

T. F. PAYNE.
 FLUSHING VALVE.
 APPLICATION FILED JULY 28, 1911.

1,048,867.

Patented Dec. 31, 1912.

4 SHEETS-SHEET 1.

FIG. 5.

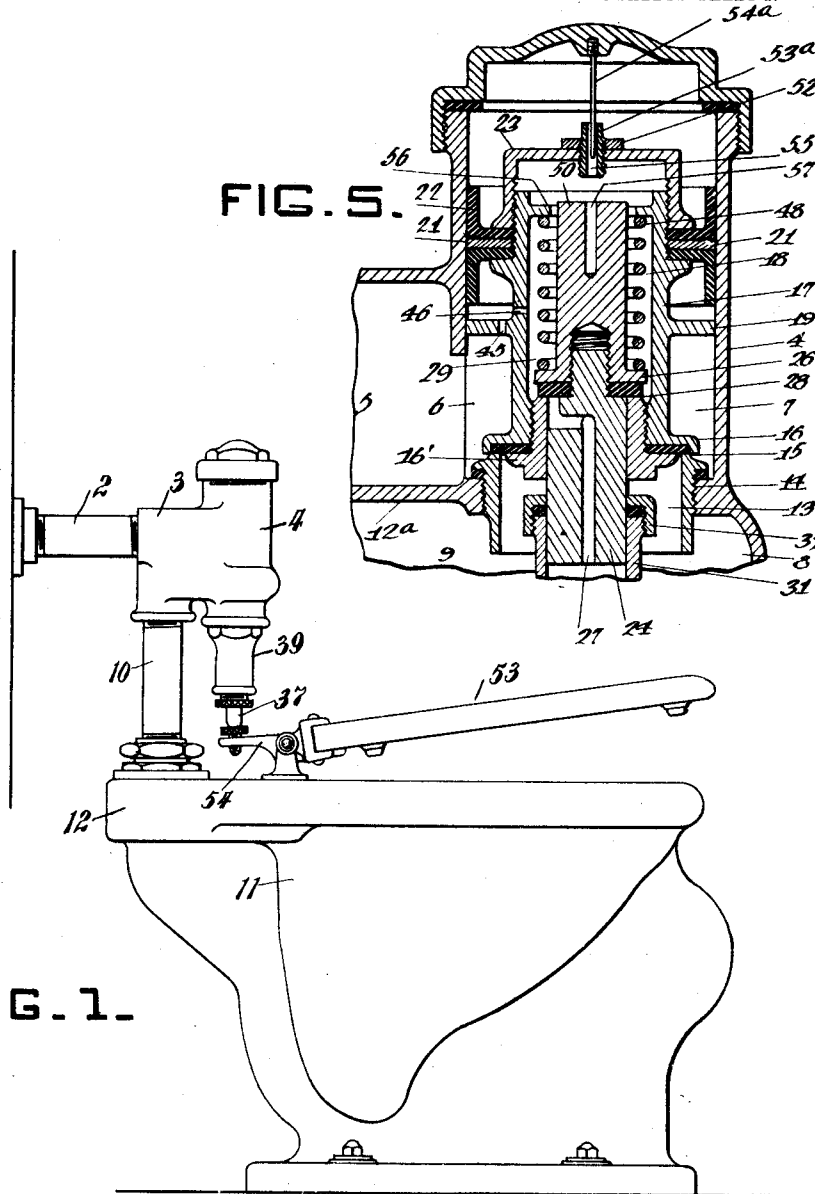


FIG. 1.

WITNESSES

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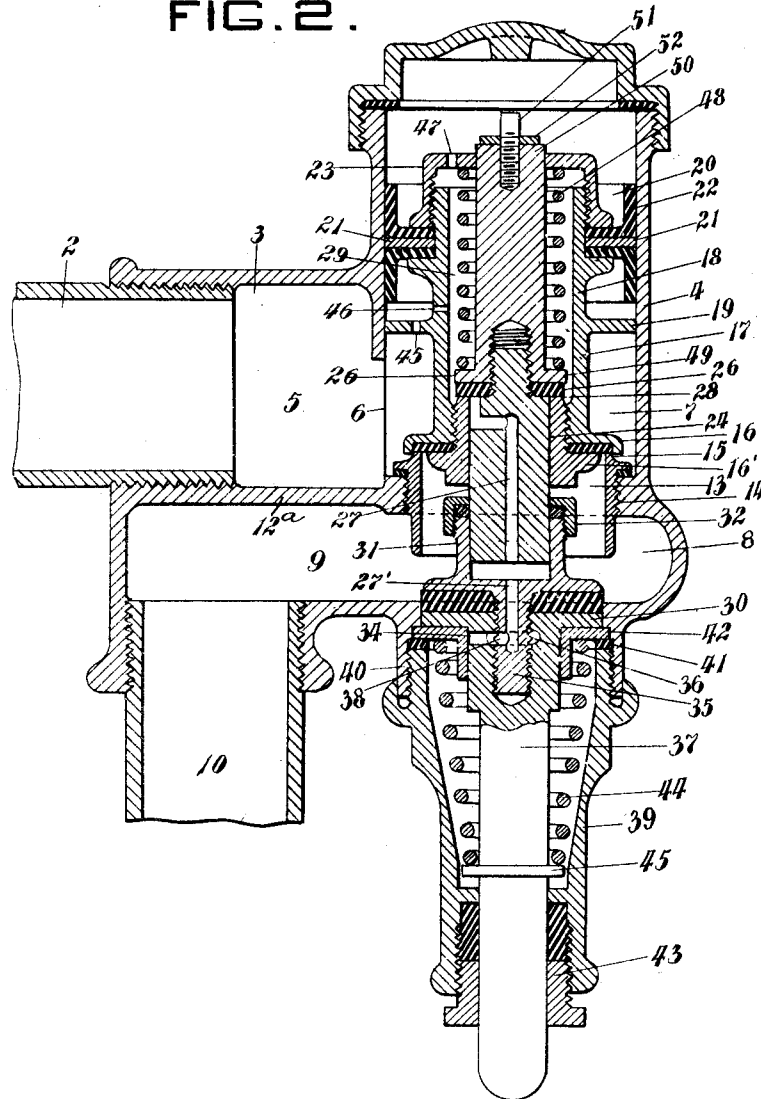
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4 SHEETS—SHEET 2.

FIG. 2.



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4 SHEETS—SHEET 3.

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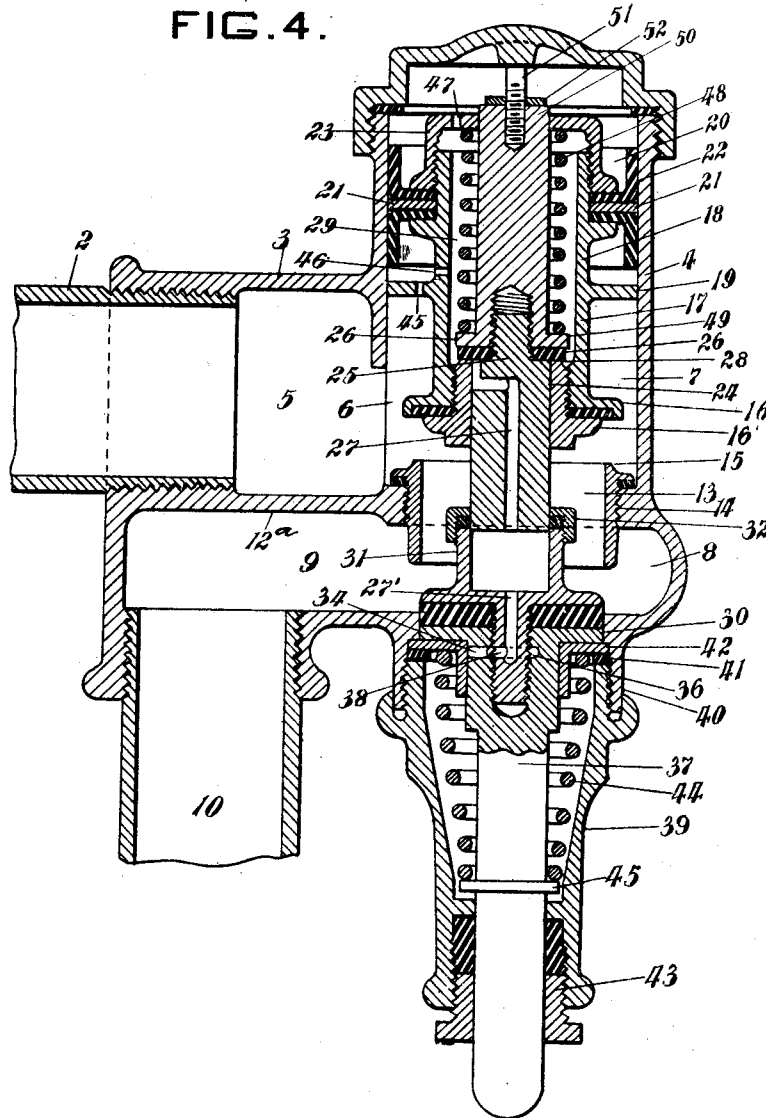
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4 SHEETS-SHEET 4.

FIG. 4.



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UNITED STATES PATENT OFFICE.

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FLUSHING-VALVE.

1,048,867.

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To all whom it may concern:

Be it known that I, THOMAS F. PAYNE, a citizen of the United States of America, residing at Pittsburgh, in the county of Allegheny, State of Pennsylvania, have invented a certain new and useful Improvement in Flushing-Valves, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form part of this specification.

This invention relates to flushing devices or valves for flushing closet bowls, lavatories, and other sanitary apparatus.

The device, taking the embodiment shown in the accompanying drawings, of my invention, relates more commonly to that type of valve in which the main valve which controls the source of supply is operated by the differential pressure of the water, this pressure being controlled by a secondary or relief valve, and its primary object is to provide a simple, durable, inexpensive and improved construction therefor, whereby there is provided a valve that is capable of causing a sustained uninterrupted flow of an abundant supply of flushing water without such impetus of delivery as occasions splattering or splashing within the bowl. As such a valve it contemplates the provision of a structure in which sticking of the valve is overcome and which is susceptible to symmetry in form and lightness in weight.

My invention also aims to provide a novel form of valve in which the mechanism is operatively manipulated by the depression and elevation of the closet-seat incident to use. As such a valve, its object is to provide mechanism which may be easily manipulated without jarring and injurious ramming of the valve mechanism and whereby the valve may be returned without liability of canting or sticking; and valve mechanism which is otherwise improved in detail of construction as will be hereinafter more fully described.

I will now describe my invention so that others skilled in the art to which it appertains may understand and construct the same and, while reference is had to the accompanying drawings in connection with this description, it is to be understood that I do not desire to limit myself to the embodiment of my invention illustrated in the drawings, it being premised that the invention is susceptible of embodiment in various forms of valves of the type mentioned above.

The particular type of valve shown is of the class known as automatically operating valves, that is, valves which are operated by the depression and returning elevation of the closet seat, the depression of the seat serving to place the valve mechanism, as stated above, in condition preparatory to flushing upon removal of the pressure from and consequent elevation of the seat, and in Figure 1 I show a side elevation of a water-closet having attached thereto a flushing valve of the type mentioned, that is, of the automatically operating type, and embodying my invention; Fig. 2 is an enlarged vertical sectional view of the valve showing the valve in the closed or normal position it occupies when the seat is inclined or elevated; Fig. 3 is a similar view showing the position of the valve mechanism immediately upon depression of the closet seat; Fig. 4 is a similar view showing the valve mechanism in flushing position immediately after release of the pressure upon the closet seat; and Fig. 5 is a similar, but fragmentary view showing a modified form of valve of this same automatically operating type and to be hereinafter more fully referred to in the body of this specification.

The valve illustrated is of the type in which the flushing is effected directly from the source of supply, that is, it is shown as having no auxiliary storage or flushing tank as is sometimes employed with valves of this class and as such the source of supply is indicated by the numeral 2, leading into the inlet 3 of the casing 4. This inlet 3 is formed by the chamber 5 laterally communicating at 6 with the chamber 7 of the casing 4. Below the chamber 7 is the chamber 8 and leading therefrom is the passage-way 9, or discharge port which communicates with the discharge pipe 10 leading to the closet bowl 11, or flushing rim 12 of the closet bowl or other apparatus to be flushed. The wall 12^a which separates the chamber 8 and passage 9 from the chamber 7 and chamber 5 has the opening 13 in which is disposed the screw threaded removable bushing 14. This bushing 14 carries at its top the valve seat 15 formed complementary with the valve 16 carried at the base of the piston 17. The piston 17 comprises the barrel-like member 18 having a suitable spacing flange or arm 19 and the piston head or piston proper 20. As shown, this head 20 may be formed by the disk 21, on the

opposite sides of which are symmetrically disposed the suitable cup leathers 22, the leathers and disks being clamped in position by the cap piece 23 having screw-threaded engagement with the top of the barrel 18 as clearly brought out.

The valve 16 has the central bore 24 within which snugly fits the plug-like stem 25 of the valve 26. This plug 25 has the central inlet passage 27 leading to the valve seat 28 which coöperates with the valve 26 to normally close communication of the said passage 27 with the chamber 29 of the barrel 18. This passage-way 27 is formed to register with the passage-way 27' of the valve 30, which is adapted to be elevated as shown in Fig. 3 into socketed engagement with the bushing 14. This communication of the passage-way 27 with that of the passage 27' is effected by mounting of the lower end of the stem 25 within the upwardly extending cup-like head 31 of the valve 30, and is maintained thereby at whatever relative operative position the valve may occupy. This head 31 carries a suitable stuffing box 32 which serves to prevent entrance of water into the joint between the stem 25 and the valve 30. It will be noticed that the wall itself of the cup-like member 31 extends upwardly, sufficiently to be associated with the lower end of the stem 25 even when the valve 30 is in its lowered or normal position, the purpose of this being to prevent the lower end of the valve stem 25 from acting upon and injuriously abrading the packing of the stuffing-box.

With the valve 30 elevated in the position shown in Fig. 3 the passage 27' is adapted to communicate with the chamber 8 and discharge passage-way 9, this communication being effected by laterally boring the stem as at 34 into direct association with the central passage 27'. The passage 27' leads into the depending screw shank 35 of the valve head 31, and the said bore 34 communicates with the annular pocket 36 which is carried by the stem 37 of the valve and into which leads the passage-way 27', no matter in what position the small lateral or annular opening 38 of the passage 27' may lie with respect to the entrance 34.

The stem 37 of the valve 30 projects from the casing 4 at the lower end thereof. This part of the casing is preferably separately formed, being indicated by the numeral 39, and screw-threaded to the depending nipple-portion 40 of the casing proper. The upper end of this sleeve-like portion 39 of the casing serves to clamp with the suitable packing 41 the ringlike bushing 42 interposed between a shoulder of the casing 4 and the packing. This bushing 42 serves to centrally mount the upper end of the valve stem 37, the lower end of the valve stem projecting beyond the casing, passing through a

suitable stuffing-box arrangement 43. A coiled spring 44 interposed between a shoulder or fixed collar 45 carried by the stem 37 and the bushing 42 serves to normally press the stem 37 downwardly against the bushing 42 as shown in Fig. 2.

With the valve in its normal or closed position, the water from the source of supply 2 exerts its pressure upon the piston 17 at the upper part of the casing, through the openings 45, 46 and 47, formed respectively in the guide flange or arm 19, wall of the piston 17 and the wall of the cap 23. The valve 26 is kept normally pressed into engagement with its seat 28 by the spring 48 within the chamber 29 of the piston and interposed between the cap 23 and the flange 49 of the upper portion 50 of the stem 25. This upper portion 50 of the stem projects through an opening in the cap 23 and terminally carries the adjusting screw 51 provided with a suitable jam nut 52, and which serves to limit the upward travel of the piston 17 and valve 16 when they are caused to ascend within the chamber 7 of the casing 4.

The operation of the valve is clearly shown in the several views, the normal position of the valve being shown in Fig. 2 and therein the valve 16 is shown as normally engaging its seat 15 for closing the inlet port from association with the lower part of the casing having the discharge or outlet passage or port. In this position the lower valve 30 assumes a position out of association with the bushing 14. When the closet seat 53 is depressed the stem 37 is caused to be forced upwardly by means of the swinging lever 54 common to this class of automatically operating flushing mechanism, to the position shown in Fig. 3. In this position, the valve 30 now occupies a position within the bushing 14 in such manner as to close communication of the chamber 7 with the chamber 8, and by this upward thrust of the stem 37 the stem 25 and its associated portion 50, together with the secondary valve 26, piston 17 and valve 16 are elevated as brought out in this view in Fig. 3.

The upward forcing of the valve 26 from its seat opens communication of the chamber 29 and upper portion of the chamber 7 above the piston 17 with the chamber 8 and discharge passage-way 27, the upward travel of the valve 30 serving to bring the passage-way 27' communicating with the passage 27 into open communication with the chamber 8 and passage 9. By the unseating of the valve 26 and this communication of the upper part of the chamber 7 with the chamber 8 as just described, the pressure which has heretofore been exerted upon the top of the piston is now relieved by the escape of the water through the passage 27 and 27' into the chamber 8 and discharge passage 9 with the result that the spring 48 exerting its

pressure against the cap 23, the seat 28 is carried upwardly into closing engagement with the valve 26 by an upward movement of the piston 17. The upward movement of the piston results in the upward travel or further opening of the valve 16, in which position it remains preparatory to the flushing operation which takes place immediately upon the removal of the pressure on the closet seat and consequent return of the valve stem 37 and its valve 30 to normal position. This return of the valve 30 to normal position, of course, as shown in Fig. 4, uncovers the opening within the bushing 14, bringing the chamber 7 and inlet chamber or passage 5 into direct and wide open communication with the lower chamber 8 and discharge passage-way 9. This communication enables the water to pass from the inlet 2 to the chambers and passage-ways just mentioned to the discharge port 10 and thence to the apparatus to be flushed while the valve 16 remains open. During this flow of water, the chamber 7 above the piston 17 is being filled from the source of supply through the openings 45, 46 and 47, where it exerts its pressure upon the piston 17 of large area against the slight resistance offered by the open lower portion of the chamber 7. The valve 16 preferably carries the head 16' which serves to choke off the water and proportionately increase the pressure exerted at the top of the piston as the valve, through such pressure, gradually goes to its seat.

The opening 27 is preferably of a size that will prevent a too free discharge of water from the top of the chamber 7.

In Fig. 5 I show a modified form of valve employing my invention, wherein the cap 23 of the piston 17 is shown as having the adjusting screw 53^a in lieu of the opening 47 shown in the preceding views, and depending from the cap or top of the casing 4, is the wiper-rod 54^a which lies within the orifice 55 and serves, through the reciprocation of the piston 17 to keep the passage-way 55 free from dirt or deposits which would otherwise tend to clog it. The coiled spring, carried within the barrel 18 of the piston 17, instead of bearing against the under side of the cap 23, is interposed between the flange or shoulder of the valve 26 and the upper annular shoulder 56 of the barrel 18, the upper portion 50 of the valve stem terminating within the cap 23 and having the central bore 57 into which the lower end of the wiper-rod 54^a passes when the piston 17 is elevated. The operation of this valve is the same as that described above with the exception that water passes from the chamber of the barrel 18 of the piston 17 to the top of the chamber 7 through the openings 45 of the screw 53^a instead of the opening 47 in the cap 23, as shown in Fig. 2.

Further modifications in the structure shown in the accompanying drawings may be made without departing from my invention. The valves, while of a design which conduces to lightness and symmetry, may be constructed in various different ways while the general shape of the casing proper and the disposition of the ports therein may also be varied without sacrificing my invention.

The device is simple in construction and the specific embodiment shown is such that the valves with their associated stems, coiled springs, etc., may be removed intact from the fitting or casing. The form of piston, while conveniently shaped to adapt the valve to simple mounting, nevertheless, may be varied still further than is shown in Fig. 5.

In the operation of the valve, the valve 30 as above described, is returned to its seat through the pressure of the spring 44, although it will be apparent that pressure is exerted upon the upper face of the valve 30 by the water in the chamber 7. However, the return of the valve 30 is independent of the return of the valve 16 to its seat. This enables the valve 30 to immediately drop from the passage 13 and thereby uncover a large mouth or entrance way to the passage 9 preparatory to the slow, gradual closing of the valve 16 and resultant flow from the source of supply from the chamber 7 into the chamber 8 and thence to the passage 9.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a flushing valve, a casing having an inlet and an outlet port communicating with a chamber, a piston reciprocally mounted in the chamber, a valve associated with the piston and adapted to control communication between the ports, and a second valve adapted to be moved to a position to close communication between the ports and having a passage way associated with a passage way leading from the chamber; the passage way of the second valve being adapted to communicate with the outlet port when the second named valve is moved to closing position.

2. In a flushing valve, a casing having a chamber and an inlet and an outlet port communicating therewith, a piston reciprocally mounted in the chamber and having a valve for controlling communication between the ports, a second valve for closing communication between the ports, and a third valve for normally closing a passage way leading from the top of the piston to a passage way in the second valve; the last named passage way being adapted to communicate with the outlet of the valve when the second valve is in closing position.

3. In a flushing valve, a casing having a

chamber and an inlet and an outlet port communicating therewith, a wall separating the inlet from the outlet port and having an opening to effect communication between the ports, a piston mounted in the chamber, a valve associated with the piston and adapted to control communication of the ports at the opening and a second valve adapted to be moved to a position to close the opening and associated with the first named valve and having a passage way effecting communication between the chamber and outlet port when the said second valve is moved to closed position, the second valve being adapted to return to normal position independently of the closing movement of the first valve, and by such return movement to close the lower end of the pas-

sage-way leading from the chamber to the outlet.

4. In a flushing valve, a casing having inlet and outlet ports, communicating with a chamber, a piston reciprocally mounted in the chamber, a valve associated with the piston and adapted to control communication between the ports, a second valve provided with a chambered head portion, and a stem portion carried by the first valve and reposing in the chambered head portion, the second valve having a passage-way in communication with a passage-way in the stem portion of the first valve.

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Witnesses:

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