To all whom it may concern:

Be it known that I, ALBERT C. JACKSON, citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Flush-Valves for Water-Closets, of which the following is a specification.

My invention relates to flush tanks for water closets and more particularly to means for automatically controlling the supply or inlet valve thereof.

The object of the invention is to simplify the structure as well as the means and mode of operation of such devices whereby they will not only be cheapened in construction but will be more efficient in use, positive in action, easily controlled and unlikely to get out of repair.

In flush tanks, as usually constructed, the supply or inlet valve is under the control of a float, which, as the water within the tank rises, gradually closes the valve until the predetermined level is reached at which point the valve will be completely seated. In such constructions the relation of the inlet valve with its seat varies constantly with the quantity of water in the tank. As the water in the tank approaches the required level the supply of water is gradually diminished by the approach of the valve toward its seat. This prolongs the period of the filling operation and as the valve approaches more closely to its seat produces a shrill, disagreeable, whistling or screeching sound.

The object of the present invention is to provide means by which the tank will be rapidly refilled thus reducing the period of filling to minimum. This is accomplished by providing means for maintaining the supply or inlet valve in wide open position during the entire filling operation and permitting it to suddenly and quickly seat itself at the termination of the filling period, thus eliminating the disagreeable noise before mentioned.

With the above primary and other incidental objects in view, as will more fully appear in the specification, the invention consists of the features of construction, the parts and combinations thereof, and the mode of operation, or their equivalents as hereinafter described and set forth in the claims.

Referring to the drawings, Figure 1 is a vertical sectional view of an assembled flush tank embodying the mechanism forming the subject matter hereof. Fig. 2 is a transverse sectional view of the supply or inlet valve in its operating connections. Figs. 3, 4, and 5 are detail views of modifications of the valve locking means.

Like parts are indicated by similar characters of reference throughout the several views.

In constructions of this character it is customary to control the movement of the supply or inlet valve in opening and closing by means of a float which in turn is controlled by the variation of the water level within the tank. In the present instance it is to be noted that, while a float is employed, it does not actuate the valve in either direction. The supply or inlet valve, as hereinafter described, is opened by manual effort and is closed at the termination of the filling period by the influence of the pressure of the water supply upon the valve together with the weight of the valve. The sole object of the float in the present case is to lock the valve in its open position after it has been initially operated and to release the valve when the water level in the tank has reached a predetermined level.

In the drawings, 1 is the tank provided with the inlet conduit 2 and the outlet or flush conduit 3. The flush conduit 3 is controlled by the ordinary ball valve 4 connected by a jointed link 5 with one end of the pivoted operating lever 6. This lever is fulcrumed to a suitable bracket at 7 and is oscillated by the usual pull chain or cord 8. This is the usual construction by which the flush valve is operated and forms no part of the present invention. It is obvious that any other form of flush valve or operating means therefor may be employed.

The inlet or supply conduit 2 terminates in a head 9 provided with a reciprocatory valve 10 which controls the admission of the water to the tank. This valve 10 is provided with a suitable seat 11 within the head 9 and is further provided with an extended valve stem 12 which projects beyond the head. The valve may be guided in its movement to and from its seat by any suitable means. In the drawings the valve is shown provided with a supplemental stem 13 which reciprocates in a suitable opening within the closure plug or cap 14 of the head 9.

The supply or inlet valve 10 is lifted from
its seat 11 to admit a charge of water to the tank simultaneously with the opening of the flush valve 4. This movement of the valve 10 is accomplished by means of a stirrup 15 suspended from the operating lever 6 with which the lower end of the valve stem 12 engages. The connection of the stirrup 15 with the lever 6, however, is a slotted or yielding connection as at 16 whereby the lever 6 and the flush valve 4 are permitted to return to normal position independent of the inlet or supply valve 10, which is held in elevated or open position by the locking means hereinafter mentioned. It will thus be noted that the valves are opened simultaneously but are closed independent one of the other.

To maintain the inlet or supply valve 10 in its elevated or open position after the lever 6 and valve 4 have returned to normal position, there is provided locking means controlled by the float 17. In the construction shown in Fig. 1 the locking means comprises an oscillatory, arcuate, shouldered or offset head 18 to which the float 17 is rigidly connected by a radially disposed arm 19. The float 17 is normally held in an elevated position by the engagement of the shoulder or offset against the side of the stirrup 15. When the stirrup 15 and valve 10 have been elevated by the oscillation of the operating lever 6 to a point above the level of the oscillatory locking head 18, the elevated float 17 is permitted to fall thereby bringing the arcuate portion of the head 18 beneath the stirrup 15 which is thereby locked in its elevated position where it holds the valve 10 unseated. The slotted connection 16 of the operating lever 6 permits the return of the lever independent of the stirrup.

As the water is discharged from the tank through the flush opening 3 the float 17 continues to descend until the flush opening is closed by the seating of the ball valve 4. During this interval the water is being discharged into the tank from the supply conduit 2. This water passes through the tank and out through the flush opening 3 providing a supply of water supplemental to that originally contained in the tank. After the flush opening 3 is closed the supply of water is retained within the tank and the float 17 ascends as the water level rises.

The ascent of the float 17 oscillates the locking head 18 until it is moved entirely out of the path of the stirrup 15 permitting the stirrup and valve to fall under the influence of the water pressure assisted by gravity. Thus the valve 10 is held in wide open position during the filling operation shortens the period very materially and the sudden seating of the valve eliminates the disagreeable whistling or screeching sound before referred to.

In order that the float 17 may act quickly to lock the valve after its initial operation the float is normally maintained in an elevated position above the normal fluid level from which it falls by gravity. There is provided a water outlet or overflow conduit 20 at the normal water level xx. This overflow or outlet conduit 20 is of less capacity than the inlet or supply conduit 2. The result is that the surplus water will not escape through the overflow 20 as fast as it enters through the conduit 2. This causes the water to collect within the tank to a point above the normal level or to a level indicated at yy. The locking head 18 is so adjusted in relation with the float 17 that it will not release the stirrup 15 and valve 10 until the float 17 has been elevated above the normal level xx by the surplus water discharged into the tank. In other words, the head 18 will not release the valve until the float is elevated to a position shown in solid lines in Fig. 1 by the rise of the surplus water to the level yy. When the water reaches this level yy the head 18 releases the stirrup and permits the valve 10 to close. The supply of water being thus cut off, the surplus water within the tank between the levels xx and yy is permitted to escape through the outlet 20 which leaves the float 17 suspended above the normal water level xx. The float is maintained in this suspended or elevated position by the engagement of the head 18 upon the side of the stirrup 15. The construction is such that upon the elevation of the stirrup the weight of the float 17 causes it to fall to the water level as at 17 and thereby draw the head 18 into locking position. This movement is accomplished very quickly. It is obvious that this provision for a supplemental water supply by which the float is elevated above the normal level is unnecessary if means are provided for maintaining the flush valve 4 open for a sufficient period of time to permit the float 17 to fall with the water level to bring the head 18 into locking position. However, the construction before described wherein the float 17 is held in elevated position by the engagement of the locking head with the stirrup and falls by gravity to lock the valve insures a prompt operation of the parts.

While the arcuate or concentric pivoted head 18 provides an economical and convenient form of locking device, many modifications of this construction may be made without departing from the spirit of the invention. In Fig. 3 there is shown a simple modification in which the pivoted float
arm 19 is provided with a hook arm 21 rigidly connected with the arm 19 and moving in unison therewith. This hook arm 21 normally engages against the side of the stirrup 15 as shown in dotted lines in said figure. Upon the elevation of the stirrup and the valve the offset or shoulder of the hook arm 21 is projected beneath the stirrup by the falling action of the float thereby maintaining the stirrup and valve in elevated position until the water level rises to a predetermined level whereupon the float, in rising with the water level, withdraws the hook arm from beneath the stirrup and permits the valve and stirrup to descend. In Fig. 4 there is shown a further modification employing a reciprocatory bolt or slide 22 actuated by the oscillatory movement of the arm 19 which carries a rock arm 23 connected with the slide 22. The construction is such that the shoulder or offset 24 of the slide 22 normally rests against the side of the stirrup. When the stirrup and valve are elevated above the level of the slide, however, the float, falling by gravity, oscillates the rock arm 25 to draw the slide 22 beneath the stirrup and so maintain the stirrup and valve in operative position. While the oscillatory lever 6, which is a common and well known form of operating device, provides a convenient method of operating the valve, it is obvious that valve operating means of the push button type which is also in common use may be employed. In Fig. 5 there is shown a construction of this type employing an oscillatory bell crank 25, one arm of which is engaged beneath the stem 12 of the valve 10. The other arm of the bell crank is provided with an arcuate face in which is located an offset or shoulder 26. In this construction the oscillatory arm 19 is projected beyond its pivotal point and is provided with a tooth or hook 27 normally engaging the arcuate face of the bell crank 25 but which will be projected into the offset or shoulder 26 by the falling movement of the float when the bell crank has been oscillated by the reciprocatory movement of the button 28. The oscillatory movement of the bell crank 25 elevates the valve 10 to admit the supply of water. The bell crank is held in its oscillated position and thus the valve 10 held open by the engagement of the hook or tooth 27 in the shoulder or offset 26. Upon the refilling of the tank the upward oscillation of the float by the rise of the water level will disengage the tooth or detent 27 from the shoulder 26 thereby permitting the parts to return to normal position. It is thus obvious that the details of construction may be indefinitely modified without materially changing the operation of the parts nor the result accomplished. From the above description it will be apparent that there is thus provided a device of the character described, possessing the particular features of advantage before enumerated as desirable but which obviously is susceptible of modification in its form, proportion, detail construction or arrangement of parts without departing from the principle involved or sacrificing any of its advantages. While in order to comply with the statute the invention has been described in language more or less specific as to certain structural features, it is to be understood that the invention is not limited to any specific details but that the means and construction herein described comprise but one mode of putting the invention into effect, and the invention is therefore claimed broadly in any of its possible forms or modifications within the scope of the appended claims. Having thus described my invention, I claim:

1. In an apparatus of the character described, a reservoir, a flush valve, a supply valve, means for simultaneously opening both valves by manual effort, and means for automatically holding the inlet valve open subsequent to the closing of the flush valve.

2. In an apparatus of the character described, a reservoir, a flush valve, a supply valve, an operator common to both valves for simultaneously opening the valves, and a yielding connection whereby the flush valve may close in advance of the supply valve.

3. In an apparatus of the character described, a reservoir, an inlet valve therefor, means for manually opening the valve, a lock for the valve adapted to maintain the valve in operated position until the contents of the reservoir reach a predetermined level.

4. In an apparatus of the character described, a reservoir, a supply valve, means for locking the valve in open position, and means for releasing the valve when the contents of the reservoir have reached a predetermined level.

5. In an apparatus of the character described, a reservoir, a supply valve, means for locking the valve in open position, and a float actuated by the rise of the contents within the reservoir for releasing the valve when the contents have reached a predetermined level.

6. In an apparatus of the character described, a supply valve, a detent to lock the valve in open position, and a float controlling the movement of the detent.

7. In an apparatus of the character described, a reservoir, a supply valve, a lock for maintaining the valve in open position, and a buoyant weight operating by gravity to set the lock and operating by its buoyancy to release the lock when the contents of the reservoir have risen to a predetermined level.
8. In an apparatus of the character described, a reservoir, a supply valve therefor, an oscillatory arm, a buoyant weight carried by the arm and a detent for the supply valve moved into locking position when the arm is moved in one direction and out of engagement with the valve when moved in the opposite direction.

9. In an apparatus of the character described, a reservoir, a supply valve therefor adapted to admit to the reservoir an excess of fluid, a detent for the valve, a buoyant control member for the detent, means for detaining the buoyant control member in its elevated position to which it is raised by the excess of fluid admitted, and a discharge for the excess fluid.

10. In an apparatus of the character described, a reservoir, a supply valve therefor, a detent for the valve, a buoyant control member for the detent, means for elevating the buoyant control member above the normal fluid level of the reservoir, and means for maintaining the control member in elevated position until the valve is opened.

11. In an apparatus of the character described, a reservoir, a supply valve therefor, a detent for locking the supply valve normally held in inoperative position, and means actuating the detent to operative position upon the opening of the valve.

12. In an apparatus of the character described, a reservoir, a supply valve therefor, a detent for the valve and a float controlling the detent, adapted by its descending movement to cause said detent to lock the valve and by its ascending movement to release the valve.

13. In an apparatus of the character described, a reservoir, a supply valve therefor, and a buoyant control member adapted to lock the valve by its initial falling movement and to release the valve at the limit of its rising movement.

14. In an apparatus of the character described, a reservoir, a supply valve therefor, a buoyant control member and a locking detent controlled by the buoyant member and operatively engaged with the valve during the interval between the movement of the control member from normal position until its return thereto.

15. In an apparatus of the character described, a reservoir, a supply valve therefor, a float controlling the closing of the valve, means for opening the valve independent of the float, the float being capable of rising movement in unison with the rise of the fluid level within the reservoir independent of the valve.

16. In an apparatus of the character described, a reservoir, a supply valve therefor, and a buoyant control member for the valve, locked against movement until the initial operation of the valve, and means for locking the valve against return movement until the completion of the movement of the buoyant control member.

17. In an apparatus of the character described, a reservoir, a supply valve therefor opened by manual effort and closed by fluid pressure, a float, and means for preventing the closing movement of the valve until the float has reached a predetermined position.

In testimony whereof, I have hereunto set my hand this 26th day of September A. D., 1914.

ALBERT C. JACKSON.

Witnesses:
A. W. SCHULMAN,
CARRIE M. RECKER.