

June 22, 1926.

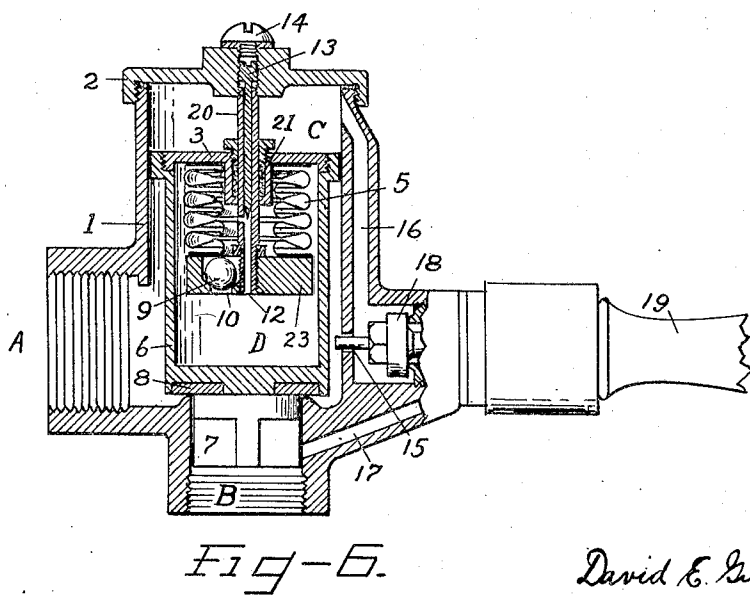
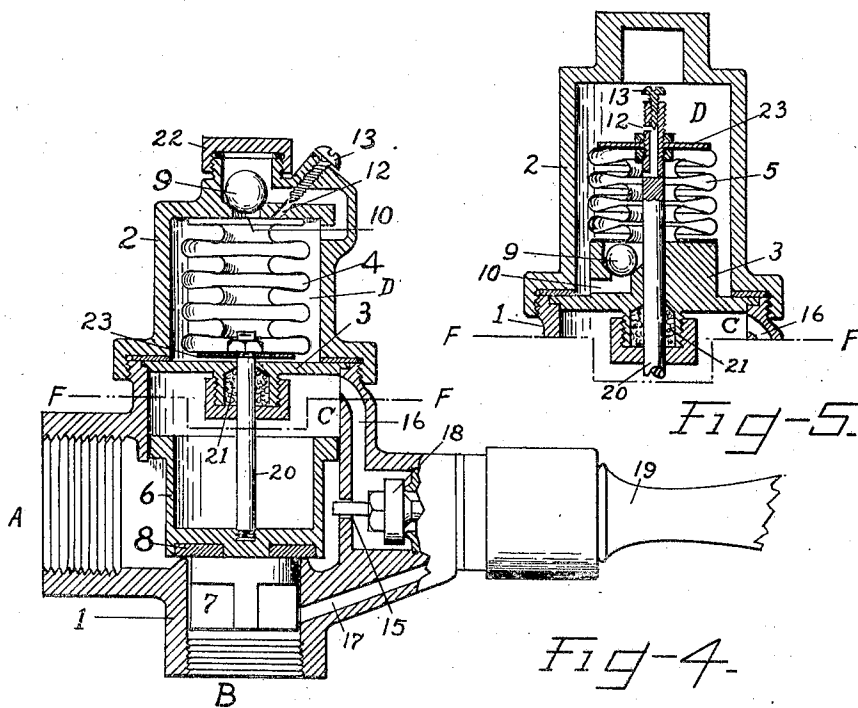
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FLUSHING VALVE

Filed March 10, 1923

3 Sheets-Sheet 2



Witness
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INVENTOR.
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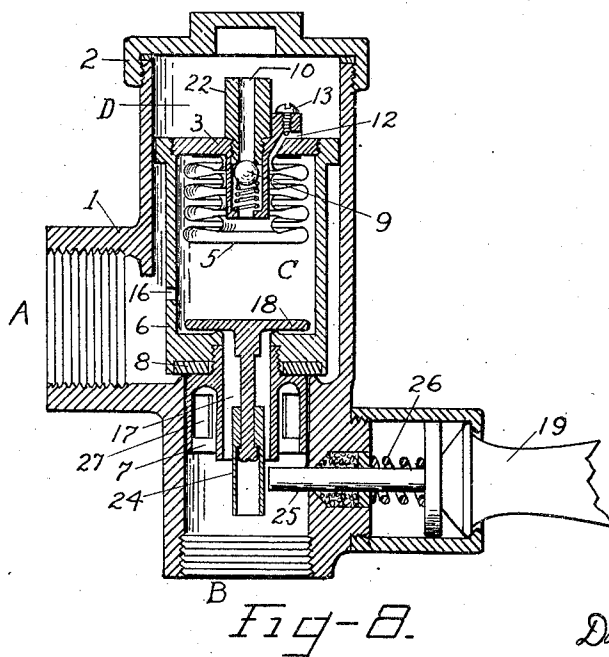
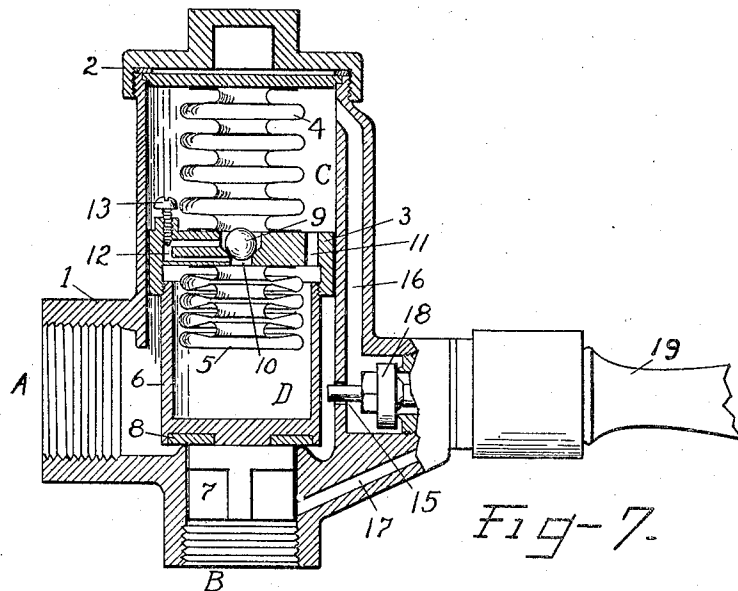
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UNITED STATES PATENT OFFICE.

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FLUSHING VALVE.

Application filed March 10, 1923. Serial No. 624,064.

This invention relates to flushing devices, and its object is to produce a device which shall be slow closing, simple in construction and positive in operation, by means of separating the controlling fluid from the flushing water passing through the valve and thereby preventing dirt and foreign matter from coming into contact with and clogging the regulating by-pass.

In accomplishing this result I use one or more flexible bellows of very thin metal or other suitable material, the controlling fluid being wholly or in part enclosed in said bellows and being separated from the flushing water.

To operate, the initiating valve is opened by hand or otherwise, but all other operations are automatic.

I have illustrated my invention in the accompanying three sheets of drawings.

Figure 1 is a vertical section showing an approved form of the apparatus with all parts in the normally closed position.

Figure 2 is a vertical section of certain parts showing the bellows and main valve in the open position with relation to the main discharge outlet.

Figure 3 shows a cross section taken at line E—E of Fig. 1.

Figure 4 is a vertical section of the device modified to pass the controlling fluid alternately back and forth from a bellows to a chamber enclosing said bellows and from said chamber to said bellows.

Figure 5 is a vertical section of a modified arrangement of the upper parts above the line F—F of Fig. 4. In this arrangement the bellows is attached to the partition 3 instead of to the inside of the top of upper casing 2.

Figure 6 is a vertical section of another modification in which the bellows is enclosed within a movable piston. The principle of operation is the same as in the previous figures and will be readily understood.

Figure 7 is a vertical section of a further modification of Fig. 1 in which the partition 3 is movable with the main valve instead of being fixedly secured. The principle in each is the same and the controlling fluid is alternately passed back and forth between the bellows 4 and 5.

Figure 8 is a vertical section of another modification in which there is a bellows enclosed within the piston. In this arrangement the initiating valve opens through the bottom of the piston and is operated by a stem 25 actuated by a handle 19.

A description of the parts follows. In all drawings the numbers of the various parts refer to similar or equivalent parts.

In Fig. 1, 1 is the lower part of the casing with an inlet A and main outlet B, 2 the upper casing and 3 a partition. 4 is a vertical section of a flexible expanded bellows and attached at its upper end to partition 3 and at its lower end to the main valve and chambered piston 6. The contracted bellows 5 is closed at the top and attached at its lower end to partition 3. 4 and 5 show an accepted form of bellows but there are various other forms of construction which may be used. The guide 7 because of being circular at its upper edge tends to choke the flow toward the end of the closing of the main valve and thereby give a refill. 8 is the main valve washer. 9 a check valve to allow a one way flow from bellows 4 to 5, through passage 10. The passage 11 connects bypass chambers C and D. 12 is a regulating bypass controlled by the regulating screw 13 and the screw 14 is to prevent leakage at that point. The passage 15 connects the inlet with passage 16 and the chamber around initiating valve 18. The passage 17 connects the initiating valve opening with the outlet B. The handle 19 operates the initiating valve 18.

In Figures 4, 5, 6, 7 and 8 similar numbers indicate similar or equal parts as shown in Fig. 1.

In Figures 4, 5 and 6 the stuffing box 21 prevents leakage where the stem 20 passes through partition 3. The member 23 is attached to the stem 20 and is secured to the bellows 5 closing the lower end.

In Figure 8, when the handle 19 is moved in any direction the stem 25 is pushed inwardly and strikes the extension 24 moving it to one side, thereby tilting and opening the initiating valve 18. The extension 24 is slidable on the stem supporting it. The spring 26 returns the stem 25 and handle 19 to normal position when handle is released. 27 is a number of ports through the guide

to permit the flow of water when the main valve is raised to bring these ports above its seat.

In each figure where the end of the bellows comes against the upper side of the main valve, or against the partition or other member it is soldered or otherwise securely and suitably joined to make a leak proof connection.

The operation of the device as shown by drawings is as follows:

Figure 1.—The parts are shown in the closed position. When in service the bellows 4 and 5 are filled with clear water, oil or other suitable liquid, the bellows 4 being expanded and 5 contracted. The chambers C and D are filled with water entering through passages 15, 16 and 11. By moving the handle 19 in any direction the initiating valve 18 is opened and relieves the pressure in chambers C and D. Immediately the pressure of the water entering at A lifts the piston and main valve 6 to the position shown in Fig. 2, discharging water from chamber C out through passage 16, the opening of initiating valve 18 and passage 17 to the outlet B. As the main valve is raised the bellows 4 is compressed forcing the liquid from it through passage 10 into the bellows 5 and expanding said bellows to the extent that bellows 4 is contracted. Check valve 9 prevents the return of the liquid through passage 10. Passage 11 allows the discharge of water from chamber D into chamber C to compensate for the expansion of bellows 5. The return flow of the liquid from bellows 5 to bellows 4 through passage 12 can be regulated by adjusting the regulating screw 13 in or out as may be desired.

When the handle 19 is released the initiating valve is automatically closed by spring or other pressure means. Immediately on the closing of the initiating valve water begins to flow through passages 15 and 16 into chamber C and from chamber C through passage 11 into chamber D and exerts a pressure on the upper surface of main valve and piston 6 and on the upper surface of bellows 5 tending to contract said bellows and force the liquid from it through passage 12 into and to expand bellows 4 and to bring the main valve down onto its seat and close the main discharge outlet. The main valve can travel only so fast as bellows 4 is expanded by liquid entering it through passage 12 from bellows 5. This flow can be controlled by the regulating screw 13. The stem on the initiating valve 18 extending into passage 15 is moved each time the initiating valve is opened and closed and tends to keep this passage clear of obstruction.

Figure 4.—The operation of the modification as shown by Figure 4 is practically

identical with that of Figure 2. The parts are shown in the closed position. The bellows 4 is fixedly secured at the top and movably attached at the bottom. In opening, the main valve rises and the attached stem 20 which is attached to the lower end of bellows 4 compresses said bellows discharging the liquid from it out through passage 10 into chamber D. A small amount of air in chamber D will compress and compensate for the stem 20 entering during the opening movement of the main valve. In the closing movement pressure is exerted through passages 15 and 16 into chamber C on the upper surface of the piston and main valve forcing them downward. The rate of travel is regulated by the time required to fill bellows 4 through the passage 12. This rate can be adjusted by regulating screw 13.

In Figure 5 the action is identical with that of Figure 4 except that the bellows 5 is fixedly secured at the bottom and movably attached at the top and is expanded during the opening movement of the main valve and compressed during the closing movement of said valve.

In Figure 6 the action is practically identical the same as Figure 5 and will be readily understood by reference to the drawing.

In Figure 7 the action is practically identical with that of Figure 1 except the respective positions of the bellows 4 and 5 have been reversed and the upper bellows 4 being fixedly attached at its upper end, movably attached at its lower end and the lower bellows 5 fixedly attached at its upper end and freely suspended at its lower end. It will be readily understood by reference to the drawing.

Figure 8 is in all practical respects the same as in Figure 7. The upper bellows 4 has been omitted and the initiating valve opening placed through the main valve. When the handle 19 is moved the stem 25 is pushed inwardly and strikes the extension 24 and tilts and thereby opens the initiating valve 18 permitting the discharge of water from chamber C. The small passage 16 admits water to chamber C to exert closing pressure on the main valve. During the opening movement the main valve carries with it the initiating valve and lifts the extension 24 above the line of travel of the stem 25 so that the initiating valve automatically falls back to its seat closing the outlet, at which time the main valve begins the closing movement. If the handle 19 still be held in the open position with the stem 25 projecting inwardly the extension 24 will strike and rest on top of said stem 25 and the stem on the lower side of the initiating valve will slide down into extension 24 without opening the initiating valve and allow

the main valve to close even though the handle is held in the open position. If this feature however is not desired the extension 24 and the stem on the lower side of the initiating valve can be made as one piece.

This type of handle and initiating valve with non-hold open feature can be readily applied to Figure 7 and in fact by slight modification of Figures 1, 2, 4, 5 and 6 can be applied to any of these figures.

While I have referred to upper and lower parts, it will be understood that this refers only to the position of the device in the drawings, as it may be set for practical use in any convenient position.

Having thus described my invention, as required by law, and knowing that it comprises novel, useful and valuable improvements in the art to which it pertains, I here state I do not wish to be limited to the precise construction and arrangements of the several parts, as herein set forth as the same may be variously modified by a skilled mechanic without departing from the spirit of the invention.

I claim:

1. A flushing device including a casing having an inlet and an outlet, bellows means within said casing for containing a controlling fluid separated from the flushing water, a relief valve controlling hydraulic means through the opening and closing of said relief valve for flexing the bellows to pass the controlling fluid in or out of said bellows means.

2. A flushing valve including a casing, a main valve, flexible bellows means to contain a controlling fluid separated from the flushing water, means connecting said main valve and bellows means and means for hydraulically flexing the said bellows means during the opening and closing of said main valve.

3. A flushing device including a casing, a piston and main valve in said casing, flexible bellows means in the piston, an initiating valve, actuating means for opening said

initiating valve and means permitting the closing of said initiating valve and said main valve while the said actuating means remains in the open position.

4. A flushing device including a main valve, flexible bellows means for containing a controlling fluid separated from the flushing water, said bellows means connected to co-operate in the movement of the main valve, a relief valve unattached to and not participating in the movement of the said bellows means, hydraulic means through the opening of said relief valve for opening the main valve and regulating means for retarding the closing movement thereof.

5. A flushing valve including a casing having an inlet and main discharge outlet, a main valve to control the discharge outlet, hydraulic means for opening the main valve, bellows means connected to co-operate in the movement of the main valve, an initiating valve unattached to said bellows means, means for actuating the initiating valve and regulating means to retard the closing movement of the main valve.

6. In a flushing device, a casing having an inlet and main discharge outlet, a main valve to control said outlet, hydraulic means for opening the main valve, bellows means connected to cooperate in the movement of the main valve, a controlling fluid separated from the flushing water, fluid passage means communicating with the interior of the bellows means, a check valve to control said passage means and regulating means to retard the closing movement of the main valve.

7. In a flushing device a casing having an inlet and main discharge outlet, a main valve and chambered piston, bellows means connected to cooperate in the movement of said valve and piston, an initiating valve to hydraulically actuate the opening and closing of the main valve and means for discharging fluid from the chambered piston during the opening of the main valve.

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