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PATENTED MAY 21, 1907.

O. J. BACKUS, JR. & R. E. CRANE.

SLOW CLOSING VALVE.

APPLICATION FILED JUNE 28, 1904.

Fig. 1.

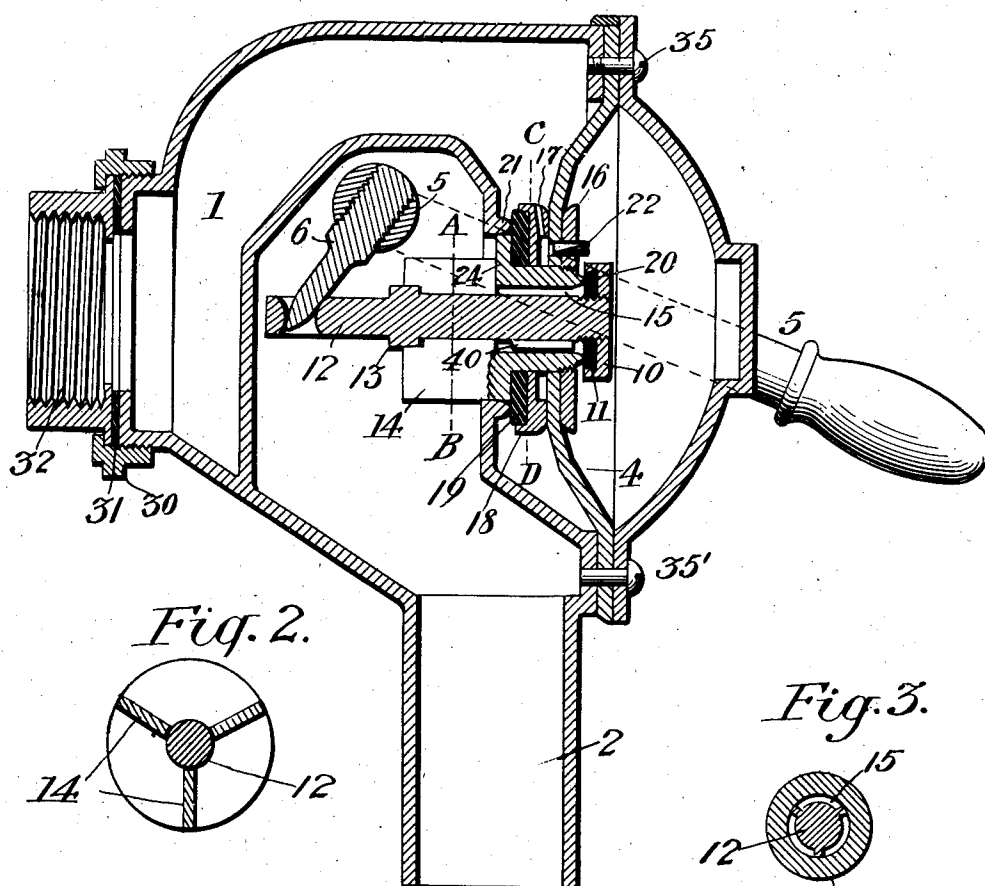


Fig. 2.

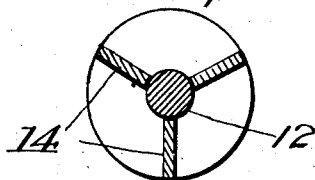
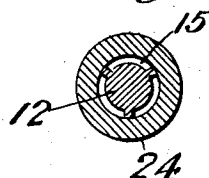


Fig. 3.



Witnesses

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SLOW-CLOSING VALVE.

No. 854,138.

Specification of Letters Patent.

Patented May 21, 1907.

Application filed June 28, 1904. Serial No. 214,571.

To all whom it may concern:

Be it known that we, OSCAR J. BACKUS, Jr., and RAYMOND E. CRANE, citizens of the United States, residing at Oakland, in the county of Alameda and State of California, have invented a new and useful Improvement in Slow-Closing Valves, of which the following is a specification.

Our invention is for the purpose of providing a suitable mechanism which will provide a predetermined length of flow of water upon each operation of the device.

The invention is principally for use in flushing water closets and other sanitary fixtures by the direct method, that is to say by admitting the flushing water directly from the supply pipe under pressure of the street main, without the employment of the usual storage tank or reservoir.

Our invention comprises a diaphragm which is retarded in its movement in one direction by a timing chamber, and a valve which is controlled by the movement of said diaphragm. The movement of the diaphragm is caused by an operating lever the water pressure helping in the operation of the device.

The invention can be readily understood by reference to the following detailed description and the accompanying drawing in which,

Figure 1 is a vertical sectional view of a simple form of the invention. Fig. 2 is a vertical cross section on the line AB of Fig. 1. Fig. 3 is a vertical cross section on part of the line CD, showing the construction of the stem 12 and the three-winged guide piece 14.

Similar numerals refer to similar parts throughout the three views.

The water enters the device through the inlet 1, and when the valve is opened it passes through the seat 21, and out through the outlet of the device 2. The valve is opened by means of the lever 5 which is on the outside of the device, (and which is) bent at a proper angle and enters the device through a suitable packing box, forming an axle into which the inside lever 6 is screwed. The passage 17 connects with a constantly open timing vent in the diaphragm and provides means for the water to enter the chamber 3 from the inlet 1. The water passing through this passage must pass through a tapering

slot in the screw 22 (which is screwed in the washer 16) before it can enter the chamber 3. This screw 22 is so slotted that screwing the screw farther in makes the passage smaller and thus provides means of adjustment of the amount of water passing through the passage thereby regulating or timing the period required for the valve to close.

The stem 12 of the relief valve strikes a shoulder 13 on the piece 14 and the movement of stem 12 to the right by means of this shoulder forces the main valve off of its seat 21 and thus opening the valve. The relief valve is composed of the stem 12 and the nut 10 with the leather washer 11. The piece 14 is secured to the main valve 24 and is illustrated in Fig. 2 which shows how the main valve is guided to its seat and how the water passes through the guide. Fig. 2 also illustrates the stem 12 which passes through this guide. Fig. 3 shows how the upper end of this stem 12 is guided inside of the piece 14. In this way the opening of the relief valve or its movement to the right permits the water in chamber 3 to (run) through the passage 15 through the main valve into the outlet 2 of the device. The main valve is composed of the diaphragm washer 18 and the leather valve 19 and which closes against the seat 21. As the lever 6 engages a slot in the stem 12, the entire device can be operated by means of the outside lever 5. The pieces 30 and 32 with the washer 31 are a simple ordinary union for convenience in setting up the device. The screws 35 and 35' are for use in clamping the diaphragm in place.

As shown in the drawing the valve is closed. The water pressure in timing chamber 3 is the same as in the inlet 1 as the water is always free to enter through passage 17. At the commencement of the opening movement, that is when the lever 5 starts to rise, the relief valve 10 opens and releases the pressure in chamber 3. The water pressure in the inlet part of the valve then pushes the diaphragm to the right and assists in the opening movement of the valve. When the lever 5, which has a heavy handle, is let go of, the weight of the handle first closes the relief valve 10. The water cannot enter the chamber 3 except through the passage 17. As the water enters the chamber 3 slowly, the closing of the main valve is retarded and the speed of closing can be determined by

adjusting the screw 22. Of course the weight of the lever 5 cannot close the main valve until the water pressure accumulates on the right hand side of the diaphragm thus balancing the pressure against the diaphragm.

In this construction we believe we have advantages over any previous construction as the lever 5 can be used to close the device in case of failure of any parts inside or the leakage of any part. The device works entirely without springs which are likely to lose their strength in long wear. The valve 10 is guided entirely by the main valve and is kept in perfect alinement so that it is sure to seat true.

The construction being as thus described, the operation is as follows. The passage 17 and the timing vent in the diaphragm being constantly open, the chamber 3 is normally full of water and the pressure therein is the same as in the inlet 1. When the handle 5 is actuated to open the main valve 24, the first part of the movement opens the relief valve 20 by the engagement of the shoulder 13 on the rod 12 of the relief valve with the guide piece 14 of the main valve, thereby immediately reducing the pressure in the timing chamber, and permitting the diaphragm to be easily moved so as to open the main valve 24, which movement is assisted by the pressure preponderating at this time in inlet 1. When the handle is released, the relief valve is instantly closed, and the shoulder 40 on the stem 12 contacts with the piece 14 on the main valve and tends to close that valve also. The preponderating pressure in the inlet 1, however, prevents the main valve from closing until sufficient water has passed into the timing chamber through the passage 17 and the timing vent to raise the pressure therein so as to counterbalance that in the inlet. When this occurs, the weight of the handle causes the main valve to close, and it is to be noted that this closure is gradual as the water passes from the inlet into the timing chamber. It is also to be noted that though the automatic closing of the main valve through the intermediacy of the weight of the handle 5 is gradual, this valve may be closed more promptly by forcing the handle down by hand, and that, in any event, the lost motion connection between the stem of the relief valve and the main valve permits both valves to be operated positively by the handle. The time that is required for the main valve to close automatically is regulated entirely by the screw 22 in the timing vent which can be adjusted so as to admit more or less water into the timing chamber 3. The adjustment of the screw is easily effected after the fixture has been installed by taking off the cover of the timing chamber, and it is to be furthermore noted, that the removal of this cover also permits the removal of the

diaphragm and both valves, so that these parts may all be repaired or replaced when required.

We do not limit ourselves to all the details as shown in the drawing but

We do claim as new and desire to secure by Letters Patent, the following:—

1. In a slow closing valve for flushing water closets and the like, a timing chamber, a flexible and movable diaphragm separating the same from the inlet passage and having an open timing vent therein, a main valve carried by the diaphragm and controlling the flow of flushing water through the valve, a relief valve also carried by the diaphragm for reducing pressure in the timing chamber preliminary to opening the main valve, the stem of the relief valve passing through and having a lost motion connection with the main valve, an operating lever on the outside of the valve casing, and connections between the same and the relief valve stem, whereby both valves may be positively operated in both directions.

2. In a slow closing valve for flushing water closets and the like, a timing chamber, a flexible and movable diaphragm separating the same from the inlet passage, a main valve carried by the diaphragm and controlling the flow of flushing water through the valve, a relief valve also carried by the diaphragm for reducing pressure in the timing chamber preliminary to opening the main valve, the stem of the relief valve passing axially through the main valve, and guide vents or wings on the main valve coacting with the valve orifice to guide said main valve in its movements, the stem of the relief valve being also guided by the vents or wings on the main valve.

3. In a slow closing valve for flushing water closets and the like, a timing chamber separated from the inlet passage by a flexible and movable diaphragm having an adjustable timing vent therein, a removable cover for the timing chamber, a main valve carried by the diaphragm and controlling the flow of flushing water through the valve, a relief valve also carried by the diaphragm for reducing pressure in the timing chamber preliminary to opening the main valve, said relief valve stem passing axially through the main valve, and having a lost motion connection therewith, whereby both main and relief valves are actuated, an operating lever on the outside of the valve casing, and disconnectible connections between the lever and the relief valve stem, whereby on removing the cover of the timing chamber the timing vent may be adjusted and the operating parts of the valve may be removed.

4. In a slow closing valve for flushing water-closets and the like, a timing chamber having open communication with the inlet pipe through a regulable filling vent, a flexible and movable diaphragm separating

the timing chamber from the inlet, a main valve carried by the diaphragm and controlling the flow of flushing water directly from the inlet pipe to the outlet pipe, a relief valve also carried by the diaphragm for reducing pressure in the timing chamber preliminary to opening the main valve, the stem of the relief valve passing through and having a lost motion connection with the main valve, an operating lever on the outside of the valve casing, and connections between the same and the relief valve stem whereby both valves may be positively operated in both directions.

5. In a slow closing valve for flushing water-closets and the like, a timing chamber having open communication with the inlet pipe through a regulable filling vent, a vertically arranged flexible and movable diaphragm separating the timing chamber from the inlet passage, a removable cover for the timing chamber, a horizontally operating main valve carried by the diaphragm and

controlling the flow of flushing water from the inlet pipe to the outlet, a relief valve also carried by the diaphragm for reducing pressure in the timing chamber preliminary to opening the main valve, said relief valve stem passing horizontally and centrally through the main valve and having a lost motion connection therewith, whereby both main and relief valves may be positively actuated, a horizontally arranged weighted operating lever on the outside of the valve casing, and disconnectible connections between the shaft of the lever and the relief valve stem, whereby on removing the cover of the timing chamber the timing vent may be adjusted and the operating parts of the valve may be removed.

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Witnesses:

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