R. H. CANFIELD.

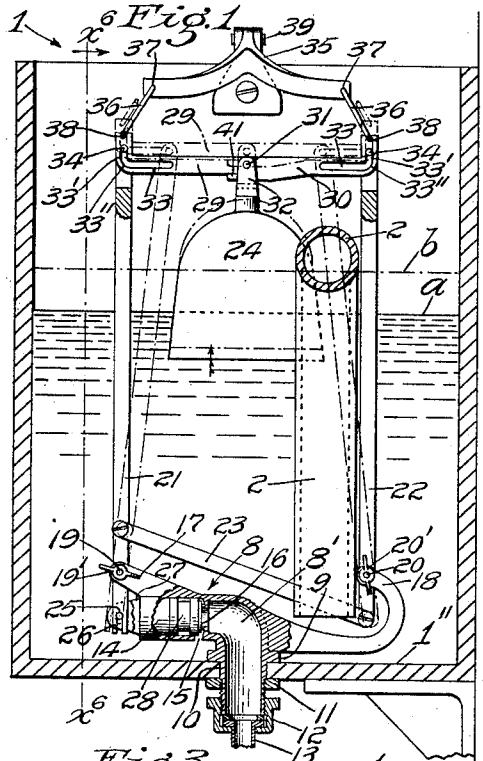
FLOAT VALVE.

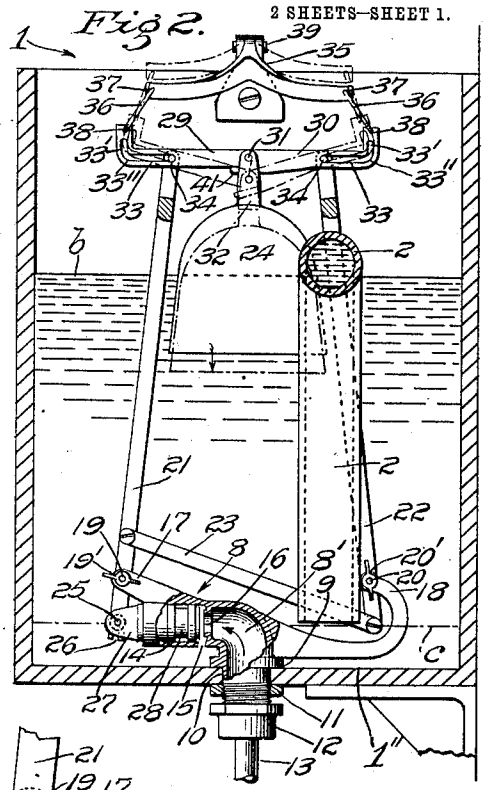
APPLICATION FILED MAY 25, 1911.

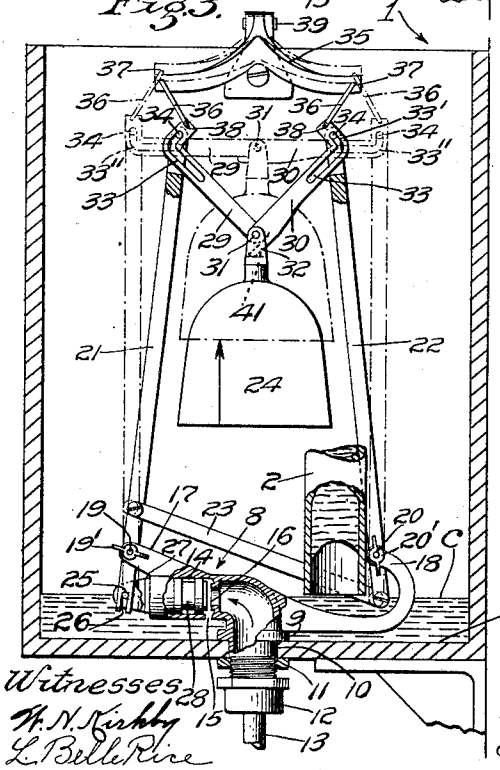
1,040,141.

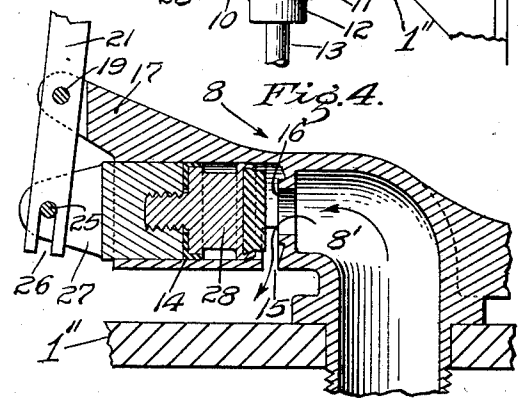
Patented Oct. 1, 1912.

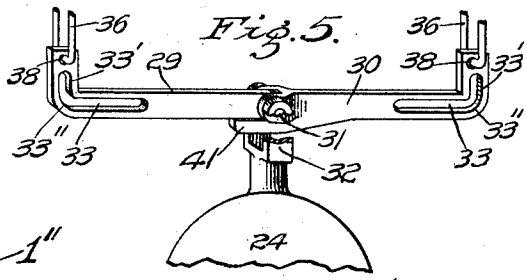
2 SHEETS—SHEET 1.











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2 SHEETS—SHEET 2.

Fig. 6.

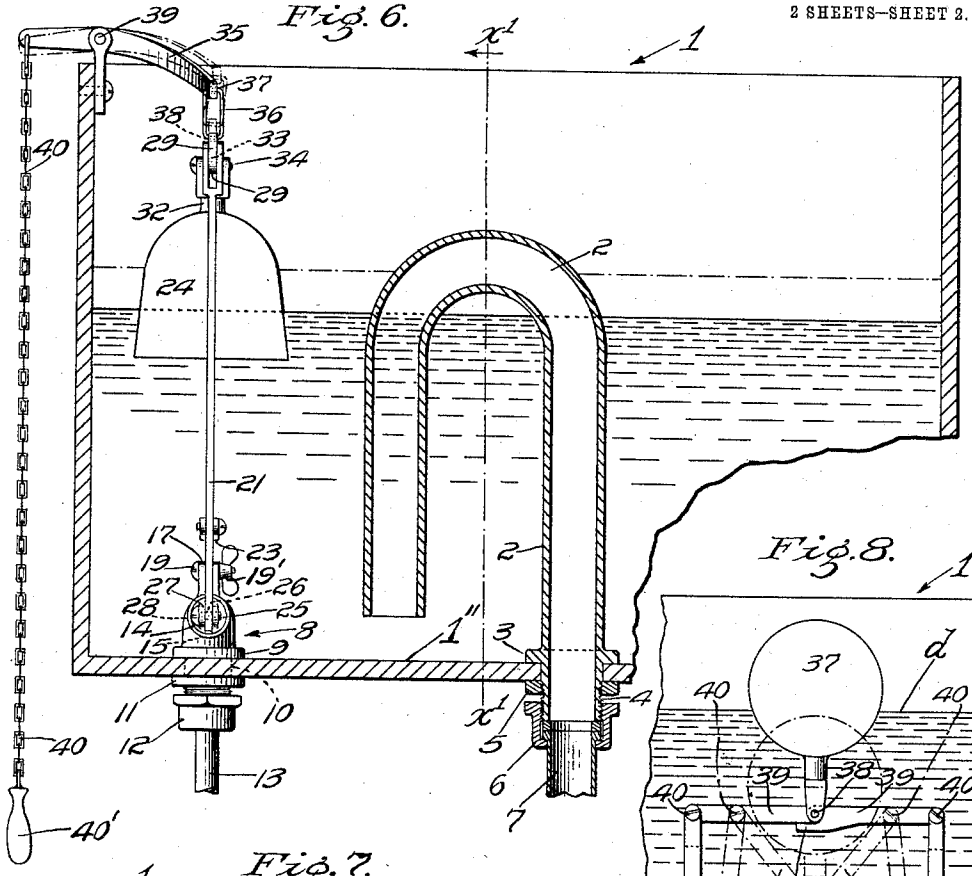


Fig. 7.

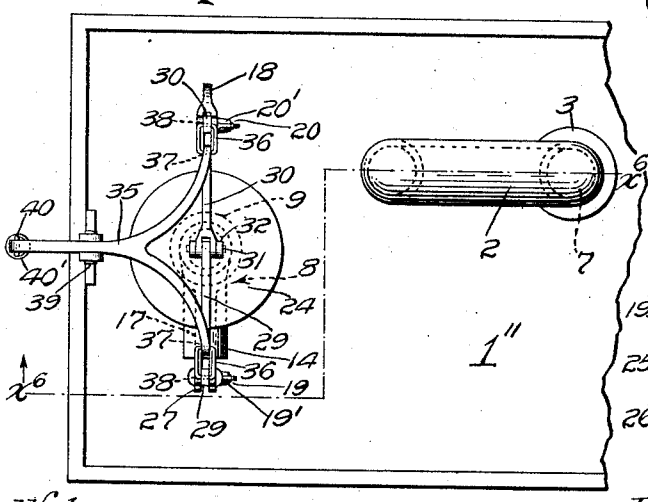
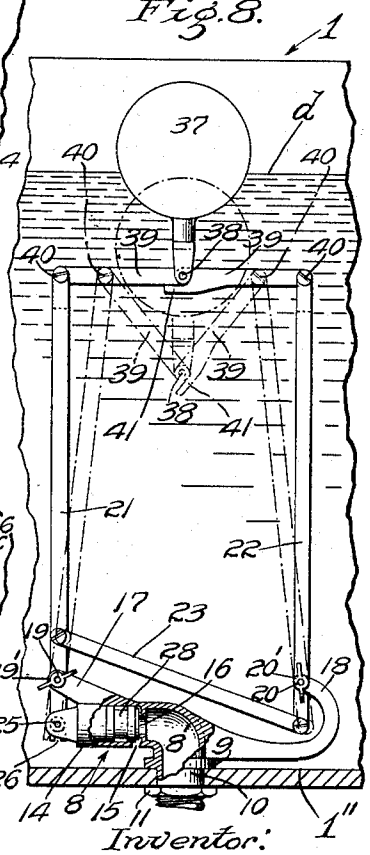


Fig. 8.



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UNITED STATES PATENT OFFICE.

ROY H. CANFIELD, OF LOS ANGELES, CALIFORNIA.

FLOAT-VALVE.

1,040,141. Specification of Letters Patent. Patented Oct. 1, 1912.

Application filed May 25, 1911. Serial No. 629,509.

To all whom it may concern:

Be it known that I, ROY HARRISON CANFIELD, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Float-Valve, of which the following is a specification.

This invention relates to a float valve adapted for use in direct high and low pressure flush tanks.

Objects of this invention are:—to provide means for operating the supply valve with great power from the float so as to positively shut off water under high pressure; to dispense with the usual long float lever and to make the action of the valve operating devices direct and free from vibration and lateral movement and side strain, and also to minimize the friction of parts during the flushing operation; and to make the supply valve more readily accessible and to reduce the number of parts to be removed in the operation of repairing the valve.

Another object is to so construct the flush tank that the supply valve will be closed quickly and the closing action will not begin until the water has nearly reached the normal water level in the tank, thus minimizing the time required to refill the tank and avoiding the noise usually caused by the slow closing valve.

The accompanying drawings illustrate the invention.

Figure 1 is a sectional elevation of a flush tank on line indicated at x', Fig. 6, looking in the direction of the arrow and showing a tank filled to the normal level. Dotted lines indicate the position of parts for starting the flushing action, the siphon starting level of the liquid in the tank being indicated in dotted lines. An arrow on the float indicates the direction of motion of the float from the normal position to the flush starting position. Fig. 2 is a view analogous to Fig. 1, showing the position of parts at the starting of the siphon. Fig. 3 is a view analogous to Figs. 1 and 2, showing the siphon breaking position. Fig. 4 is an enlarged sectional detail of the open supply valve. Fig. 5 is a perspective detail of the link attachment for the float. Fig. 6 is a section elevation from line x^6, Figs. 1 and 7, the siphon being sectioned on an axial plane. Fig. 7 is a plan view of the form shown in Figs. 1, 2, 3 and 6. Fig. 8 is a fragmental sectional elevation of another form in which the invention may be embodied.

The reservoir 1 is of the usual construction of flush tank reservoirs and the siphon 2 corresponds with the usual siphon excepting that it is fixed to the reservoir floor 1'', being provided on top of the floor with a collar 3 to fit on the floor, and also provided below the floor with a threaded extension 4 on which are screwed the lock nut 5 and the coupling 6 by which connection is made with the flush pipe 7.

The supply valve 8 has an L-shaped body 8' provided with a collar 9 to fit on the reservoir floor and with an extension 10 projecting through the floor and there screw-threaded to receive the lock-nut 11 to fix the valve body to the floor and to also receive the coupling 12 by which connection is made with the supply pipe 13. The horizontal limb of said valve body is an open cylinder forming a valve way 14 and is provided on its under side with a lateral slot 15 forming the supply outlet from the valve, and is provided internally with a valve seat 16 close to the slot and between it and the supply pipe. The valve body is provided at its opposite ends above the collar 9 with fulcrum brackets 17, 18, to which are respectively fulcrumed by pins 19 and 20 the direct and auxiliary valve levers 21, 22, that are connected by a rod 23 which is pivoted to the direct lever 21 above the fulcrum 19 and to the auxiliary lever below the fulcrum 20. The fulcrum pins 19 and 20 are detachably held by thumb nuts 19' and 20'. The upper ends of the levers 21, 22 are connected by operating arms with each other and with a float which may be of any suitable form. The lower end of the direct lever 21 is longitudinally slotted and is detachably connected by a pivot pin 25 in the slot 26 with the stem 27 of the supply valve plug 28 which works in the valve way 14 across the slot 15 to enter and withdraw from the seat 16 to close and open the valve to prevent and to allow fluid to enter the reservoir.

In the form shown in Figs. 1, 2, 3 and 6, the arms 29 30 are pivotally connected at their inner ends by the pin 31 with the forked float stem 32 which extends upwardly from the float 24, and said arms are provided at their outer ends with bent slots having horizontal and upright limbs 33, 33' into which pins 34 extend to pivotally connect the arms with the tops of the levers 21,

22, respectively. The bent slots form ways for the pins 34 to work in.

To the top of the arms 29, 30, the flushing lever 35 is pivotally connected by swinging connections 36 which are hooked into holes 37, 38 in the flushing lever and in the bent arms respectively, so that when the flushing lever which is fulcrumed at 39 to the side of the tank is operated by the chain 40 fastened to the lever 35 outside of the tank in the usual manner, the arms will be drawn upward. The result of this movement which is indicated in Fig. 1 is that the horizontal limbs of the bent slots are brought into line with the pins 34 and thereupon the pressure of the water on the valve 28 moves the valve outward past the slot 15, thus allowing water to flow into the tank, thereby raising the water level from the normal level *a* to the siphon starting level *b*, whereupon the siphon is brought into action and the water discharges from the tank through the siphon in the usual manner until the siphon breaking level *c* is reached, thus forming an air space at the mouth of the siphon. As the water descends in the tank the float 24 acts as a weight to draw down the inner ends of the arms 29, 30 into the position shown in Fig. 3, thereby operating through the compound lever form of the members 21, 22 and 23 to positively open the valve and hold it open. When the siphonage is broken, the water rises in the tank to the normal level *a* and the chain 40 having been released and the float valve 24 restored to the normal position the flush tank is at rest.

The flushing lever 35 is preferably forked, as shown in Fig. 7, and the loose connections 36 are fastened to the ends of the arms of the fork.

In the form shown in Fig. 8, the float 37 is pivotally connected by the pin 38 with the arms 39 which are pivotally connected by the pins 40 with the tops of the levers 21, 22, and it is evident that when the float is lifted by the liquid to the normal level *d*, thus bringing the arms 39 to horizontal position, the valve will be closed. The joint between the arms 29, 30 in the form shown in Fig. 1 and the joint between the arms 39 in the form shown in Fig. 8 are provided with a stop 41 in the form of a finger rigidly projecting from the arm 30 in Figs. 1, 2, 3 and 5 and from one of the arms 39 in Fig. 8 to engage the other arm, in each case to prevent the joint from bending upward, so that when the float 24 or 37 as the case may be has brought the arms into alinement as in Figs. 1, 2, 5 and 8, the float will no longer rise without bodily lifting both arms.

Referring now to Fig. 1 it will be noted that when the normal level *a* has been reached by the water in the reservoir the main bodies of the lever arms will extend in a horizontal right line and the pivots 34 will be moved away from each other so as to hold the direct and auxiliary levers in valve-closing position.

In the form shown in Fig. 8 the action is practically the same as that described for Fig. 1, but no further movement of the valve can be effected after the lever arms 39 are alined, except by pushing the float 37 down or by starting the siphon, not shown, and allowing the water level to fall; whereupon the valve will be opened as indicated in dotted lines.

In the form shown in Figs. 1, 2, 3 and 5 the bent slots comprising the longitudinal limbs 33, the perpendicular limbs 33′ and the bends 33″ allow movement of the pivot pins 34 toward and from the float. When the float is lowered by the escape of water from the reservoir as indicated in Fig. 3, the weight of the float brings the reservoir arms 29 and 30 into position with the upper ends of the vertical limbs 33′ resting on the pivots 34, consequently drawing and holding the upper ends of the levers 21, 22 toward each other. As the float rises upon the influx of water through the valve, the position of parts shown in Fig. 1 is reached, the outer ends of the lever arms 29 and 30 being still supported by the upper ends of the slots 33′ resting upon the pins 34, which are thereby held apart to close the valve. From this position the arms will be lifted when the flushing handle 40′, shown in Fig. 6, is pulled down; and when the lever arms have thus been lifted to the position shown in dotted lines in Fig. 1 the bend 33″ and the force of the water pressure against the valve plug immediately operates to force the pins 34 into the horizontal slot limbs 33 and such limbs serve as release devices to release the upper ends of said levers to allow them to approach each other, and as such ends move toward each other, the valve opens, the liquid from the supply pipe rushes into the reservoir and quickly raises the liquid to the flushing level *b*; whereupon the action indicated in Fig. 2 results and the flushing begins, thus lowering the liquid level to the siphon breaking position shown in Fig. 3. The valve remains open from the moment the pins are brought into line with the horizontal limbs 33 of the slots until the float 24 is again raised to the position shown in Fig. 1.

In this invention a compound lever is provided for holding the valve closed. Such lever in the form shown in Fig. 8 consists of the direct lever 21, the auxiliary lever 22, connecting rod 23 and the lever arms 39, all connected with the pivots as shown, so that upward movement on the float from the dotted position effects great closing pressure upon the valve plug. In the form shown in Figs. 1, 2, 3 and 5, the compound lever comprises the levers 21, 22,

connecting rod 23 and the slotted lever arms 29, 30, all pivotally connected and supported with the pivot pins as shown, so that not only is the valve closed by great pressure but the valve may be readily opened by slightly lifting the lever arms, thus to start the siphoning.

To remove the valve plug it is only necessary to unscrew the thumb-nut 19′ and lift the slotted end of the direct lever 21 off of the valve plug pivot pin 25. To remove the float and the compound levers from the reservoir, the pins 19 and 20 will be removed and the links 36 disengaged, thus freeing the float and levers from the reservoir.

It is understood that the point on the lever 21 at which the connecting rod 23 is pivoted is not arbitrarily fixed and that the further from the fulcrum pin 19 the pivot 23′ is placed the greater will be the leverage to close the valve. It is also understood that the operation of the flush tank shown in Figs. 1, 2, 3 and 5 depends upon the provision of means whereby the lever arms 29, 30 may operate to move and hold the upper ends of the levers apart while the lever arms are below a determined level and will operate when the arms are at a higher level, to release the levers so that the valve may open and that this is accomplished by the bent slots that form the ways for the pins 34. I regard such a contrivance to be broadly new.

I claim:—

1. The combination with a reservoir, of a supply valve body having a valve seat and an outlet, a valve plug to close the seat, two pivoted levers connected together one being connected with the valve plug, a float, and arms connecting the float with the levers to operate said levers, said arms being adapted to come into alinement with each other and said valve being arranged to close when the arms are alined.

2. The combination with a reservoir, of a supply valve body having a valve seat, a valve plug to close the seat, two pivoted levers connected together one being connected with the valve plug, a float, and lever arms and pivots connecting the float with said levers to operate the levers to open and close the valve; said arms being provided with bent slots having upright and horizontal arms for the pivots which connect the arms and their levers.

3. The combination with a supply valve, of two pivoted levers, one of which is connected below its fulcrum with the valve to open and close it, a connecting rod connecting one of the levers above its fulcrum with the other lever below its fulcrum, arms pivotally connected respectively with the levers above their fulcrums, a float, and means pivotally connecting the arms and the float between the levers to draw the upper ends of the levers toward each other to open the valve as the float falls, and to close the valve on the upward movement of the float.

4. The combination with a reservoir, of a supply valve body having a valve seat, a valve plug to close the seat, two pivoted levers connected together, one of said levers being connected with the valve plug, a float, and arms connecting the float with the levers to operate the same to open and close the valve, said valve being arranged to close when the arms are alined and to open when the arms are not alined, and the joint between the arms being provided with a stop to prevent the joint from bending up.

5. The combination with a supply valve, of two pivoted levers, one of which is connected below its fulcrum with the valve to open and close the valve, a connecting rod connecting the first lever above its fulcrum with the second lever below the fulcrum of the second lever, arms pivotally connected respectively with the levers above their fulcrums, a float, and means pivotally connecting the arms and the float between the levers to draw the upper ends of the levers toward each other to open the valve as the float falls and to close the valve on the upward movement of the float, and means to move the arms to open the valve.

6. The combination with a valve body having a valve seat, a valve way, a lateral outlet from the valve way near the valve seat, and also having fulcrum brackets spaced apart and alined with the valve-way, of a direct valve lever fulcrumed to one of said brackets, a valve plug pivotally connected with said direct valve lever below its fulcrum and adapted to close said valve seat, an auxiliary lever fulcrumed to the other bracket, a connecting rod pivotally connected with the direct valve lever above its fulcrum and with the auxiliary lever below its fulcrum, a float, and lever arms pivotally connected to the float and pivotally connected respectively with the upper ends of said levers.

7. The combination with a valve body having a valve seat, a valve way, a lateral outlet from the valve way near the valve seat, and also having fulcrum brackets spaced apart and alined with the valve-way, of a direct valve lever fulcrumed to one of said brackets, a valve plug pivotally connected with said direct valve lever below its fulcrum and adapted to close said valve seat, an auxiliary lever fulcrumed to the other bracket, a connecting rod pivotally connected with the direct valve lever above its fulcrum and with the auxiliary lever below its fulcrum, a float, and lever arms pivotally connected to the float and pivotally connected respectively with the upper ends of said levers; said arms being pro-

vided with bent ways in which the pivots for said upper ends of the levers may move.

8. A valve, levers connected to operate the valve, a float and means connecting the float with the free ends of the levers to force such ends apart as the float rises to a determined level to close the valve.

9. A valve, levers connected to operate the valve, a float and means connecting the float with the free ends of the levers to force such ends apart as the float rises to a determined level to close the valve, said means comprising a release device to allow said ends to approach each other when the float reaches a higher level.

10. A valve, levers connected to operate the valve, a float and means connecting the float with the free ends of the levers to force such ends apart as the float rises to a determined level to close the valve, and to permit such ends to move toward each other when the float reaches a higher level.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 16th day of May, 1911.

ROY H. CANFIELD.

In presence of—
JAMES R. TOWNSEND,
L. BELLE RICE.