

No. 671,770.

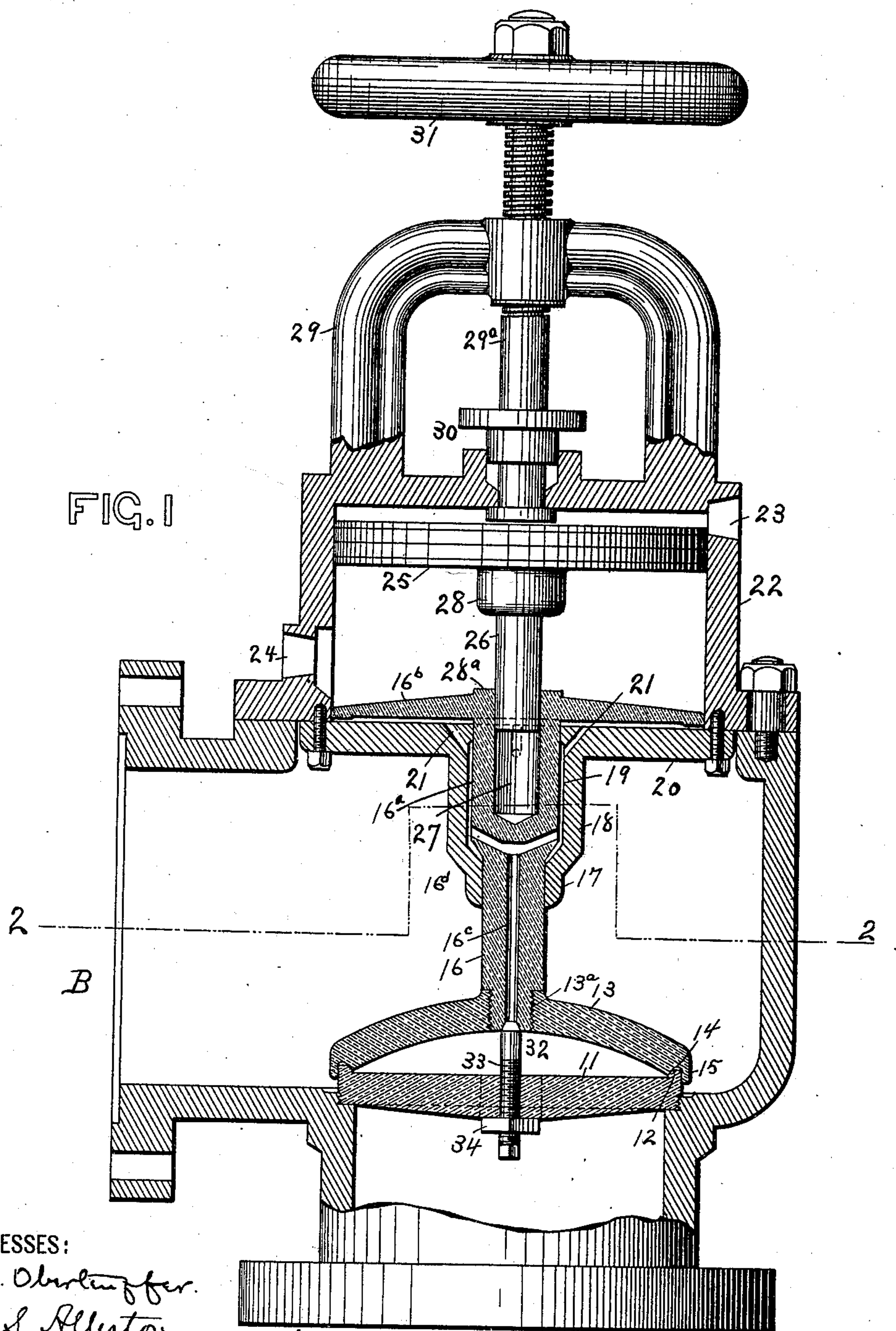
Patented Apr. 9, 1901.

N. C. LOCKE.
VALVE.

(No Model.)

(Application filed Nov. 30, 1900.)

3 Sheets—Sheet 1.



WITNESSES:

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A INVENTOR: *Nathaniel C. Locke.*

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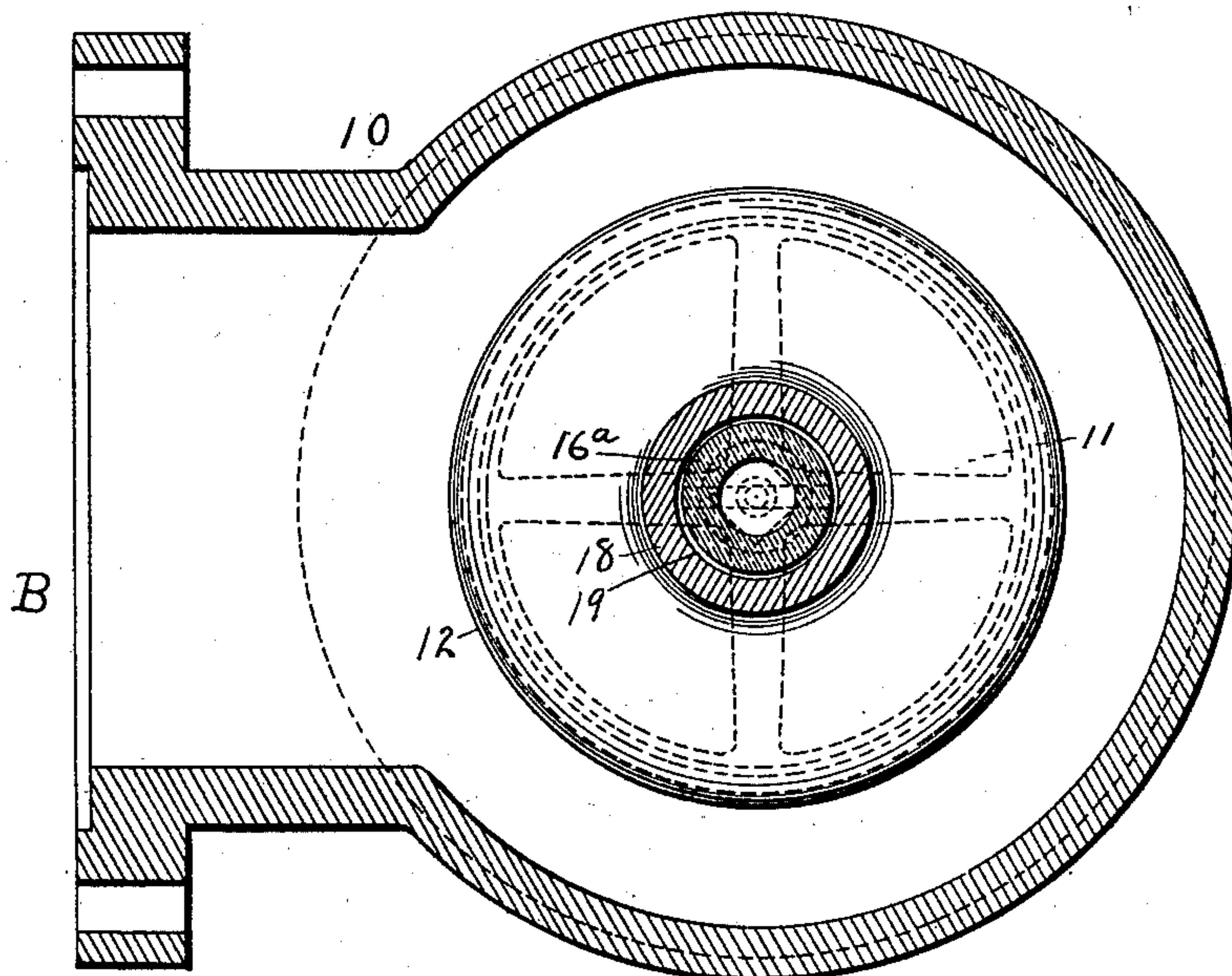


FIG. 2

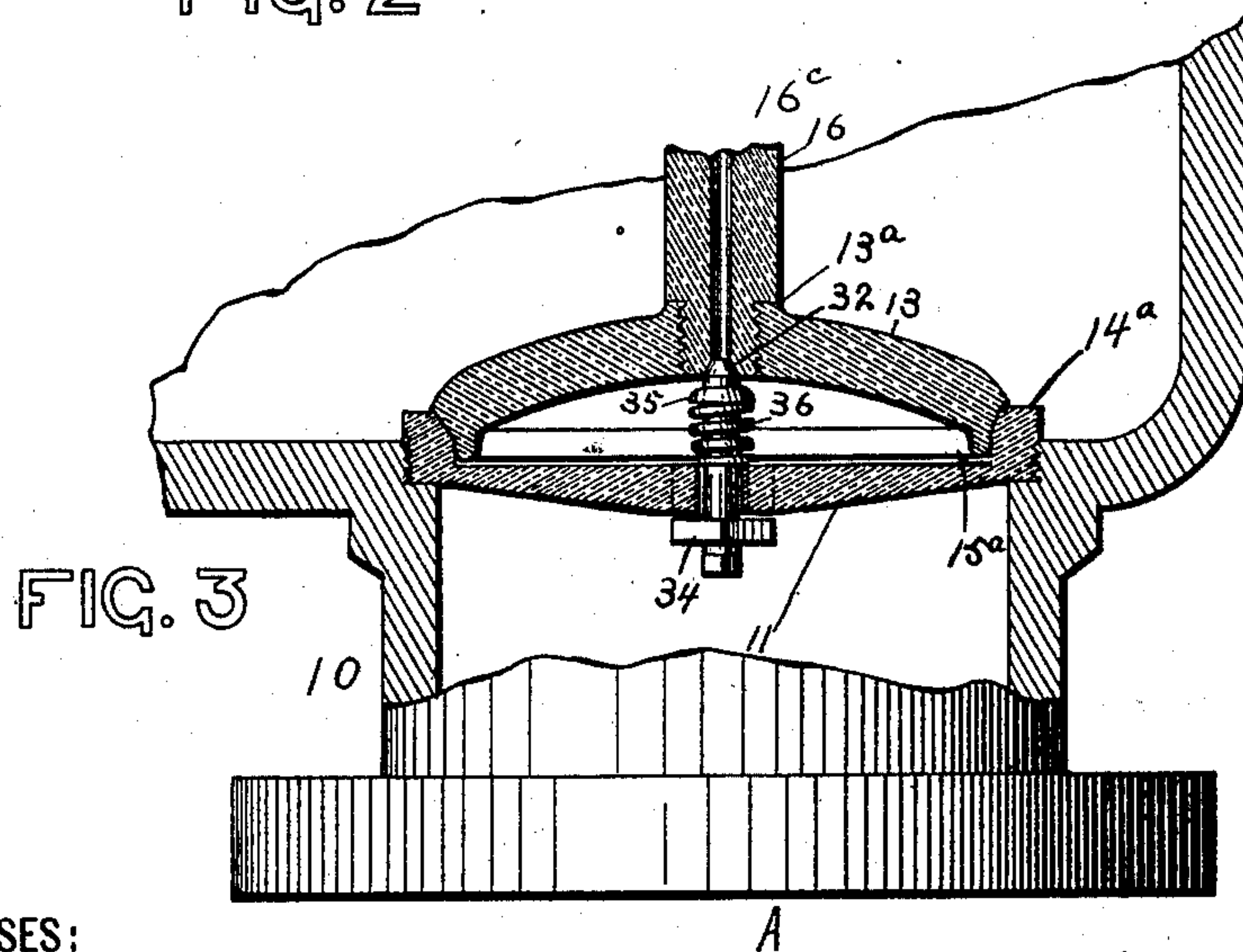


FIG. 3

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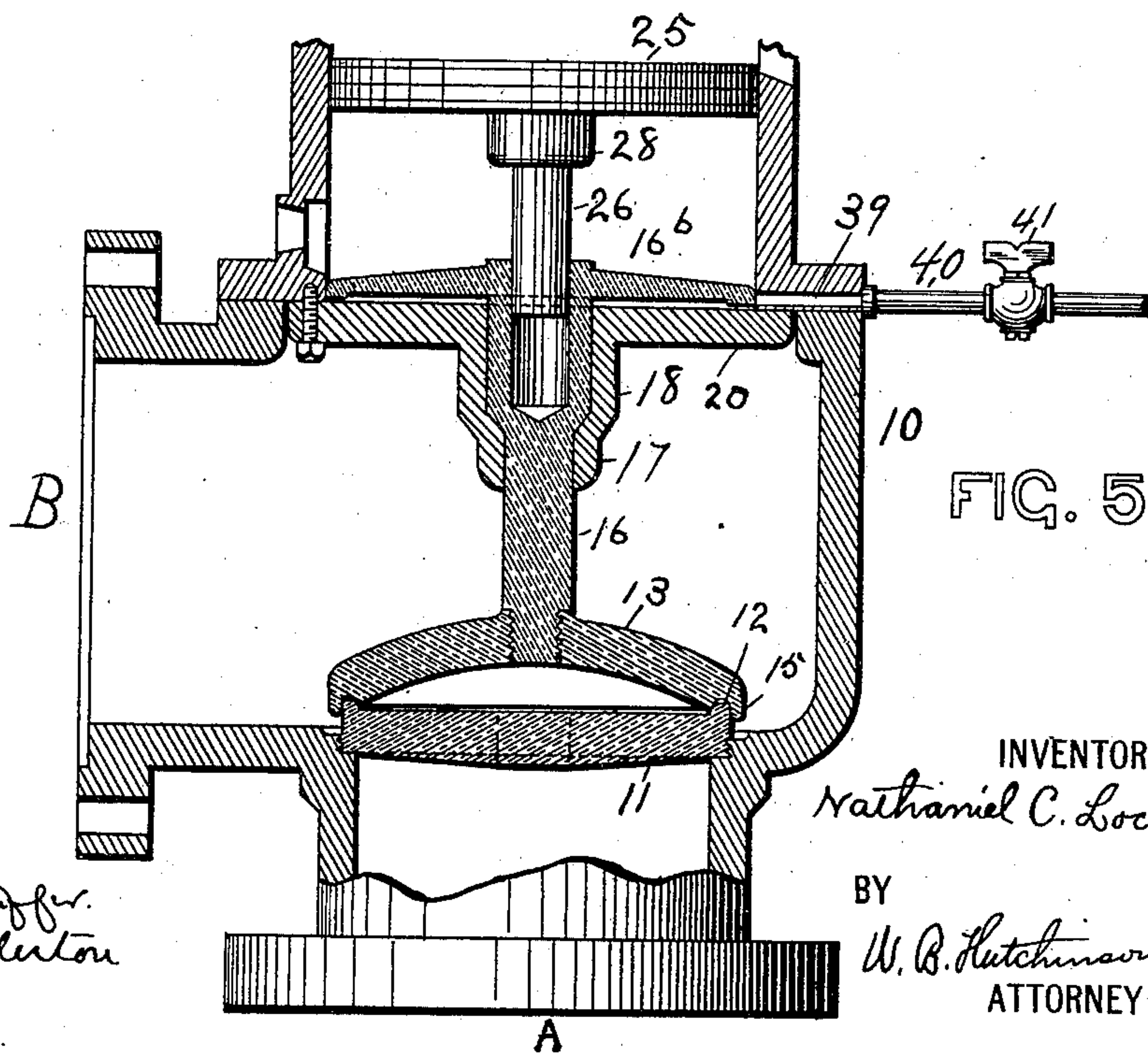
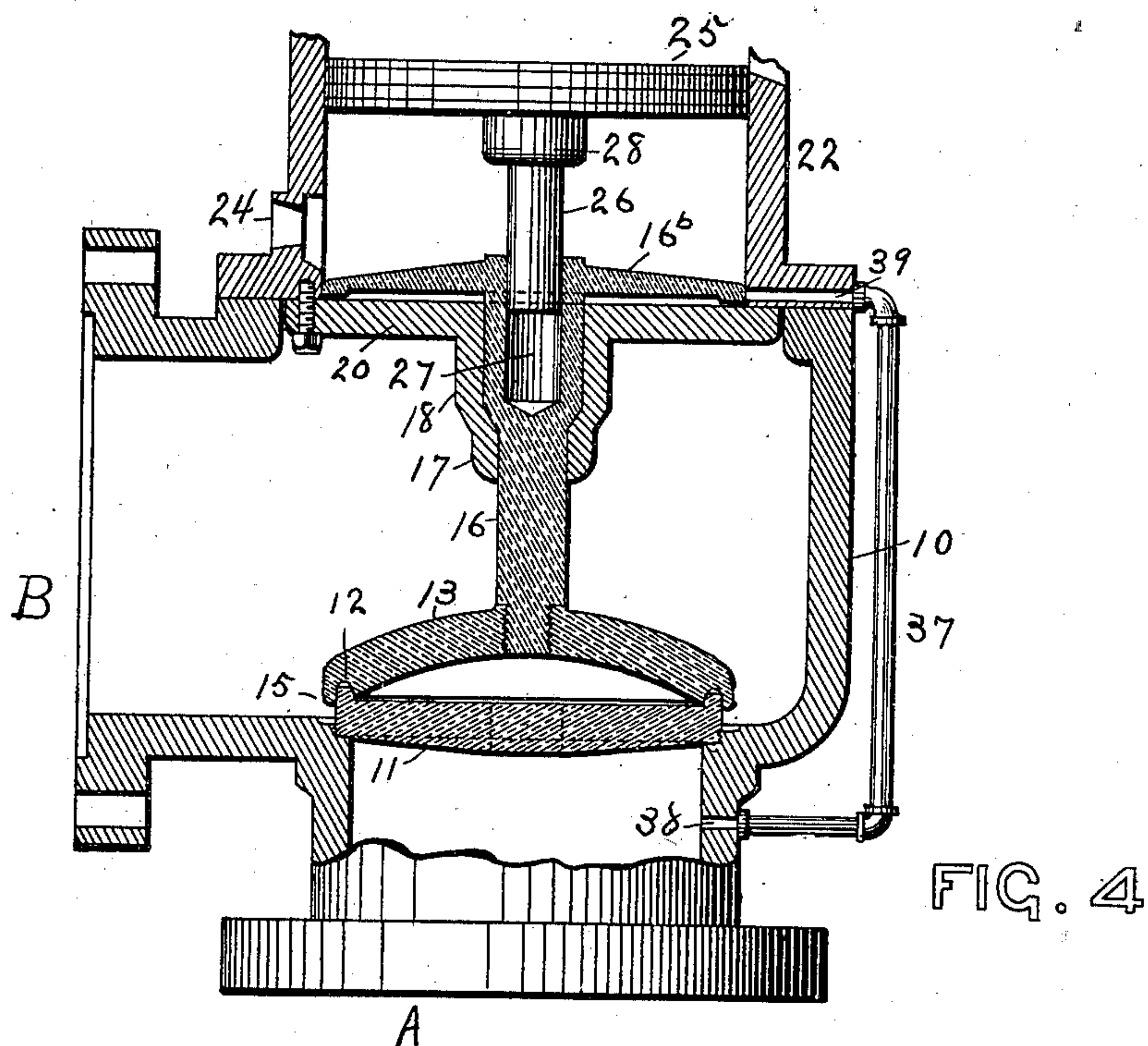
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

NATHANIEL C. LOCKE, OF SALEM, MASSACHUSETTS.

VALVE.

SPECIFICATION forming part of Letters Patent No. 671,770, dated April 9, 1901.

Application filed November 30, 1900. Serial No. 38,233. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL C. LOCKE, of Salem, Essex county, Massachusetts, have invented certain new and useful Improvements in Valves, of which the following is a full, clear, and exact description.

My invention relates to improvements in valves, and especially to that class of valves known as "automatic shut-off valves" and "return stop-valves," although I do not restrict my invention to any particular use.

The objects of my invention are particularly to simplify the construction of valves of the class specified, to the end that the structure may be cheapened and rendered more positive in operation; to produce a simple valve having combined functions of the automatic shut-off valve and return stop-valve; to provide means whereby the double purpose of the valve may be obtained by the use of two pistons in a single cylinder; to provide means for admitting a live-steam cushion beneath the piston, serving to float the main valve, so that the valve may be absolutely prevented from clattering or rattling on its seat, thus destroying the valve, and in general to produce a simple valve of the kind specified which is sensitive, durable, and positive.

To these ends my invention consists of a valve the construction and arrangement of which will be hereinafter specifically described and claimed.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters and figures of reference refer to similar parts throughout the several views.

Figure 1 is a broken vertical section of the valve embodying my invention. Fig. 2 is a sectional plan on the line 2 2 of Fig. 1. Fig. 3 is a detail vertical section through the valve-seat, showing a slightly-modified form of both the main and auxiliary valves; and Figs. 4 and 5 show modified means of admitting steam behind the piston which is connected with the main valve to float it.

The valve has a suitable casing 10, through which the steam may enter at A and from which it may pass at B, and located within the valve and across the inlet is a spider 11, which is adapted to screw into its place in

the casing, as shown clearly in Figs. 1 and 3, this spider having a raised circumferential seat 12, on which the main valve 13 is adapted to be seated, this valve being preferably convex on the back and concave on the under side and having also by preference a hollow seating portion 14, which comes opposite the seat 12 and which when the metal is relatively soft under the influence of hot steam forms a sort of bead and makes a particularly tight joint. The valve 13 is also provided with a peripheral lip 15, adapted to close over the seat 12, overlapping the outside thereof, as shown clearly in Fig. 1, and the object of this is to permit the valve to open slightly before the steam can pass by it, thus enabling the steam to first pass through the bore 16^c of the stem 16, which is secured to the valve 13, being preferably screwed thereto, as shown at 13^a. Instead, however, of having the lip 15 on the outer portion of the valve 13, so as to overlap the exterior of the seat 12, the lip may be produced on the inner side of the seat, as shown at 15^a in Fig. 3, and the seat may also be made flat, as shown at 14^a in the same figure.

The stem 16 of the valve 13 extends upward through the guide 17, which is enlarged, as shown at 18, to form the chamber 19 and which is fast to the head 20, forming one side of the valve-casing and preferably detachably secured to the cylinder 22, which is also fast to the casing, in which moves the balancing-piston 16^b, which is fast to the stem 16 above referred to.

It will be understood that the particular construction of the casing 10, head 20, and cylinder 22 may be departed from; but the form shown illustrates a cheap and convenient design for the said parts.

The bore 16^c connects by ports 16^a with the chamber 19, and from this chamber lead ports 21, which deliver beneath the piston 16^b. This means of admitting live steam beneath the piston 21 for a cushion is a very important feature of the invention and will be described in detail in connection with the auxiliary valve 32; but the main idea is to admit steam at boiler-pressure beneath the piston 16^b, so as to effect the necessary cushion.

The cylinder 22 is provided with steam-inlets 23 and 24, the former being adapted to

connect with the boiler and the latter with a steam drum or main.

Within the cylinder 22 is a piston 25, formed, preferably, with the usual split piston-rings, so that it will be held up frictionally when not operated by steam-pressure, and the rod 26 of this piston enters the guide-chamber 27 in the stem 16 of the valve 13, the said rod 26 being provided with a shoulder 28, which is adapted to abut with the shoulder 28^a on the piston 16^b, so that when the piston 25 is forced downward the piston 16^b, stem 16, and valve 13 will be similarly moved.

The cylinder 22 has on its outer side a yoke 29, in which is held the stem 29^a, which works through a stuffing-box 30, so as to abut with the piston 25, as shown in Fig. 1, and the stem 29^a has the usual screw and the customary hand-wheel or handle 31. The object of this arrangement is to enable the valve 13 to be manually closed and locked when desired, and it will be seen that by turning in the stem 29^a the piston 25 and stem 26 will be moved in, so as to close and lock the valve 13.

When the valve 13 is closed, the bore 16^c is closed by the valve 32, which can be made with a screw 33, so as to be adjustable in the spider 11, and held in the desired place by a nut 34, or it can be made as shown in Fig. 3, where the valve 32 has a collar 35, pressed by a spiral spring 36, arranged between the collar and the spider 11, so that the valve is normally pushed to its seat in the lower end of the bore 16^c. This feature of the auxiliary valve, in connection with the bore 16^c and connections beneath the piston 16^b, is a very important feature of this invention, for it will be noticed that when the steam enters from the end A of the valve-casing it will lift the valve 13; but before the steam can pass the valve, by reason of the lip 15 or 15^a, the valve will be first moved so as to separate the valve 32 from its seat, and the steam will pass through the bore 16^c, the ports 16^d, the chamber 19, and the ports 21 beneath the piston 16^b. Thus a cushion of live steam is placed beneath the piston 16^b, and this remains here until the valve 13 is again tightly closed.

I am aware that attempts have been made to cushion a floating valve; but I do not know that any means equivalent to that described have been heretofore used to permit an independent steam-supply from behind the valve beneath a piston corresponding to the piston 16^b, so that the valve and piston are substantially cushioned, as specified. It is desirable to have the boiler-pressure beneath the piston 16^b, and this end can best be obtained by the mechanism shown in Figs. 1, 2, and 3, already described; but I do not limit my invention to this means, and so illustrate in Figs. 4 and 5 modified means of accomplishing this result, and, perhaps, even other modifications may be used for the purpose. As shown in Fig. 4, a pipe 37 leads from a port 38 in the casing 10 below the valve 13 and delivers into a port 39, arranged in the lower part of the

cylinder or chamber 22, and when the piston 16^b and valve 13 are closed the piston closes also the port 39. As illustrated in Fig. 5, the pipe 40, provided with a controlling-cock 41, leads from the boiler to the port 39. In either case it will be observed that the steam at boiler-pressure is admitted beneath the piston 16^b and that the steam-supply is automatically shut off by the closing of the piston and of the valve 13. By having this ample cushion the valve 13 is floated, so that it never rattles or clatters on its seat, and all users of valves of this kind know that heretofore this clattering has been a serious obstacle, as when any such movement obtains the valve is soon destroyed.

The operation of the valve is as follows: When steam enters from the end A of the casing 10, it lifts the valve 13, the steam first passing beneath the piston 16^b, which is described in detail above, and next lifting the valve 13 clear from its seat, after which it floats in the casing 10, so as to permit a free passage of steam. If now there is a break along the main or in the steam-drum or in any connection with the port 24 of the cylinder 22, the pressure is immediately lowered beneath the piston 16^b and valve 13 in relation to the boiler-pressure, which enters through the port 23, and consequently the piston 25 moves down till the shoulders 28 and 28^a abut and the valve 13 is closed. If, on the other hand, the boiler or its connections with the valve are damaged, the pressure behind the valve 13 is dropped sufficiently for the pressure on the piston 16^b to cause the latter to close the valve 13. It will thus be seen that a single valve 13, in connection with two pistons 25 and 16^b and with the single cylinder 22, causes the valve to serve the double purpose of an automatic shut-off valve and of a return stop-valve, and, further, that the valve 13 is effectually cushioned, so that it is at the same time positive in operation and prevented from early destruction.

In conclusion special attention is called to the double function of the valve-operating mechanism—that is to say, it will be evident from the foregoing description that the piston 16^b operates to float and cushion and in some cases close the valve, and the piston 25 operates independently to close the valve. It will also be further observed that I have devised a very compact structure of the valve and accessory mechanism and that the manual means for operating it in combination with the automatic means shown is of a very convenient and positive nature.

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

1. As an improved article of manufacture, a valve seating on its main seat and on an auxiliary seat closing a separate conduit or bore from that closed by the main valve, the auxiliary valve being opened and closed by the movement of the main valve.

2. A valve seating upon its main seat and having a conduit passing through it, in combination with an auxiliary valve arranged to close the conduit when the main valve is closed, the auxiliary valve being opened and closed by the action of the main valve.

3. A valve seating on its main seat and provided with a conduit therethrough, in combination with an auxiliary valve arranged to close the conduit when the main valve is closed, the main valve being constructed so as to open the auxiliary valve slightly before opening the main passage.

4. In combination with a valve, a cylinder, a piston movable in the cylinder and connected with the valve, an independent passage permitting steam to enter behind the piston from behind the valve, and means for opening and closing the independent passage by the action of the main valve.

5. In combination with a valve, a cylinder, a piston within the cylinder connected with the valve, an independent passage delivering behind the piston, and means for closing the said independent passage by the closing of the valve.

6. In combination with a valve controlling a steam-passage, a cylinder, a piston working in the cylinder to operate the valve, an independent passage from the source of steam-supply discharging beneath the piston, and means for opening and closing the said independent passage by the action of the valve.

7. The combination with a valve, of a piston connected with the valve, an independent passage delivering behind the piston, an auxiliary valve to close the said passage when the first valve is shut, and means for opening the auxiliary valve by the movement of the main valve but before a passage is opened by the latter.

8. The combination with a main valve having a prolongation to permit it to slightly leave its seat before opening, of a piston connected to the main valve, a passage from the main valve to a point behind the piston, and an auxiliary valve supported behind the main valve and in line with the aforesaid passage so that said passage is closed by the auxiliary valve when the main valve is closed.

9. In a valve of the kind described, the

combination of the main valve, a single cylinder, and a plurality of pistons within the cylinder, each piston working independently, one to close the main valve and the second to open it and to assist in closing.

10. In a valve of the kind described, the combination of the main valve, a single cylinder, and a plurality of pistons within the cylinder, each piston working independently, one adapted to close the main valve, and the other to open it.

11. The combination with the main valve, of a single cylinder, and two pistons within the said cylinder, one adapted to open the valve and the other acting only to close it.

12. The combination with the main valve, of a single cylinder having a plurality of ports therein, a piston working in the cylinder and rigidly connected to the main valve, and a second piston within the cylinder working independently of the first piston but adapted when moved in one direction to move the first piston and close the valve.

13. The combination of the main valve, a single cylinder, the two independent pistons within the cylinder, one of said pistons being rigidly connected to the valve, and the manually-operated stem adapted to move the two pistons and close the valve.

14. The combination with the main-valve casing and the cylinder, of the valve within the casing, the pistons in the cylinder operatively connected with the valve, and the independent hand-screw mounted on the outer portion of the cylinder and abutting with the outer piston, substantially as described.

15. The combination with the valve-casing and cylinder containing automatic valve-closing means, of the yoke on the cylinder, and the manually-operated stem mounted in the yoke and abutting with the automatic valve-closing means whereby said means may be hand-operated to close the main valve.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

NATHANIEL C. LOCKE.

Witnesses:

FRANK E. PHILLIPS,

MAUDE B. HOLLEY.