

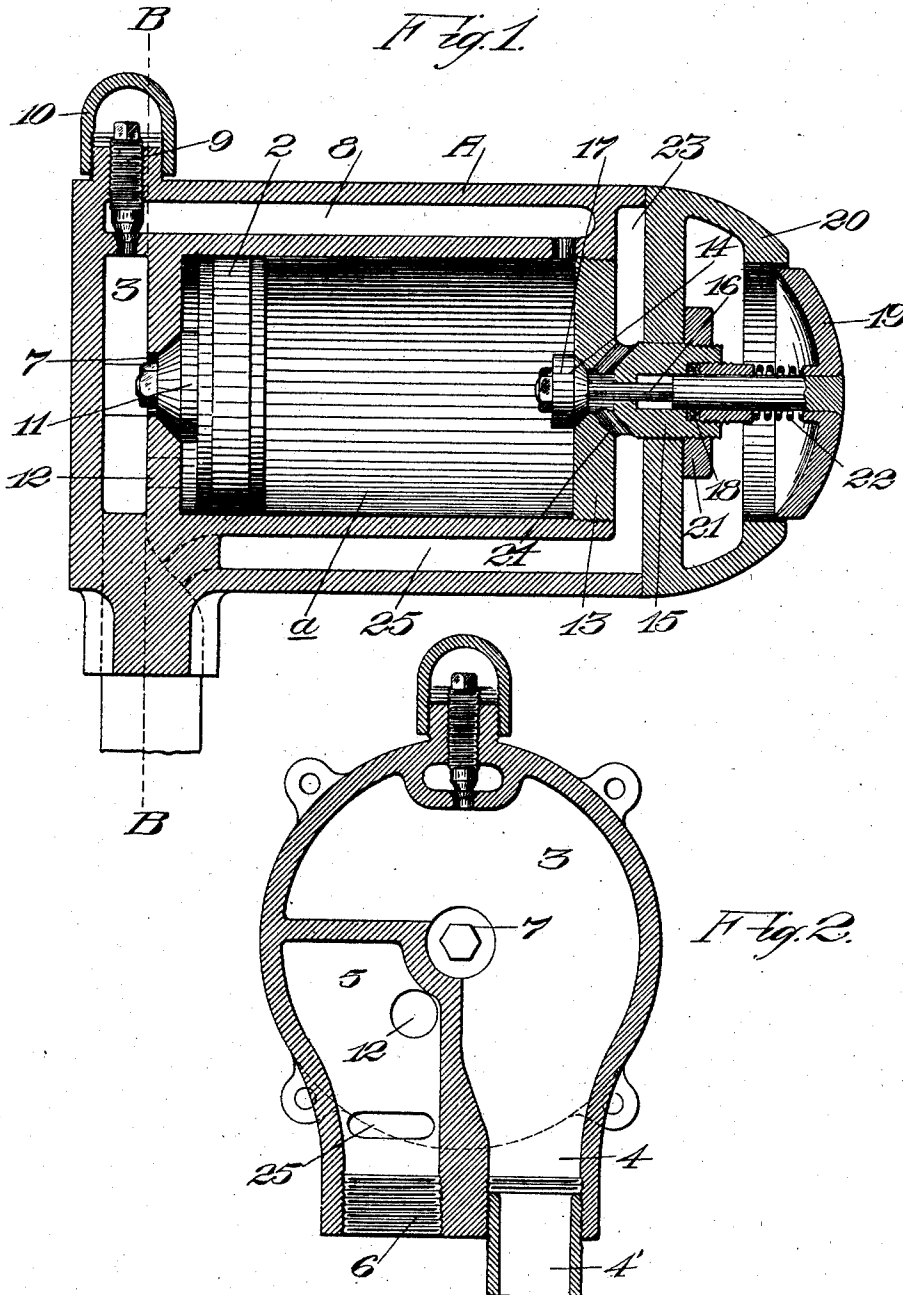
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J. B. WILLIAMS & P. W. LANDELL.

AUTOMATIC FLUSH VALVE.

APPLICATION FILED DEC. 19, 1905.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC FLUSH-VALVE.

No. 868,619.

Specification of Letters Patent.

Patented Oct. 15, 1907.

Application filed December 19, 1905. Serial No. 292,423.

To all whom it may concern:

Be it known that we, JOHN B. WILLIAMS and PETER W. LANDELL, citizens of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Automatic Flush-Valves, of which the following is a specification.

Our invention relates to devices for automatically controlling the periodic flow of pre-determined quantities of liquid under an approximately uniform pressure.

Our especial object is to provide a compact, neat-appearing, simple, practical flush valve for toilets and the like.

It consists of the parts and the construction and combination of parts, as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a longitudinal section of our invention. Fig. 2 is a section of same on line B—B of Fig. 1.

A represents a cylindrical casing having a piston chamber *a* in which the rodless piston 2 is intermittently moved through the medium of the differences in fluid pressure created on its two sides.

The casing has a passage-way 3 at one end communicating through the inlet 4 with any suitable source of fluid pressure supply, as for example the regular water main 4'.

A second passage-way 5 is provided at the same end of the casing, and this has an outlet 6 leading to any desired point of discharge.

The passage-way 3 communicates with one end of the piston chamber through the central port 7 and with the opposite end of the same chamber through the port 8 in the sides of the casing.

The flow of liquid through port 8 may be adjustably controlled by suitable means as the screw plug 9, which latter is normally protected against being tampered with by the screw cap 10.

Each end of the chamber *a* has a separate outlet, just as it has a separate inlet: The inlet 7 is valved and the outlet at the other end of the chamber is valved, and the closing of these valves is effected alternately by the piston 2. The valve for inlet 7 is carried by the piston and is represented at 11. It is of suitable construction and is adapted to seat snug over the port 7 when the piston has moved its limit in that direction. The outlet from that end of the chamber *a* is through the port 12 directly into the passage-way 5.

The opposite end of the casing A is screw-threaded internally to receive a plug 13 which is ported as at 14 to provide an outlet from that end of chamber *a*. This plug has a central outwardly-extending threaded-projection 15, through which a valve stem 16 is reciprocal.

The inner end of this valve stem carries a valve 17 projecting into chamber *a* and operable to open and close the eduction port 14. Suitable packing 18 may be provided to prevent leak from chamber *a* around the valve stem.

The outer end of the valve stem carries a push button 19 which is operable in the guard plate or washer 20 which latter is adapted to slip on over the projection 15 of plug 13 and to abut against the end of the casing *a* and to be held in place by the nut 21; suitable packing being interposed to prevent leak. If found necessary a light spring 22 may be employed to aid in overcoming the friction of the packing around the valve stem and insure the seating of valve 17 in the proper fashion. This spring however, is not essential.

Passage-way 23 is formed between the guard-plate or washer 20 and the plug. This passage-way is open to the port 14 through the lateral ports 24 in the plug and communicates with the outlet chamber 5 through the port 25 in the side of the casing.

In operation with the parts assembled, the device is secured to the wall by any suitable means and connected through inlet 4 with any appropriate source of fluid pressure supply, as the main 4'. The outlet port 6 is suitably connected with the receptacle to be filled or flushed.

Normally with the device in inoperative position the parts will be in the position shown in Fig. 1 with the valve 11 seating over the induction port 7 and with the valve 17 closing the eduction port 14. With the regulating valve 9 suitably opened, a constant fluid pressure from the inlet 4 is maintained through the induction port 8 in chamber *a* on the front end of the piston 2.

Pushing in on the button 19 opens the valve 17 and allows the water in the front end of the chamber *a* to pass freely outward through the eduction passages 14—24—23 & 25 to the discharge 6. The port 8 being much larger than the outlet passages 14, etc., the pressure on the front end of the piston is almost instantly released, and the water entering through the port 7 quickly pushes the piston across the chamber and up against the valve 17 to close it.

The several ports are so proportioned relatively, that the discharge from the front of the chamber will take place in the manner described, to close the valve 17; whereupon the piston 2 will gradually be moved again toward the back of the chamber through the differences in the fluid pressure on the two sides of the piston.

With the eduction valve 17 closed, the fluid pressure is exerted on that side of piston 2, and since the eduction port 12 at the opposite end of the cylinder is always open there is created such a difference in pressures at the two ends of the chamber, as to cause the piston 2 to move to the back of the chamber and close the valve

over the induction port 7. The valves 11 and 17 are of suitable material and design and are adapted so as to fit upon their seats when closed that no leak will take place through them.

5 The time that it takes for the piston to move back to close port 7 corresponds to the amount of water that will periodically flow for flushing, or other purposes. The purpose of the regulating valve 9 is to control this return movement of the piston 2 by allowing a greater
10 or less quantity of water to pass through port 8. With a uniform fluid pressure through inlet 4, it is possible to so regulate the valve 9 as to cause the piston to take a half minute, or five minutes, more or less, to make its return traverse; meanwhile, so long as port 7 is uncovered,
15 water is passing out through port 12 and into passage 5 and outlet 6. Whenever the valve 11 closes over port 7 and with the valve 17 closed, the operation of the device ceases.

It will thus be seen that the device is self-acting,
20 other than it simply needs to be started by manually operating the eduction valve 17 to open it.

This apparatus may be used not only for flushing toilets and the like, but owing to its construction and the principle upon which it works it can be adapted for
25 a variety of uses wherever it is desired to periodically measure out pre-determined quantities of liquid maintained under a fixed head. Thus in filling barrels the regulating valve 9 may be so adjusted that with a uniform pressure maintained at the source of fluid supply, a certain amount of liquid will flow through the
30 ports 7—12—5 & 6, while the piston 2 is returning to the back of the chamber after closing valve 17. The moment that the piston has moved the limit of its stroke toward the rear to cause the valve 11 to close port 7,
35 further discharge ceases.

This apparatus is simple in its construction and mode of operation, and has no mechanisms to get out of order, since everything is incased and does not depend on springs for its action. At the same time, in case of need-
40 ed repair or inspection, the interior of the device is easily gotten at.

The device is also neat in appearance and can be attached to any fixed support within convenient reach of the operator. It takes but very little room and can
45 be connected direct with the source of water supply.

It is possible that various modifications in our invention may be made without departing from the principle thereof, and we do not wish to be understood as limiting ourselves to our specific construction beyond what
50 is required by a reasonable interpretation of our claims.

Having thus described our invention, what we claim and desire to secure by Letters Patent, is—

1. A flush valve comprising outer and inner concentric cylinders separated by an annular water space, a piston
55 in the inner cylinder, said cylinders connected at one end,

at which end there are two water compartments, one an inlet compartment and the other a discharge compartment, said compartments separated from the interior of the piston cylinder by a partition, said partition having two
60 ports, one connecting the adjacent end of the piston chamber with the discharge compartment and the other connecting the same end of the piston chamber with the inlet compartment, said piston having a valve to close the last named port, the opposite end of the piston chamber having an outlet port connected with said discharge chamber, a
65 normally closed valve for said last named outlet port, and means to operate said valve.

2. A flush valve comprising outer and inner concentric cylinders separated by an annular water space, a piston in the inner cylinder, said cylinders connected at one end,
70 at which end there are two water compartments, one an inlet compartment and the other a discharge compartment, said compartments separated from the interior of the piston cylinder by a partition, said partition having two
75 ports, one connecting the adjacent end of the piston chamber with the discharge compartment and the other connecting the same end of the piston chamber with the inlet compartment, said piston having a valve to close the last named port, the opposite end of the piston chamber having
80 an outlet port connected with said discharge chamber, a normally closed valve for said last named outlet port, means to operate said valve, a by-pass connecting said inlet compartment with the end of the piston chamber adjacent to said normally closed valve, and a regulating valve in
85 said by-pass operating to close in a direction contrary to the flow of the water through the by-pass whereby the tendency of the current through the by-pass is to cleanse the valve seat and prevent clogging.

3. A flush valve comprising outer and inner cylinders connected at one end to inclose separate inlet and discharge
90 compartments, said cylinders separated by a water space having communication with said discharge compartment, a piston in the inner cylinder, said compartment separated from the space at the adjacent end of the piston cylinder by a partition, said partition having a port opening into
95 each compartment, a valve on the piston to close one of said ports, a screw plug fitting the opposite end of the piston cylinder, open fluid connections between said end of the piston cylinder and said inlet compartment, said plug having a central reduced extension, a guard plate fitting said
100 extension and removably held thereto, ports in said plug opening into the piston chamber, and a valve controlling flow through said ports.

4. A flush valve comprising a piston chamber having an inlet and outlet port at one end, a piston in the chamber
105 having a valve arranged to seat on said inlet port, the opposite end of said chamber closed by a screw plug, a by-pass connecting the space in said chamber between the piston and said plug with the source of fluid pressure supply, said screw plug having a reduced central extension,
110 said plug having ports providing an outlet for said chamber, a valve closing said ports and closable by said piston, said valve having a stem slidable in said central extension on the plug, a push button for operating the valve, and a guard for said push button, said guard removably held on
115 said central extension and inclosing a drip compartment.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

JOHN B. WILLIAMS.
PETER W. LANDELL.

Witnesses:

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C. C. ELSASSER.