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

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(54) **SEAL ASSEMBLY**

(71) Applicant: **S.P.M. Flow Control, Inc.**, Fort Worth, TX (US)

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(52) **U.S. Cl.**
USPC **D23/249**

(58) **Field of Classification Search**
CPC ... F16K 5/0673; F16K 5/0464; F16K 3/0227;
F16K 5/201; F16K 25/00; F16L 21/03;
F16L 17/025; F16L 21/025
USPC D23/233-237, 244-249; 137/68.23;
251/174, 309, 316, 314, 343; D25/137,
D25/143, 119, 120, 122, 123, 125, 138,
D25/136; 277/607, 616, 627

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

345,420 A	7/1886	Eskholme et al.
375,464 A	12/1887	Thacher et al.
580,226 A	4/1897	Sanford
741,477 A	10/1903	Flinn
1,201,022 A	10/1916	Conniff
1,379,092 A	5/1921	Fraccascia
1,452,603 A	4/1923	Himes
1,473,634 A	11/1923	Loudon
1,483,001 A	2/1924	Kurre

1,488,211 A	3/1924	Loeffler
1,543,637 A	6/1925	Woll
1,607,463 A	11/1926	Kent
1,664,493 A	4/1928	Smith
1,675,808 A	7/1928	Kliss
1,764,936 A	6/1930	Dean
1,798,498 A	3/1931	Riley
1,889,256 A	11/1932	Lipscomb
1,990,090 A	2/1935	Packard

(Continued)

FOREIGN PATENT DOCUMENTS

AU	1320088 A	9/1988
AU	649744 B2	6/1994

(Continued)

OTHER PUBLICATIONS

4" Halliburton Big Inch Clamp Connection spec sheet (1 page).

(Continued)

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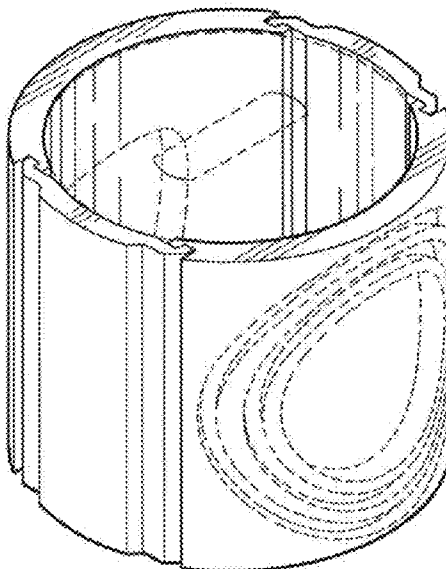
(57) **CLAIM**

The ornamental design for a seal assembly, as shown and described.

DESCRIPTION

FIG. 1 is a front perspective view of a seal assembly; FIG. 2 is a top view of the seal assembly, the bottom view being a mirror image thereof; FIG. 3 is a front elevation view of the seal assembly, the rear view being a mirror image thereof; and, FIG. 4 is right side elevation view of the seal assembly, the left side being a mirror image thereof. The broken lines in FIGS. 1 through 4 form no part of the claimed design.

1 Claim, 1 Drawing Sheet



(56)

References Cited

U.S. PATENT DOCUMENTS

2,197,320 A	4/1940	Shenton	4,254,793 A	3/1981	Scaramucci
2,310,583 A	2/1943	Johnson	4,261,387 A	4/1981	Cohn
2,310,813 A	2/1943	Sellmeyer	4,274,434 A	6/1981	Hafele
2,339,287 A	1/1944	Neef, Jr.	4,321,945 A	3/1982	Chabat-Courrede
2,354,161 A	7/1944	Waterman	4,327,768 A	5/1982	Behle
2,361,881 A	10/1944	Sheppard	4,332,370 A	6/1982	Williams
2,391,266 A	12/1945	Parker	4,338,707 A	7/1982	Byerly
2,404,142 A	7/1946	Parker	4,367,571 A	1/1983	Speirs et al.
2,506,162 A	5/1950	Metzgar	4,378,849 A	4/1983	Wilks
2,587,212 A	2/1952	Placette	4,399,830 A	8/1983	Brodie
2,606,068 A	8/1952	Bonacor	4,445,255 A	5/1984	Olejak
2,694,503 A	11/1954	Young	4,448,148 A	5/1984	Gain, Jr.
2,717,001 A	9/1955	Perrault	4,478,388 A	10/1984	George
2,746,773 A	5/1956	Bily	4,485,530 A	12/1984	Begley et al.
2,766,999 A	10/1956	Watts	4,485,843 A	12/1984	Wolff
2,795,459 A	6/1957	Cornelius	4,497,344 A	2/1985	Kisiel
2,923,317 A	2/1960	McInerney	4,501,291 A	2/1985	Siegrist
3,024,047 A	3/1962	Schmohl	4,506,696 A	3/1985	Von Pechmann
3,060,961 A	10/1962	Conley	4,511,120 A	4/1985	Conley et al.
3,061,267 A	* 10/1962	Hamer 251/172	4,524,599 A	6/1985	Bailey
3,064,940 A	11/1962	Anderson	4,531,542 A	7/1985	Looney
3,072,379 A	1/1963	Hamer	4,597,505 A	7/1986	Mozley et al.
3,113,792 A	12/1963	Brown	4,605,036 A	8/1986	Smith et al.
3,150,681 A	9/1964	Hansen	4,616,803 A	10/1986	Schils
3,160,426 A	12/1964	Faesar	4,667,570 A	5/1987	Jensen, Jr. et al.
3,204,484 A	9/1965	Gustafson et al.	4,705,306 A	11/1987	Guido et al.
3,216,746 A	11/1965	Watts	4,716,930 A	1/1988	Richmond et al.
3,241,567 A	3/1966	Pusch	4,836,240 A	6/1989	Elliott
3,294,425 A	12/1966	Franck	4,842,014 A	6/1989	Strelow et al.
3,341,232 A	9/1967	Deakins	4,848,398 A	7/1989	Leach
3,343,802 A	9/1967	Schuilwerve	4,864,696 A	9/1989	Mittermaier et al.
3,346,002 A	10/1967	Thompson, Jr. et al.	4,915,418 A	4/1990	Palatchy
3,357,679 A	12/1967	Gulick	4,969,482 A	11/1990	Perrin et al.
3,403,931 A	10/1968	Crain	4,993,489 A	2/1991	McLeod
3,425,661 A	2/1969	Mayo	5,056,548 A	10/1991	Mills
3,439,897 A	4/1969	Priese	5,143,112 A	9/1992	Scaramucci
3,455,534 A	7/1969	Scaramucci	5,161,566 A	11/1992	Scaramucci
3,467,224 A	9/1969	Curtis	5,161,570 A	11/1992	Scaramucci
3,472,479 A	10/1969	Sherwood	5,178,185 A	1/1993	Stehling et al.
3,554,581 A	1/1971	Mason	5,199,464 A	* 4/1993	Savard 138/99
3,556,474 A	1/1971	Scaramucci	5,307,835 A	5/1994	Scaramucci
3,561,727 A	2/1971	Scaramucci	5,341,840 A	8/1994	Manson et al.
3,571,896 A	3/1971	Wilkerson	5,386,847 A	2/1995	Scaramucci
3,594,835 A	7/1971	Wilson	5,417,402 A	5/1995	Speybroeck
3,630,483 A	12/1971	Canalizo	5,439,027 A	8/1995	Layton et al.
3,680,188 A	8/1972	Mason et al.	5,441,072 A	8/1995	Indey et al.
3,687,415 A	8/1972	Turkot	5,443,088 A	8/1995	Hoch et al.
3,712,585 A	1/1973	Grenier	5,477,752 A	12/1995	West et al.
3,726,314 A	4/1973	Moen	5,507,533 A	4/1996	Mumma
3,789,872 A	2/1974	Elliott	5,522,420 A	6/1996	Martin
3,813,733 A	6/1974	Flohr	5,526,883 A	6/1996	Breaux
3,840,048 A	10/1974	Moen	5,538,296 A	7/1996	Horton
3,845,876 A	11/1974	Needham et al.	5,544,675 A	8/1996	Dean
3,881,480 A	5/1975	LaFourcade	5,584,315 A	12/1996	Powell
3,894,718 A	7/1975	Koch et al.	5,685,334 A	11/1997	Hagan
3,916,950 A	11/1975	Mongerson et al.	5,689,862 A	11/1997	Hayes et al.
3,933,172 A	1/1976	Allen	5,755,427 A	5/1998	Koskinas
3,934,608 A	1/1976	Guyton	5,787,926 A	8/1998	Mukumoto et al.
3,937,240 A	2/1976	Nanny	5,791,693 A	8/1998	Crawford
3,942,551 A	3/1976	Schuller et al.	5,947,152 A	9/1999	Martin et al.
3,967,842 A	7/1976	Kendrick	5,957,592 A	9/1999	Yamanaka
3,972,364 A	8/1976	Brumm	5,983,826 A	11/1999	Lohde
3,974,848 A	8/1976	Wheatley	6,003,837 A	12/1999	Raymond, Jr. et al.
4,022,427 A	* 5/1977	Read 251/343	6,029,693 A	2/2000	Nakanishi et al.
4,027,696 A	6/1977	Guyton	6,079,439 A	6/2000	Hartley
4,046,164 A	9/1977	Pool	6,082,707 A	7/2000	Hosie et al.
4,059,872 A	11/1977	Delesandri	6,085,572 A	7/2000	McGuire, Sr. et al.
4,085,770 A	4/1978	Woronowicz	6,089,531 A	7/2000	Young
4,086,803 A	5/1978	Wheeler	6,155,091 A	12/2000	Hayes et al.
4,093,180 A	6/1978	Strabala	6,164,707 A	12/2000	Ungchusri et al.
4,113,228 A	9/1978	Frye	6,209,561 B1	4/2001	Kugelev et al.
4,150,847 A	4/1979	De Cenzo	6,240,951 B1	6/2001	Yori
4,171,095 A	10/1979	Filan et al.	6,250,605 B1	6/2001	Young
4,218,080 A	8/1980	Kendrick	6,290,237 B1	9/2001	Graupner
4,221,204 A	9/1980	Meyer	6,361,051 B1	* 3/2002	Babin 277/607
			6,371,527 B1	4/2002	Ungchusri et al.
			6,382,247 B1	5/2002	Gundry
			6,450,477 B1	9/2002	Young
			6,554,024 B2	4/2003	Mefford et al.

(56)

References Cited

U.S. PATENT DOCUMENTS

6,554,249	B2	4/2003	Pang et al.	CN	1225298	A	8/1999
6,742,538	B1	6/2004	Aderholt et al.	CN	2426550	Y	4/2001
6,843,265	B2	1/2005	Taylor	CN	2901281	Y	5/2007
6,854,704	B1	2/2005	Young	CN	201043685	Y	4/2008
6,880,567	B2	4/2005	Klaver et al.	CN	101205798	A	6/2008
6,880,568	B1	4/2005	Taylor	CN	101258350	A	9/2008
6,886,593	B2	5/2005	Madden et al.	CN	101303033	A	11/2008
6,945,569	B1	9/2005	Diaz et al.	CN	101367099	A	2/2009
6,948,526	B2	9/2005	Seder et al.	CN	201206648	Y	3/2009
6,978,799	B2	12/2005	Kugelev et al.	CN	201262043	Y	6/2009
7,004,445	B2	2/2006	Lymberopoulos	CN	101539218	A	9/2009
7,028,986	B2	4/2006	Young	CN	101722221	A	6/2010
7,204,525	B2	4/2007	Matzner	CN	201496006	U	6/2010
RE39,695	E	6/2007	Ungchusri et al.	CN	201650157	U	11/2010
7,228,869	B2	6/2007	Wilhelm	CN	201747313	U	2/2011
7,264,059	B2	9/2007	Akselberg	CN	202047762	U	11/2011
7,302,961	B2	12/2007	Martin et al.	CN	102323158	A	1/2012
7,398,796	B2	7/2008	Hjorth et al.	CN	202208237	U	5/2012
7,401,819	B2	7/2008	Gibb et al.	CN	202255848	U	5/2012
7,451,959	B2	11/2008	Matzner	DE	1166571	B	3/1964
7,458,212	B2	12/2008	Koizumi et al.	DE	2358756	A1	3/1975
7,516,941	B2	4/2009	Combs	DE	2558272	A1	7/1977
7,549,681	B1	6/2009	Matzner	DE	2642743	A1	3/1978
7,677,526	B2	3/2010	Lymberopoulos	DE	218416	A1	2/1985
7,819,386	B2	10/2010	Combs	DE	3341643	A1	5/1985
7,823,265	B2	11/2010	Matzner et al.	DE	19707228	A1	8/1998
7,890,276	B2	2/2011	Killion et al.	DE	102004033453	A1	1/2006
8,000,909	B2	8/2011	Danzy	EA	201171356	A1	5/2012
8,051,875	B2	11/2011	Edwards	EM	002185371-0001		2/2013
8,261,771	B2	9/2012	Witkowski et al.	EM	002307421-0001		9/2013
8,465,001	B2	6/2013	Witkowski et al.	EM	002307421-0002		9/2013
2002/0185867	A1	12/2002	Stachowiak	EP	44619	A1	1/1982
2002/0186910	A1	12/2002	Maret	EP	1219942	A1	7/2002
2003/0047944	A1	3/2003	Ungchusri et al.	EP	1488867	A1	12/2004
2003/0178067	A1	9/2003	Fredrickson et al.	FR	2635476	A1	2/1990
2004/0163716	A1	8/2004	Madden et al.	GB	578008	A	6/1946
2005/0121073	A1	6/2005	Carroll	GB	731895	A	6/1955
2005/0199286	A1	9/2005	Appleford et al.	GB	1536728	A	12/1978
2006/0091339	A1	5/2006	Young	GB	2056626	A	3/1981
2006/0185731	A1	8/2006	Grable et al.	GB	2117822	A	10/1983
2006/0283513	A1	12/2006	Kurian et al.	GB	2140338	A	11/1984
2007/0051411	A1	3/2007	Scaramucci et al.	GB	2185287	A	7/1987
2007/0262029	A1	11/2007	Yoshida et al.	GB	2228885	A	9/1990
2007/0272308	A1	11/2007	Spears et al.	GB	2312728	B	5/2000
2008/0054204	A1	3/2008	Zhou	GB	2355510	A	4/2001
2008/0196773	A1	8/2008	Franconi	GB	2408562	A	6/2005
2008/0308159	A1	12/2008	Stunkard	GB	2416574	B	8/2008
2009/0008934	A1	1/2009	Matzner et al.	GB	2413606	B	3/2009
2010/0154894	A1	6/2010	Kotapish et al.	GB	2444822	B	6/2011
2010/0258200	A1	10/2010	Walker et al.	GB	2452801	B	4/2012
2010/0326541	A1	12/2010	Kugelev et al.	JP	53108873	A	9/1978
2011/0036415	A1	2/2011	Lymberopoulos	JP	53125261	A	11/1978
2011/0240126	A1	10/2011	Lymberopoulos et al.	JP	08291543	A	11/1996
2011/0316274	A1	12/2011	Gronlund et al.	JP	08300052		11/1996
2012/0025114	A1	2/2012	Lymberopoulos et al.	JP	10175026		6/1998
2012/0031494	A1	2/2012	Lymberopoulos	JP	2000330646		11/2000
2012/0073670	A1	3/2012	Lymberopoulos	JP	2002098068		4/2002
2012/0091743	A1	4/2012	Ohman, III et al.	JP	2004190769	A	7/2004
2012/0219354	A1	8/2012	Bauer et al.	JP	2008215626	A	9/2008
2012/0227983	A1	9/2012	Lymberopoulos et al.	JP	05033883		9/2012
2013/0000745	A1	1/2013	Witkowski et al.	MX	2011011007	A	2/2012
2013/0020519	A1	1/2013	Lymberopoulos	MX	2011012944	A	6/2012
2013/0037125	A1	2/2013	Drake et al.	RU	1466084	C	6/1995
				RU	1417281	C	7/1995
				RU	02088831	C1	8/1997
				RU	2242313	C2	12/2004
				RU	2367770	C1	9/2009
				RU	2367771	C1	9/2009
				SG	175263	A1	11/2011
AU	348253	5/2013		SG	176534	A1	1/2012
CA	2485817	A1	4/2005	SG	D2013186	G	4/2013
CA	2490664	A1	10/2005	SU	585898	A1	12/1977
CA	2503231	A1	10/2005	SU	1391769	A1	4/1988
CA	2612397	A1	6/2008	WO	WO-9713398	A2	4/1997
CA	2636751	A1	1/2009	WO	WO-2010080636	A2	7/2010
CN	2118877	U	10/1992	WO	WO-2010123889	A2	10/2010
CN	1137309	A	12/1996	WO	WO-2010141651	A2	12/2010

(56)

References Cited

FOREIGN PATENT DOCUMENTS

WO WO-2010151680 A2 12/2010
 WO WO-2011095453 A1 8/2011
 WO WO-2013023154 A1 2/2013

OTHER PUBLICATIONS

BJ 285959-3 Inch 15,000 PSI Popoff Valve, Mar. 26, 2004 (1 page).
 BS&B Safety Systems "An Introduction to Rupture Disk Technology," Catalog 77-1001 (3 pages).
 CN OA 2010800253503 mailed Jun. 5, 2013 (8 pages).
 EP Search Report mailed Jan. 30, 2013 for EP09838004.1 (4 pages).
 Grayloc(r) Products, 3" flange diameter, Jul. 24, 2006 (2 pages).
 Harrisburg, Inc., "Reset Relief Valves" brochure, (c) 1982 (2 pages).
 HP70-001 OA for U.S. Appl. No. 06/419,141 mailed Nov. 17, 1983 (4 pages).
 HP70-006 OA for U.S. Appl. No. 08/643,239 mailed Dec. 30, 1996 (11 pages).
 HP70-011 NOA for U.S. Appl. No. 10/690,888 mailed Aug. 29, 2005 (7 pages).
 HP70-016 NOA for U.S. Appl. No. 10/833,859 mailed Jul. 6, 2005 (4 pages).
 HP70-016 OA for U.S. Appl. No. 10/833,859 mailed Dec. 22, 2004 (5 pages).
 HP70-021 NOA for U.S. Appl. No. 11/013,486 mailed Feb. 12, 2007 (4 pages).
 HP70-021 NOA for U.S. Appl. No. 11/414,984 mailed Feb. 11, 2009 (8 pages).
 HP70-021 OA for U.S. Appl. No. 11/013,486 mailed Aug. 30, 2005 (12 pages).
 HP70-022 NOA for U.S. Appl. No. 11/354,663 mailed Jun. 29, 2010 (4 pages).
 HP70-022 OA for U.S. Appl. No. 11/354,663 mailed Jan. 8, 2010 (6 pages).
 HP70-022 U.S. Appl. No. 60/653,014 (16 pages).
 HP70-023 CA 2612397 NOA mailed Dec. 20, 2012 (1 page).
 HP70-023 NOA for U.S. Appl. No. 11/638,965 mailed Sep. 23, 2008 (6 pages).
 HP70-023 OA for U.S. Appl. No. 11/638,965 mailed Apr. 4, 2008 (10 pages).
 HP70-024 Advisory Action mailed May 20, 2013 for U.S. Appl. No. 12/165,680 (3 pages).
 HP70-024 Final Office Action dated Jan. 31, 2012 for U.S. Appl. No. 12/165,680 (28 pages).
 HP70-024 Final Office Action dated Mar. 7, 2013 for U.S. Appl. No. 12/165,680 (23 pages).
 HP70-024 Office Action mailed Aug. 9, 2011 for U.S. Appl. No. 12/165,680 (18 pages).
 HP70-024 Office Action mailed Jul. 12, 2013 for U.S. Appl. No. 12/165,680 (24 pages).
 HP70-024 Office Action mailed May 31, 2011 for GB 0812086.7 (2 pages).
 HP70-024 U.S. Appl. No. 60/947,738 (12 pages).
 HP70-029 ISR and WO for PCT/US2009/068822 mailed Aug. 9, 2010 (7 pages).

HP70-029 OA for U.S. Appl. No. 12/642,541 mailed Mar. 19, 2012 (15 pages).
 HP70-036 EP Extended SR for EP10767632.2 mailed Mar. 14, 2013 (6 pages).
 HP70-036 EP SR for EP10767632.2 mailed Mar. 14, 2013 (6 pages).
 HP70-036 ISR and WO for PCT/US2010/031738 mailed Dec. 27, 2010 (7 pages).
 HP70-036 NOA for U.S. Appl. No. 12/763,786 mailed May 16, 2012 (6 pages).
 HP70-036 OA for U.S. Appl. No. 12/763,786 mailed Oct. 11, 2011 (9 pages).
 HP70-036 U.S. Appl. No. 61/170,917 (9 pages).
 HP70-036A OA for U.S. Appl. No. 13/608,562 mailed Sep. 13, 2013 (12 pages).
 HP70-037 EP Extended SR for EP10784052.2 mailed Jul. 4, 2013 (7 pages).
 HP70-037 ISR and WO for PCT/US2010/037156 mailed Jan. 13, 2011 (8 pages).
 HP70-037 NOA for U.S. Appl. No. 12/793,194 mailed Feb. 19, 2013 (10 pages).
 HP70-037 OA for U.S. Appl. No. 12/793,194 mailed Oct. 25, 2012 (8 pages).
 HP70-039 FOA for U.S. Appl. No. 12/822,900 mailed Aug. 16, 2013 (15 pages).
 HP70-039 ISR and WO for PCT/US2010/039834 Feb. 8, 2011 (6 pages).
 HP70-039 OA for U.S. Appl. No. 12/822,900 mailed Dec. 6, 2012 (20 pages).
 HP70-039 U.S. Appl. No. 61/220,067 (12 pages).
 HP70-072 IPRP for PCT/US2012/050376 mailed Jul. 15, 2013 (28 pages).
 HP70-072 ISR and WO for PCT/US2012/050376 mailed Oct. 26, 2012 (2 pages).
 HP70-072 U.S. Appl. No. 61/522,234 (23 pages).
 HP70-714 IN Exam Report for IN Design 251691 mailed Jun. 26, 2013 (2 pages).
 HP70-714 Design U.S. Appl. No. 29/429,809 (4 pages).
 HP70-720 Design U.S. Appl. No. 29/453,837 (8 pages).
 HPH70-716 Design U.S. Appl. No. 29/449,867 (8 pages).
 S.P.M. Flow Control, Inc. (Weir SPM), "Long Radius Swivel Joints," 2007 (5 pages).
 S.P.M. Flow Control, Inc., "4-Inch Integral Swivel Joint" (1 page).
 S.P.M. Flow Control, Inc., "Flow Control Products and Drilling Equipment for the Worldwide Petroleum Industry," [online] Jan. 8, 2007, <URL:www.spmflo.com>.
 S.P.M. Flow Control, Inc., "High-Pressure Long Radius Swivel Joints," 2002, www.spmflo.com (1 page).
 S.P.M. Flow Control, Inc., "Long Radius Swivel Joints, H2S, Operating and Maintenance Instructions," 1999 (6 pages).
 S.P.M. Flow Control, Inc., "Long Radius Swivel Joints, Operating and Maintenance Instructions," 2004 (4 pages).
 S.P.M. Flow Control, Inc., "Long Radius Swivel Joints, Operating and Maintenance Instructions," 2006 (6 pages).
 S.P.M. Flow Control, Inc., "Swivel Joints," 1999 (1 page).
 S.P.M. Flow Control, Inc., Valve Illustration Retsco (1 page).
 SPM "Emergency Relief Valve Brochure" 1997 (4 pages).
 Venture Oilfield Services, Ltd., Oilfield Drawing (1 page).

* cited by examiner

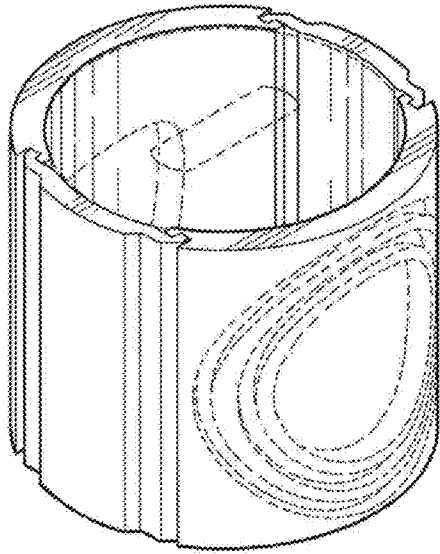


FIG. 1

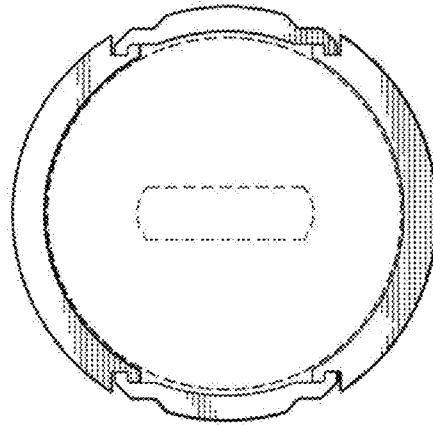


FIG. 2

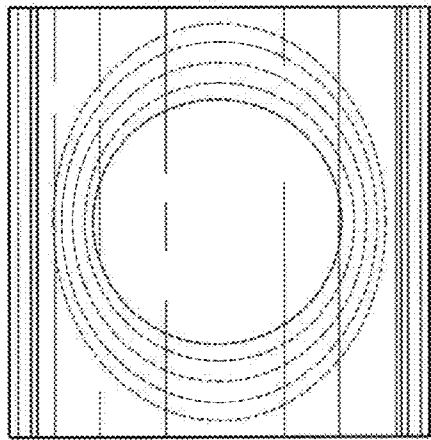


FIG. 3

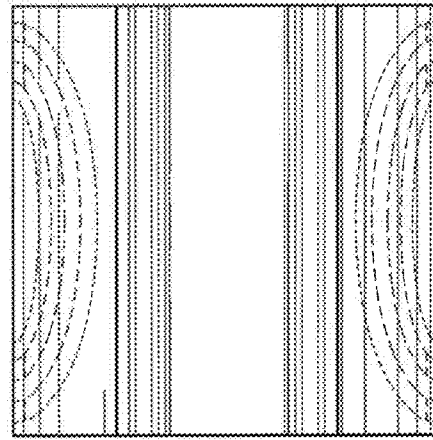


FIG. 4