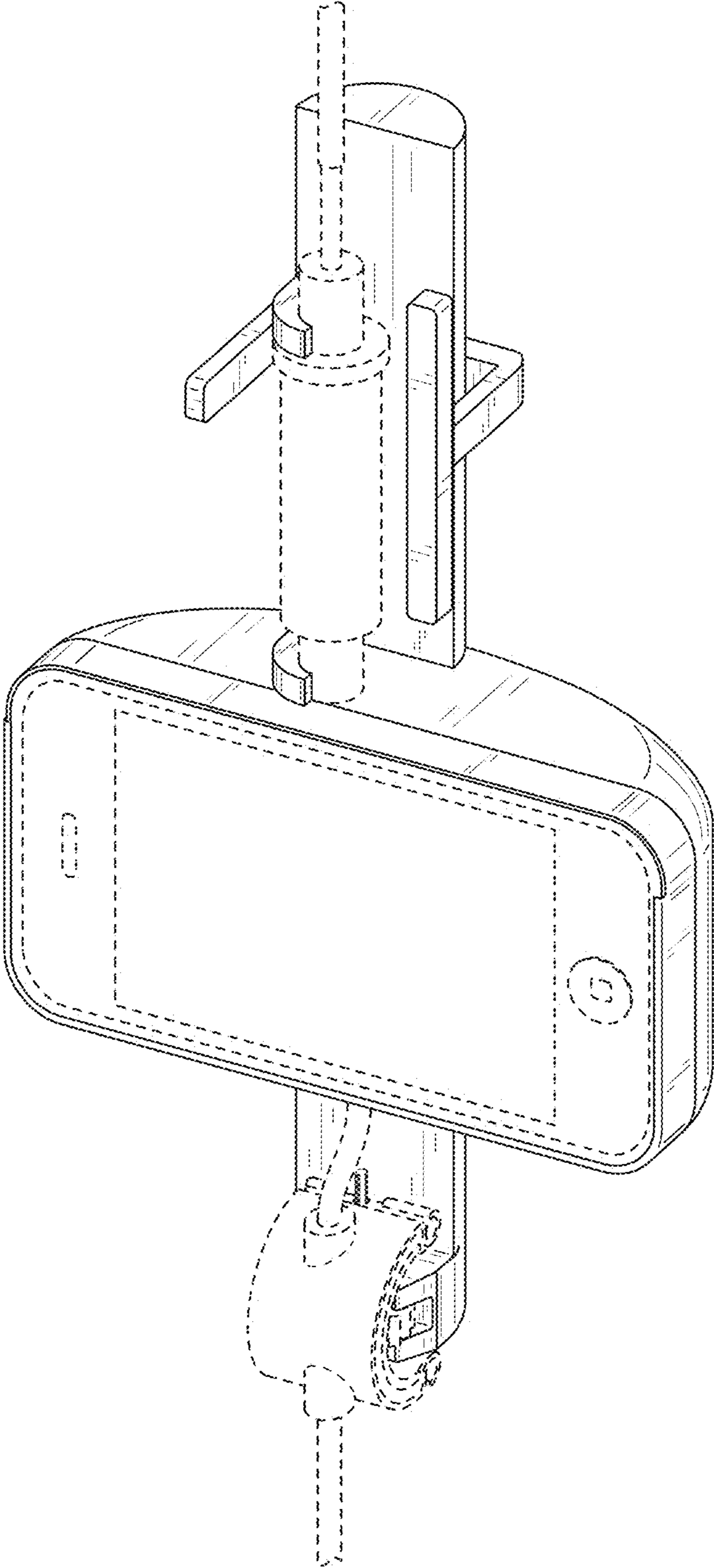


FIG. 1

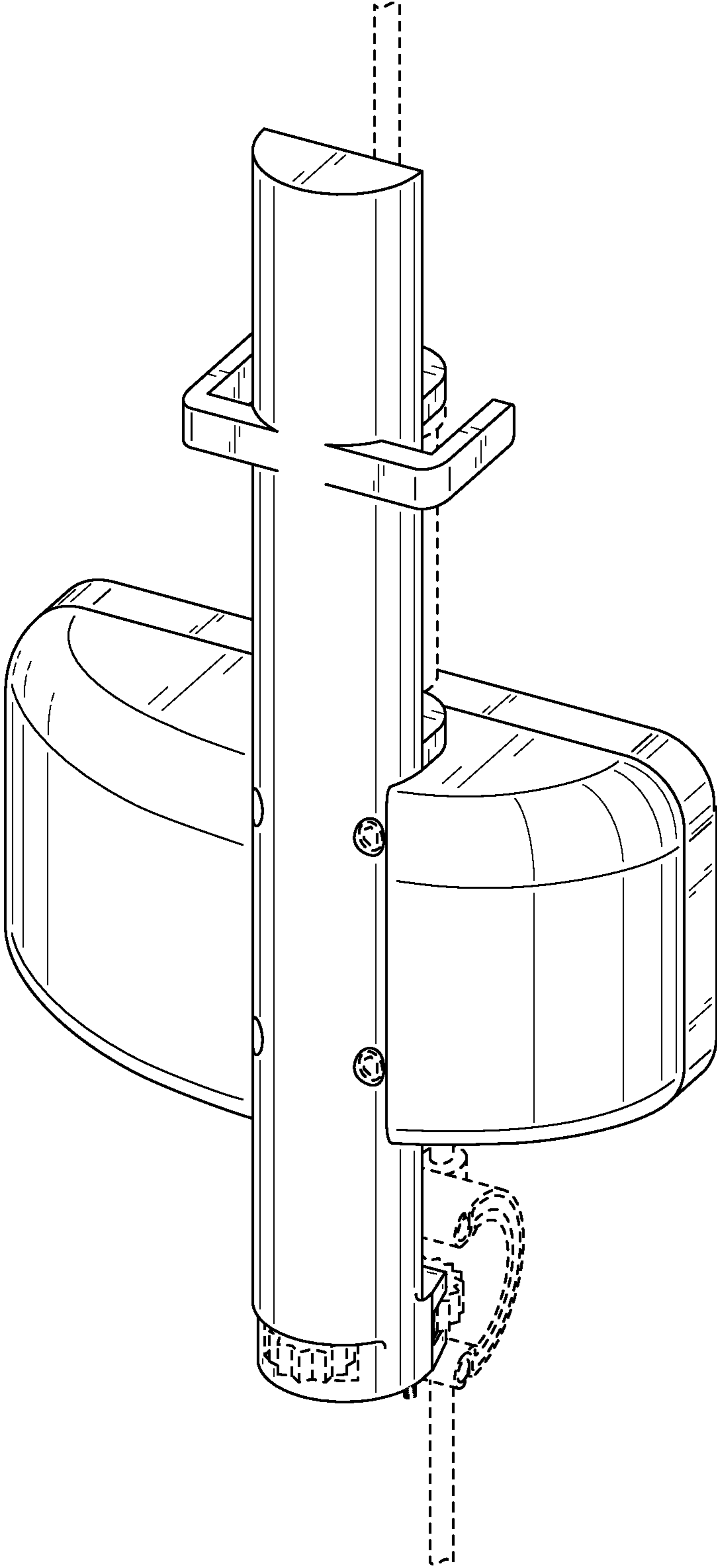


FIG. 2

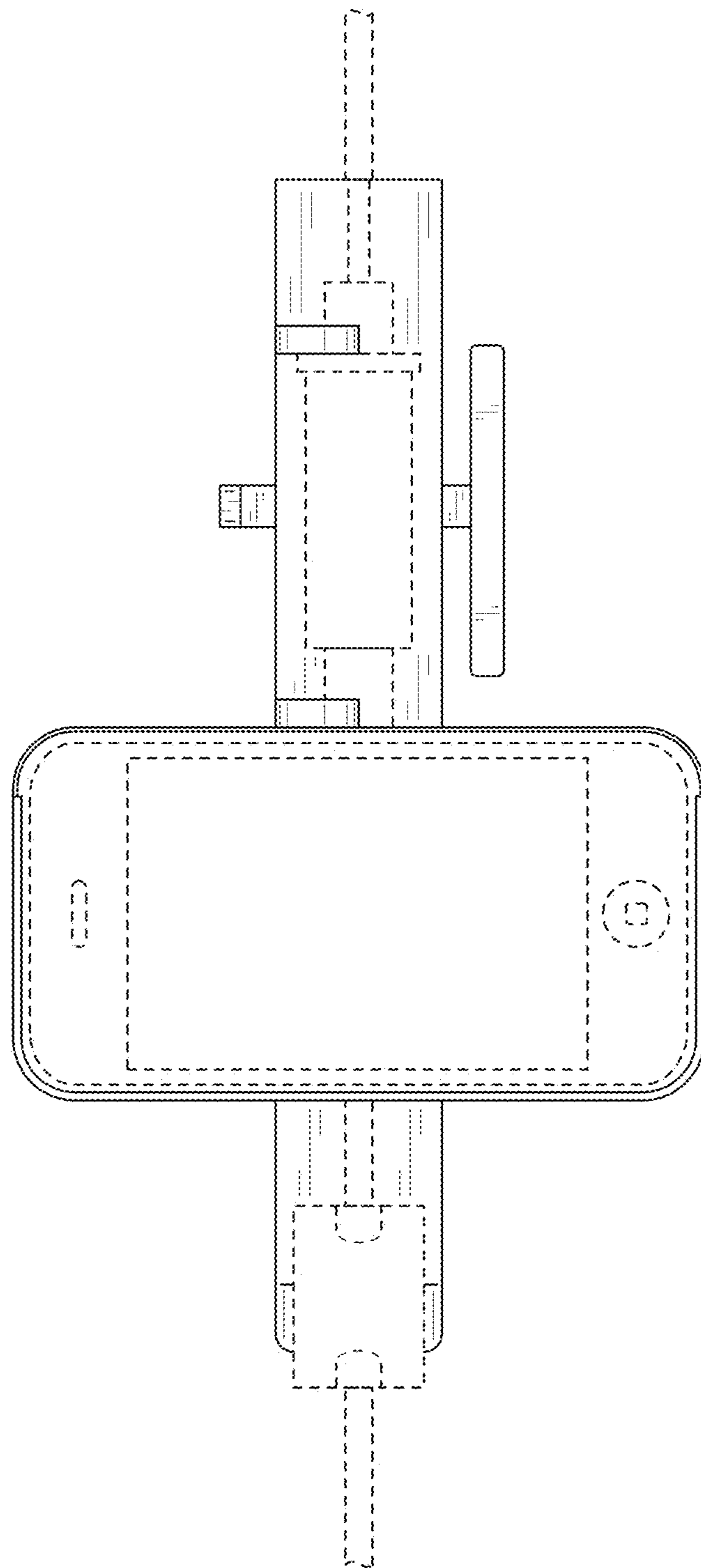


FIG. 3

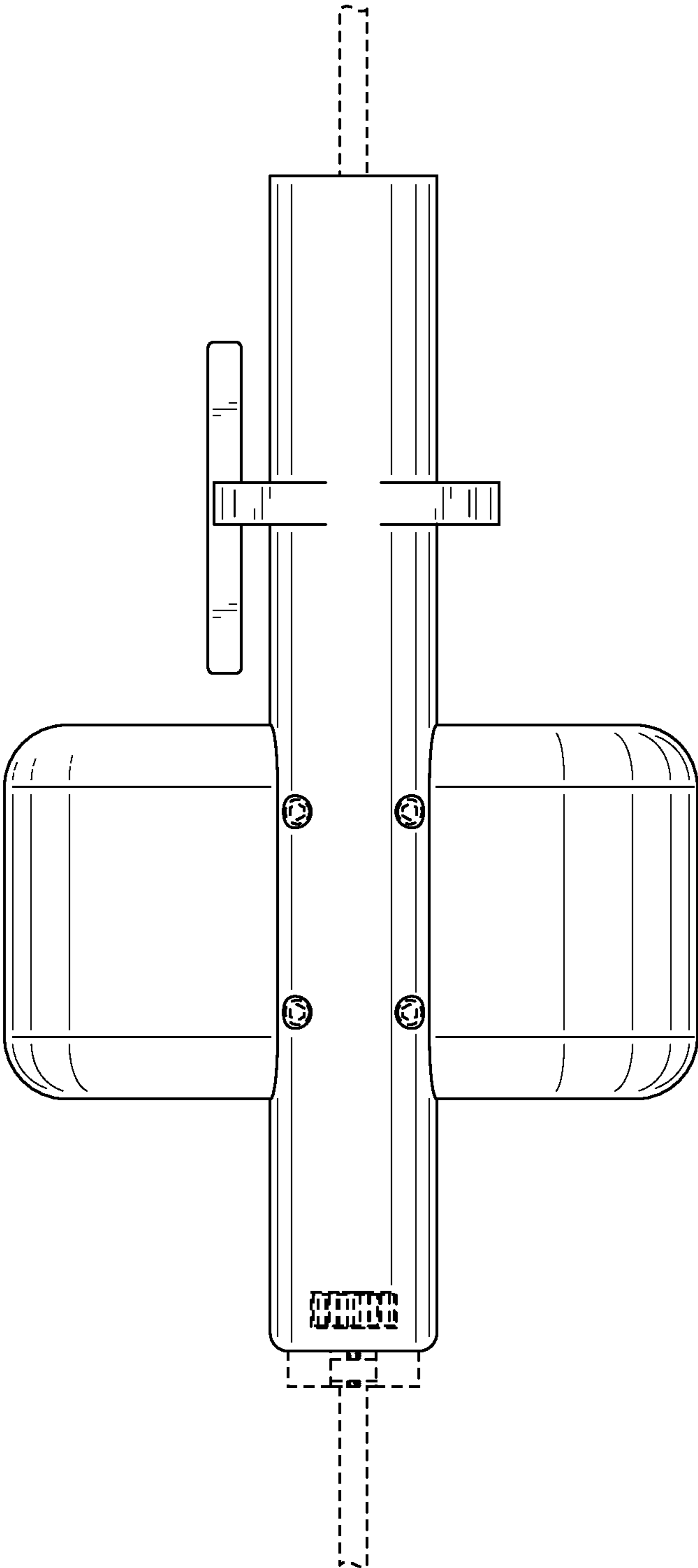


FIG. 4

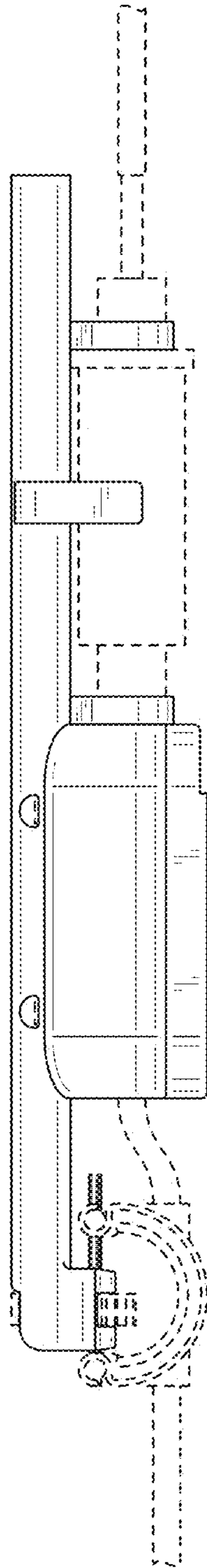


FIG. 5

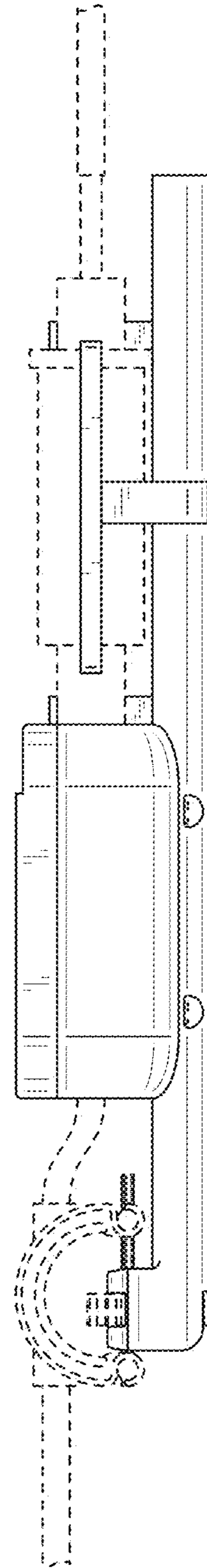


FIG. 6

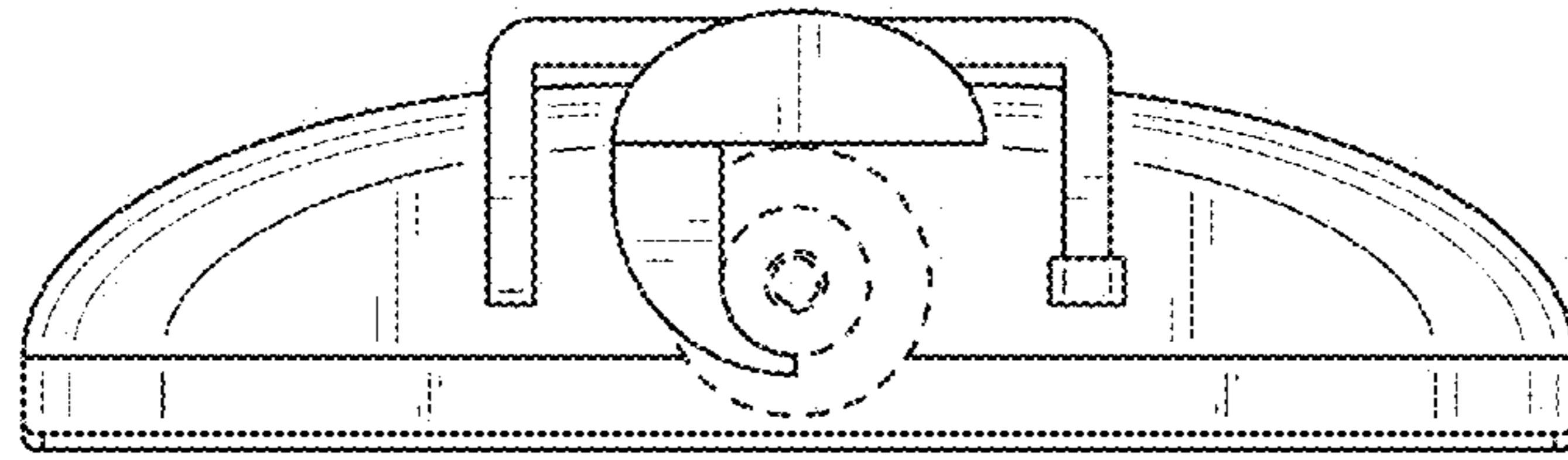


FIG. 7

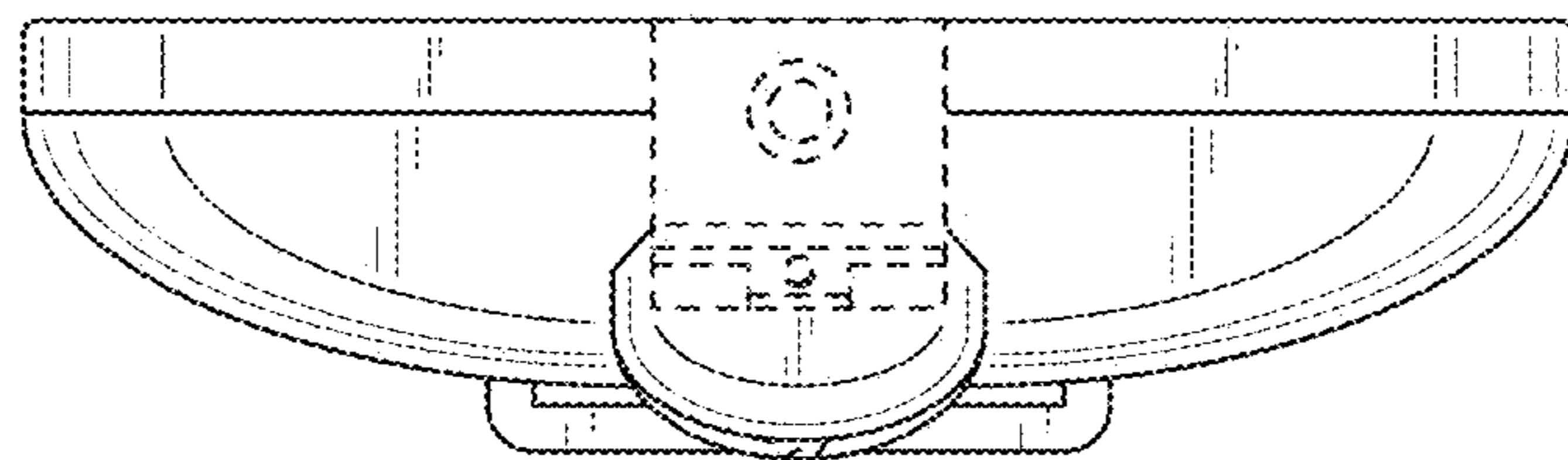


FIG. 8