

No. 719,028.

PATENTED JAN. 27, 1903.

I. S. McDOUGALL.

STEAM TRAP.

APPLICATION FILED DEC. 6, 1901.

NO MODEL.

2 SHEETS—SHEET 1.

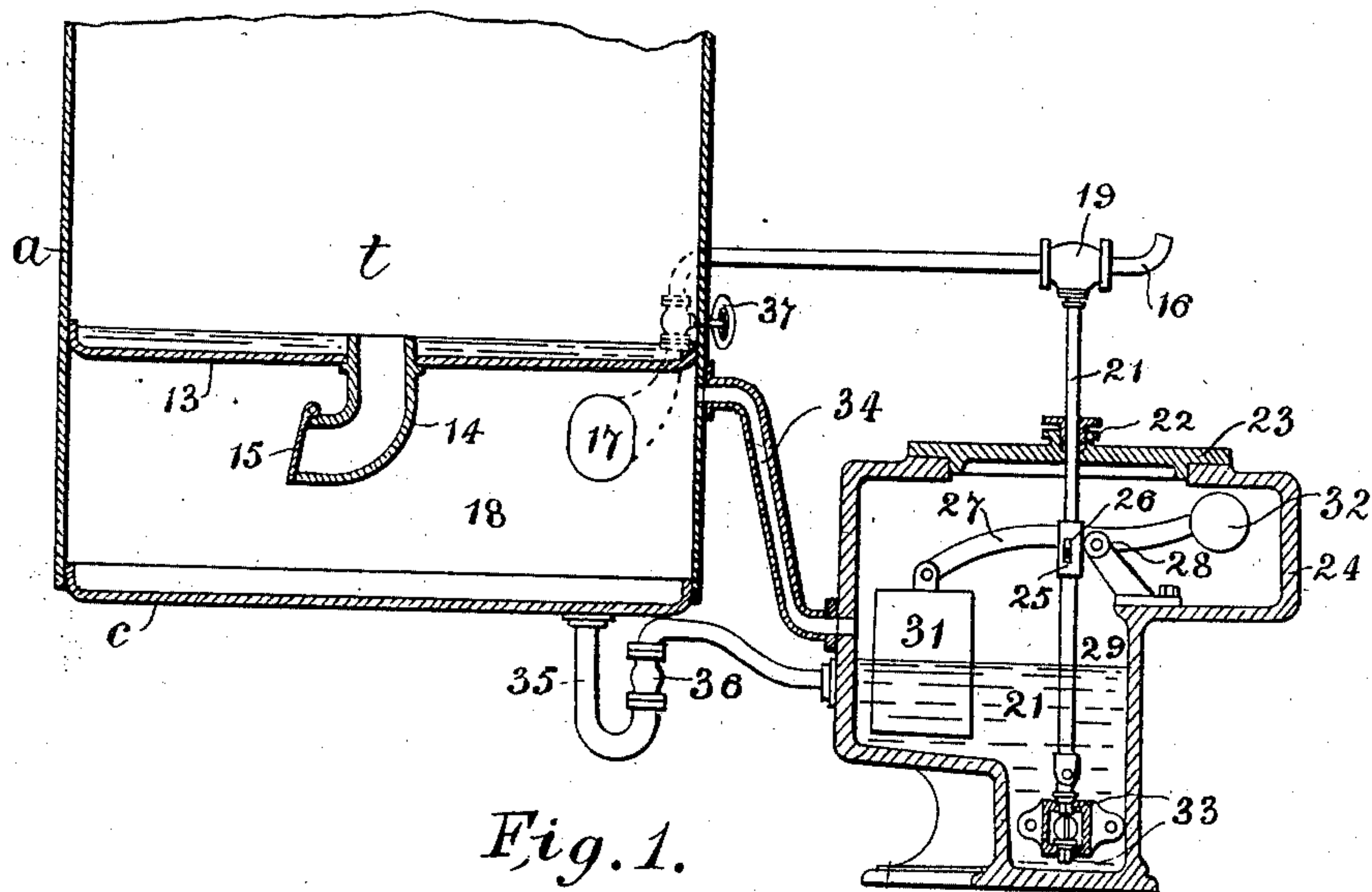


Fig. 1.

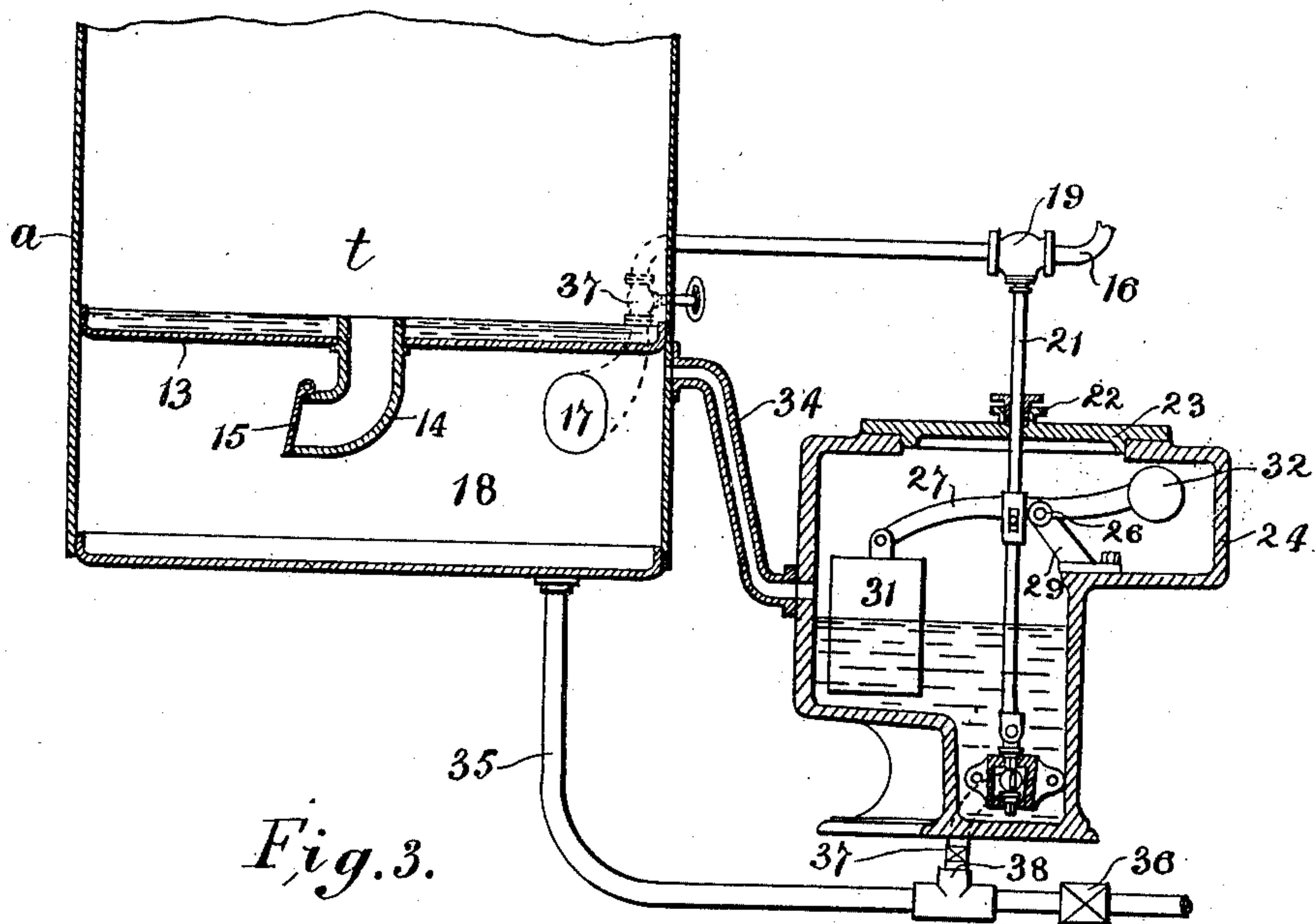


Fig. 3.

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By Eli Spear

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2 SHEETS—SHEET 2.

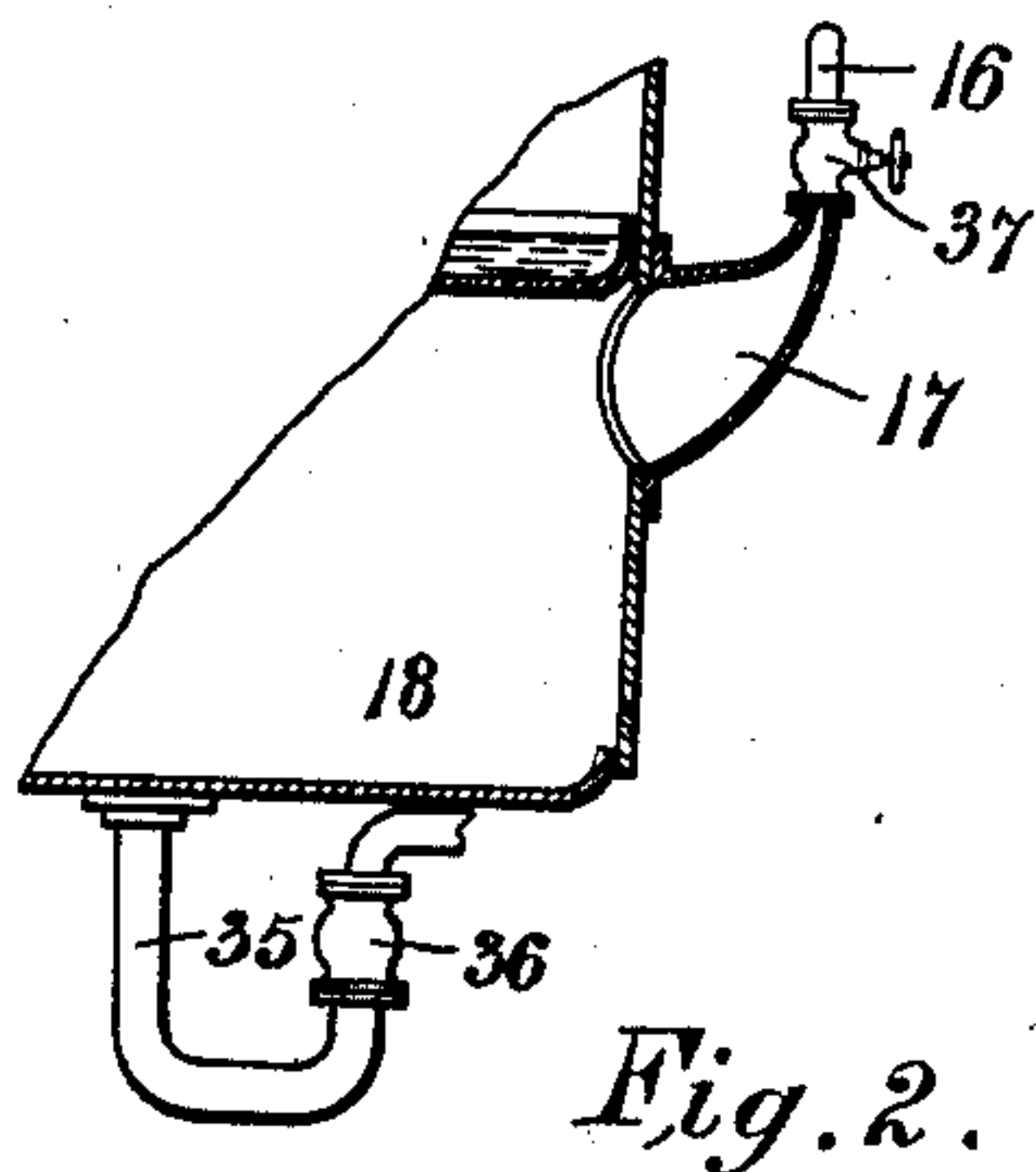


Fig. 2.

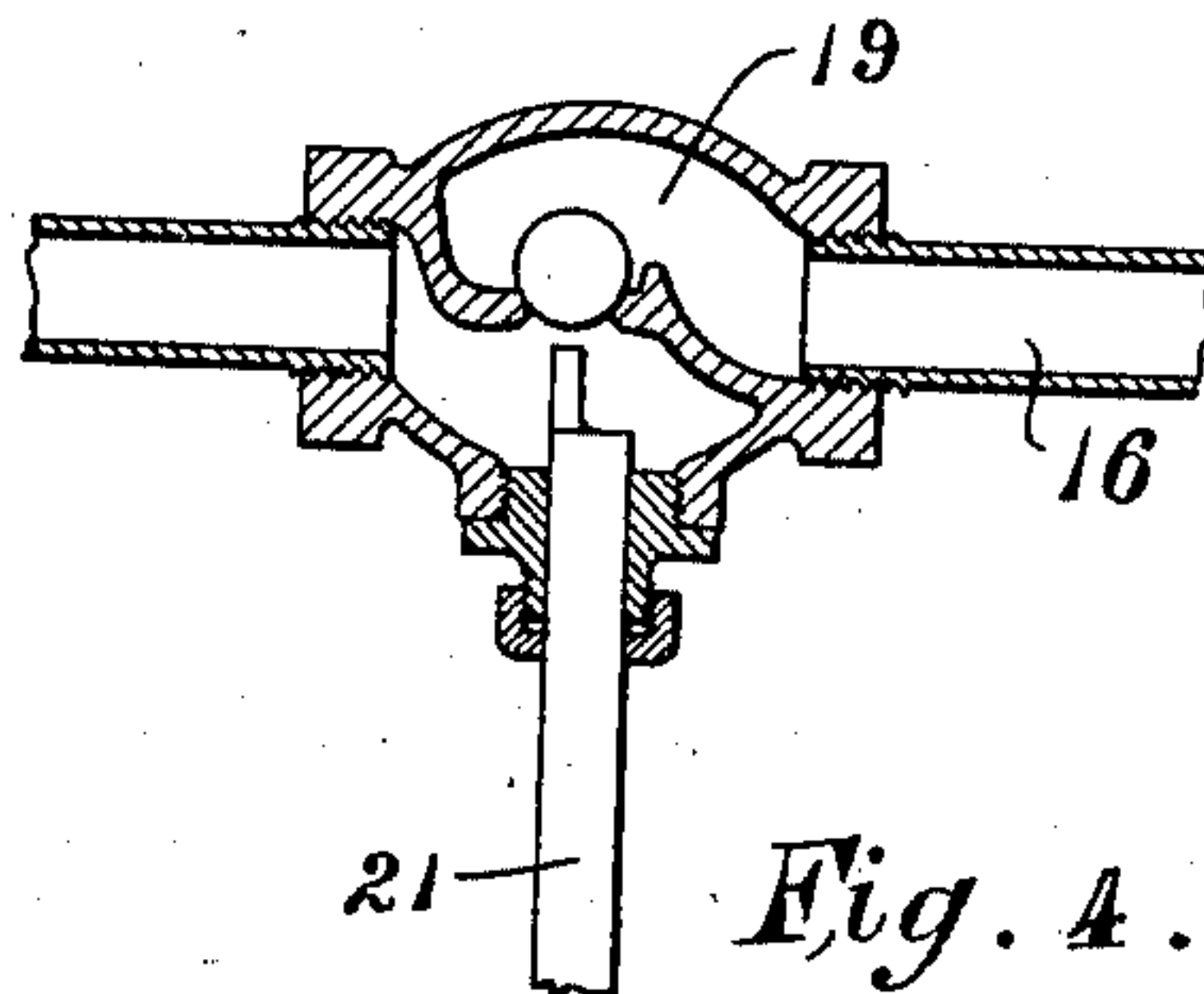


Fig. 4.

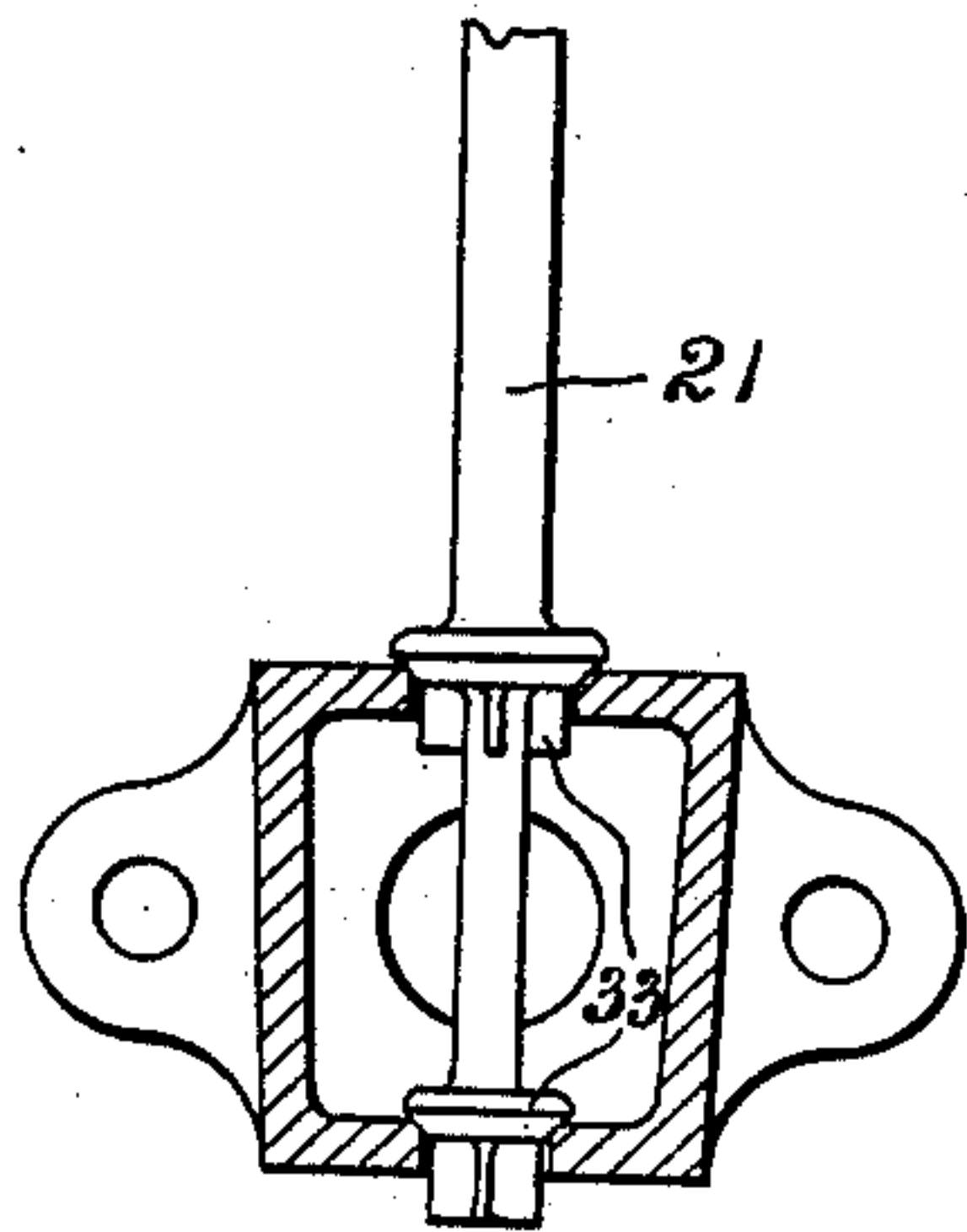


Fig. 5.

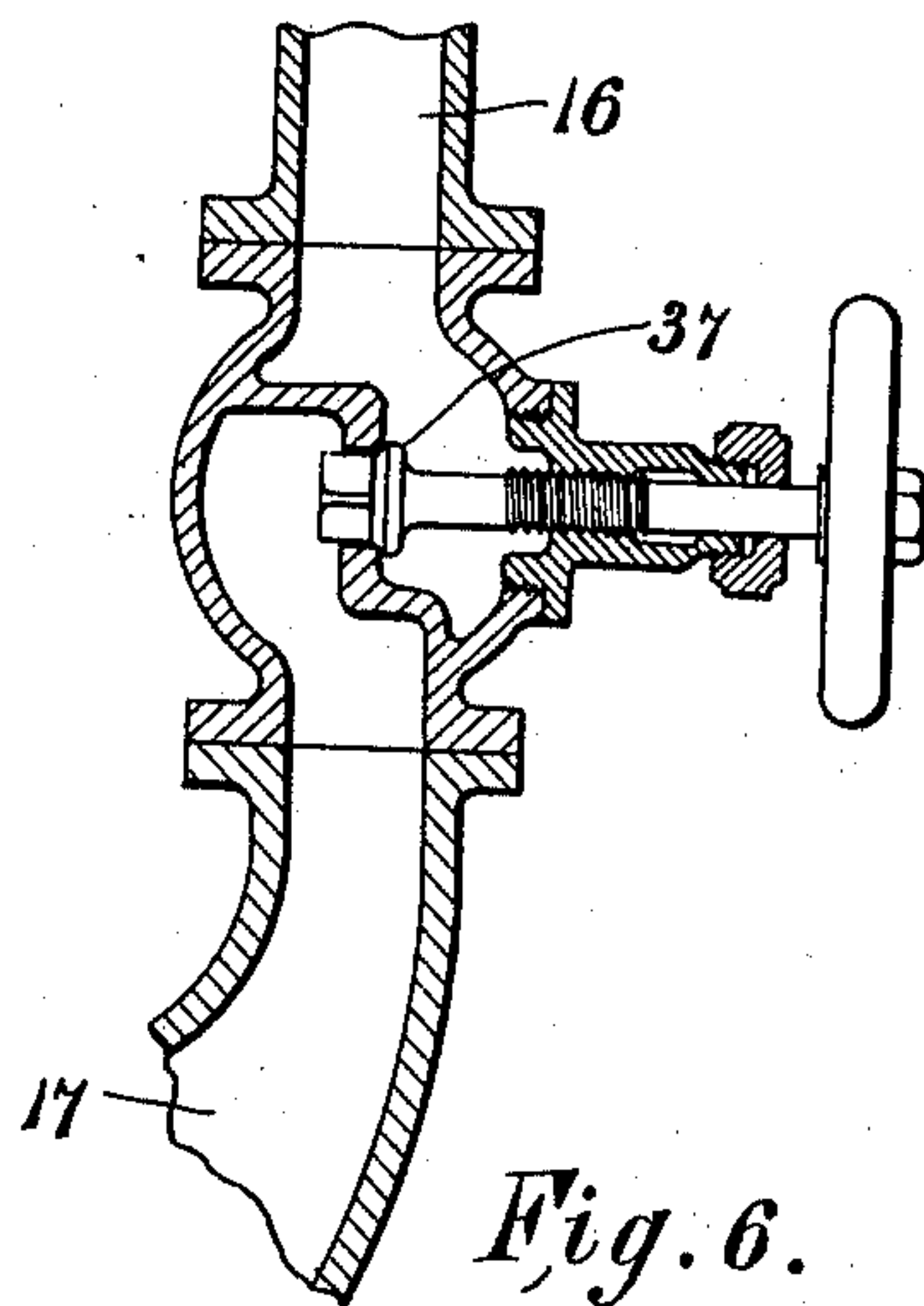


Fig. 6.

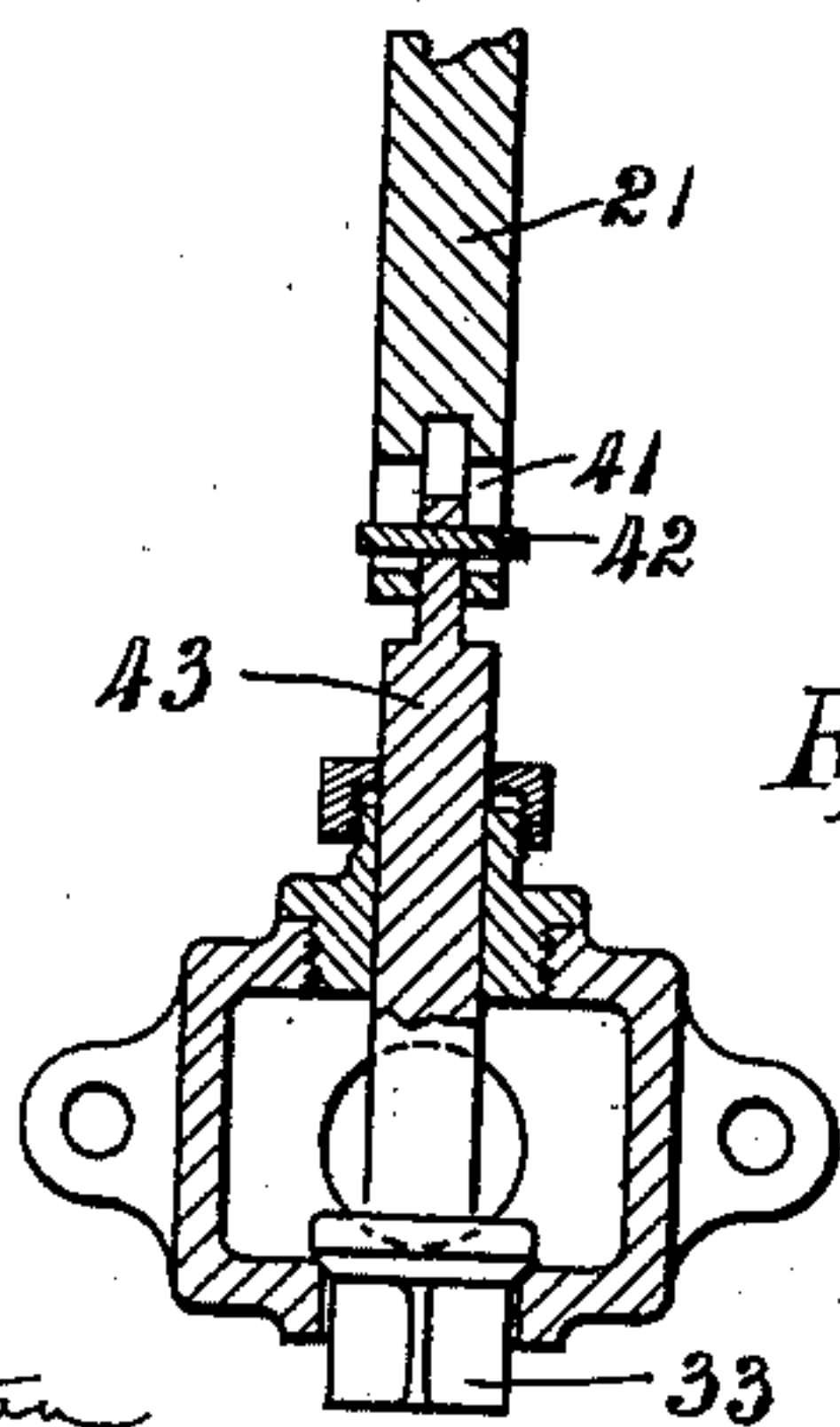


Fig. 7.

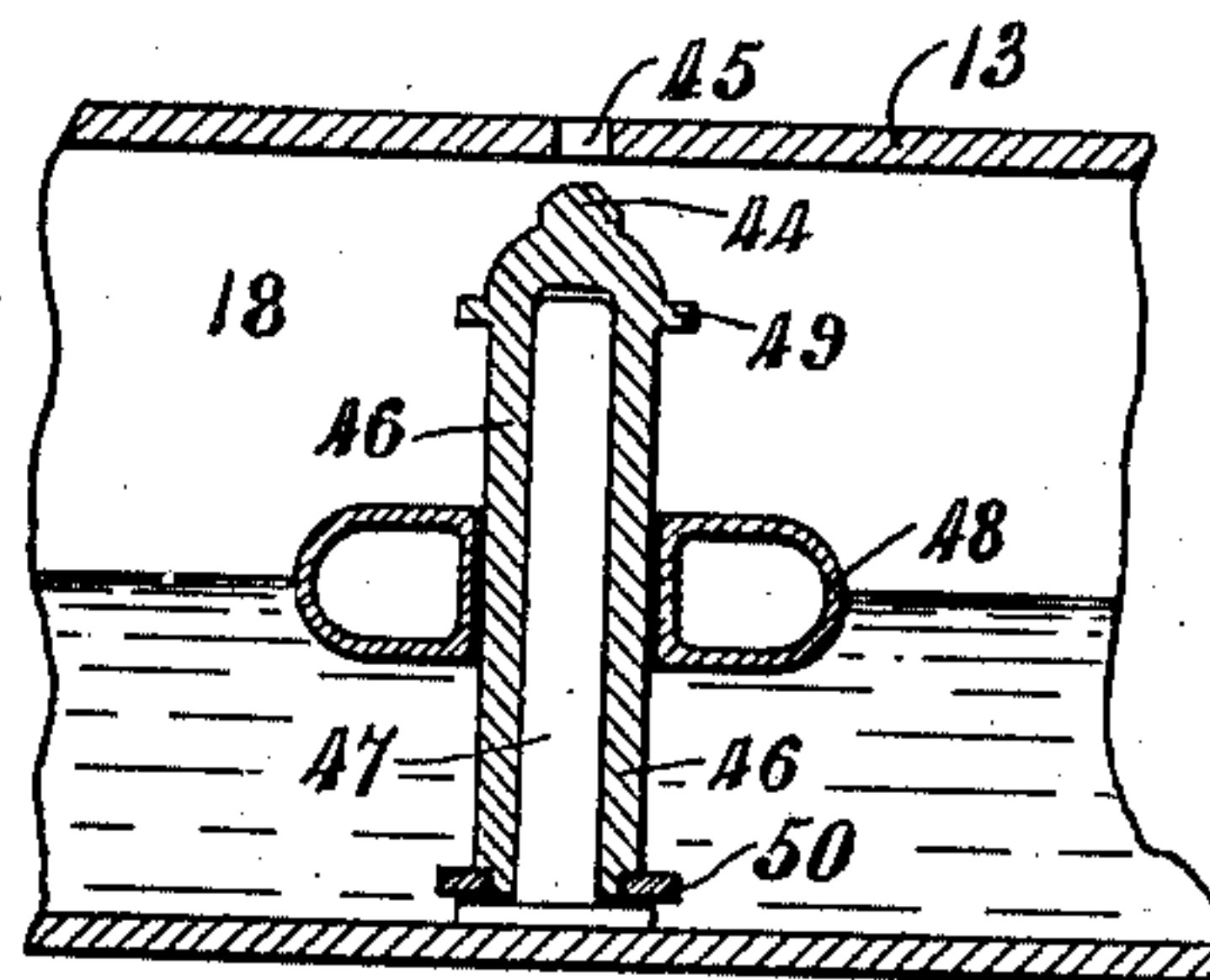


Fig. 8. Inventor.
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Attest:
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UNITED STATES PATENT OFFICE.

ISAAC SHIMWELL McDOUGALL, OF MANCHESTER, ENGLAND.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 719,028, dated January 27, 1903.

Application filed December 6, 1901. Serial No. 84,988. (No model.)

To all whom it may concern:

Be it known that I, ISAAC SHIMWELL McDOUGALL, engineer, a subject of the King of Great Britain and Ireland, residing at 68 Port street, Manchester, in the county of Lancaster, England, have invented certain new and useful Improvements Relating to Steam-Traps, (for which I have made application for Letters Patent in Great Britain, No. 9,569, dated the 8th day of May, 1901,) of which the following is a specification.

My invention relates to improvements in apparatus for discharging grease, oil, and water which have been separated from exhaust-steam from vessels in which they are deposited.

My invention consists in a construction and combination of apparatus which will be fully described in the specification and its novel features clearly pointed out in the claims.

Referring now to the accompanying drawings, which illustrate my invention, Figure 1 shows one form of my invention in vertical section. Fig. 2 shows a part of the same in vertical section, the plane of section of Fig. 2 being at forty-five degrees to the plane of section of Fig. 1. Fig. 3 shows in vertical section a modified form of my invention. Figs. 4, 5, 6, and 7 illustrate details of construction and will be referred to hereinafter.

Referring in the first place to Figs. 1 and 2, *t* is a chamber in which the grease, oil, and water collect after being separated from the exhaust-steam. This chamber *t* is provided with a horizontal partition 13, through which passes a bent pipe 14. At the bottom outlet of this pipe is a flap-valve 15, which is pivoted at its upper end, so that its weight tends to press it against and close the outlet of the pipe 14. 16 is a steam-pipe connected to a nozzle 17, which diverges from its connection with the steam-pipe to its connection with the chamber 18, situated below the partition 13. A valve 19, a section of which is shown in Fig. 4, is situated on the steam-pipe and is adapted to be opened and closed by a spindle 21, which passes through a stuffing-box 22 in the cover 23 of the box 24. The part of the spindle inside the box is provided with a slot 25, in which works a pin 26, carried by a lever 27, which is fulcrumed at 28 on a pin carried by the bracket 29, attached to the inside of the box 24. The lever 27 carries at one end a float 31 and at the other end a bal-

ance-weight 32, the float being situated on the same arm of the lever as the pin 26. The lower end of the spindle 21 carries a valve 33. This valve is preferably a double-seat or equilibrium valve, a section of which, drawn to an enlarged scale, is shown in Fig. 5. An ordinary lift-valve may, however, be used, as shown in Fig. 7. When this valve is opened, any liquid in the box 24 can flow out or be forced out. The interior of the box 24 is connected by a pipe 34 with the upper end of the chamber 18. 35 is a drain-pipe provided with a non-return valve 36 and connecting the lower portion of the chamber 18 with the interior of the box 24. 37 is a hand-operated valve provided on the steam-pipe 16. A section of this valve is shown in Fig. 6. The operation of this form of my invention is as follows: Liquid separated from the exhaust-steam passing through the vessel *a* is deposited on the plate 13 and flows down the pipe 14 and pushing open the valve 15 by its weight enters the chamber 18. When the level of the liquid in the chamber 18 has risen sufficiently, there is a flow of liquid down the pipe 34 into the box 24. When the level of the liquid has risen to a sufficient height in the box 24, the rise of the float 31 acts, by means of the pin 26 on the spindle 21, so as to open the valve 19. If, therefore, the valve 37 is open, steam will pass into the divergent nozzle 17, where it will expand and enter the chamber 18 at a low pressure. The pressure in the chamber 18 will then cause the valve 36 to open and the liquid in the chamber to drain by the drain-pipe 35 into the box 24, from which it escapes by the valve 33. When the liquid has been nearly all drained from the chamber 18, the fall of level of the liquid in the box 24 will cause the float 31 to drop sufficiently to close the valve 33 and the steam-valve 19. The valve 33 is adapted to open very slightly with the first upward motion of the spindle 21 caused by the flow of liquid into the box 24 and to open to a greater extent when the rush of liquid from the chamber 18 into the box 24 by way of the drain-pipe 35 raises the level in the box 24. With this object in view the spindle 21 may be connected to the valve 33 by means of a pin-and-slot or equivalent device, or the valve 33 may be so constructed and arranged that it opens after the steam-valve 19 opens and closes after the steam-valve closes. This pin-and-slot

device is shown in Fig. 7 as applied to an ordinary lift-valve, the spindle 21 being formed with the slot 41, in which works the pin 42, carried by the spindle 43 of the valve 33. While
 5 a steam-pressure exists in the chamber 18 in excess of that in the chamber *t* the valve 15 will be held closed. When, however, the steam-supply is cut off by the closing of the valve 19, the steam condenses by contact with the
 10 cold lower portion of the chamber 18 and the pressure falls in the chamber 18 to the same value as exists above the partition 13. An equalizing-valve may be provided in the partition 13, which valve may be opened automatically or by hand when the chamber 18 is emptied. This avoids the delay of waiting till the pressure falls in the chamber 18. This equalizing-valve may conveniently be formed as shown in Fig. 8, where 44 is the valve which
 20 is adapted to close the opening 45 in the partition 13. The valve is fitted on the end of a tubular portion 46, adapted to slide on a pin or stud 47 to the foot of the chamber 18. On the tubular part 46 slides a float 48.
 25 When the water-level rises in the chamber 18, the float strikes the flange 49, formed on the tubular part 46, and raises this, so as to close the valve 44. This occurs just before the liquid gains access to the pipe 34. When the
 30 liquid is being removed from the chamber 18, the float falls until it strikes the flange 50, carried by the tubular part 46. The weight of the float 48 is sufficient to open the valve 44 against the pressure in the chamber 18.
 35 When the pressures on both sides of the valve 15 are equal, the liquid that has meanwhile collected on the top of the partition 13 and in the pipe 14 can then flow into the chamber 18. The same cycle of operations is then repeated.
 40

According to another form of my invention, which is illustrated in Fig. 6, the drain-pipe 35 is not conducted to the box 24, but is led direct to the tank or other receptacle into
 45 which it is desired that the liquid shall eventually flow. A branch pipe 38, however, connects the outlet from the box 24 with the portion of the drain-pipe situated between the chamber 18 and the non-return valve 36. A
 50 hand-operated valve 37 may be furnished on the pipe 38. The operation of this form of my invention is the same as that of the other form except that the liquid is drained away from the chamber 18 without passing through
 55 the box 24. By adjusting the valve 37 the flow of liquid from the box can be so regulated that the float falls and closes the steam-valve 19 and the valve 33 just when the liquid has all or nearly all drained from the
 60 chamber 18. If desired, the pipe 38 may be connected to the pipe 35 beyond the non-return valve or may be altogether unconnected with the pipe 35.

In both forms of my invention when the
 65 pressure in the vessel *a* is less than atmospheric, air at atmospheric pressure may be used instead of steam for ejecting the liquid

from the vessel. In this case an equalizing-valve is absolutely necessary in the partition 13.

In both forms of my invention the chamber 18 may, if desired, be formed as a separate vessel from *a* and connected to *a* only by the pipe 14.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination, a vessel provided with means for separating water, oil and other suspended matter from exhaust-steam, a chamber 18 adapted to receive the separated matter, a pipe connecting the lower part of said vessel with the said chamber, a flap-valve such as 15 provided on said pipe, a drain-pipe 35, connected to the lower part of said chamber, a non-return valve on said drain-pipe, a divergent nozzle connected to said chamber, a pipe 16 adapted to convey steam to said nozzle, a valve 19 on said pipe 16, a box 24, a pipe connecting said box 24 with the top of the chamber 18, a lever such as 27 fulcrumed inside said box, a float 31 carried by said lever, a valve 33 situated at the bottom of said box and means whereby the rise and fall of said float opens and closes the said valves 19 and 33, substantially as described.

2. In combination, a vessel provided with means for separating water, oil and other suspended matter from exhaust-steam, a chamber 18 adapted to receive the separated matter, a pipe connecting the lower part of said vessel with the said chamber, a flap-valve such as 15 provided on said pipe, a drain-pipe 35 connected to the lower part of said chamber, a non-return valve on said drain-pipe, a divergent nozzle such as 17 connected to said chamber, a pipe 16, adapted to convey steam to said nozzle, a valve 19 on said pipe 16, a box 24, pipes connecting said box 24 with the top and bottom of the chamber 18, a lever such as 27 fulcrumed inside said box, a float 31 carried by said lever, a valve 33 situated at the bottom of said box and means whereby the rise and fall of said float opens and closes the said valves 19 and 33, substantially as described.

3. In combination, a vessel provided with means for separating water, oil and other suspended matter from exhaust-steam, a chamber at a lower level than said vessel, a pipe connecting said chamber with the lower part of said vessel, a non-return valve on said pipe, a pipe 16 adapted to convey steam to said chamber, a nozzle such as 17 which diverges from its connection with said pipe 16 to its connection with said chamber and a drain-pipe connected to the bottom of said chamber, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

ISAAC SHIMWELL McDOUGALL.

Witnesses:

ALBERT E. PARKER,
 FRANCIS JAMES BIGNELL.