

E. J. BLOOM.
 FLUSH VALVE.
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1,046,548.

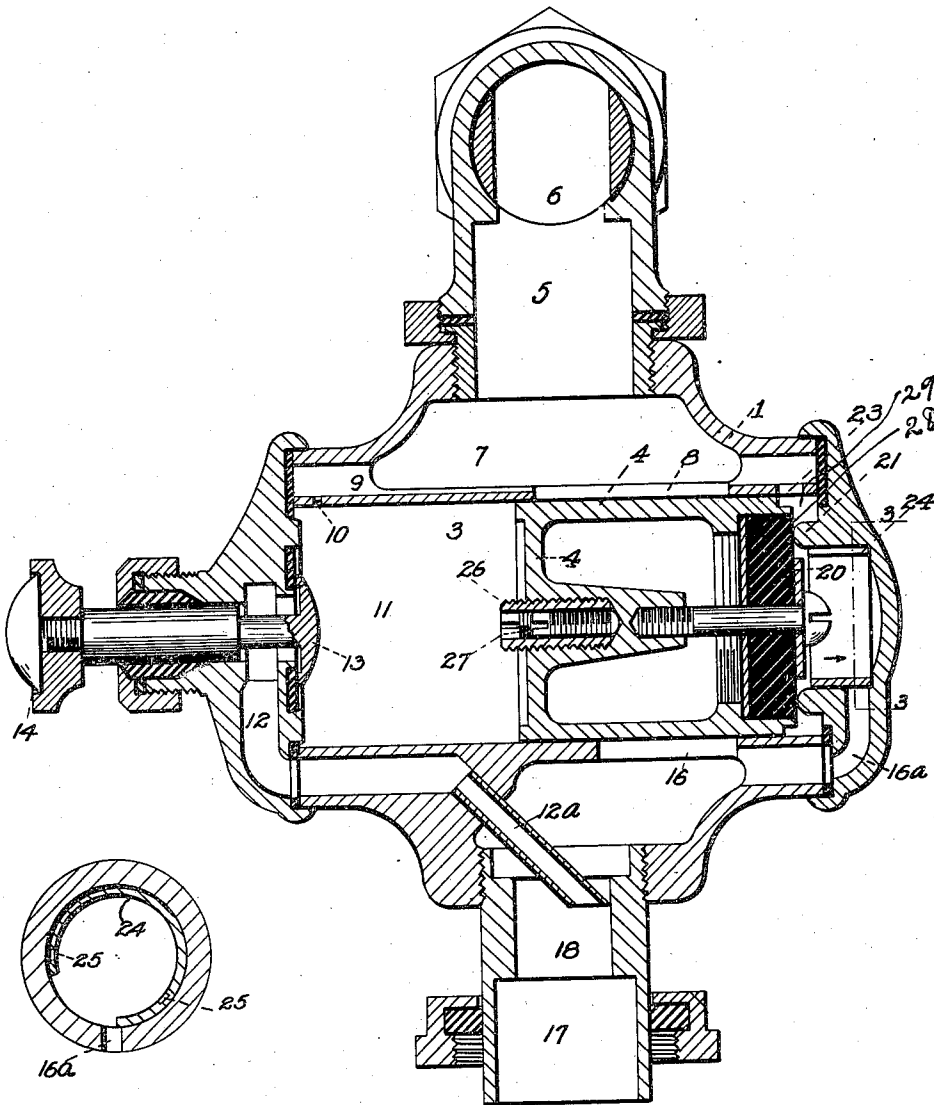


Fig. 3.

Fig. 1.

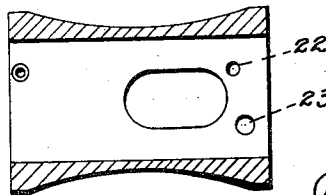


Fig. 2.

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FLUSH-VALVE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDGAR J. BLOOM, a citizen of the United States, residing at Tiffin, county of Seneca, State of Ohio, have
5 invented a certain new and useful Improvement in Flush-Valves, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to
10 make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to flush valves.

It has for its object an improved valve
15 which opens automatically and closes automatically after the actuation of a pilot valve which is actuated manually.

In the drawings:—Figure 1, is a vertical cross section. Fig. 2, is a horizontal cross
20 section on a reduced scale. Fig. 3, is a cross section showing the adjusted ring 24 of Fig. 1.

1 indicates a case which contains a cylinder 3 in which reciprocates a piston 4. The
25 water is introduced into the case through a passage 5 controlled by a manually actuated valve 6. The water enters the chamber 7 from which it may pass through passage 8 directly into the piston chamber or through
30 passage 9 and a small passage 10 directly into the piston chamber in the end opposite to that into which the water enters when entering through the passage 8. The passage
35 10 through the walls of the cylinder is quite small and is enlarged on the inside or toward the piston chamber, and the small end of the passage is directed toward the passage 9. The water entering the part 11 of the piston chamber is allowed to escape
40 therefrom through passage 12 which is controlled by a valve 13 actuated by the push button 14. The water entering the opposite end of the piston chamber escapes through the passage 16 into the final discharge conduit 17 through a constricted port 18. The
45 passage 16 is smaller than the passage 8, and the passage 18 is smaller than the passage 16, the reduction or choking of the passage on this side being for the purpose of
50 producing a constant opening pressure of the water against the piston when water is passing through the ports 8, 16 and 18.

The piston 4 which reciprocates in the cylinder 3 is provided at one end with a compression packing 20 that engages against the
55 seat ring 21, and completely prevents water

passing the ports 16 and 16^a, the latter of which will be referred to later. The compression packing 20 is smaller in diameter than the piston 4 and there is a zone 28 exposed to water in an annular chamber 29; this pressure overbalances the pressure of the water in chamber 11 when the valve 13 is open but is not equal to the pressure in chamber 11 when the valve 13 is closed. On
60 the entrance side to the cylinder there are in addition to the ports 8 and 10 already described, two other ports 22 and 23 of which 23 is seen in Fig. 1. The ports 22 and 23 are so arranged with respect to the port 8
70 that the piston 4 in closing does not entirely shut off the water entering the piston chamber until the compression face 20 is finally seated against the seat 21, but the quantity of water entering at the last part of the stroke of the piston is much reduced as compared with that which enters and passes through when the piston is thrown over toward the
75 valve 13, and this water is prevented by the piston from escaping through the port 16 and is only able to escape through the port 16^a. The entrance to said passage 16^a is regulated by a ring 24 that can be adjusted in its bearings to close, partially close, or leave entirely open the entrance to the passage 16^a. The ring is loose, held in position by friction only and is shifted by a spanner wrench which engages into holes 25. On the opposite end of the piston 4 is a threaded hole in which is inserted a hollow screw 26
80 within which a second screw 27 engages, the latter screw serving as a lock screw for the former, and the screw 26 adjusts the relative throw of the piston 4 with reference to the valve 13; when the valve 13 is pushed in
85 manually, the parts being in the position shown in Fig. 1, the water escapes through the passage 12 and the out-flow 12^a thereof into the final discharge conduit 18 or its continuation 17, the piston now acted upon
90 by the water which enters through passage 23 begins to travel toward the valve 13 and continues to travel in that direction until the end of the screw 26 engages the valve 13, pushes the valve 13 to its seat, closes the
95 outlet from the chamber 11, at which time the ports 8 and 16 are open to the fullest extent allowed them with the adjustment given. The water from the main now delivers rapidly through the flushing structure
100 and continues to deliver rapidly until the piston closes the ports 8 and 16 which occurs

as soon as the water entering the chamber 11 through the small passage 10 has actuated the piston to close the ports 8 and 16 and accumulated therein because valve 13 is closed. The heavy flush of water continues until the ports 8 and 16 close, after which there continues a lighter flow of water entering through ports 22 and 23 passing out through passage 16^a. This is utilized as a refill and the amount of it may be adjusted by the ring 24. The port 8 is larger than the port 16 and the port 16 is larger than the passage 18 so that during the period of heavy flushing there is a back pressure in the piston chamber tending to fully open the ports 8 and 16; by fully opening, is meant pushing the piston over as far as it can go toward the valve 13.

The terminal 12^a to the passage 12 is led down into the reduced passage 18 constituting the final outlet to provide against possible action of water from the passage 16^a or 16 from backing into the passage 12 and preventing the proper closing of the valve 13 on its seat. Preferably, the ports 8 and 16 are oval in construction with the long axis of the oval parallel with the axis of the cylinder.

What I claim is:—

1. A flush valve, having in combination, a cylinder through which there is a main water passage, a single-head piston adapted to reciprocate in the cylinder and to control said main water passage, water passages for furnishing water under pressure through the respective end portions of the cylinder to drive said piston both ways in the cylinder, thereby opening and closing the main water passage, the pressure areas being arranged so that the piston normally closes the main water passage, a drainage passage for relieving the pressure at one end of the cylinder to allow movement of the piston for the purpose of opening the main water passage, a push valve controlling said drainage passage and closing upon its seat by the piston contacting it and arranged normally to be kept closed, substantially as described.

2. A flush valve, having in combination, a horizontally disposed cylinder through which there is a main water passage, a piston adapted to reciprocate in the cylinder and adapted to control said main water passage, water passages opening into each end portion of the cylinder and adapted to furnish water under pressure to drive said piston both ways in the cylinder to open and close the main water passage, the pressure areas being arranged so that the piston normally closes the main water passage, a drainage passage leading out of one end of the cylinder for relieving the pressure of the cylinder at that end, to allow movement of the piston for the purpose of opening the main water passage, a horizontally disposed

push valve controlling said drainage passage and closing upon its seat by the piston contacting it and kept closed by reason of the horizontal disposition of the cylinder and valve, substantially as described.

3. A flush valve, having in combination, a cylinder having a main water passage directly across the cylinder, a single-head piston adapted to control said main water passage and adapted to reciprocate thereacross but not interfere with the water flow through the main passage when it is in position to open such passage, a water passage for furnishing a water pressure that normally holds the piston in closed relation with the main water passage, means for temporarily relieving said pressure and a second water passage for furnishing a water pressure that moves the piston and opens the main water passage, when the first mentioned pressure is relieved, the uninterrupted main water passage across the piston travel serving to resist the return or closing stroke of the piston, substantially as described.

4. A flush valve, having in combination, a cylinder through which there is a main passage, a single-head piston adapted to reciprocate in the cylinder and to control said main water passage withdrawing, in the opening operation, so that the entire piston is substantially out of the path of the main water passage, water passages for furnishing water pressure to drive said piston both ways in the cylinder to open and close the main water passage, the pressure areas being so arranged that the piston normally closes the main water passage, and means for temporarily relieving the pressure at one end of the cylinder to allow the piston to enter upon the opening stroke, the said uninterrupted stream of water through the main water passage and across the end of the piston acting to resist the return of the single-head piston so as to allow a period of opening in the main water passage commensurate with the pressure and hence to equalize in the case of variant pressures the amount of water allowed to pass through the main passage, substantially as described.

5. A flush valve, having in combination a cylinder having a main water passage directly across the cylinder, a piston adapted to control the main water passage and adapted to reciprocate thereacross, a water passage for furnishing a water pressure that normally holds the piston in closed relation with the main water passage, a drainage passage for relieving said pressure, a push valve closed upon its seat by the piston on its opening stroke, the said main water passage being constricted in its outlet from the cylinder so as to choke the water in the cylinder and thereby secure quick closing of the push valve by utilizing the pressure of the water in the main water passage to finish

the opening stroke of the piston and a water passage for furnishing water pressure to start the piston on its opening stroke, substantially as described.

5 6. A flush valve, having in combination, a cylinder having a main water passage directly across the cylinder, a piston adapted to control the main water passage and reciprocate thereacross, a water passage for furnishing a water pressure that normally holds the piston in closed relation with the main passage, a drainage passage for relieving said pressure, a push valve closed upon its seat by the piston on its opening stroke, the said water passage leading from the cylinder being contracted for the purpose of choking the water passing across said cylinder, substantially as described.

10 7. A flush valve, having in combination, a cylinder provided with a main water passage directly across the cylinder, a piston adapted to control the main water passage and adapted to reciprocate thereacross, a water passage for furnishing a water pressure that holds the piston normally in closed relation with the main water passage, means for temporarily relieving said pressure, a water passage for furnishing water pressure to start the reciprocation of the piston to open the main water passage, and a refill passage near the limit of the return or closing stroke of the piston and controlled thereby, whereby the arrangement of the main water passage causes a resistance to the closing movement of the piston thereby delaying the closing of the refill passage for sufficient time to allow it to properly function, substantially as described.

15 8. A flush valve, having in combination, a cylinder provided with a main water passage directly across the cylinder, a piston adapted to control the main water passage and reciprocating thereacross, a water passage for furnishing a water pressure that holds the piston normally in closed relation with the main water passage, means for temporarily relieving said pressure, a water passage for furnishing water pressure to start the reciprocation of the piston to open the main water passage, and a refill passage near the limit of the return or closing stroke of the piston and controlled thereby, the said main water passage being constricted in its outlet from the cylinder so as to choke the water in the cylinder, substantially as described.

20 9. A flush valve, having in combination, a cylinder through which there is a main water passage, a piston adapted to reciprocate in the cylinder and to control the said main water passage, water passages for furnishing water pressure to drive said piston both ways in the cylinder for the purpose of closing and opening the main water passage, the pressure areas being arranged so that the

piston normally closes the main water passage, means for temporarily relieving the pressure at one end of the cylinder to allow the piston to enter upon its opening stroke and a refill passage controlled by the piston and located at the extreme end of the cylinder so as to be open until the piston reaches the limit of its stroke and also to furnish a cushioning medium to prevent the piston striking the end of the cylinder too forcefully, substantially as described.

25 10. A flush valve, having in combination, a cylinder through which there is a main water passage, a piston adapted to reciprocate in the cylinder and adapted to control said main water passage, water passages for furnishing water pressure to drive said piston both ways in the cylinder to open and close the main water passage, the pressure areas being arranged so that the piston normally closes the main water passage, means for temporarily relieving the pressure at one end of the cylinder to allow the piston to enter upon its opening stroke and a refill passage controlled by the piston and located at the extreme end of the cylinder, the main water passage being located so as to cross the path of the piston at the side of the refill passage, the water flowing through said main passage thereby affording a resistance to the piston on its closing stroke, substantially as described.

30 11. A flush valve, having in combination, a cylinder through which there is a main water passage extending directly across the cylinder, a piston reciprocable in the cylinder and adapted to control said main water passage, water passages for furnishing water pressure to drive said piston both ways in the cylinder for the purpose of opening and closing the main water passage, the pressure areas being arranged so that the piston normally closes the main water passage, means for temporarily relieving the pressure at one end of the cylinder to allow the piston to enter upon its opening stroke, and a refill passage controlled by the piston and located at the extreme end of the cylinder, the said main water passage being constricted in its outlet from the cylinder so as to choke the water in the cylinder, substantially as described.

35 12. A flush valve, having in combination, a cylinder provided with a main water passage directly therethrough, a piston adapted to reciprocate in said cylinder and to control the main water passage, a water passage for supplying water pressure to drive the piston to one end of the cylinder and close the main water passage, a drainage passage for relieving said pressure, a valve for controlling such drainage passage and a water passage at the opposite end of the cylinder from the water passage that drives the piston into closed relation with the main water passage

and adapted to furnish water pressure to start the piston on its opening stroke when the water pressure at the opposite end is temporarily relieved and adapted to act as
5 a refill passage when the piston is closing the main water passage, substantially as described.

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

EDGAR J. BLOOM.

Witnesses:

R. L. DE RAU,
W. H. HIXON.