No. 858,063. PATENTED JUNE 25, 1907.

J. H. DELANY.

VALVE.

APPLICATION FILED JUNE 28, 1906.

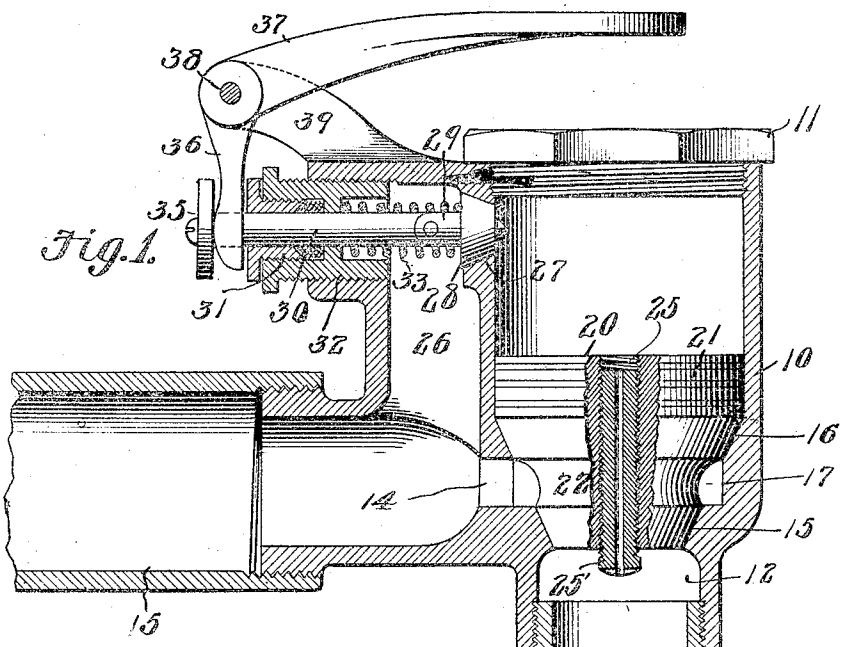
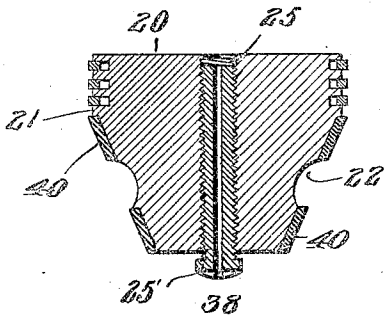


Fig. 1.

Fig. 4.



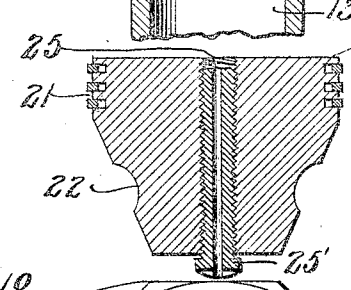


Fig. 3.

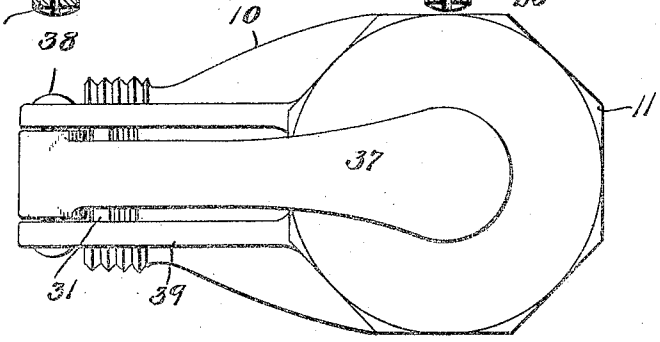


Fig. 2.

Witnesses

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VALVE.

No. 858,063. Specification of Letters Patent. Patented June 25, 1907.

Application filed June 28, 1906. Serial No. 323,845.

To all whom it may concern:

Be it known that I, JAMES H. DELANY, a citizen of the United States, residing at Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Valve, of which the following is a specification.

This invention relates to pre-determined time limited, exhaustive or flushing valves, and has for one of its objects to provide a valve in which the valve member is closed or seated and held to its seat by the pressure of the water, and may be entirely independent of either springs or gravity, a further object in this connection being to secure a sealing or closing pressure proportioned to the pressure in the reservoir, tank, or other source of supply.

A further object of the invention is to provide a valve which may be employed either as a single acting or repeating valve, as desired.

A still further object of the invention is to provide a valve in which both the opening and closing movements are gradual, thereby avoiding splashing, detonation or mechanical hammering, and insuring sufficient slack water for sealing the closet.

A still further object of the invention is to provide a valve which will act as a safety valve to relieve excess pressure in case the pressure in the tank or reservoir rises to the danger point, and further to provide means for regulating the pressure required for effecting automatic opening of the valve.

A still further object of the invention is to provide a valve which may be readily operated, and by which the acutating lever or similar member will be quickly restored to its normal position after each operation.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings:—Figure 1 is a sectional elevation of a flushing valve constructed in accordance with the invention. Fig. 2 is a plan view of the same. Fig. 3 is a detail sectional view of the valve proper. Fig. 4 is a similar view of the valve piston or plug provided with packing rings.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The valve casing 10 is cylindrical in form, and at the top is closed by a screw cap 11. At the bottom of the casing is an intake port 12 which may be coupled by a pipe 13 to a reservoir, tank, or other source of water supply. Leading from one side of the casing is a discharge port 14 which may communicate through a pipe 15 with the closet. In the lower portion of the casing is arranged a tapered primary valve seat 15, and a tapered secondary valve seat 16, these being separated from each other by an annular groove 17 that is in communication with the escape port 14, and the area of said port 14 bears a fixed relation to the area of the port 12, the areas being altered in accordance with the manner in which the valve is to be operated, as will hereinafter appear.

Arranged within the valve casing is a piston valve 20 having a cylindrical head 21 provided with packing rings and provided with two tapered valve portions separated by a groove 22, these valve portions being designed to close against the seats 15 and 16 for the purpose of preventing the passage of water through the port 12 to the port 14, or from the upper portion of the casing 10 to said port 14. The piston valve is provided with a passage or port 25 through which the water may flow from the inlet port 12 to the upper portion of the valve casing, and maintain the valve in closed position. The area of the top of the valve is much greater than the area of the bottom, so that the seating pressure is always considerably greater than the pressure tending to open the valve, and said pressure will, of course, be automatically proportioned to the pressure of the supply.

The area of the port 25 may be changed by providing the port with internal threads and screwing thereinto the small sleeve 25′. The sleeves are provided with ports or passages of different area, and are made interchangeable, so that the size of the port may be proportioned to the pressure of water and other conditions.

At one side of the cylindrical portion of the casing is arranged a passage 26 that communicates at its lower end with a discharge, and

at its upper end may be placed in communication with the upper portion of the cylindrical casing through a passage 27 that is arranged to form a tapered seat for a tapered controlling valve 28. This valve is carried by a stem 29 that is pivoted to a main stem 30, arranged to slide through a suitable stuffing box 31 in a plug 32, the latter being mounted in a threaded opening at one side of the casing proper. The inner end of the plug is recessed for the reception of one end of a helical compression spring 33, the opposite end of which bears against the valve 28 and tends to maintain the same in closed position. The pivotal stem allows free seating of the valve in case of wear, and the spring serves to hold the two stem members in alinement with each other, so that the valve will always be returned to its seat when the spring is allowed to act. The outer end of the stem 20 is provided with a head 35 against which bears the shorter curved arm 36 of an operating lever 37, said lever being fulcrumed on a pin 38 carried by a bracket 39 that is formed integral with the casing.

In operation, the valve being in closed position, the water pressure passing through the port 25 fills the chamber above the valve and holds the latter tightly to its two seats 15 and 16, and as the area at the top of the valve is much greater than the area at the bottom of the valve, said valve will be firmly held in closed position.

The lever operated controlling valve 28 is held firmly closed against the pressure in the cylinder by the compression spring 33, the stress of which may be varied in accordance with the pressure of the water.

The pressing down of the lever 37 will move the valve 28 to open position, and the escape thus afforded being greater than the inlet through the port 25, the pressure at the bottom of the valve will cause the latter to rise to a point where the escape through the outlet port 14 is approximately equal to the volume of water passing through the port 12. If the area of the port 14 is equal to that of the port 12, the valve will be held above its seats, until the discharge through the port 12 shall have sufficiently subsided through emptying of the pressure tank or other supply to permit the valve to settle of its own weight. Once this closing movement is started, the slight increase in pressure resulting will be sufficient to cause the flow through port 25, and valve 28 being at this time closed through release of the lever 37, the pressure exerted on top of the valve will accelerate the closing movement as the area of the escape port diminished until the main valve rests on its seat, and is held thereon by the water pressure. This operation is suitable for a single action valve which would remain open independent of the controlling valve so long as the flow from the port 12 to the port 14 is sufficient to hold the valve in raised position.

To operate the device as a repeating valve, capable of repeating the flushing operation after a predetermined amount of water has been discharged, it is only necessary to make the discharge port 14 slightly smaller than the inlet port 12, so that when the valve has opened, there will be an appreciable pressure at the bottom of the valve, which would cause a flow or current through the port 25 and result in a gradual forcing down of said valve as soon as the controlling valve is closed, the time required for said closing being dependent upon the relative areas of ports and channels 12, 14 and 25, thereby causing the cessation of the flushing process after a certain period, independent of the pressure remaining in the tank, reservoir, or other source of supply.

Whether the valve be arranged for single or multiple flushing, it is apparent that the opening, while prompt, need not be sudden, unless the valve 28 is very large and, similarly, the closing speed will depend principally on the size of the port 25, and will be relatively slow, thereby insuring plenty of water for sealing the closet siphon.

The pressure exerted on valve 28 by the spring 33 is a little more than sufficient to keep the valve tight against working pressure, and very little weight applied to the lever is sufficient to operate the valve. Should the water pressure rise materially above the point at which the closet is supposed to operate, such increase in pressure would overcome the force of the spring and cause the valve to open, thus relieving what would otherwise become dangerous strain on the pressure tank, or reservoir.

The spring 33 is normally counter-balanced by the water pressure to approximately ninety per-cent of its force when the valve is at rest, and thus is very readily operated by the lever 37, but the instant the main valve is wide open, the spring exerts its full pressure of approximately one hundred per-cent, or ten times the force required to push the lever down, thus closing the valve and returning the lever to its normal position and preventing slow release by the operator.

In Fig. 4 is illustrated a slight modification of the invention, wherein the valve is provided with packing rings 40 to close against seats 15 and 16.

I claim:—

In a flushing or discharge valve, a valve casing having an inlet and an outlet port and provided with a pair of superposed tapered valve seats disposed upon opposite sides of the outlet port, said seats being formed along the lines of a cone, a cap removably mounted upon one end of the casing, a frusto-conical piston valve loosely mounted within the cas-

ing and disposed to simultaneously close against both seats, said valve having an annular groove therein disposed to register with the outlet port when the valve is seated, said valve having a port to permit leakage of water from the inlet to the casing above the piston to equalize pressure upon opposite faces of the piston to close said piston, there being a by-pass within the casing and extending from the upper portion thereof and opening into the outlet, a valve between said by-pass and the upper portion of the casing, a spring within the by-pass for holding said valve normally upon its seat, said valve being disposed to open into the by-pass when subjected to a predetermined pressure from within the upper portion of the casing to permit the escape of the contents of the upper portion of the casing into the outlet, means for adjusting the tension of said spring, and manually operated means for actuating the valve to open communication between the upper portion of the casing and the by-pass.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JAMES H. DELANY.

Witnesses:
H. J. KILLMEYER,
JOHN L. KINGHORN.