

Dec. 9, 1924.

1,518,593

L. E. MacBRYDE

FLUSHING DEVICE

Filed Feb. 19, 1924

2 Sheets-Sheet 1

Fig. 1.

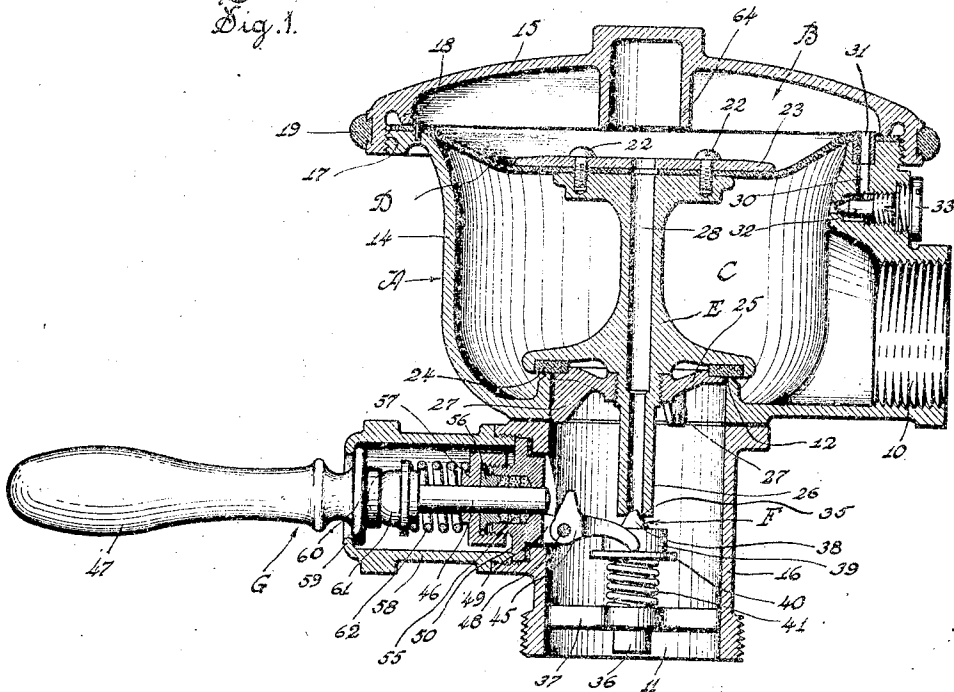
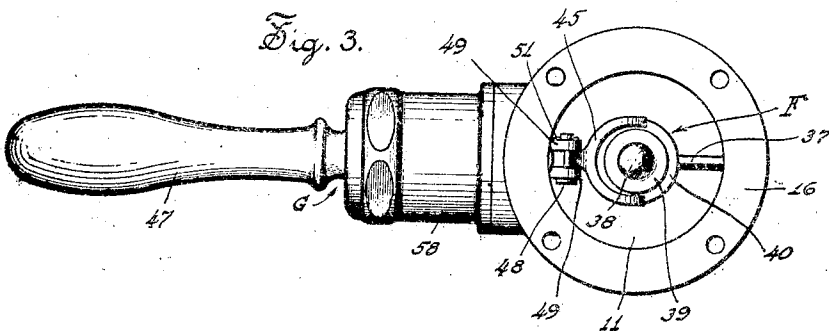


Fig. 3.



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Fig. 2.

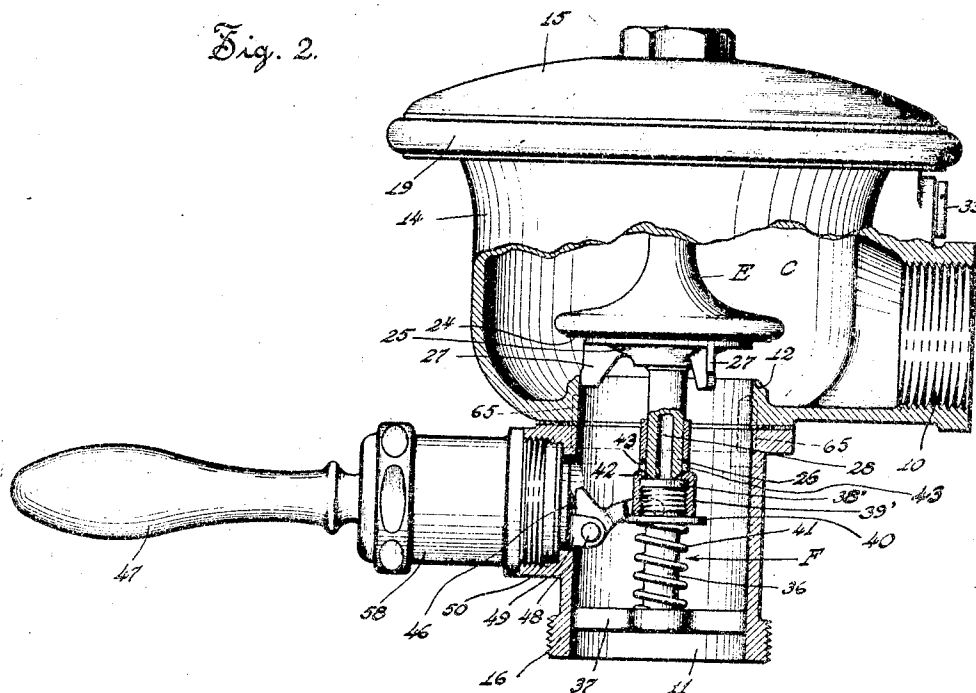
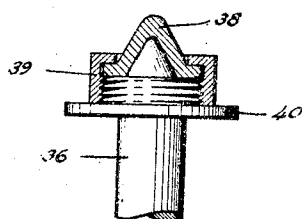


Fig. 4.



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UNITED STATES PATENT OFFICE.

LOUIS E. MACBRYDE, OF WEST HARTFORD, CONNECTICUT.

FLUSHING DEVICE.

Application filed February 19, 1924. Serial No. 693,326.

To all whom it may concern:

Be it known that I, LOUIS E. MACBRYDE, a citizen of the United States, and a resident of West Hartford, county of Hartford, State of Connecticut, have invented certain new and useful Improvements in a Flushing Device, of which the following is a specification.

This invention relates to flush valves of the type wherein the valve is opened to allow a flow of water therethrough when the pressure behind the main valve is relieved by actuating a relief valve, and the flow is automatically cut off by the building up of water pressure behind the main valve after the relief valve has been brought to its seat.

The aim of the present invention is to provide a flush valve of this sort having various features of novelty and advantage, and which is particularly characterized by its extreme simplicity in construction and the ease with which the parts may be assembled, thus making for economy in manufacture; and by its effectiveness in operation, in that the flow of water therethrough is easily controlled and the valve operates with a minimum amount of noise and with no water-hammer.

Other objects of the invention will be in part obvious and in part pointed out hereinafter more in detail.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the appended claims.

In the accompanying drawings, wherein I have shown, for illustrative purposes, one embodiment which the invention may take;

Figure 1 is a view in central section through my improved flush valve with the parts shown in their normal or closed positions;

Fig. 2 is a partial sectional view, similar to Fig. 1, but showing the relative positions of the main valve and relief valve immediately after the operating handle has been released and before the main valve has been brought to its seat;

Fig. 3 is a top plan view of the discharge section of the casing which carries the re-

lief valve and the operating mechanism therefor; and

Fig. 4 is a detail view, in section, of the relief valve.

Referring to the drawings in detail, my improved valve consists, generally, of a casing A divided into a pressure chamber B and a valve chamber C, the latter chamber having an inlet 10, a discharge passage 11, and a valve seat 12 therebetween. The casing is divided into the chambers B and C by a diaphragm D to which is secured the main valve E adapted to cooperate with the seat 12. Located in the discharge portion of the casing is the auxiliary valve F which is manually controlled by the operating mechanism G to relieve the pressure in the chamber B when it is desired to flush the valve. In the present illustrative disclosure of my invention, the casing comprises three parts or sections, namely, a main body 14 in which the main valve E is located, a cap 15 which provides the pressure chamber, and a discharge section 16 to the outlet side of the valve seat 12, and which discharge section carries the relief valve and the operating mechanism therefor, as hereinafter described more in detail. The cap 15 is screw threaded, as at 17, onto the main body 14, and the marginal edge of the diaphragm is clamped between this cap and the main body. In order to insure that the diaphragm will not be pulled loose, the cap is, by preference, formed with an annular bead or rib 18 which, when the cap is screwed home, is pressed into the diaphragm, thereby securely holding it in place. About the circumference of the cap 15 is a resilient ring 19 of rubber or the like against which the seat of the closet engages when it is in raised position and, thus, damage to the seat by being thrown against the metal of the flush valve is guarded against. In the present illustrative disclosure, this rubber ring 19 is seated in a dovetail groove in the perimeter of the cap.

Secured to the under side of the diaphragm D is the main valve E which, by preference, is of reduced diameter between its ends. The valve is secured to the diaphragm D in any suitable manner, as by means of screws 22 which pass through a retaining or wear plate 23 on the upper side

of the diaphragm. This retaining plate, which is in the form of a disk, may be larger than the upper end of the valve E, as shown. The lower edge of the valve E is recessed on its under surface to receive an annular valve packing 24 which is held in place by a disk 25 screwed onto the threaded portion of a stem 26 depending from the main valve into the discharge section 16. The disk 25 may have three or more wings 27 which engage the wall of the discharge passage so as to guide the main valve in its movements towards and away from the seat 12. The main valve is provided with a relief port 28 leading from the pressure chamber B to the discharge opening and controlled by the relief valve F.

Communication between the chamber C and the pressure chamber B is had through a by-pass or duct 30 which, in the present instance, is located in the wall of the main body 14. The upper end of this duct has a bushing 31 carried by the body 14 and extending through the diaphragm D. The flow of water through this duct may be regulated by a needle valve 32 screwed into the valve body. The opening in which the needle valve 32 is screwed may be closed by a plug 33 so as to prevent leakage.

The relief valve F is mounted in the discharge section 16 for movement towards and away from the relief valve seat 35 provided at the lower end of the port 28 through the main valve. In the present illustrative disclosure, this auxiliary valve is carried by a stem or plunger 36 supported for axial movement in a cross-piece or web 37 extending across the discharge opening of the section 16. The valve head of this auxiliary valve as shown in Figs. 1, 3 and 4, is in the form of a hollow cone 38 of leather or the like, and this cone is secured to the upper end of the stem 36 by a cap nut 39 which has a circumferential flange 40. Between the cross-piece 37 and the cap nut 39 is a compression spring 41 which normally urges the relief valve upwardly towards its seat 35 on the main valve.

The mechanism, by which the relief valve is operated to effect the desired flushing, comprises, generally, a pivoted trigger 45, a plunger 46 and a handle 47 so arranged that when the handle is rocked the plunger 46 throws the trigger in a direction to withdraw the relief valve from its seat, whereupon the pressure in the chamber B is relieved, permitting the pressure within the chamber C to raise the diaphragm and the main valve carried thereby. In the present instance, the trigger is in the form of an angle lever pivoted by a pin 48 to lugs or ears 49 extending forwardly from a stuffing box 50 which supports and guides the plunger 46. The pin 48 is held against removal by a cotter 51. That arm of the le-

ver 45 which cooperates with the relief valve is forked or pronged, as shown most clearly in Fig. 3. The ends of these prongs engage and ride upon the flange 40 of the relief valve. It will be noted that there is no rigid connection between the lever 45 and the relief valve, thus permitting the relief valve to adjust itself to the valve seat 35. The relief valve is free to turn so that wear will be evenly distributed thereon. The other arm of the lever is in the form of an upstanding lug which is in line with the plunger 46. Leakage of water about the plunger 46 is guarded against by the packing 55 and the packing gland 56 held in place in the stuffing box 50 by a cap nut 57. The stuffing box 50, together with the parts carried thereby, is held in place by a cylindrical sleeve 58, the forward end of which is threaded into a threaded opening in the side of the discharge section 16. The outer end of this sleeve 58 is turned inwardly to provide a retaining flange 59 against which engages a rib or flange 60 on the rocking handle 47. The inner end of the handle 47 is provided with a convex recess in which engages the round head 61 of the plunger 46. The handle 47 and the plunger 46 are normally held in their inoperative positions by a compression spring 62 located between the cap nut 57 and the head of the plunger 46.

The operation of the device is briefly as follows. When the handle 47 is rocked in any direction, the plunger 46 is moved forwardly against the upstanding arm of the lever 45, thereby rocking this lever in a direction to move the relief valve downwardly away from the valve seat 35. As the water passes from the pressure chamber E through the port 28, the pressure within this chamber is reduced, whereupon the greater pressure within the valve chamber C will raise the diaphragm and, as the main valve is connected to the diaphragm, the main valve is moved upwardly from its seat, whereupon the water is free to flow directly from the inlet to the discharge opening. The upward travel of the main valve is limited by a stop provided in the cap 15, in the present instance this stop being in the form of a depending cylindrical boss 64 against the lower end of which the retaining plate 23 is adapted to engage. The main valve will remain in its raised position, during which time the water will continue to flow through the valve, until the handle 47 is released, whereupon the spring 62 will force the plunger 46 away from the lever or trigger 45, and the spring 41 will cause the relief valve to move upwardly into engagement with its seat 35, as shown in Fig. 2. The flow of water through the relief port 28 is not shut off so that the pressure within the chamber B will build up to such an extent as to more than counterbalance the pressure in

the chamber C, whereupon the main valve will be forced down to its seat. It is to be understood that the relief port 28 will accommodate a faster flow of water than the duct 30, so that when this port is open, the pressure within the chamber B will fall. When the port 28 is closed, the water which flows through the duct 30 into the pressure chamber B cannot escape. It will be understood, of course, that by adjusting the needle valve 32, and thereby controlling the rate of flow of the water to the pressure chamber B, the time required for closing the main valve, after the handle is released, may be regulated, and to that extent the flush may be automatically controlled.

It will be seen from the foregoing description, taken in connection with the accompanying drawings, that the relief valve and the operating mechanism therefor are carried by the section 16 of the valve casing. This section may be readily dissembled from the body 14 by removing the screws 65 which pass through a flange at the upper end of the section 16 and are screwed into suitable threaded holes in the bottom of the main section 14. Preferably, the holes which receive these screws 65 are spaced apart at equal angles, for instance, if there are four such holes in the flange, there will be four similar holes in the body 14, and the holes will be spaced ninety degrees apart. This arrangement is of advantage in that it permits of angular adjustment of the section 16 on the body portion 14. In the present instance, the section 16 may be secured to the body 14 in four different positions, and that position will be selected which will permit of the most convenient operation of the handle 47. It will be further noted that the operating mechanism for the relief valve may be very quickly assembled and taken down. In the event that it is desired to repair or renew any of the parts of the valve mechanism, it is merely necessary to unscrew the sleeve 58 from the section 16 and then withdraw the stuffing box arrangement from position. As the trigger 45 is carried by the stuffing box, it is removed therewith. It is easy to attach and detach the trigger from the stuffing box. Thus, it will be seen, that the arrangement is a very simple one, and the construction is such that the parts may be cheaply made and quickly assembled.

In Fig. 2, the valve head is in the form of a disc 38' held in place by a sleeve 39' screwed onto the upper end of the stem 36. The sleeve has inturned legs 42 engaging the disc. The stem 26 of the main valve has a sliding fit in the upper end of the sleeve 39' for guiding the same. Immediately above the disc 38', the sleeve has outlet ports 43.

As many changes could be made in the above construction and many apparently widely different embodiments of this inven-

tion could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said, to fall therebetween.

I claim as my invention:

1. A flushing device comprising a casing divided into two chambers, one of which is provided with an inlet opening, a discharge opening and a main valve seat therebetween: a diaphragm dividing said casing into said chambers, a main valve carried by said diaphragm and having a relief port, a relief valve independently of said main valve controlling said port and located to the discharge side of said valve seat, and means for operating said relief valve.
2. A flushing device comprising a casing, a diaphragm dividing said casing into a pressure chamber and a valve chamber, said valve chamber having an inlet opening, a discharge opening and a main valve seat therebetween; a main valve carried by said diaphragm and having a port leading from said pressure chamber to said discharge opening, a relief valve carried by said casing independently of said main valve and in said discharge opening for controlling said port, and means for operating said relief valve.
3. A flushing device comprising a casing, a diaphragm dividing said casing into a pressure chamber and a valve chamber, said valve chamber having an inlet opening, a discharge opening and a main valve seat therebetween; a duct leading from said valve chamber to said pressure chamber, a main valve carried by said diaphragm and having a port leading from said pressure chamber to said discharge opening, a relief valve controlling said port and carried by said casing for opening movement in a direction opposite to the opening movement of said main valve, means for normally urging said relief valve into closed position, and means for opening said relief valve.
4. A flushing device comprising a casing, a diaphragm dividing the same into a pressure chamber and a valve chamber, said valve chamber having an inlet opening, a discharge opening and a main valve seat therebetween; a main valve carried by said diaphragm and having a part extending into said discharge opening, a port leading through said part from said pressure chamber to said discharge opening, a relief valve unsupported by said main valve and ar-

ranged to engage and close the lower end of said port, and means for operating said relief valve.

5. A flushing device comprising a casing, a diaphragm dividing the same into a pressure chamber and a valve chamber, said valve chamber having an inlet opening, a discharge opening and a main valve seat therebetween; a main valve carried by said diaphragm and having a port leading from said pressure chamber to said discharge opening, a relief valve carried by said casing and located in said discharge opening, a spring urging said relief valve in a direction to close said port, and means for operating said relief valve.

6. A flushing device comprising a casing, a diaphragm dividing the same into a pressure chamber and a valve chamber, said valve chamber having an inlet opening, a discharge opening and a main valve seat therebetween, a main valve carried by said diaphragm and having a relief port leading from the pressure chamber to said discharge opening, a relief valve unsupported by said main valve and located in said discharge opening for controlling said port, a pivoted lever associated with said relief valve, and means for rotating said lever to operate said valve including a rocking handle and a plunger between said handle and lever.

7. A flushing device comprising a casing, a diaphragm dividing said casing into a pressure chamber and a valve chamber, said valve chamber having an inlet opening, a discharge opening and a main valve seat therebetween, a main valve carried by said diaphragm and having a relief port there-through, a relief valve independently of said main valve controlling said port, and means for operating said relief valve.

8. A flushing device comprising a casing divided into a pressure chamber and a valve chamber, said valve chamber having an inlet opening, a discharge opening and a main valve seat therebetween; a main valve having a port leading from said pressure chamber to said discharge opening, a relief valve carried by said casing and located in said discharge opening, and means for operating said relief valve including a plunger, a stuffing box supporting and guiding the same, a rocking handle, a sleeve for securing said stuffing box and handle in place, and a lever pivoted to and removable with said stuffing box and interposed between said plunger and relief valve.

9. A flushing device comprising a casing, a diaphragm dividing said casing into a pressure chamber and a valve chamber, said valve chamber having an inlet opening, a discharge opening and a main valve seat therebetween, a main valve carried by said diaphragm for movement toward and from the said main valve seat and having a port

therethrough leading from said pressure chamber to said discharge opening and provided with a relief valve seat at one end of the port, a relief valve carried by the casing independently of said main valve and adapted for movement toward and from said relief port seat, a spring normally urging the relief valve against said relief valve seat at all adjustments of said main valve, and means for opening said relief valve at times.

10. A flushing device comprising a casing divided into a pressure chamber and a valve chamber, said valve chamber having an inlet, a discharge opening and a valve seat therebetween; a main valve having a relief port leading from the pressure chamber to the discharge opening, a discharge section, a relief valve carried thereby for controlling said port, means for operating said relief valve including a rocking handle, and means for securing said discharge section to the body portion of said casing in any one of a number of predetermined angular positions.

11. A flushing device comprising a casing divided into a pressure chamber and a valve chamber, said valve chamber having an inlet, a discharge opening and a valve seat therebetween; a main valve having a relief port leading from the pressure chamber to the discharge opening, a discharge section, a relief valve carried thereby for controlling said port, means for operating said relief valve including a rocking handle, the body portion of said casing and said discharge section having similarly and equally spaced screw receiving openings or recesses, and screws received by said openings for securing the discharge section to the body portion of the casing.

12. A flushing device comprising a casing, a diaphragm dividing the same into a pressure chamber and a valve chamber, said valve chamber having an inlet opening, a discharge opening and a main valve seat therebetween, a main valve carried by said diaphragm and having a depending stem and a relief port leading from the pressure chamber to said discharge opening, a relief valve unsupported by said main valve and located in said discharge opening for controlling said port, said relief valve having a sleeve slidably receiving said stem, a pivoted lever associated with said relief valve, and means for rotating said lever to operate said valve including a rocking handle and a plunger between said handle and lever.

13. A flushing device comprising a casing divided into two chambers one of which is provided with an inlet opening, a discharge opening and a main valve seat therebetween; a diaphragm dividing said casing into said chambers, a main valve carried by said diaphragm and having a relief port, a relief valve controlling said port and adapted to

close against the fluid pressure, and means for operating said relief valve.

14. A flushing device comprising a casing, a diaphragm dividing said casing into a pressure chamber and a valve chamber, said valve chamber having an inlet opening, a discharge opening and a main valve seat therebetween; a main valve carried by said diaphragm and having a port leading from said pressure chamber to said discharge opening, a relief valve controlling said port, a spring normally urging said relief valve into closed position and against fluid pressure, said relief valve being adapted to be opened in the direction in which the fluid passes through said port, and means for opening said relief valve.

a pressure chamber and a valve chamber, said valve chamber having an inlet opening, a discharge opening and a main valve seat therebetween; a duct leading from the valve chamber to said pressure chamber, a main valve carried by said diaphragm and having a port leading from the pressure chamber to said discharge opening, a relief valve controlling said port and mounted for opening movement in a direction opposite to the opening movement of the main valve, said relief valve having a closing movement against the fluid pressure, a spring normally urging said relief valve into closed position and against fluid pressure, and means for opening said relief valve.

15. A flushing device comprising a casing, a diaphragm dividing said casing into

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