C. POOL.
BALL COCK VALVE FOR FLUSH TANKS.
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1,263,699. Patented Apr. 23, 1918.

ATTORNEY
To all whom it may concern:

Be it known that I, Chester Pool, a citizen of the United States, residing at Delta, in the county of Delta and State of Colorado, have invented certain new and useful Improvements in Ball-Cock Valves for Flush-Tanks, of which the following is a specification.

This invention relates to an improvement in ball cock valves, and more particularly to such valves as are adapted to be used to control the water supply to flush tanks and in other connections where noiseless action is desired.

With the majority of such valves now in use, the water supply is gradually cut off through the gradual closing of the valve through rising of a ball float connected to actuate the same, and it is an object of my invention to provide a device in which the valve will be maintained full open until the water has reached substantially the desired level, and then the valve will be permitted to close almost instantaneously.

A further object is to so construct the parts that the valve and other parts pertinent thereto may be fitted in place of the original valve after the flush tank has been installed, or may be built thereinto in the manufacture, the parts being arranged to fit within the space provided in such flush tanks without any alterations or modifications in the installation.

A still further object is to so construct the mechanism that the water flowing through the valve will be strained and at the same time, the valve opening will be of sufficient size that the usual whistling sound caused by the water passing through a more or less constricted opening will be avoided, and also to so construct the parts that the “water hammer” action usually attended upon the sudden closing of these valves, should a quick closing valve be used, will be avoided.

With the above and other objects in view, my invention consists in certain novel features of construction and combinations of parts which will be hereinafter set forth in connection with the drawings and then more particularly pointed out in the claims.

In the drawings:

Figure 1 is a view in elevation with parts shown in section to illustrate the arrangement of the various members when the valve is in the open position.

Figure 2 is a fragmentary side elevational view showing the relative positioning of the parts when the valve is closed.

Figure 3 is a fragmentary top plan view showing the structure shown in Fig. 2.

Figure 4 is a fragmentary view partly in section to show the lower end of the main valve tube.

Figure 5 is a detail perspective view to better disclose the arrangement of the tripping parts.

The main valve tube 1 is adapted to pass through the bottom 2 of the flush tank and the locking packing nuts 3 and 4 are received upon the lower screw-threaded end of the tube 1 so that these nuts may be tightened against the upper and lower sides of the bottom 2 to establish a water-tight joint in the installation of the tube 1. A cap 5 has internal screw-threads to fit and be threaded onto the external screw-threads on the upper end of the main valve tube 1 and a sleeve 6 is made to depend downwardly from the cap 5 to be reentered into the tube 1. A water supply tube 7 is connected with the lower end of the sleeve 6 and the lower end of this water supply tube 7 is closed and is shaped to have the pointed formation as at 8 so that a flat impendiment to the flow of water up into the main tube 1 will not be interposed, and this water supply tube 7 has the saw slots 9 formed at spaced apart points adjacent the lower pointed end 8 thereof so that communication is established by the main tube 1 to the interior of the water supply tube 7. The sleeve 6 has a bore formed therein to provide a continuation of the opening from the water supply tube 7, and this opening is continued on up through the shaft to have its upper end terminate in the valve seat 10. A valve casing 11 is secured on the cap 5.
through the medium of the screw-threads as at 12, and this valve casing has the branch 13 disposed from one side thereof and thence to open downwardly, the water discharge pipe 14 being connected with this branch 13 and extended to open at its lower end adjacent to the bottom 2 of the flush tank. The valve casing 11 has a valve passage 15 formed through the upper part thereof in line with the passage terminating in the valve seat 10, and a reciprocating valve 16 of the usual type, is fitted in this opening 15, the packing washer 17 being mounted around the valve 16 to establish a water-tight connection in the valve receiving opening 15 to prevent leaking up through it. It is preferable to make the valve seat 10 be made tapered or dished-in, and a packing disk 18 which is made substantially cone-shaped or rounded on its outer face, is secured by a screw 19 in the proper relation that when the valve 16 is moved downwardly, this packing disk 18 will close into the valve seat 10 to cut off the supply of water to the valve casing 11.

Bearing lugs 20 are provided on one side of the valve casing 11, and the valve operating lever 21, which may be of the standard form, is passed through the slot 22 in the valve and is pivoted on the bearing lugs 20 so that as this valve operating lever 21 is rocked around its pivotal mounting, the valve 16 will be opened and closed. A bearing lug 23 is formed to extend upwardly from the branch extension 13 of the casing 11, and a float lever 24 is pivoted by means of the usual screw or pin 25 to be capable of swinging movement, the links 26 being connected between the free ends of the valve operating lever 21 and the adjacent end of the float lever 24 so that as the float lever is rocked around its pivotal mounting, the connection to the valve operating lever 21 through the links 26 will normally act to open and close this valve. A ball float 27, which may be of standard form is mounted on the free end of the float lever 24, and ordinarily this float 27 will act to swing the valve operating lever 21, to close the valve disk 18 within the valve seat 10 when the water has risen to the proper level to float the ball 27 at a sufficient height, the rise of the ball float 27 being gradual due to the fact that the quantity of water supplied through the water discharge pipe 14 is comparatively small when the total area and volume of the flush tank is considered, and when this gradual closing of the valve 16 occurs, an audible whistling sound is occasioned by the passage of the water through the constricted ring-like slit between the valve and the valve seat, and as this opening becomes more constricted, the whistling sound becomes more shrill until the valve is actually seated by the rise of the water to raise the float 27 to the proper level.

Thus far the valve structure and the connection of the float therewith is of substantially standard form, it however, being preferable that the inner end of the float lever 24 be extended as shown at 28 so that as the float 27 falls and raises the valve 16 from its seat, the degree of opening movement of the valve operating lever 21 will be constricted by the extended end 28 striking against the lower side thereof. The locking arm 29, which is of substantially bell crank shape with a wide angle between the arms thereof, is pivotally mounted on the pin or screw 25 and at one end is provided with a notch 30 formed on the upper side, the opposite end of the locking arm 29 being widened out and then extended at right angles to form a loop portion 31. A float rod 32 is provided with an eye on one end thereof which is passed through the loop formed in the portion 31 of the arm 29 and the pin or screw 25 mounts this float arm 32 to be capable of pivotal swinging movement. It will be understood that the float operating lever 24 and the float arm 32 are placed in parallel arrangement and are close together, and therefore the float 33 is made substantially circular in side elevation but is flattened out in its transverse extent so that this float may fit and work properly between the float operating lever 24 and the rear wall of the flush tank when the valve is installed. A friction roller 34 is mounted at the point of pivotal connection of the link 36 and the valve operating lever 21 and this friction roller 34 projects laterally in such relation that as the float 27 falls and the valve operating lever 21 is raised, the locking arm 29 will be swung through the weight of the float 33 to such a relation that the friction roller 34 is received in the notch 30 of the arm 29, after the manner shown in Fig. 1, and then with the parts in this relation, the valve operating lever 21 is held against downward swinging movement until the float 33 has been raised sufficiently to elevate the outer end of the locking arm 29, and consequently to move the inner end of this arm to a relation to move the notched portion thereof from the engagement around the friction roller 34.

As has been stated, the lower end of the main tube 1 has the screw-threads 35 formed therearound, and it is preferable that the water passage 36 into this tube be made more constricted than the passage communicating with the valve seat 10. The usual after-fill pipe may be connected with the parts as above set forth, and the connection from the source of water supply may be accomplished in any desired manner, still

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other parts being arranged to fit the particular adaptation in use, and when the valve structure is fitted in a flush tank, and the water has risen to the proper level therein, the valve operating lever 21, the float operating lever 24, the locking arm 29, and the float arm 32 will occupy the position shown in Fig. 2, and then as the outlet valve from the flush tank is opened, both the float 27 and 33 will fall, in consequence of which the parts will be brought to the relation shown in Fig. 1. With the parts in this relation, the valve 16 is open, and when the outlet valve of the flush tank is again closed, the water flowing through the discharge pipe 14 will raise the water level in the tank until the lower part of the float 27 is submerged, however this float is held against raising movement to be floated by the water due to the fact that the roll 34 is engaged in the notch 30, and in consequence the valve 16 is held wide open. When the water has risen to the proper level to float the ball 33 and raise the same to a sufficient height that the upper side of the loop of the portion 31 of the locking arm 29 is engaged, this arm 29 will be swung around its pivotal mounting at 25 and in consequence, the notched end thereof will be swung to disengage the roller 34 from the notch 30, and as the float ball 27 has been held in a submerged relation, the release of this roller 34 will permit free swinging of the float operating arm 24 and as the float will rise sharply to accommodate itself to water level, the valve operating lever 21 will be swung sharply down and in consequence, the valve 16 will be almost instantaneously closed. The spaces within the main tube 1 around the water supply tube 7 and above the inlet slots 9 thereof, will act as an air chamber, and thus the usual sound caused by the "water hammer" action when the valve is closed will be overcome by the fact that the water starting forward will strike the air cushion on the exterior of the water supply tube 7 and all sound will be deadened in this way, the water to pass through the discharge pipe 14 to the flush tank being taken in through the slots 9 and being consequently strained before flowing through the passage opening into the valve seat 10, thus assuring that all particles which might lodge beneath the valve disk 18 and cause leaking through the valve will be removed from the water before it is permitted to flow through the water supply pipe 7. By constructing the water inlet 36 to the main tube 1 of lesser size than the passage communicating with the valve seat 10, a more even flow through the valve is accomplished, and also any tendency to knocking or whistling in the passage to the valve is relieved.

From the foregoing it will be seen that I have provided a valve arrangement which may be fitted in the flush tank as turned out of the factory or may be installed in the standard flush tank in place of the original valve, the construction of the float ball 33 permitting the same to work freely between the rear wall of the flush tank and the float operating lever 24, and that due to the fact that the possibility of "water hammer" is relieved, and the valve 16 is maintained in the open position until substantially the instant before its closure, thus eliminating whistling sound, the valve will be substantially almost noiseless in its action and at the same time, will be very efficient in operation and will present less likelihood of getting out of order than if presented by the usual type of ball valve.

While I have herein shown and described only one specific form of the valve structure, and the operating parts therefor, it will be understood that a number of various modifications might be resorted to in the form and arrangement of the parts, as well as the manner of connecting the same operatively together without departing from the spirit and scope of my invention, and hence I do not wish to be limited to the exact disclosure, but only to such points as may be set forth in the claims.

I claim:

1. A water supply valve for flush tanks comprising float actuated means to normally hold the valve in a closed position and to open said valve upon dropping of the water level in the tank, an extension carried by a part of the float actuated means, a locking lever notched at one end and having stop portions at the remaining end mounted pivotally intermediate its ends on the main structure of the device, and a pivotally mounted float having a stem extending therefrom to engage with the stop portions of the locking lever, the parts being so arranged that said float drops upon rising of the water level causing its stem to engage one of said stop portions to swing the locking lever to a position that the notched end thereof engages with the extension of the float actuating means to hold the valve open and that as the float is raised through the reverse supply of water to the tank another of said stop portions of the locking lever will be engaged by said lever to trip said lever.

2. A water supply valve for flush tanks comprising float actuated means to normally hold the valve in a closed position and to open said valve upon dropping of said water level in the tank, a roller carried by a part of the float actuated means, a locking lever notched at one end and having a loop at the remaining end mounted pivotally intermediate its length on the main structure of the device in such relation that when the
valve is open and the locking lever is swung to one of its extreme positions the roller will be received in the notch and the float actuated means locked to hold the valve open, and a float having a stem passed through the loop of the locking lever and pivoted substantially at the point of pivot of said lever, the parts being so arranged that said float has limited movement with respect to the locking lever and upon extreme movement in one direction will move said lever to locking position and upon extreme movement in the other direction will move the lever to be tripped from said float actuated means.

In testimony whereof I affix my signature in presence of two witnesses.

CHESTER POOL.

Witnesses:
GEORGE W. HULL,
CLIFFORD P. HOPSON.