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Johnson et al.

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

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

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(56) **References Cited**

U.S. PATENT DOCUMENTS

2,880,764 A 4/1959 Pelavin
2,888,877 A 6/1959 Shellman
(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 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;

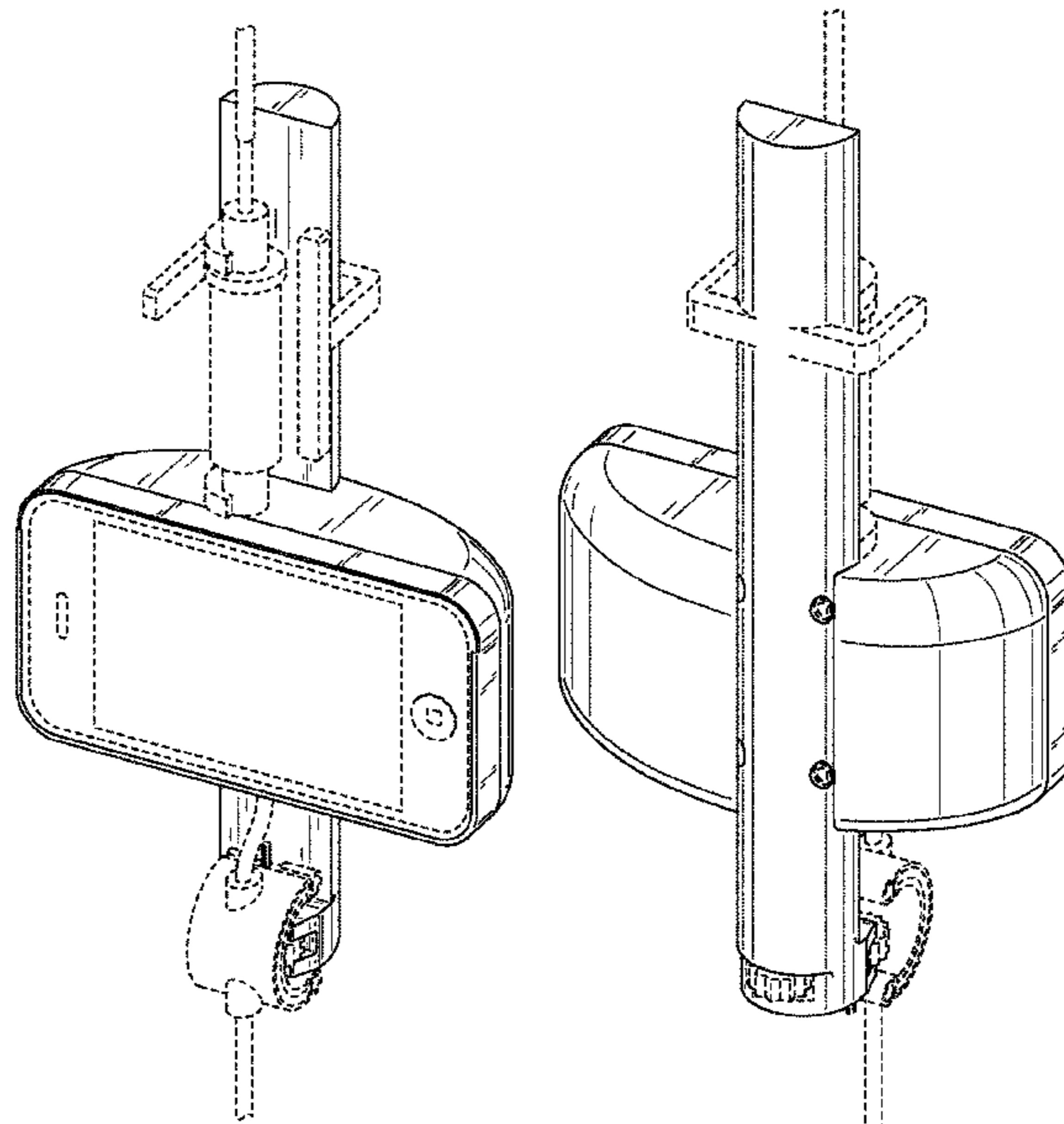
FIG. 6 is a right side elevational view thereof;

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



(58) **Field of Classification Search**
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5,278,626 A 1/1994 Poole
 5,279,558 A 1/1994 Kriesel
 5,314,316 A 5/1994 Shibamoto
 5,328,341 A 7/1994 Forni
 5,331,309 A 7/1994 Sakai
 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
 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
 5,843,045 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
 6,305,908 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
 7,118,549 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

(56) **References Cited**
 U.S. PATENT DOCUMENTS

3,173,372 A 3/1965 Baldwin
 3,384,336 A 5/1968 Prockter
 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.
 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
 4,812,904 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 Gijsselhart
 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
 5,057,090 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.

(56)

References Cited

U.S. PATENT DOCUMENTS

7,892,204 B2	2/2011	Kraus	2007/0228071 A1	10/2007	Kamen et al.
7,905,859 B2	3/2011	Bynum	2007/0293817 A1	12/2007	Feng
7,914,483 B2	3/2011	Simmons	2008/0004574 A1	1/2008	Dyar
7,918,834 B2	4/2011	Merno	2008/0051732 A1	2/2008	Chen
7,924,424 B2	4/2011	Erickson	2008/0147008 A1	6/2008	Lewis
7,933,780 B2	4/2011	De La Huerga	2008/0147016 A1	6/2008	Faries
7,952,698 B2	5/2011	Friedrich	2008/0154214 A1	6/2008	Spohn
8,004,683 B2	8/2011	Tokhtuev et al.	2008/0235765 A1	9/2008	Shimizu
8,025,634 B1	9/2011	Moubayed	2008/0237502 A1	10/2008	Fago
8,038,657 B2	10/2011	Davis	2008/0252472 A1	10/2008	Su et al.
8,038,663 B2	10/2011	Miner	2009/0097029 A1	4/2009	Tokhtuev
8,103,461 B2	1/2012	Glaser et al.	2009/0112115 A1	4/2009	Huang
8,112,814 B2	2/2012	Shimizu	2009/0180106 A1	7/2009	Friedrich
8,137,083 B2	3/2012	Zhou	2009/0224638 A1	9/2009	Weber
8,147,447 B2	4/2012	Sundar et al.	2009/0254025 A1	10/2009	Simmons
8,147,448 B2	4/2012	Sundar	2009/0262351 A1	10/2009	Erickson
8,147,464 B2	4/2012	Spohn	2009/0276167 A1	11/2009	Glaser
8,184,848 B2	5/2012	Wu	2009/0281460 A1	11/2009	Lowery
8,256,984 B2	9/2012	Fathallah	2010/0021933 A1	1/2010	Okano
8,257,779 B2	9/2012	Abernathy	2010/0097451 A1	4/2010	Bruce
8,282,894 B2	10/2012	Lee	2010/0114027 A1	5/2010	Jacobson
D676,551 S	2/2013	Desai et al.	2010/0120601 A1	5/2010	Hayamizu
8,394,062 B2	3/2013	Powers	2010/0168671 A1	7/2010	Faries, Jr.
8,439,880 B2	5/2013	Rondeau	2010/0204650 A1	8/2010	Hungerford et al.
8,447,069 B2	5/2013	Huang et al.	2010/0211003 A1	8/2010	Sundar
8,471,231 B2	6/2013	Paz	2010/0217229 A1	8/2010	Miner
8,523,797 B2	9/2013	Lowery et al.	2010/0229978 A1	9/2010	Zhou
8,523,829 B2	9/2013	Miner et al.	2010/0292635 A1	11/2010	Sundar
8,523,839 B2	9/2013	Siefert	2010/0309005 A1	12/2010	Warner
8,529,511 B2	9/2013	Boulanger	2011/0004186 A1	1/2011	Butterfield
8,531,517 B2	9/2013	Tao	2011/0025826 A1	2/2011	Dabiri
8,552,361 B2	10/2013	Mandro	2011/0046899 A1	2/2011	Paz
8,622,979 B2	1/2014	Hungerford	2011/0125103 A1	5/2011	Rondeau
8,638,358 B2	1/2014	Dabiri et al.	2011/0142283 A1	6/2011	Huang
8,647,074 B2	2/2014	Moberg et al.	2011/0144595 A1	6/2011	Cheng
8,692,678 B2	4/2014	Warner et al.	2011/0166511 A1	7/2011	Sharvit
8,777,897 B2	7/2014	Butterfield	2011/0178476 A1	7/2011	Lin
D712,043 S	8/2014	Sliger	2011/0190146 A1	8/2011	Boehm
8,834,429 B2	9/2014	Grant	2011/0190637 A1	8/2011	Knobel
D720,449 S	12/2014	Galbraith et al.	2011/0196304 A1	8/2011	Kramer et al.
D728,779 S	5/2015	Sabin et al.	2011/0196306 A1	8/2011	De La Huerga
D735,319 S	7/2015	Sabin et al.	2011/0206247 A1	8/2011	Dachille
D736,370 S	8/2015	Sabin et al.	2011/0208123 A1	8/2011	Gray
9,095,652 B2	8/2015	Dewey	2011/0231204 A1	9/2011	De La Huerga
9,128,051 B2	9/2015	Bui	2011/0251557 A1	10/2011	Powers
9,134,735 B2	9/2015	Lowery et al.	2011/0275063 A1	11/2011	Weitz
9,134,736 B2	9/2015	Lowery et al.	2011/0313351 A1	12/2011	Kamen et al.
9,144,644 B2	9/2015	Hungerford	2011/0313789 A1	12/2011	Kamen
9,151,646 B2	10/2015	Kamen et al.	2011/0316919 A1	12/2011	Baldy, Jr.
D745,661 S	12/2015	Collins et al.	2011/0317004 A1	12/2011	Tao
9,216,279 B2	12/2015	Travis et al.	2012/0013735 A1	1/2012	Tao
9,234,850 B2	1/2016	Hammond et al.	2012/0059318 A1	3/2012	Dewey
D749,206 S	2/2016	Johnson et al.	2012/0059350 A1	3/2012	Siefert
D751,689 S	3/2016	Peret et al.	2012/0095415 A1	4/2012	Sharvit
D751,690 S	3/2016	Peret et al.	2012/0095433 A1	4/2012	Hungerford
D752,209 S	3/2016	Peret et al.	2012/0185267 A1	7/2012	Kamen
9,295,778 B2	3/2016	Kamen et al.	2012/0197185 A1	8/2012	Tao
D754,065 S	4/2016	Gray et al.	2012/0238997 A1	9/2012	Dewey
D756,505 S *	5/2016	Park D24/112	2012/0265166 A1	10/2012	Yodfat
2001/0026292 A1	10/2001	Ishizaki	2012/0310153 A1	12/2012	Moberg
2001/0055462 A1	12/2001	Seibel	2013/0035659 A1	2/2013	Hungerford
2002/0194933 A1	12/2002	Roelofs	2013/0083191 A1	4/2013	Lowery et al.
2003/0045840 A1	3/2003	Burko	2013/0085443 A1	4/2013	Lowery
2003/0055406 A1	3/2003	Lebel	2013/0177455 A1	7/2013	Kamen
2003/0107819 A1	6/2003	Lin et al.	2013/0182381 A1	7/2013	Gray
2003/0217962 A1	11/2003	Childers	2013/0184676 A1	7/2013	Kamen
2004/0044309 A1	3/2004	Lynch et al.	2013/0188040 A1	7/2013	Kamen
2004/0171994 A1	9/2004	Goldberg	2013/0191513 A1	7/2013	Kamen
2005/0096581 A1	5/2005	Chan	2013/0197693 A1	8/2013	Kamen
2005/0171491 A1	8/2005	Miner et al.	2013/0201471 A1	8/2013	Bui et al.
2006/0096660 A1	5/2006	Diaz	2013/0201482 A1	8/2013	Munro
2006/0140466 A1	6/2006	Seshimo	2013/0204188 A1	8/2013	Kamen
2006/0146077 A1	7/2006	Song	2013/0253442 A1	9/2013	Travis
2006/0291211 A1	12/2006	Rodriguez	2013/0272773 A1	10/2013	Kamen
2007/0102623 A1	5/2007	Fengler	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

(56)

References Cited

U.S. PATENT DOCUMENTS

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	
2014/0121601	A1*	5/2014	Hoenninger, III	A61M 5/1413 604/151
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	
2014/0267709	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 et al.	
2015/0002677	A1	1/2015	Peret	
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	
2015/0257974	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.	

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	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	1020100037914	A	4/2010
NL	7006908		11/1970
NL	8801680	A	2/1989
NL	9101825	A	5/1993

SE	376843	B	6/1975
WO	WO8102770	A1	10/1981
WO	WO9309407	A1	5/1993
WO	WO0072181	A3	11/2000
WO	WO0240084	A2	5/2002
WO	WO0210262	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	A1	6/2013
WO	WO2013095459	A9	6/2013
WO	WO2013096713	A1	6/2013
WO	WO2013096713	A2	6/2013
WO	WO2013096718	A1	6/2013
WO	WO2013096718	A2	6/2013
WO	WO2013096722	A1	6/2013
WO	WO2013096722	A2	6/2013
WO	WO2013096909	A1	6/2013
WO	WO2013096909	A2	6/2013
WO	WO2013176770	A1	6/2013
WO	WO2013176770	A2	11/2013
WO	WO2013177357	A1	11/2013
WO	WO/2014/100571	A1	6/2014
WO	WO/2014/100687	A1	6/2014
WO	WO/2014/100744	A1	6/2014
WO	WO2014100557	A1	6/2014
WO	WO2014100557	A2	6/2014
WO	WO2014100571	A2	6/2014
WO	WO2014100658	A1	6/2014
WO	WO2014100687	A2	6/2014
WO	WO2014100736	A1	6/2014
WO	WO2014100736	A2	6/2014
WO	WO2014100744	A2	6/2014
WO	WO/2014/144557	A1	9/2014
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

OTHER PUBLICATIONS

Invitation to Respond to Written Opinion from the Intellectual Property Office of Singapore for Application 11201507504S, mailed on Nov. 23, 2015.

First Examination Report from the Intellectual Property Office of New Zealand for Application 626382, mailed on Apr. 1, 2015.

Report of substantive examination from Superintendent of Industry and Commerce of Colombia for Patent Application 14155193, mailed on Nov. 19, 2015.

Notice of Preliminary Rejection (Non-Final) from the Korean Intellectual Property Office ("KIPO") for Korean Patent Application No. 10-2014-7019883, mailed on Dec. 15, 2015.

First Examination report from the New Zealand Intellectual Property Office for New Zealand IP No. 715098, mailed on 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-2flj00FZetfTSdnhcU/China-Microcomputer-Intravenous-Infusion-Drip-Controller.html>.

(56)

References Cited

OTHER PUBLICATIONS

“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>.

“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://acemedical.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.

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 Wild, Oct. 31, 2011 (retrieved), 7 pgs, 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, 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 Oct. 1, 2013, received in International patent application No. PCT/US2012/071490, 19 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 pages.

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.

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.

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.

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 Wild, 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.

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.

Report of substantive examination from Superintendent of Industry and Commerce of Colombia for Patent Application 14155193, mailed on Nov. 19, 2015, English Machine Translation.

Notice of Preliminary Rejection (Non-Final) from the Korean Intellectual Property Office (“KIPO”) for Korean Patent Application No. 10-2014-7019883, mailed on Dec. 15, 2015, English Translation.

* cited by examiner

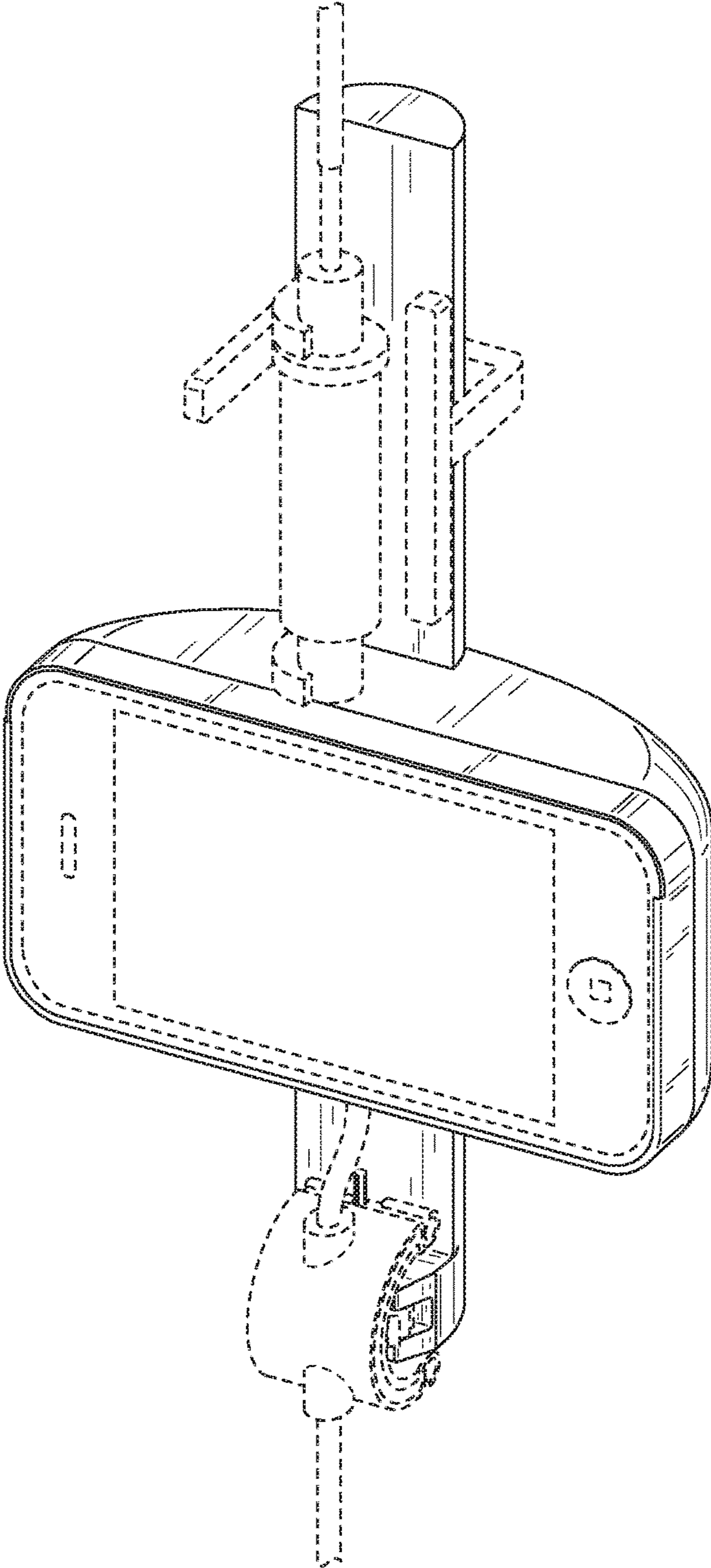


FIG. 1

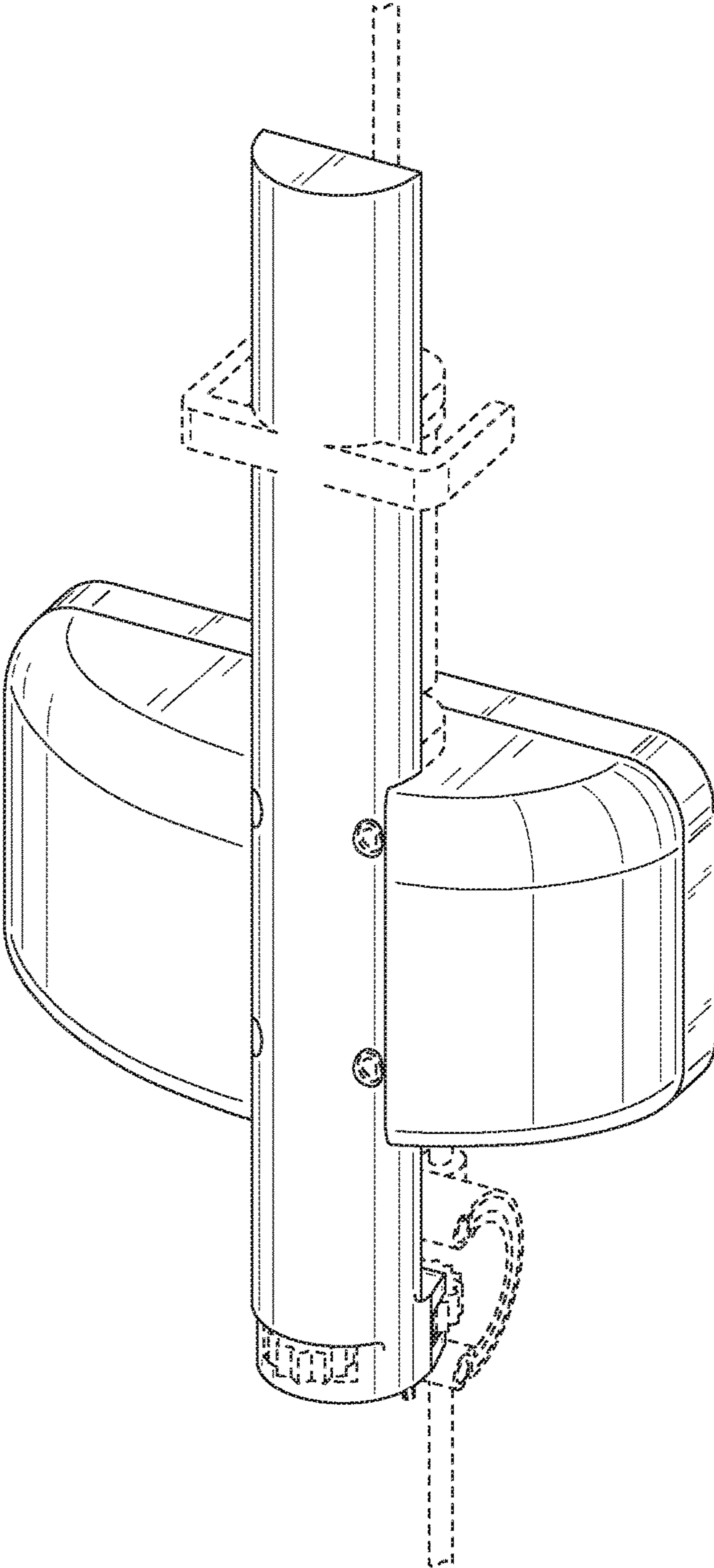


FIG. 2

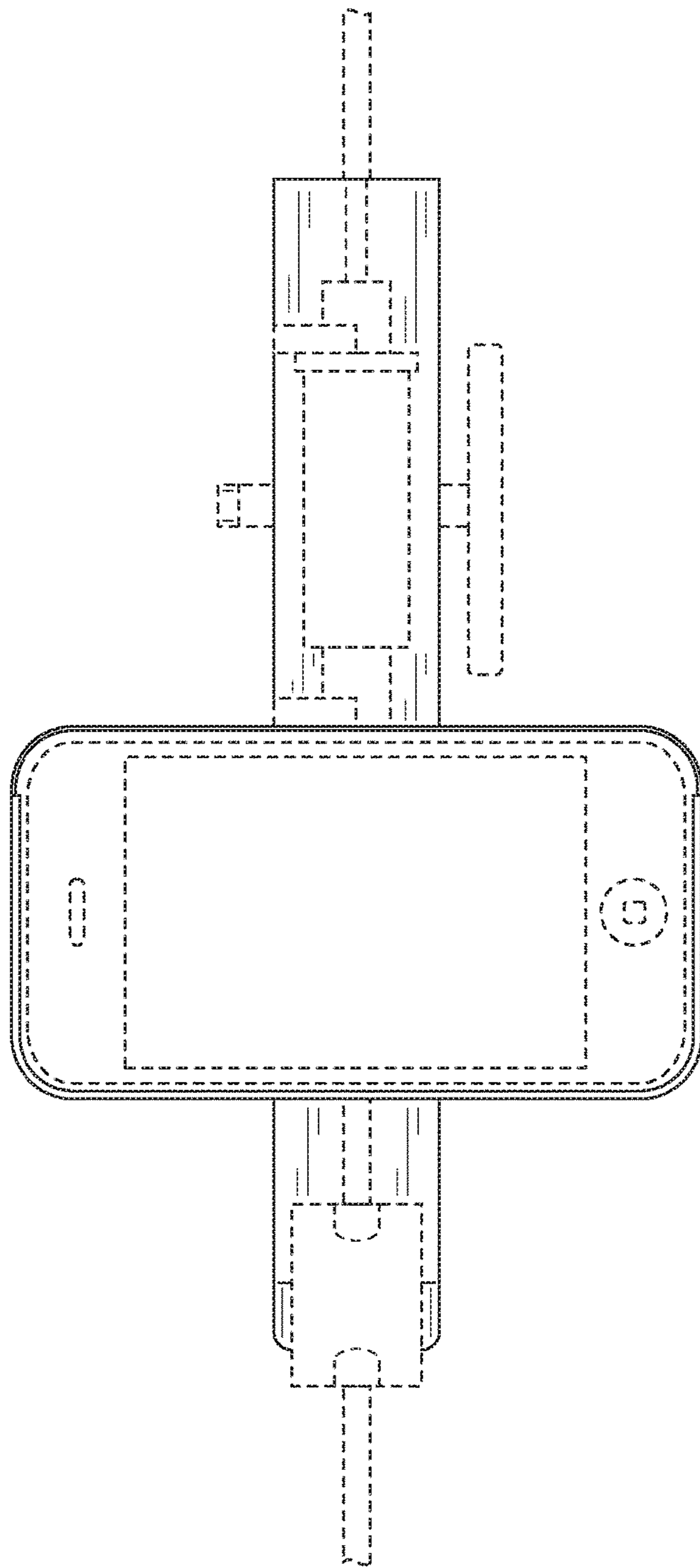


FIG. 3

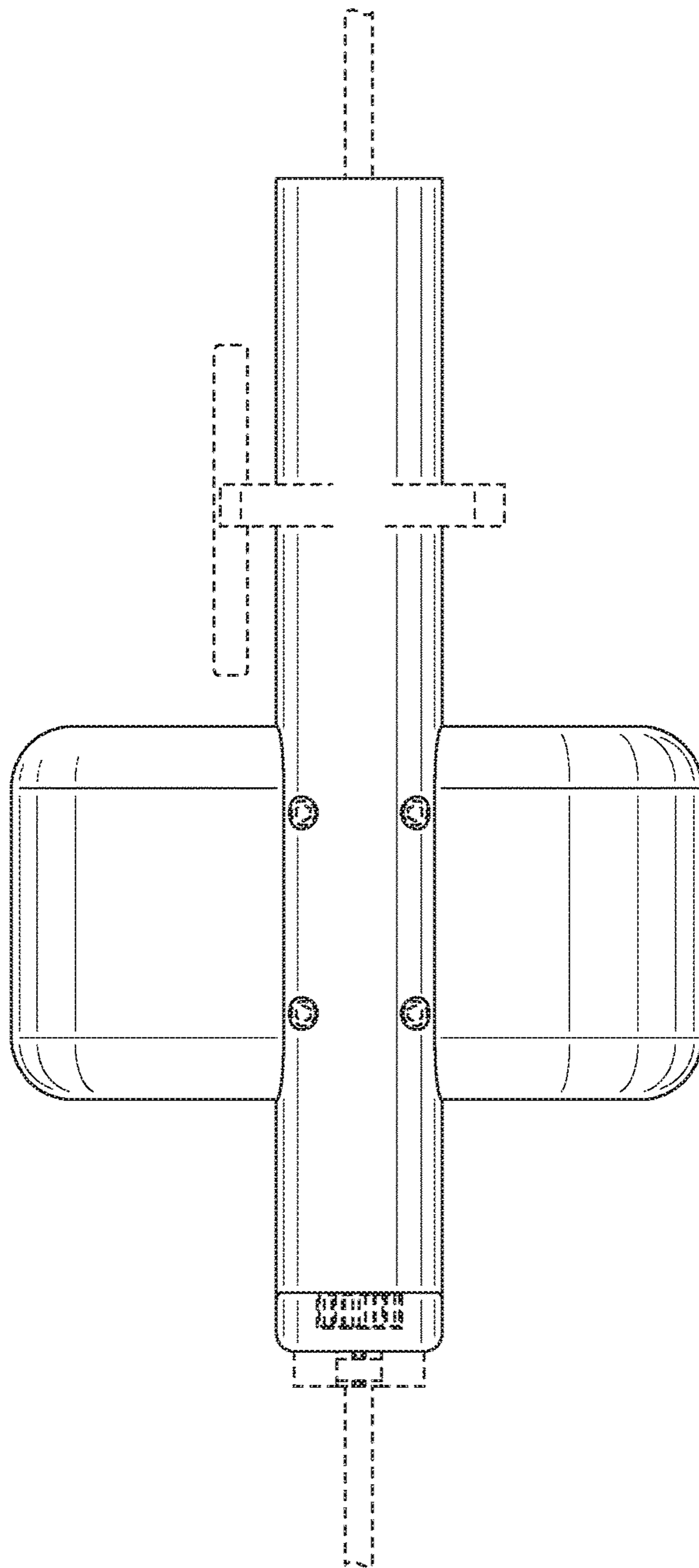


FIG. 4

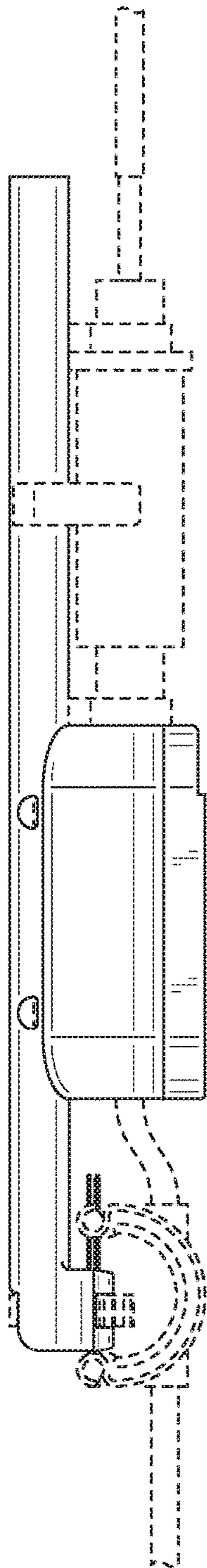


FIG. 5

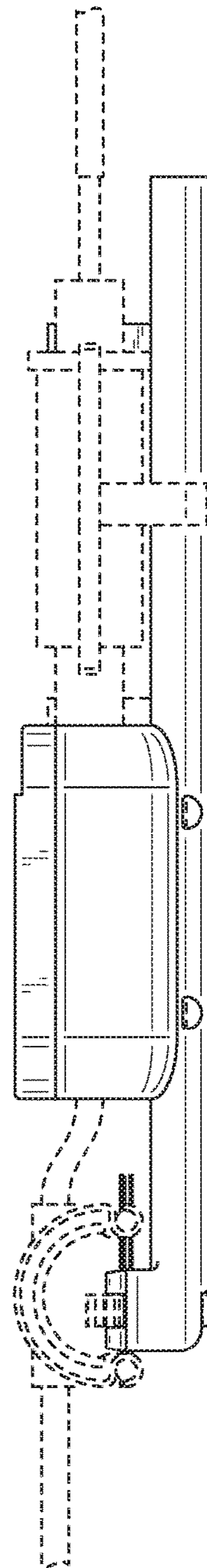


FIG. 6

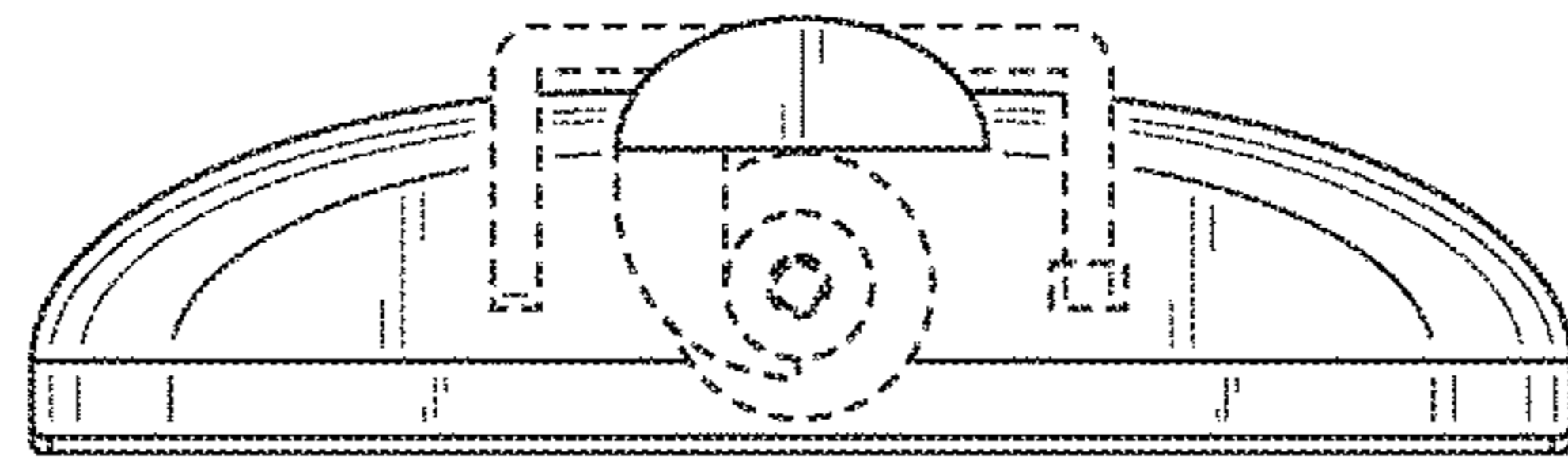


FIG. 7

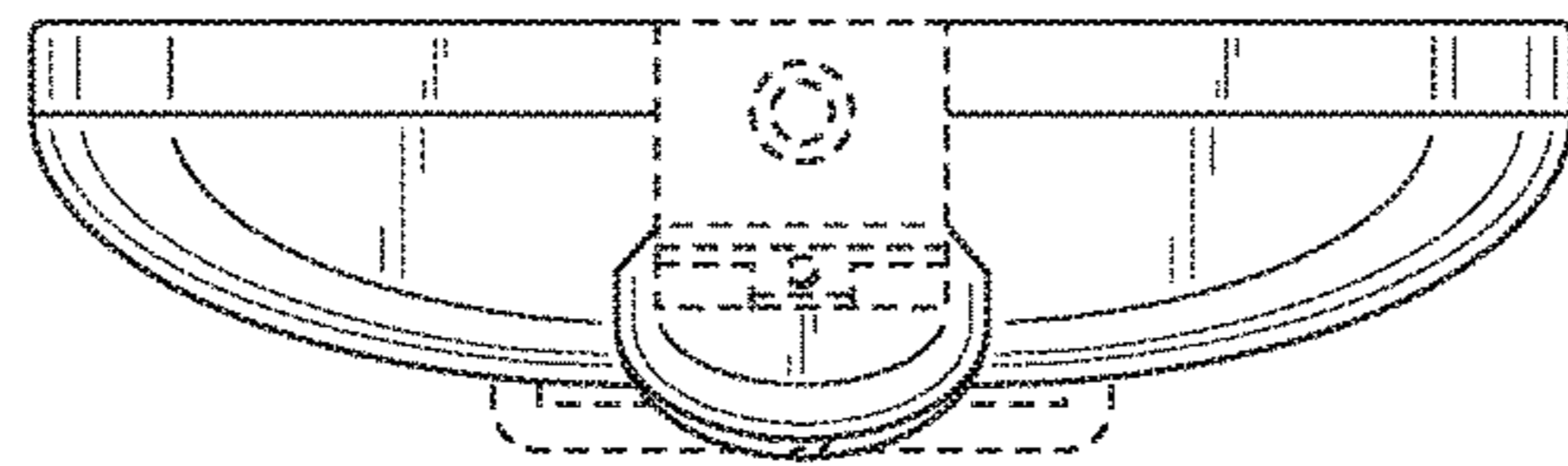


FIG. 8