980,836.

J. C. REGAN.

DOUBLE ACTING DOOR CHECK.

APPLICATION FILED JAN. 22, 1910.

Patented Jan. 3, 1911.

6 SHEETS—SHEET 1.

Fig. 1.

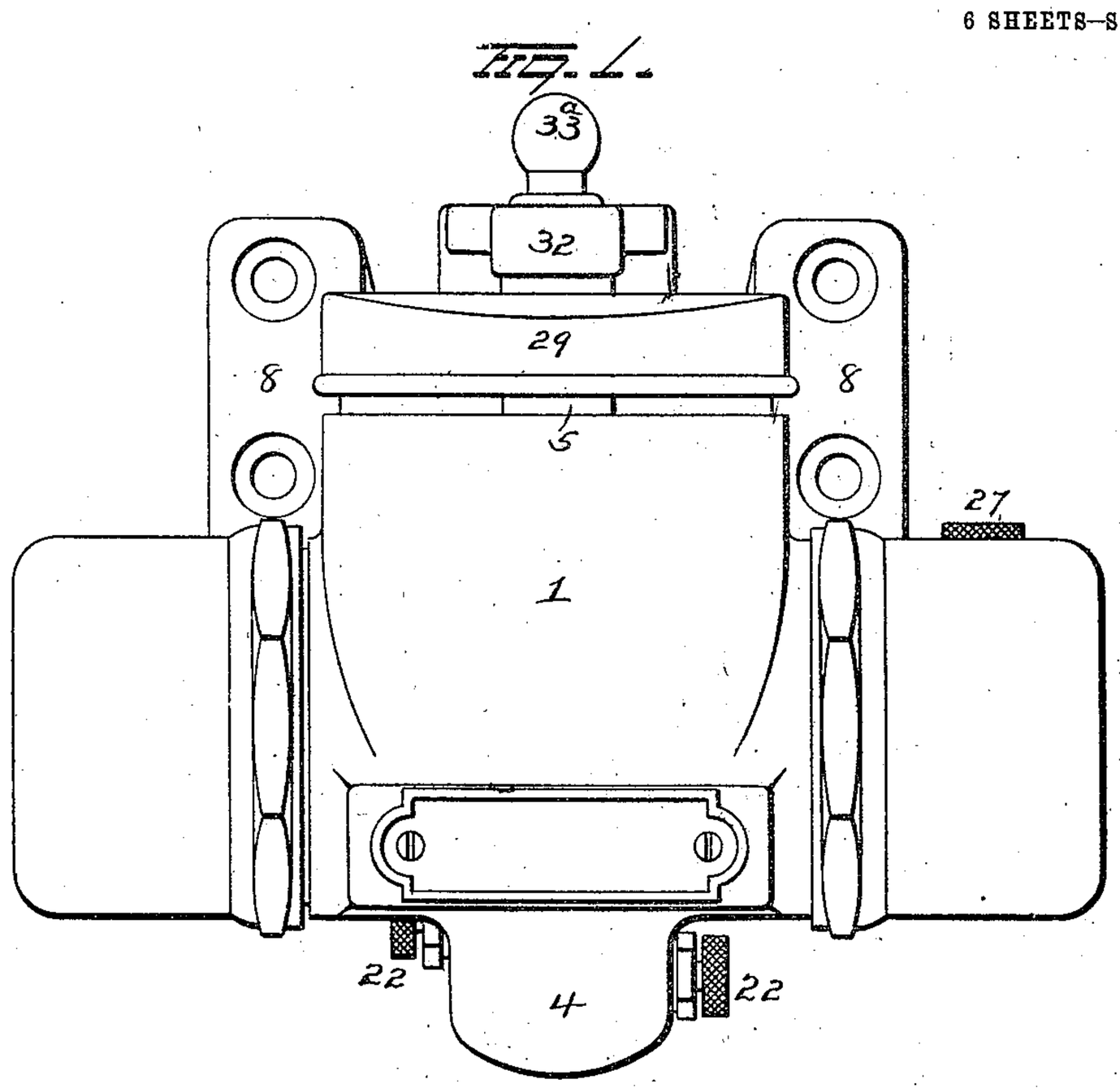
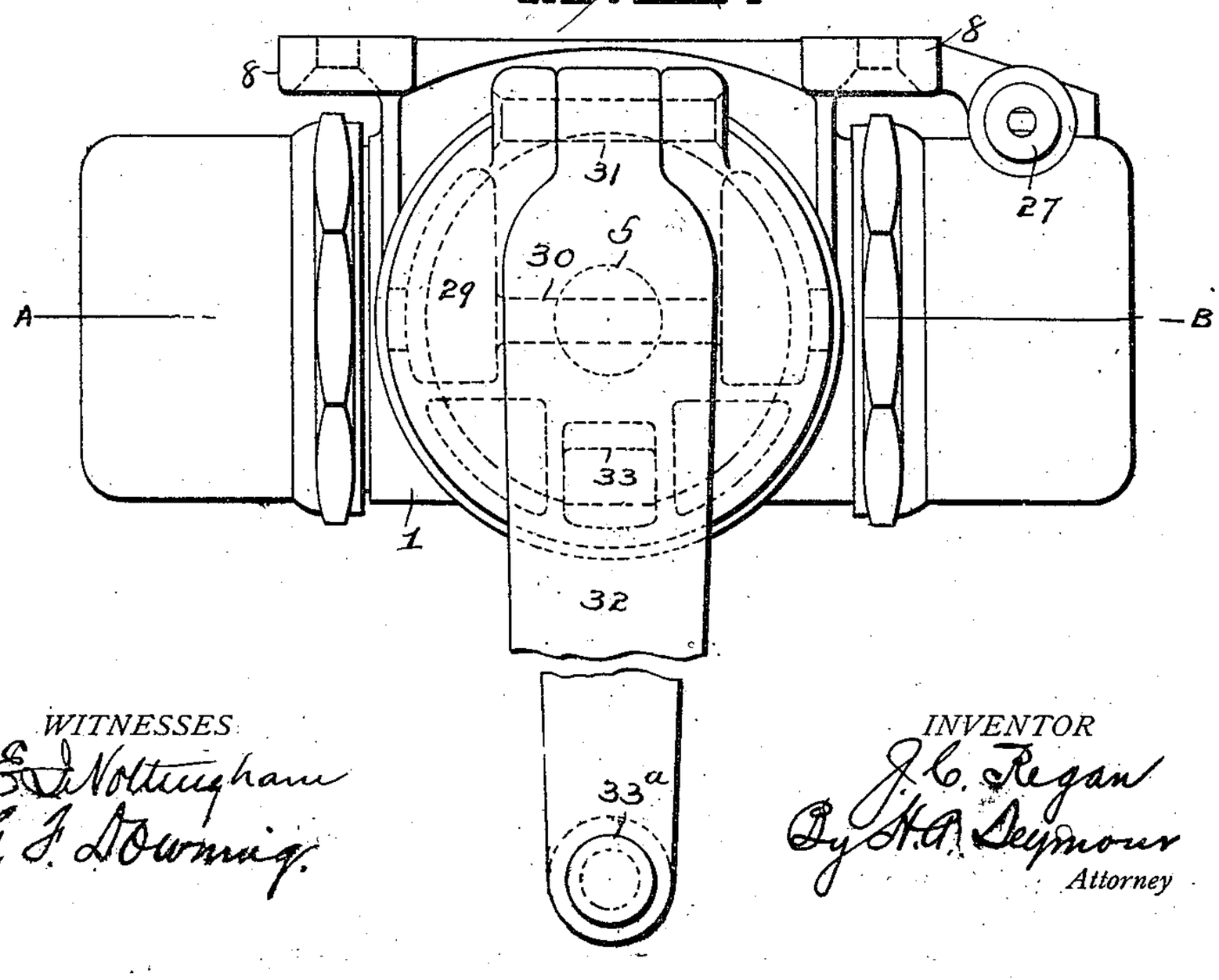


Fig. 2.



WITNESSES

E. L. Nottingham

G. F. Downing

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6 SHEETS—SHEET 2.

Fig. 3.

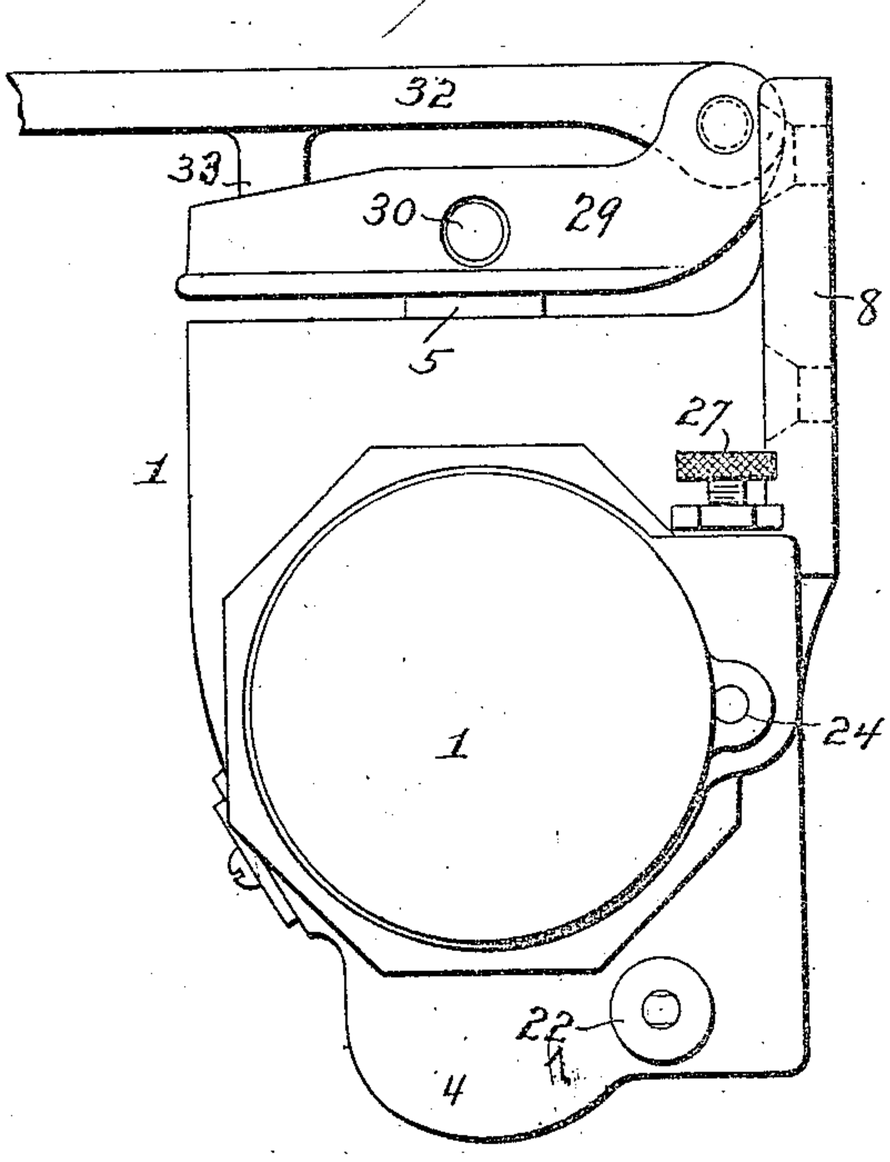


Fig. 5.

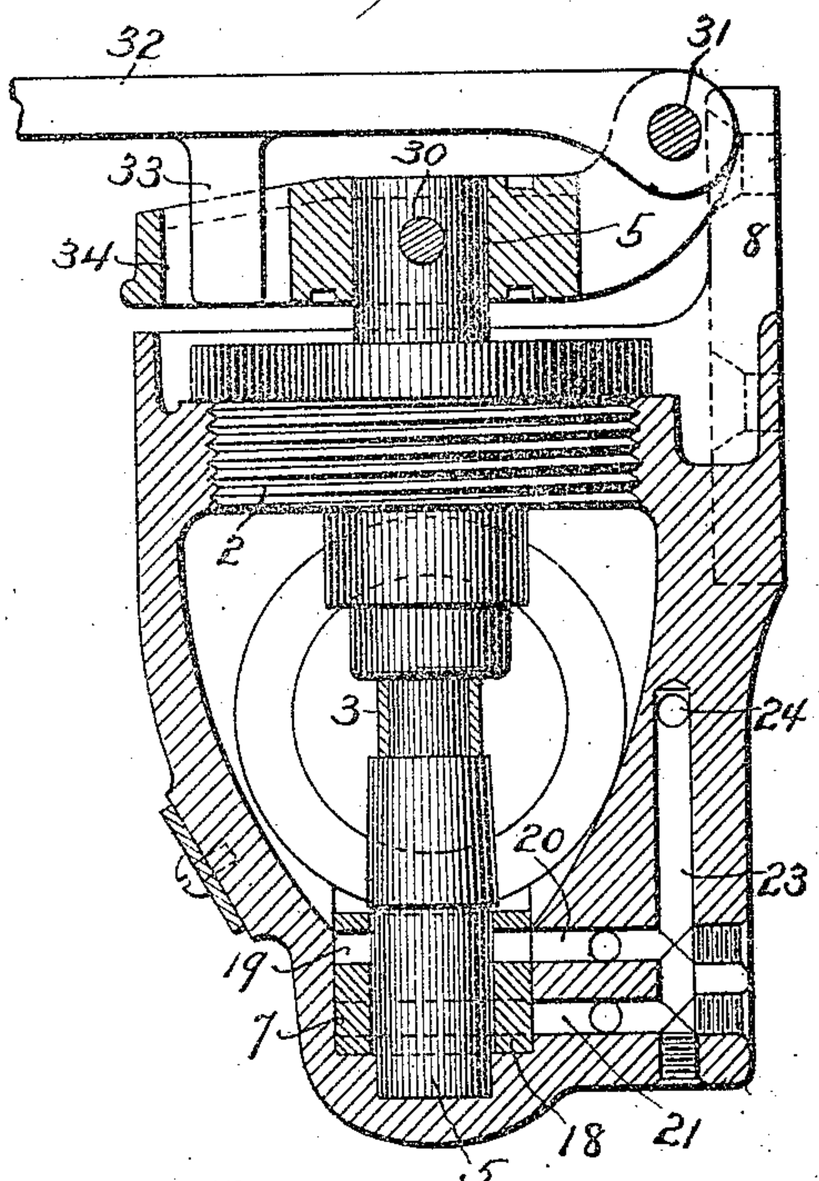
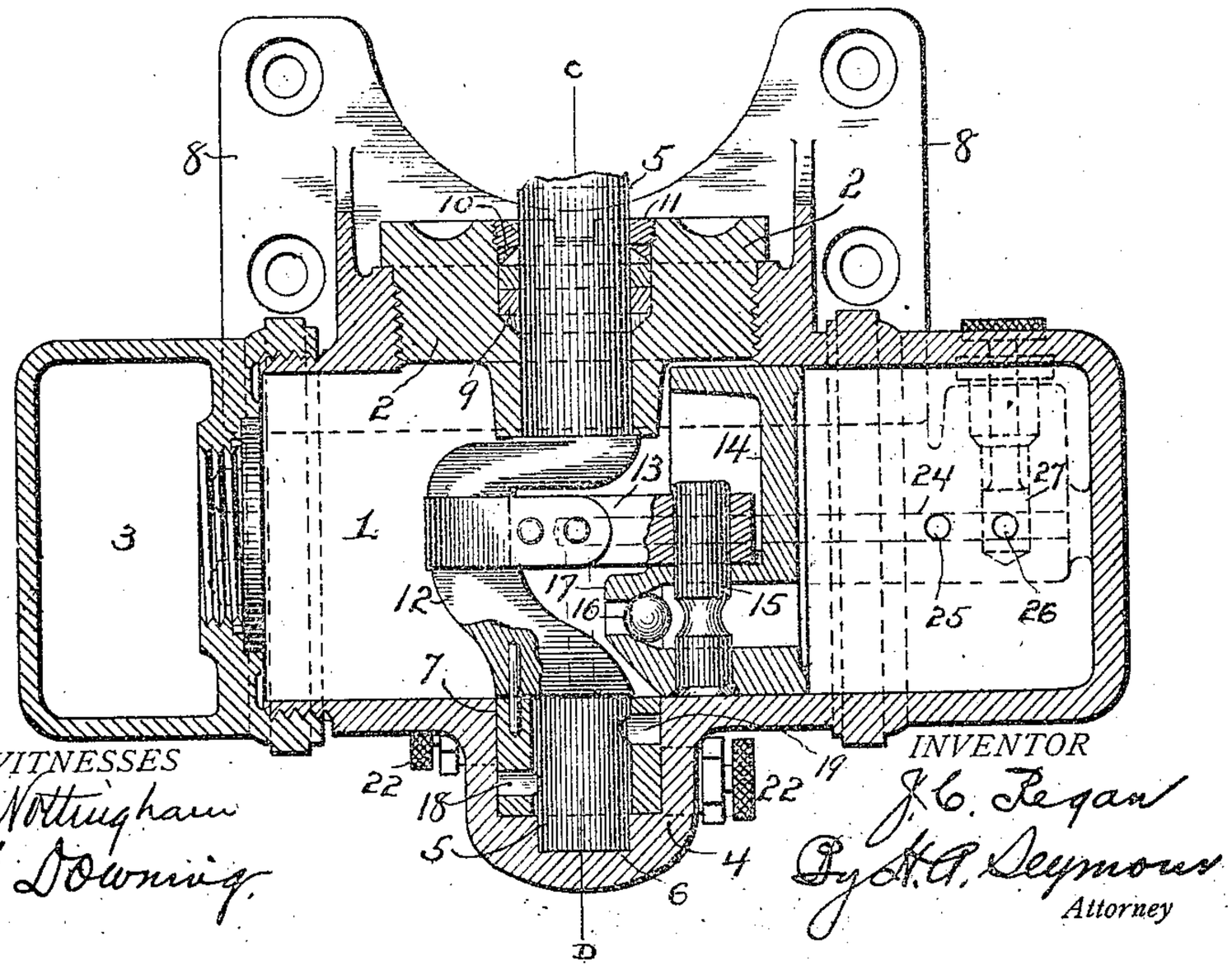


Fig. 4.



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6 SHEETS—SHEET 3.

Fig. 5.

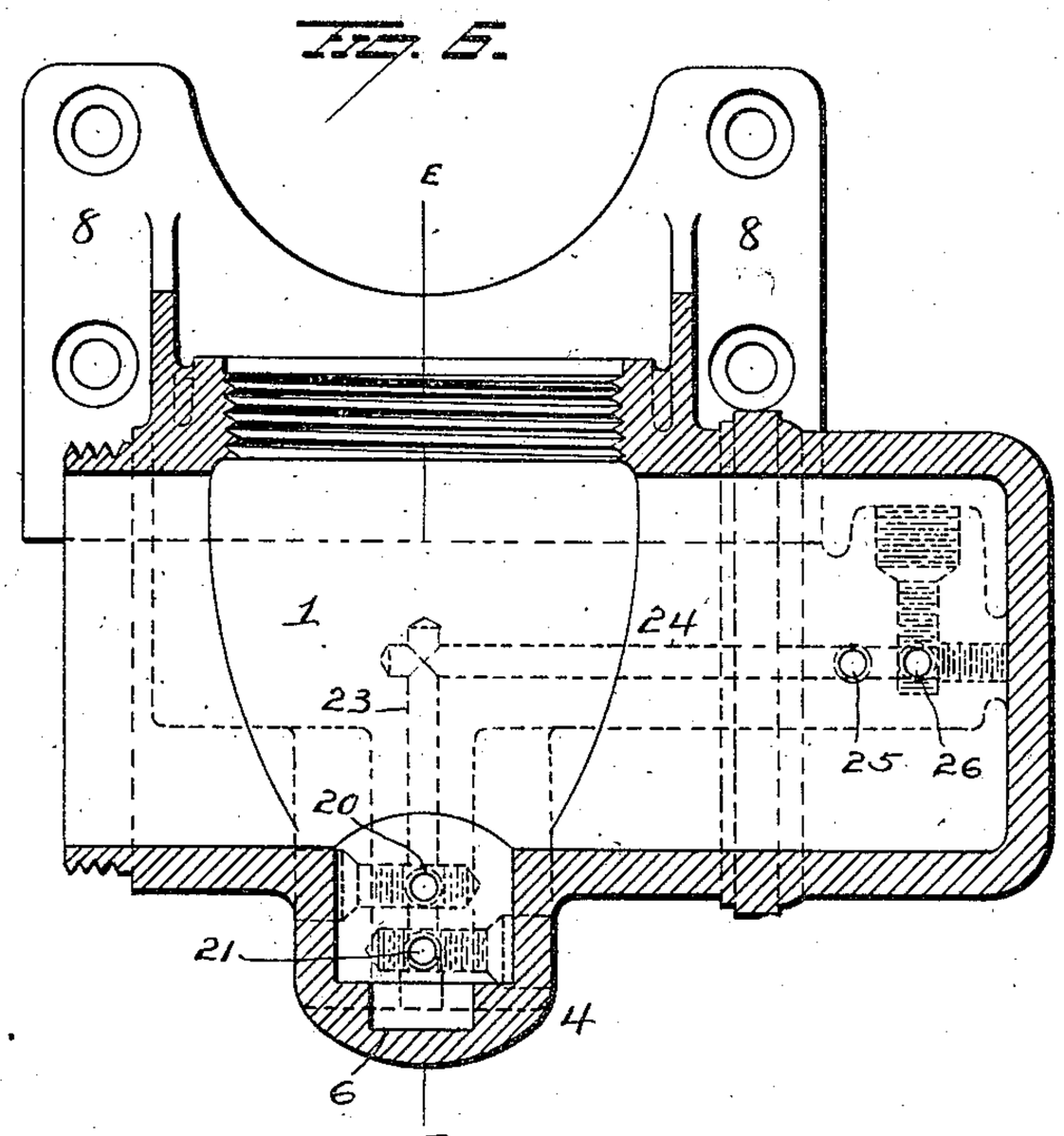
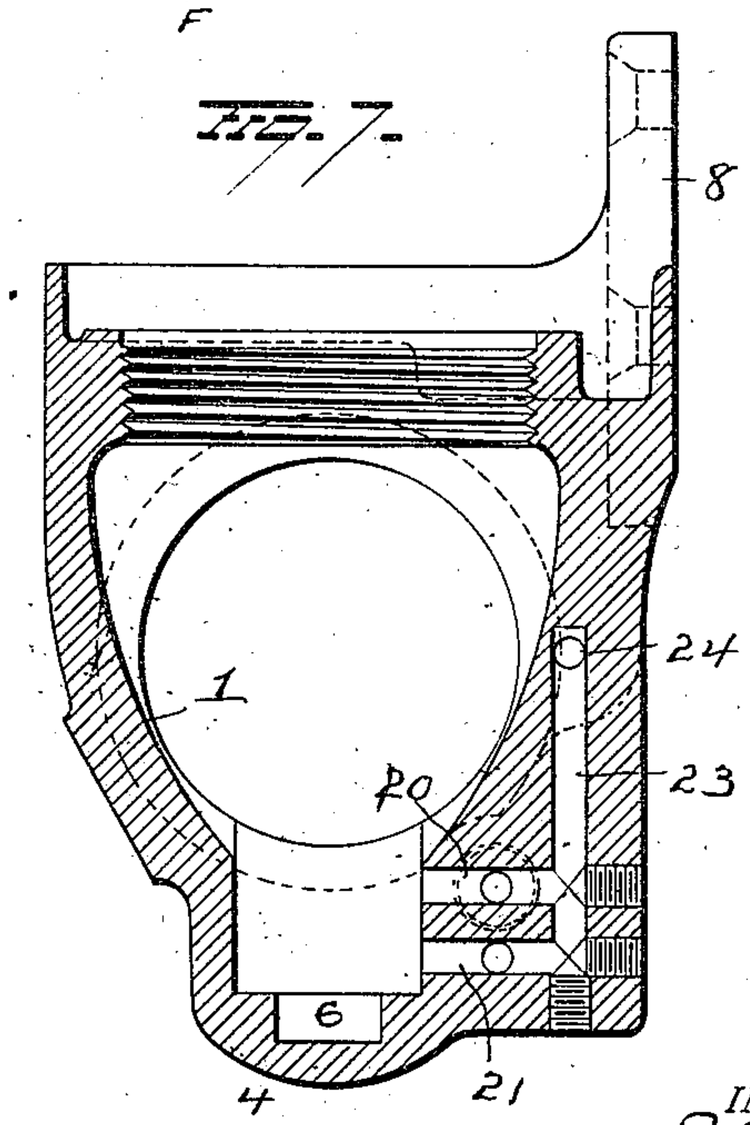


Fig. 7.



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6 SHEETS—SHEET 4.

Fig. 4.

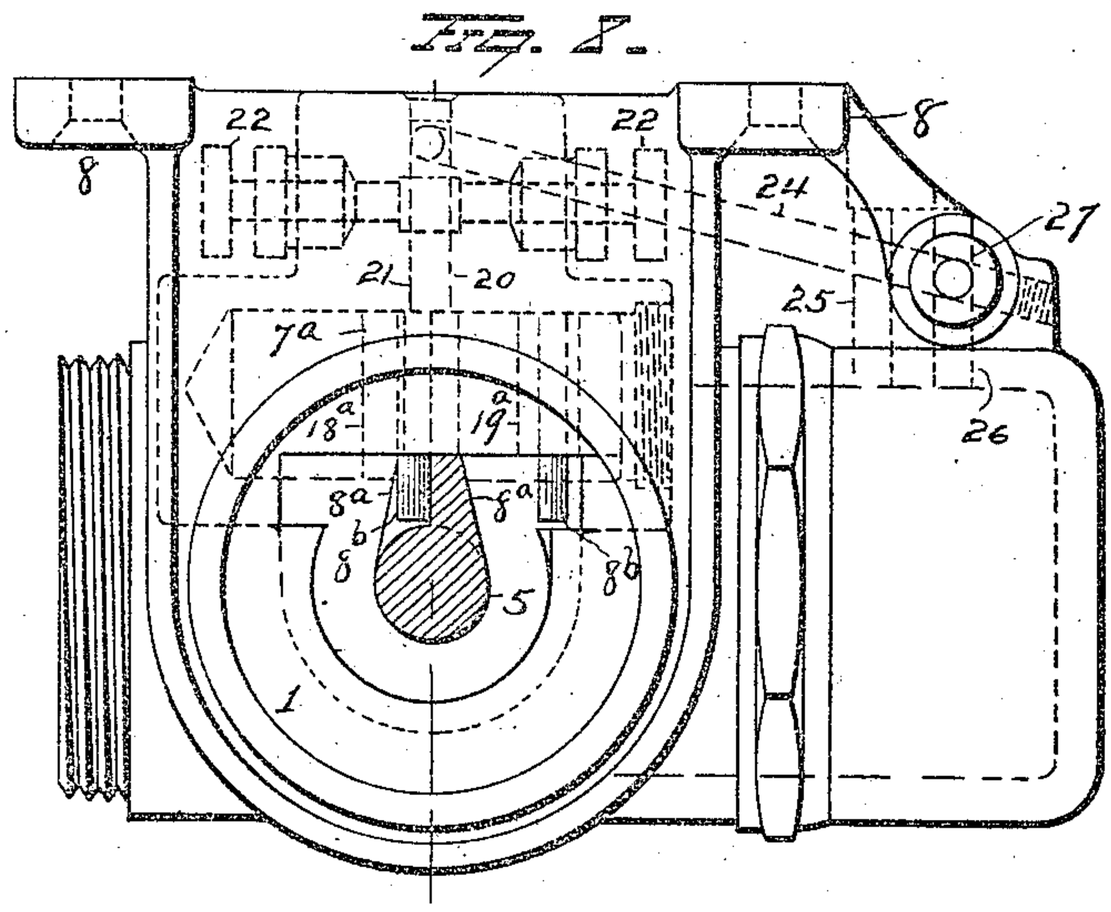
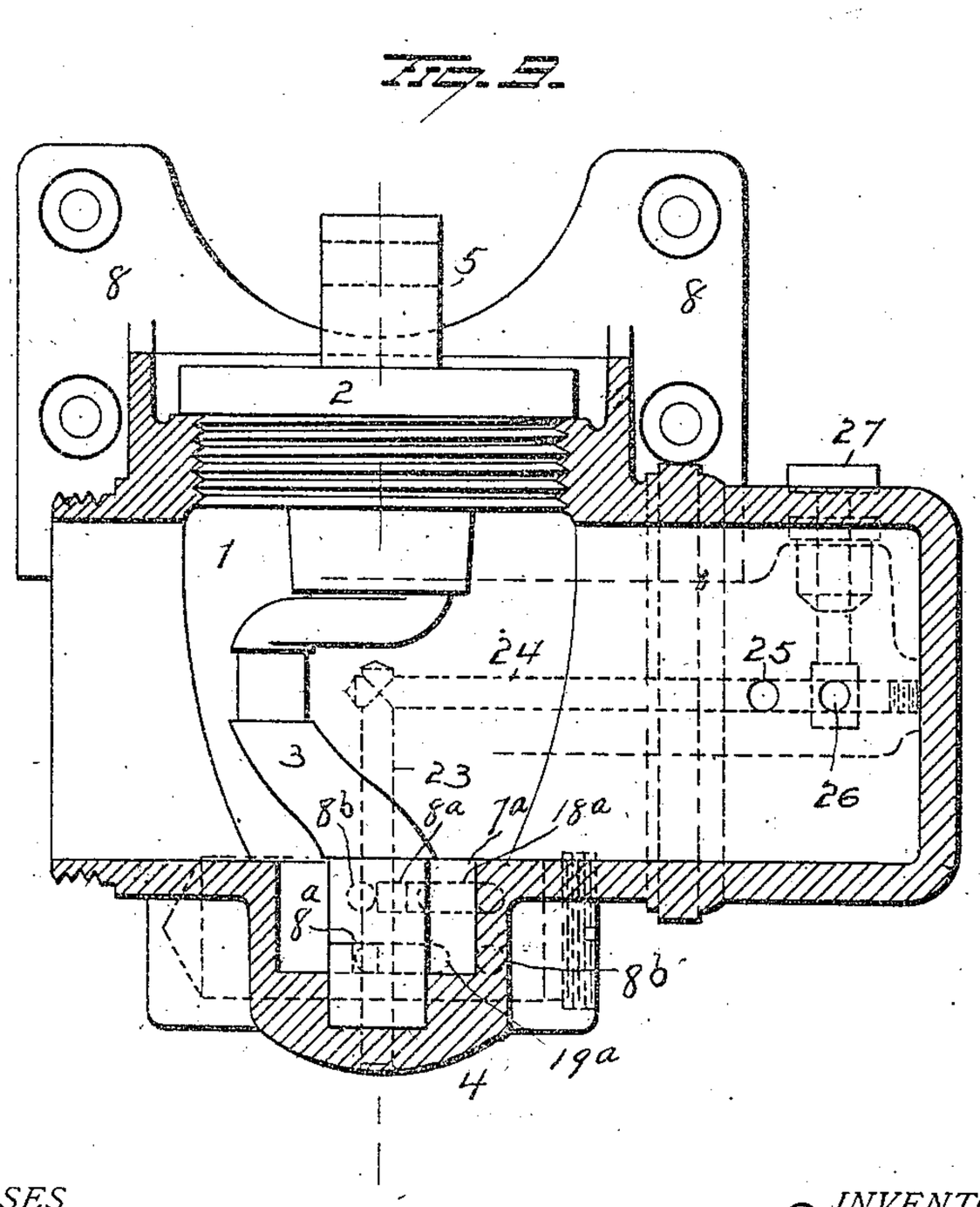


Fig. 5.



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6 SHEETS—SHEET 5.

Fig. 10.

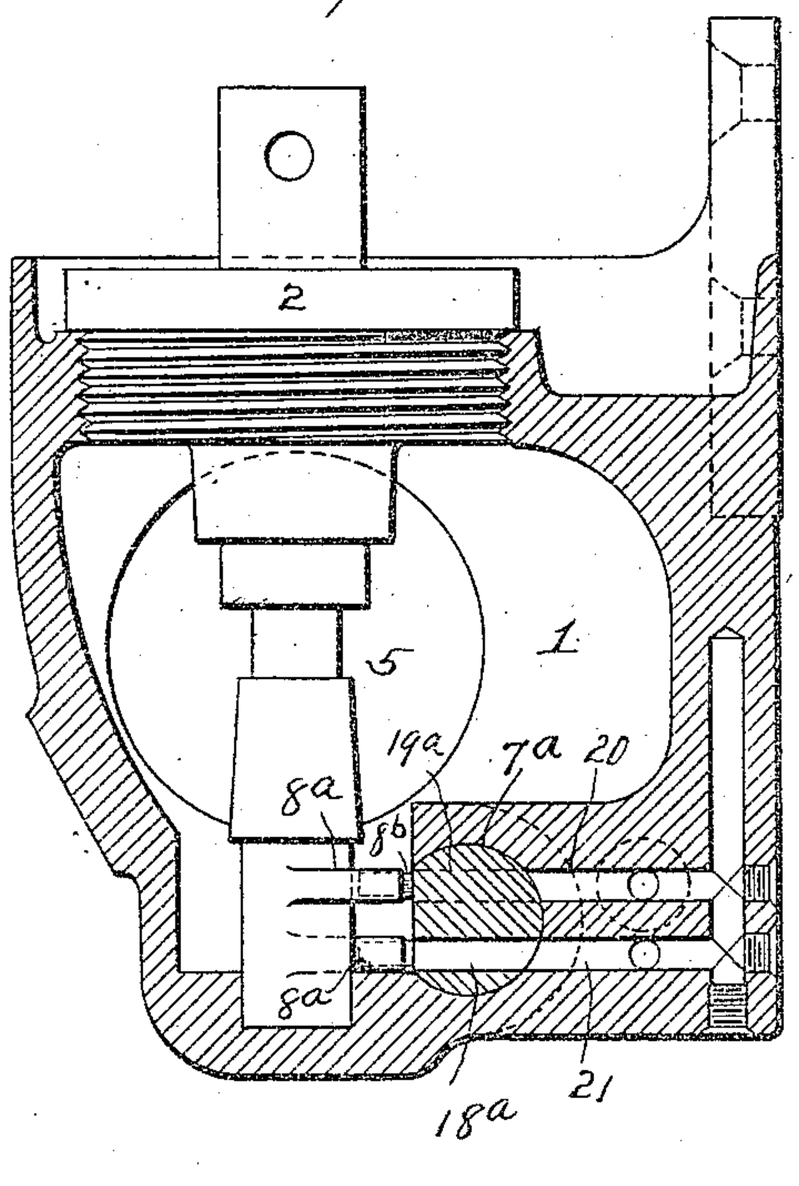


Fig. 11.

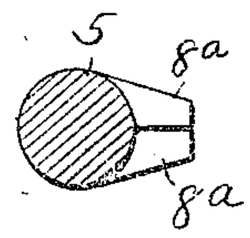


Fig. 12.

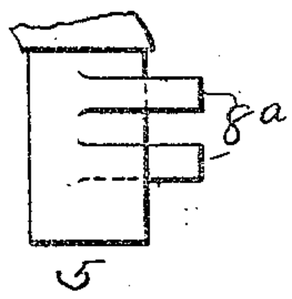


Fig. 13.

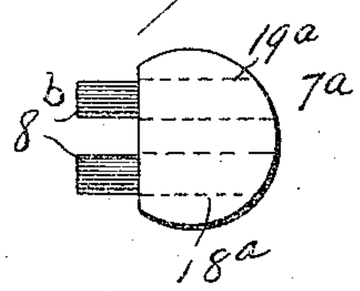


Fig. 14.

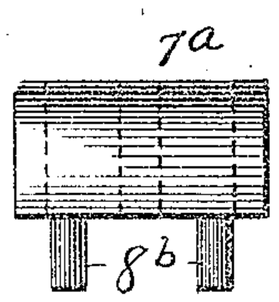
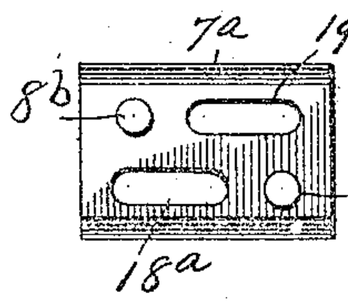


Fig. 15.



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6 SHEETS—SHEET 6.

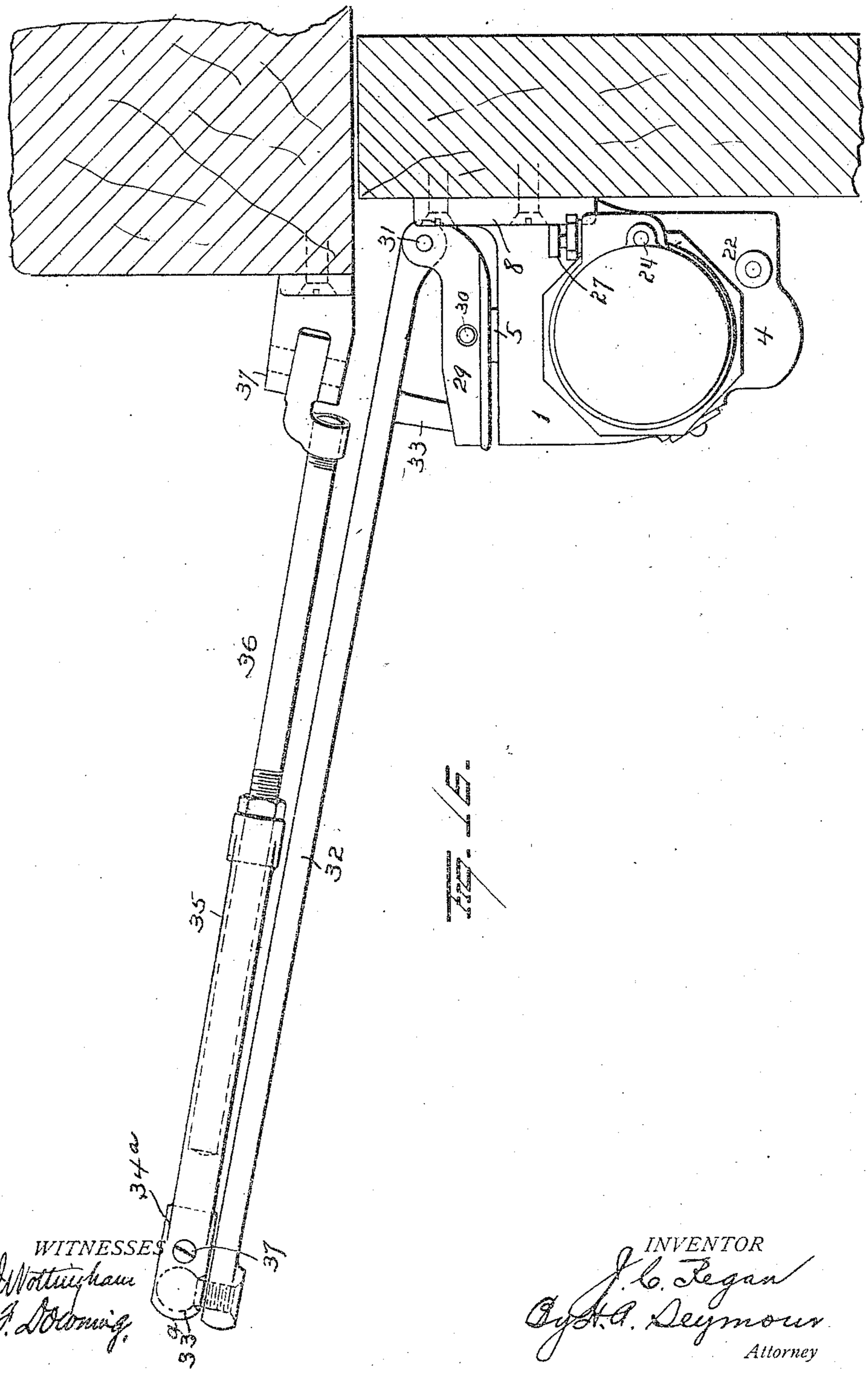

Fig. 1.

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UNITED STATES PATENT OFFICE.

JOSEPH C. REGAN, OF STAMFORD, CONNECTICUT, ASSIGNOR TO THE YALE & TOWNE MANUFACTURING COMPANY, OF STAMFORD, CONNECTICUT.

DOUBLE-ACTING DOOR-CHECK.

980,836. Specification of Letters Patent. **Patented Jan. 3, 1911.**

Application filed January 22, 1910. Serial No. 539,517.

To all whom it may concern:

Be it known that I, JOSEPH C. REGAN, of Stamford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Double-Acting Door-Checks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in double acting door checks, the object being to provide a construction wherein the closing movement of the door in either direction, may be regulated independently of the closing movement in the other direction.

A further object is to provide means whereby when the door begins to close, the action will be comparatively quick, dependent on the adjustment of the primary regulating means, while the final closing movement will be slower, owing to a gradual increasing resistance to the escape of the liquid from the front of the piston.

A further object is to generally simplify, cheapen and improve the efficiency of this type of check, and with these objects in view my invention consists in the parts and combinations of parts and in the details of construction as will be more fully described and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in front elevation of the check. Fig. 2 is a view in plan. Fig. 3 is an end elevation. Fig. 4 is a vertical longitudinal section on the line A—B of Fig. 2. Fig. 5 is a transverse vertical section on the line C—D of Fig. 4. Fig. 6 is a view in section of the casing the end cap being removed. Fig. 7 is a view on the line E—F of Fig. 6. Figs. 8, 9 and 10 are views of a check casing showing a sliding valve actuated by the crank shaft. Figs. 11 and 12 are views of a section of the shaft showing the lugs for actuating the sliding valve. Figs. 13, 14 and 15 are views of the sliding valve, and Fig. 16 is a view showing the check applied to a door.

1 represents the checking cylinder closed at one end and open at its other end, and provided in its upper surface with a threaded hole for the packing nut 2. The open end of the casing 1 is closed by the removable end cap 3, the latter being elongated as shown to conform in shape and size to the closed end of the casing. The casing is provided with the depressed portion 4, having a depressed seat 6 for the lower end of checking shaft 5. The casing 1 is also provided with integral wings 8 which are screwed to the door adjacent to the upper edge of the latter.

The shaft 5 is mounted at its lower end in the seat 6, and near its upper end ir the packing nut 2, which latter as before explained closes the opening in the top of casing 1. This nut has a central opening for the passage of the shaft, which opening is counterbored from the top foi the reception of the packing ring 9, follower 10 and nut 11, which prevent the escape of any liquid up around shaft 5. The shaft 5 is further provided with the crank 12, connected by pitman 13 with the piston 14. The closed end of casing 1 constitutes the cylinder in which piston 14 moves, and the latter is connected to the pitman 13 by the pin 15, which latter as shown in Fig. 4, acts as a back stop for the ball valve 16 which is mounted in the port 17 in the piston 14, and operates to close said port as the piston is moving to its forward position, as in the closing movement of the door, and moves away from its seat, when the piston is moving rearwardly or toward the shaft 5, and thus permits the liquid in the casing to pass freely through port 17 into the cylinder in front of the piston.

The double acting valve 7 is movable with the shaft. This may be a rotary valve as shown in Figs. 1 to 7, or it may be a sliding valve as shown in Figs. 8 to 15. The rotary valve is concentric with the shaft and is provided with two ports 18 and 19 located at different levels, the port 19 being in a plane above the port 18. Port 19 communicates with port 20 in casing 1, and port 18 communicates with port 21 in said casing, but the ports 19 and 18 in valve 7 are so located with relation to each other and to the ports 20 and 21, that when the door to which the check is connected is closing in one direction, one of the valve ports will be in communication with its port in the casing and when the door is closing in the opposite direction the other valve port will be in

communication with its port in the casing. The valve 7 embraces the lower end of the shaft 5, but its bore is of slightly greater diameter than the diameter of the shaft. The ports 18 and 19 extend through the valve to the bore of the latter and the liquid entering these ports passes through same and up around the shaft to the main liquid reservoir.

Each of the ports 20 and 21, which as before explained communicate respectively with the ports 19 and 18, is provided with a valve 22, located on opposite sides of the downward extension 6 of the casing 1, as shown in Fig. 4, so that the flow through each port can be regulated independently of the flow through the other, thus permitting the door to close in one direction by one degree of resistance, and in the opposite direction by a different resistance. The ports 20 and 21 extend laterally or toward the door side of the casing, and both communicate with the upwardly projecting port 23 clearly shown in Fig. 5. This upwardly projecting port communicates with the port 24 which extends horizontally forward in the side wall of the cylinder and communicates with the latter through the ports 25 and 26, located in a line, one in advance of the other, so that in the forward or closing movement of the piston the port 25 will be closed by the piston 14 in advance of the port 26. With this construction, as the door begins to close in either direction, the liquid passes through both openings thus permitting of rapid closing movement, the speed however being dependent on the position of the primary valves 22. As the piston reaches and closes port 25, the remaining liquid in the cylinder in advance of the piston, escapes through port 26, the size of which may be regulated by the main valve 27. The casing 1 constitutes the liquid reservoir, and from the foregoing it will be apparent that as the door is opened in either direction, the liquid will freely pass through port 17 to the front of the piston. As the door which swings both inward and outward and which is closed by springs or spring hinges, is released, the springs tend to close the door against the resistance of the liquid now confined in the cylinder in front of the piston. As the door begins to close the pressure of the liquid in front of the piston forces ball valve 16 to its seat and holds it there, thus limiting the escape of the liquid, to the ports 25 and 26. As the piston moves forwardly, it closes port 25, thus checking the closing action, and limiting the further escape of the liquid to the single port 26, the size of which, may, as explained, be regulated by the main valve 27. By this construction I obtain a gradually increasing resistance or control to the closing action, by means of which I am enabled to bring the door to a gradual stop at the proper point without any oscillation whatever of the door. By providing the check with valves accessible from the outside, the closing action can be quickly and conveniently regulated so as to provide for one degree of resistance in closing in one direction, and a different resistance when closing in the opposite direction and by the employment of the third or main valve the resistance to the final closing movement in both directions, can be under complete control.

29 is a cap having a central hole for the passage of the upper end of shaft 5. This cap rests above the casing 1, out of contact therewith and is secured to the shaft by the pin 30. Hinged at 31 to this cap 29 is the arm 32 which is provided on its under side with a lug 33 which rests within a recess 34 in the cap 29, the recess 34 and hinge 31 being on opposite sides of the shaft 5. This arm therefore, is connected by the hinge, and by the lug and recess, with the cap 29, the lug and recess permitting free vertical movement of the free end of the arm 32, within the necessary limits, without disengaging the lug and recess. The outer free end of this arm 32 is provided with a rounded knob 33^a projecting upwardly, which is embraced by the forked end 34^a of the section 35 of arm 36. Each member of the fork is concaved to engage the side of the rounded knob forming in effect a ball and socket joint, and the two members are held in contact with the knob by the screw 37. By this means a universal joint is secured which permits of the necessary freedom of movement between the two arms without binding or straining the parts. The other member of arm 36 is provided at one end with threads for engagement with a threaded hole in the forked section of the arm whereby the sections may be adjusted as to length and is pivotally mounted at its opposite end in the bracket 37 secured to the door frame. This bracket comprises a base member secured to the door frame and two parallel outwardly and upwardly projecting members to which the arm 36 is pivoted. By inclining these members slightly upwardly, it will be seen that as the door is opened outwardly or in a direction to carry arm 36 under the top of the door frame, the free end of said arm will, in its movement toward the door frame be slightly downwardly, so that by the time it reaches the frame it will have been lowered sufficiently to pass under same, the universal connection between the two arms, and the hinge connection of arm 32 with the cap 29, permitting of such movement of the arms. The arm 36 is supported in the bracket against any vertical movement except that which is imparted to it by the inclination of the supporting member of the bracket, hence there

can be no movement of the arm 32 or 36 except when the door is being opened or closed.

In the construction shown in Figs. 8 to 15 inclusive, the parts are identical with those previously described, except that a slide valve is substituted for the rotary valve. This valve 7^a is provided with two ports 18^a and 19^a located in different horizontal planes in order to aline with ports 20 and 21 and also in different vertical planes, so that when one port 20 or 21 is uncovered the other will be covered. This valve is located in a chamber into which the ports 20 and 21 terminate, and is actuated by two projecting crank pins 8^a secured to shaft 5, one above the other, which pins coact with correspondingly located lugs 8^b on the sliding valve 7^a, so that when the crank shaft 5 is revolved by opening the door in one direction, the valve 7^a will be moved correspondingly, by the engagement of one crank pin 8^a on shaft 5 with one lug 8^b on the sliding valve 7^a. This longitudinal movement of the valve 7^a, brings the other lug 8^b thereon in position to be engaged by the other crank pin 8^a as the shaft is rotated in the opposite direction as in closing the door, thus operating to restore the valve to its normal position and to continue the movement of the valve in the event the door be opened in the opposite direction. These movements of the valve bring the two openings in the latter, into line with the coacting ports in the casing. The valve is restored to its normal position by the rotation of the shaft 5 under the influence of the closing springs or spring hinges, the crank pins 8^a on said shaft engaging the lugs 8^b on the valve thus causing the valve to move in unison with the shaft. The opening in the valve extends through the latter thus permitting the liquid as it is forced from the front of the piston to flow back into the liquid reservoir.

It is evident that changes in the construction and relative arrangement of the several parts might be made without avoiding my invention and hence I would have it understood that I do not restrict myself to the particular construction and arrangement of parts shown and described, but,—

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

1. In a door check, the combination with a casing and a crank shaft therein, of a piston mounted in the casing and connected to the crank shaft, and a valve having two independent ports through same, the said valve being connected with and actuated by the crank shaft for opening and closing two ports leading from the casing in front of the piston.

2. In a door check, the combination with a casing and a crank shaft therein, of a piston mounted in the casing and connected to the crank shaft, a valve having two independent ports through same, the said valve being connected with and actuated by the crank shaft for opening and closing two ports leading from the casing in front of the piston, and a valve in each port for regulating the passage of liquid through said ports.

3. In a door check, the combination with a casing and a crank shaft therein, of a piston mounted in the casing and connected to the crank, a double valve carried by said shaft for opening and closing ports leading from the casing in front of the piston, and a main valve for regulating the passage of liquid to said ports.

4. In a door check, the combination with a casing, a piston therein and a crank connected to said piston, of a port opening into the liquid reservoir and having two openings into the piston chamber, the said openings in the piston chamber being one in advance of the other, a valve in the piston for permitting free passage of liquid to the front of the piston as the door is being opened, and a valve in the opening leading from the piston chamber for regulating the escape of liquid from said chamber.

5. In a door check, a checking control consisting of a port which connects with the liquid reservoir and with the piston chamber, said port having two openings into the piston chamber one in advance of the other, the forward opening being provided with a regulating valve; and also two openings into the liquid reservoir, each of said openings being further controlled by its own separate valve substantially as described.

6. In a door check, the combination with a casing, a piston chamber therein, a piston in said chamber, and a crank shaft, of a double valve carried by the crank for opening and closing ports leading to the piston chamber, a valve in each of said ports for regulating the passage of the liquid through same, and a third valve for regulating the passage of liquid from the piston chamber into said ports.

7. The combination with a casing, a crank shaft and a piston therein, and means connecting the crank and piston, of a rotary valve concentric with and actuated by the crank shaft and adapted to open and close a port through which the liquid passes from the front of the piston during the closing movement of the door.

8. The combination with a casing, a crank shaft and a piston therein, and means connecting the crank and piston, of a rotary valve concentric with and actuated by the crank shaft, the said valve having two independent ports adapted to register with corresponding ports in casing.

9. The combination with a casing, a crank

shaft and a piston therein, and means connecting the crank and piston, of a rotary valve concentric with and actuated by the crank shaft, the said valve having two independent ports adapted to register with corresponding ports in the casing, and a valve in each of said latter ports for controlling the passage of liquid through same.

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

JOSEPH C. REGAN.

Witnesses:
SCHUYLER MERRITT,
WARREN S. ABEL.