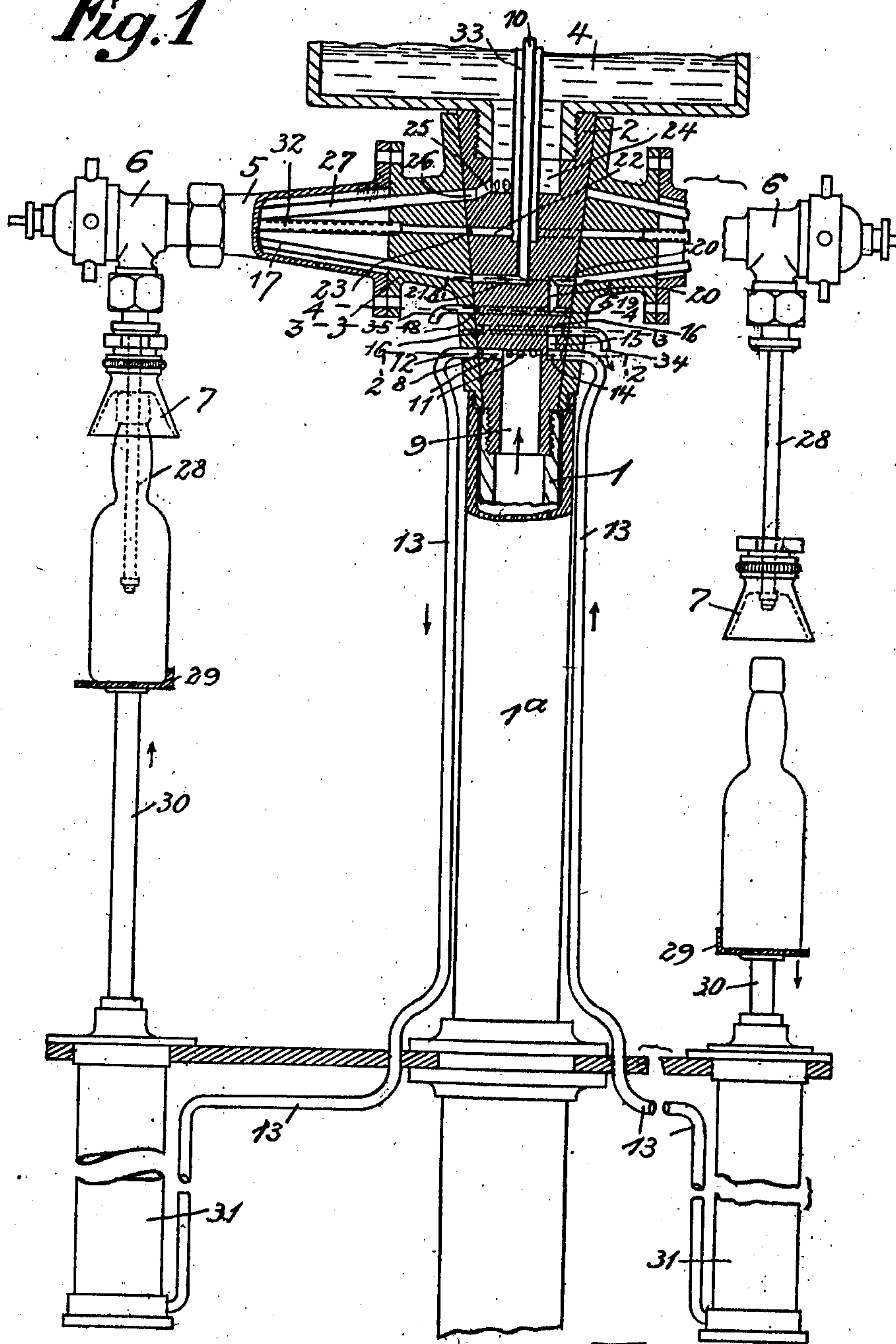


R. PFAFF & W. SUTER.  
BOTTLE FILLING MACHINE.  
APPLICATION FILED MAR. 15, 1909.

988,658.

Patented Apr. 4, 1911.  
3 SHEETS—SHEET 1.

*Fig. 1*



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3 SHEETS-SHEET 2.

Fig. 2

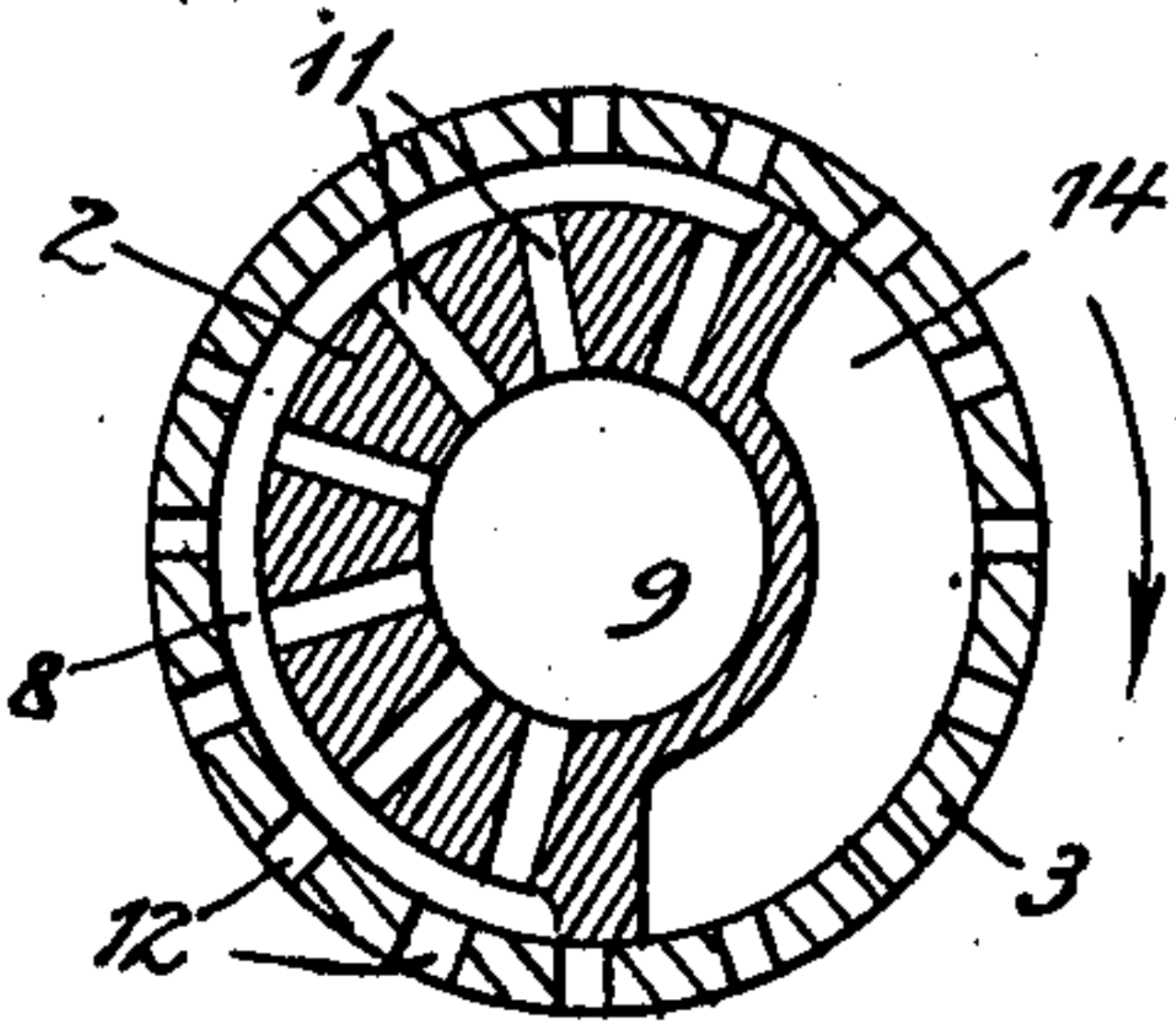


Fig. 3

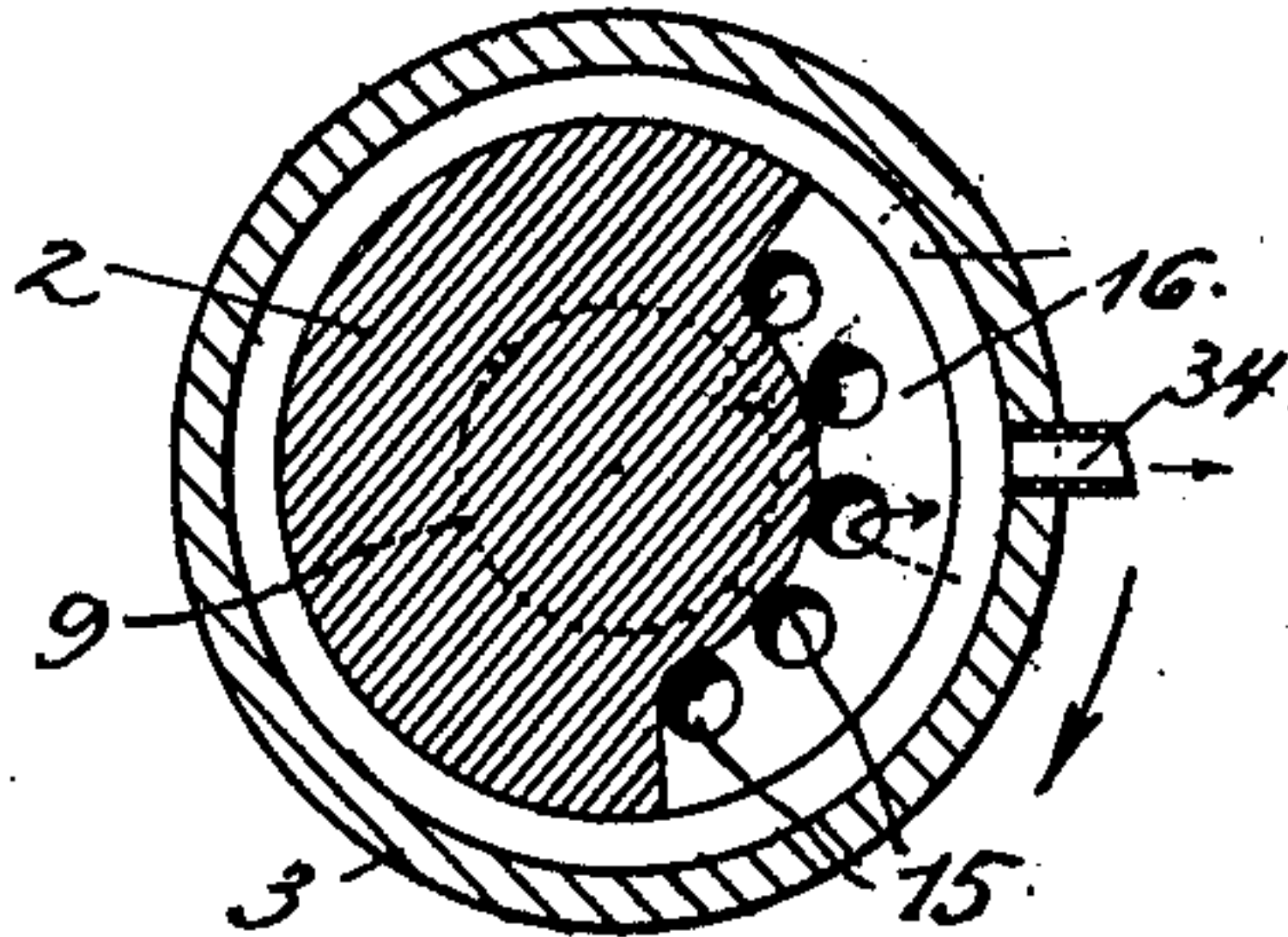


Fig. 4

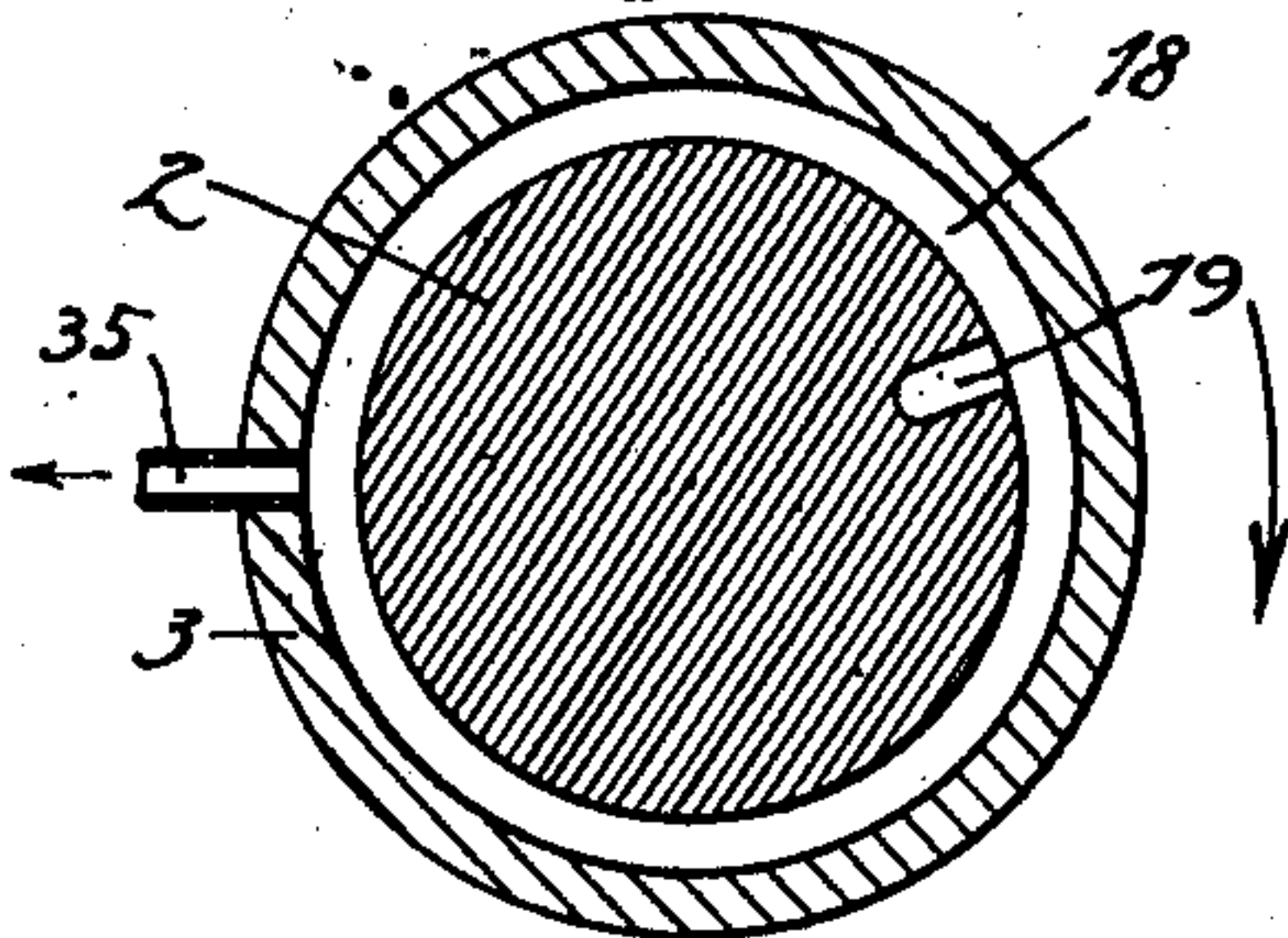


Fig. 5

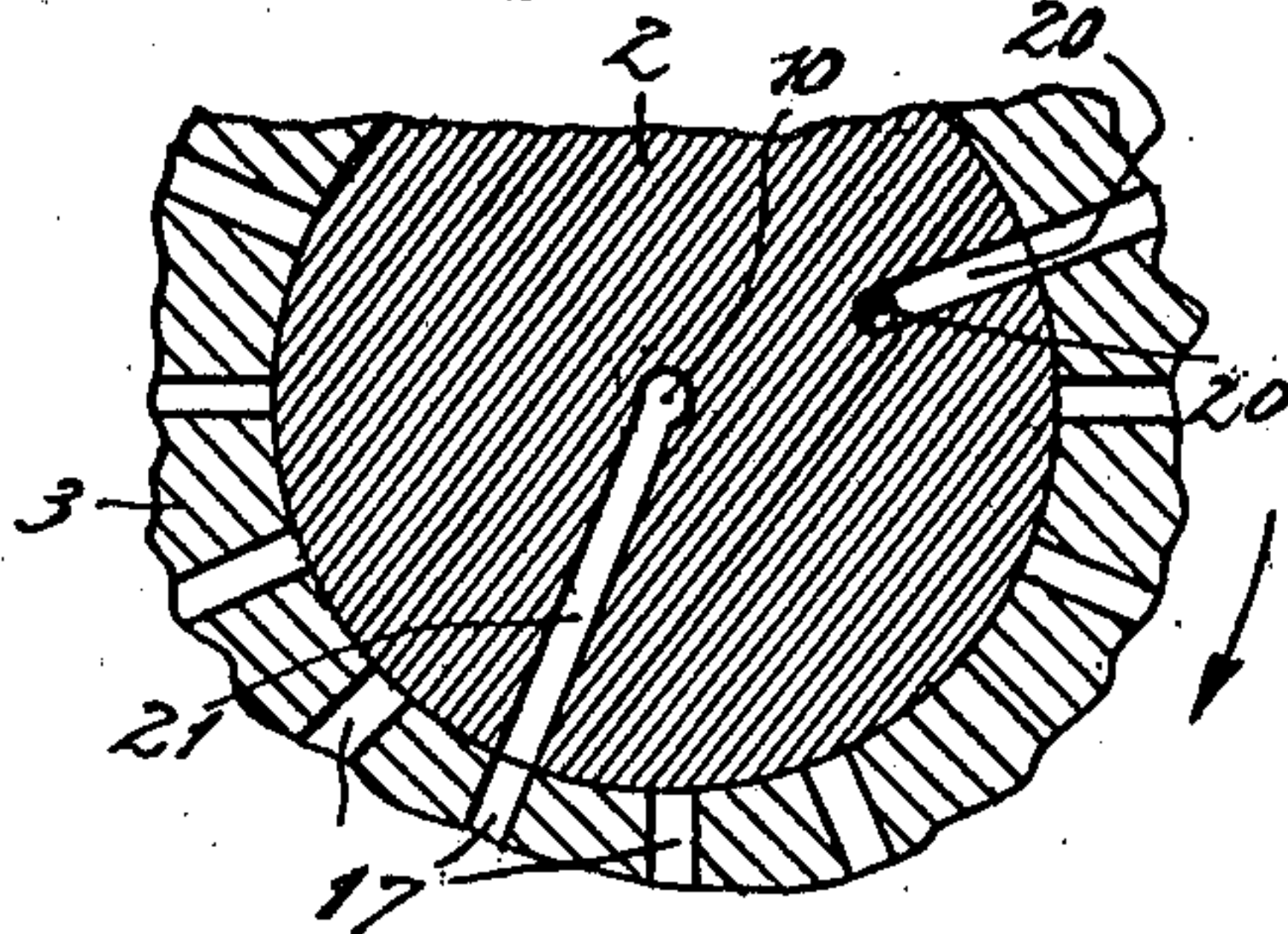


Fig. 9.

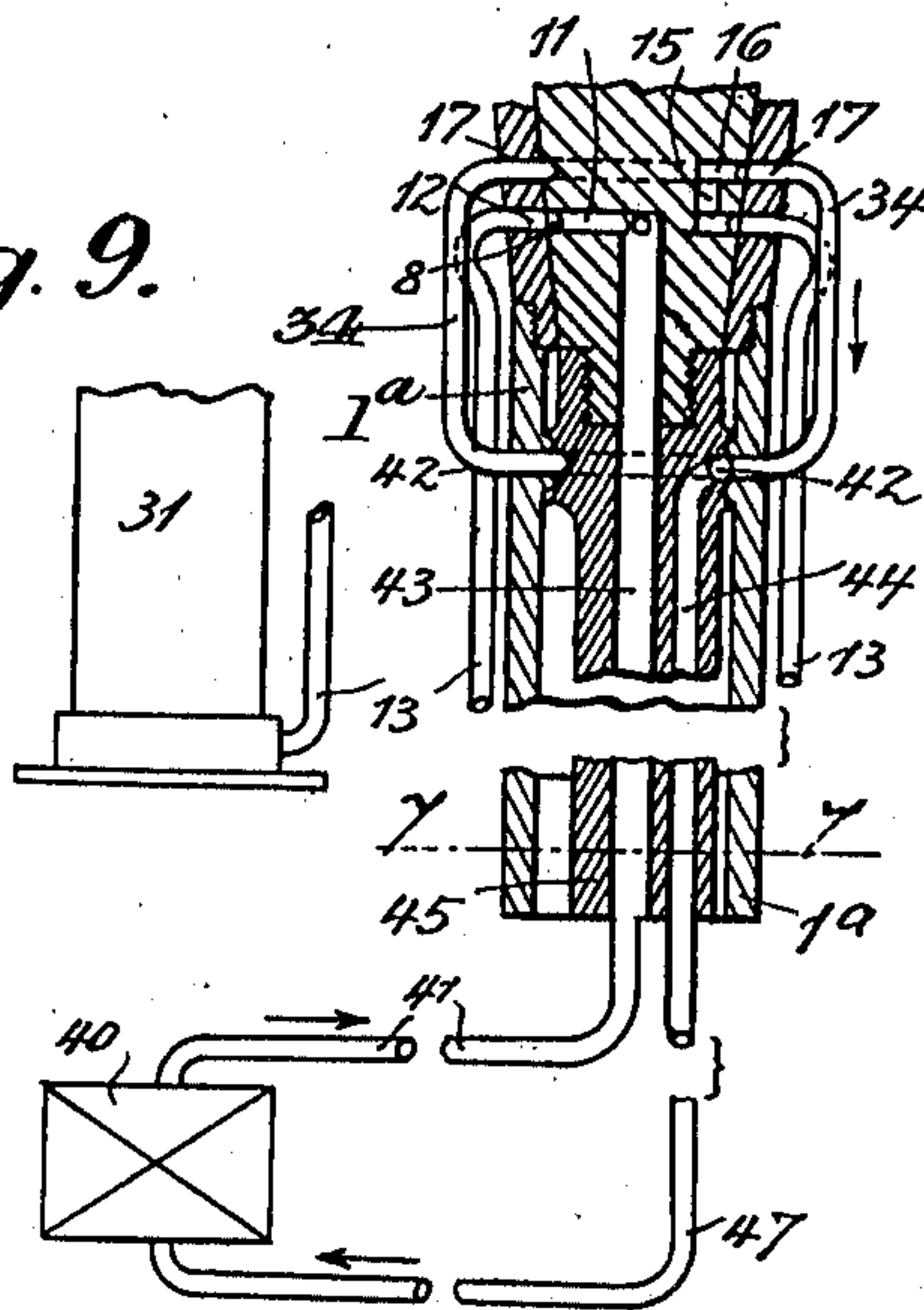
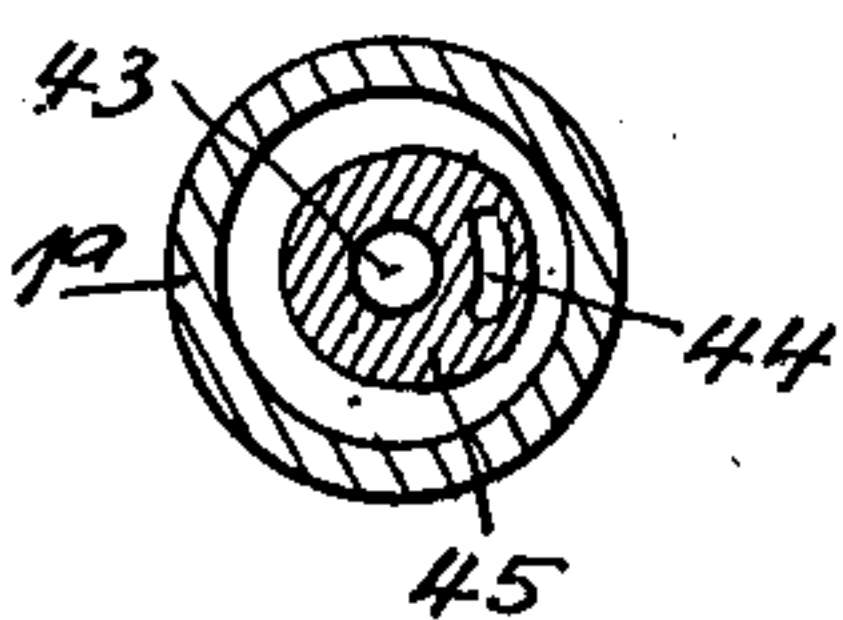


Fig. 10.



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3 SHEETS—SHEET 3.

Fig 6.

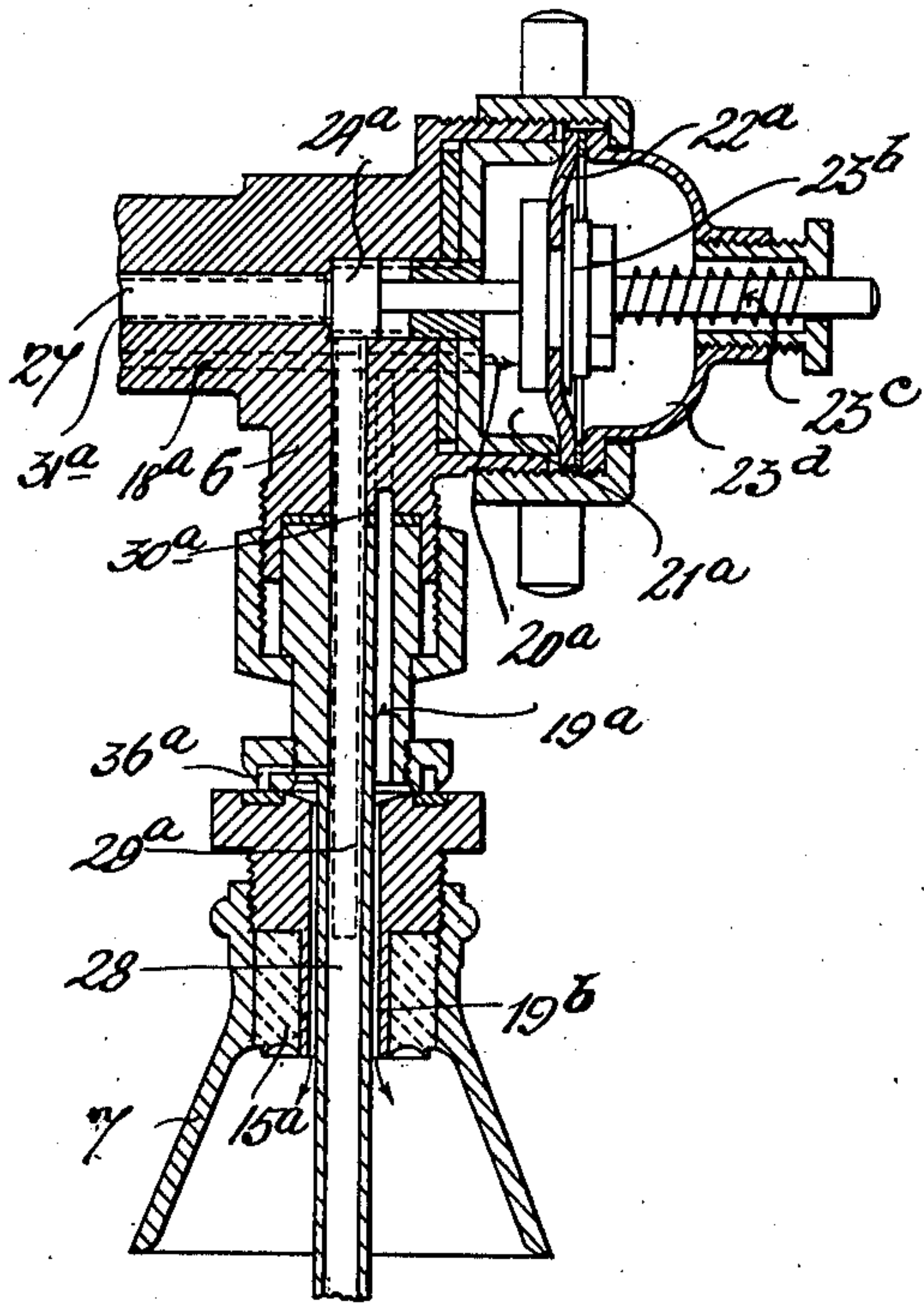


Fig 7.

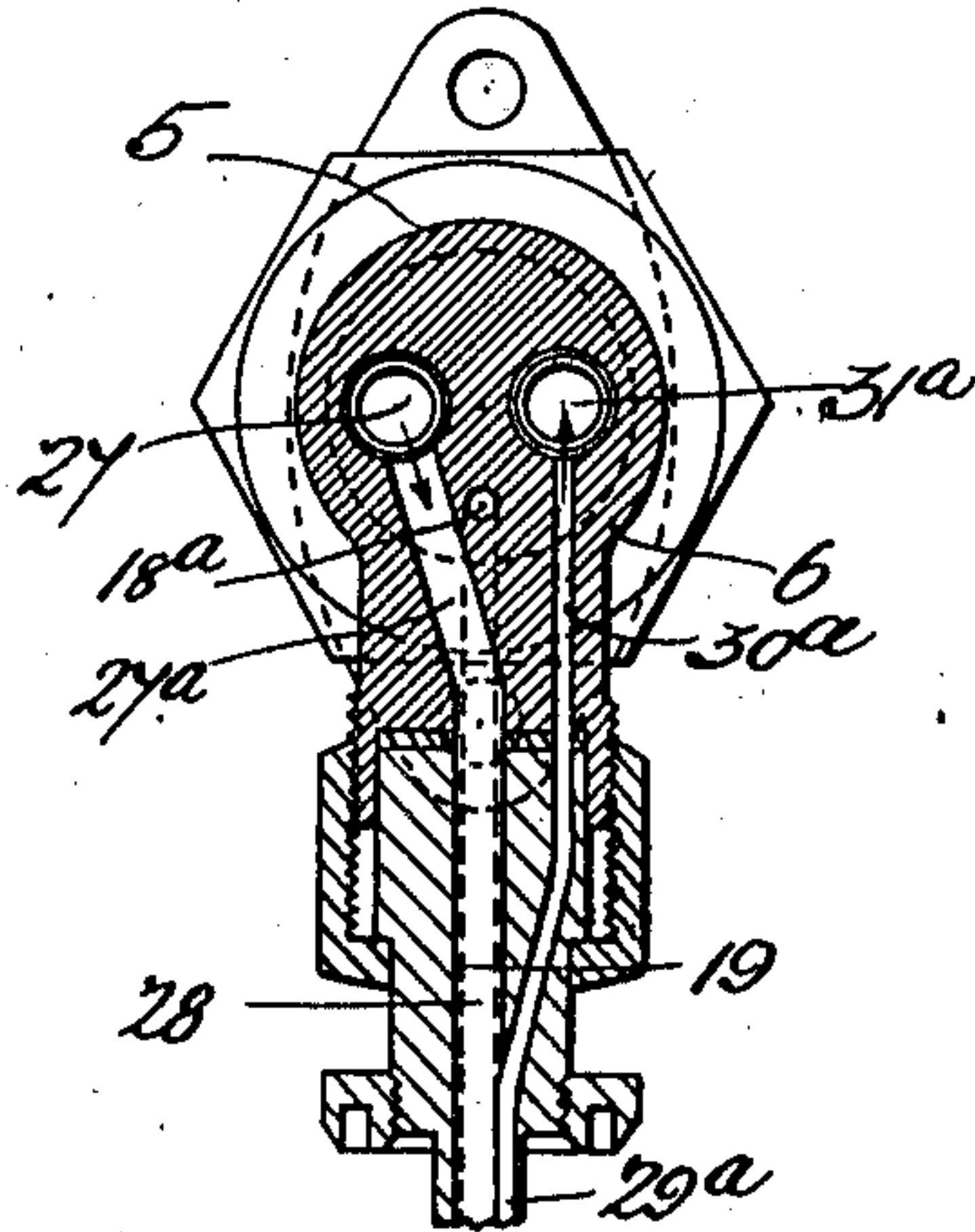
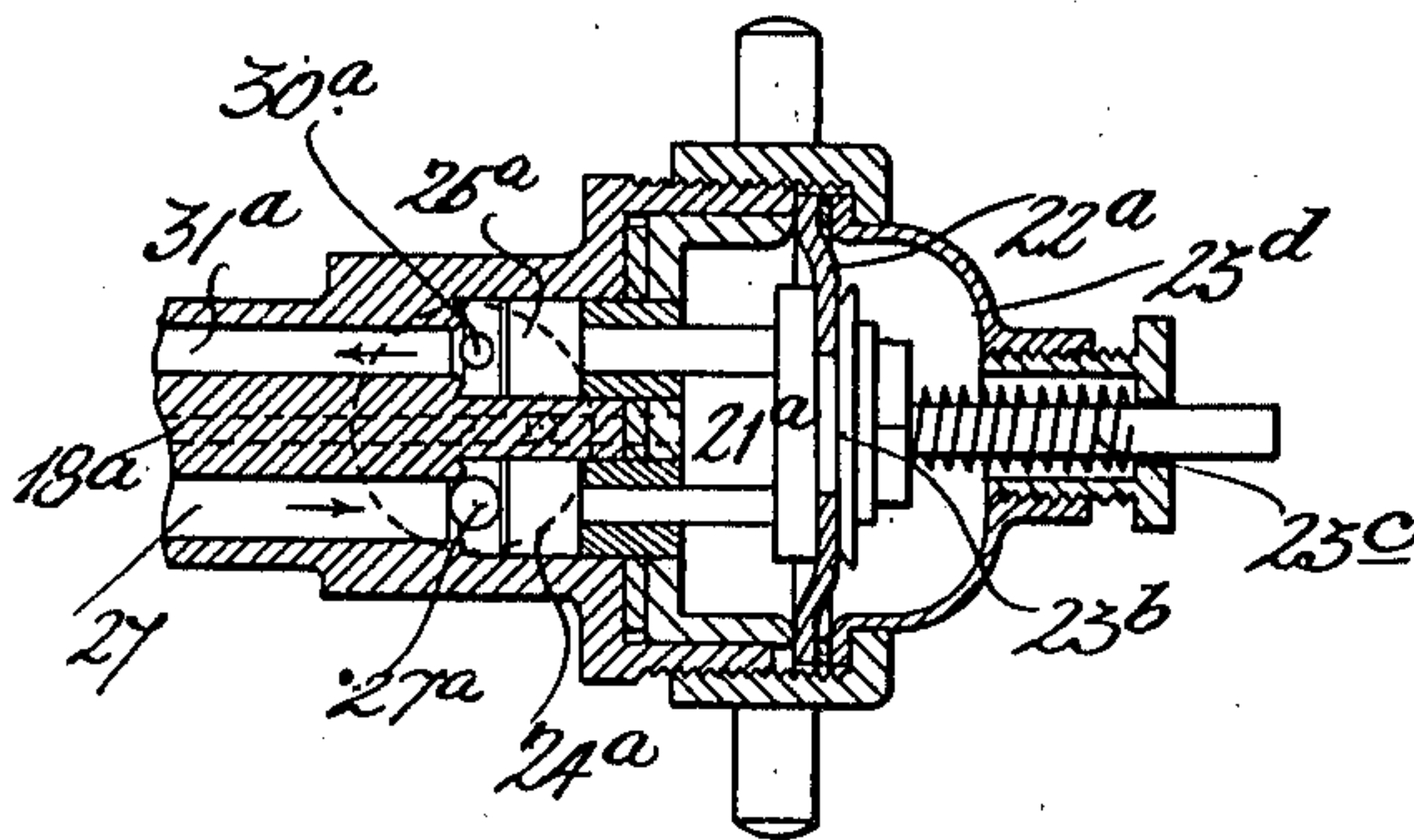


Fig 8.



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# UNITED STATES PATENT OFFICE.

RICHARD PFAFF AND WERNER SUTER, OF ZURICH, SWITZERLAND.

## BOTTLE-FILLING MACHINE.

988,658.

Specification of Letters Patent.

Patented Apr. 4, 1911.

Application filed March 15, 1909. Serial No. 483,582.

*To all whom it may concern:*

Be it known that we, RICHARD PFAFF, a subject of the German Emperor, and WERNER SUTER, a citizen of the Swiss Republic, residing at Zurich, in Switzerland, have invented certain new and useful Improvements in Bottle-Filling Machines, of which the following is a specification.

This invention relates to apparatus for filling bottles and other receptacles and comprises receptacle-holders which are carried by a horizontally rotatable frame and are adapted to be lifted by means of a pressure fluid.

The object of the invention is that all operations for filling the receptacles, between the moving thereof to the filler-head and the depositing thereof at the place of delivery, are automatically performed, the control of the channels for the liquid and pressure fluid being controlled by means of a single central cock. By the rotation of the frame these channels are opened and closed as required.

A further object of the present invention consists in a construction and arrangement whereby the supply and return of the pressure fluid lifting the receptacles are also controlled by the said central cock.

Two modifications of the invention are shown in the accompanying drawing, in each of which the apparatus comprises sixteen filling devices, but there may be a greater or less number of these devices. The apparatus shown in Figures 1 to 5 is designed for working with compressed air as pressure fluid.

Fig. 1 is a vertical section of the central cock, and shows in elevation two of the sixteen fillers in two different positions, namely on the left with a bottle pressed against the filler-head, and on the right with the bottle-lifting piston lowered. Figs. 2, 3, 4 and 5 are cross-sections of the central cock on a larger scale, on lines 2—2, 3—3, 4—4, 5—5 respectively. Figs. 6 and 7 are vertical sections at right angles to each other of a filler which may be employed with the present machine. Fig. 8 is a horizontal section of the upper part of the filler. Fig. 9 shows in vertical section a modification for working with water under pressure. Fig. 10 is a cross-section on line 7—7 of Fig. 6.

In the drawing, 1 represents a pillar, to

the upper end of which the plug of the central cock is fixed below a vessel 4 containing the liquid with which the bottles are to be filled. The rotatable shell 3 of the cock is screwed to a rotatable pillar 1<sup>a</sup> and has arms 5, which connect the shell with valves in valve-boxes 6 for the liquid flowing to the filler-heads and air escaping from the bottles. Each valve-box 6 has a filling pipe 28 and bottle-centering device 7.

From the vessel 4 channels 10 and 21 in the plug 2 and 17 in the shell 3 lead, respectively, directly to the bottle and to the valve-box 6. These channels serve for the supply of pressure fluid to the bottle and valve-box. In the latter the fluid opens valves which allow liquid to flow to the bottle and air to escape from the bottle. Liquid flows from the vessel 4 through channels 24, 25 and 26 to one of the sixteen channels 27 in arms 5, and through one of the valves in the box 6 to the pipe 28 and bottle.

Communicating with the aforesaid channel 17 is a channel 18<sup>a</sup> which divides into two branch channels 19<sup>a</sup> and 20<sup>a</sup>. The channel 19<sup>a</sup> leads to an annular channel 19<sup>b</sup> passing to the filler head 15<sup>a</sup> from which the fluid flows into the bottle. The channel 20<sup>a</sup> communicates with a channel 21<sup>a</sup> (Fig. 6) one wall of which is formed by a membrane 22<sup>a</sup> dividing said chamber 21<sup>a</sup> from a chamber 23<sup>a</sup>. To this membrane is attached a metallic member 23<sup>b</sup> which is acted on by a spring 23<sup>c</sup> at one side and has fixed to its other side pistons 24<sup>a</sup> and 25<sup>a</sup> adapted to close the channels 27 and 31<sup>a</sup> provided for the passage of the liquid and the exhausting air respectively.

When the piston 24 is in its right hand position the liquid flows from the channel 27 through a channel 27<sup>a</sup> and pipe 28 into the bottle. The air expelled from the bottle being filled flows through a channel 29<sup>a</sup> to the channel 30<sup>a</sup> and thence to the chamber containing the piston 25<sup>a</sup>. When the latter is moved to its right hand position the air flows through channels 31<sup>a</sup>, 32, 23, 22 and 33 to the vessel 4.

Above the movable filler head 15<sup>a</sup> is a channel 36<sup>a</sup> communicating with the atmosphere. When the bottle is under pressure, displacement of the filler head closes this channel. When the pressure is relaxed the said channel is opened by return of the



filler head to normal position so that the pressure fluid exhausts through said channel 36<sup>a</sup> and ceases to act on the filled bottle.

If the bottle is broken the pressure fluid in the chamber 21<sup>a</sup> escapes through the channel 19<sup>a</sup> into the atmosphere so that the pistons 24<sup>a</sup> and 25<sup>a</sup> are thrust to the left by the springs 23<sup>c</sup> and close the passage for the liquid and exhaust air.

The compressed air for lifting the bottle flows from an air-pump (not illustrated) through channels 9, 11 and 8 in the plug 2, one of the channels 12 in the shell, and pipe 13 (left-hand side of Fig. 1) to the cylinder 31. Rotation of the frame subsequently enables the pressure fluid to flow through pipe 13 on the right-hand side to channels 12 and 14 (Fig. 2) and thence through channels 15, 16 and 34 into the atmosphere.

Each of the sixteen fillers fills one bottle during each revolution of the frame, the operation of the apparatus being as follows. During rotation of the shell with the frame, the channel or groove 8 is in communication with a plurality of channels 12. Air flowing from the air-pump through 9, 11 and 8 flows through 12 and 13 to the cylinder 31, successively lifts the bottle-holders 29 and bottles 28 by means of the pistons and piston-rods 30, and presses the bottles against the filler-heads. A channel 17 (Fig. 5) of the shell 2 is then placed in communication with channels 21 and 10. Pressure fluid can then flow from the vessel 4 through 10, 21 and 17 to the bottle to be filled, and acts on the latter as previously explained. The latter are opened, and while liquid flows into the bottle through 24, 25, 26, 27 and 28, air flows from the bottle as previously explained.

Meanwhile communication between the respective channels 17 and 21 (Fig. 5) has been broken, so that the flow of pressure fluid to the bottle being filled is cut off. The bottle is filled, and the channel 17 is placed in communication with a channel 20 of the plug 2, through which the pressure fluid in the channel 17 and channels communicating therewith can flow to channel 19, groove 18, pipe 35 and the atmosphere. The valves in the box 6 are then closed by the spring 23<sup>c</sup>. Continued rotation of the shell brings the filler shown on the left-hand side of Fig. 1 to the right hand position. The pipe 13 and channel 12 are placed in communication with the channel 14 in the plug, and the pressure fluid in cylinder 31 can flow through channels 15, 16 and pipe 34 to the atmosphere, so that the piston carrying the filled bottle descends.

The air compressed by the pump is at considerably higher pressure than the pressure fluid in the vessel 4. The former has to overcome the pressure of the latter, in addition to the weight of the bottle and bottle-holder.

In the modification shown in Fig. 6 water under pressure is used for pressing the bottles against the filler-heads. This water is forced through a pipe 41 by means of a suction and pressure pump 40 of any suitable type (diagrammatically indicated in the drawing). The pipe 41 communicates with a channel 43 in the fixed pillar 45, and also with channels 11 and 8 in the plug of the cock, and with a channel 12, pipe 13 and piston cylinder 31. Rotation of the shell 3 and pillar 1<sup>a</sup> breaks communication between the channels 8 and 12, and places the channel 12 in communication with the return channels 14, 15, 16 and 17, whence the pressure fluid flows back to the pump through pipe 34, annular channel 42, channel 44 and pipe 47. The annular channel 42 is formed in a flange of the pillar 1<sup>a</sup>. In this modification also the most essential feature is the control of the bottle-lifting fluid by means of the central cock which also controls the liquid for filling the bottles, and the pressure fluid required for filling. The modifications shown do not exhaust the possibilities of the invention. Other means may be used for controlling all the parts by means of a central cock.

From the foregoing description it will be understood that the pressure fluid, which may be water or compressed air, acts on a piston in a cylinder located below the receptacle-holder. During each revolution of the frame the channel for admission of pressure fluid to the piston is first opened, so that the fluid lifts the receptacle and presses it against the filler-head. Then the said channel is closed, and finally, immediately after the closing, and during the same revolution, the channel between the piston and central cock is placed in communication with an open channel of the cock, or with the pressure fluid reservoir, so that the fluid below the piston flows out of the cylinder and allows the filled receptacle to descend. Only a single device, the piston below the holder, is therefore required for pressing the receptacle against the filler-head, inasmuch as the central cock, which may serve an indefinite number of receptacles, also controls the supply of pressure fluid to the lifting device. By centralizing the control in this manner the working of the apparatus is rendered very exact. The pressure acting on the receptacles from below, for overcoming the pressure produced in the receptacle before filling, and the weight of the receptacle and holder, can be very exactly regulated.

The plug of the central cock is fixed, and the shell rotates, but this arrangement may be reversed.

What we claim as our invention and desire to secure by Letters Patent of the United States is:—

A bottle-filling machine comprising a cen-



tral cock, a carrier having a series of radi-  
ally-disposed filling heads rotatable about  
said cock, a series of bottle-holders on said  
carrier below said heads, having fluid pres-  
5 sure-operated means for severally lifting  
said holders into operative relation with said  
heads, a receptacle for the filling liquid  
above said heads, fluid supply and exhaust  
connections between said receptacle and each  
10 head, separate fluid pressure-operated means  
for normally closing each pair of said con-  
nections, sources of fluid pressure supply,  
and means, comprising radiating ducts, con-  
trolled by said cock as said carrier is rotated,  
15 for successively connecting one of said fluid  
pressure supplies to the pressure-operated

means of said bottle-holders to lift the same  
and then to connect the other of said pres-  
sure supplies to the pressure-operated means  
of said supply and exhaust connections to 20  
open the same and thereafter to connect the  
first mentioned pressure-operated means to  
an exhaust and permit the bottle-holders to  
be lowered, substantially as described.

In witness whereof we have signed this 25  
specification in the presence of two wit-  
nesses.

RICHARD PFAFF.  
WERNER SUTER.

Witnesses:

JOSEPH SIMON,  
HERM. SCHILLING.