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

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>.

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(Continued)

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(57) **CLAIM**

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

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

DESCRIPTION

(21) Appl. No.: **29/553,094**

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

(58) **Field of Classification Search**
USPC D24/107, 108, 111, 169, 185, 186
(Continued)

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 elevation 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;

FIG. 7 is a top plan view thereof;

FIG. 8 is a front, top, and right-side perspective view with the door open thereof;

FIG. 9 is a front elevation view with the door open thereof;

FIG. 10 is a right elevational view with the door open thereof;

FIG. 11 is a back elevational view with the door open thereof;

FIG. 12 is a left-side elevational view with the door open thereof;

FIG. 13 is a top plan view with the door open thereof; and, FIG. 14 is a bottom elevational view with the door open 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.

(56) **References Cited**

U.S. PATENT DOCUMENTS

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

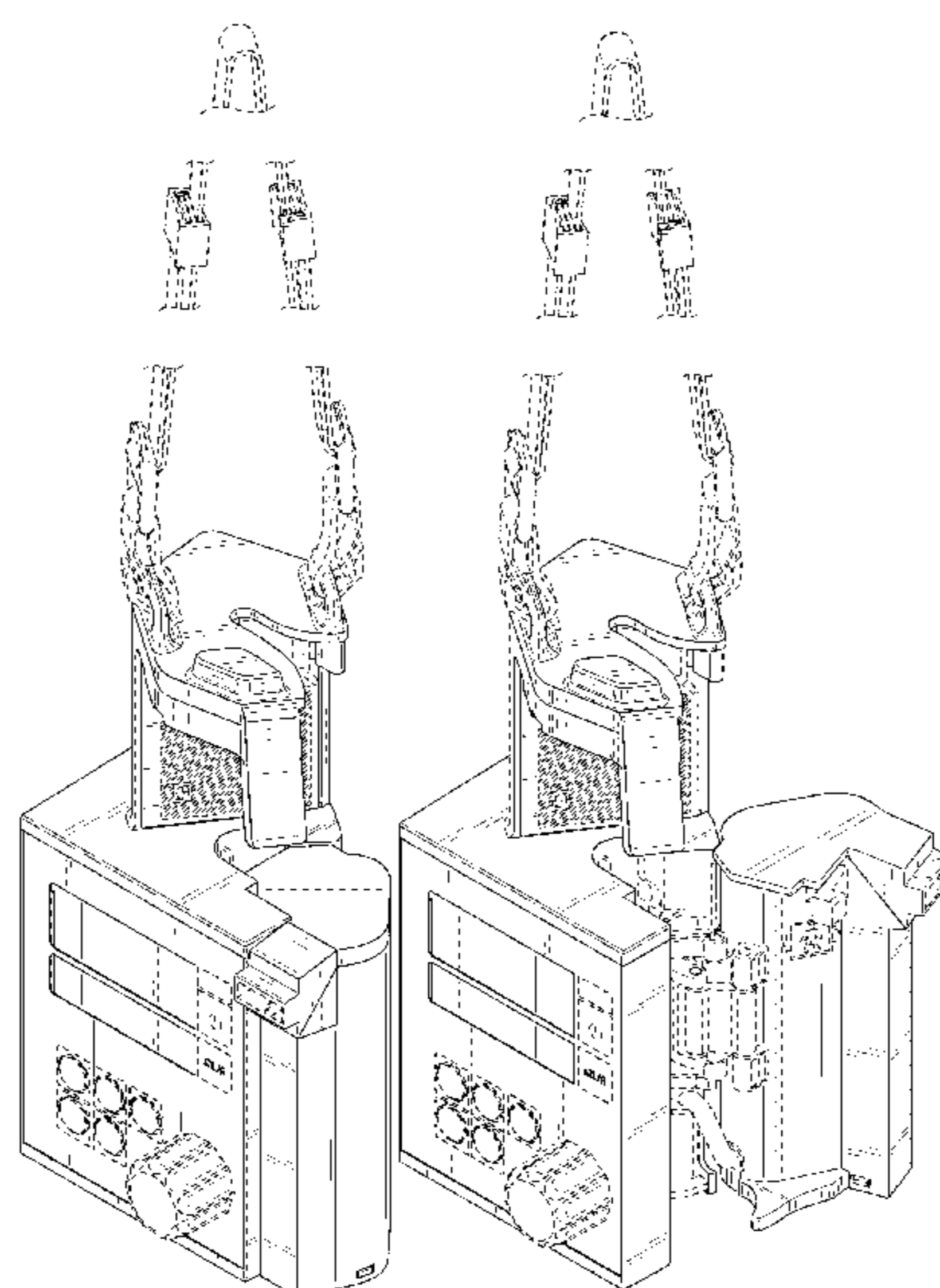
FOREIGN PATENT DOCUMENTS

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

OTHER PUBLICATIONS

“Microcomputer Intravenous Infusion Drip Controller”, Longfian Scitech Co., Ltd., Mar. 18, 2016 (retrieved). Advertisement listed as

1 Claim, 14 Drawing Sheets



(58) **Field of Classification Search**
 CPC A61M 5/142; A61M 2205/502; A61M
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(56) **References Cited**
 U.S. PATENT DOCUMENTS

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.
 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 A61M 5/1689
 128/DIG. 12
 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 Iwatschenko
 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 Gijsselhart 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 Imperato
 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 D24/111
 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 A61M 5/1689
 604/30
 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.

(56)

References Cited

U.S. PATENT DOCUMENTS

7,448,706 B2	11/2008	Yamanobe	D758,399 S	6/2016	Kendler et al.
7,467,055 B2	12/2008	Seshimo et al.	D760,288 S	6/2016	Kendler et al.
7,498,563 B2	3/2009	Mandro	D760,289 S	6/2016	Kendler et al.
7,499,581 B2	3/2009	Tribble	9,364,394 B2	6/2016	Demers et al.
7,540,859 B2	6/2009	Claude	9,372,486 B2	6/2016	Peret et al.
7,677,689 B2	3/2010	Kim	D760,782 S	7/2016	Kendler et al.
7,695,448 B2	4/2010	Cassidy	D760,888 S	7/2016	Gill et al.
7,767,991 B2	8/2010	Sacchetti	9,400,873 B2	7/2016	Kamen et al.
7,776,927 B2	8/2010	Chu	D767,756 S	9/2016	Sabin
7,783,107 B2	8/2010	Zandifar	9,435,455 B2	9/2016	Peret et al.
D629,503 S	12/2010	Caffey et al.	D768,716 S	10/2016	Kendler et al.
7,892,201 B1	2/2011	Laguna	D770,034 S *	10/2016	McNall, III D24/108
7,892,204 B2	2/2011	Kraus	9,465,919 B2	10/2016	Kamen et al.
7,905,859 B2	3/2011	Bynum	9,468,716 B2 *	10/2016	Hariharsan A61M 5/14232
7,914,483 B2	3/2011	Simmons	9,488,200 B2	11/2016	Kamen et al.
7,918,834 B2	4/2011	Merno	D799,025 S *	10/2017	Johnson D24/111
7,924,424 B2	4/2011	Erickson et al.	D802,118 S *	11/2017	Peret D24/111
7,933,780 B2	4/2011	De La Huerga	D813,376 S *	3/2018	Peret D24/111
7,952,698 B2	5/2011	Friedrich	D815,730 S *	4/2018	Collins D24/111
8,004,683 B2	8/2011	Tokhtuev et al.	D816,829 S *	5/2018	Peret D24/111
8,025,634 B1	9/2011	Moubayed	D854,145 S *	7/2019	Collins D24/111
8,038,657 B2	10/2011	Davis	D860,437 S *	9/2019	Collins D24/111
8,038,663 B2	10/2011	Miner	2001/0026292 A1	10/2001	Ishizaki
8,103,461 B2	1/2012	Glaser et al.	2001/0055462 A1	12/2001	Seibel
8,112,814 B2	2/2012	Shimizu	2002/0194933 A1	12/2002	Roelofs
8,137,083 B2	3/2012	Zhou	2003/0045840 A1	3/2003	Burko
8,147,447 B2	4/2012	Sundar et al.	2003/0055406 A1	3/2003	Lebel
8,147,448 B2	4/2012	Sundar	2003/0107819 A1	6/2003	Lin et al.
8,147,464 B2	4/2012	Spohn	2003/0217962 A1	11/2003	Childers
8,184,848 B2	5/2012	Wu	2004/0044306 A1	3/2004	Lynch et al.
8,256,984 B2	9/2012	Fathallah	2004/0044309 A1	3/2004	Lynch et al.
8,257,779 B2	9/2012	Abernathy	2004/0171994 A1	9/2004	Goldberg
8,282,894 B2	10/2012	Lee	2005/0096581 A1	5/2005	Chan
D676,551 S	2/2013	Desai et al.	2005/0171491 A1	8/2005	Minh Miner et al.
D677,784 S	3/2013	Marguerie	2006/0096660 A1	5/2006	Diaz
8,394,062 B2	3/2013	Powers	2006/0140466 A1	6/2006	Seshimo
8,439,880 B2	5/2013	Rondeau	2006/0146077 A1	7/2006	Song
8,447,069 B2	5/2013	Huang et al.	2006/0291211 A1	12/2006	Rodriguez
8,471,231 B2	6/2013	Paz	2007/0088269 A1	4/2007	Valego et al.
8,523,797 B2	9/2013	Lowery et al.	2007/0102623 A1	5/2007	Fengler
8,523,829 B2	9/2013	Miner et al.	2007/0228071 A1	10/2007	Kamen et al.
8,523,839 B2	9/2013	Siefert	2007/0293817 A1	12/2007	Feng
8,529,511 B2	9/2013	Boulanger	2008/0004574 A1	1/2008	Dyar
8,531,517 B2	9/2013	Tao	2008/0051732 A1	2/2008	Chen
8,552,361 B2	10/2013	Mandro	2008/0147008 A1	6/2008	Lewis
8,622,979 B2	1/2014	Hungerford	2008/0147016 A1	6/2008	Faries
8,638,358 B2	1/2014	Dabiri et al.	2008/0154214 A1	6/2008	Spohn
8,647,074 B2	2/2014	Moberg et al.	2008/0235765 A1	9/2008	Shimizu
8,692,678 B2	4/2014	Warner et al.	2008/0237502 A1	10/2008	Fago
8,733,178 B2 *	5/2014	Bivans A61M 5/14228	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
8,777,897 B2	7/2014	Butterfield	2009/0276167 A1	11/2009	Glaser
D712,043 S	8/2014	Sliger	2009/0281460 A1	11/2009	Lowery
8,834,429 B2	9/2014	Grant	2010/0021933 A1	1/2010	Okano
D720,449 S	12/2014	Galbraith et al.	2010/0097451 A1	4/2010	Bruce
D728,779 S	5/2015	Sabin et al.	2010/0114027 A1	5/2010	Jacobson
D735,319 S	7/2015	Sabin et al.	2010/0120601 A1	5/2010	Hayamizu
D736,370 S	8/2015	Sabin et al.	2010/0168671 A1	7/2010	Faries, Jr.
9,095,652 B2	8/2015	Dewey	2010/0204650 A1	8/2010	Hungerford et al.
9,128,051 B2	9/2015	Bui	2010/0211003 A1	8/2010	Sundar
9,134,735 B2	9/2015	Lowery et al.	2010/0217229 A1	8/2010	Miner
9,134,736 B2	9/2015	Lowery et al.	2010/0229978 A1	9/2010	Zhou
9,144,644 B2	9/2015	Hungerford	2010/0292635 A1	11/2010	Sundar
9,151,646 B2	10/2015	Kamen	2010/0309005 A1	12/2010	Warner
D745,661 S	12/2015	Collins et al.	2011/0004186 A1	1/2011	Butterfield
9,216,279 B2	12/2015	Travis et al.	2011/0025826 A1	2/2011	Dabiri
9,234,850 B2	1/2016	Hammond et al.	2011/0046899 A1	2/2011	Paz
D749,206 S	2/2016	Johnson et al.	2011/0060284 A1	3/2011	Harr
D751,689 S	3/2016	Peret et al.	2011/0125103 A1	5/2011	Rondeau
D751,690 S	3/2016	Peret et al.	2011/0137239 A1 *	6/2011	DeBelser A61M 5/14244
D752,209 S	3/2016	Peret et al.			604/67
9,295,778 B2	3/2016	Kamen et al.			
D754,065 S	4/2016	Gray et al.	2011/0142283 A1	6/2011	Huang
D756,386 S	5/2016	Kendler et al.	2011/0144595 A1	6/2011	Cheng
D756,505 S	5/2016	Park	2011/0166511 A1	7/2011	Sharvit

(56)

References Cited

U.S. PATENT DOCUMENTS

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
 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
 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
 2013/0253442 A1 9/2013 Travis
 2013/0272773 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
 2014/0340512 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
 2018/0185569 A1* 7/2018 Slaby A61M 5/16831
 2018/0236162 A1* 8/2018 McNall, III A61J 1/20
 2018/0243500 A1* 8/2018 McNall, III A61M 5/142
 2018/0304010 A1* 10/2018 DeBelser A61M 5/172
 2020/0001068 A1* 1/2020 Donze A61M 5/5086

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 WO2002010262 A1 12/2002
 WO WO2004035116 A1 4/2004
 WO WO2005094919 A1 10/2005
 WO WO2006086723 A2 8/2006
 WO WO2008022880 A1 2/2008

(56)

References Cited

FOREIGN PATENT DOCUMENTS

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

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>.

“IV 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.

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 002381669/0001-0005 (Docket #: L19EM), 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.

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

Notice of Allowance from Korean Intellectual Property Office for Patent Application 10-20147019883 (J79KR), dated Jun. 28, 2016, 3 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.

Extended European Search Report dated Mar. 3, 2016, received in European patent application No. 15192051.9 (Q59EP), 7 pgs.

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

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. 21, 2016.

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.

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 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.

(56)

References Cited

OTHER PUBLICATIONS

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.

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.

"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.

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.

"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.

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

"Feature Detection", OpenCV Wiki, 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 (197WO), 9 pgs.

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

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

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.

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.

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

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.

U.S. Appl. No. 29/471,856, filed Nov. 6, 2013, now U.S. Pat. No. D0751689S issued Mar. 15, 2016.

U.S. Appl. No. 29/471,858, filed Nov. 6, 2013, now U.S. Pat. No. D0751690S, issued Mar. 15, 2016.

U.S. Appl. No. 29/471,859, filed Nov. 6, 2013, now U.S. Pat. No. D0745661, issued Dec. 15, 2015.

U.S. Appl. No. 29/471,861, filed Nov. 6, 2013, now U.S. Pat. No. D0749206S, issued Feb. 9, 2016.

U.S. Appl. No. 29/471,864, filed Nov. 6, 2013, now U.S. Pat. No. D0752209S, issued Mar. 22, 2016.

U.S. Appl. No. 29/553,094, filed Jan. 28, 2016.

U.S. Appl. No. 29/548,225, filed Dec. 11, 2015, now U.S. Pat. No. D0815730S, issued Apr. 17, 2018.

U.S. Appl. No. 29/552,303, filed Jan. 21, 2016, now U.S. Pat. No. D0799025S, issued Oct. 3, 2017.

U.S. Appl. No. 29/552,942, filed Jan. 27, 2016, now U.S. Pat. No. D0802118S, issued Nov. 7, 2017.

U.S. Appl. No. 29/552,943, filed Jan. 27, 2016, now U.S. Pat. No. D0816829S, issued May 1, 2018.

U.S. Appl. No. 29/556,048, filed Feb. 26, 2016, now U.S. Pat. No. D0813376S, issued Mar. 20, 2018.

U.S. Appl. No. 29/565,908, filed May 25, 2016.

U.S. Appl. No. 29/575,316, filed Aug. 24, 2016.

U.S. Appl. No. 29/575,331, filed Aug. 24, 2016.

* cited by examiner

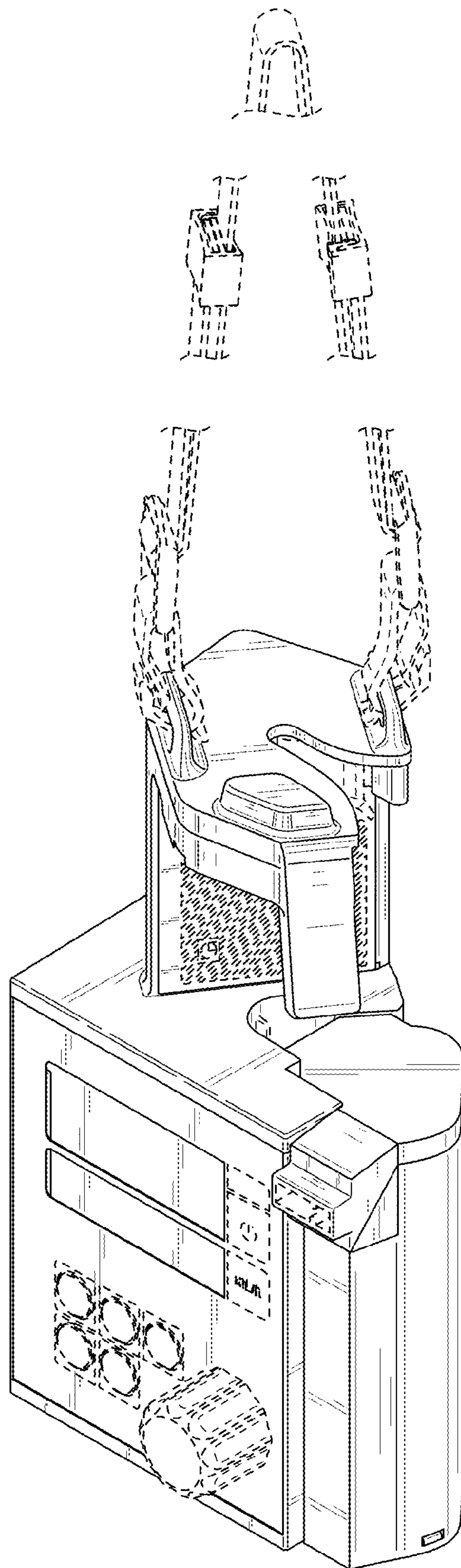


FIG. 1

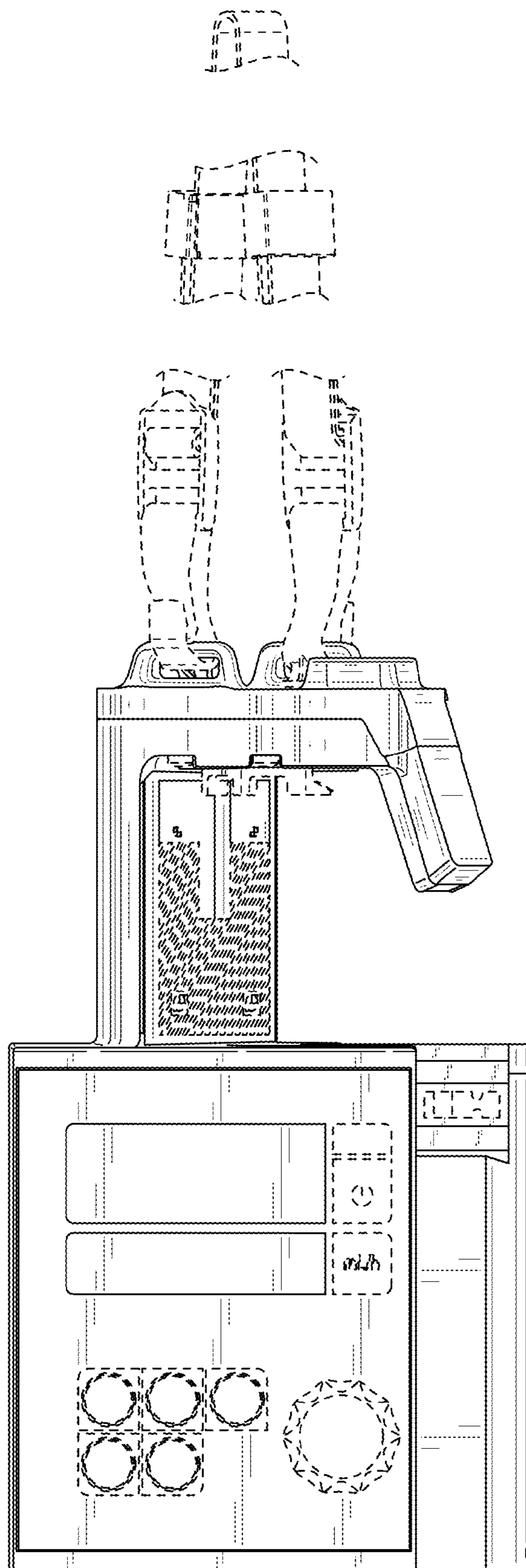


FIG. 2

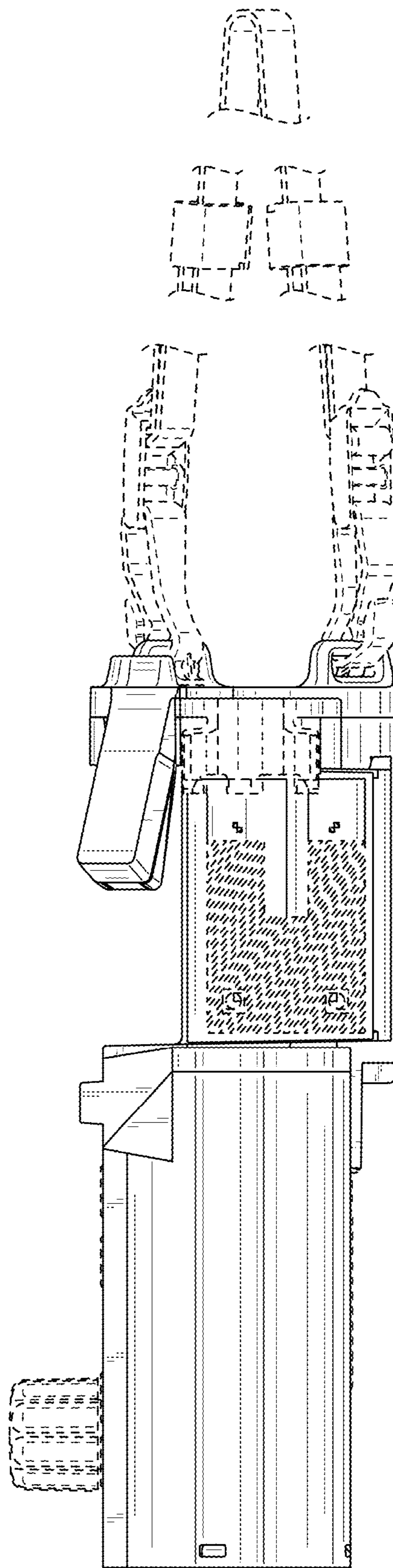
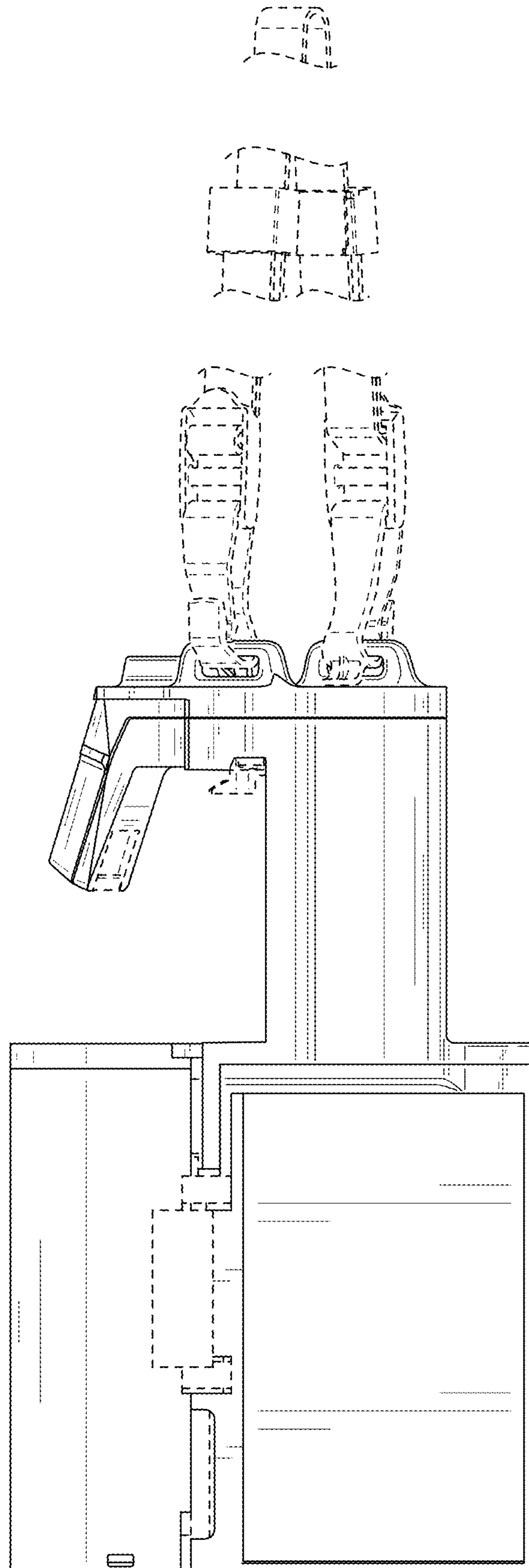


FIG. 3



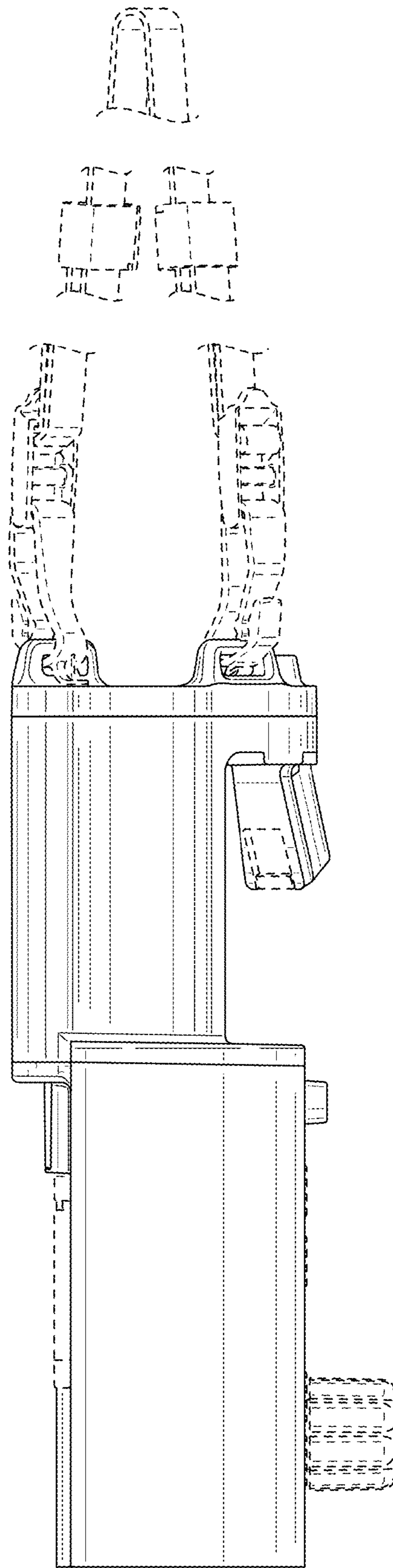


FIG. 5

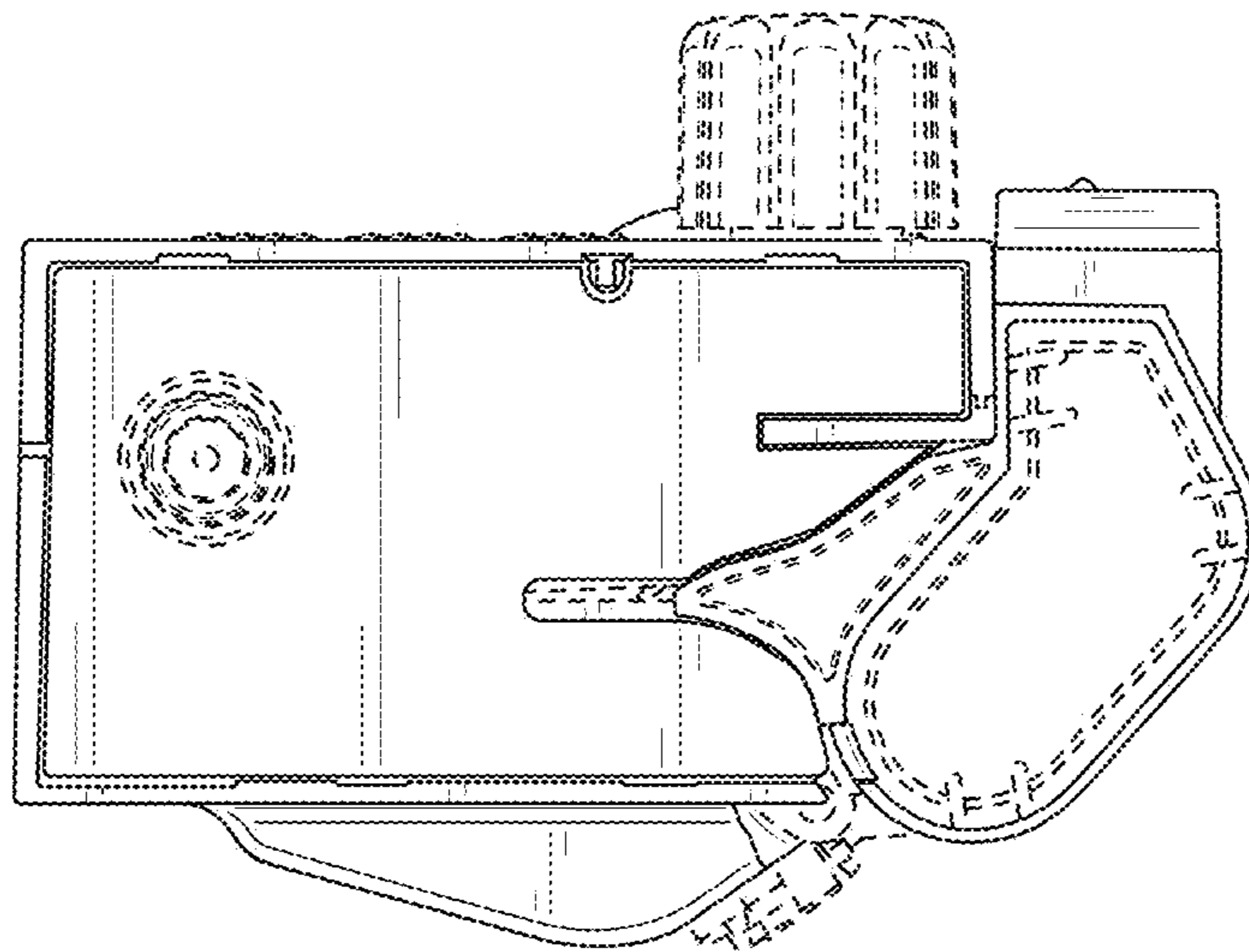


FIG. 6

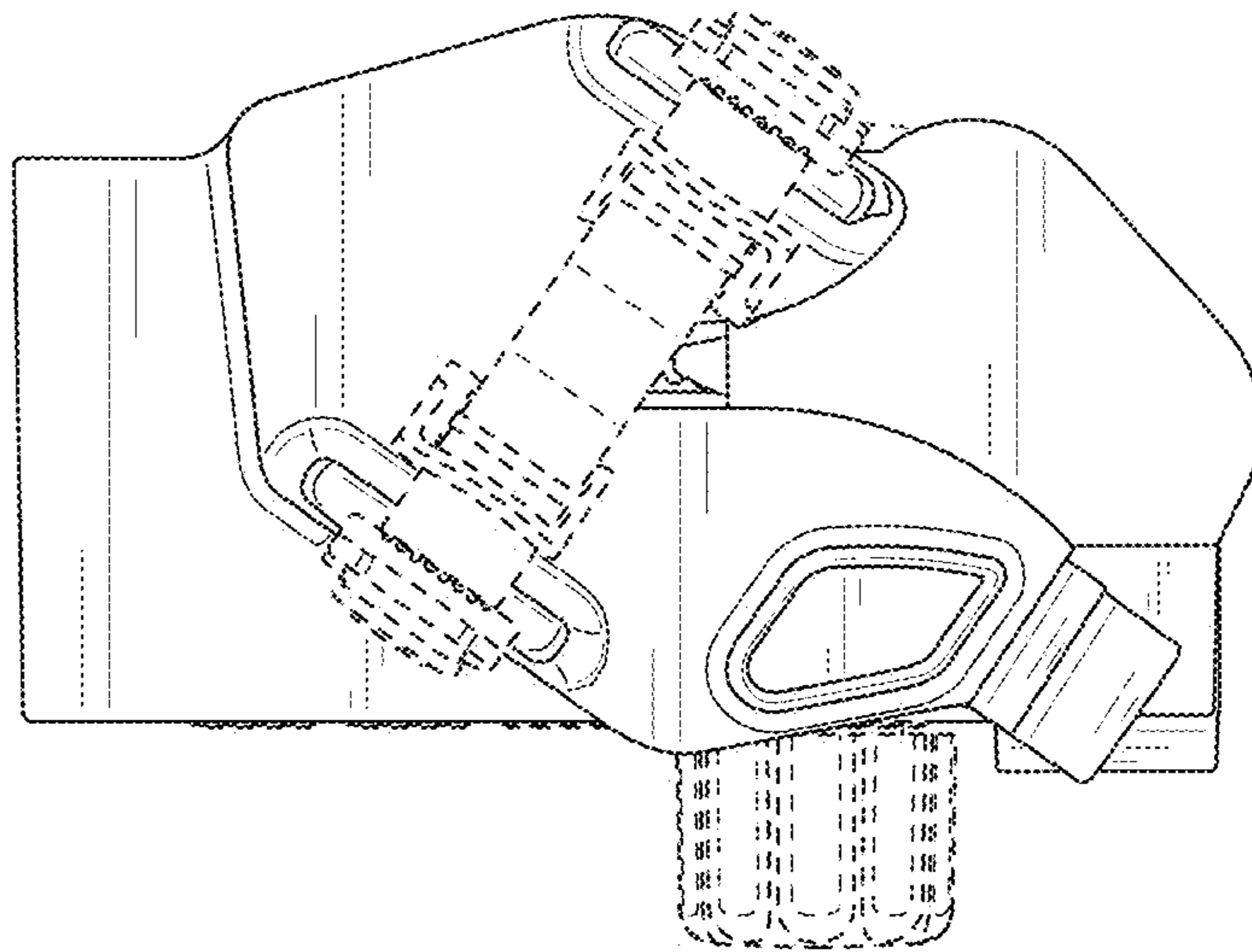


FIG. 7

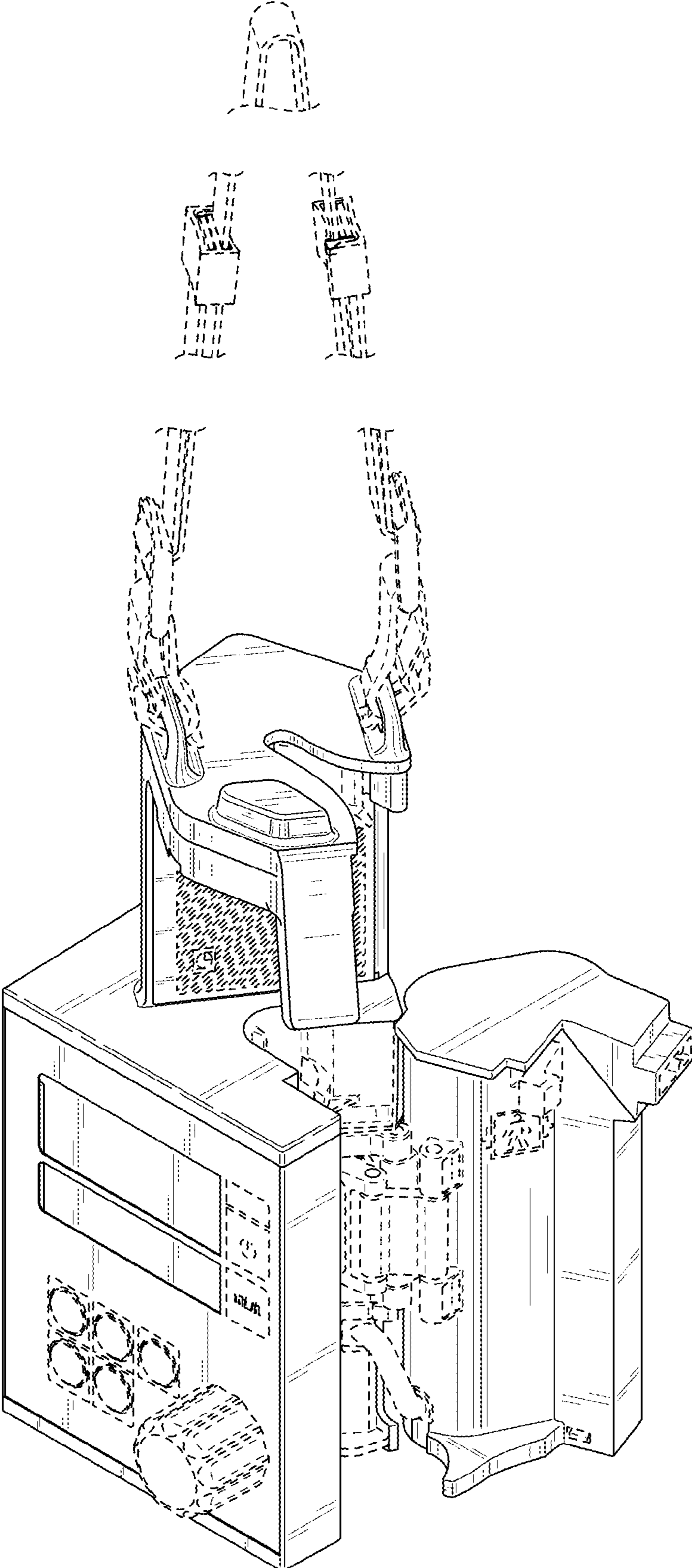


FIG. 8

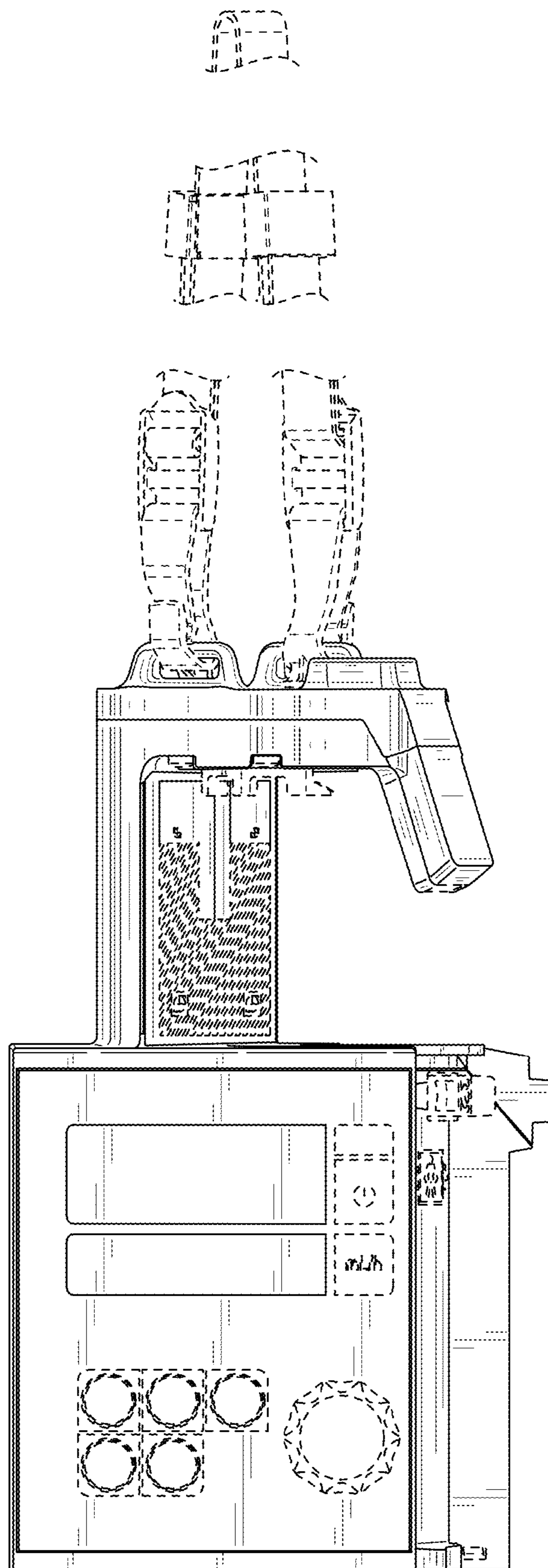


FIG. 9

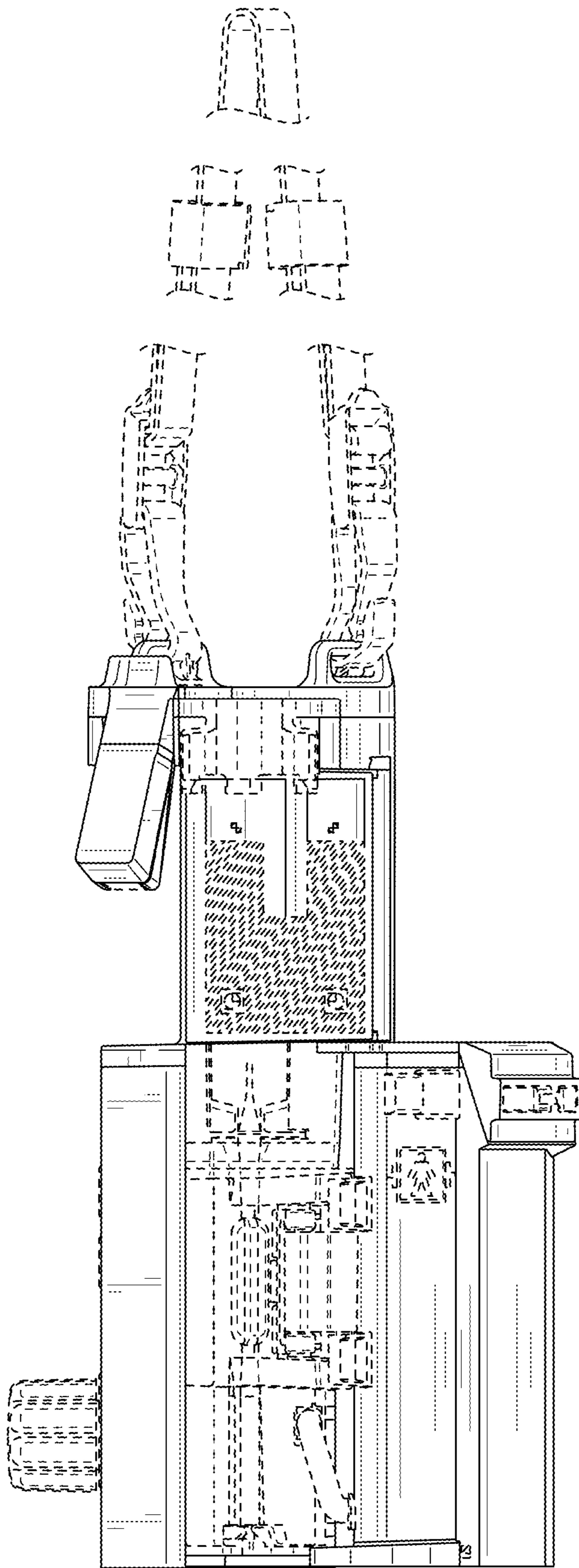


FIG. 10

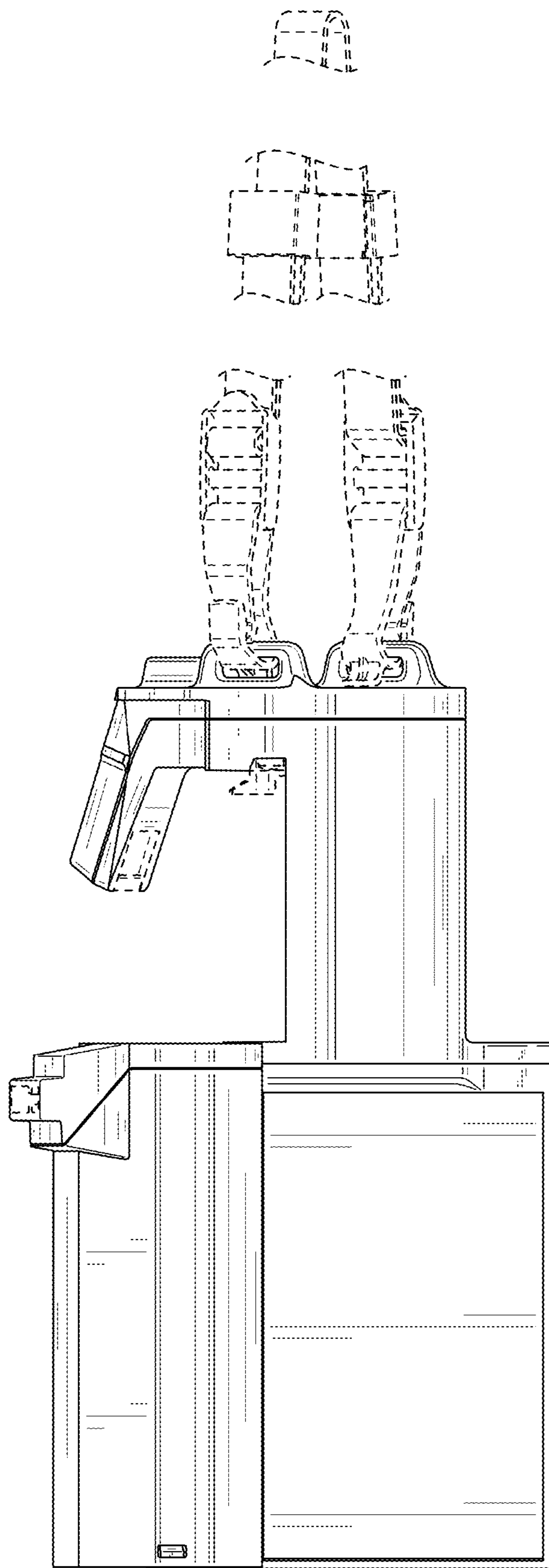


FIG. 11

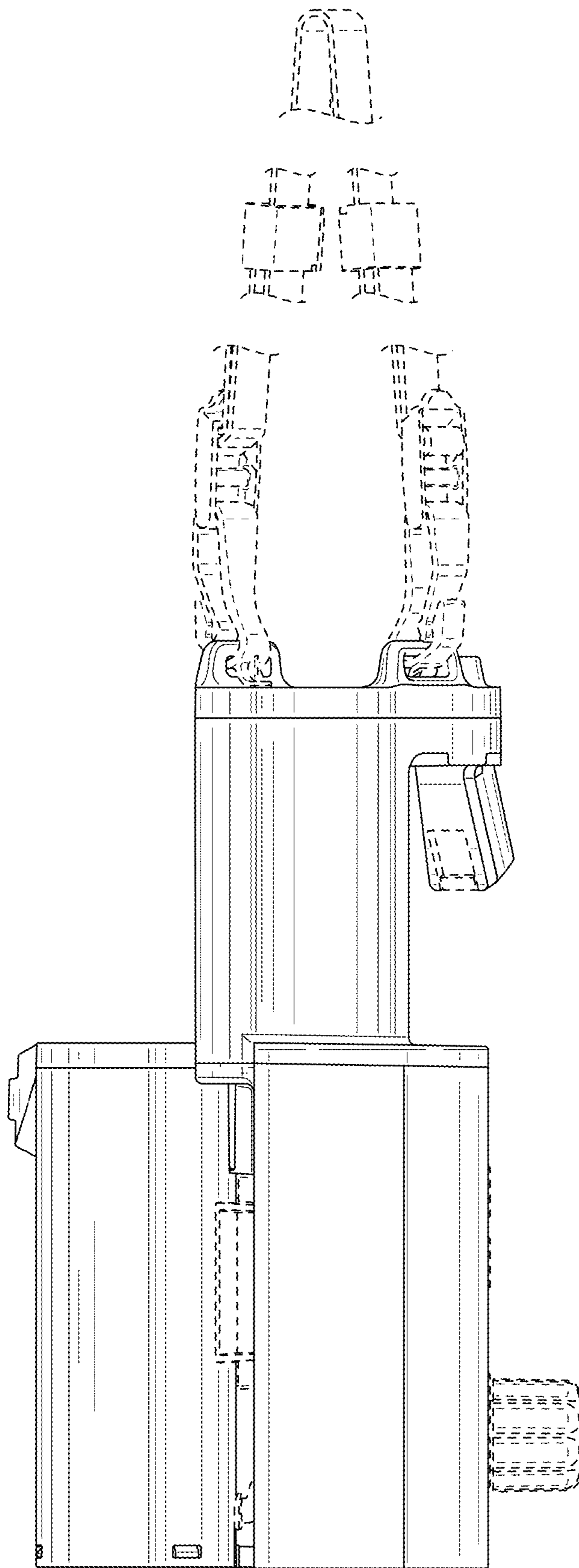


FIG. 12

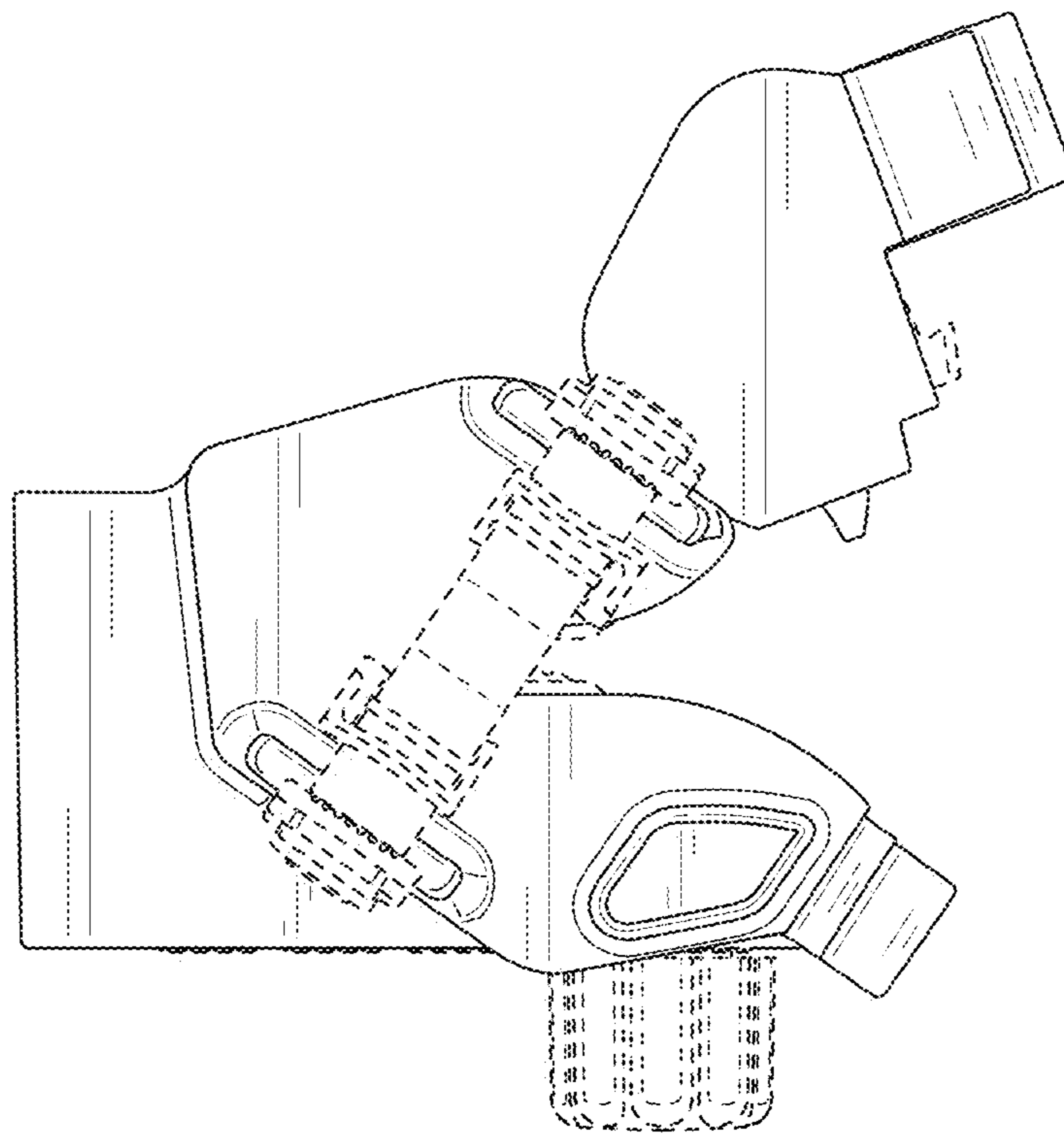


FIG. 13

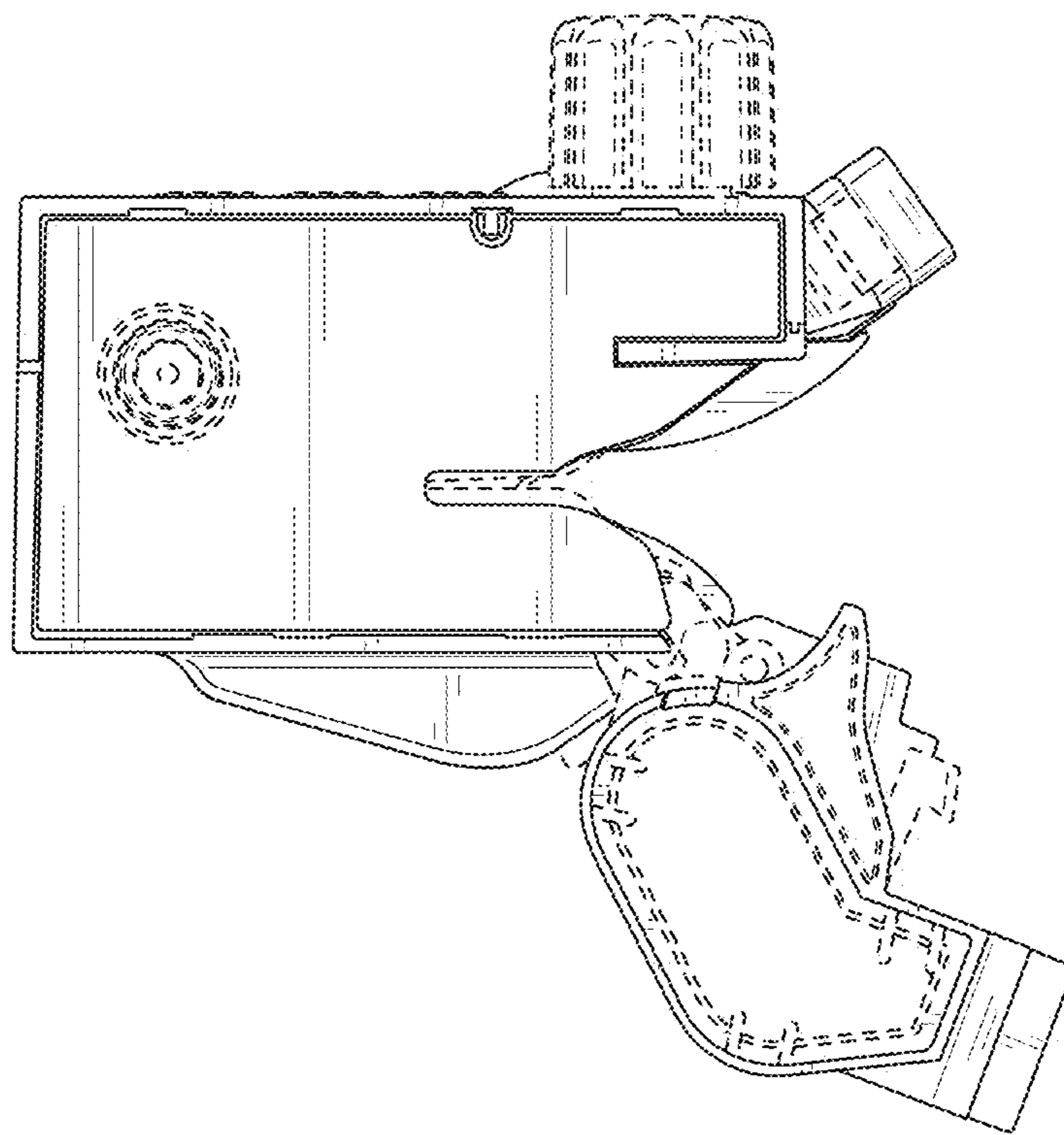


FIG. 14