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O. J. FAIRCHILD.

AUTOMATIC FLUSHING VALVE.

(Application filed July 26, 1901.)

(No Model.)

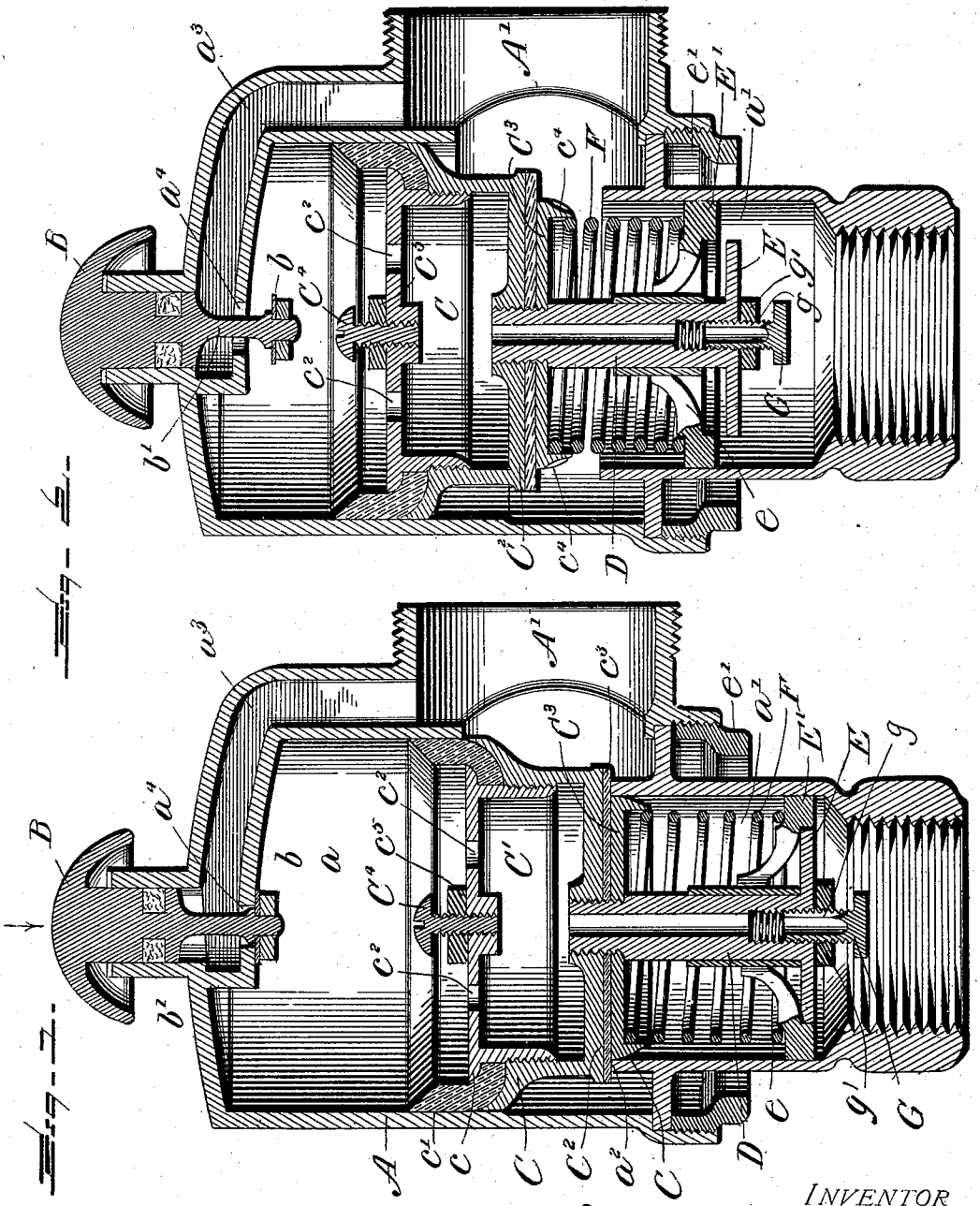


Fig. 1.

Fig. 2.

WITNESSES:

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OREN J. FAIRCHILD, OF CORRY, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO HORACE W. TIBBALS, OF JAMESTOWN, NEW YORK.

AUTOMATIC FLUSHING-VALVE.

SPECIFICATION forming part of Letters Patent No. 695,676, dated March 18, 1902.

Application filed July 26, 1901. Serial No. 69,845. (No model.)

To all whom it may concern:

Be it known that I, OREN J. FAIRCHILD, a citizen of the United States, residing at Corry, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Flushing-Valves; 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 is an improvement in automatic flush-valves; and it consists in the novel features hereinafter described, reference being had to the accompanying drawings, which illustrate one form of my invention, and said invention is fully disclosed in the following description and claims.

Referring to the drawings, Figure 1 represents a vertical sectional view of the valve, showing it closed. Fig. 2 is a similar view showing the valve open.

Referring to the drawings, A represents the main casing of the valve, which is provided, preferably, in its upper part with a cylinder a and in its lower part with a cylinder a', of less diameter than the cylinder a. The cylinder a' is for convenience made separately from the casing A and secured thereto. The upper end of cylinder a' forms the main-valve seat a^2, and its lower end is connected with the service-pipe or water-supply in any desired manner.

The casing A is provided with an outlet-aperture A′ and with a vent-passage a^3, communicating with the cylinder a by a small aperture a^4. This aperture a^4 is adapted to be closed by a trip-valve b on a valve-stem b', which extends to the outside of the casing A and is provided with a knob or finger-piece B, which may be depressed to open the valve b.

In the cylinder a is arranged a reciprocating piston C. This piston is shown as hollow and made in two parts C C′, adapted to screw together and having annular flanges c c, between which is clamped the packing-ring c'.

D represents a hollow stem, which is secured to the piston C and communicates with the interior thereof, and the upper part C′ of the piston is provided with one or more apertures c^2, forming a communication between the interior of the piston and the upper part of the cylinder a.

The main valve of the device is preferably formed by the bottom face C^2 of piston C, which is provided with a packing c^3, of rubber, leather, or other suitable material, to engage the valve-seat a^2 and close the top of the cylinder a', and said valve C^2 is also provided with a washer C^3, having an annular flange extending down into the top of cylinder a' and curved or beveled on its outer face, as shown, so as to shut off the flow of water gradually and prevent hammering. The outer face of the washer C^3 may also be notched, as shown at c^4, to render the cutting off of the water slow and gradual, if found desirable, as shown in the drawings in Fig. 2.

The lower end of the hollow valve-stem D is provided with a piston having a spring-actuated valve formed therein. I prefer to form this piston in two concentric parts, one of which is capable of yielding with respect to the other, and in this instance I have shown the piston formed of a central part E, formed integrally with the stem D, and an outer ring E′, provided with arms e, extending inwardly to a sleeve e', having a sliding engagement with the stem D.

F represents a coiled spring, one end of which bears down on the upper face of the ring E′, while the other end bears against the under face of washer C^3 or other part secured to the stem D.

I provide suitable means for regulating the admission of water through the hollow stem to the upper part of cylinder a, consisting in this instance of a hollow screw-plug G, screwed into the central aperture of said stem, having an aperture or slot g in one side communicating with the interior to permit the passage of water longitudinally therethrough and provided with a set-nut g'. By adjusting this plug farther in or out the flow through the stem to the cylinder a may be decreased or increased, as desired.

The trip-valve b and large piston C are so constructed that when the piston moves to its highest position it will automatically close

the trip-valve. In this instance the upper part C′ of the piston C is provided with an adjustable screw-plug C^4, held in its adjusted position by a set-nut c^5 and arranged in position to engage the stem b' of valve b and close said valve.

When the device is placed in position, the lower end of cylinder a' will be connected with a water-supply pipe capable of furnishing water under a given pressure, and the outlet A′ will be connected to the tank or closet which is to be flushed. In its normal position the trip-valve b is closed, and the upper cylinder a is filled with water which has passed up through the hollow stem D. When the parts are in the position shown in Fig. 1, the chamber a' is filled with water under the same pressure as is in the main supply-pipe. Consequently the movable ring E′ is practically a balanced valve and will remain seated upon the part E by the force exerted in the spiral spring F and gravity. Upon the opening of the relief-valve by pressing on the finger-piece B all pressure will be removed from the chamber above the main piston, when all of the parts, including the piston, the main valve, and the parts E and E′, will automatically rise together; but as soon as the main valve opens up a passage-way from the chamber a' to the discharge-pipe A′ all pressure will be removed from the ring E′, except that of the spiral spring and gravity, which is not sufficient to hold this ring on its seat against the pressure from the supply-pipe. It will consequently then rise to a position approximately shown in Fig. 2 of the drawings, when a free passage-way from the supply-pipe to the discharge-pipe will be obtained. After the relief-valve is closed pressure will begin to accumulate in the chamber above the main piston, when the valve will be forced thereby down upon its seat, the ring E′ remaining in its open position until the main valve has become seated, thus trapping all the water above the ring, equalizing the pressure on both sides of said ring, which will then fall to its seat by gravity, and the pressure of the spring F and the parts will then be in the position shown in Fig. 1.

It will be noted that both during the upward and downward movements of the pistons the spring F acts to insure a pressure of water sufficient to overcome the spring, for it is evident that should the pressure fall below that point the spring would tend to force down the ring E′ and close the aperture through which the water is flowing, which would increase the upward pressure of the water, while if the pressure tended to increase above that point the spring would yield and allow a greater opening for the water, resulting in a corresponding decrease in the water-pressure. Hence the spring acts to insure a uniform pressure of water to act first upward on the piston E E′ while the trip-valve b is open and then also downward on the larger piston C after the closing of the trip-valve. It will also be noticed that as the spring moves bodily with the pistons it does not act directly to move them in either direction.

What I claim, and desire to secure by Letters Patent, is—

1. The combination with the casing, provided with a main-valve seat, two cylinders of different diameters and a vent-aperture for the larger cylinder, of a movable valve for engaging said main-valve seat, a piston in each cylinder connected with said valve, the smaller piston being provided with a spring-valve, to allow the fluid to pass through said piston, means for admitting fluid from one side of the smaller piston to the opposite side of the larger piston, and a trip-valve for said vent-aperture, substantially as described.

2. The combination with the casing provided with a main-valve seat, two cylinders, of different diameters, and a vent-passage communicating with the larger cylinder, of a main valve for engaging said main-valve seat, a piston in each cylinder connected with said main valve, the smaller piston having a movable part to provide a passage for the fluid therethrough, a spring normally holding said movable part in closed position, means for admitting fluid from one side of the smaller piston to the opposite side of the larger piston, and a trip-valve for said vent-passage, having a part in the path of a part connected with the larger piston, for automatically closing said trip-valve, substantially as described.

3. The combination with the casing provided with a main-valve seat, two cylinders, of different diameters and a vent-passage communicating with the larger cylinder, of a piston in each of said cylinders, a hollow stem connecting said pistons and providing a passage for the fluid through both of said pistons, a regulating device for said passage, a main valve connected with said pistons and adapted to engage the main-valve seat, the smaller piston being provided with a movable part to permit the passage of fluid therethrough, a spring holding said movable part normally closed, and a trip-valve for said vent-passage, substantially as described.

4. The combination with the casing provided with a main-valve seat, two cylinders of different diameters and a vent-passage communicating with said larger cylinder, of a perforated piston in the larger cylinder, a perforated piston in the smaller cylinder, a hollow stem connecting said pistons, a movable ring forming part of said smaller piston, a spring normally holding said ring in closed position, a main-valve seat, provided with a part adapted to project into said seat and cut off the flow of fluid gradually before the valve engages the said seat, and a trip-valve for said vent-passage, substantially as described.

5. The combination with the casing provided with a main-valve seat, two cylinders of different diameters and a vent-passage communicating with said larger cylinder, of a per-

forated piston in the larger cylinder, a perforated piston in the smaller cylinder, a hollow stem connecting said pistons, a movable ring forming part of said smaller piston, a spring normally holding said ring in closed position, a main-valve seat provided with an annular part having an outer beveled face, adapted to project into said seat and cut off the flow of fluid gradually before the valve engages said seat, and a trip-valve for said vent-passage, substantially as described.

6. The combination with the casing provided with a main-valve seat, two cylinders of different diameters and a vent-passage communicating with said larger cylinder, of a perforated piston in the larger cylinder, a perforated piston in the smaller cylinder, a hollow stem connecting said pistons, a movable ring forming part of said smaller piston, a spring normally holding said ring in closed position, a main valve adapted to engage the main-valve seat provided with an annular part having an outer beveled face provided with notches adapted to project through the said seat and gradually cut off the flow of fluid, a trip-valve for said vent-passage, and an adjustable part on said larger cylinder for engaging and automatically closing said trip-valve, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

OREN J. FAIRCHILD.

Witnesses:
SCOTT C. LOWE,
C. L. SHAVER.