G. D. SHOWERS.

FLUSH VALVE.

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1,394,945. Patented Oct. 25, 1921.

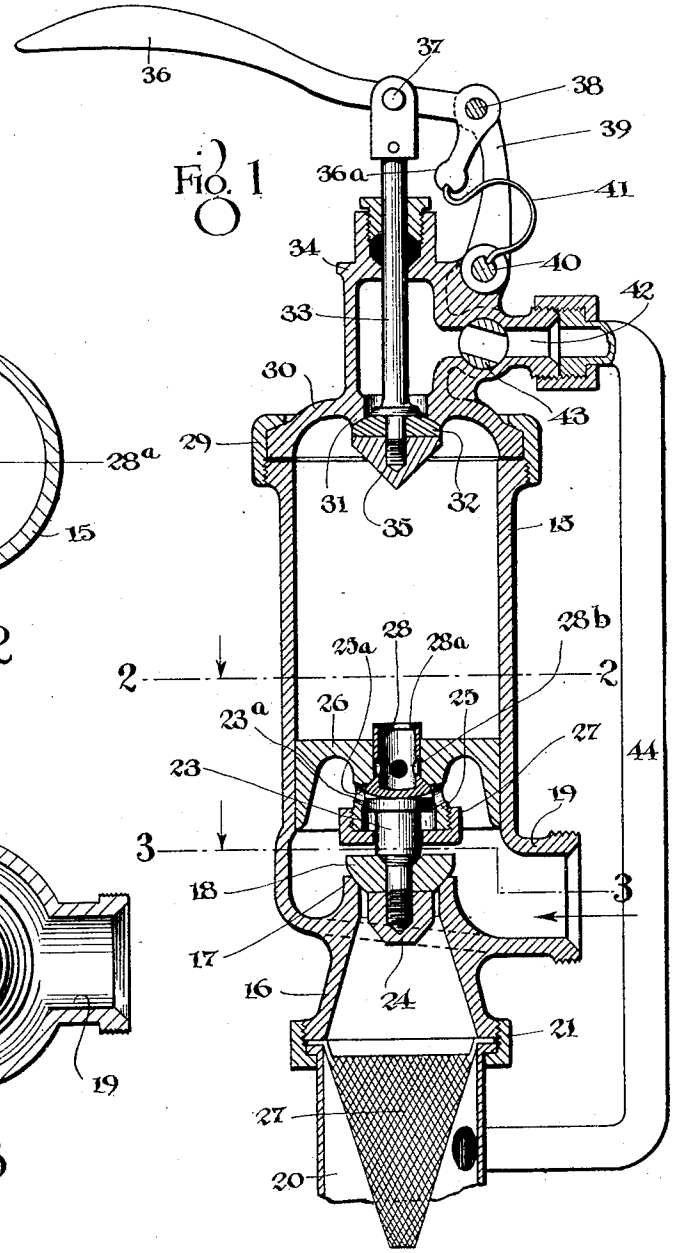


FIG. 1

FIG. 2

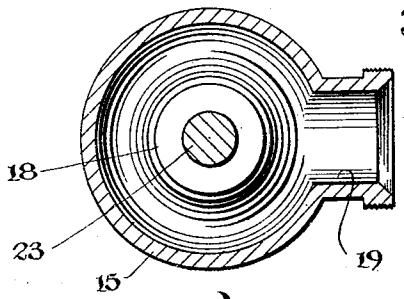


FIG. 3

WITNESSES

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FLUSH-VALVE.

1,394,945. Specification of Letters Patent. Patented Oct. 25, 1921.

Application filed July 6, 1920. Serial No. 394,147.

To all whom it may concern:

Be it known that I, GEORGE DOUGHMAN SHOWERS, a citizen of the United States, and a resident of Altoona, in the county of Blair and State of Pennsylvania, have invented certain new and useful Improvements in Flush-Valves, of which the following is a specification.

My invention relates to flush valves and a purpose of my invention is the provision of a flush valve which is quiet and efficient in operation, durable in service, simple and inexpensive to construct, dismember, and repair, readily adjusted for timing purposes, automatic in operation, and one which will discharge at each operation a predetermined quantity of water that can be varied by adjustment of the valve.

I will describe one form of flush valve embodying my invention and will then point out the novel features thereof in claims.

In the accompanying drawings:

Figure 1 is a view showing in vertical section and partly in elevation one form of flush valve embodying my invention.

Figs. 2 and 3 are transverse sectional views taken on the lines 2—2 and 3—3, respectively, of Fig. 1.

Similar reference characters refer to similar parts in each of the several views.

Referring specifically to the drawings, 15 designates a cylinder formed at its lower end with a discharge spout 16 of reduced diameter and having formed at its upper end a valve seat 17 upon which is adapted to seat a valve 18 for controlling the passage of water through the discharge spout. Water is admitted to the cylinder 15 through an inlet port 19 formed in the cylinder at a point slightly above the discharge spout 16, it being understood that in the application of the flush valve to a flushing system, the inlet port is to be in communication with a water supply pipe. The lower end of the discharge spout 16 is in communication with a flush pipe 20 and is connected thereto by means of a conventional form of coupling nut 21. A frusto-conical shape foraminous member 22, preferably formed of wire, is supported within the flush pipe 20 in the manner shown in Fig. 1.

The valve 18 is carried by a stem 23 and is locked thereupon by a guide head 24, which threadedly engages the lower end of the stem, as shown. The stem 23 is movably fitted in a sleeve 25 formed on the lower side of a piston 26, and is locked therein by means of a collar 27 which forms an abutment for a flange 23^a formed on the upper end of the stem. Formed axially of the piston 26 is a port in which is slidably fitted a gravity valve 28 which as shown in Fig. 1 is closed at its lower end, its upper end being open and shaped to provide a valve seat 28^a. The sleeve 25 is formed with perforations 25^a, and adjacent its lower end, the valve 28 is formed with perforations 28^b through which water from the lower side of the piston can pass to the upper side of the piston and into the upper end of the cylinder 26.

Secured to the upper end of the cylinder 15 by means of a coupling nut 29 is a cylinder head 30 which is formed axially thereof with a valve seat 31 against which an operating valve 32 is adapted to seat. The valve 32 is carried by a stem 33 which is movable through the cylinder head and through an extension 34 formed on the upper side of such head. The stem 33 also carries a conical shaped valve 35 which in the operation of the first valve is adapted to seat upon the valve seat 28^a of the valve 28. The valve stem 33 is adapted to be manually actuated by means of an operating lever 36 pivotally connected to the upper end of the stem at the point indicated at 37 and fulcrumed at the point indicated at 38 upon a link 39 pivotally supported upon the extension 34 by a pintle 40. The forward end of the lever 36 is provided with an arm 36^a which is notched at its free end to receive one end of a leaf spring 41. The opposite end of such spring rests in a similar notch formed in the pintle 40.

The extension 34 of the cylinder head 30 is hollow to provide a chamber, and communicating with this chamber is an outlet port 42 controlled by a regulating valve 43. The port 42 communicates with the flush pipe 20 through the medium of a pipe 44.

In practice, the cylinder 15 is entirely filled with water supplied thereto by the inlet port 19. In operation, the several valves occupy closed positions as shown in Fig. 1. The operating valve 32 being held closed by the action of the spring 41 and the pressure within the cylinder above the piston 26. The valve 18 is also closed by the water pressure and the weight of the piston 26. The grav-

ity valve 28 weighs less per unit of area than the piston 26. A small amount of leakage around the piston will not interfere with its operation, therefore such piston need not be water-tight.

To set the flush valve into operation, it is only necessary to manually depress the lever 36 so as to move the valve 32 from the seat 31. During this movement of the lever, the spring 41 is compressed and swung to the right until it passes dead center, when its action will be to hold the operating lever down and the operation valve 32 open. With the operating valve in open position, water is now free to pass from above the piston 26 out through the regulating valve 43 and the outlet port 42. From the outlet port 42, the water enters and traverses the pipe 44 discharging into the flush pipe 20. As the water leaves the cylinder 15, the piston 26 now starts to rise, the gravity valve 28 remaining closed because of the pressure due to the weight of the piston. As the piston rises, it lifts the collar 27 thereby elevating the valve stem 23 and moving the valve 18 from its seat 17. With the valve 18 in open position, water now flows from the inlet port 19 into the outlet port 16 and thence into the flush pipe 20. As the water enters the flush pipe 20, it engages the foraminous member 22 and because of the shape of the latter the velocity of the water is checked to give it a full and even flow.

The piston 26 continues to rise causing the conical valve 35 to engage the seat 28^a at the top of the gravity valve, and upon continued rising of the piston the conical valve 35 causes a depression of the gravity valve 28 until the perforations 28^b are in communication with the perforations 25^a. This movement of the valve 28, however, does not effect communication between the upper and lower sides of the piston 26 because the valve 35 is still within the seat 28^a. However, upon continued upward movement of the piston 26 an operation of the valves 35 and 32 is effected causing the valve 32 to engage the seat 31. During this operation, the spring 41 serves to assist and subsequently retain the valve 32 in closed position. With the valve 32 in closed position, pressure is now equalized upon opposite sides of the piston 26 which causes the piston to descend, water passing from beneath the piston to a point above the same by way of the gravity valve 28, the latter now being open as a result of the unseating of the valve 35 from the seat 28^a. The piston 26 continues to descend until the valve guide 24 enters the outlet passage 16, when the flow is reduced for a short period before the valve 18 closes upon its seat 17. This reduction in flow is for the purpose of obtaining the after-fill of the bowl. After the valve 18 is properly seated, the continued movement of the piston 26 closes the gravity valve 28 by such valve engaging the upper end of the stem 23, as will be understood.

The regulating valve 43 is designed to control the speed at which the piston 26 moves upwardly within the cylinder 15, thereby regulating the amount of water discharged from the outlet 16 and thus giving a wide range of adjustment.

From the foregoing operation, it will be clear that the amount of water passing through the flush valve at each operation is constant, while yet being variable by an adjustment of the regulating valve 43. This is effected by virtue of the fact that the operating valve 32 remains in open position until closed by the piston 26. I consider this feature a distinct advantage over other types of flush valves in all of which the total amount of water discharged depends upon the length of time the operator holds the operating valve open, and the only constant quantity is that which flows after the operating valve is released. The operation of my flush valve is automatic, it being only necessary for the operator to initially depress the operating lever whereupon such lever is maintained in depressed position during the discharge of a predetermined quantity of water from the valve.

Although I have herein shown and described only one form of operating valve embodying my invention, it is to be understood that various changes and modifications may be made herein without departing from the spirit of the invention and the spirit and scope of the appended claims.

What I claim is:

1. A flush valve comprising, a cylinder having an inlet port and two communicating outlet ports, a pair of valves controlling one of the outlet ports, a piston within the cylinder having a port therein, a gravity valve controlling the piston port and provided with a port, a valve carried by one of the pair of valves and controlling said valve port, a valve carried by said piston and controlling the other of the outlet ports, manually operable means for moving one valve of said pair of valves to open position, the last mentioned valve being adapted to be moved to closed position by said piston, and manually operable means for actuating the other valve of said pair of valves independently of the first valve for the purpose described.

2. A flush valve comprising, a cylinder having an inlet port and two communicating outlet ports, a manually operable valve controlling one of the outlet ports, a piston within the cylinder having a port therein, a gravity valve having a port therein, said gravity valve being within the piston and controlling the piston port, a valve carried by the first valve and controlling said grav-

ity valve port, and an outlet valve carried by the piston and controlling the other of said outlet ports.

3. A flush valve comprising, a cylinder having an inlet port and two communicating outlet ports, a manually operable valve controlling one of the outlet ports, a piston within the cylinder having a port therein, a gravity valve having a port therein, said gravity valve being within the piston and controlling the piston port, a valve carried by the first valve and controlling said gravity valve port, an outlet valve carried by the piston and controlling the other of said outlet ports, and a valve adjustable to control the port controlled by the manually operable valve independently of the latter.

4. A flush valve comprising, a cylinder, a piston within the cylinder, an inlet port within the cylinder through which water is supplied to the cylinder beneath the piston, a gravity valve within the piston for admitting water to the upper side of the piston, an outlet port at the lower end of the cylinder, a second outlet port at the upper end of the cylinder and communicating with the first port exteriorly of the cylinder, manually operable valves for controlling the second outlet port and said gravity valve in a manner to prevent the passage of water from the upper side of the piston to the lower side thereof, and an outlet valve carried by the piston and controlling the first outlet port.

5. A flush valve comprising, a cylinder, a piston within the cylinder, an inlet port within the cylinder through which water is supplied to the cylinder beneath the piston, a gravity valve within the piston for admitting water to the upper side of the piston, an outlet port at the lower end of the cylinder, a second outlet port at the upper end of the cylinder and communicating with the first port exteriorly of the cylinder, manually operable valves for controlling the second outlet port and said gravity valve in a manner to prevent the passage of water from the lower side of the piston to the upper side thereof, an outlet valve carried by the piston and controlling the first outlet port, and a regulating valve controlling the second outlet port and adjustable to regulate the flow of water from the upper side of the piston.

6. A flush valve comprising, a cylinder, a piston within the cylinder, an inlet port within the cylinder through which water is supplied to the cylinder beneath the piston, a gravity valve within the piston for admitting water to the upper side of the piston, an outlet port at the lower end of the cylinder, a second outlet port at the upper end of the cylinder and communicating with the first port exteriorly of the cylinder, manually operable valves for controlling the second outlet port and said gravity valve in a manner to allow the passage of water from the lower side of the piston to the upper side thereof, an outlet valve carried by the piston and controlling the first outlet port, and means for actuating the manually operable valves comprising a lever and a spring associated with the lever to urge the valves in one direction when the lever is in one position and in another direction when the lever is in another position.

7. A flush valve comprising, a cylinder having an inlet port and two outlet ports, a piston between the outlet ports controlling one of the outlet ports and having a port, a valve controlling said piston port and so arranged as to be closed at one end of the piston stroke and opened at the other, a valve to control the other outlet port, manually operable means to move said valve to open position, means for maintaining said valve in open position until closed by piston, and means to regulate the port controlled by the manually operated valve.

8. A flush valve comprising a cylinder, a piston within the cylinder, an inlet port within the cylinder through which water is supplied to the cylinder beneath the piston, a gravity valve within the piston for admitting water to the upper side of the piston, an outlet port at the lower end of the cylinder, a second outlet port at the upper end of the cylinder and communicating with the first port at a point exteriorly of the cylinder, manually operable valves for controlling the second outlet port and said gravity valve in a manner to prevent the passage of water from the upper side of the piston to the lower side thereof, an outlet valve carried by the piston and controlling the first outlet port, and a stem secured to the outlet valve and controlling said gravity valve.

GEORGE DOUGHMAN SHOWERS.