Sept. 17, 1940. J. F. PROSSER 2,215,133

FLUSH VALVE

Filed Jan. 4, 1940

FIG. 1

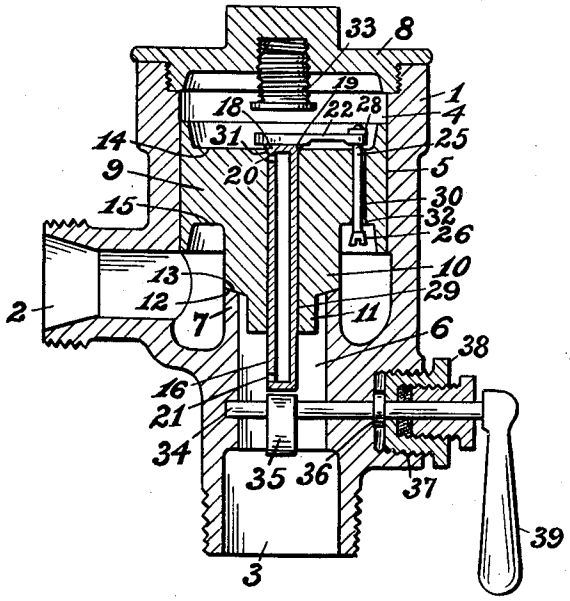


FIG. 4

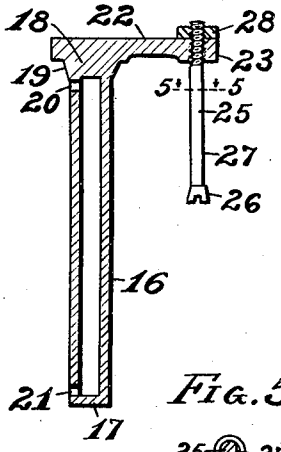


FIG. 5

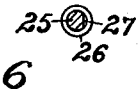


FIG. 6



FIG. 2

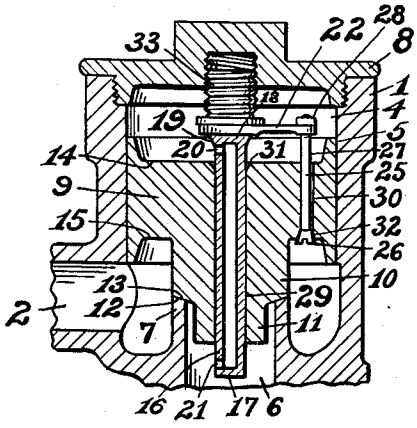
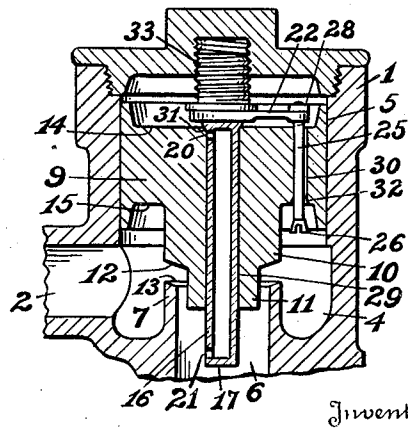


FIG. 3



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FLUSH VALVE

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7 Claims. (Cl. 137—93)

This invention relates to flush valves and has for its main object to provide a flush valve especially for the flushing of water-closet bowls, which is of simple construction and practical design.

Another object of the invention is to provide a flush valve of said character, which closes automatically after a predetermined quantity of water has passed therethrough and is quiet and positive in its closing operation.

A further object of the invention is to provide a flush valve of said character, which may be adjustably set to give proper timing and efficient flushing action, and eliminates the wasting of water before and after the flushing action.

With the above and other objects in view, the invention will be hereinafter fully described with reference to the accompanying drawing, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawing, Figure 1 is a sectional elevation of a flush valve constructed in accordance with my invention, the main valve being closed, the central piston valve being closed and the lateral piston valve being open.

Fig. 2 is a similar view after the manual actuation of the operating handle, the central piston valve being open and the lateral piston valve being closed.

Fig. 3 is a similar view, the main valve being open due to the rising of the piston, the central piston valve being closed and the lateral piston valve being open.

Fig. 4 is a sectional elevation of the piston valve-member.

Fig. 5 is a cross section of the valve stem taken on line 5—5.

Fig. 6 is a plan view of the arm of the valve-member.

Referring to the drawing, 1 represents the body of the valve which is of cylindrical design having a suitable side inlet 2 for connection in the usual manner to a water supply line and a bottom outlet 3 for connection to the inlet of a water-closet bowl. The body is hollowed out at 4 and turned at 5. Leading into the hollow space 4 is the side inlet 2 and leading therefrom is a passage 6 which leads to the outlet 3. Formed integrally with the body 1 and projecting into the space 4 in alignment with the passage 6 is a collar 7. A suitable cap 8 threaded into the body 1 closes its upper end and is convenient for removal.

Mounted in the hollow space 4 of the body 1 and slidable on the turned surface 5 thereof is a piston 9 having a depending and reduced cylindrical portion 10 and a further reduced cylindrical portion 11. An annular shoulder 12 of the piston 9 between the cylindrical portions 10 and 11 thereof serves as the main valve by engaging the upper edge 13 of the collar 7 and forming a seat therefor. The upper end of the piston 9 is countersunk as indicated at 14 and its lower end as at 15.

The piston 9 is adapted to be normally forced downwardly by the pressure of the supply water above the piston thereby closing the main valve 12, and said piston is automatically forced upwardly by the water pressure below same upon releasing the pressure above it, thereby opening the main valve for permitting the flushing action. This is accomplished by means of a valve-member consisting of a pair of valves slidably arranged in the piston and connected together to move in unison. Said valve-member consists of a tube 16 having a closed lower end 17 while its upper end is closed by a head 18 which tapers downwardly to form a valve 19. Through the wall of the tube 16 just below the valve 19 is an inlet port 20, and near the lower end of said tube is an outlet port 21. Formed integrally with the head 18 and extending laterally therefrom is an arm 22 having at its free end a boss 23, which is threaded at 24 for receiving a depending stem 25 which is arranged parallel to the tube 16 and terminates in an upwardly tapering valve 26. One side of the stem 25 is cut off to make a flat surface 27 to provide clearance space for admitting water to the space above the piston. The stem 25 is adjustable longitudinally in the arm 22 by the use of a screw-driver, and a lock-nut 28 on the upper threaded end of said stem secures same in its adjusted position. The tube 16 of the valve-member is slidably mounted in the central opening 29 of the piston 9 and extends below same, and the stem 25 in a lateral opening 30 of the piston, its valve 26 being below the end 15 of said piston. The upper end of the central opening 29 of the piston 9 is tapered to provide a seat 31 for the valve 19 and the lower end of the lateral opening 30 is tapered to provide a seat 32 for the valve 26. An adjustable stop 33 threaded in and depending from the cap 8 is adapted to be engaged by the arm 22 of the valve-member to limit its upward movement and also that of the piston 9.

Any suitable means may be employed for imparting manual upward movement to the tube 16 of the valve-member to raise its valve 19 from its seat 31 for relieving the supply water pres-

sure above the piston 9 and, at the same time, lifting the stem 25 and closing the valve 26 to cut off said water pressure, and thereby causing the automatic opening of the main valve for the flushing action and its closing. For said manual movement, a shaft 34 is rotatably supported in the valve body and fixed thereto is a suitable cam 35 adapted to engage the lower end of the tube 16. Formed integrally with the shaft 34 is a flange collar 36, which is arranged between the bottom of the threaded opening 37 of the valve body and a suitable packing box 38 therein to prevent longitudinal movement of said shaft. An operating handle 39 is fixed to the outer projecting end of the shaft 34.

Operation.—In practice, the piston 9 is in its down position, the main valve 12 is closed, the valve-member is also in its down position, its valve 19 being closed and its other valve 26 being open, its inlet port 20 being closed and its outlet port 21 being, as at all times, open. The water supply entering at 2 fills the space 4 and flows up through the opening 30 due to the flat side 27 of the stem 25 to the space above the larger end 14 of the piston 9 and thus is the piston held down closing the main valve 12. To cause the main valve 12 to be automatically opened by the water supply pressure against the reduced lower area 15 of the piston 9, the operating handle 39 is flipped or swung upwardly thereby rotating the cam 35 and lifting the tube 16 and also the stem 25 of the valve-member. This closes the valve 26, opens the valve 19, exposes the inlet port 20 above the upper end 14 of the piston and permits the water to escape through said tube and its outlet port 21, thus at the same time cutting off the water supply to the space above the piston and releasing the water thereabove, whereupon the piston 9 rises and the main valve 12 is opened. When the arm 22 engages the stop 33, the piston continues to rise until the valve 19 closes the opening 29 of the piston, and at the same time, the valve 26 opens the opening 30 thereof. The supply water from below the piston 9 again enters the opening 30 and the pressure above the piston forces same downwardly to close the main valve 12. By adjusting the valve 26 relative to the valve 19, the proper relation of alternating opening and closing action of said valves is obtained for quiet, smooth and quick operation of the piston. The stop 33 may be set to give the desired flushing time, or period between the opening and closing of the main valve.

From the foregoing, it is readily seen that this flush valve is of simple and practical construction, that it is quick and positive in its opening and closing operations, that it is efficient in its flushing action, and that it is adjustable for the co-action of the piston valves and proper timing of the flushing action.

Having fully described my invention, what I claim is:

1. In a flush valve, the combination of a body having an inlet and an outlet, a piston slidably mounted in the body, the piston having a main valve adapted to control communication between said inlet and outlet, the piston having an opening extending from one end and leading into said outlet, the piston having an opening extending from said end thereof and leading into said inlet, said second mentioned opening being lateral of the first, a pair of valves for controlling said openings, means connecting said pair of valves, and means for engaging one of said pair of valves for actuating both.

2. In a flush valve, the combination of a body having an inlet and an outlet, a piston slidably mounted in the body, the piston having a main valve adapted to control communication between said inlet and outlet, the piston having an opening extending from one end and leading into said outlet, the piston having an opening extending from said end and leading into said inlet, a pair of valves for alternately opening and closing said openings, an arm arranged at a right angle to and connecting said pair of valves, and means for actuating said pair of valves.

3. In a flush valve, the combination of a body having an inlet and an outlet, a piston slidably mounted in the body, the piston having a main valve adapted to control communication between said inlet and outlet, the piston having an opening extending from one end and leading into said outlet, the piston having a second opening extending from said end and leading into said inlet, said second opening being lateral of said first mentioned opening, a valve controlling said first mentioned opening, a valve for controlling said second mentioned opening, said valves being arranged to act alternately, said valves being fixed together to move in unison, and means for actuating said valves.

4. In a flush valve, the combination of a body having an inlet and an outlet opening, a piston slidably mounted in the body, the piston having a main valve adapted to control communication between said inlet and outlet, the piston having an opening extending from one end and leading into said outlet, the piston having an opening extending from said end and leading into said inlet, a valve controlling said first mentioned opening, a valve controlling said second mentioned opening, an arm fixing said valves together, means for adjusting the relation of one of said valves to the other, and means for actuating said valves.

5. In a flush valve, the combination of a body having an inlet and an outlet, a piston slidably mounted in the body, the piston having a main valve adapted to control communication between said inlet and outlet, the piston having an opening extending from one end and leading into said outlet, the piston having an opening extending from said end and leading into said inlet, a tube slidably mounted in said first mentioned opening and carrying a valve adapted to control same, a stem slidably mounted in said second mentioned opening and carrying a valve adapted to control same, an arm fixing said stem to said tube, and means for actuating said tube.

6. In a flush valve, the combination of a body having an inlet and an outlet, a piston slidably mounted in the body, the piston having a main valve adapted to control communication between said inlet and outlet, the piston having an opening extending from one end and leading into said outlet, the piston having an opening extending from said end and leading into said inlet, a tube slidably mounted in said first mentioned opening and carrying a valve adapted to control same, the tube having an inlet port below the valve carried thereby, a stem slidably mounted in said second mentioned opening and carrying a valve adapted to control same, said valves being arranged to act alternately, said valves being fixed together to move in unison, and means for actuating said valves.

7. In a flush valve, the combination of a body having a side inlet and a bottom outlet, a piston slidably mounted in the body, the piston having

a depending reduced portion and a further reduced portion, the first reduced portion of the piston serving as a main valve adapted to control communication between said inlet and outlet, the piston having a central opening extending from its top through its last reduced portion, the piston having a lateral opening extending from its top through its bottom surface, a valve member, the valve member consisting of a tube, a head fixed to the tube, an arm fixed to said head, a stem supported by said arm, said tube being slidably mounted in said central opening of the piston, said stem being slidably mounted in said lateral opening of the piston, said head serving as a valve for controlling said central opening, said stem carrying a valve adapted to control said lateral opening, said tube having an inlet port below said head, and means imparting longitudinal movement to said valve member for actuating its said valves.

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