March 3, 1931. J. C. OWENS 1,794,640

TANK FLUSHING VALVE

Filed April 23, 1930

Fig. 1.

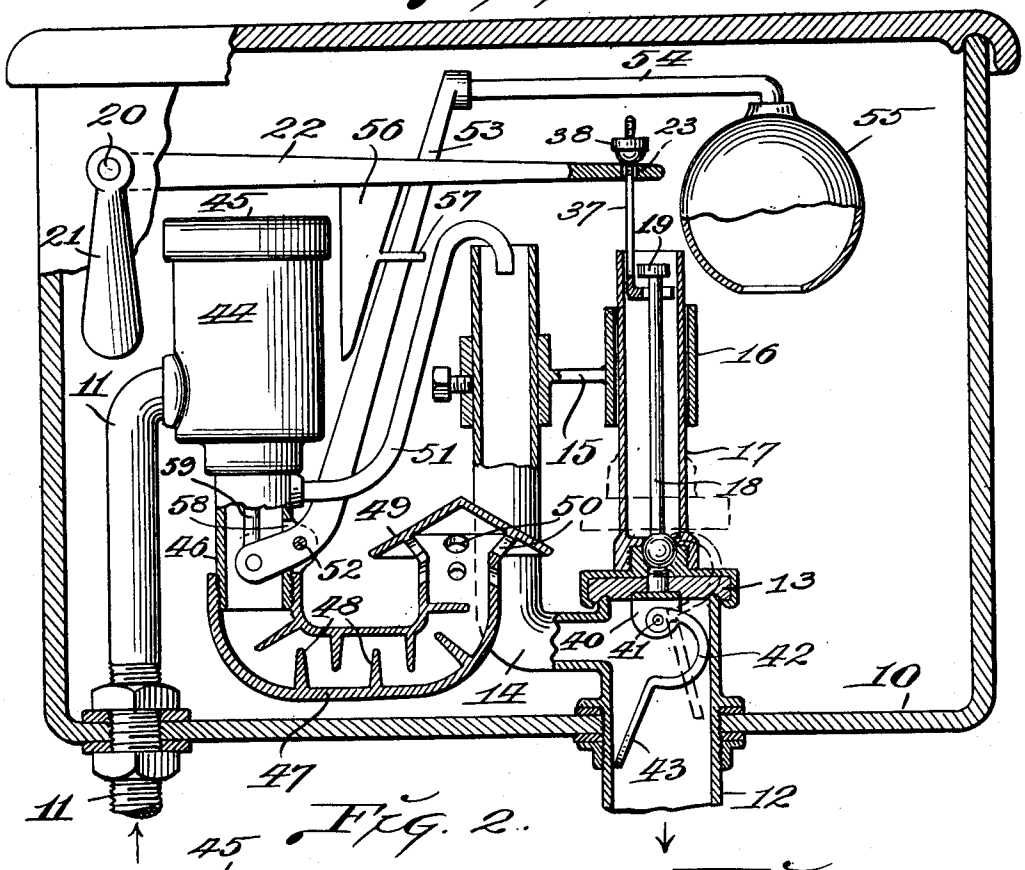


Fig. 2.

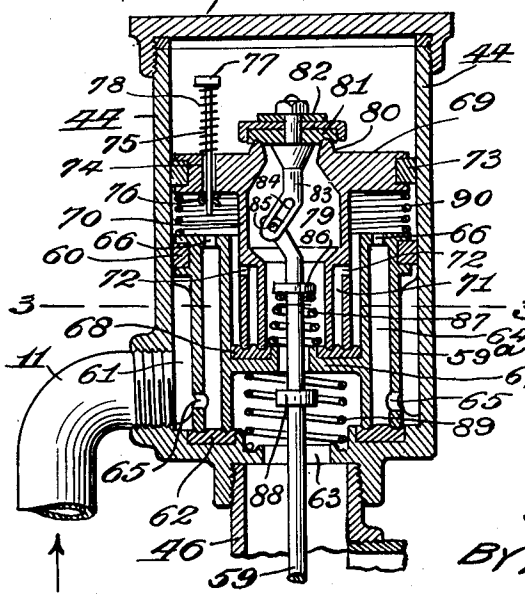
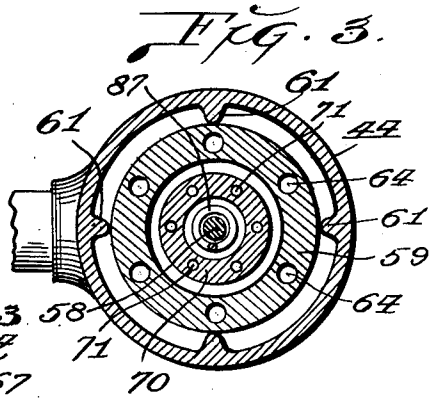


Fig. 3.



INVENTOR:
JESSE C. OWENS.
BY Martin P. Smith ATTY.

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JESSE C. OWENS, OF LOS ANGELES, CALIFORNIA

TANK-FLUSHING VALVE

Application filed April 23, 1930. Serial No. 446,595.

My invention relates to a flushing apparatus and has for its principal object, the provision of a relatively simple, practical and efficient flushing device that is especially designed for use in flushing water closet bowls and the like.

Further objects of my invention are, to provide a flushing device having relatively simple and practical valves for controlling the flow of water into the tank with which the flushing apparatus is associated and likewise for controlling the discharge of water from said tank, and to provide an improved valve for controlling the inlet of water into the tank, which valve is constructed so that the pressure of the water on the operating parts of the valve, is equalized so as to render the manual actuation of the valve comparatively easy and at the same time, minimizing the liability of leakage of water through the valve due to unequal pressure upon its parts.

A further object of my invention is, to generally improve upon and simplify the construction of the flushing valves disclosed in Letters Patent No. 1,728,625, issued to me September 17th, 1929, and No. 1,755,558, issued to me April 22nd, 1930, and my copending patent application filed July 16th, 1926, Serial No. 122,815.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts that will hereinafter be more fully described and claimed and illustrated in the accompanying drawings, in which:

Fig. 1 is a vertical section taken lengthwise through the center of a toilet tank and showing my improved flushing apparatus positioned therein.

Fig. 2 is an enlarged vertical section taken through the center of the valve that controls the inlet of water into the tank.

Fig. 3 is a horizontal section taken on the line 3—3 of Fig. 2.

Referring by numerals to the accompanying drawings which illustrate a practical embodiment of my invention, 10 designates a tank of the type generally used for flushing toilet bowls and the like and leading into the lower portion of said tank is a water supply pipe 11 and leading downwardly from the lower portion of the tank is an outlet pipe 12 that is connected to the bowl or other fixture that is to be flushed.

The upper end of outlet pipe 12 constitutes a seat upon which normally rests a valve 13.

Leading from the upper portion of outlet pipe 12 within the tank a short distance laterally and thence vertically is an open ended pipe 14 and detachably secured thereto is one end of a horizontally disposed bracket 15 provided at its outer end with a vertically disposed sleeve 16. This sleeve serves as a vertical bearing for a tubular member 17 that projects upwardly from the top of valve 13.

Connected by a bolt and socket joint to the top of valve 13 within the lower portion of tube 17 is the lower end of a vertically disposed rod 18, on the upper end of which is formed a head 19.

Journaled in the upper portion of the front wall of the tank 10 and adjacent to one end thereof is a horizontally disposed shaft 20 and secured thereto directly in front of the tank is a handle 21.

Secured to shaft 20 within the tank is one end of a horizontally disposed arm 22 and formed in the free end of this arm is an aperture 23 for the accommodation of the vertical leg of an L-shaped member 37. That portion of the vertical leg or member 37 above the arm 22 is threaded for the reception of a nut 38 that bears on top of the end of arm 22.

The horizontal leg of member 37 is slotted as designated by 39 and this slotted member engages beneath head 19 on rod 18.

Depending from the underside of the center of valve 13 is an inverted U-shaped bracket 40, through which passes a horizontally disposed pin 41 and pivoted on said pin is the upper end of a semi-circular arm 42 and projecting downwardly from the lower end of this arm 42 is a tongue or plate 43.

When valve 13 is closed the arm 42 and plate 43 hang by gravity from the underside of the valve and said parts occupy the positions as shown by solid lines in Fig. 1.

Secured to the upper end of inlet pipe 11 that enters tank 10, is a short vertically dis-

posed cylindrical valve housing 44 provided with a removable cap 45 and connected to and depending from this valve housing is an outlet pipe 46 to the lower end of which is connected the upturned end of a horizontally disposed baffle pipe 47 that is provided with a plurality of internally arranged staggered or offset baffle plates 48. These baffle plates are for the purpose of restraining the flow of water through pipe 47. The end of pipe 47, opposite the end that is connected to outlet pipe 46, is turned upward and provided with a cap 49 and formed through the wall of the pipe just below said cap are outlet apertures 50.

Leading from the upper portion of outlet pipe 46, just below the valve housing 44 upwardly and into the upper end of pipe 14 is a small tube 51 which functions as a refill pipe in that it delivers water from the inlet control valve to pipe 14 and this water passing downwardly through outlet pipe 12 refills the bowl immediately after a flushing operation.

Fulcrumed on a horizontal axis 52 on the side of outlet pipe 46 is an upwardly projecting arm 53 and connected to the upper end thereof in the upper portion of tank 10 is a horizontal arm 54 to the outer end of which is connected a float 55.

Depending from arm 22 and normally spaced a short distance away from arm 53 is a lug 56 that is adapted to bear against the float carrying arm 53 when arm 22 is swung upward and a pair of fingers 57 project from the lower portion of lug 56 and engage arm 53 so as to hold the parts in proper operative positions.

The lower end of lever 53 projects through an opening 58 in pipe 46 and the end of said lever within said pipe is pivotally connected to the lower end of a rod 59 that projects axially upward through pipe 46 and into valve housing 44.

Arranged for sliding movement in the lower portion of valve housing 44 is a tubular valve 59[a] and seated in the upper portion of the periphery thereof is a packing ring 60 that bears against the inner face of housing 44.

The external diameter of valve 59[a] is slightly less than the internal diameter of housing 44 and during the vertical movement of said valve its periphery bears against vertically disposed ribs 61 that project inwardly from the wall of the housing.

The lower end of valve 59[a] rests on a seat 62 that is formed of suitable packing and which is positioned on the upper face of the bottom of housing 44 around the outlet opening 63 in said bottom and which outlet opening communicates with the upper end of pipe 46.

Leading upwardly from the bottom of the wall of valve 59[a] are vertically disposed ducts 64 and formed through the outer portion of the wall of the valve and communicating with the lower portions of these ducts are apertures 65.

Formed through the top of the body of the valve and communicating with the upper ends of ducts 64 are apertures 66.

Formed in the lower portion of tubular valve 59[a] is a horizontally disposed partition 67 in the center of which is an aperture for the accommodation of rod 58 and arranged on top of this partition is a circular seat 68 of suitable packing.

Arranged for sliding movement in the upper portion of valve housing 44 is a disc 69 from the center of which depends a tubular member 70 and the lower end of this tubular member normally rests on seat 68.

Formed through the lower portion of the wall of tubular member 70 is a series of vertically disposed bores 71 that are open at their lower ends and the upper ends thereof communicating through ports 72 with the annular space between the tubular member 70 and the opening through valve 59[a].

Seated in the edge of disc 69 is a packing ring 73. Formed through disc 69 to one side of the center thereof is an aperture 74 and arranged to slide freely therethough is a vertical rod 75, the diameter of which is slightly less than the diameter of aperture 74.

Carried by rod 75 below the disc 69 is a pin 76 and arranged on the upper portion of said rod between disc 69 and a head 77 that is formed on the upper end of said rod is a relatively light expansive spring 78.

Formed through disc 69 and in the upper portion of the tubular member 70 is an opening 79 and formed on top of the disc around said opening is a rib 80 that functions as a seat for a packing disc 81 and the latter being secured to the underside of a disc valve 82.

Depending from the center of this valve is a short inclined arm 83 in which is formed a slot 84 and projecting through said slot is a pin 85 that is seated in the laterally bent upper end of rod 58.

Secured on rod 58 a short distance above the upper end of tubular member 70 is a collar 86 against which engages the upper end of an expansive spring 87 and the lower end of the latter rests on partition 67.

Arranged on rod 58 a short distance below partition 67 is a collar 88 and arranged by the partition 67 and the bottom of housing 44 is an expansive coil spring 89.

Arranged between the top of valve 59 and the edge of disc 69 is an expansive coil spring 90.

Under normal conditions or with tank 10 partially filled with water the various operating parts of the flushing apparatus occupy the positions as illustrated in Figs. 1 and 2 with valve 13 closed on the upper end

of outlet pipe 12 and with the buoyancy of float 55 acting through arms 53 and 54 to exert pulling strains on rod 58 and thereby hold valve 82 on its seat 80.

Water from supply pipe 11 enters the lower end of valve housing 44 and passes through ports 65, ducts 64 and ports 66 into the chamber between the top of the tubular member 59 and disc 69 and water passes through ports 72 and ducts 71 so as to equalize pressure of the water on the operating parts of the valve.

Water under pressure passes upwardly through aperture 74 into the chamber within the upper portion of the valve housing and the pressure of this water against disc 69 which has relatively large area is effective in holding the lower end of the tubular member 70 on its seat 79 and as valve 82 is held on its seat by the pulling strains exerted by the buoyant float, the outlet for the supply water under such conditions are entirely closed and therefore leakage of water through the main valve is practically eliminated.

To operate the flushing apparatus, handle 21 is manually engaged and swung toward the right hand with the result that the free end of arm 22 will be swung upward. Following this action the L-shaped bracket 37 engages on rod 18, thereby exerting upward pull on valve 13 so as to unseat same and water contained within the tank will immediately flow into the open end of inlet pipe 12 and downwardly so as to flush the bowl.

As valve 14 is thus elevated semi-circular arm 42 will be brought into position just above the upper end of outlet pipe 12 and the rush of water into and through the outlet pipe acting against plate 43 will move the same into an intermediate position and thereby swing the semi-circular arm 42 outwardly so that its lower portion rests on the upper edge of outlet pipe 12 and consequently holding the valve 13 in its elevated position while the water is discharging through the outlet pipe.

As soon as this discharge ceases, arm 42 and plate 43 will return to their normal positions by reason of gravity and valve 13 will now move downwardly until it rests on the upper end of the outlet pipe.

Inasmuch as tube 17 is open at its upper end and said open upper end is always positioned above the water level within the tank, said tube will to a certain extent function as a float to exert tendency to hold the valve off its seat when elevated as just described, but when the tank is filled with water to its normal level the pressure of such water maintains valve 13 on its seat.

When handle 21 is actuated to switch arm 23 upward the lower end of lug or finger 56 will bear against arm 53 so as to swing same outwardly and downwardly away from valve housing 44 so as to accelerate the movement of the float carrying arm and which latter controls the water inlet valve.

As arm 53 swings on its fulcrum rod 58 is elevated and the pin 85, travelling upward in slot 84, tilts the arm 83 and consequently opens valve 82 with a tilting action and which action is accomplished with greater ease than if the valve were lifted bodily from its seat while in a horizontal plane.

Following the opening movement of valve 82 water under pressure in the chamber above disc 69 will flow downwardly through chamber 79 and thence through the lower portions of the valves to outlet pipe 46 and this water, after passing through the baffle tube 47, will discharge from the apertures 50 into the chamber within the tank so as to refill the latter.

As the air and water pressure in the chamber in housing 44 above the disc 69 is thus relieved, disc 69 and member 70 carries itself, thereby moving upwardly within the valve housing, thereby withdrawing the lower end of member 70 from seat 68 and the tubular member 59 will now move upwardly under the pressure of the water entering through supply pipe 11 and as a result the water from pipe 11 may flow directly through the lower portion of the valve housing and discharge through opening 62 into outlet 46.

The upward movement of the valves within the housing is accelerated by the action of the expansive coil springs 87, 89 and 90 and which springs are not strong enough to overcome the pressure of the water that prevails within the housing under normal conditions.

As disc 69 moves upwardly within the housing, the head 77 or rod 75 will strike against cap 45 and move downwardly a short distance, thereby cleaning the aperture 74 of any corrosion or any dirt that may collect within said opening and thus water may at all times pass through said opening to the chamber above piston 69.

As my improved flushing apparatus has been actuated as just described and water discharges into the tank to refill the same, the float 55 will be gradually moved upward, thereby swinging arm 53 on its fulcrum 52 and through rod 58, valve 82 will be drawn downwardly so as to reseat the lower end of member 70 on its seat 68 and to seat the lower end of tubular member 59 on its seat 62.

When the parts of the valve have been reseated as just described water under pressure will fill the chambers within the valve housing 44 surrounding the valves therein and the pressure of this water is utilized in retaining the valves upon their seats.

After valve 13 has been seated and water is still discharging into the tank to refill same, a relatively small amount of water will discharge through pipes 51, 14 and 12 so as to refill the bowl immediately after the same has been flushed.

Thus it will be seen that I have provided a flushing apparatus that is relatively simple in construction, practically automatic in operation and very effective in performing the functions for which it is intended.

It will be understood that minor changes in the size, form and construction of the various parts of my improved tank flushing valve may be made and substituted for those herein shown and described without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim as my invention:

1. In a tank flushing apparatus, a tank provided with inlet and outlet connections, a valve housing arranged within the tank and connected to the inlet connection, a plurality of cooperating valves arranged within said valve housing for controlling the flow of water therethrough, a float arranged for operation within the tank and connected to one of the cooperating valves for normally retaining all of said valves on their seats, a valve for normally closing the outlet connection from the tank and manually operable means for unseating said last mentioned valve.

2. A tank flushing apparatus, as set forth in claim 1, and with a member carried by said manually operable means for applying pressure to said float when the valve controlling the outlet connection is opened.

3. A tank flushing apparatus, as set forth in claim 1, and with means associated with the valve controlling the outlet connection for holding said valve in open position during the discharge of water through said outlet connection.

4. In a tank flushing apparatus, a tank provided with inlet and outlet connections, a valve housing connected to the inlet connection with said tank, a pair of piston valves arranged for operation within said valve housing, one of which piston valves is disposed within and above the other, there being an axial opening, through the upper one of said piston valves, a valve controlling said opening, a push rod for unseating said last mentioned valve and a float arranged for operation within said tank and connected to said push rod.

5. A tank flushing apparatus, as set forth in claim 4, and with connections between said push rod and valve for tilting the latter as said push rod is raised.

6. A tank flushing apparatus, as set forth in claim 4, with springs arranged to exert upward pressure on said piston valves and a spring arranged to exert upward pressure on said push rod.

7. A tank flushing apparatus, as set forth in claim 4, with the upper one of the piston valves provided with an aperture to establish communication between the chamber above the upper one of the piston valves and the chamber between said piston valves and a spring pressed rod arranged for sliding movement through said aperture.

8. In a tank flushing apparatus, a tank having inlet and outlet connections, a valve housing arranged within the tank and connected to said inlet connection, there being a seat in the lower portion of said valve housing around the outlet opening therefrom, a piston valve arranged for operation within the lower portion of said valve housing and normally resting on said seat, said piston valve being provided in its intermediate portion with a seat, a second piston valve arranged for operation within and above the first mentioned piston valve, the lower end of which second piston valve normally engages the seat on the intermediate portion of the first mentioned piston valve, the second mentioned piston valve having an axial opening and a float control valve normally closing said opening.

9. A tank flushing apparatus, as set forth in claim 8, and with springs arranged so as to exert pressure tending to unseat said piston valves.

10. A tank flushing apparatus, as set forth in claim 8, with the upper one of the piston valves provided with an opening and a spring pressed rod arranged for operation through said opening.

11. In a tank flushing apparatus, as set forth in claim 8, and with said piston valves provided in their walls with ducts for the admission of water to the chambers between said valves and to the seats on which the lower ends of said valves rest.

In testimony whereof I affix my signature.

JESSE C. OWENS.