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

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(54) **ALIGNMENT SUB**

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

(21) Appl. No.: **29/729,981**

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(51) **LOC (12) Cl.** **23-01**

(52) **U.S. Cl.**
USPC **D23/262**

(58) **Field of Classification Search**
USPC D23/259–260, 262, 264–266; D15/126,
D15/138–139, 143; D8/382, 387, 394,
D8/396–397; D22/108–111, 199;
285/148.14, 148.19, 148.21, 148.2, 328,
285/921, 345, 377, 388, 390; 251/143,
251/146–148, 152

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,147,544 A * 2/1939 Potts E21B 47/017
166/66

2,216,359 A 10/1940 Spencer
(Continued)

FOREIGN PATENT DOCUMENTS

CA 3021913 A1 2/2018
CN 101892822 B 11/2010

(Continued)

OTHER PUBLICATIONS

Yellow Jacket Oil Tools, Orienting Sub, 2019, 2 pgs., <https://www.yjoiltools.com/Wireline-Subs/Orienting-Sub>.

Gore Lab, ZERO180™ Gun System Assembly and Arming Procedures, 2015, 33 pgs., <https://www.corelab.com/owen/CMS/docs/Manuals/gunsys/zero180/MAN-Z180-000.pdf> (see p. 13).

(Continued)

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(57) **CLAIM**

We claim the ornamental design of an alignment sub, as shown and described.

DESCRIPTION

FIG. 1 is a front left perspective view of an alignment sub, showing our new design;

FIG. 2 is a rear right perspective view of the alignment sub as shown in FIG. 1;

FIG. 3 is a rear elevated view of the alignment sub as shown in FIG. 1;

FIG. 4 is a front elevated view of the alignment sub as shown in FIG. 1;

FIG. 5 is a bottom plan view of the alignment sub as shown in FIG. 1;

FIG. 6 is a top plan view of the alignment sub as shown in FIG. 1;

FIG. 7 is a left side elevated view of the alignment sub as shown in FIG. 1;

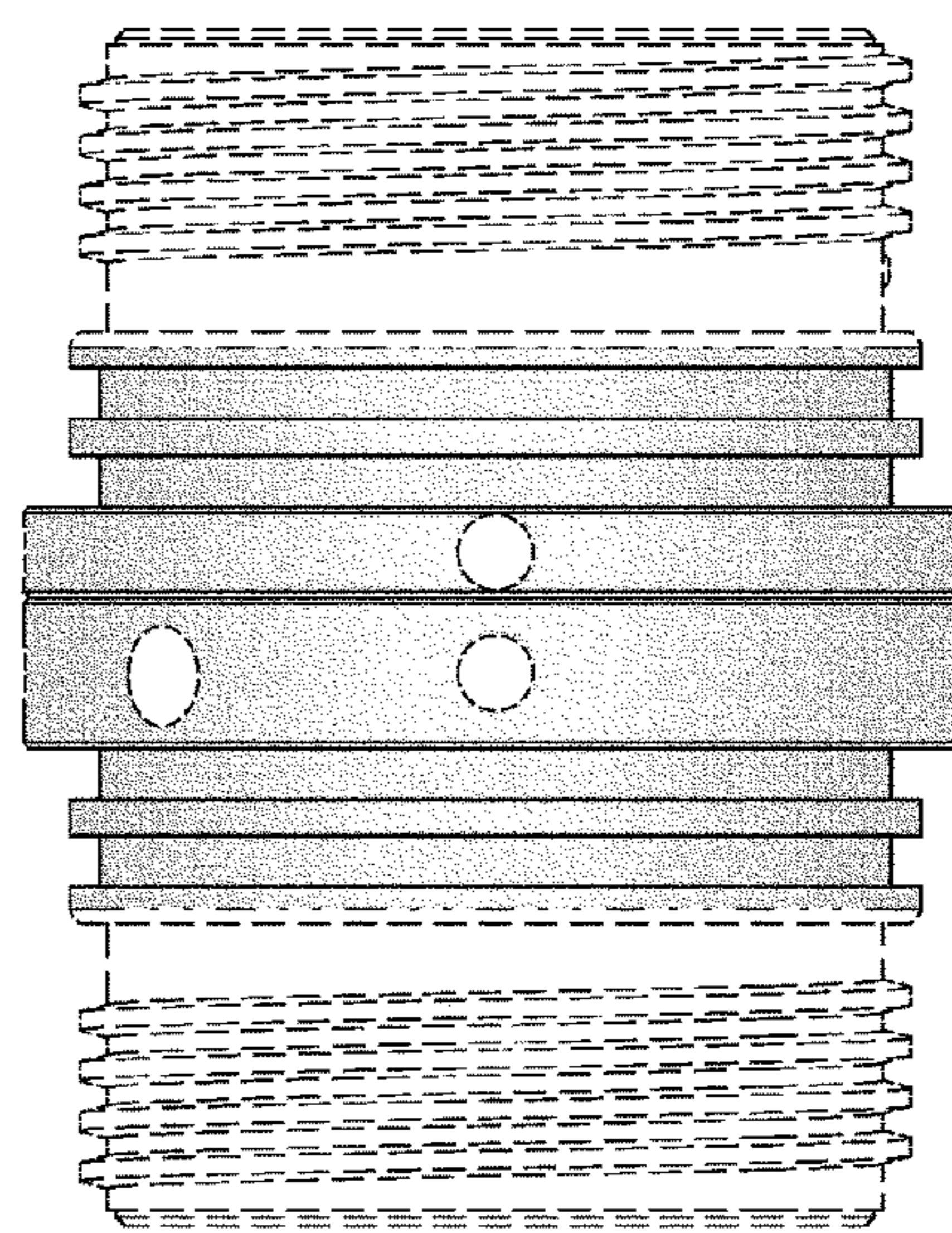
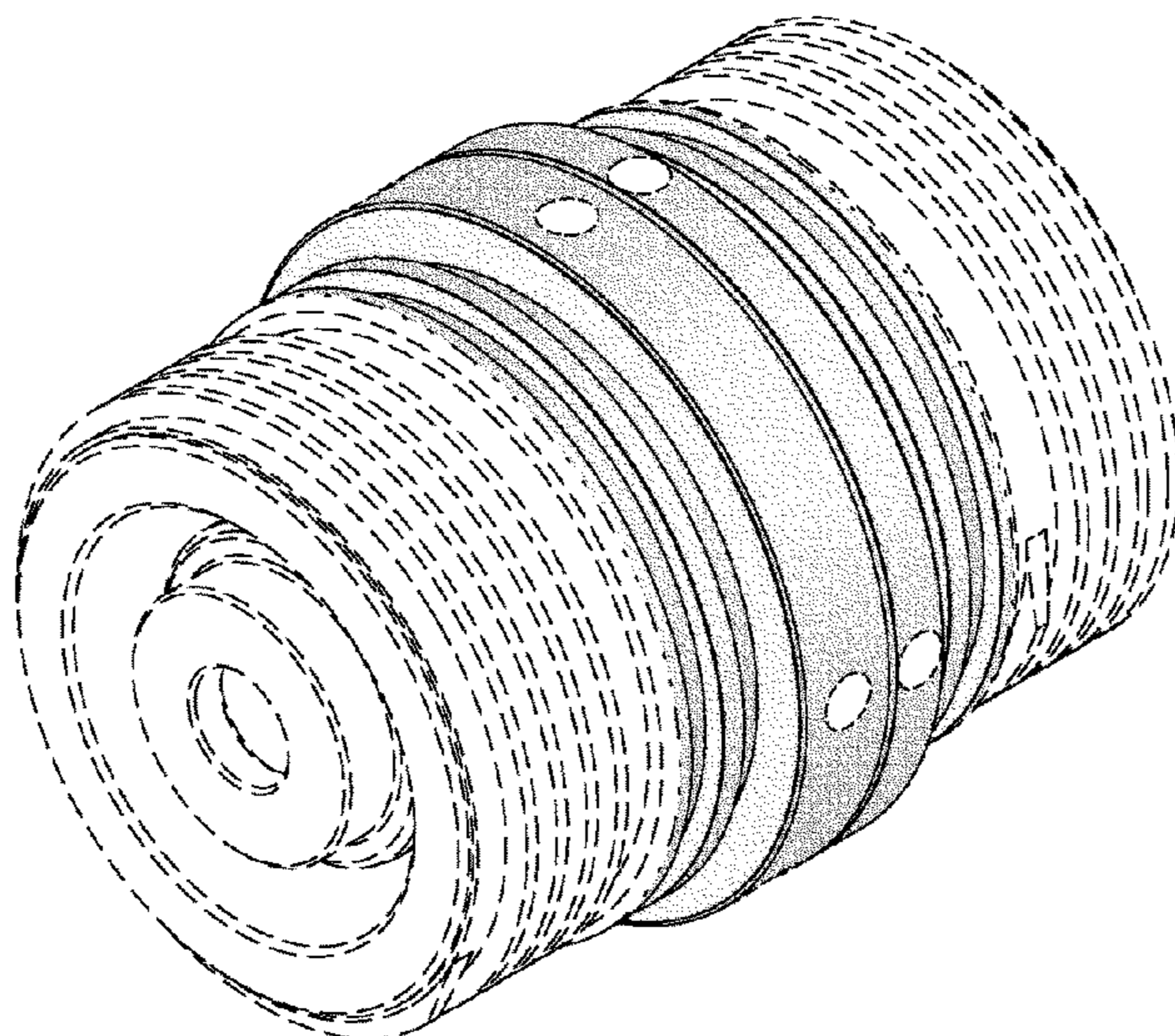
FIG. 8 is a right side elevated view of the alignment sub as shown in FIG. 1;

FIG. 9 is a cross-section view of the alignment sub as shown in FIG. 7 along line 9-9; and,

FIG. 10 is a cross-section view of the alignment sub as shown in FIG. 7 along line 10-10.

The broken lines consisting of dashes show an environment that forms no part of the claimed design. The broken lines consisting of a double-dot/dash pattern show a boundary of the claimed design and forms no part thereof.

1 Claim, 5 Drawing Sheets



(56)

References Cited

U.S. PATENT DOCUMENTS

2019/0292887	A1	9/2019	Austin, II et al.	
2019/0316449	A1	10/2019	Schultz et al.	
2019/0330947	A1*	10/2019	Mulhern	E21B 23/10
2019/0330961	A1	10/2019	Knight et al.	
2020/0018132	A1	1/2020	Ham	
2020/0024934	A1	1/2020	Eitschberger et al.	
2020/0024935	A1	1/2020	Eitschberger et al.	
2020/0063537	A1	2/2020	Langford et al.	
2020/0182025	A1	6/2020	Brady	
2020/0199983	A1	6/2020	Preiss et al.	
2020/0217635	A1*	7/2020	Eitschberger	F42D 1/05
2020/0248536	A1*	8/2020	Holodnak	E21B 43/1185
2020/0256166	A1*	8/2020	Knight	E21B 43/117
2020/0256168	A1*	8/2020	Knight	E21B 23/00
2020/0284104	A1*	9/2020	Holmberg	E21B 43/116

FOREIGN PATENT DOCUMENTS

WO	2012006357	A2	1/2012
WO	2018009223	A1	1/2018
WO	2018213768	A1	11/2018

OTHER PUBLICATIONS

GE Oil & Gas, Pipe Recovery Technology & Wireline Accessories, 2013, 435 pages (see pp. 6-10).

Hunting Titan, T-Set Setting Tool Product Catalog, 2015, 87 pgs., http://www.hunting-intl.com/media/1872254/AMG-1054.HT_T-Set_Catalog_LowRes.pdf (see p. 7).

Hunting Titan, T-Set® Family of Setting Tools, 2015, 2 pages.

Hunting Titan, T-Set® Tool Catalog, Sep. 27, 2016, 87 pages (see p. 7).

Owen Oil Tools, Expendable Perforating Guns, Jul. 2008, 7 pgs., https://www.corelab.com/owen/cms/docs/Canada/10A_erhsc-01.0-c.pdf.

Owens Oil Tools, E & B Select Fire Side Port Tandem Sub Assembly, 2009, 9 pgs., <https://www.corelab.com/owen/CMS/docs/Manuals/gunsys/MAN-30-XXX-0002-96-R00.pdf>.

Schlumberger, Perforating Services Catalog, 2008, 521 pages (see pp. 258-263).

Thilo Scharf, "DynaStage & BTM Introduction"; pp. 4-5, 9; presented at 2014 Offshore Technology Conference; May 2014.

Yellow Jacket Oil Tools; Tandem Sub; 2019; 3 pages.

* cited by examiner

FIG. 1

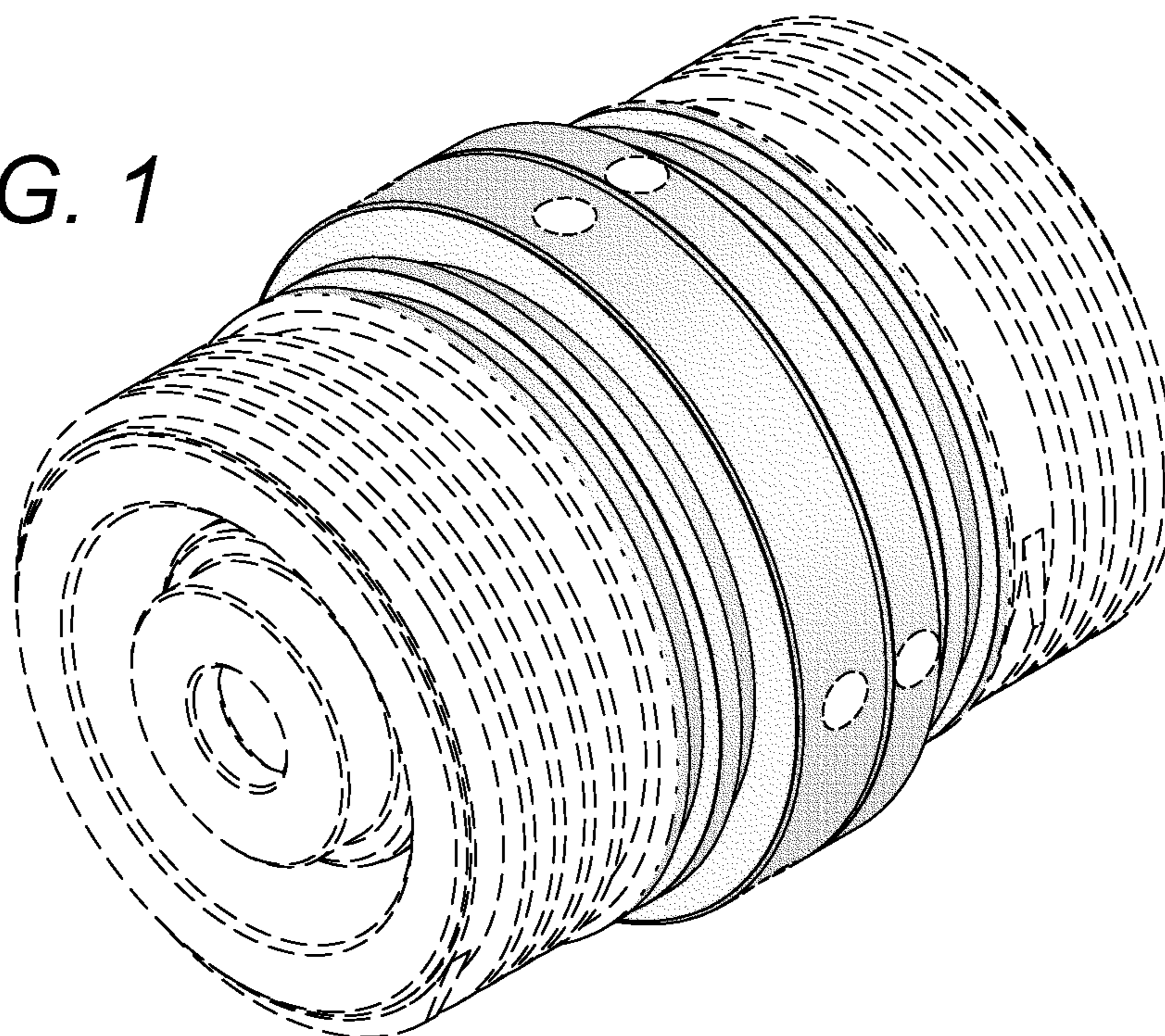
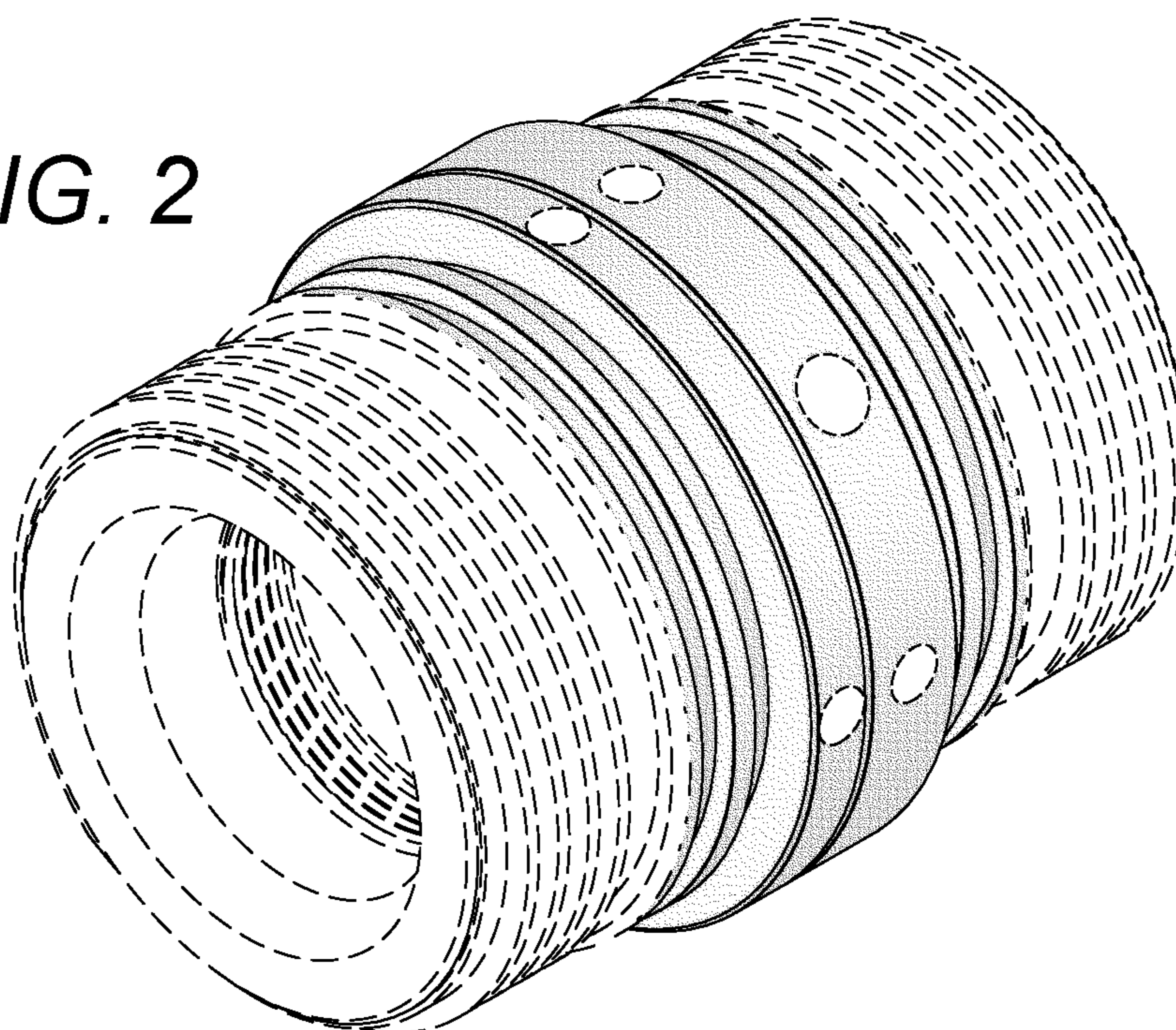


FIG. 2



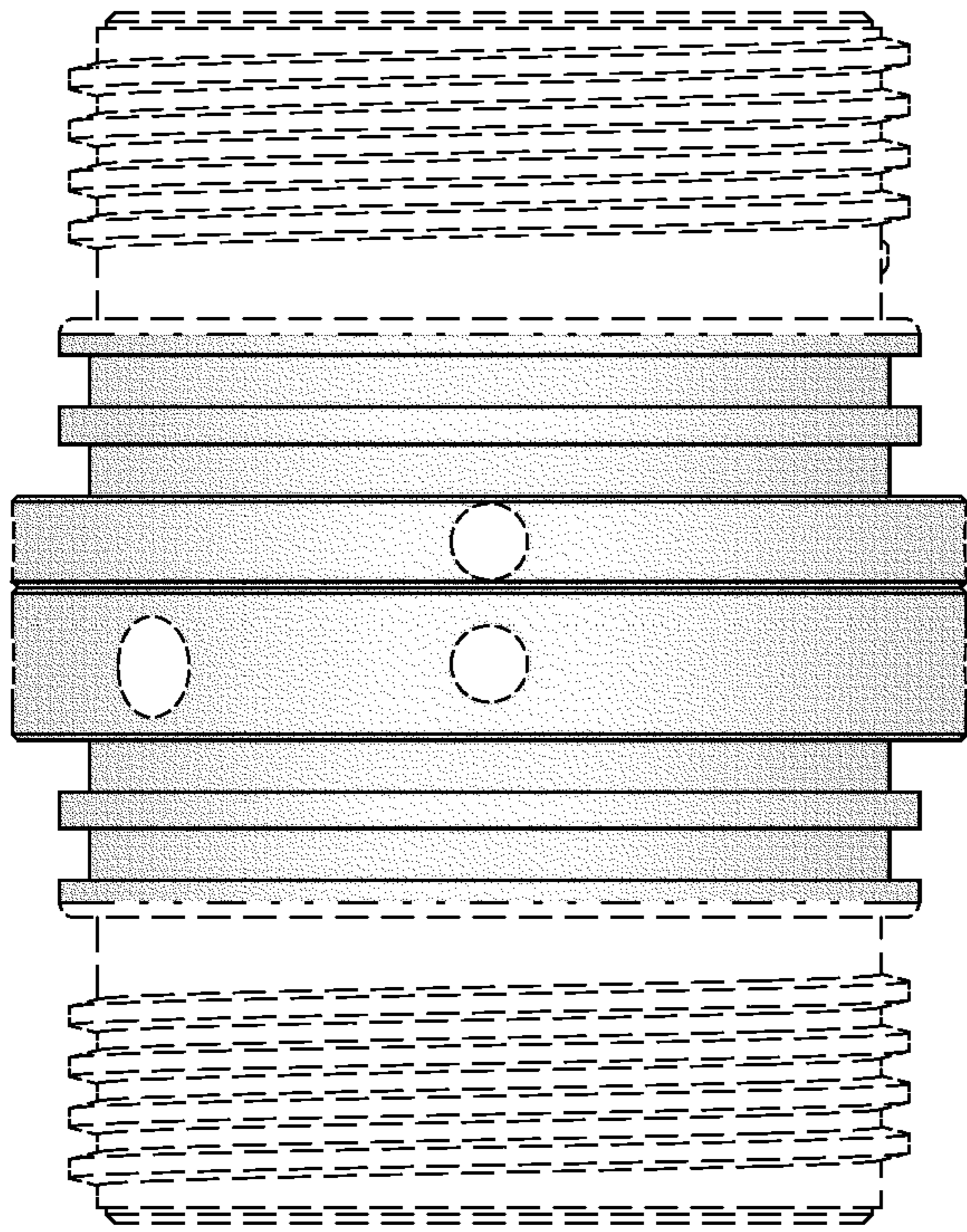


FIG. 3

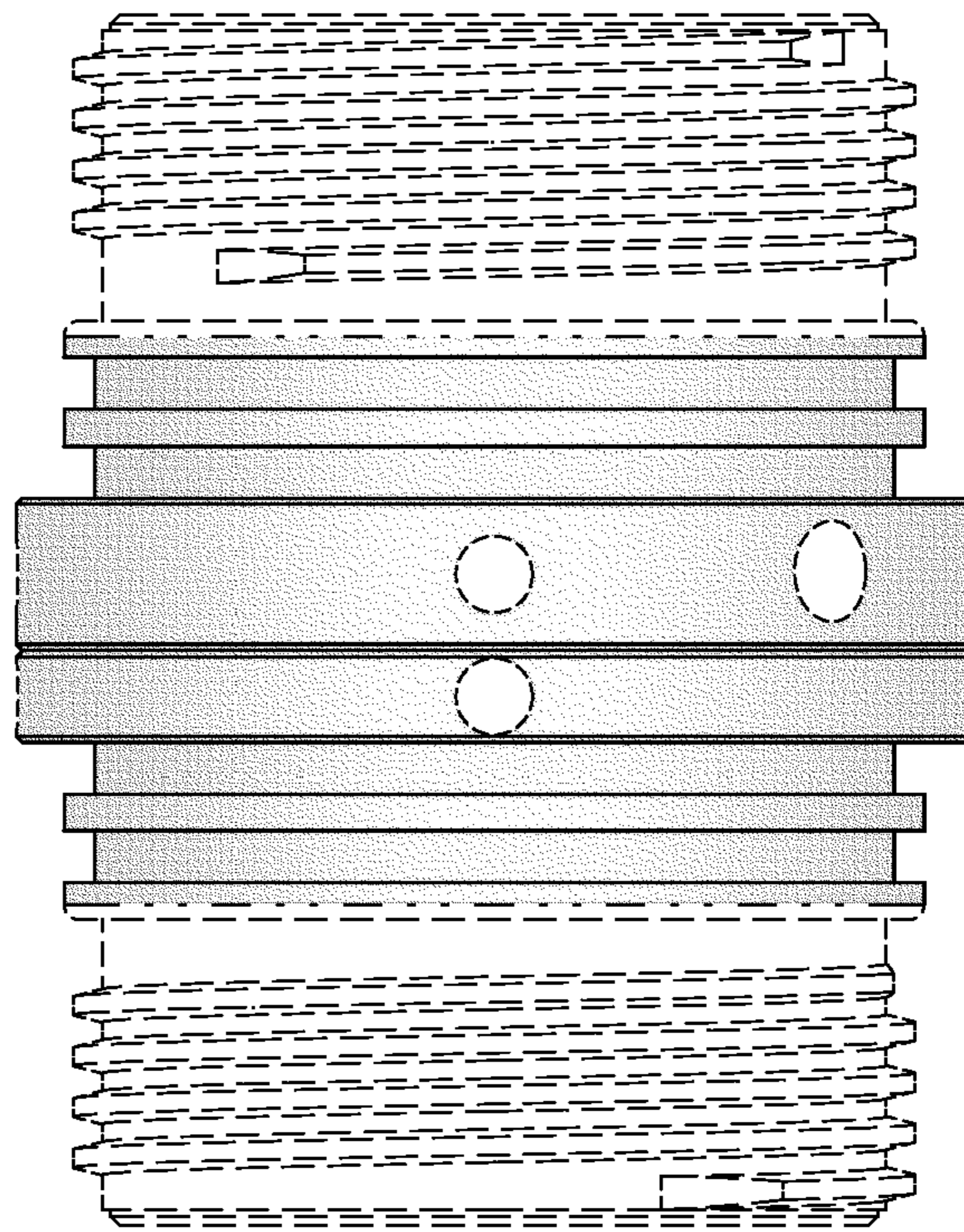


FIG. 4

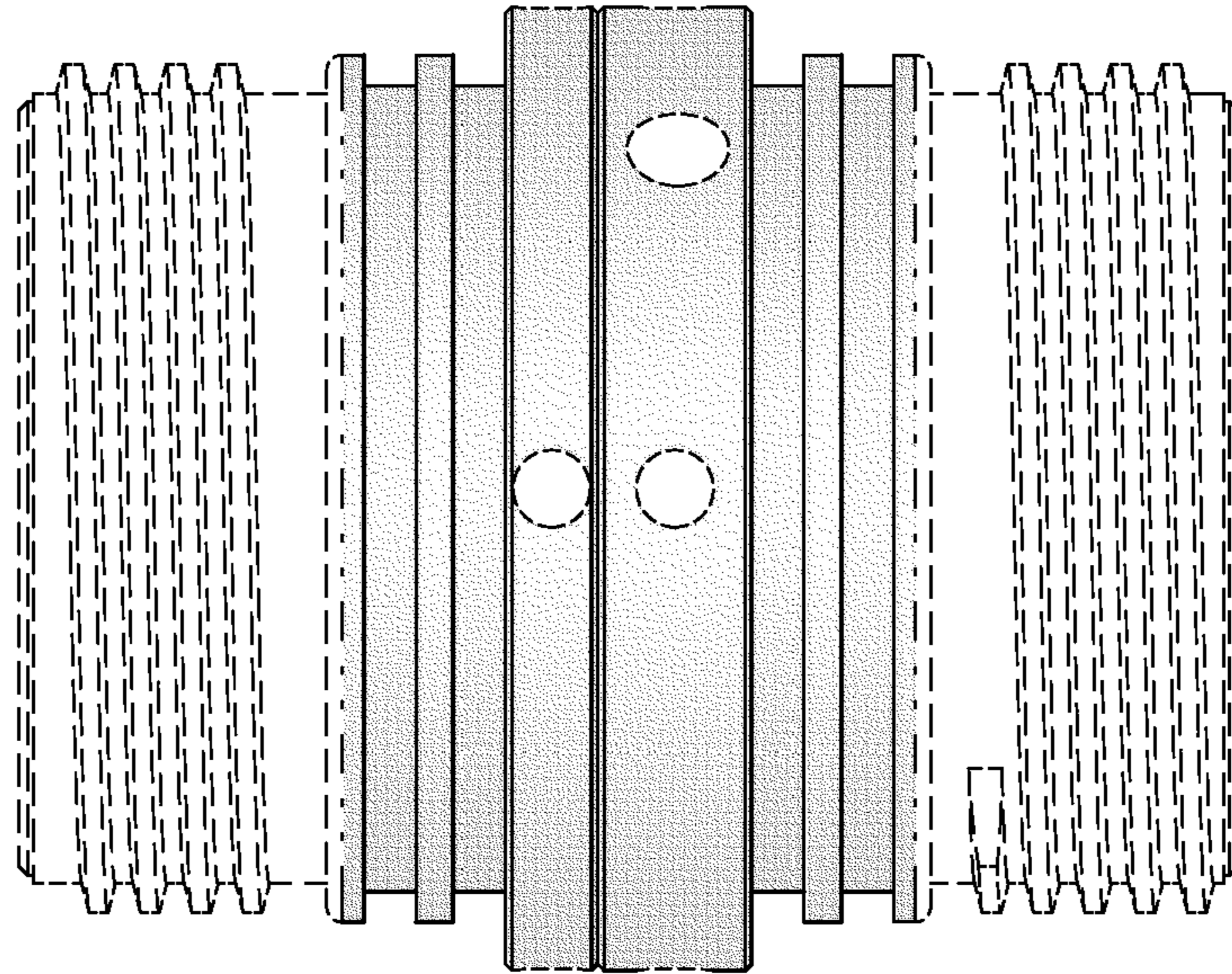


FIG. 5

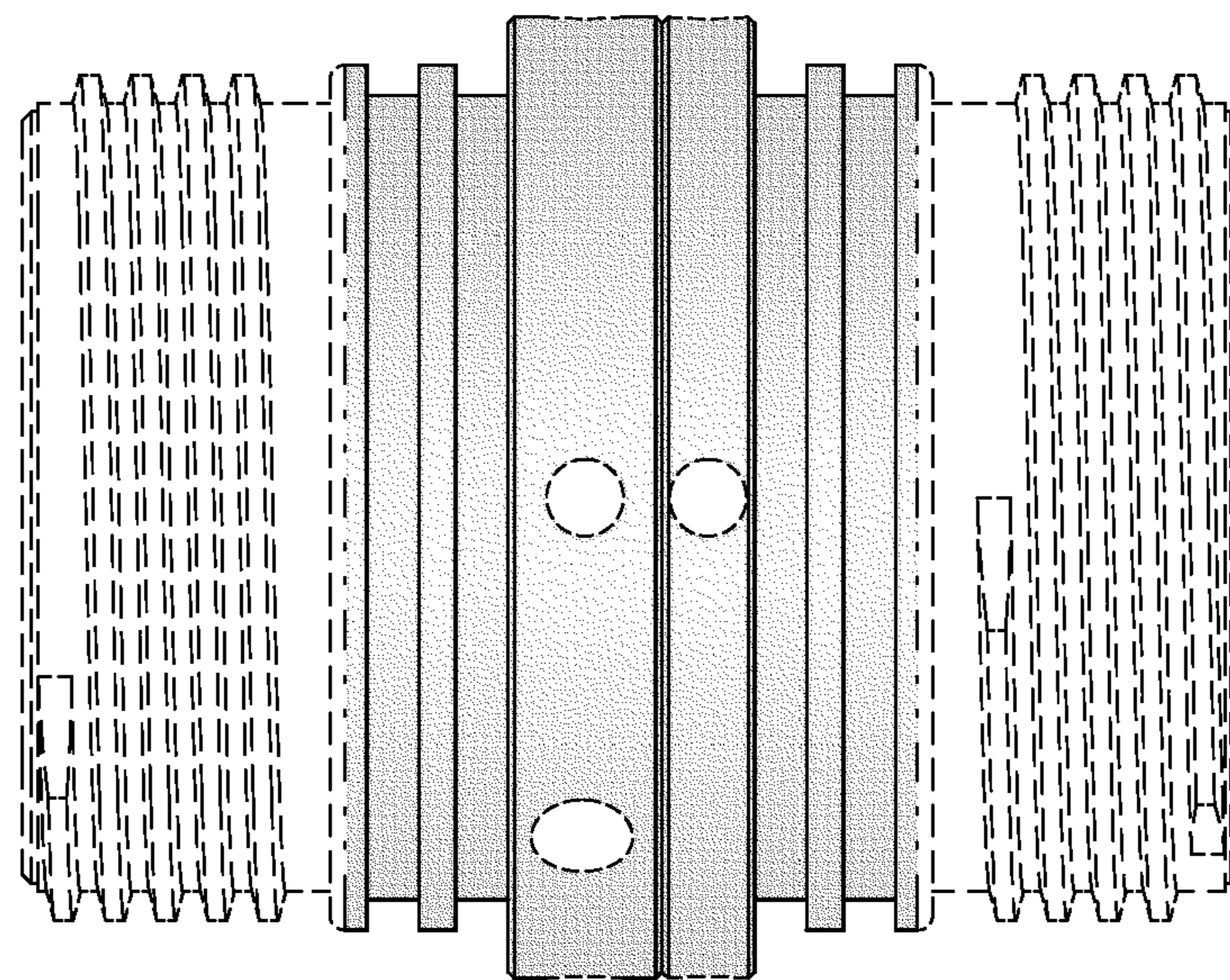


FIG. 6

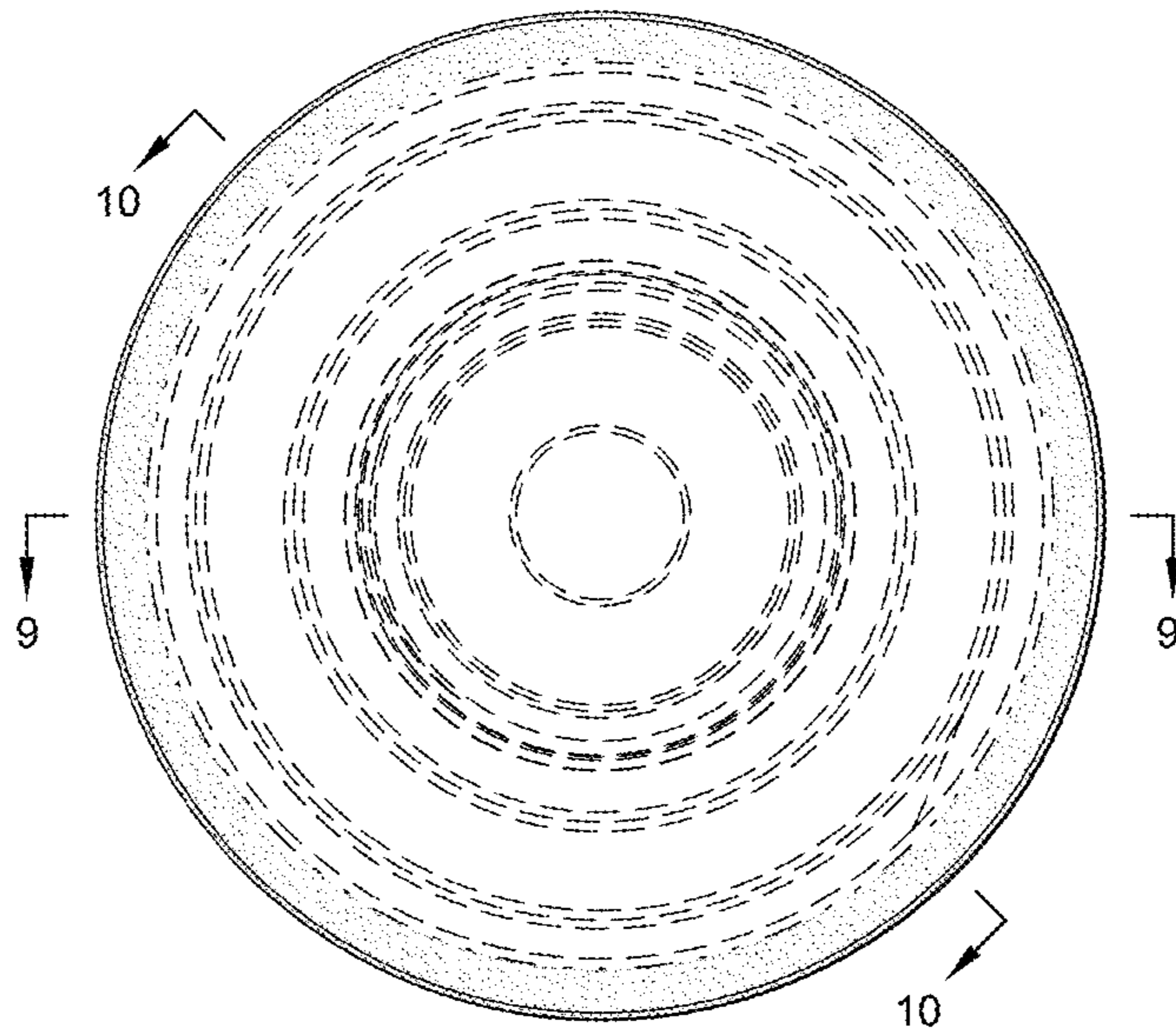


FIG. 7

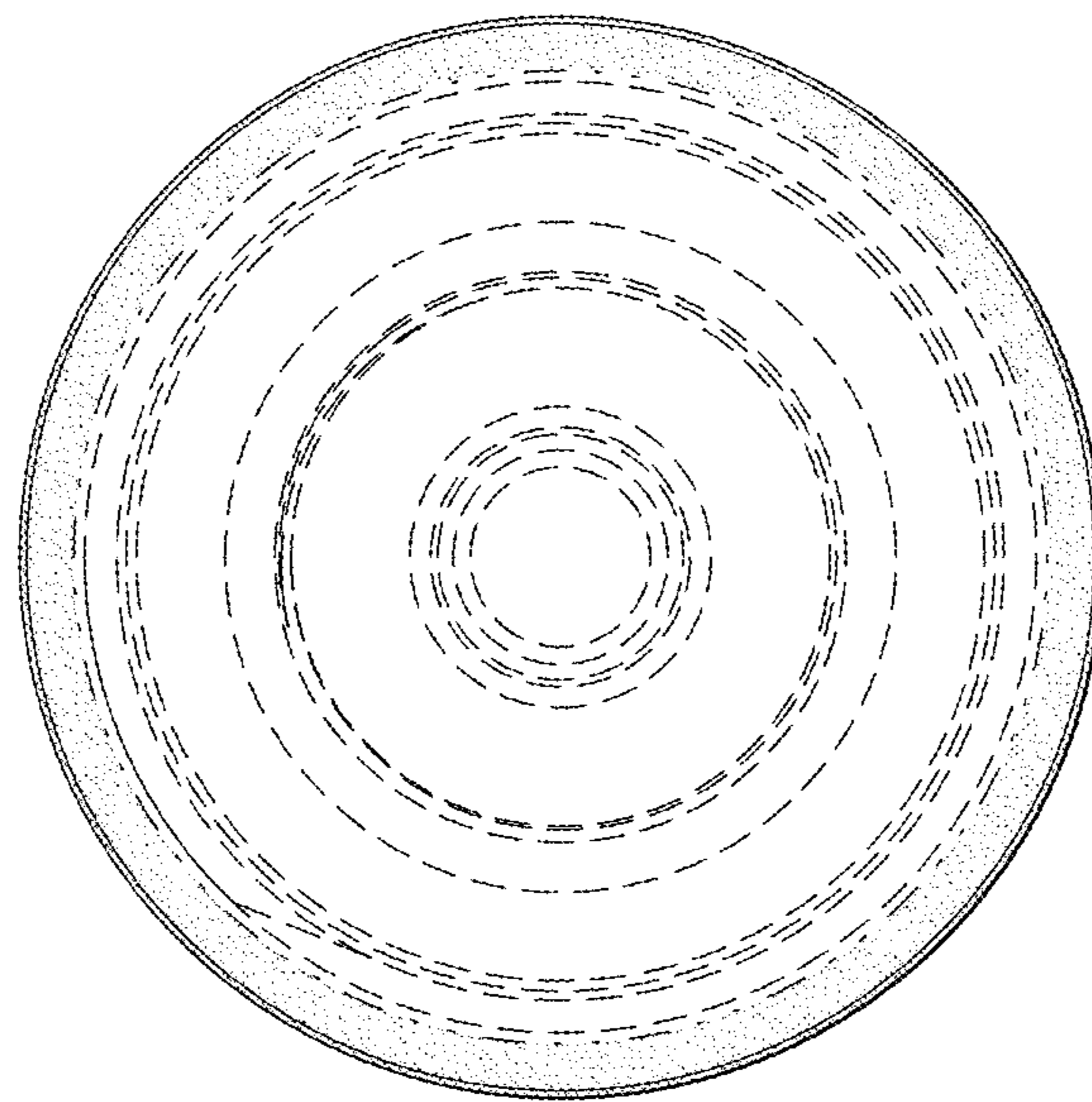


FIG. 8

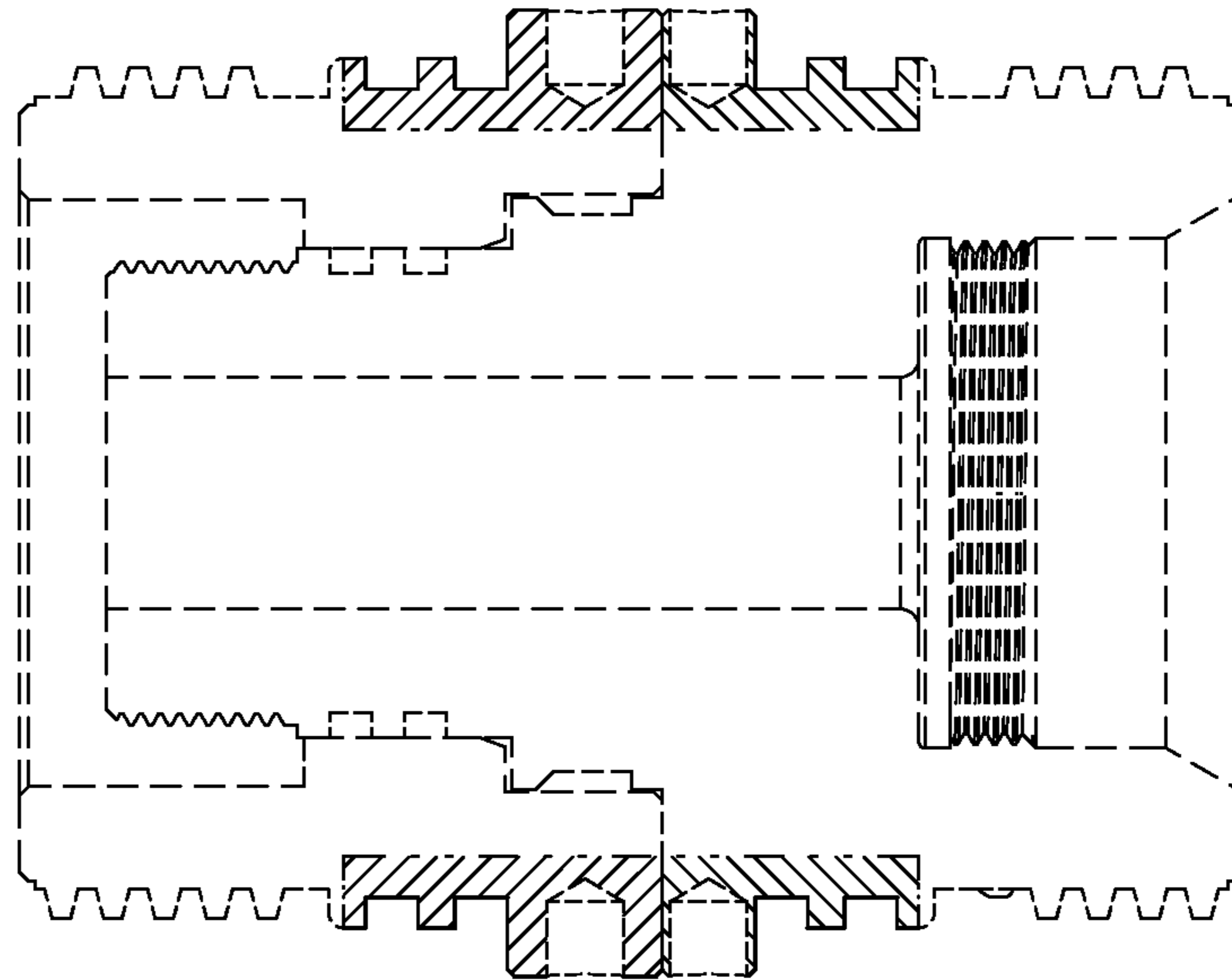


FIG. 9

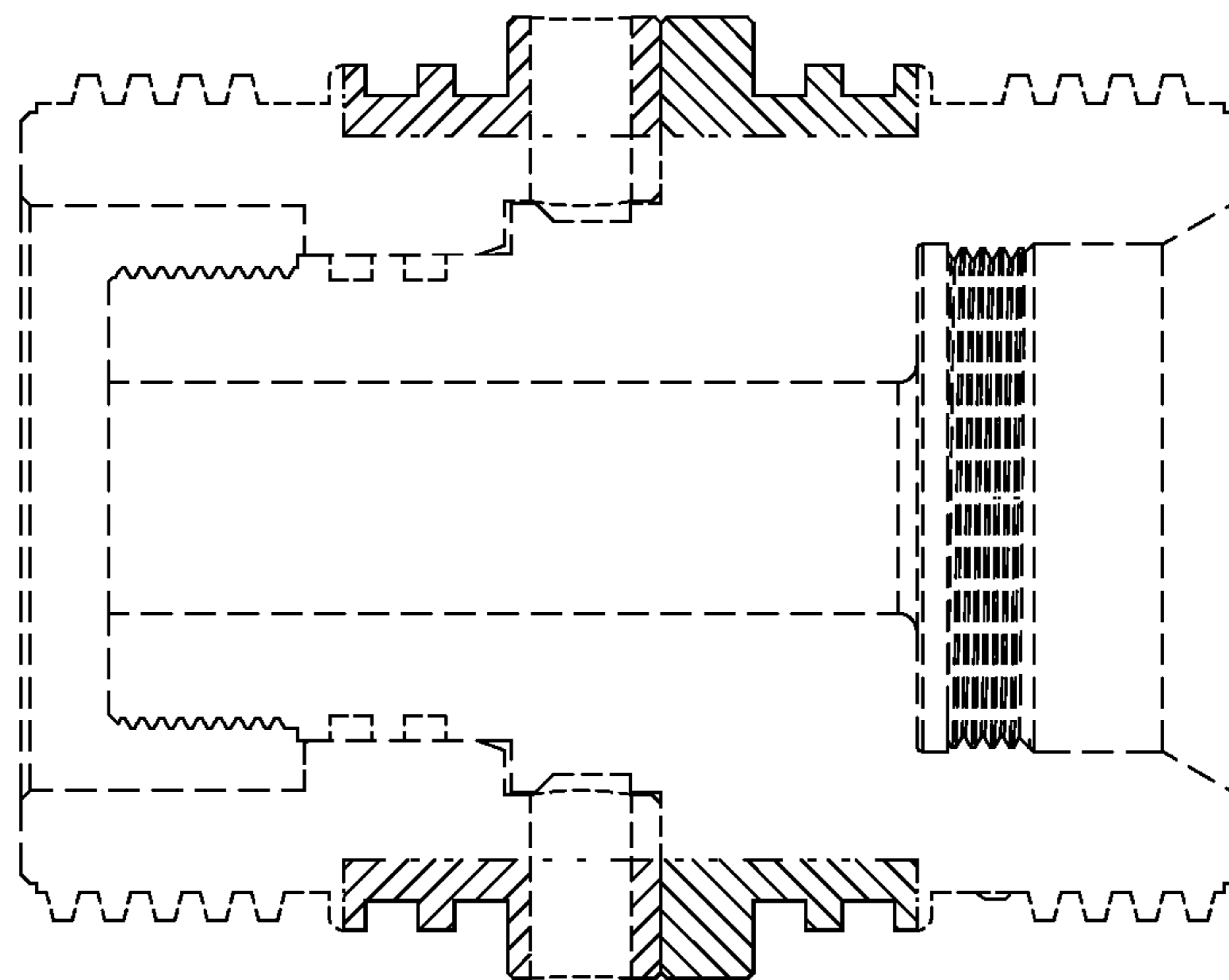


FIG. 10