

May 9, 1933.

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1,908,198

RETURN BEND AND METHOD OF FORMING THE SAME

Filed Oct. 30, 1929

4 Sheets-Sheet 1

Fig. 1.

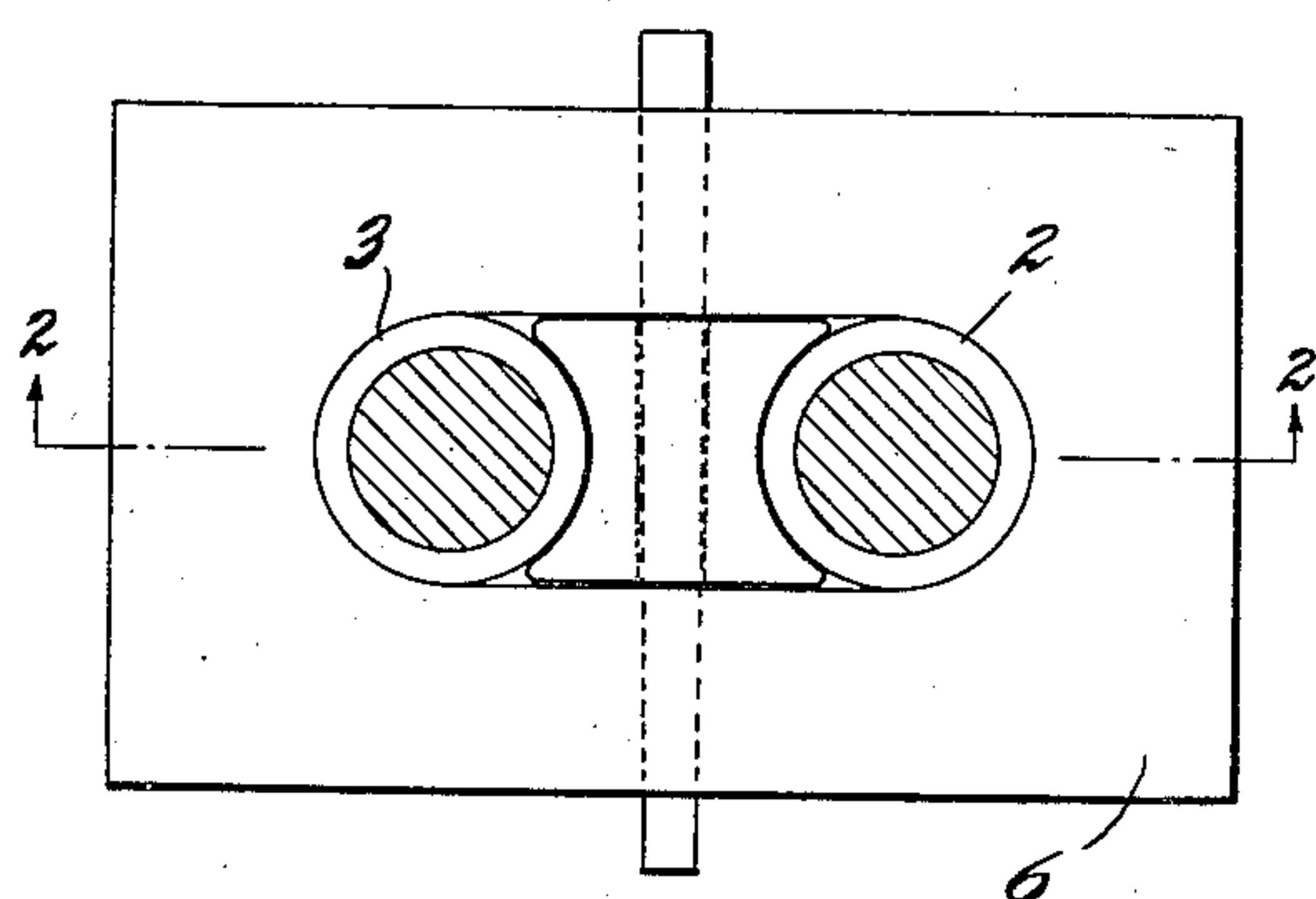


Fig. 3.

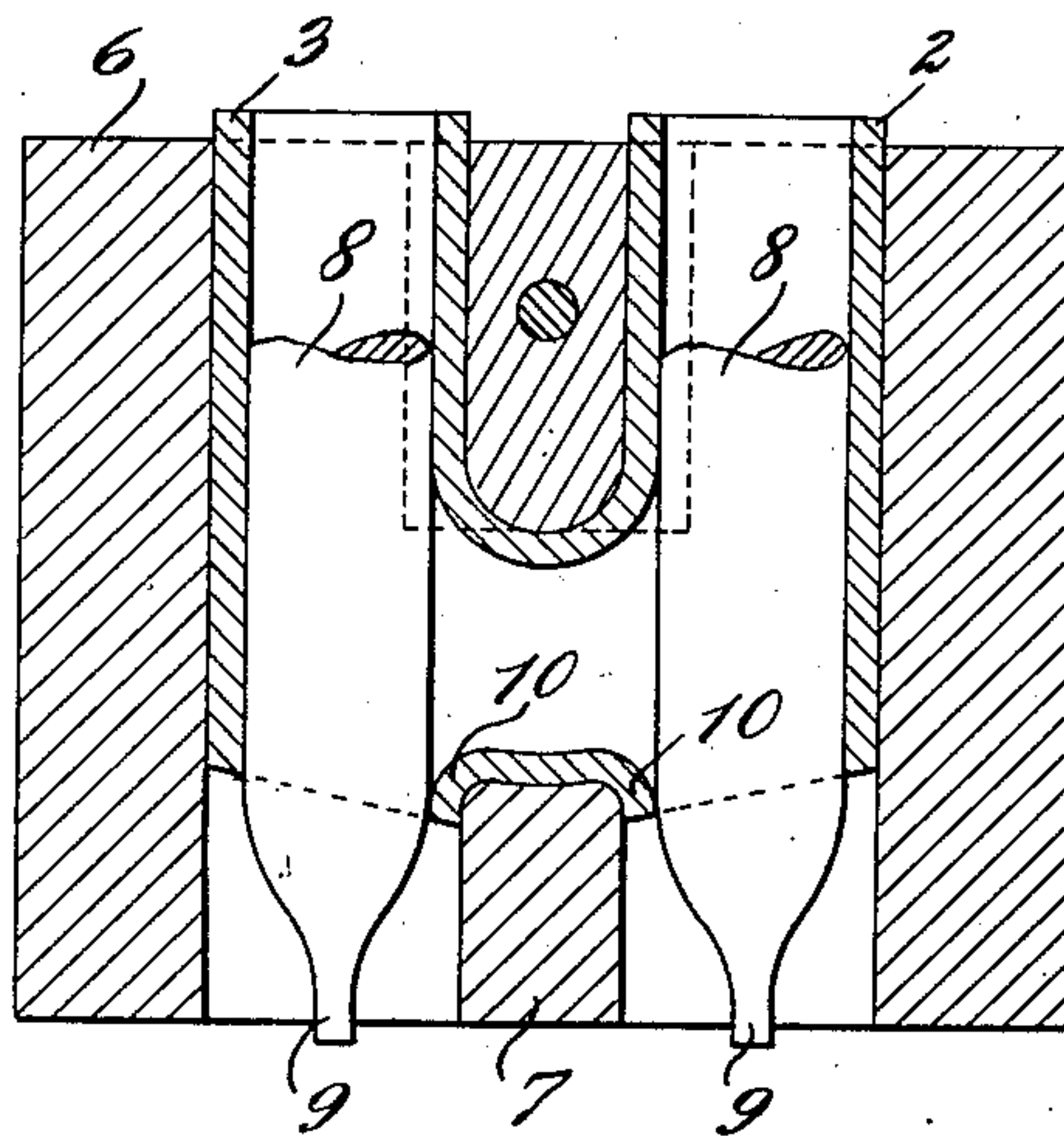


Fig. 2.

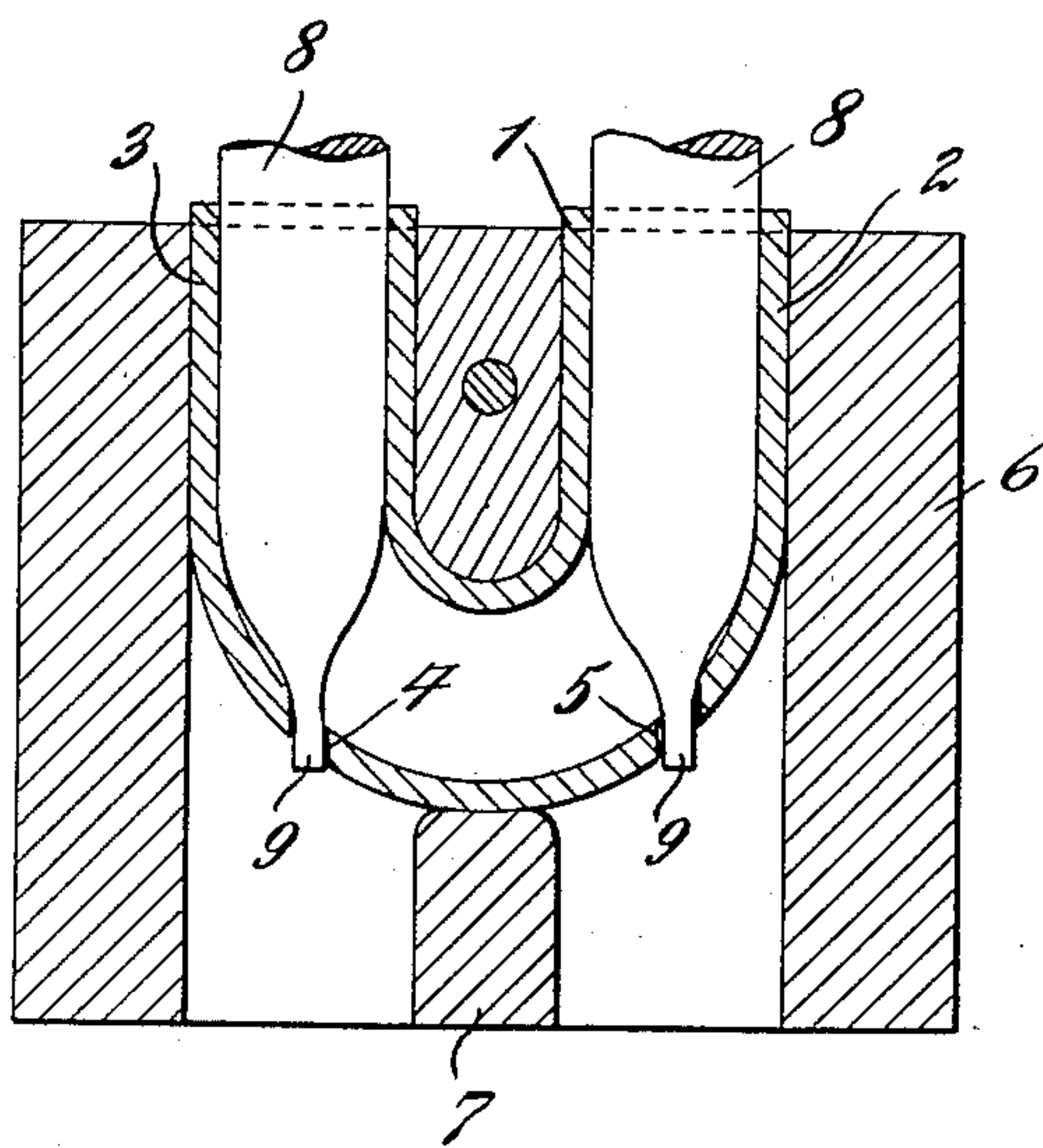
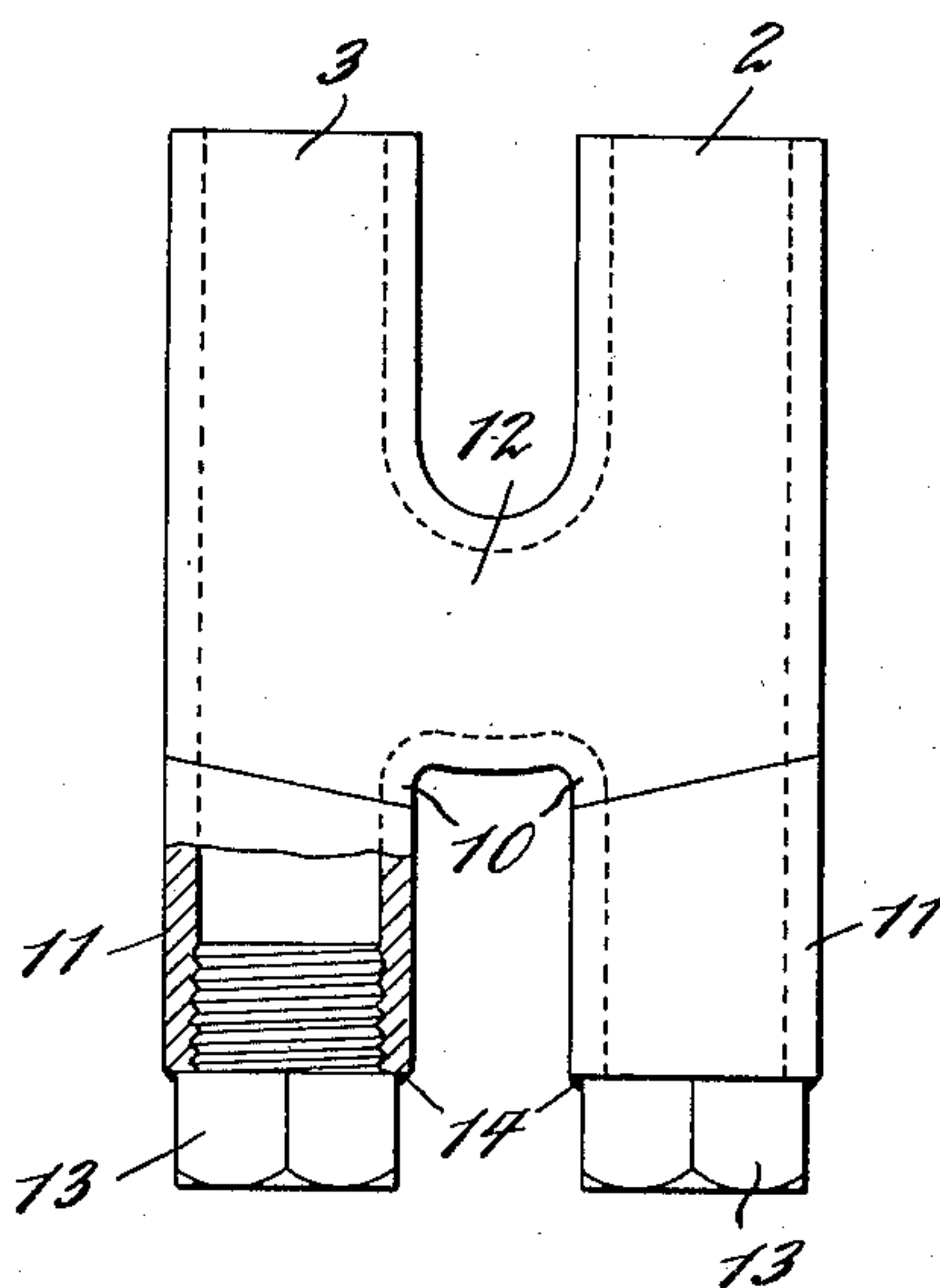


Fig. 4.



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Fig-5-

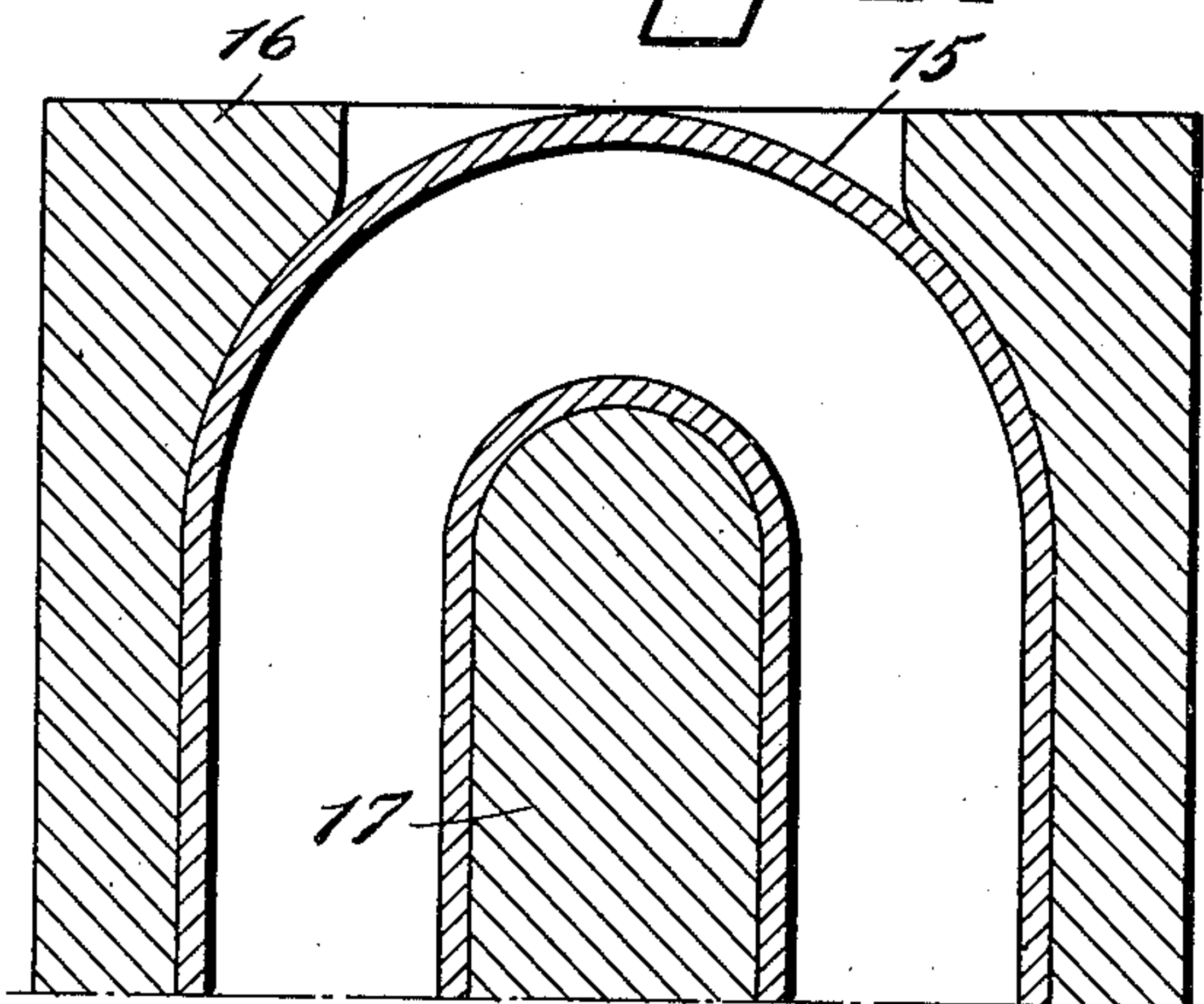


Fig-6-

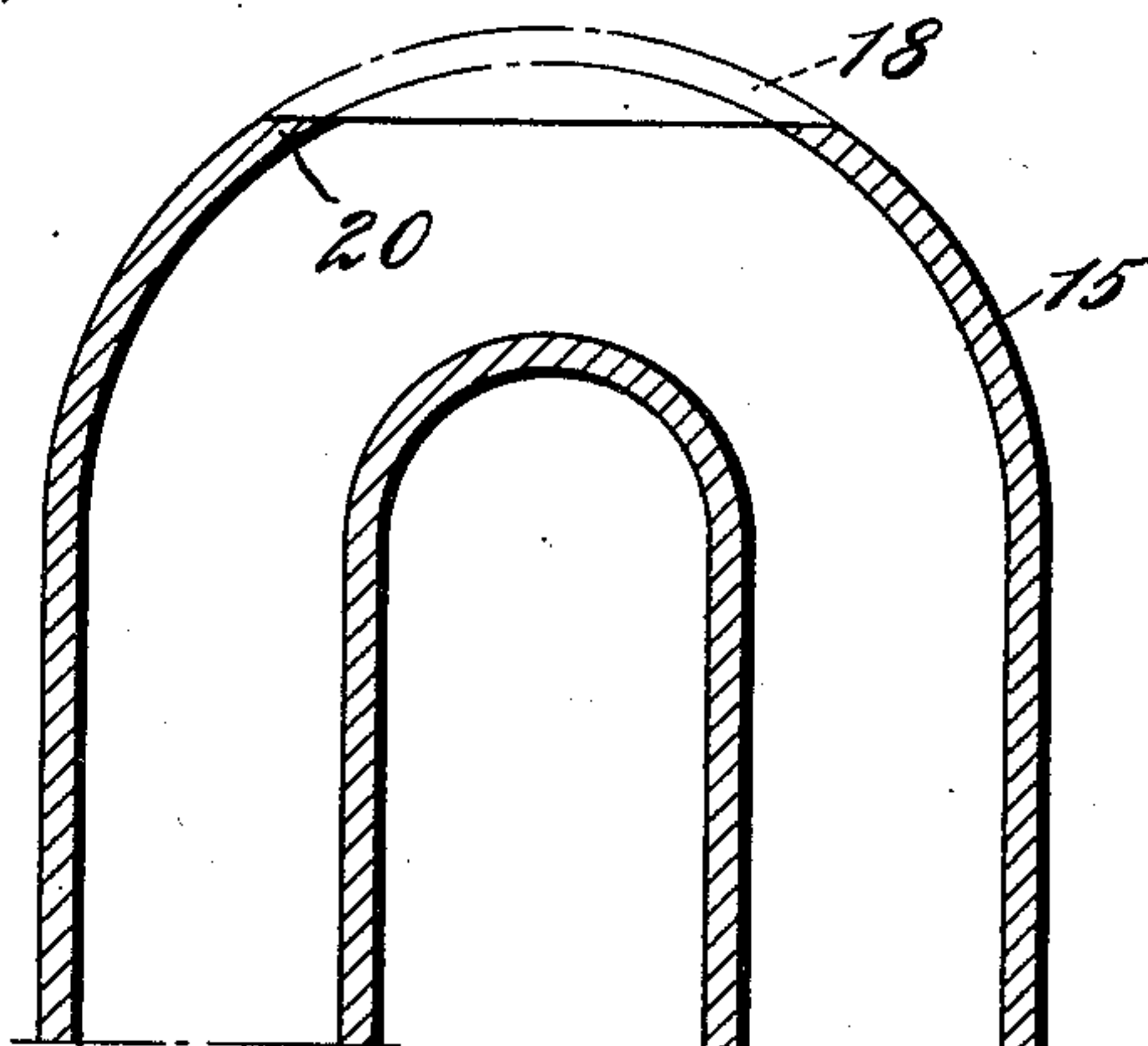


Fig-7-

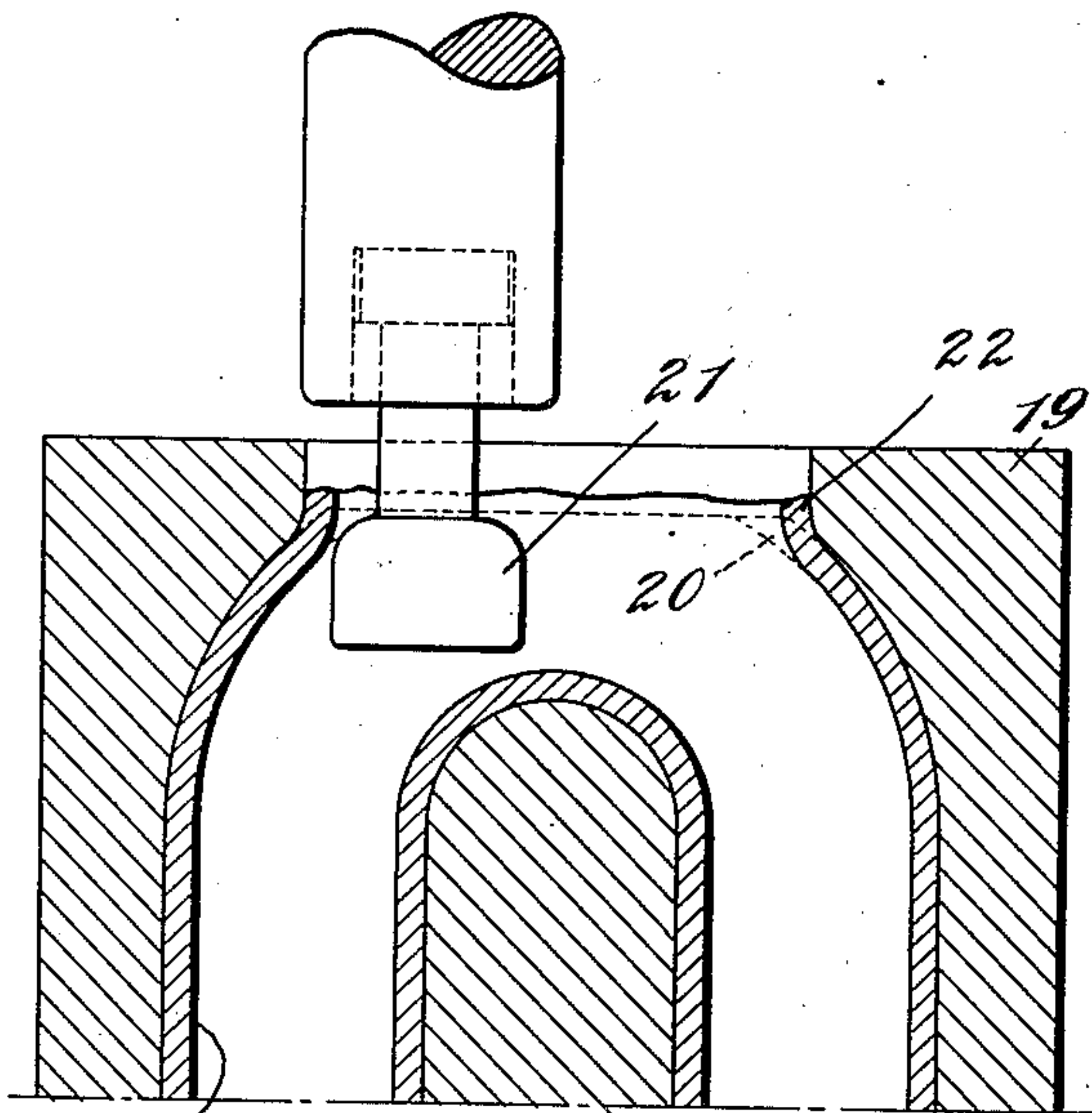


Fig-8-

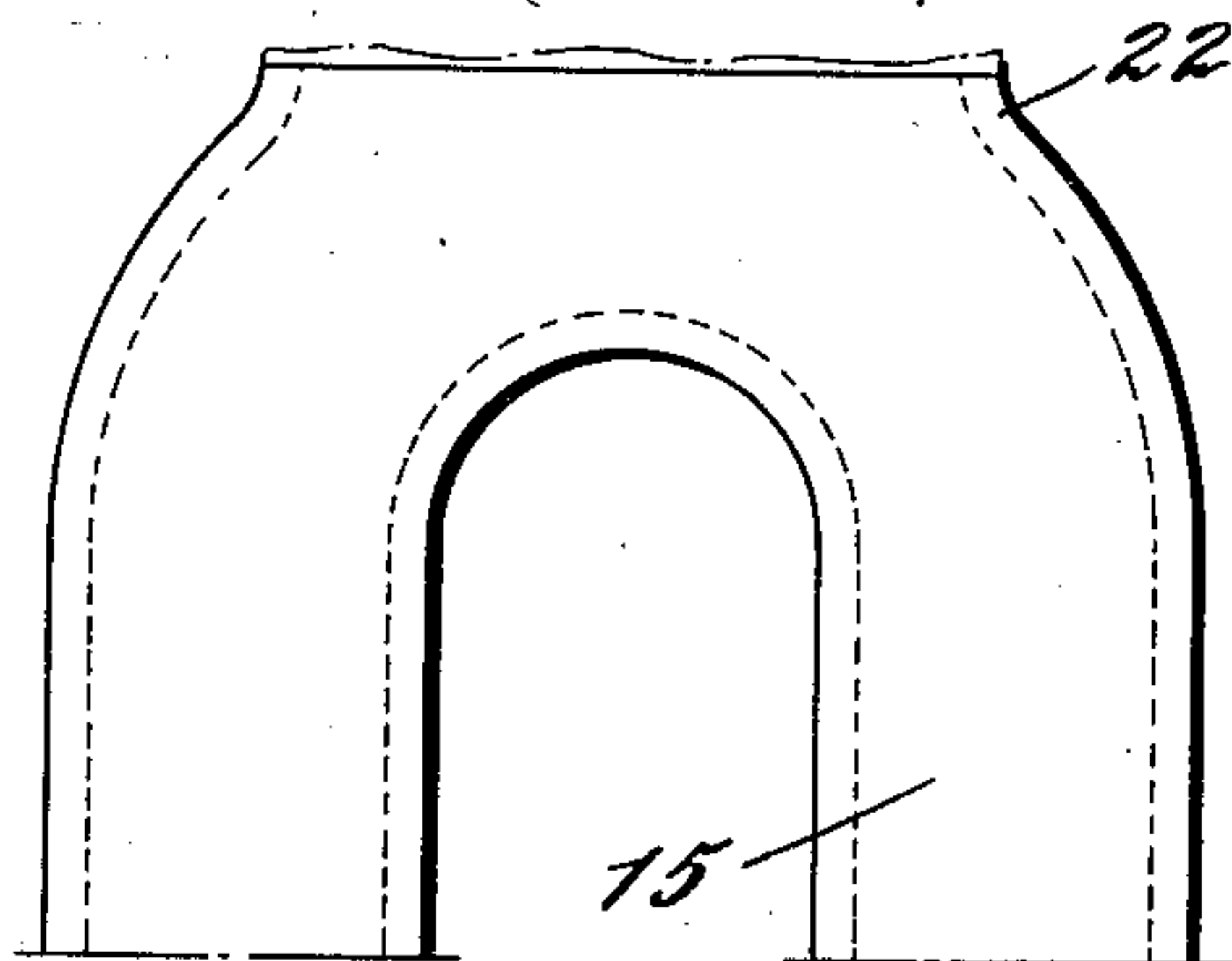
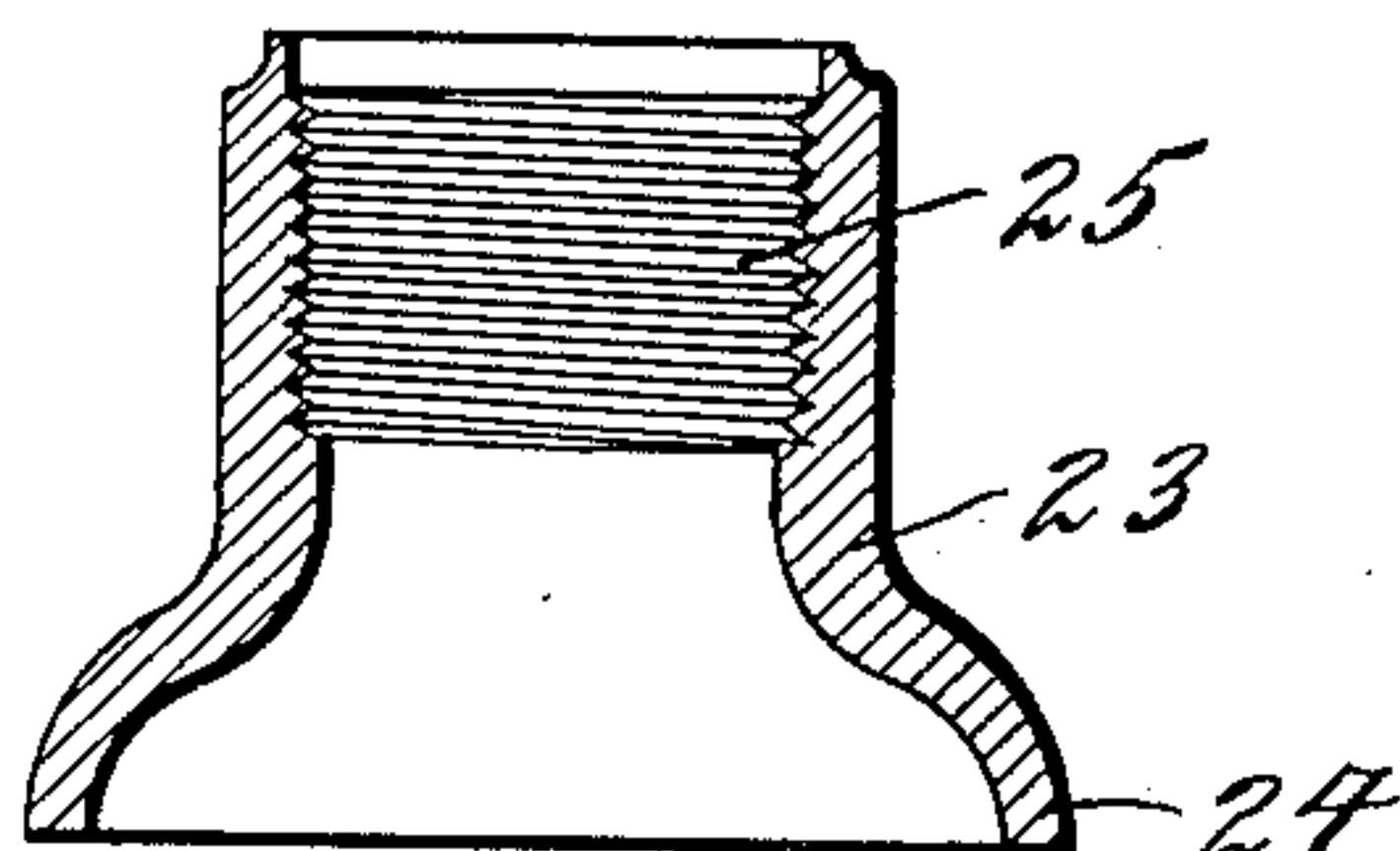


Fig-9-



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Fig-12.

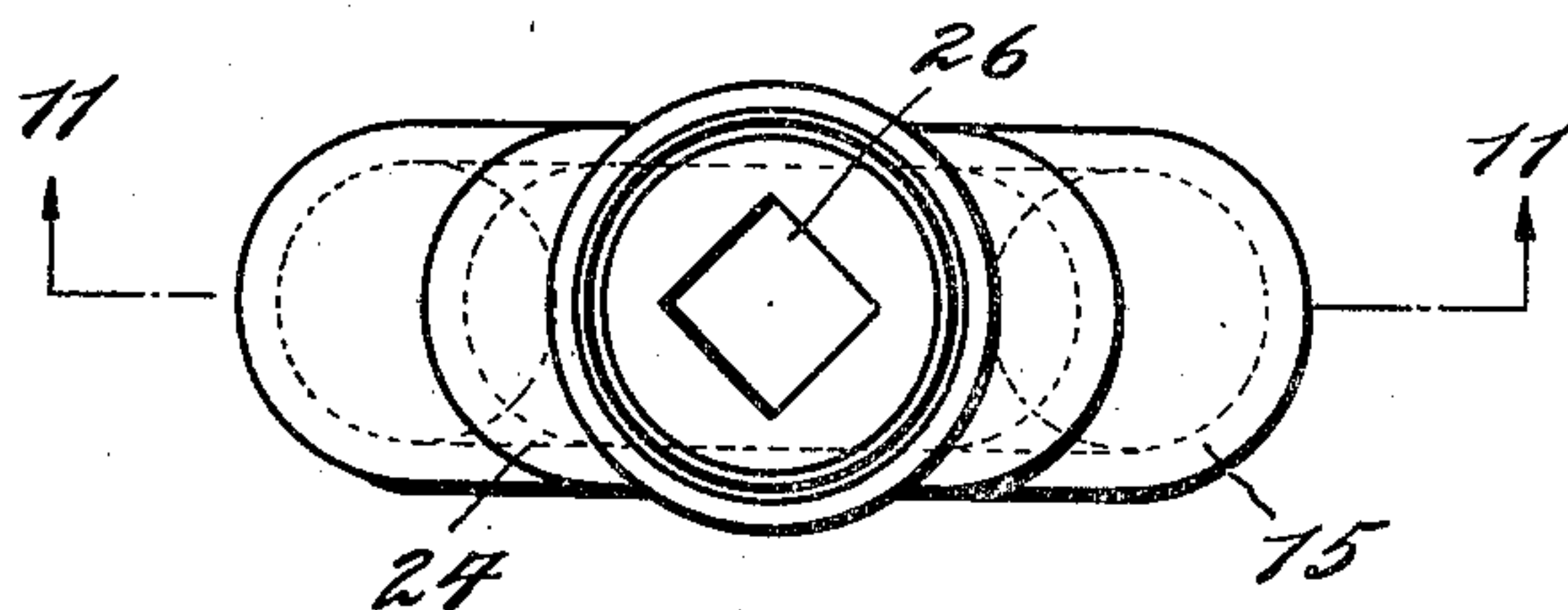


Fig-10.

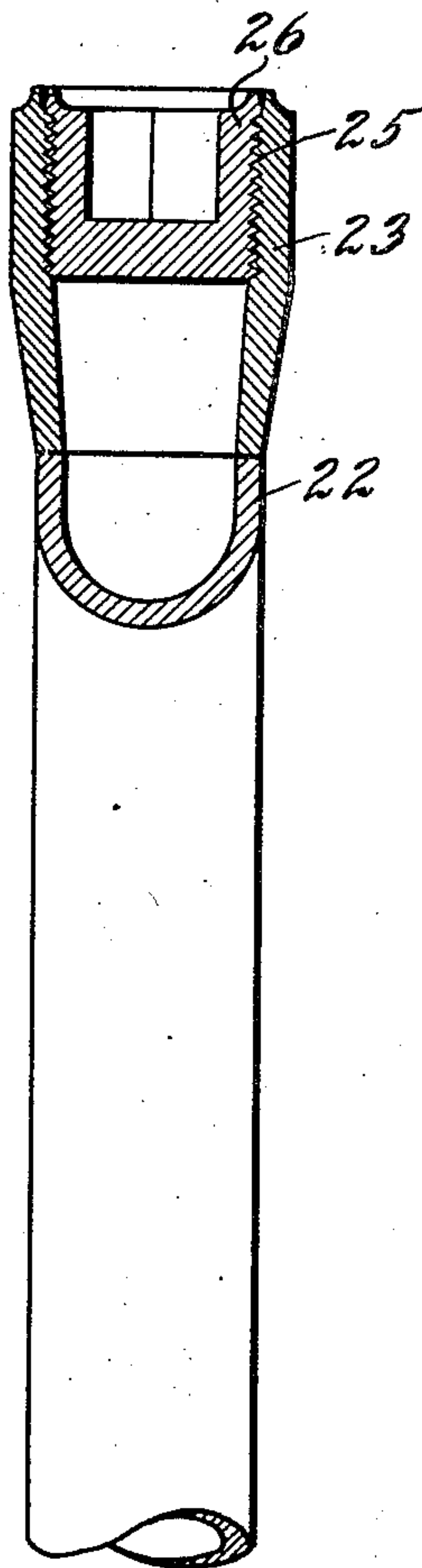
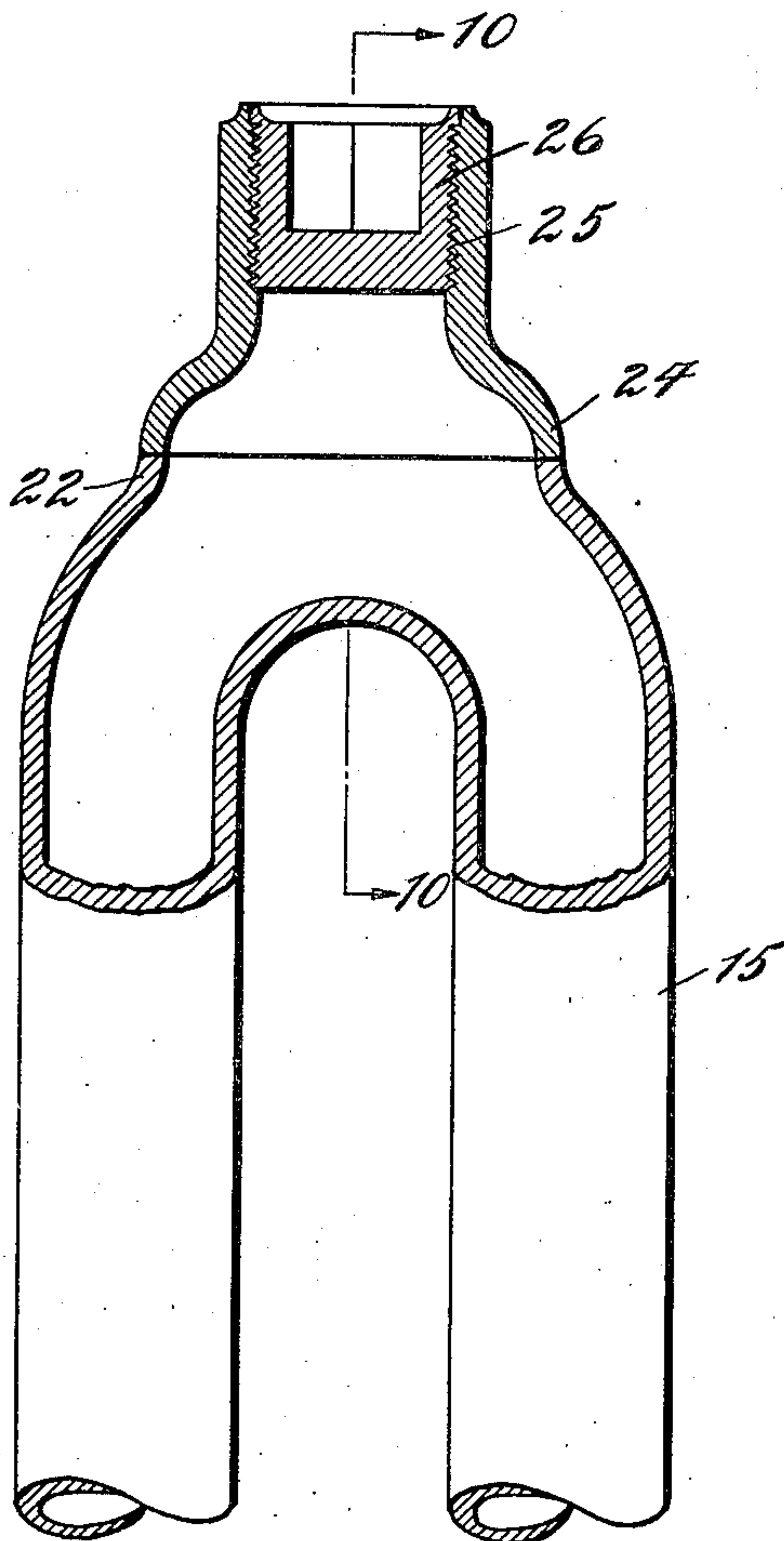


Fig-11.



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Fig-13.

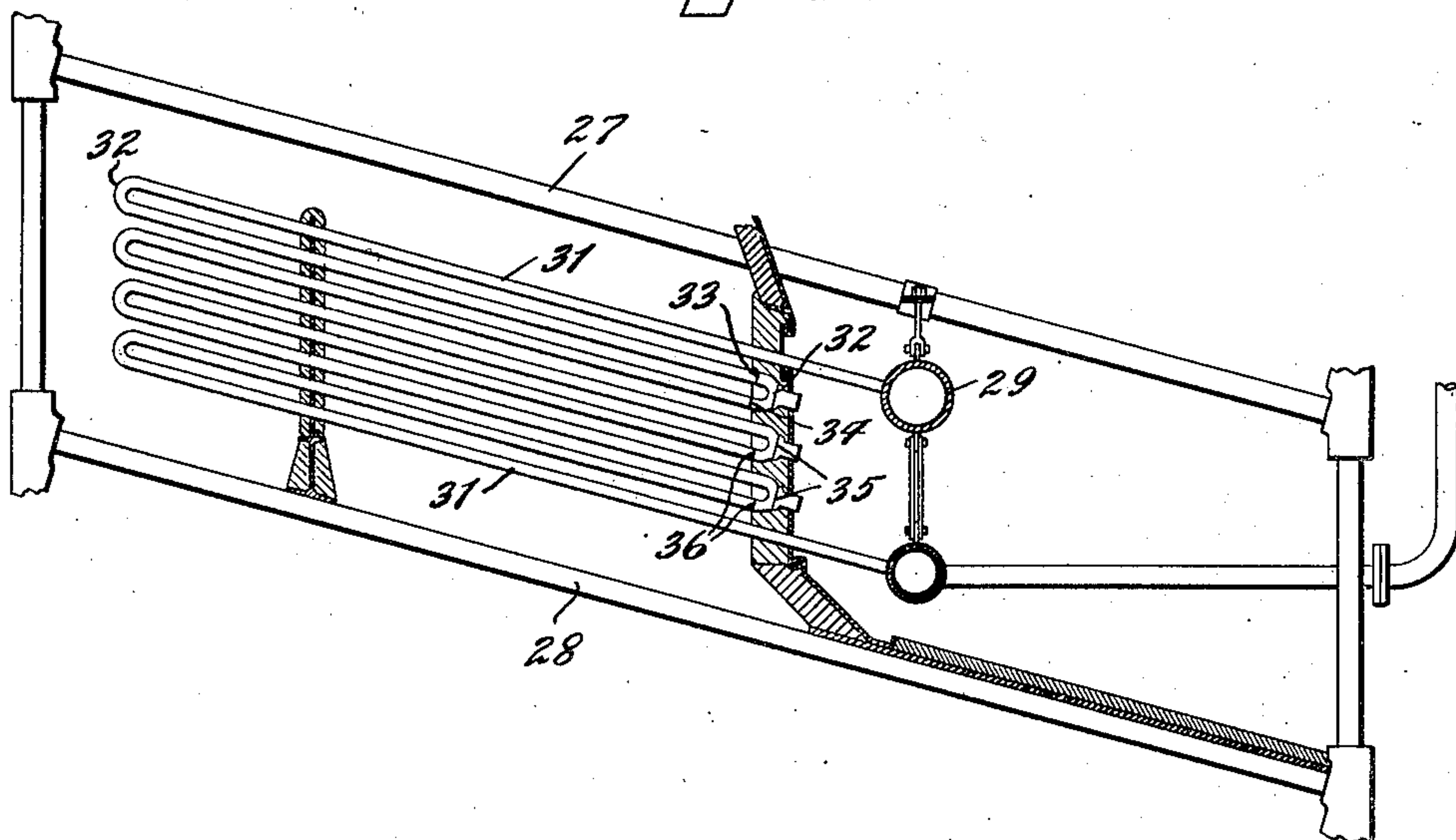
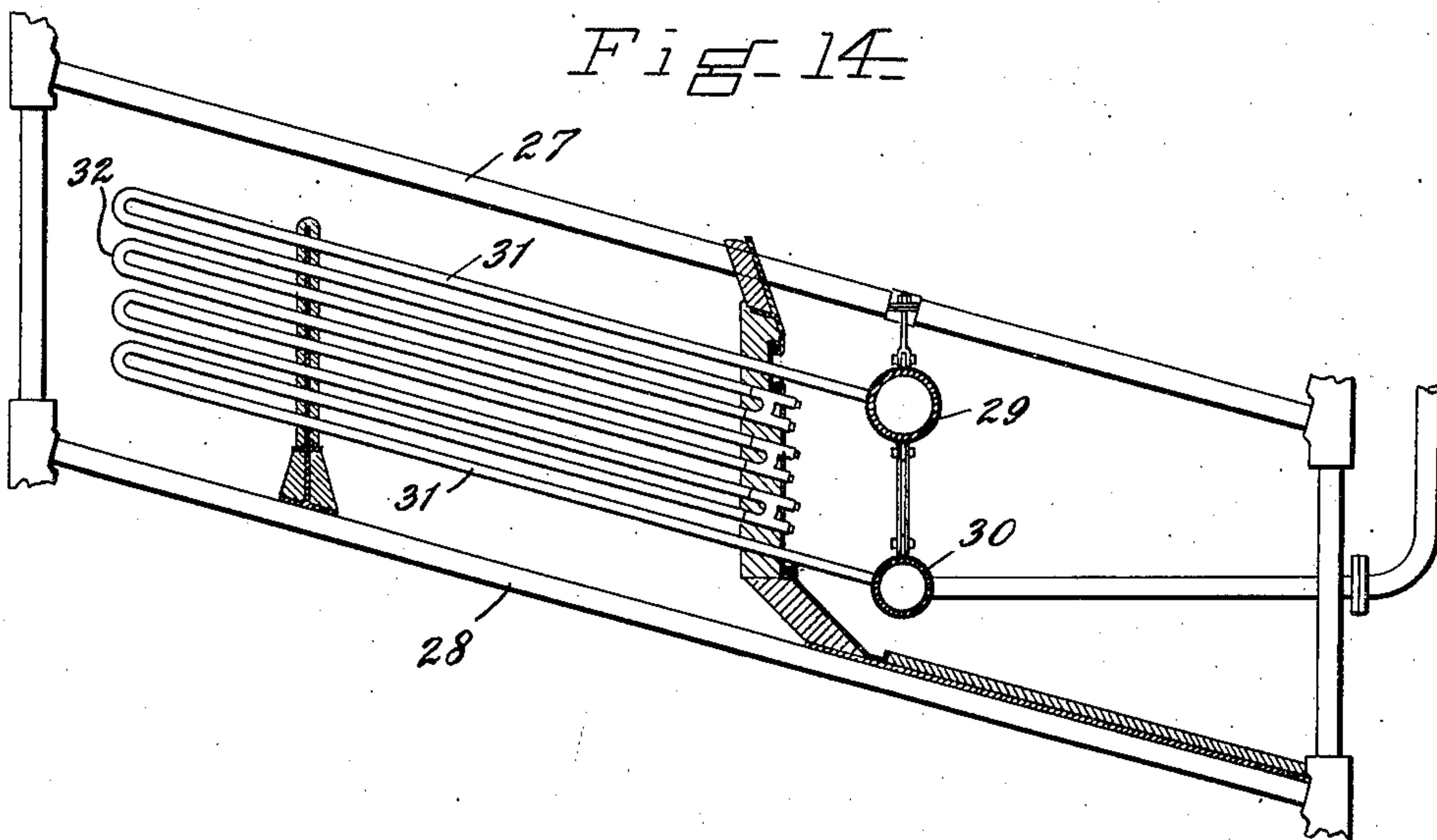


Fig-14.



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# UNITED STATES PATENT OFFICE

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## RETURN BEND AND METHOD OF FORMING THE SAME

Application filed October 30, 1929. Serial No. 403,506.

This invention relates to a novel and improved form of return bend for securing together a plurality of tubes, and also to a novel method of forming such a bend.

5 The invention will be best understood from the following description and the annexed drawings, in which I have shown selected embodiments of the return bend and the method of making the same. In the drawings,

10 Fig. 1 is a plan view of the die and parts therein shown in Fig. 2.

Fig. 2 is a section on the line 2—2 of Fig. 1 and showing part of one step in the method.

15 Fig. 3 is a view corresponding to Fig. 2 but showing another part of the same step.

Fig. 4 is a view partly in elevation and partly in section, illustrating the finished return bend.

20 Fig. 5 is a view illustrating the bending of a tube as the initial step in making a different form of the invention.

Fig. 6 illustrates the step following that shown in Fig. 5.

25 Fig. 7 illustrates the method of forming the flange on the bend appearing in Fig. 6.

Fig. 8 illustrates the bend after the flange is formed.

30 Fig. 9 is a vertical sectional view of a tubular member to be secured to the structure appearing in Fig. 8.

Fig. 10 is a view of the completed bend, partly in section and partly in elevation, the section being taken on the line 10—10 of Fig. 11.

35 Fig. 11 is a view at right angles to Fig. 10, partly in elevation and partly in section, the section being taken on the line 11—11 of Fig. 12.

40 Fig. 12 is an end view of the bend appearing in Fig. 11.

Fig. 13 is an elevation showing my invention as embodied in an interdeck superheater, this figure showing the form of invention disclosed in Figs. 5 to 12 inclusive.

45 Fig. 14 is a view similar to Fig. 13 but showing the form of invention disclosed in Figs. 1, 2, 3 and 4.

50 The invention consists primarily in providing a return bend which embodies means for cleaning the tubes which are connected by the

bend. Referring first to Figs. 1 to 4 inclusive, I start with a return bend 1, having a plurality of branches 2 and 3, here shown as two in number, which are adapted to connect a corresponding number of tubes. It is to be understood that the invention is not necessarily limited to a bend having two branches. The material of the bend is preferably forged of wrought metal capable of withstanding the high pressures common in present day engineering practice.

The bend is provided with two small holes 4 and 5, each substantially in line with the axes of the branches 2 and 3. These holes may be formed by drilling or any other suitable method. The bend is then heated to flanging heat and placed within a suitable die 6. This die is of a form which will grip the return bend securely and will hold it against deformation during the subsequent steps performed thereon. For that purpose, it is provided with parts engaging the walls of the branches, as plainly shown in Figs. 2 and 3, and another part 7 engaging the return bend between the holes 4 and 5.

Suitable mandrels 8 are then placed in the two branches, as shown in Fig. 2, each mandrel having a nose 9 of a size to be received in the holes 4 and 5. The mandrels are then pushed down through the holes, as illustrated in Fig. 3, this operation resulting in the formation of flanges 10 surrounding each of the holes 4 and 5 which have now become relatively large openings of substantially the same size as the internal diameters of the branches 2 and 3, and substantially in alignment therewith. The operation just described may be performed in any suitable mechanism such as a hydraulic press.

I next weld to each of the flanges 10 a tubular member 11 of substantially the same internal diameter as the branches 2 and 3 so that the result is an H-shaped return bend having the two branches 2 and 3 which are capable of being secured to the tubes as by welding or other well-known means and forming substantial extensions of these branches are the members 11 through which the tools may be inserted for the purpose of cleaning the tubes connected to the branches. The two



sides of the H are connected to a transverse part 12 which is formed from a portion of the original curved part of the bend. Preferably each of the members 11 is internally threaded to receive a plug 13 exemplifying a detachable closure, and this plug may be welded as indicated at 14 to aid in holding it in position. This welded joint may be cut when it is desired to remove a plug.

Referring now to Figs. 5 to 12 inclusive, the invention is here shown as comprising a bend having a single opening through which any one of the plurality of branches may be reached by cleaning tools. In practicing the invention according to the disclosure in these figures, I first bend a section of tubing to form a bend 15, as shown in Fig. 5, suitable dies 16 and 17 being employed for this purpose. The bend is next cut, as shown in Fig. 6, to remove a portion 18 therefrom, thus forming an opening.

The bend is next securely clamped in a holder designated 19 in Fig. 7, and the edge portion 20 of the opening is acted on by a suitable tool designated 21 in Fig. 7, this tool spinning the portion 20 outwardly to form a flange 22 surrounding the opening, this flange appearing in Fig. 8.

In Fig. 9 is shown a tubular member 23 having an end portion 24 of the same internal dimensions as the flange 22. The member 23 is placed in position on the flange 22 and welded to the bend. This member is internally threaded, as plainly shown at 25, and is provided with a plug 26.

In each of Figs. 13 and 14 is shown an interdeck superheater disposed between banks of water tubes 27 and 28. This superheater comprises headers 29 and 30 connected together by tubes which are shown as having substantially straight parallel portions 31 joined together by return bends. At their outer ends, removed from the headers, these bends 32 are formed by bending the tubes and therefore, are of one piece with the tubes which they join together.

In Fig. 13 the return bends, at the inner ends of the tubes, near the headers, are formed according to my invention as disclosed in Figs. 5 to 12 inclusive. At 32 is indicated a bend formed separately and joined to the adjacent tubes by welding at 33 and 34. At 35 are shown bends formed by bending one end of a tube 31 and joining it to the end of the adjacent tube by welding at 36. This form of my invention may be practised with either kind of bend.

In Fig. 14 the tubes 31 have their inner ends welded to the branches of bends constructed in the manner disclosed in Figs. 1, 2, 3 and 4, this form of bend being preferably made as a separate fitting.

While I have shown the invention as used in connection with a certain kind of superheater, it is to be understood that it may

be used with other forms of apparatus where found suitable.

I claim:—

1. A forged metal return bend having a plurality of branches, an opening in said bend communicating with at least one of said branches, a flange surrounding said opening, and a tubular member having an end portion of substantially the same internal dimensions as said opening and welded to said flange, said tubular member being adapted to receive a closure member.

2. The method of providing means for cleaning tubes connected by a return bend, said bend having a plurality of branches adapted to be connected to said tubes, which comprises forming an opening in said bend communicating with at least one of said branches, forming a flange surrounding said opening, welding a tubular member to the flange, and securing a closure member to said tubular member.

3. The method of providing means for cleaning tubes connected by a return bend, said bend having a plurality of branches adapted to be connected to said tubes, which comprises drilling a small hole in said bend substantially on the axis of one of said branches, heating said bend, inserting a mandrel into said branch with a portion thereof in said hole, forcing said mandrel through the hole to form a flange surrounding it, welding a tubular member to said flange substantially in line with said branch, and affixing a closure member to the tubular member.

4. A forged metal return bend having a plurality of branches connected together by a curved portion, openings in said curved portion substantially in line with said branches, and tubular members each having an end portion of substantially the same internal dimension as one of said openings and welded to the wall thereof, said tubular members being adapted to receive closure members.

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