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(12) United States Design Patent

Byrne et al.

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(54) **POWER END FRAME SEGMENT**

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USPC **D15/9**

(58) **Field of Classification Search**
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(56) **References Cited**

U.S. PATENT DOCUMENTS

364,627 A 6/1887 Arnold
879,560 A 2/1908 Lepley
(Continued)

FOREIGN PATENT DOCUMENTS

BR 8700642 A 8/1988
CA 2486126 A1 10/2005
(Continued)

OTHER PUBLICATIONS

"Simatool bearing handling tool BHT," Simatec Smart Technologies; Dec. 19, 2013; http://www.simatec.com/products/simatool/bearingahandlingtool/.
(Continued)

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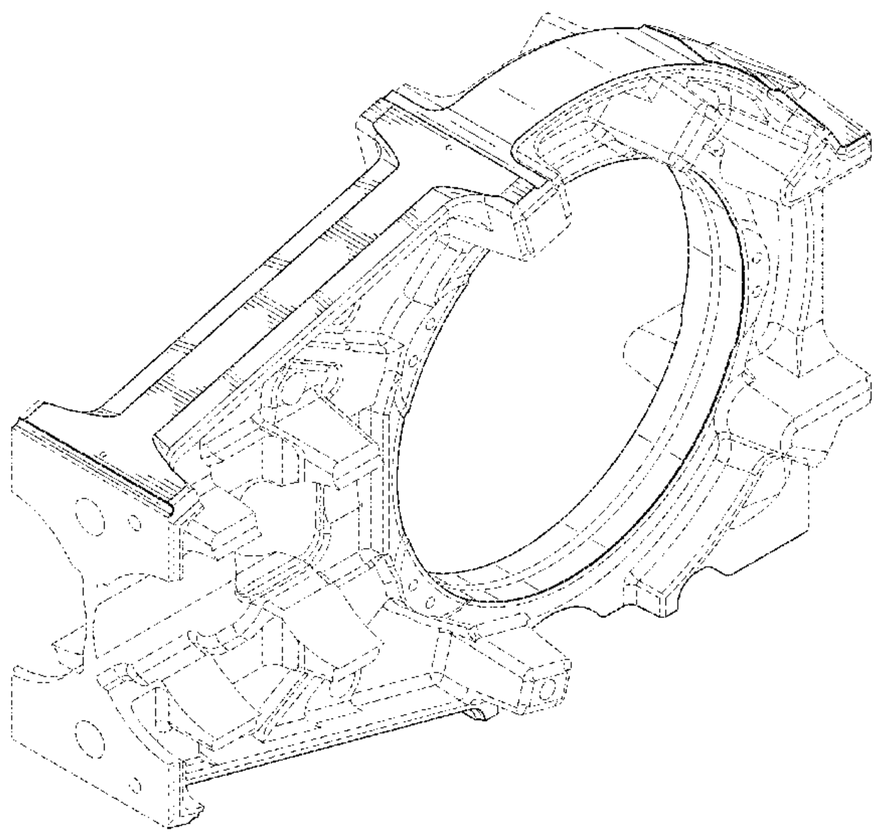
(57) **CLAIM**

The ornamental design for a power end frame segment, as shown and described.

DESCRIPTION

FIG. **1** is a front perspective view of a power end frame segment;
FIG. **2** is a front view of the power end frame segment;
FIG. **3** is a rear view of the power end frame segment;
FIG. **4** is left side view of the power end frame segment, the right side view being a mirror image thereof;
FIG. **5** is a top view of the power end frame segment; and,
FIG. **6** is a bottom view of the power end frame segment.
The broken lines in FIGS. **1** through **6** form no part of the claimed design.
Although FIGS. A-F form no part of the claimed design, FIGS. A through F depict a power end frame segment that includes the claimed design. FIG. A is a front perspective view of the power end frame segment. FIG. B is a front view of the power end frame segment. FIG. C is a rear view of the power end frame segment. FIG. D is a left side view of the power end frame segment, the right side view being a mirror image thereof. FIG. E is a top view of the power end frame segment. FIG. F is a bottom view of the power end frame segment.

1 Claim, 4 Drawing Sheets



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(58) **Field of Classification Search**
CPC F02M 37/04; F02M 37/14
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,418,202	A	5/1922	Parsons	
1,596,037	A	8/1926	Warner	
1,707,228	A	4/1929	Knapp	
1,867,585	A	7/1932	Moore	
1,890,428	A	12/1932	Ferris et al.	
1,899,743	A	2/1933	Berry	
1,926,925	A	9/1933	Wescott	
2,056,622	A	10/1936	Schaer	
2,420,779	A	5/1947	Holmes	
2,428,602	A	10/1947	Yingling	
2,443,332	A	6/1948	Summers	
2,665,555	A	1/1954	Martinsson	
2,682,433	A	6/1954	Maier	
2,729,117	A	1/1956	Maybach	
2,755,739	A	7/1956	Euwe	
2,766,701	A	10/1956	Giraudeau	
2,823,085	A	2/1958	Keylwert	
2,828,931	A	4/1958	Harvey	
2,878,990	A	3/1959	Zurcher	
2,991,003	A	7/1961	Petersen	
3,039,317	A	6/1962	Wilson	
3,049,082	A	8/1962	Barry	
3,137,179	A	6/1964	Moorhead	
3,158,211	A	11/1964	McCue	
3,163,474	A	12/1964	Wilson	
3,168,665	A	2/1965	Holper	
3,179,451	A	4/1965	Blank	
3,206,242	A	9/1965	Fensin	
3,207,142	A	9/1965	Gorissen et al.	
3,236,315	A	2/1966	Lora	
3,238,892	A	3/1966	Coberly	
3,356,036	A	12/1967	Repp	
3,358,352	A	12/1967	Wilcox	
3,487,892	A	1/1970	Kiefer	
3,595,101	A	7/1971	Cooper, Sr.	
3,656,582	A	4/1972	Alcock	
3,757,149	A	9/1973	Holper	
3,760,694	A	9/1973	Lieb	
3,880,604	A	4/1975	Hawkins	
3,883,941	A	5/1975	Coil	
3,967,542	A	7/1976	Hall et al.	
4,013,057	A	3/1977	Guenther	
4,048,909	A	9/1977	Jepsen	
4,099,447	A	7/1978	Ogles	
4,140,442	A	2/1979	Mulvey	
4,191,238	A	3/1980	Pichl	
4,209,079	A	6/1980	Marchal et al.	
4,210,399	A	7/1980	Jain	
4,211,190	A	7/1980	Indech	
4,246,908	A	1/1981	Inagaki et al.	
4,269,569	A	5/1981	Hoover	
4,338,054	A	7/1982	Dahl	
4,381,179	A	4/1983	Pareja	
4,388,837	A	6/1983	Bender	
4,476,772	A	10/1984	Gorman et al.	
4,477,237	A	10/1984	Grable	
4,494,415	A	1/1985	Elliston	
4,512,694	A	4/1985	Foran et al.	
4,553,298	A	11/1985	Grable	
4,606,709	A	8/1986	Chisolm	
4,667,627	A	5/1987	Matsui et al.	
4,705,459	A	11/1987	Buisine et al.	
4,729,249	A	3/1988	Besic	
4,762,051	A	8/1988	Besic et al.	
4,771,801	A	9/1988	Crump et al.	
4,803,964	A	2/1989	Kurek et al.	
4,809,646	A	3/1989	Paul et al.	
4,824,342	A	4/1989	Buck	
4,842,039	A	6/1989	Kelm	
4,876,947	A	10/1989	Rhodes	
4,887,518	A	12/1989	Hayakawa	
4,939,984	A	7/1990	Fletcher-Jones	
4,950,145	A	8/1990	Zanetos et al.	
4,966,109	A	10/1990	Pusic et al.	
5,031,512	A	7/1991	Graziani	
5,033,177	A	7/1991	Gathright et al.	
5,060,603	A	10/1991	Williams	
5,063,775	A	11/1991	Walker, Sr. et al.	
5,076,220	A	12/1991	Evans et al.	
5,078,580	A	1/1992	Miller et al.	
5,080,319	A	1/1992	Nielsen	
5,115,725	A	5/1992	Horiuchi	
5,135,031	A	8/1992	Burgess et al.	
5,156,534	A	10/1992	Burgy et al.	
5,159,743	A	11/1992	Somerville	
5,165,160	A	11/1992	Poncelet	
5,216,943	A	6/1993	Adler et al.	
5,246,355	A	9/1993	Matzner et al.	
5,247,873	A	9/1993	Owens et al.	
5,287,612	A	2/1994	Paddock et al.	
5,313,061	A	5/1994	Drew et al.	
5,337,612	A	8/1994	Evans	
5,370,093	A	12/1994	Hayes	
5,425,306	A	6/1995	Binford	
5,560,332	A	10/1996	Chang	
5,594,665	A	1/1997	Walter et al.	
5,658,250	A	8/1997	Blomquist et al.	
5,671,655	A	9/1997	Vollrath	
5,673,666	A	10/1997	Beardmore et al.	
5,682,851	A	11/1997	Breen et al.	
5,772,403	A	6/1998	Allison et al.	
5,839,888	A	11/1998	Harrison	
5,846,056	A	12/1998	Dhindsa et al.	
5,855,397	A	1/1999	Black et al.	
5,984,645	A	11/1999	Cummings	
6,260,004	B1	7/2001	Hays et al.	
6,330,525	B1	12/2001	Hays et al.	
6,419,459	B1	7/2002	Sibbing	
6,557,457	B1	5/2003	Hart et al.	
6,581,261	B1	6/2003	Chen	
6,663,349	B1	12/2003	Discenzo et al.	
6,697,741	B2	2/2004	Yu et al.	
6,718,955	B1	4/2004	Knight	
D495,342	S	8/2004	Tojo et al.	
D496,670	S	9/2004	Ohnishi	
6,853,110	B1	2/2005	Durham et al.	
6,859,740	B2	2/2005	Stephenson et al.	
6,873,267	B1	3/2005	Tubel et al.	
6,882,960	B2	4/2005	Miller	
7,044,216	B2	5/2006	Otten et al.	
7,111,604	B1	9/2006	Hellenbroich et al.	
D538,824	S	3/2007	Tojo	
7,219,594	B2	5/2007	Kugelev et al.	
7,220,119	B1	5/2007	Kirchmer et al.	
7,272,533	B2	9/2007	Schlosser	
7,364,412	B2	4/2008	Kugelev et al.	
7,374,005	B2	5/2008	Gray, Jr.	
7,404,704	B2	7/2008	Kugelev et al.	
D591,311	S	4/2009	Tojo	
7,588,384	B2	9/2009	Yokohara	
7,610,847	B2	11/2009	McKelroy	
7,621,179	B2	11/2009	Ens et al.	
7,623,986	B2	11/2009	Miller	
7,866,153	B2	1/2011	Sollie et al.	
7,931,078	B2	4/2011	Toporowski et al.	
8,100,048	B2	1/2012	Christopher	
8,162,631	B2	4/2012	Patel et al.	
D658,684	S	5/2012	Roman	
D668,266	S *	10/2012	Ramirez, Jr.	D15/7
D670,312	S	11/2012	Alexander et al.	
D676,875	S *	2/2013	Ramirez, Jr.	D15/7
8,376,723	B2	2/2013	Kugelev et al.	
D678,628	S	3/2013	Krueger	
D678,911	S	3/2013	Prevost	
D682,317	S	5/2013	Carruth et al.	

(56) **References Cited**

U.S. PATENT DOCUMENTS

D685,393	S	7/2013	Prevost	
8,529,230	B1	9/2013	Colley, III et al.	
D692,026	S	10/2013	Alexander et al.	
8,561,760	B2	10/2013	Yoshikawa et al.	
D693,200	S	11/2013	Saunders	
D698,502	S	1/2014	Krueger	
D700,622	S	3/2014	Carruth et al.	
8,707,853	B1 *	4/2014	Dille	F04B 53/14 92/165 R
D704,385	S	5/2014	Hoofman	
D708,401	S	7/2014	Krueger	
D713,101	S	9/2014	Bruno et al.	
8,833,301	B2	9/2014	Donegan et al.	
8,833,302	B2	9/2014	Donegan et al.	
8,857,374	B1	10/2014	Donegan et al.	
D759,728	S *	6/2016	Byrne	D15/9
2002/0020460	A1	2/2002	Viken	
2002/0046905	A1	4/2002	Hulkkonen et al.	
2002/0189587	A1	12/2002	Hirano	
2003/0024386	A1	2/2003	Burke	
2003/0079604	A1	5/2003	Seo	
2003/0118104	A1	6/2003	Zaccarin	
2004/0213677	A1	10/2004	Matzner et al.	
2004/0219040	A1	11/2004	Kugelev et al.	
2004/0244577	A1	12/2004	Haughom	
2006/0029502	A1	2/2006	Kugelev et al.	
2007/0041847	A1	2/2007	Inoue et al.	
2007/0041849	A1	2/2007	Allen	
2007/0099746	A1	5/2007	Hahlbeck	
2007/0131839	A1	6/2007	Dunn et al.	
2007/0144842	A1	6/2007	Zhou	
2008/0006148	A1	1/2008	McKelroy	
2008/0078583	A1	4/2008	Cummins	
2008/0213115	A1	9/2008	Hilger et al.	
2008/0271562	A1	11/2008	Yasuhara et al.	
2009/0084260	A1	4/2009	Christopher	
2009/0092510	A1	4/2009	Williams et al.	
2010/0044028	A1	2/2010	Brooks	
2010/0129245	A1	5/2010	Patel et al.	
2010/0129249	A1 *	5/2010	Bianchi	F02F 7/0007 417/521
2010/0158726	A1 *	6/2010	Donald	F04B 9/042 417/437
2010/0160710	A1	6/2010	Strickland	
2010/0172778	A1	7/2010	Kugelev et al.	
2010/0242720	A1	9/2010	Matzner et al.	
2010/0260631	A1	10/2010	Kugelev et al.	
2010/0322802	A1	12/2010	Kugelev	
2012/0141305	A1	6/2012	Landers et al.	
2012/0144995	A1 *	6/2012	Bayyouk	F04B 1/0456 91/472
2012/0148430	A1	6/2012	Hubenschmidt et al.	
2012/0167759	A1	7/2012	Chinthan et al.	
2012/0272764	A1	11/2012	Pendleton	
2013/0064696	A1	3/2013	McCormick et al.	
2013/0112074	A1	5/2013	Small	
2013/0195701	A1	8/2013	Skurdalsvold et al.	
2013/0206108	A1	8/2013	Schule et al.	
2013/0233165	A1	9/2013	Matzner et al.	
2013/0264761	A1	10/2013	Dagenais	
2014/0013769	A1	1/2014	Martin et al.	
2014/0147291	A1	5/2014	Burnette	
2014/0196570	A1	7/2014	Small et al.	
2014/0322050	A1	10/2014	Marette et al.	
2015/0377318	A1	12/2015	Byrne	
2016/0025082	A1	1/2016	Byrne et al.	
2016/0025088	A1	1/2016	Byrne et al.	
2016/0025089	A1	1/2016	Kumar et al.	
2016/0025090	A1 *	1/2016	Bayyouk	F04B 7/0069 92/161

FOREIGN PATENT DOCUMENTS

CA	2686204	A1	5/2010
CA	2749110	A1	7/2010
CA	153846	S	9/2014
CN	2436688		6/2001
CN	2436688	Y	6/2001
CN	2612816	Y	4/2004
CN	2674183	Y	1/2005
CN	2705626	Y	6/2005
CN	2758526	Y	2/2006
CN	1908435	A	2/2007
CN	2900853	Y	5/2007
CN	2926584	Y	7/2007
CN	101012821	A	8/2007
CN	200964929	Y	10/2007
CN	201092955	Y	7/2008
CN	101356399	A	1/2009
CN	101476558	A	7/2009
CN	201610828	U	10/2010
CN	201836038	U	5/2011
CN	201874803	U	6/2011
CN	102374159	A	3/2012
CN	202186832		4/2012
CN	102439314	A	5/2012
CN	102652223	A	8/2012
CN	202493418	U	10/2012
CN	202707463	U	1/2013
CN	102959244	A	3/2013
CN	203067205	U	7/2013
CN	103403351	A	11/2013
CN	2009100265839		4/2014
CN	ZL201330555622.7		5/2014
CN	103850908	A	6/2014
CN	104204519	A	12/2014
CN	105264275	A	1/2016
DE	975401	C	11/1961
DE	1191069	B	4/1965
DE	3234504	A1	4/1983
DE	3441508	A1	5/1986
DE	3802714	A1	8/1988
DE	4416120	A1	11/1995
DE	19653164	C2	3/2000
DE	20120609	U1	3/2002
DE	10129046	B4	1/2006
EP	0300905	A1	1/1989
EP	0449278	A1	10/1991
EP	1 640 571	A1	3/2006
EP	2397694	A1	12/2011
EP	2 626 525	A1	8/2013
FR	2618059	A1	1/1989
GB	0 204 454	A	10/1923
GB	2342421	B	3/2003
GB	2419671	A	5/2006
GB	2482786	B	1/2015
JP	60175753	A	9/1985
JP	40-7208479	A	8/1995
JP	10288086	A	10/1998
JP	2920004	B2	7/1999
JP	11200947	A	7/1999
JP	3974386	B2	9/2007
JP	2008539364	A	11/2008
JP	2012002225		1/2012
KP	19990079544		11/1999
KP	100287572		6/2001
KR	1019990060438		7/1999
KR	100275877	B1	12/2000
KR	20010065249	A	7/2001
KR	100302886		11/2001
KR	10200170108223		12/2001
RU	2037700	C1	6/1995
SG	20131413		3/2014
WO	WO-2008137515	A1	11/2008
WO	WO-2010080963	A2	7/2010
WO	WO-2040080961	A2	7/2010
WO	WO-2011005571	A2	1/2011
WO	WO-2012/038623		3/2012
WO	WO-2012092452	A2	7/2012
WO	WO-2013183990	A1	12/2013

(56) **References Cited**

FOREIGN PATENT DOCUMENTS

WO	WO-2014143094	A1	9/2014
WO	WO-2015200810	A2	12/2015
WO	WO-2016014967	A1	1/2016
WO	WO-2016014988	A1	1/2016
WO	WO-2016015006	A1	1/2016
WO	WO-2016015012	A1	1/2016

OTHER PUBLICATIONS

International search report and written opinion dated Jun. 29, 2015 in corresponding PCT application PCT/US2015/014898, 14 pages.
Decision on Appeal dated Feb. 20, 2013, by USPTO, re U.S. Appl. No. 10/831,467.
Dirk Guth et al., "New Technology for a High Dynamical MRF-Clutch for Safe and Energy-Efficient Use in Powertrain," FISITA 2012 World Automotive Congress, Beijing, China, Nov. 27-30, 2012, 31 pages.
Gardner Denver Well Servicing Pump Model C-2500Q Power End Parts List, Feb. 2009.
International Search Report and Written Opinion, by the ISA/US, dated Aug. 3, 2010, re PCT/US2010/020447, 7 pages.
International Search Report and Written Opinion, by the ISA/US, dated Oct. 19, 2015, re PCT/US2015/042119.
MSI/Dixie Iron Works, Ltd., Technical Manual for MSI Hybrid Well Service Pump Triplex and Quintuplex Modesl, Rev. D, 91 pages, date unknown.
Office Action/Restriction dated Mar. 29, 2016, by the USPTO, re U.S. Appl. No. 14/565,962.
Office Action dated May 23, 2013, by the USPTO, re U.S. Appl. No. 12/693,900.
Office Action dated May 7, 2008, by the USPTO, re U.S. Appl. No. 10/831,467.
International Preliminary Report on Patentability dated Feb. 9, 2017 in PCT/US2015/042111, 9 pages.
"Metaldyne, Torsional Vibration Dampers, Brochure.".
"Simatool Bearing Handling Tool BHT," Simatec Smart Technologies; Dec. 19, 2013; http://www.simatec.com/products/simatool/bearinghandlingtool/.
Advisory Action dated Apr. 7, 2009, by the USPTO, re U.S. Appl. No. 10/833,921.
Australia Exam Report, dated Feb. 9, 2015, by IP Australia, re App No. 2011352095.
Canadian Examiner's Report dated Aug. 18, 2016, by the CIPO, re App No. 2905809.
Canadian Examiner's Report dated Jan. 11, 2016, by the CIPO, re App No. 2749110.
Canadian Examiner's Report, dated Oct. 22, 2015, by the CIPO, re App No. 2686204.
Canadian Examiner's Report, dated May 13, 2014, by the CIPO, re App No. 153846.
Canadian Examiner's Report, dated Oct. 8, 2014, by the CIPO, re App No. 2823213.
Canadian Office Action dated May 17, 2011, re App No. 2486126.
Chinese Office Action dated Mar. 15, 2013, re App No. 200910226583.9.
Chinese Office Action dated Oct. 29, 2013, re App No. 201080008236.X.
Chinese Office Action, dated Sep. 2, 2014, by SIPO, re App No. 201080008236.X.
Decision on Appeal dated Feb. 20, 2013, USPTO, re U.S. Appl. No. 10/831,467.
Dirk Guth et al., "New Technoloy for a High Dynamical MRF-Clutch for Safe and Energy-Efficient Use in Powertrain," FISITA 2012 World Automotive Congress, Beijing, China, Nov. 27-30, 2012, 31 pages.
Election Requirement, dated Nov. 18, 2014, by the USPTO, re U.S. Appl. No. 29/455,618.
Estee Lauder Inc. v. *L'Oreal, USA*, 129 F.3d 588, 44 U.S.P.Q.2d 1610, No. 96-1512, United States Court of Appeals, Federal Circuit, Decided Nov. 3, 1997.
Examiner's Answer dated Jan. 29, 2010, by USPTO, re U.S. Appl. No. 10/831,467.
Examiner's Interview Summary dated Apr. 10, 2008, by the USPTO, re U.S. Appl. No. 10/833,921.
Examiner's Interview Summary dated Jul. 17, 2008, by the USPTO, re U.S. Appl. No. 10/831,467.
Gardner Denver Well Servicing Pump Model C-2500Q Power End Parts Lists, Feb. 2009.
International Preliminary Report on Patentability, by the IPEA/US, dated Aug. 23, 2016 re PCT/US2013/042043.
International Preliminary Report on Patentability, by the IPEA/US, dated Jan. 4, 2012 re PCT/US2010/039651.
International Preliminary Report on Patentability, by the IPEA/US, dated Jul. 12, 2011 re PCT/US2010/020445.
International Preliminary Report on Patentability, by the IPEA/US, dated Jul. 12, 2011 re PCT/US2010/020447.
International Preliminary Report on Patentability, by the IPEA/US, dated Mar. 9, 2015 re PCT/US2013/040106.
International Preliminary Report on Patentability, by the IPEA/US, dated Sep. 16, 2016 re PCT/US2015/042104.
International Search Report and Written Opinion dated Dec. 28, 2015 in corresponding international application PCT/US2015/042043, 14 pages.
International Search Report and Written Opinion dated Dec. 28, 2015 in corresponding PCT application PCT/US2015/042043, 14 pages.
International Search Report and Written Opinion dated Dec. 4, 2015 in corresponding PCT Application PCT/US2015/042111; 13 pages.
International Search Report and Written Opinion dated Jun. 29, 2015 corresponding PCT application PCT/US2015/014898, 14 pages.
International Search Report and Written Opinion dated Oct. 19, 2015 in corresponding PCT/US2015/042104; 11 pages.
International Search Report and Written Opinion, by the ISA/US, dated Aug. 28, 2012, re PCT/US2011/067770, 6 pages.
International Search Report and Written Opinion, by the ISA/US, dated Aug. 3, 2010, re PCT/US2010/020445, 7 pages.
International Search Report and Written Opinion, by the ISA/US, dated Aug. 3, 2010, PCT/US2010/020447, 7 pages.
International Search Report and Written Opinion, by the ISA/US, dated Feb. 24, 2011, re PCT/US2010/039651, 7 pages.
International Search Report and Written Opinion, by the ISA/US, dated Mar. 4, 2015, re PCT/US2014/069567.
International Search Report and Written Opinion, by the ISA/US, dated Nov. 27, 2015, re PCT/US2015/038008.
International Search Report and Written Opinion, by the ISA/US, dated Oct. 19, 2015, re PCT/US2015/042104.
International Search Report and Written Opinion, by the ISA/US, dated Oct. 19, 2015, re PCT/U52015/042119.
International Search Report and Written Opinion, by the ISA/US, dated Sep. 5, 2013, re PCT/US2013/040106.
International Search Report dated Dec. 4, 2015 in corresponding PCT application PCT/US2015/042078, 13 pages.
International Search Report dated Dec. 4, 2015 in corresponding PCT application, PCT/US2015/042111, 13 pages.
International Search Report dated Jun. 29, 2015 in corresponding PCT application, PCT/US2015/014898, 14 pages.
MSI/Dixie Iron Works, Ltd., Technical Manual for 600 HP Triplex MSI TI-600 Pump, Rev. P. 102 pages, date unknown.
MSI/Dixie Iron Works, Ltd., Technical Manual for MSI Hybrid Well Service Pump Triplex and Quintuplex Modest, Rev. D, 91 pages, date unknown.
Notice of Allowance dated Dec. 23, 2011, by the USPTO, re U.S. Appl. No. 12/277,849.
Notice of Allowance dated Feb. 12, 2016, by the USPTO, re U.S. Appl. No. 29/534,091.
Notice of Allowance dated Jan. 28, 2015, by the USPTO, re U.S. Appl. No. 29/455,618.
Notice of Allowance dated Oct. 12, 2012, by the USPTO, re U.S. Appl. No. 12/683,804.

(56) **References Cited**

OTHER PUBLICATIONS

Office Action dated Apr. 19, 2012, by the USPTO, re U.S. Appl. No. 12/821,663.
Office Action dated Jan. 18, 2013, by the USPTO, re U.S. Appl. No. 12/748,127.
Office Action dated Jan. 2, 2014, by the USPTO, re U.S. Appl. No. 13/866,121.
Office Action dated Jan. 21, 2009, by the USPTO, re U.S. Appl. No. 10/833,921.
Office Action dated Jan. 27, 2012, by the USPTO, re U.S. Appl. No. 12/683,804.
Office Action dated Jul. 16, 2007, by the USPTO, re U.S. Appl. No. 10/831,467.
Office Action dated Jul. 16, 2012, by the USPTO, re U.S. Appl. No. 12/683,804.
Office Action dated Jul. 28, 2008, by the USPTO, re U.S. Appl. No. 10/833,921.
Office Action dated Jun. 1, 2016, by the USPTO, re U.S. Appl. No. 14/565,962.
Office Action dated Jun. 24, 2009, by the USPTO, re U.S. Appl. No. 10/831,467.
Office Action dated Mar. 8, 2016, by the USPTO, re U.S. Appl. No. 14/262,880.
Office Action dated Mar. 9, 2012, by the USPTO, re U.S. Appl. No. 12/821,663.
Office Action dated May 23, 2013, by the USPTO, re U.S. Appl. No. 12/683,900.
Office Action dated May 29, 2007, by the USPTO, re U.S. Appl. No. 10/833,921.
Office Action dated May 7, 2007, by the USPTO, re U.S. Appl. No. 10/831,467.
Office Action dated Nov. 14, 2008, by the USPTO, re U.S. Appl. No. 10/831,467.
Office Action dated Oct. 11, 2011, by the USPTO, re U.S. Appl. No. 12/277,849.
Office Action dated Oct. 7, 2013, by the USPTO, re U.S. Appl. No. 13/843,525.
Office Action dated Sep. 18, 2007, by the USPTO, re U.S. Appl. No. 10/833,921.
Office Action dated Sep. 29, 2014, by the USPTO, re U.S. Appl. No. 13/339,640.
Office Action dated Mar. 29, 2016, by the USPTO, re U.S. Appl. No. 14/565,962.
SPM QEM2500 GL Well Service Plunger Pump, Generic Operation Instruction and Service Manual, May 8, 2010.
Suction Requirements for Reciprocating Power Pumps, p. 59, Figure 3.4 Composite Pump Dynamics.
Supplemental Notice of Allowance dated Mar. 21, 2012, by the USPTO, re U.S. Appl. No. 12/277,849.

* cited by examiner

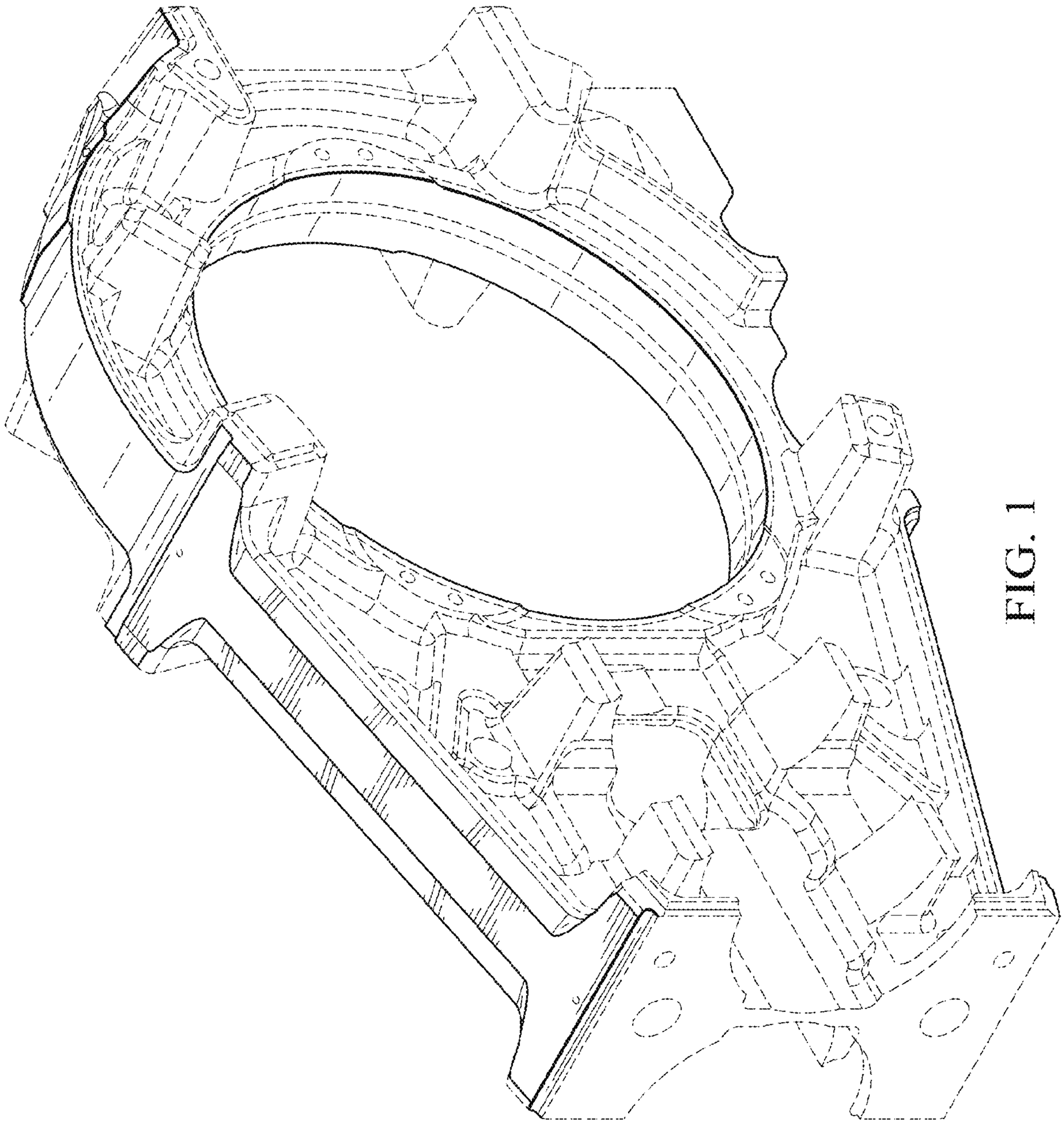

FIG. 1

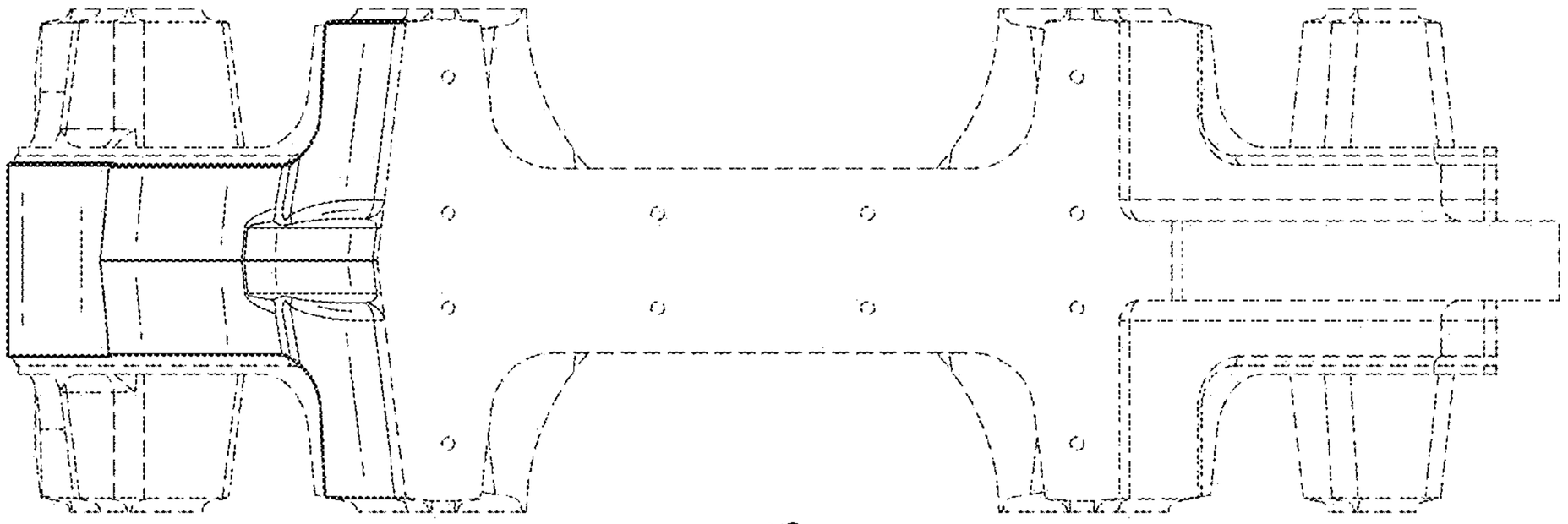

FIG. 3

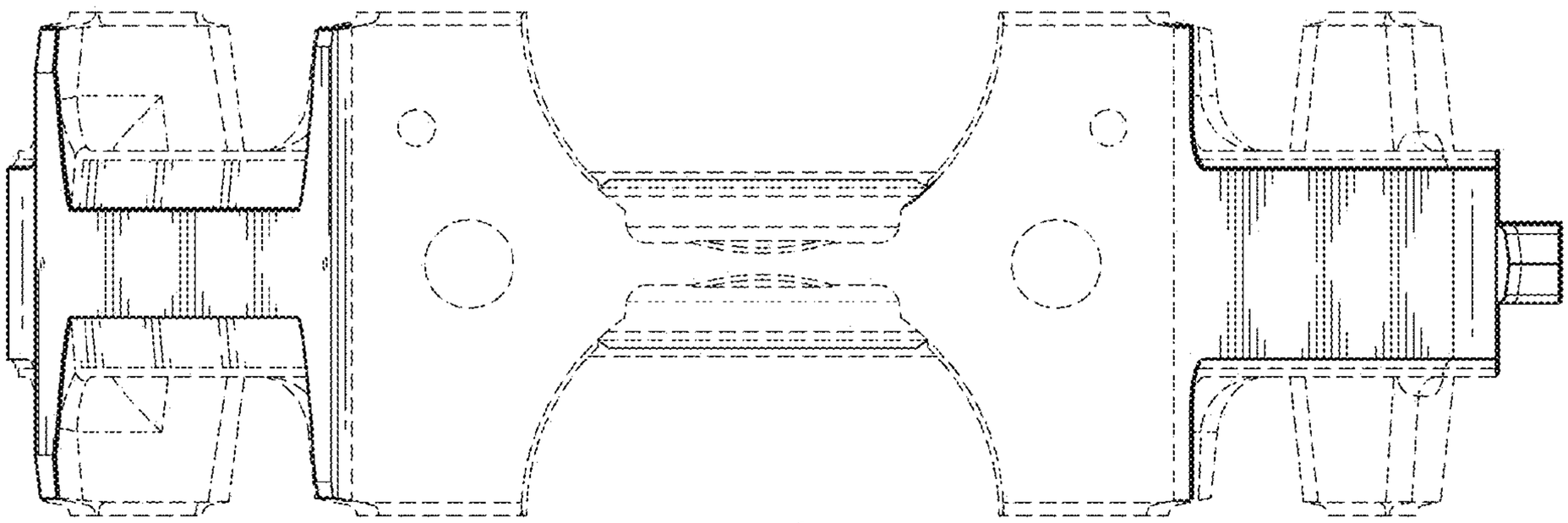

FIG. 2

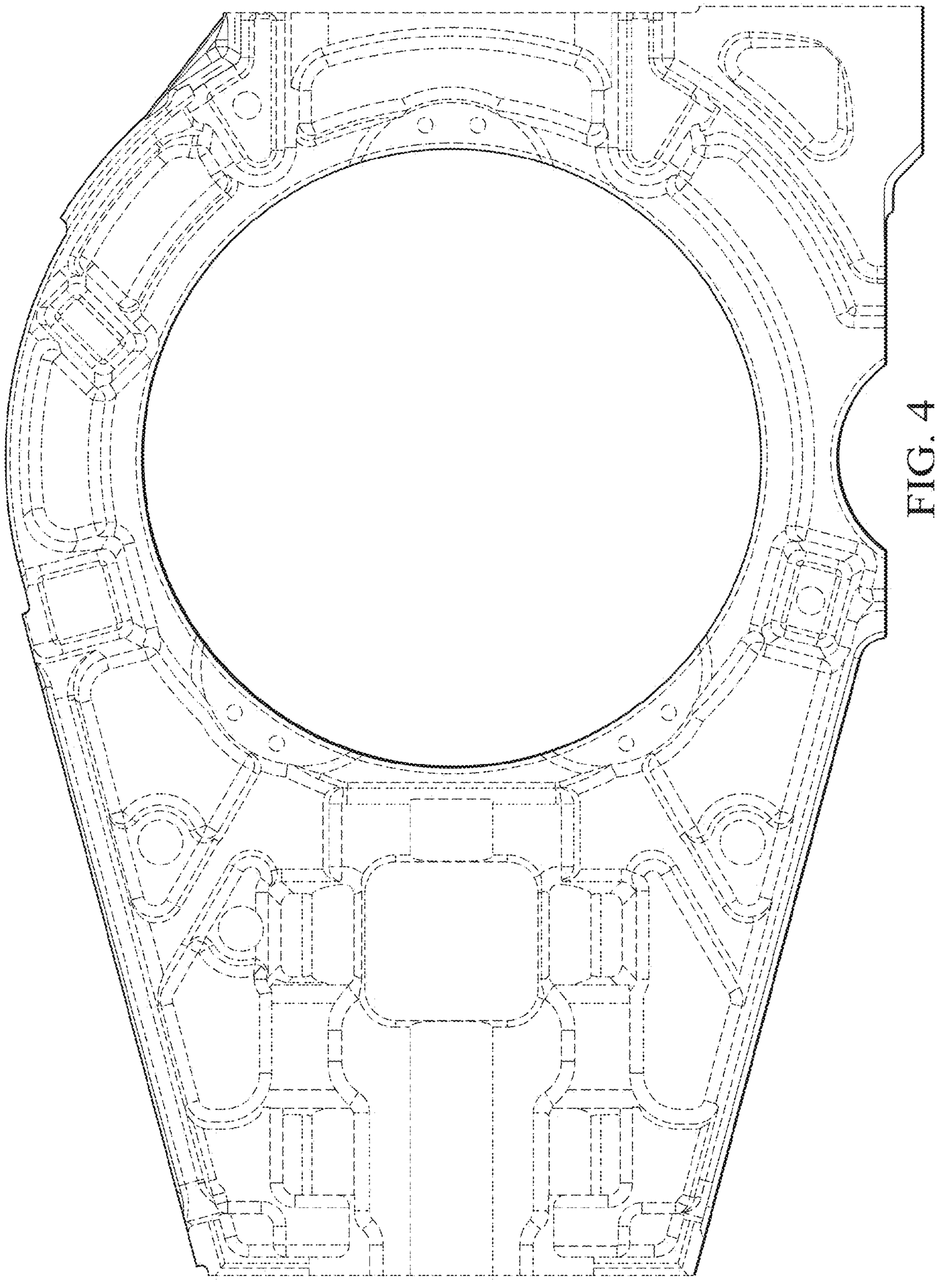

FIG. 4

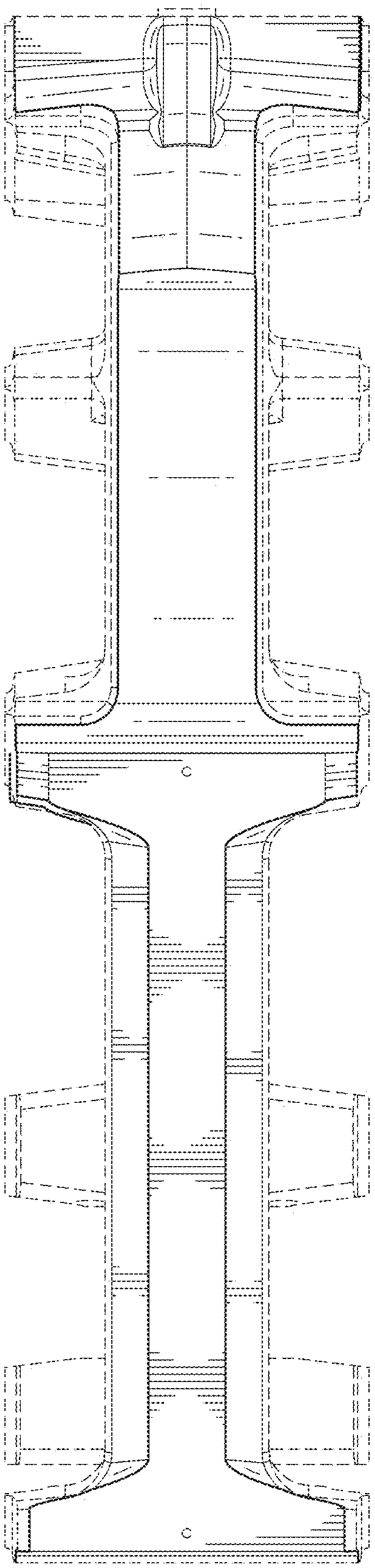

FIG. 5

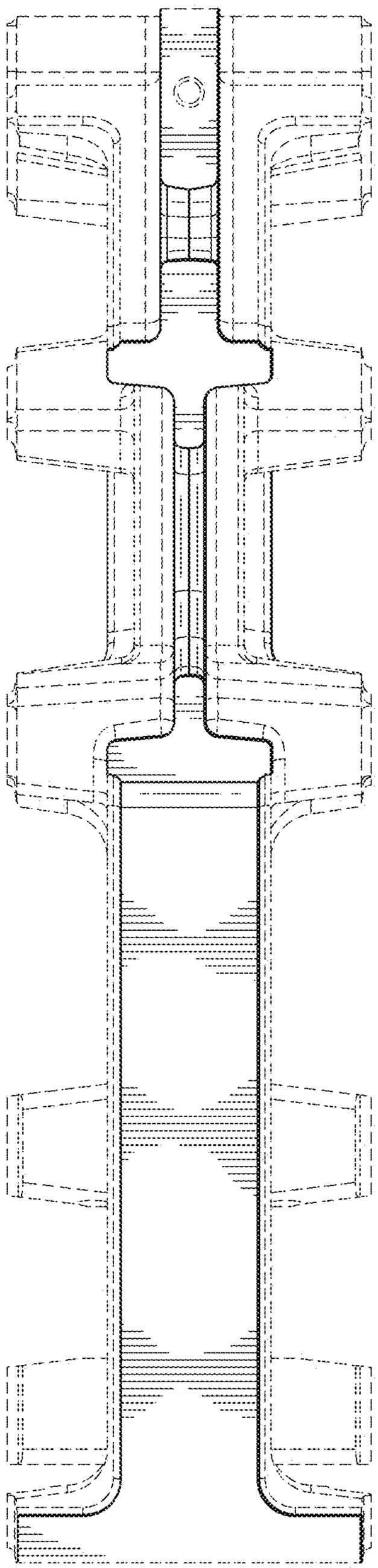

FIG. 6