No. 713,138. Patented Nov. 11, 1902.

J. W. NETHERY.

AUTOMATICALLY ACTING VALVE.

(Application filed Sept. 3, 1901.)

(No Model.)

Fig. 1.

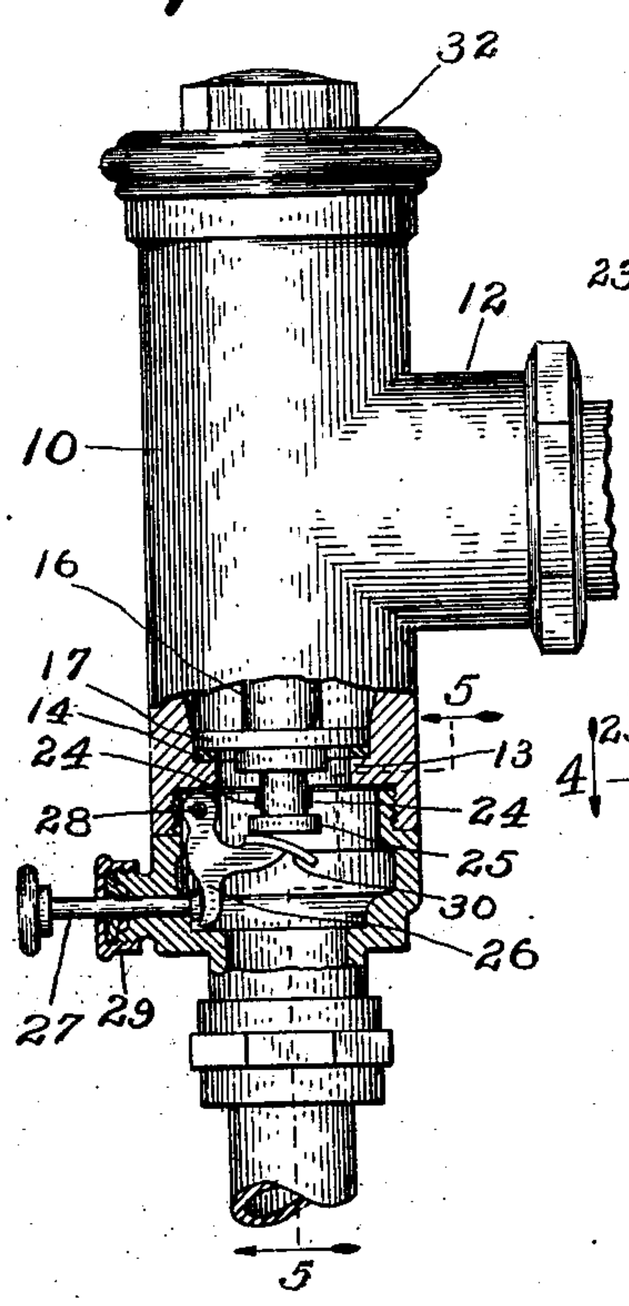


Fig. 2.

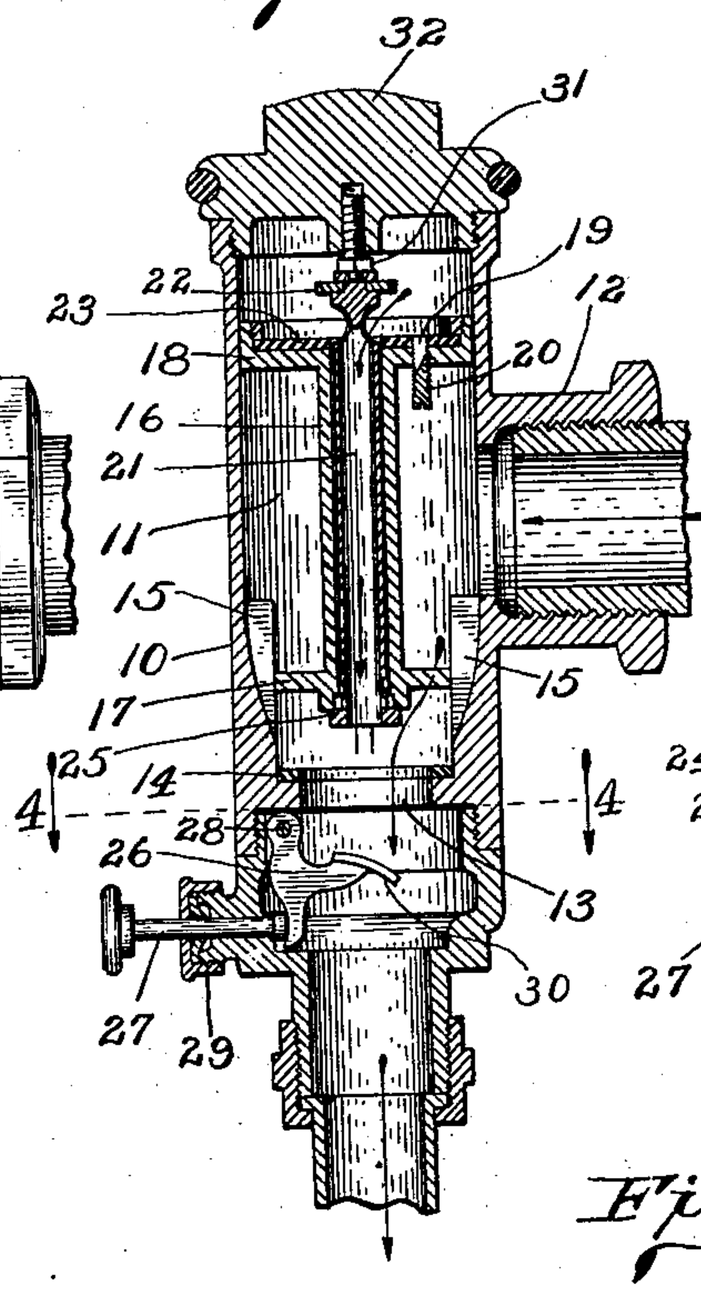


Fig. 3.

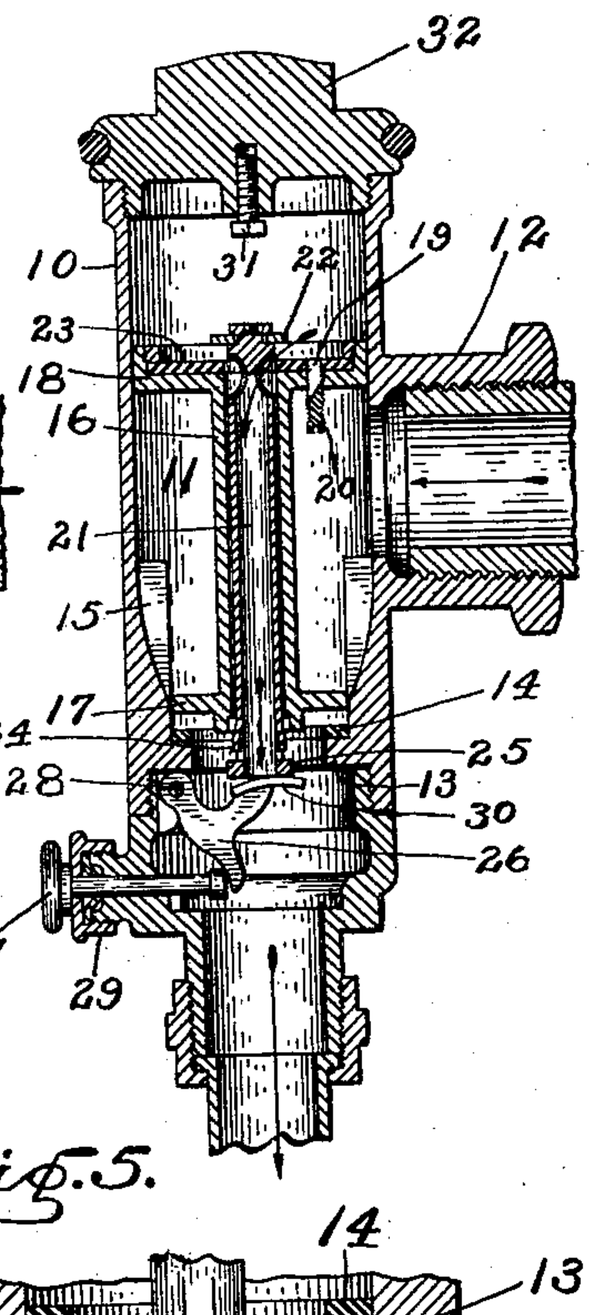


Fig. 5.

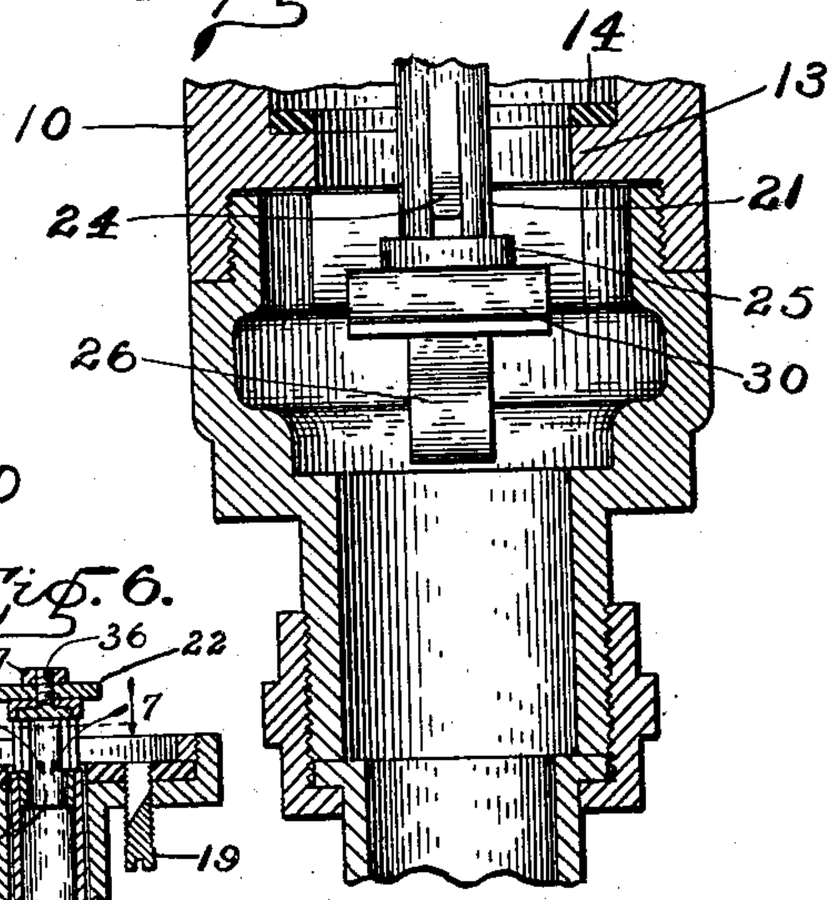


Fig. 4.

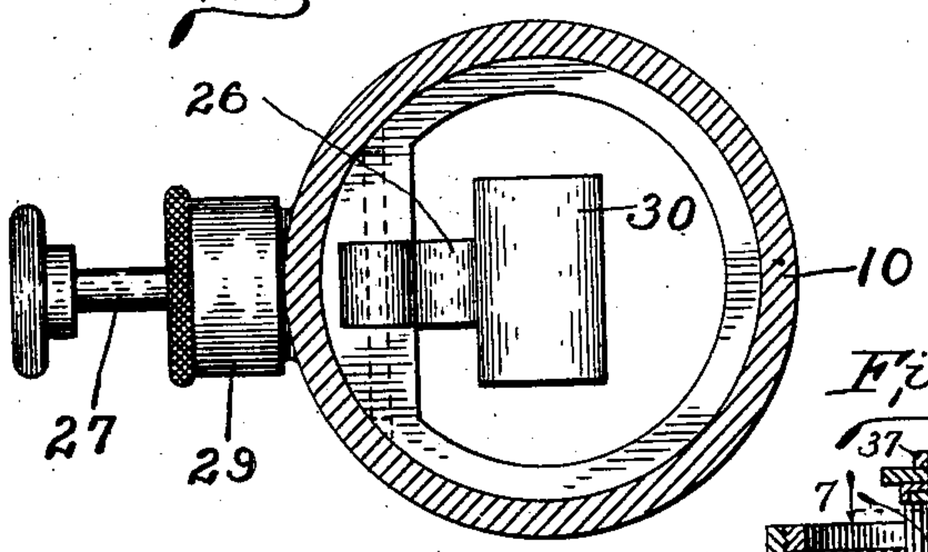


Fig. 6.

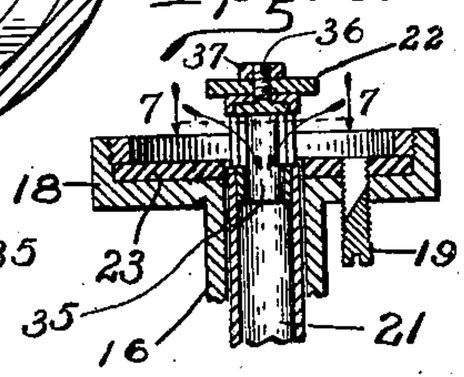
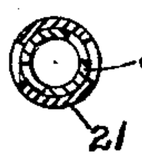


Fig. 7.



WITNESSES:

C. S. Frye.

L. H. Colvin.

INVENTOR

Joseph W. Nethery,

BY

Chester D. Bradford,

ATTORNEY

UNITED STATES PATENT OFFICE.

JOSEPH W. NETHERY, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO THE NETHERY HYDRAULIC VALVE COMPANY, OF INDIANAPOLIS, INDIANA, NEW YORK, N. Y., AND JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

AUTOMATICALLY-ACTING VALVE.

SPECIFICATION forming part of Letters Patent No. 713,138, dated November 11, 1902.

Application filed September 3, 1901. Serial No. 74,152. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH W. NETHERY, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Automatically-Acting Valves, of which the following is a specification.

Wastage in many situations where valves are used is a serious matter. For example, in sleeping-cars, where the supply of water for flushing the closets is necessarily limited to the capacity of the comparatively small tanks which can be built in the available space, careless or wasteful use may exhaust the supply before opportunity for replenishment, and much inconvenience and annoyance will result. So, too, where water is supplied by landlords in large buildings—such as apartment-houses, flats, and office-buildings, and is paid for according to meter measurement—the frequently careless and wasteful use of the water by tenants adds much to the landlord's expenditure without beneficial result to anybody. While deliberate and purposeful waste cannot be prevented, I have designed a valve which is calculated to much diminish such losses by reason of carelessness.

A valve embodying my said invention will first be fully described and the novel features thereof then pointed out in the claims.

Referring to the accompanying drawings, which are made a part hereof, and on which similar reference characters indicate similar parts, Figure 1 is a side elevation of a valve embodying my said invention, a portion being broken away to show the lower operative parts, said parts in this view being shown in the positions they occupy when the valve is at rest and closed; Fig. 2, a central vertical section view thereof, the valve being shown at nearly its extreme uppermost or open position, while the operating push-pin and lever are shown as released and in the same position illustrated by Fig. 1; Fig. 3, a view similar to Fig. 2 except that the valve is shown in a practically closed position, so that the flow of fluid therethrough is substantially shut off, while the push-pin and lever are shown as pushed in, the parts being in the position they would occupy if an attempt were made to hold the valve open continuously; Fig. 4, a horizontal sectional view, on an enlarged scale, showing the lever and push-pin in plan as the same would be seen when looking downwardly from the dotted line 4 4 in Fig. 2; Fig. 5, a vertical sectional view, also on an enlarged scale, as seen when looking in the direction indicated by the arrows from the dotted line 5 5 in Fig. 1; Fig. 6, a view on a somewhat-enlarged scale similar to a portion of Fig. 2, but showing a means of varying the sizes of the discharge-openings from the portion of the chamber above the head of the main-valve structure; and Fig. 7, a detail sectional view on the dotted line 7 7 in Fig. 6, showing said openings partly cut off.

The main shell or body 10 of this valve contains a comparatively large cylindrical chamber 11, into which the fluid enters through the inlet 12 and whence it is discharged through the main-valve seat 13. Said valve-seat preferably has a gasket 14 to immediately receive the main valve and prevent leakage. The walls of the chamber 11 continue up parallel with each other for a short distance and then diverge, as best shown in Figs. 2 and 3, until the full size of the chamber is reached. Guide-wings 15 for the valve continue the same size as the smaller portion of the chamber to a point somewhat beyond the extreme travel of the valve, so as to hold it to central position and prevent it from tipping and binding.

The main-valve structure preferably consists of a central hollow rod or stem 16, on the lower end of which is the main valve proper, 17, and on the upper end of which is a head 18, of sufficient size to fill the main portion of the chamber 11, and which is consequently larger than said main valve 17, so that when pressure is removed from above said head the pressure of the fluid coming in through the inlet 12 will cause the main valve to open because of the difference in sizes of the two sur-

faces against which it operates. Means are provided to permit the fluid to slowly enter that portion of the chamber above said head, and this, as will be readily understood, as soon as the pressure upon the two sides of the head becomes equalized will cause the valve to gradually close. Said means are shown as consisting of a small perforation 19, extending through the head 18. The size of the perforation 19 is preferably rendered adjustable by means of an adjusting-screw 20. This screw is shown as slitted at its point, the bottom of the slit being diagonal or tapered and the slit itself really constituting the perforation. It is obvious that with such a construction the perforation can be reduced or closed by driving in the screw sufficiently and can be enlarged to its full capacity by backing out the screw to the proper point.

In this valve means are necessarily provided whereby when properly manipulated the fluid in that portion of the chamber above the head 18 may be discharged and pressure on the upper side of said head removed, thus permitting the pressure of the fluid entering the chamber through the main inlet 12 to open the valve. The hollow stem 16 in a general way (when provided with a suitable valve and means of operating the same) constitutes such means. The small-valve-operating means being below the main valve, as will be presently described, and said small valve being properly above the head 18, a prolongation thereof extending through the hollow stem is to be provided, and this prolongation may be solid or tubular at the pleasure of the maker, as will be readily understood. The prolongation or stem is longer than the distance through the main-valve structure in order to permit of the necessary relative movement of the parts. I prefer and have shown this prolongation in the form of a movable tubular conduit 21. The opening, whatever means is provided, is to be of considerably-greater capacity than the perforation or ingress-opening in or around the head 18, so that when the small valve thereto is open the fluid from above said head 18 may be rapidly discharged, and the main-valve structure thus permitted to ascend. This tubular conduit is shown as having a solid upper end carrying a flange or collar 22, which when said conduit is in its lowermost position forms the small valve above referred to and which prevents the egress of fluid through said conduit or the hollow stem 16 from the portion of the chamber above the head 18. Said head is provided with a gasket 23, which forms a valve-seat for the valve 22 of a character which prevents leakage when said valve is closed. Orifices in the sides of the conduit 21 just below the valve 22 communicate with the opening therein and permit the discharge of fluid therethrough when said conduit is in its uppermost position. When this conduit is forced from its lowermost to its uppermost position relatively to the main-valve structure by the means presently to be described, it is necessary for its proper operation that it should there remain until said main-valve structure has reached its uppermost position. I therefore provide means for effecting frictional contact between the lower end of said conduit 21 and the adjacent surface, such as springs 24, which when said conduit is forced up will impinge upon the adjacent sides of the opening in the main-valve structure in which said conduit is situated, thus holding said conduit to the said position with considerable strength. Just below the frictional engaging surfaces thus provided is a head or collar 25, which limits the upward movement of the conduit relatively to the main-valve structure, as best shown in Fig. 2.

The operating mechanism for forcing up the conduit 21, and thus starting the valve into operation, consists of a bell-crank lever 26 and a push-pin 27, the former of which is mounted on a pivot 28 and the latter of which passes in through a stuffing-box 29 and is adapted to operate said bell-crank lever by coming in contact with its lower arm. The upper arm of said bell-crank lever comes directly in contact with the lower end of the conduit 21, and is thus adapted to operate it, as will be readily understood. The upper arm of said lever also preferably develops into a plate 30 of sufficient size to cover the conduit-opening. This insures that the lever shall be reversely operated and the push-pin forced out into position for its next use at each operation, as the force of the stream of fluid coming down through the conduit from the portion of the main chamber above the head 18 will strike directly on this plate or flattened portion of the lever and drive it to its lowermost position with considerable force.

The position of the parts shown in Fig. 3 illustrates the fact that this valve will not operate continually even if the push-pin becomes stuck or is purposely held in. When the main-valve structure ascends, carrying with it the conduit 21, the latter will strike the upper end of the main chamber and be forced down, so that the orifices in its sides under the valve 22 are closed. That portion of the chamber above the head 18 then begins to fill, and the main-valve structure consequently begins to descend. When it has descended to the position shown in Fig. 3, the discharge of fluid through the main valve has been shut off. By this time the lower end of the conduit has come in contact with the upper arm of the bell-crank lever, which raises said conduit slowly a short distance until a point is reached where room is left for a slight leakage through the conduit equal to the quantity of fluid entering the upper portion of the chamber through the small perforation 19. The parts will then remain in this position with the main valve closed (but not quite seated) and the upper valve also substantially closed until the push-pin

is moved out and the valves are permitted to completely seat themselves, as in Fig. 1, whereupon the valve as a whole is ready for a new operation. Continuous running of the fluid through the valve beyond the very slight leakage above mentioned is, however, effectually precluded.

The distance which the main-valve structure may ascend before the small valve 22 is closed (and the return movement of the main-valve structure thus started) may be regulated by providing an adjustable strike 31 in the cap or upper end 32 of the body of the valve, against which the valve 22 may strike and whereby it may be driven shut as the main-valve structure reaches its uppermost position. This adjustable strike may be in the form of a screw, as shown, and the adjustment is readily effected by removing the cap and turning the screw, as will be readily understood.

In situations where fluid-pressure is variable, as where waterworks systems of the direct-pumping variety are employed, it is necessary in order that the main-valve structure may be adjusted to rise with equal speed under the various pressures that the discharge-orifices leading from the portion of the main chamber above the head 18 shall be rendered adjustable. I have shown a means of doing this in Figs. 6 and 7, where I have placed within the tubular conduit 21 a small tubular gate 35, having openings in its sides which may register with the openings in the sides of the upper end of said conduit 21. In this construction I form the small screw-threaded stem 36 on the upper end of this gate, and this carries the nut 37. To adjust the openings, it is only necessary to loosen the nut 37, turn the gate 35 to the desired point, and retighten said nut. A position in which the openings are placed partly out of registry is illustrated in Fig. 7. The gate, as illustrated in Figs. 6 and 7, is not necessary where a constant fluid-pressure is maintained, as where tanks are employed. It is merely for the purpose of adapting this invention to be used under high pressure, as where the ingress-pipe is connected to the distributing pipes or mains of a direct-pumping system and the pressure is apt from time to time to be increased beyond the normal pressure necessary for an ordinary supply, as in cases of fires and the like.

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

1. The combination, in a valve, of a main shell or body containing a chamber with an ingress-opening at one side and an egress-opening at one end, a main-valve seat being formed adjacent to the egress-opening smaller in diameter than the main portion of the chamber, a portion of said chamber adjacent to said valve-seat being also smaller than the main portion, and formed with parallel sides for a short distance from said valve-seat and then tapered to the full size of the main portion of the chamber, a main-valve structure within said chamber formed to fit within the smaller portion thereof and seat upon said main-valve seat, and having a portion carrying a piston which extends to above the ingress-opening of said casing formed to fit within the larger portion of said chamber, a small passage leading to the upper portion of the chamber above said piston, a discharge-opening from said upper chamber of larger diameter than said small ingress-opening and leading down through the main-valve structure to the main egress-opening, a second valve adapted to close said discharge-opening and provided with a stem extending through said main-valve structure to a short distance beyond, frictional contact devices for supporting said second valve away from its seat when not closed forcibly and a lever operated from the exterior of the main structure for opening said valve through contact with the projecting lower end of its stem, all substantially as described and for the purposes specified.

2. The combination, in a valve, of the main chamber having the ingress and egress openings and formed with a portion adjacent to the egress-opening of contracted size, said contracted portion having parallel sides for a short distance, a valve-seat formed adjacent to said portion, a valve structure carrying a main valve adapted to fit in said contracted portion between the ingress and egress openings, and a piston on its other end above the ingress-opening formed to fit within the larger portion of said chamber, a small ingress-opening leading from one side of said piston to the other, a passage-way leading through the valve structure from above the piston to the main egress-opening, a valve for said passage-way carried on a hollow stem extending to beneath the main-valve structure, a pivoted lever formed with an enlarged surface, the end being adapted to contact with the lower end of said hollow stem, and a push-pin adapted to contact with said lever for operating the same, and extending to the outside of the main-valve structure, substantially as set forth.

3. The combination, in a valve, of a shell or body containing a chamber and provided with ingress and egress openings, a main-valve structure within said chamber, an opening through said main-valve structure through which fluid from the compartment of said chamber above said structure may be discharged, a small ingress-opening to said compartment, a valve to said discharge-opening having a prolongation or stem of greater length than the distance through the main-valve structure, a lever pivoted within the chamber below the lower end of said valve structure and adapted to strike said stem, the length of said stem being such that when said lever is moved to its operated position

said valve is raised off its seat, and a push-pin extending to the outside for operating said lever, substantially as set forth.

4. The combination, in a valve, of a shell or body containing a chamber provided with ingress and egress openings, a main-valve structure contained within said chamber and extending across one of the openings thereinto and provided with a head or end whereby a portion of the chamber beyond said opening is divided from the remainder, an ingress-opening to said divided-off chamber portion whereby fluid is admitted thereto from the source of supply, a discharge-opening through the main-valve structure, a valve to said discharge-opening provided with an extension or prolongation extending through to below the main valve and frictional surfaces at or near its lower end, and a lever operated from the exterior of the structure for forcing said prolongation and the valve carried thereby upwardly and at the same time engaging said frictional surfaces, whereby the valve to the discharge-opening will be held open until forcibly closed, substantially as set forth.

5. The combination, in a valve, of a shell or body containing a chamber and provided with ingress and egress openings, a main-valve structure within said chamber, an opening through said main-valve structure through which the fluid from the compartment of said chamber above said structure may be discharged, a small ingress-opening to said compartment, a small valve to said discharge-opening having a prolongation or stem of greater length than the distance through the main-valve structure, and a lever positioned below the lower end thereof and adapted to open said small valve; said main-valve structure, said small-valve stem and said lever being arranged as described, whereby when said lever is held to its operated position the lower end of said stem, as the valve structures descend, will come in contact therewith before the main valve reaches its seat, and the small valve thus be partially raised, until a slight flow or leakage equal to the inflow into the compartment of the chamber above the main-valve structure is provided for, whereupon the movement of the parts is arrested at this point, and continuous discharge through the main valve is thus rendered impossible.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 31st day of August, A. D. 1901.

JOSEPH W. NETHERY. [L. S.]

Witnesses:
CHESTER BRADFORD,
L. H. COLVIN.