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F. A. SCHOSSOW.

AUTOMATIC FLUSHING VALVE.

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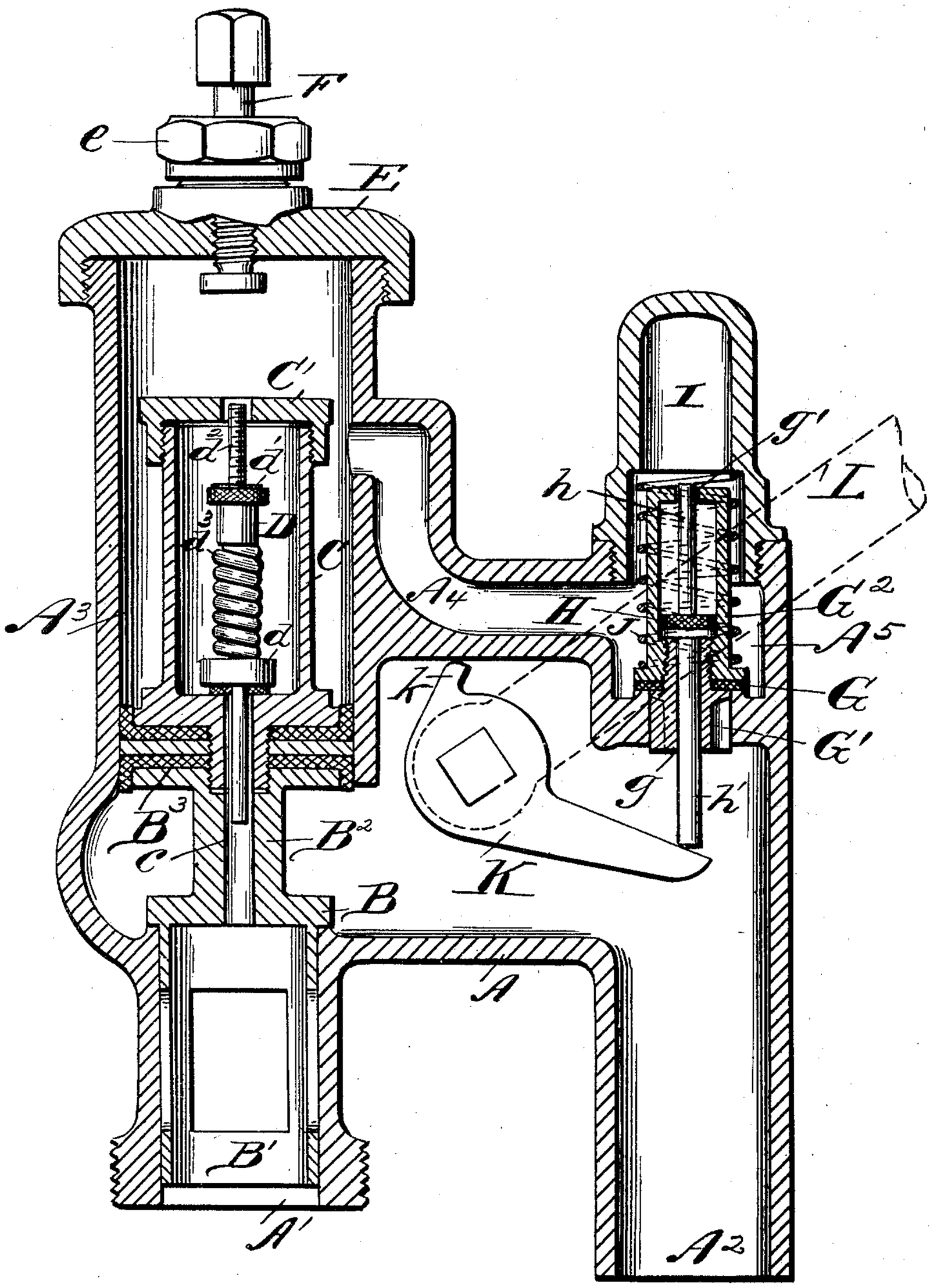
NO MODEL.



WITNESSES

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UNITED STATES PATENT OFFICE.

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AUTOMATIC FLUSHING-VALVE.

SPECIFICATION forming part of Letters Patent No. 756,291, dated April 5, 1904.

Application filed August 31, 1903. Serial No. 171,337. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK A. SCHOSSOW, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Automatic Flushing-Valves; and I 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 pertains to make and use the same, reference being had to the accompanying drawing, which forms a part of this specification.

My invention relates to an improvement in automatic flushing-valves for water-closets, shown in the accompanying drawings and more particularly set forth in the following specification and claims.

The drawing is a central vertical sectional view of the valve, showing it closed against the passage of water from the main.

One feature of my invention is the automatic means employed for regulating the volume of water admitted to the bowl after the valve is opened which controls the admission of water for flushing the bowl.

Another feature is the means for regulating the same.

Another feature is the valve employed to temporarily release the pressure of the water back of the main valve. The construction of this valve is such that even though the lever employed to operate it may be held open the valve will close automatically. Other improvements will hereinafter appear.

Referring to the letters of reference shown in the drawing, A is the valve-body, A′ is the water-inlet from the main, and A^2 the discharge-opening.

B is the valve controlling the admission of water from the main, provided with an annular perforated sleeve B′. Rising from the valve B and preferably integral therewith is the hollow stem B^2, to which is engaged the piston B^3, provided with suitable packing and traveling within the cylindrical portion A^3 of the valve-casing. Mounted on the piston is the chamber C, provided with a cap C′, having a screw-threaded engagement therewith.

c is a passage through the piston B^3 and valve B and opening into the chamber C.

D is a duplex weighted valve, the lower valve *d* (which may be cone-shaped, if desired) closing the passage *c* through the piston, the upper valve *d′* closing the orifice through the cap *c′*. The valve *d′* has a screw-threaded engagement with the stem d^2 for the purpose of regulating the travel of the valve. Coiled around the valve-stem between the valves is a leaded weight d^3. Lead or other washers may be added or substituted, if desired, or a spring used either in conjunction with or separately from the weights.

E is a cap closing the upper end of the cylindrical portion A^3.

F is a regulating-screw projecting through the cap E, controlling the travel of the main valve B and its connecting parts.

e is a stuffing-box on the cap E to insure water-tight connection with the regulating-screw F.

A^4 is a by-pass leading from the cylindrical portion A^3 to the chamber A^5, in which is located the valve G, controlling the discharge of water from the back of or above the piston B^3.

G′ is a winged guide traveling in the orifice through the valve-seat and provided with a central opening *g*.

G^2 is a cylindrical chamber rising from the valve G proper, preferably integral therewith, and having at the top an orifice *g′*.

H is a piston housed within the chamber G^2 and provided with projecting stems *h h′*, pointing in opposite directions.

I is a cap having a screw-threaded engagement with the valve-body A and mounted directly above the valve G and into which the chamber G^2 projects.

J is a spring to hold the valve G closed normally.

K is a rocking arm pivoted in the valve-body, its forward end bearing against the end of the stem *h′*.

k is a back-stop on the rocking arm K to limit its movement when brought into contact with the wall of the valve-body.

L is an operating-lever, shown in dotted lines, for actuating the rocking arm K.

The operation of the invention will now be described. The valve B is normally held to

its seat against the water-pressure in the main by the water in the chamber A^3 above the piston, the cylinder being larger in diameter than the water-inlet. The water above the piston also fills the by-pass A^4, chamber A^5, and the chamber G^2 of the valve G. To flush the closet, the lever L is operated, which causes the arm K to lift the stem h' with its piston, the chamber G^2 being filled with water, the pressure of the arm K on the end of the stem h' lifting the valve G from its seat, owing to the chamber being filled with water, as before explained, thereby permitting the water back of the piston B^3 to pass out by the by-pass A^4 and discharge-orifice A^2. By opening the valve G the water-pressure back of the piston B^3 holding the main valve to its seat is released. The water-pressure from the supply then acts upon the main valve B^2 and forces it up until the cap C′ strikes the regulating-screw F, the orifices in the cylindrical portion B′ rising above the wall forming the passage to the discharge-opening A^2, when the water passes out through the opening A^2 to flush the closet.

I will now explain the action that takes place when the water-pressure back of the piston B^3 is relieved by the raising of the valve G. The moment the pressure is relieved back of the piston the water-pressure forces the weighted valves D upward, the valve d' closing the orifice through the cap C′, the end of the stem d^2 projecting above the cap. While this movement is taking place the piston B^3, with the chamber C, is also moving upward more slowly than the valves D, the speed gradually diminishing as the orifices in the cylindrical portion B′ rise above the wall of the body forming the passage to the discharge-opening, which reduces the pressure against the under side of the valve B. As the chamber C travels upward the valve-stem comes in contact with the regulating-screw F, which is adjusted to meet varying requirements. This forces the valve d downward to its seat, closing the orifice c. Now if the operating-lever L has been released the valve G will immediately close, due to the action of the spring J; but if it is held or propped open by an inexperienced person or by malicious intent the valve G will gradually come to its seat as the water in the chamber G^2 passes out through the orifice g', due to the action of the spring J forcing the valve G down the stem h' to the valve-seat, the action in this case being a trifle slower. In either event as soon as the releasing-valve closes the pressure of water is exerted against the piston H, which forces it to limit of its movement, unless the handle is held or otherwise detained from assuming its natural position.

In the event of the water being expelled from the chamber G^2 on account of the operator not releasing the handle L previous to the release-valve G reaching its seat no further manipulation of the handle can prolong the main flush, as this in passing to the bowl forms a back pressure, which in conjunction with the friction of the piston H against the sides of the chamber retains the piston H in an elevated position until the cessation of the main flush, and therefore pressure is exerted on the piston H upon the upper face only. It will be readily understood that the rocking arm K having forced the valve from its seat, due to the action of the piston working against the pressure of the water in the chamber G^2, the handle L will not again become operative until the valve G has reached its seat and the pressure of the water from above forced the piston down to its initial position, as shown in the drawing.

As the winged guide G′ is not permitted by reason of its length to come in contact with the rocking arm K, it will readily be seen that continued manipulation of the handle L does not affect the closing of the valve G or the main valve B; nor can the flow of water by means of manipulating the handle in any manner be made constant.

The main valve B is preferably permitted to travel upward to a point where the passage of water through the perforations in the sleeve B′ is slightly retarded, or it may be permitted to rise fully by regulating the set-screw F. As soon as the release-valve G has reached its seat the water-pressure tends to close the main valve B; but the first portion of this descent is made comparatively slow, because the pressure is at the minimum point and the weights allow the water to pass the valve d but very slowly. When the valve B has descended to a certain predetermined distance, preferably about one-fifth of its entire travel, the pressure of the water becomes sufficient to unseat the valve d, allowing the water to pass it freely, and this action causes the stem d^2 to strike the regulating-screw F. The valves d and d' are at this point, therefore, inoperative and open. The water now having free access to the back of the piston B^3 causes same to descend rapidly and also continues to force the valve-stem d^2 upward against the regulating-screw F, and this rapid descent continues until the valve d' arrives at the orifice through the cap C′, when the main valve B is found to have arrived at a point where the ports in the sleeve B′ are closed, and almost the entire pressure is directed toward closing the valve B, as the amount of water now flowing into the bowl is diminished to that which passes between that portion of the sleeve B′ above the ports and the valve-body A, as the sleeve is preferably of a diameter that will render the water thus passing of insufficient quantity to produce or maintain a siphon in the bowl under any circumstances. The pressure having forced the valve d' to its seat, as described, the water filters slowly by said valve and the main valve continues to descend until it finally

seats, when the pressure becomes equalized on the upper side of the piston B^3 with that of the supply, when the valve D drops to the initial position shown in the drawing. The amount of time that is allowed to elapse between the termination of the main flush and the arrival of the valve d' at its seat determines the quantity of water that will compose the "refill," and this may be varied by adjusting the valve d' at the desired altitude on the valve-stem d^2.

The quantity of water constituting the main flush may be varied either by varying the weight d^3 or by varying the relative altitude of the regulating-screw F, thereby varying the amount of pressure retained as a counterbalance to the weights.

Considerable difficulty has heretofore resulted in the practical use of these valves by reason of the fact that in their construction the relative amount of initial flush and refill has been fixed and invariable, and as the amount of water indispensable to constitute a seal against sewer-gases varies greatly in different constructions of bowls it has been found necessary to use more water than is necessary to flush the bowl in order to obtain sufficient refill in many cases. Similarly in those valves where the water is gradually diminished the supply may be sufficient while the valve is full open, but the flow may be insufficient to produce a continuous siphon, and a series of siphonings result, the final one sometimes carrying with it the water intended to be used as a seal.

In my construction the initial closing of the valve is so slow as not to materially affect the water passing the ports, and the subsequent stoppage of the main flush is sufficiently rapid to immediately break the siphon in the bowl under any pressure of water, while the refill obtainable is in excess of that required to fill any standard form of bowl.

Either the main flush or the subsequent refill may be varied without affecting the other, making the adjustment of the valve a simple matter.

It is well known that a feature that has obtained as a very serious hindrance to the successful use of these valves is the fact that foreign particles have operated to destroy the functions of the regulating mechanism, causing the valve in many cases to remain open on being operated, thereby wasting the water and destroying the function of the valve entirely. In my construction this feature is obliterated, because any foreign particles that may enter the passage *c* are either prevented from passing upward by the stem within the passage or if the particles sufficiently minute arrive at the valve d' they are washed away when the valve rises and readily pass out at the orifice in the cap C', as said orifice is made of a diameter to have a larger space between the stem and walls of the orifice than the lower valve-stem.

As the valves *d* and d' are opened and closed twice during each operation of the main valve, it will readily be seen that these operations serve the purpose of rendering them practically self-cleansing.

What I claim is—

1. In a flushing-valve, a water-chamber, a piston-valve controlling the source of supply provided with a channel for the passage of water through the piston-valve into the water-chamber, automatically-operated valves controlling said channel alternately governing the flush and refill, and a suitable manually-operated releasing-valve to liberate the water from above the piston, substantially as described.

2. In a flushing-valve, a valve controlling the source of supply, a water-chamber, a piston connected with the valve controlling the source of supply and traveling in the water-chamber, a chamber mounted on the piston and reciprocating therewith, a channel for the passage of water through the valve and piston into the chamber reciprocating with the piston and through it into the water-chamber in which it travels, automatically-operated valves located within the reciprocating chamber controlling the passage of water through the same and a suitable manually-operated releasing-valve to liberate the water from above the piston, substantially as described.

3. In a flushing-valve, a valve controlling the source of supply, a water-chamber, a piston traveling in said water-chamber and connected with the valve controlling the source of supply, a chamber reciprocating with the piston and connected thereto by a channel leading through the valve and piston into and through the reciprocating chamber, valves located within the reciprocating chamber to control the passage of water through the same, said valves provided with a stem capable of projecting outside of the reciprocating chamber, and means for operating said valves by the stem coming in contact with the same as the chamber reciprocates, substantially as described.

4. In a flushing-valve, a water-chamber, a piston traveling within the water-chamber connected with a valve controlling the source of supply, a chamber reciprocating with the piston and connected thereto by a channel leading through the valve and piston into and through the reciprocating chamber, valves governing the passage of water into and through said chamber, a projecting valve-stem by which one of said valves is forced off and the other to its seat as the chamber in reciprocating brings the stem in contact with the means for tripping the same, and the adjustable means for controlling and tripping the valves, substantially as described.

5. In a flushing-valve, a water-chamber, a piston traveling in said chamber connected with a valve controlling the source of supply, a chamber reciprocating with the piston and connected therewith, a channel leading through the valve and piston and into and through said reciprocating chamber, weighted valves governing the passage of water into and through said chamber, a projecting valve-stem for controlling said valves by means outside of but acting in conjunction with the reciprocating chamber, one of said valves being adjustable on said stem, and a stop to operate said valve-stem when the stem is brought in contact with the same by the reciprocation of the chamber, substantially as described.

6. In a flushing-valve, a water-chamber, a piston traveling in said chamber connected with a valve controlling the source of supply, a chamber reciprocating with the piston and connected therewith, a channel leading through the valve and piston and into and through said reciprocating chamber, weighted valves governing the passage of water into and through said chamber, a projecting valve-stem for controlling the valves by means outside of but acting in conjunction with the reciprocating chamber, one of said valves being adjustable on said stem, and an adjustable stop to operate said valve-stem when the stem is brought in contact with the same by the reciprocation of the chamber, substantially as described.

7. In a flushing-valve, a release-valve provided with a water-chamber, a piston located within said chamber and means for lifting the piston whereby the release-valve may be operated, substantially as described.

8. In a flushing-valve, a water-chamber, a piston-valve controlling the source of supply, a release-valve provided with a water-chamber, a piston located within said chamber having a projecting stem, and means for engaging said stem to operate the valve, substantially as described.

9. In a flushing-valve, a water-chamber, a piston traveling in said water-chamber governing the valve controlling the source of supply, a releasing-valve controlling the discharge of water from the water-chamber, a water-chamber connected therewith, a piston located within said water-chamber and provided with stems projecting down through the valve and up through the water-chamber, means to force the releasing-valve to its seat, and means for lifting the piston-rod and the releasing-valve controlled thereby, substantially as described.

10. In a flushing-valve, a water-chamber, a piston traveling in said water-chamber governing the valve controlling the source of supply, an automatic-closing releasing-valve governing the discharge of water from the water-chamber, a by-pass leading from the water-chamber to the releasing-valve, a water-chamber mounted on the releasing-valve, a piston located within said chamber having a stem projecting down and out through the valve, means for regulating the passage of water into and from said chamber, means for forcing the valve to its seat, and means for lifting the valve-stem whereby the releasing-valve is operated, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

FREDERICK A. SCHOSSOW.

Witnesses:

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CHAS. TIMM.