



US00D779631S

(12) **United States Design Patent** (10) **Patent No.:** **US D779,631 S**
Johnson et al. (45) **Date of Patent:** **** Feb. 21, 2017**

(54) **GASIFICATION DEVICE**

6,790,360 B1 9/2004 Pedersen et al.
6,841,070 B2 1/2005 Zha et al.
6,921,483 B2 7/2005 Goldsmith et al.
7,087,170 B2 8/2006 You et al.

(71) Applicant: **Koch Membrane Systems, Inc.**,
Wilmington, MA (US)

(Continued)

(72) Inventors: **Taylor L Johnson**, Wilmington, MA
(US); **David M. Colby**, Wilmington,
MA (US)

FOREIGN PATENT DOCUMENTS

AU 765966 B2 10/2003
AU 2013202174 A1 5/2013

(73) Assignee: **KOCH MEMBRANE SYSTEMS,
INC.**, Wilmington, MA (US)

(Continued)

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

OTHER PUBLICATIONS

(21) Appl. No.: **29/543,223**

International Search Report and Written Opinion received for PCT
Patent Application No. PCT/US2015/044489, mailed on Feb. 2,
2016, 18 pages.

(22) Filed: **Oct. 22, 2015**

(Continued)

Related U.S. Application Data

(63) Continuation of application No.
PCT/US2015/044489, filed on Aug. 10, 2015.

Primary Examiner — Robin V Webster

(51) **LOC (10) Cl.** **23-01**

(57) **CLAIM**

(52) **U.S. Cl.**

The ornamental design for a gasification device, as shown
and described.

USPC **D23/209**

(58) **Field of Classification Search**

DESCRIPTION

USPC D23/207, 209; 210/650, 636

CPC B01D 65/02

See application file for complete search history.

FIG. 1 is a front, top perspective view of a gasification
device showing the new design;
FIG. 2 is a rear, bottom perspective view thereof;
FIG. 3 is a front elevation view thereof;
FIG. 4 is a left side elevation view thereof, the right side
elevation view being identical thereto;
FIG. 5 is a rear elevation view thereof;
FIG. 6 is a top plan view thereof; and,
FIG. 7 is a bottom plan view thereof.

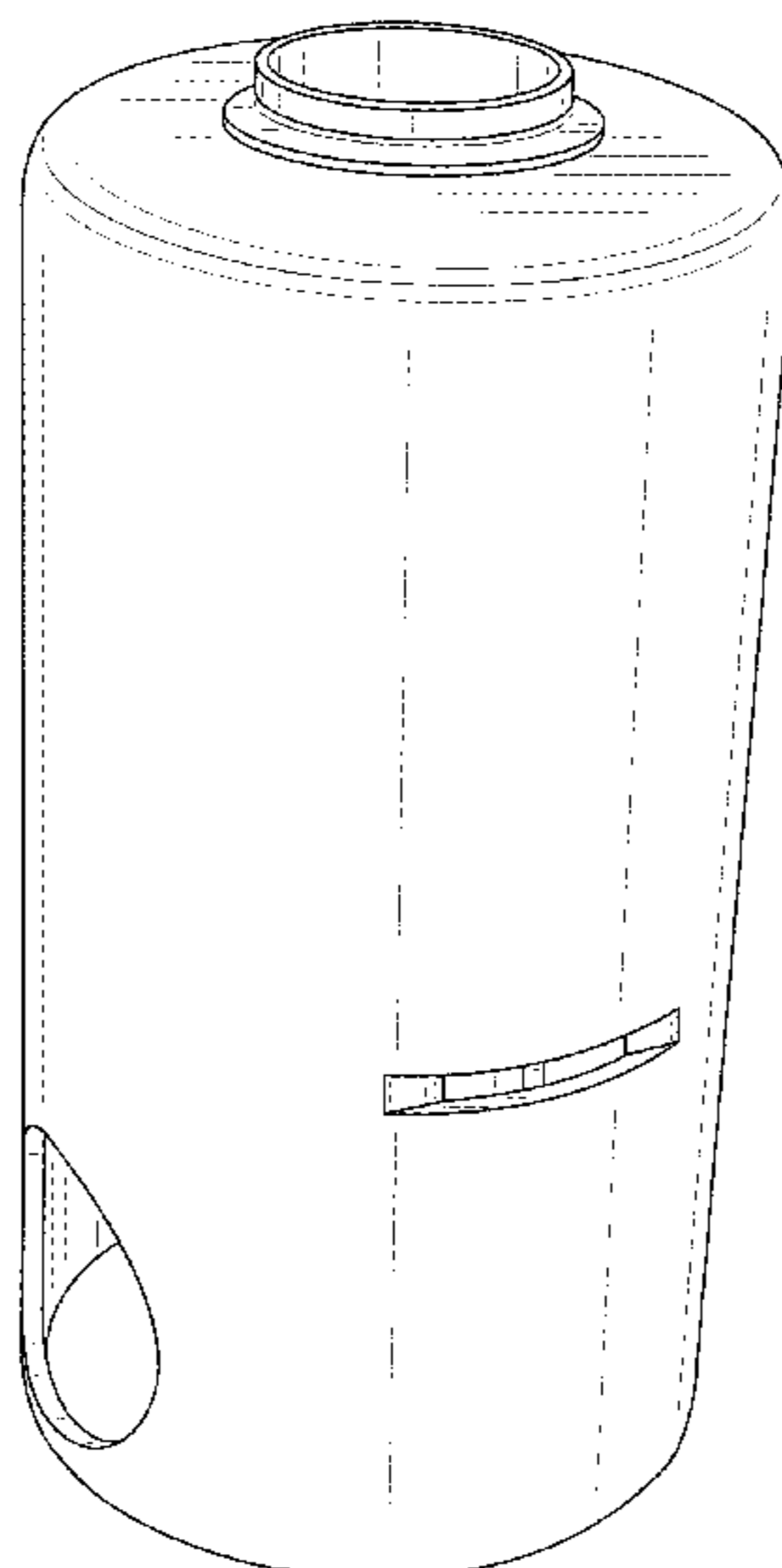
(56) **References Cited**

The broken lines shown in the drawings illustrate portions of
the gasification device that form no part of the claimed
design.

U.S. PATENT DOCUMENTS

3,068,655 A 12/1962 Murray et al.
4,828,696 A 5/1989 Makino et al.
5,770,080 A 6/1998 Malone
6,162,020 A 12/2000 Kondo
6,511,602 B1 1/2003 Miyashita et al.
6,524,481 B2 2/2003 Zha et al.
6,550,747 B2 4/2003 Rabie et al.
6,555,005 B1 4/2003 Zha et al.
D492,001 S * 6/2004 Kamata D23/209

1 Claim, 7 Drawing Sheets



(56)

References Cited

U.S. PATENT DOCUMENTS

7,311,833 B2 12/2007 Yamamoto et al.
 7,329,344 B2 2/2008 Jordan et al.
 7,361,274 B2 4/2008 Lazaredes
 7,378,024 B2* 5/2008 Bartels B01D 63/02
 210/321.69
 7,422,689 B2 9/2008 Noguchi
 7,476,322 B2 1/2009 Dimitriou et al.
 7,485,232 B2 2/2009 Yamasaki et al.
 7,575,684 B2 8/2009 Yamasaki et al.
 7,585,411 B2* 9/2009 Knappe B01D 61/14
 210/232
 7,591,950 B2 9/2009 Zha et al.
 7,641,798 B2 1/2010 Yamasaki et al.
 7,691,268 B2 4/2010 Yamasaki et al.
 7,727,394 B2* 6/2010 Kopp B01D 61/025
 210/321.72
 7,862,719 B2 1/2011 McMahon et al.
 8,038,882 B2 10/2011 Hashimoto
 8,047,808 B2 11/2011 Kondo
 8,262,911 B2 9/2012 Liao et al.
 8,287,743 B2 10/2012 Zha et al.
 8,366,929 B2 2/2013 Masutani et al.
 8,372,276 B2 2/2013 Zha et al.
 8,506,806 B2 8/2013 Beck et al.
 8,580,115 B2 11/2013 Krause et al.
 8,591,738 B2 11/2013 Toyooka et al.
 8,622,222 B2 1/2014 Zha et al.
 8,758,622 B2 6/2014 Muller
 8,790,515 B2 7/2014 Zha et al.
 8,795,526 B2* 8/2014 Matsumoto B01D 61/18
 210/236
 8,871,089 B2 10/2014 Early et al.
 D755,345 S* 5/2016 Luthi D23/209
 D756,483 S* 5/2016 Ruprecht D23/209
 2001/0027950 A1 10/2001 Rabie et al.
 2002/0162803 A1 11/2002 Haney et al.
 2003/0146153 A1 8/2003 Cote et al.
 2003/0150808 A1 8/2003 Morikawa et al.
 2004/0108268 A1 6/2004 Liu et al.
 2005/0218074 A1 10/2005 Pollock
 2006/0008865 A1 1/2006 Cote et al.
 2006/0065596 A1 3/2006 Kent et al.
 2006/0191847 A1 8/2006 Yamasaki et al.
 2006/0201876 A1 9/2006 Jordan
 2007/0007214 A1 1/2007 Zha et al.
 2007/0029258 A1 2/2007 Takeda et al.
 2007/0166171 A1 7/2007 Kondo
 2007/0187326 A1 8/2007 Bonnelye et al.
 2007/0289362 A1 12/2007 Ross et al.
 2008/0135497 A1 6/2008 Fuchs et al.
 2008/0179244 A1 7/2008 Morgan et al.
 2008/0257822 A1 10/2008 Johnson
 2009/0026139 A1 1/2009 Zha et al.
 2009/0045135 A1 2/2009 Khudenko et al.
 2009/0194477 A1 8/2009 Hashimoto
 2009/0223895 A1 9/2009 Zha et al.
 2009/0255872 A1 10/2009 Busnot et al.
 2009/0301963 A1 12/2009 Brockmann et al.
 2010/0012585 A1 1/2010 Zha et al.
 2010/0025320 A1 2/2010 Johnson
 2010/0170847 A1 7/2010 Zha et al.
 2010/0200503 A1 8/2010 Zha et al.
 2010/0300968 A1 12/2010 Liu et al.
 2011/0042311 A1 2/2011 Ames
 2011/0049047 A1 3/2011 Cumin et al.
 2011/0089013 A1 4/2011 Sakurai et al.
 2011/0100907 A1 5/2011 Zha et al.
 2011/0180475 A1 7/2011 Ahmadun et al.
 2011/0192794 A1 8/2011 Chidambaran et al.
 2012/0012524 A1 1/2012 Yang et al.
 2012/0048801 A1 3/2012 Hong et al.
 2012/0061333 A1 3/2012 Zha et al.
 2012/0091602 A1 4/2012 Cumin et al.
 2012/0223005 A1 9/2012 Toyooka et al.
 2012/0234754 A1 9/2012 Yatsugi et al.

2012/0285885 A1 11/2012 James et al.
 2012/0325741 A1 12/2012 Osborn et al.
 2012/0325742 A1 12/2012 Cumin et al.
 2013/0075322 A1 3/2013 Lee Wang
 2013/0175217 A1 7/2013 Breitner
 2013/0313190 A1 11/2013 Levy et al.
 2014/0042084 A1 2/2014 Kempson et al.
 2014/0076806 A1 3/2014 Min et al.
 2014/0083940 A1 3/2014 Zha et al.
 2014/0158618 A1 6/2014 Zha et al.
 2014/0238936 A1 8/2014 Fazel et al.
 2014/0332465 A1 11/2014 Kitagawa et al.

FOREIGN PATENT DOCUMENTS

AU 2015200091 A1 2/2015
 CN 1648071 A 8/2005
 CN 2744673 Y 12/2005
 CN 1861530 A 11/2006
 CN 101003406 A 7/2007
 CN 101028949 A 9/2007
 CN 101125281 A 2/2008
 CN 101234819 A 8/2008
 CN 101284698 A 10/2008
 CN 101293705 A 10/2008
 CN 201143420 Y 11/2008
 CN 101333035 A 12/2008
 CN 201240933 Y 5/2009
 CN 101462792 A 6/2009
 CN 101524624 A 9/2009
 CN 101591126 A 12/2009
 CN 101648763 A 2/2010
 CN 101659451 A 3/2010
 CN 201427920 Y 3/2010
 CN 101700914 A 5/2010
 CN 201458897 U 5/2010
 CN 201485304 U 5/2010
 CN 101767866 A 7/2010
 CN 101774731 A 7/2010
 CN 201520704 U 7/2010
 CN 201529493 U 7/2010
 CN 201529494 U 7/2010
 CN 101811797 A 8/2010
 CN 101811805 A 8/2010
 CN 101837246 A 9/2010
 CN 101838047 A 9/2010
 CN 101863577 A 10/2010
 CN 201678553 U 12/2010
 CN 201762146 U 3/2011
 CN 102001795 A 4/2011
 CN 102001796 A 4/2011
 CN 201785220 U 4/2011
 CN 201809262 U 4/2011
 CN 102050529 A 5/2011
 CN 201834830 U 5/2011
 CN 102101738 A 6/2011
 CN 201942597 U 8/2011
 CN 102179179 A 9/2011
 CN 102258944 A 11/2011
 CN 202046963 U 11/2011
 CN 102285713 A 12/2011
 CN 202063791 U 12/2011
 CN 202078860 U 12/2011
 CN 202089817 U 12/2011
 CN 102417234 A 4/2012
 CN 102464385 A 5/2012
 CN 102485328 A 6/2012
 CN 102491521 A 6/2012
 CN 102580545 A 7/2012
 CN 202289881 U 7/2012
 CN 102633319 A 8/2012
 CN 202390249 U 8/2012
 CN 102659241 A 9/2012
 CN 202415243 U 9/2012
 CN 202415254 U 9/2012
 CN 102698607 A 10/2012
 CN 102701434 A 10/2012
 CN 102745807 A 10/2012
 CN 202465359 U 10/2012

(56)

References Cited

FOREIGN PATENT DOCUMENTS						
CN	202465360	U	10/2012	JP	2008-259978 A	10/2008
CN	202465372	U	10/2012	JP	4160957 B2	10/2008
CN	102849858	A	1/2013	JP	2008-264664 A	11/2008
CN	102861514	A	1/2013	JP	2008-284422 A	11/2008
CN	102897900	A	1/2013	JP	2008-296087 A	12/2008
CN	102897901	A	1/2013	JP	2009-039691 A	2/2009
CN	102897902	A	1/2013	JP	2009-066469 A	4/2009
CN	202643437	U	1/2013	JP	2009-178696 A	8/2009
CN	202654945	U	1/2013	JP	4327155 B2	9/2009
CN	202808473	U	3/2013	JP	2009-247936 A	10/2009
CN	202808474	U	3/2013	JP	2009-247965 A	10/2009
CN	103011505	A	4/2013	JP	4361432 B2	11/2009
CN	103043783	A	4/2013	JP	4365734 B2	11/2009
CN	203208907	U	9/2013	JP	2009-291744 A	12/2009
CN	103570129	A	2/2014	JP	2009-297611 A	12/2009
CN	103641272	A	3/2014	JP	2010-069359 A	4/2010
CN	103663820	A	3/2014	JP	2010-082597 A	4/2010
CN	103693739	A	4/2014	JP	2010-089079 A	4/2010
CN	103755027	A	4/2014	JP	2010-094589 A	4/2010
CN	103818997	A	5/2014	JP	2010-149068 A	7/2010
CN	203602405	U	5/2014	JP	4500648 B2	7/2010
CN	203653324	U	6/2014	JP	2010-188250 A	9/2010
CN	203668118	U	6/2014	JP	2010-194481 A	9/2010
CN	103910436	A	7/2014	JP	2010-207699 A	9/2010
CN	203683208	U	7/2014	JP	2010-234342 A	10/2010
CN	203700086	U	7/2014	JP	4603395 B2	12/2010
CN	103979683	A	8/2014	JP	2011-011098 A	1/2011
CN	103979706	A	8/2014	JP	4635666 B2	2/2011
CN	203794724	U	8/2014	JP	2011-041907 A	3/2011
CN	104016474	A	9/2014	JP	2011-050905 A	3/2011
CN	203807228	U	9/2014	JP	2011-056384 A	3/2011
CN	203904065	U	10/2014	JP	2011-062632 A	3/2011
CN	104192994	A	12/2014	JP	4649529 B1	3/2011
CN	204022559	U	12/2014	JP	2011-067820 A	4/2011
CN	204039126	U	12/2014	JP	2011-078940 A	4/2011
DE	10-2005-056114	A1	5/2007	JP	2011-078949 A	4/2011
DE	10-2007-007894	A1	8/2008	JP	2011-083764 A	4/2011
DE	20-2008-015792	U1	5/2010	JP	4698274 B2	6/2011
DE	10-2013-218188	B3	12/2014	JP	4699716 B2	6/2011
EP	1629881	A1	3/2006	JP	2011-152544 A	8/2011
EP	1652572	A1	5/2006	JP	2011-177607 A	9/2011
EP	1718398	A1	11/2006	JP	2011-177608 A	9/2011
EP	2143691	A2	1/2010	JP	2011-189308 A	9/2011
GB	996195	A	6/1965	JP	4782576 B2	9/2011
GB	2512280	A	10/2014	JP	2011-194305 A	10/2011
JP	1-111494	A	4/1989	JP	2012-000585 A	1/2012
JP	2003-340250	A	12/2003	JP	2012-024647 A	2/2012
JP	2004-268023	A	9/2004	JP	4867180 B2	2/2012
JP	2004-322100	A	11/2004	JP	2012-040464 A	3/2012
JP	2005-246307	A	9/2005	JP	2012-045510 A	3/2012
JP	2005-246308	A	9/2005	JP	2012-061432 A	3/2012
JP	2005-254207	A	9/2005	JP	2012-076005 A	4/2012
JP	2005-279495	A	10/2005	JP	2012-076081 A	4/2012
JP	2006-015233	A	1/2006	JP	2012-086120 A	5/2012
JP	2006-035221	A	2/2006	JP	2012-086182 A	5/2012
JP	2006-043670	A	2/2006	JP	2012-106161 A	6/2012
JP	2006-101805	A	4/2006	JP	2012-152669 A	8/2012
JP	2006-122801	A	5/2006	JP	2012-157849 A	8/2012
JP	2006-247498	A	9/2006	JP	2012-161791 A	8/2012
JP	2006-263501	A	10/2006	JP	4996379 B2	8/2012
JP	2006-281183	A	10/2006	JP	2012-176396 A	9/2012
JP	2007-000712	A	1/2007	JP	2012-179556 A	9/2012
JP	2007-098368	A	4/2007	JP	2013-013900 A	1/2013
JP	2007-130579	A	5/2007	JP	2013-017920 A	1/2013
JP	2007-203219	A	8/2007	JP	2013-039572 A	2/2013
JP	2007-216102	A	8/2007	JP	5147267 B2	2/2013
JP	2007-253012	A	10/2007	JP	2013-052338 A	3/2013
JP	2008-086991	A	4/2008	JP	2013-052339 A	3/2013
JP	2008-194649	A	8/2008	JP	2013-052340 A	3/2013
JP	2008-212930	A	9/2008	JP	5181987 B2	4/2013
JP	2008-221133	A	9/2008	JP	5182413 B2	4/2013
JP	2008-246357	A	10/2008	JP	2013-121570 A	6/2013
JP	2008-246424	A	10/2008	JP	5203149 B2	6/2013
JP	2008-253994	A	10/2008	JP	2013-132602 A	7/2013
JP	2008-259945	A	10/2008	JP	5230071 B2	7/2013
JP				JP	2013-158764 A	8/2013
				JP	2013-163141 A	8/2013
				JP	2013-188710 A	9/2013
				JP	2013-192974 A	9/2013

(56)

References Cited

FOREIGN PATENT DOCUMENTS

JP 2013-193074 A 9/2013
 JP 2013-198867 A 10/2013
 JP 2013-202467 A 10/2013
 JP 2013-202548 A 10/2013
 JP 2013-212470 A 10/2013
 JP 2013-212496 A 10/2013
 JP 2013-233483 A 11/2013
 JP 2013-236983 A 11/2013
 JP 2013-237040 A 11/2013
 JP 2013-244455 A 12/2013
 JP 2013-248566 A 12/2013
 JP 2014-000495 A 1/2014
 JP 2014-012243 A 1/2014
 JP 5390499 B2 1/2014
 JP 2014-018781 A 2/2014
 JP 2014-028331 A 2/2014
 JP 2014-034003 A 2/2014
 JP 5423184 B2 2/2014
 JP 5497309 B2 5/2014
 JP 2014-100627 A 6/2014
 JP 2014-113511 A 6/2014
 JP 2014-128784 A 7/2014
 JP 2014-128790 A 7/2014
 JP 2014-133206 A 7/2014
 JP 2014-172014 A 9/2014
 JP 5581578 B2 9/2014
 JP 2014-188453 A 10/2014
 JP 2014-193452 A 10/2014
 JP 2014-200707 A 10/2014
 JP 2014-205110 A 10/2014
 JP 5617009 B1 10/2014
 JP 2014-231033 A 12/2014
 KR 10-0624768 B1 9/2006
 KR 10-0639824 B1 10/2006
 KR 10-0834716 B1 6/2008
 KR 10-0957047 B1 5/2010
 KR 10-1018587 B1 2/2011
 KR 10-1100715 B1 12/2011
 KR 10-1133330 B1 4/2012
 KR 10-2012-0058172 A 6/2012
 KR 2012-0138026 A 12/2012
 KR 10-2013-0082363 A 7/2013
 KR 10-1426361 B1 8/2014
 KR 2014-0103609 A 8/2014
 NZ 603143 A 3/2014
 RU 98997 U1 11/2010
 RU 2448912 C2 4/2012
 RU 121499 U1 10/2012
 RU 2537611 C2 1/2015
 TW 2008-15296 A 4/2008
 TW I348389 B 9/2011
 TW 2013-13294 A 4/2013
 WO 00/21890 A1 4/2000
 WO 2005/016826 A2 2/2005
 WO 2005/082498 A1 9/2005
 WO 2005/118116 A1 12/2005
 WO 2007/131151 A2 11/2007
 WO 2008/038436 A1 4/2008
 WO 2008/048594 A1 4/2008
 WO 2008/139836 A1 11/2008
 WO 2008/141080 A1 11/2008
 WO 2009/028435 A1 3/2009
 WO 2009/041015 A1 4/2009
 WO 2009/118787 A1 10/2009
 WO 2009/118788 A1 10/2009
 WO 2009/118789 A1 10/2009

WO 2009/145077 A1 12/2009
 WO 2010/021959 A1 2/2010
 WO 2010/035793 A1 4/2010
 WO 2010/037868 A1 4/2010
 WO 2010/056011 A2 5/2010
 WO 2010/081228 A1 7/2010
 WO 2010/101152 A1 9/2010
 WO 2010/104054 A1 9/2010
 WO 2010/120992 A1 10/2010
 WO 2011/004743 A1 1/2011
 WO 2011/041829 A1 4/2011
 WO 2011/048681 A1 4/2011
 WO 2011/052525 A1 5/2011
 WO 2011/058835 A1 5/2011
 WO 2011/065418 A1 6/2011
 WO 2011/065520 A1 6/2011
 WO 2011/108589 A1 9/2011
 WO 2011/114897 A1 9/2011
 WO 2011/116467 A1 9/2011
 WO 2011/129023 A1 10/2011
 WO 2011/130089 A1 10/2011
 WO 2011/132497 A1 10/2011
 WO 2011/158559 A1 12/2011
 WO 2012/002427 A1 1/2012
 WO 2012/079288 A1 6/2012
 WO 2012/099140 A1 7/2012
 WO 2012/117768 A1 9/2012
 WO 2012/134127 A2 10/2012
 WO 2012/139260 A1 10/2012
 WO 2012/165121 A1 12/2012
 WO 2013/001914 A1 1/2013
 WO 2013/002242 A1 1/2013
 WO 2013/008522 A1 1/2013
 WO 2013/038954 A1 3/2013
 WO 2013/048005 A1 4/2013
 WO 2013/088097 A1 6/2013
 WO 2013/103083 A1 7/2013
 WO 2013/146613 A1 10/2013
 WO 2013/146976 A1 10/2013
 WO 2013/151051 A1 10/2013
 WO 2013/167358 A1 11/2013
 WO 2013/172241 A1 11/2013
 WO 2013/176145 A1 11/2013
 WO 2013/187513 A1 12/2013
 WO 2014/003007 A1 1/2014
 WO 2014/034836 A1 3/2014
 WO 2014/103565 A1 7/2014
 WO 2014/104135 A1 7/2014
 WO 2014/110429 A1 7/2014
 WO 2014/128850 A1 8/2014
 WO 2014/128851 A1 8/2014
 WO 2014/132069 A2 9/2014
 WO 2014/157057 A1 10/2014
 WO 2014/157488 A1 10/2014
 WO 2014/192416 A1 12/2014
 WO 2014/192432 A1 12/2014
 WO 2014/192476 A1 12/2014
 WO 2014/196151 A1 12/2014
 WO 2015/008346 A1 1/2015

OTHER PUBLICATIONS

Lu et al., "The Influence of Bubble 1-32 Characteristics on the Performance of Submerged Hollow Fiber Membrane Module used in Microfiltration", Separation and Purification Technology, vol. 61, No. 1, Jun. 6, 2008, pp. 89-95.

* cited by examiner

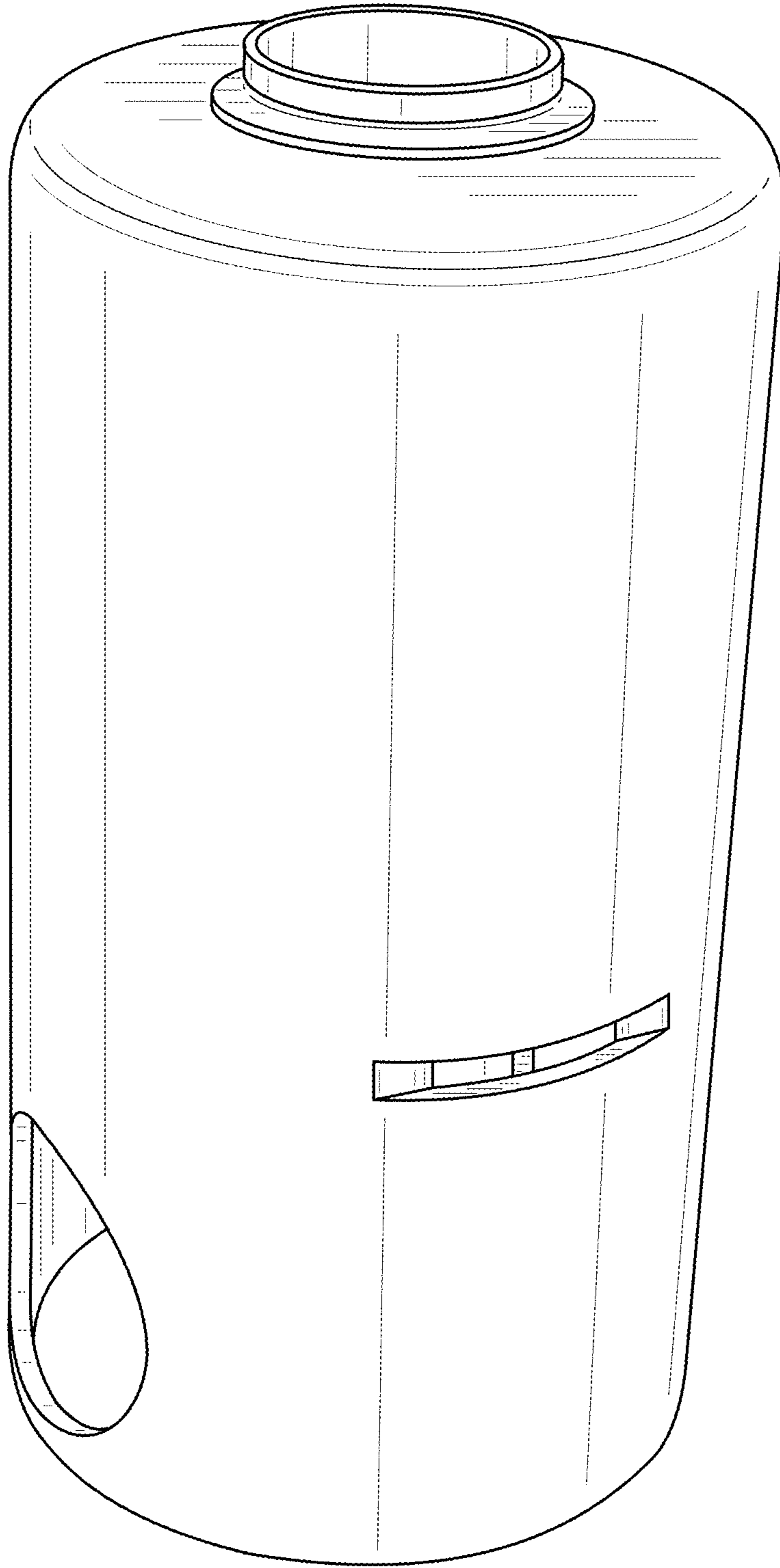


FIG. 1

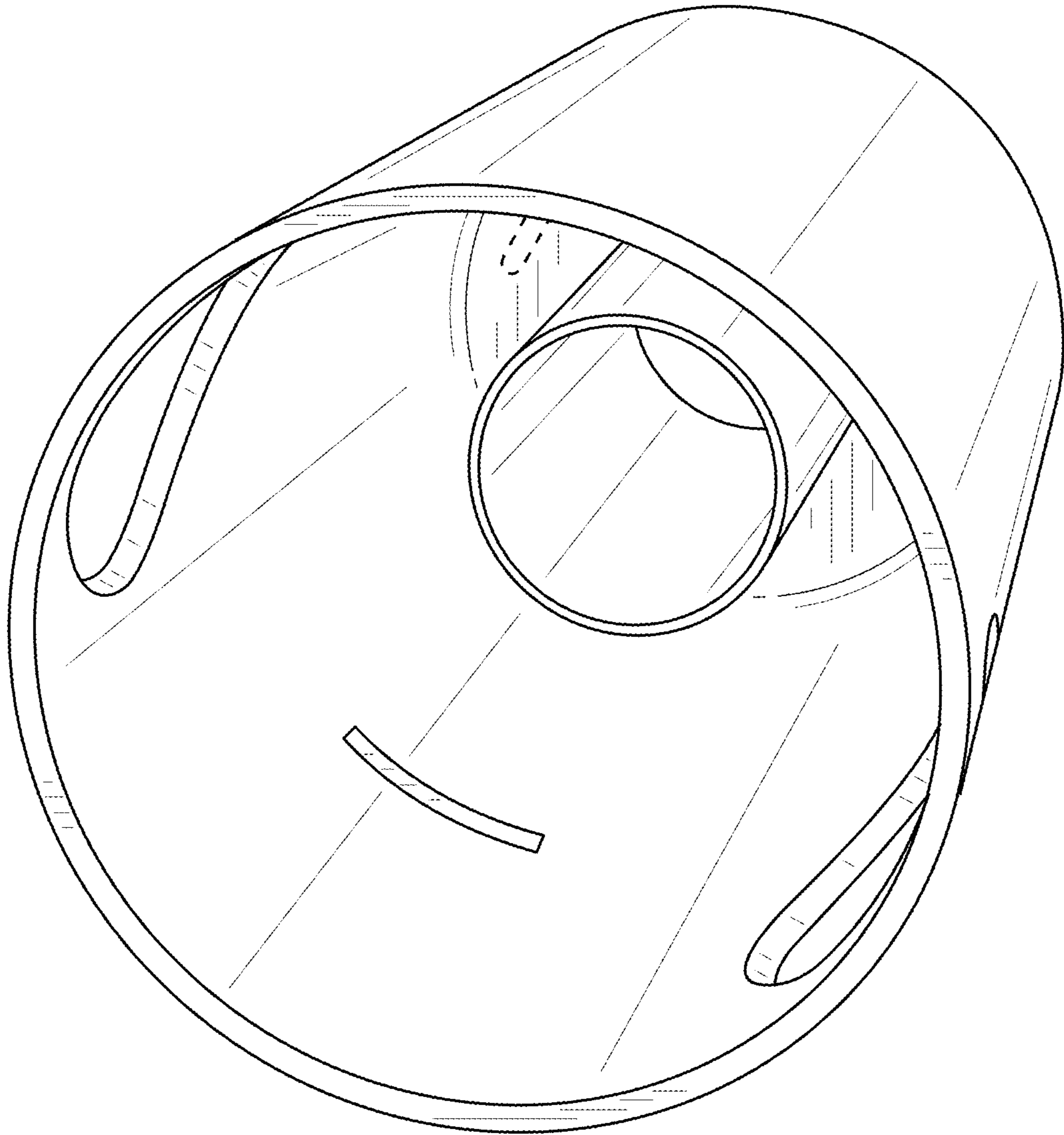


FIG. 2

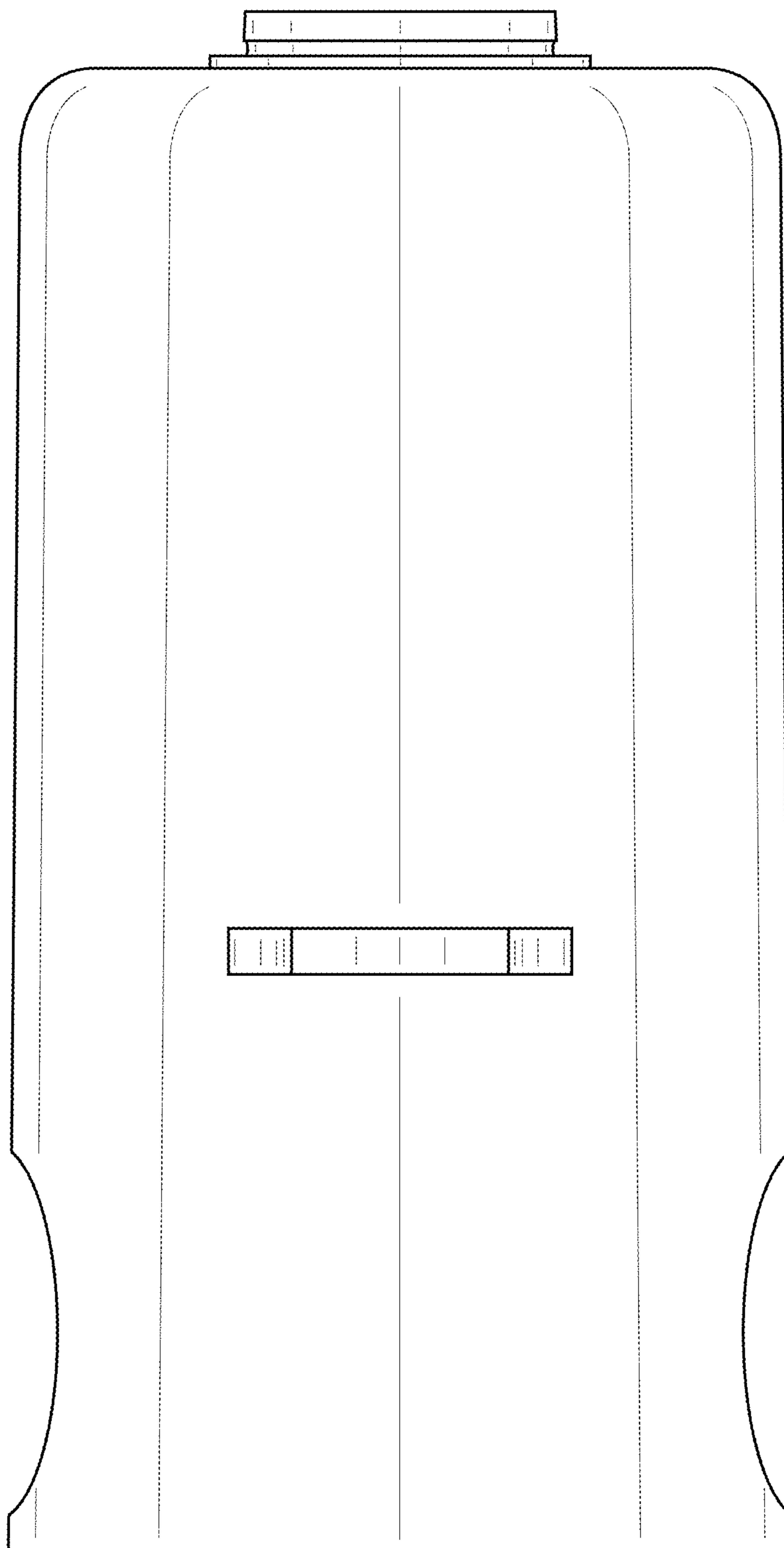


FIG. 3

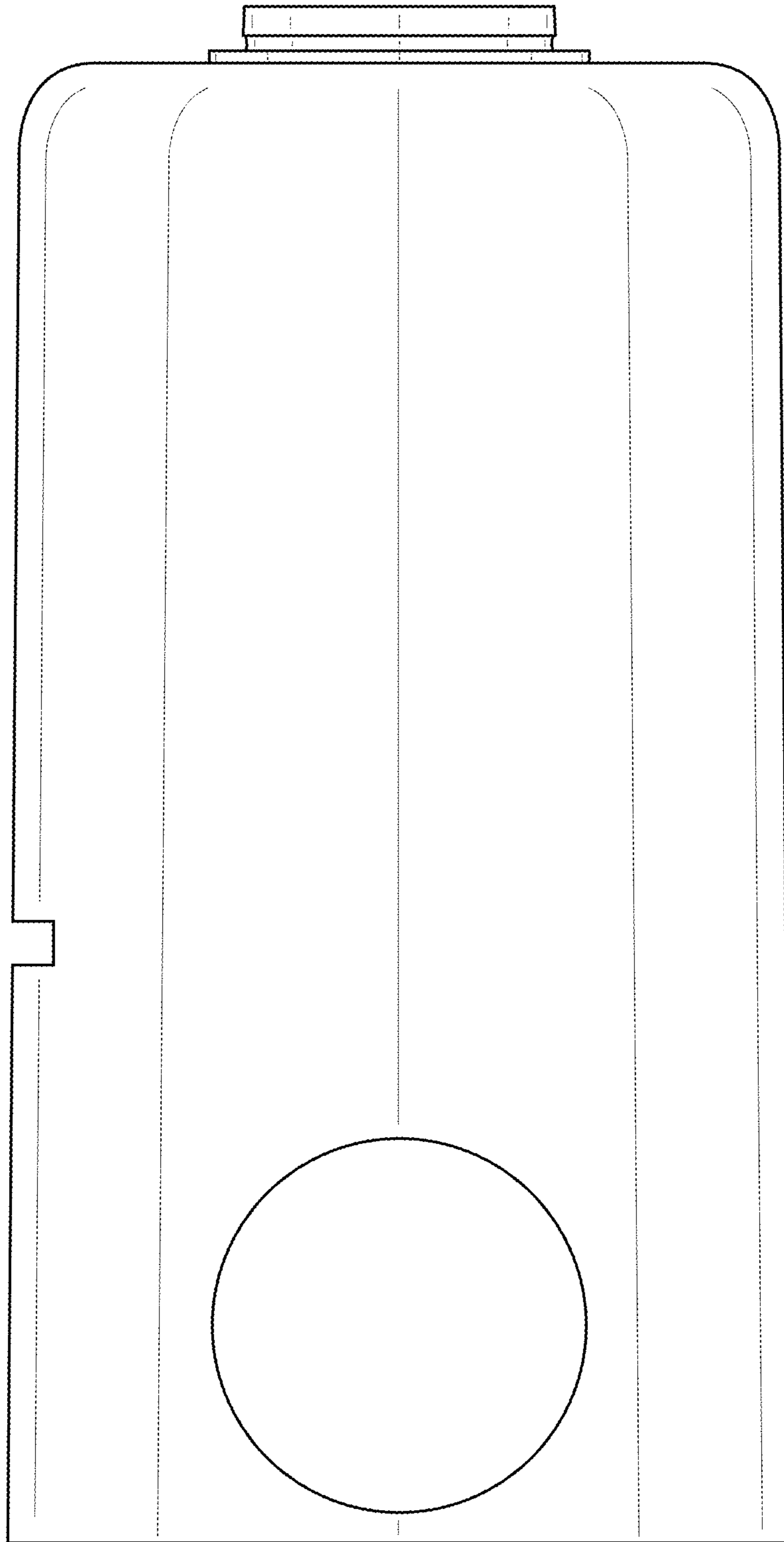


FIG. 4

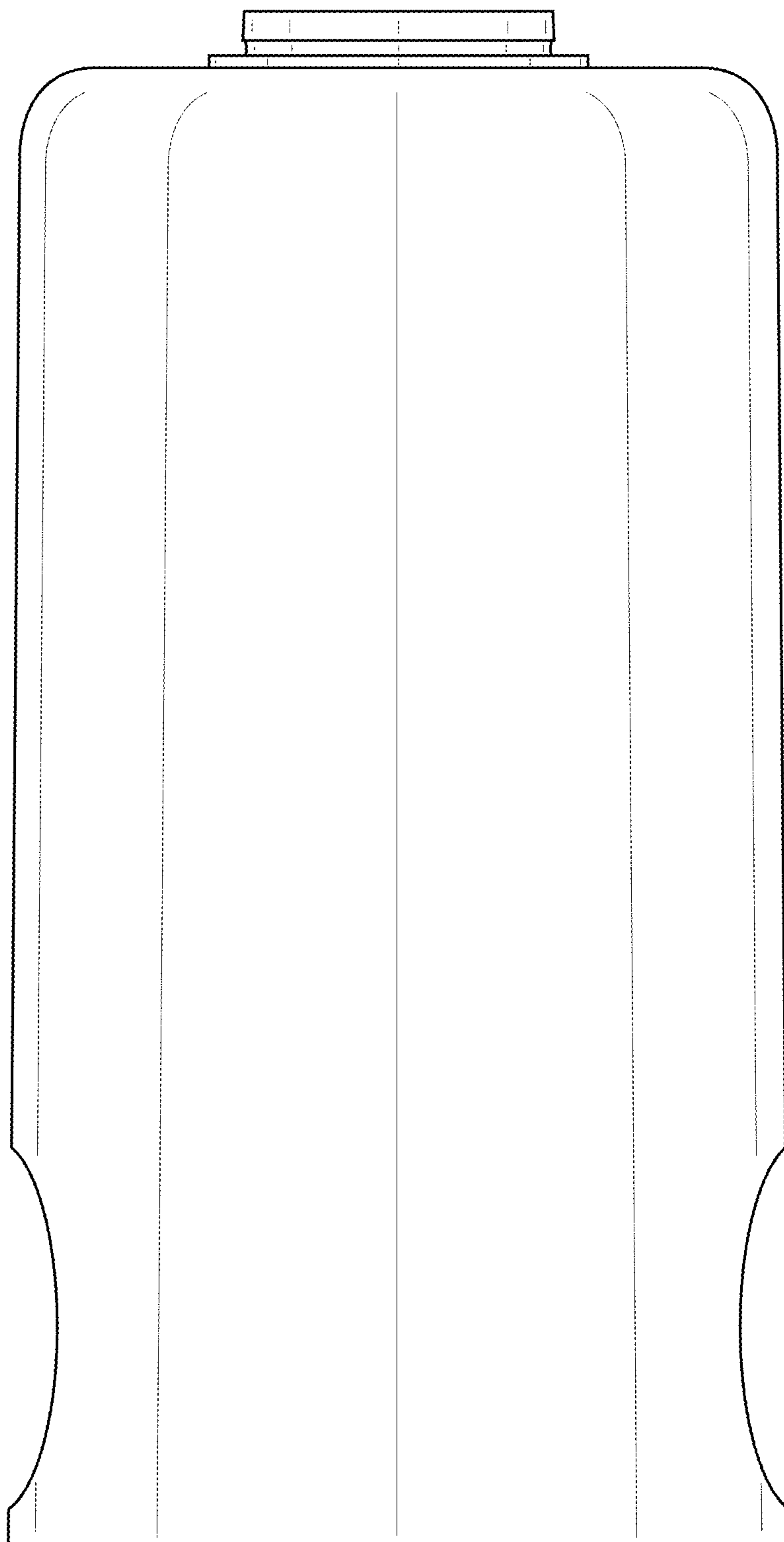


FIG. 5

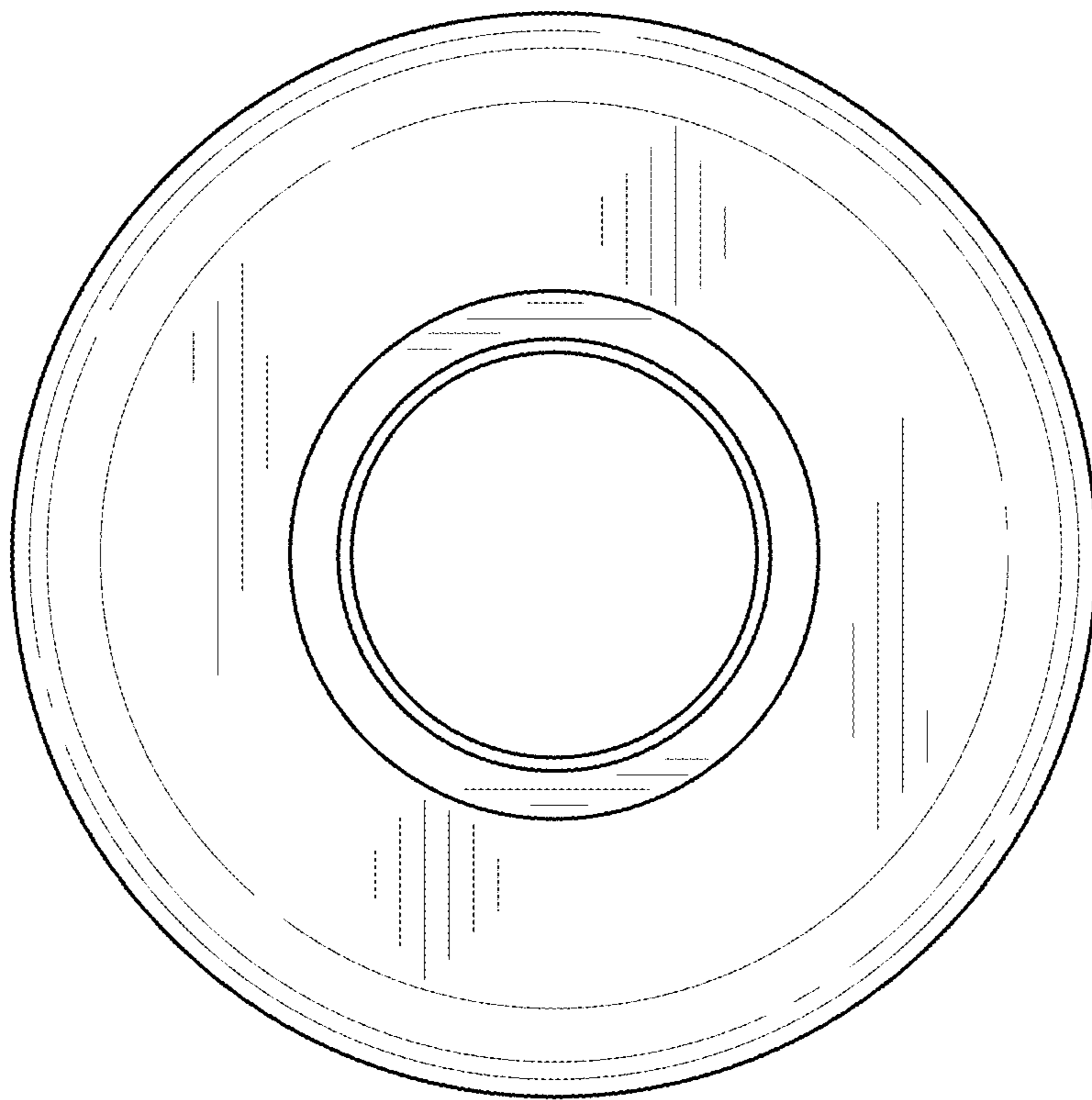


FIG. 6

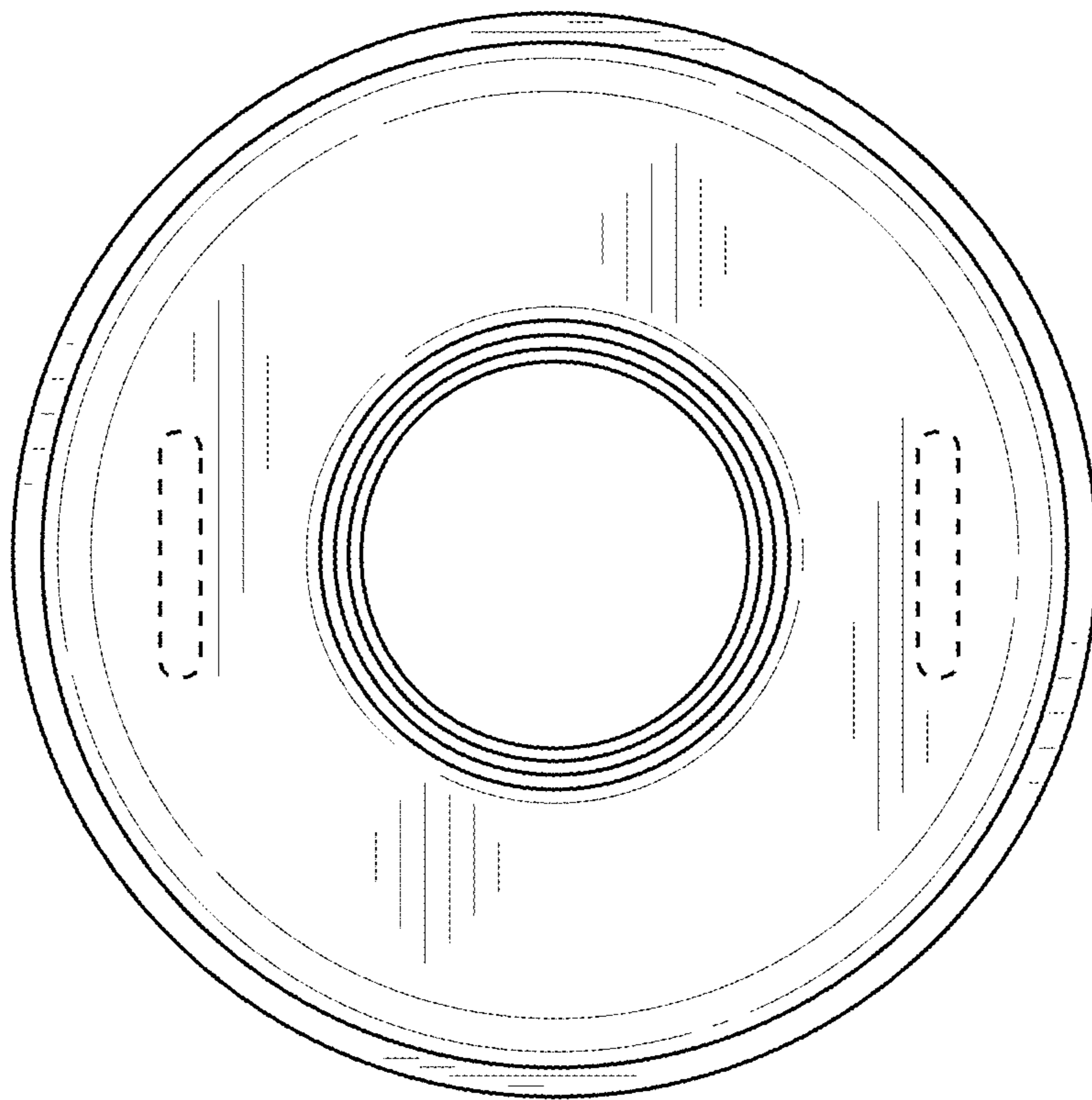


FIG. 7