No. 654,599. Patented July 31, 1900.

W. BUNTING, JR.

CLOSET CISTERN.

(Application filed Apr. 18, 1899.)

(No Model.)

Fig. 1.

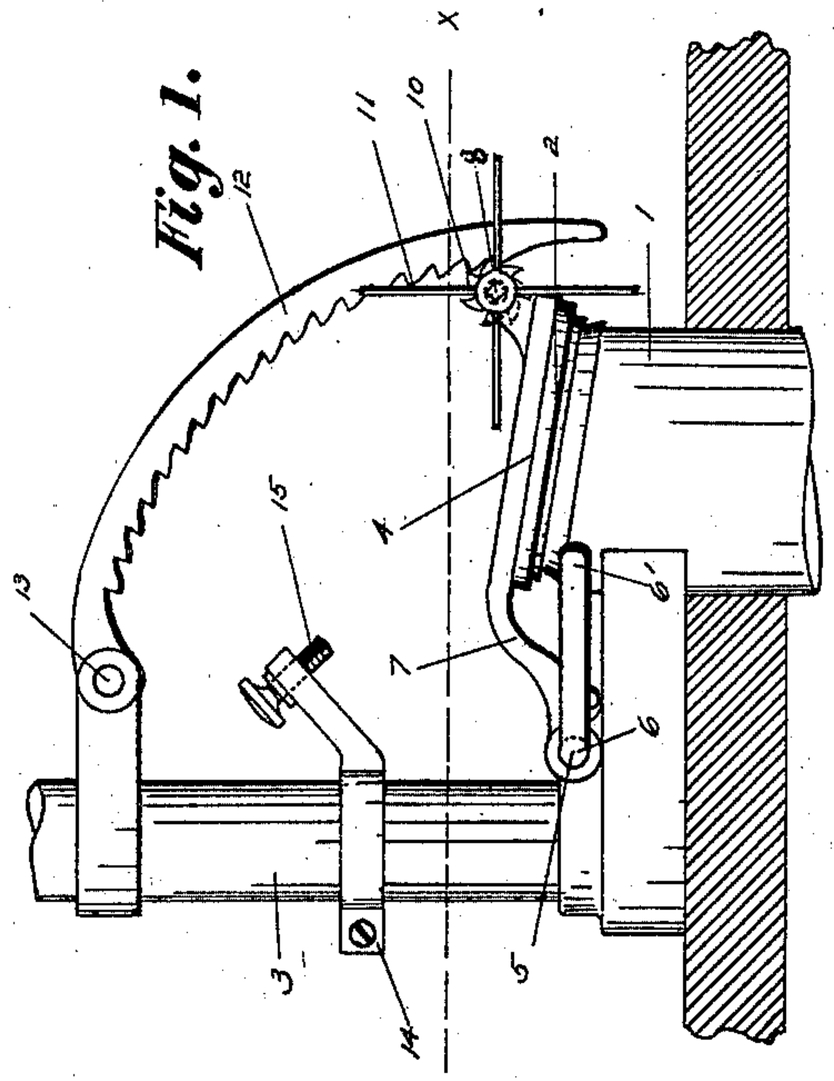


Fig. 2.

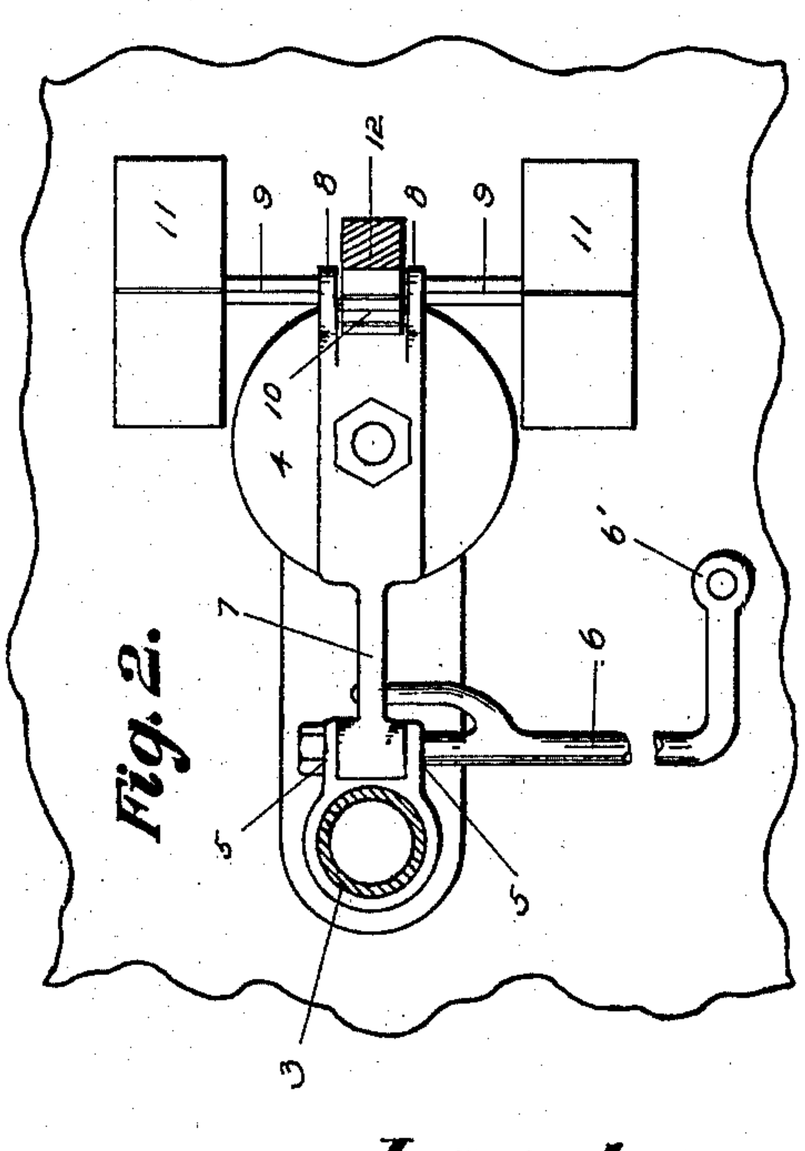


Fig. 3.

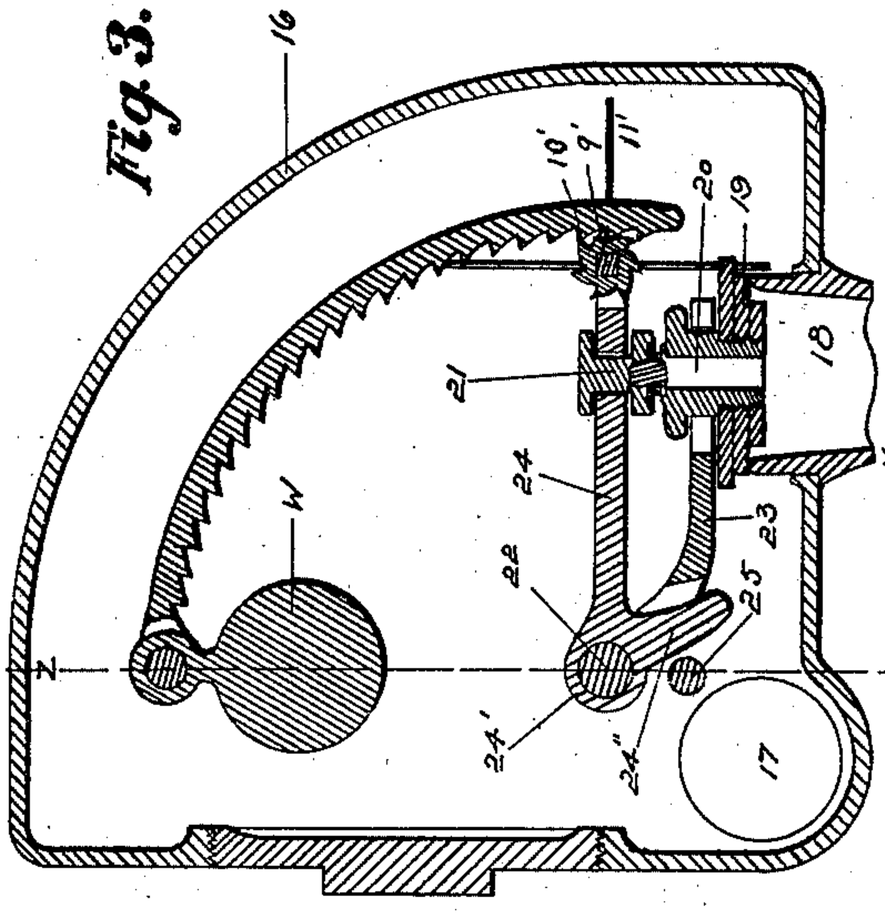
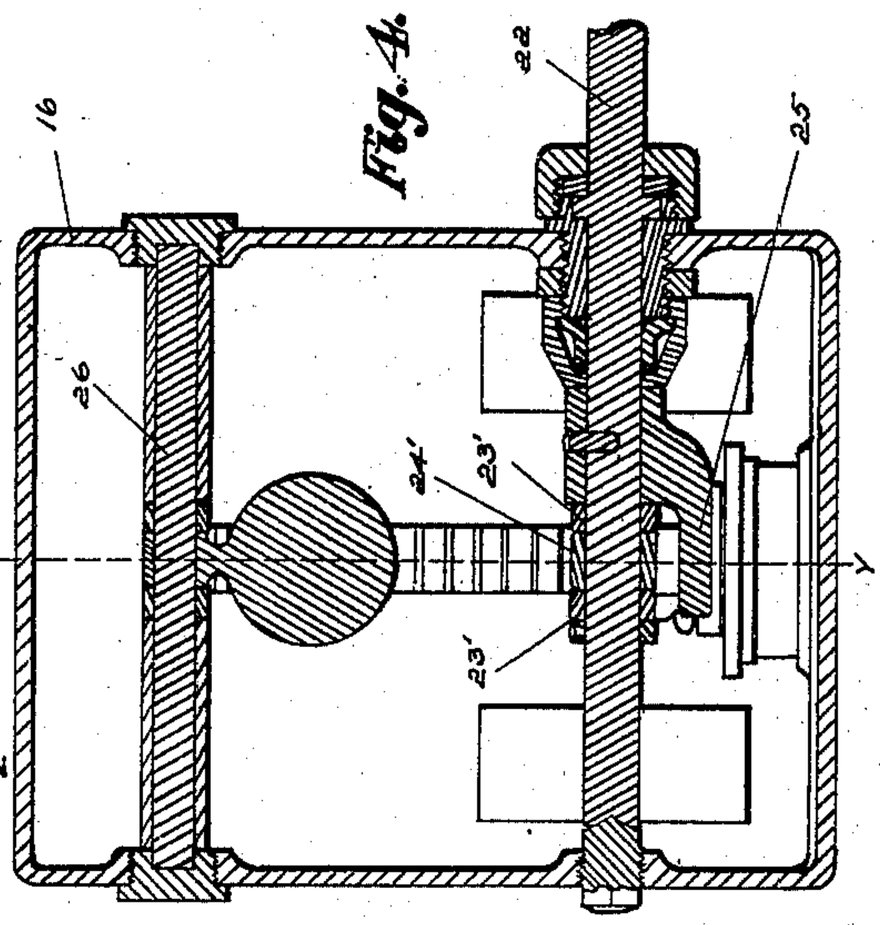


Fig. 4.



Witnesses.
Bertrand H. Johnson.
Thomas C. Keehan.

Inventor:
Wm. Bunting Jr:
By his Attorney,
Louis H. Harriman

UNITED STATES PATENT OFFICE.

WILLIAM BUNTING, JR., OF NEW YORK, N. Y.

CLOSET-CISTERN.

SPECIFICATION forming part of Letters Patent No. 654,599, dated July 31, 1900.

Application filed April 18, 1899. Serial No. 713,435. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BUNTING, Jr., a citizen of the United States, and a resident of New York, (Flushing,) in the county of Queens and State of New York, have invented certain new and useful Improvements in Closet-Cisterns, of which the following is a specification.

This invention relates to an improved apparatus for retarding the closure of a valve which drops to its seat by gravity, and is especially designed and intended to be applied to the valve of a water-closet cistern in which it is desired that the valve may be opened quickly and freely and upon the release of the pull-chain will sink slowly to its seat. Many devices which accomplish this purpose have been produced prior to my invention, which is itself in the nature of an improvement on the construction shown and described in my prior patent, No. 332,635, dated December 15, 1885. All of these prior devices have certain defects or are open to certain objections which it is my object to obviate as far as possible. Many of these retarding devices which in themselves are more or less satisfactory must be applied to a valve which lifts directly from the seat. In such cases some sort of a cage to guide the valve or a guiding-stem at the bottom of the valve is necessary in order that the valve may be directed to its seat. However, even with such appliances the valve is liable to catch and stick or not come to its seat properly. For these and other reasons a hinged valve is much more desirable for a cistern flushing-valve than a valve of the above-mentioned character, as little or no difficulty arises from sticking and the hinge always guides the valve to its seat without the presence of other guiding means. Slow-closing devices of various kinds have been applied to hinged valves; but these devices, so far as I am aware, are complicated, and therefore expensive, and are, moreover, liable to get out of order. According to my invention I provide a slow-closing device which is simple, easily and cheaply made, and which is unlikely to get out of order.

My invention consists in general of a hinged valve carrying a rotatable shaft to which a ratchet and a series of paddles are secured, and a pivotal rack which rests on said ratchet and causes said shaft to rotate as the valve descends.

My invention further consists in the provision of a closed tank or chamber which is constantly under pressure, having a main and supplemental valve in combination with means for first lifting the supplemental valve to relieve the pressure on the main valve, so that it can be opened easily, then holding both valves open a suitable length of time, preferably with the slow-closing mechanism previously referred to, and then holding the supplemental valve open by the same means for a sufficient length of time after the main valve has closed to give an adequate after-wash.

For a more complete understanding of my invention reference is had to the accompanying drawings, in which—

Figure 1 is a side elevation of my device applied to the ordinary open tank. Fig. 2 is a plan view taken on the line $x\,x$ of Fig. 1. Fig. 3 is a central cross-section on the line $y\,y$ of Fig. 4, showing the application of my invention to a closed tank; and Fig. 4 is a cross-section on the line $z\,z$ of Fig. 3.

Referring first to Figs. 1 and 2, 1 indicates the usual discharge-pipe, having an inclined seat 2 at its upper end. 3 is the usual overflow-pipe, and 4 is a valve which is hinged to lugs 5 at the base of the overflow-pipe. The operating-lever 6 is forked at its inner end, one of said forks passing through lugs 5 and forming the pintle of the hinge and the other passing under the arm 7 of the valve, so that upon an upward pull on the end 6′ of the lever to which the chain is attached the valve will be lifted in the usual way. The arm 7, to which the valve is attached, extends across the valve and is provided at its outer end with lugs 8, in which is journaled a shaft 9. This shaft is preferably made square, except at the points where it passes through the lugs. A pinion 10, having its teeth rounded on one side in the common form of a ratchet-wheel, is located between said lugs 8 on said shaft 9. Paddle-wheels 11, each having, preferably, four blades, are secured to each end of said shaft 9. Said paddle-wheels and ratchet are all provided with square holes in which the shaft fits, so that they cannot rotate thereon.

A curved rack 12 is pivoted, preferably, at its upper end 13 to the overflow-pipe and is arranged so that it rests on said ratchet-wheel. The curve on which this rack is made corresponds substantially to the arc through which the teeth of the ratchet-wheel, which are in engagement with the rack, move when the valve is lifted. The free end of the rack depends beyond the pinion, and is of such length that they will always be in engagement, even if the valve is lifted to a vertical position. The lower sides of the teeth of the rack are made slanting and the upper sides abrupt.

The operation is as follows: The flushing-valve is lifted by lever 6 and carries with it the shaft 9 and ratchet and paddles 10 and 11. As the valve is lifted the rack will be slightly lifted, and owing to the inclination of the teeth the ratchet-wheel will slide on the rack, so that no unusual resistance will be offered to the lifting of the valve. The paddles 11 are small and offer no special resistance as they are drawn up through the water. When the valve has been drawn up to an angle of, say, sixty degrees, the chain will be released and the teeth of the ratchet will engage the teeth of the rack, and the weight of the latter will hold them in engagement. The weight of the valve will then cause the parts to descend, and as the ratchet rolls down under the rack the shaft will be rotated to the left. The water in the tank will offer considerable resistance to the rotation of the shaft, and as the valve can only drop as fast as the shaft rotates it will drop slowly to its seat. As the paddle-wheels will drop at about the same rate as that at which the water lowers in the tank they will constantly be nearly or wholly submerged, and the valve will drop at nearly the same rate of speed during its entire closing movement.

In those constructions in which the rack is attached to the valve and the paddles are secured to a shaft in a stationary bearing the shaft must be journaled at a considerable distance above the bottom of the tank, so that in order to retard the valve throughout its whole downward movement the paddles must be made very long. This is objectionable for the following reasons: The paddles will take up too much room in the tank, will be only partly submerged at the last part of the flush, and will therefore throw the water out of the tank. Further, the first part of the closing movement of the valve will be very slow, while the last part will be so rapid that the valve will drop on its seat with considerable force. With my construction the valve will come to its seat easily, and as the paddles are small and constantly submerged my device will not be open to the objections just noted.

The length of the flush with my device will be dependent on several conditions, which may be varied in the manufacture of the device. If the area of the blades is increased, obviously the length of the flush will be increased, and if the number of teeth on the ratchet-wheel is reduced so that the number of revolutions of the shaft will be increased for the distance through which the valve drops the length of the flush will also be increased. The length of the flush may also be varied by providing an adjustable stop for limiting the opening of the valve. I show such a stop in Fig. 1, it consisting of a bracket 14, having a stop-screw 15 in the path of the valve 2. It is necessary that some stopping means be provided in order that the valve may not be thrown up to the vertical position. If this should occur, the valve would fail to close; but all danger of this occurrence is avoided by providing a stop to limit the opening of the valve, as above described.

In Figs. 3 and 4 I show the application of my invention to a closed tank or chamber which is always directly open to the water-supply. In these views the chamber 16 is made in quadrant shape and is provided with the open inlet 17 and outlet 18, which latter is closed by the main valve 19. A small passage 20 passes through the center of valve 19, which is closed by the supplemental valve 21. The operating-rod 22 is journaled in opposite sides of the tank and is suitably packed against leakage, as shown. Valve 19 is secured to arm 23, which is forked at its opposite end and is provided with ears 23′, through which rod 22 passes. Valve 21 is secured to arm 24, which is provided at its opposite end with an ear 24′, which fits in between ears 23′, so that arm 24 is located directly over arm 23. A finger 24″, which is made integral with arm 24, extends downwardly from ear 24′ between the forked ends of arm 23. A finger 25 is secured by set-screw or any other suitable means to shaft 22 and extends in under finger 24″ and arms 23. The forward end of arm 24, which extends out and beyond valve 21, is provided with ratchet-wheel 10′, shaft 9′, and paddle-wheels 11′, all being of the same construction as previously described with reference to Figs. 1 and 2. A curved rack 12′ is also suitably pivoted with respect to the ratchet-wheel. In this instance it is shown pivoted on a shaft 26, which extends across the tank. The pivoted end of the rack is divided into two ears, through which shaft 26 passes, and a weight W is suspended thereon between said ears.

The operation is as follows: Upon the rotation of shaft 22 the finger 25 thereof engages finger 24″ of arm 24, lifting the supplemental valve 21 from its seat. Upon further movement of finger 25 the end of finger 24″ will engage the base of the fork of arm 23 and lift the main valve 19. As valve 21 has previously been lifted, the heavy pressure on valve 19 has been to a large extent relieved, so that it may be lifted easily. Both valves will then be thrown upwardly to their fullest extent, and as the tank is under pressure

there will be a quick and strong flush. Upon the release of the operating means valve 21 will be sustained by the ratchet-wheel which engages the rack, and the finger 24″ being in engagement with arm 23 the valve 19 will also be held up from its seat. Both valves will then close slowly, being retarded by the paddles, as previously described with reference to Fig. 1, thus permitting an ample flush. The main valve 19 will reach its seat first, cutting off the main flow of water, after which a small stream will flow through the passage 20 until the valve 21 finally reaches its seat. By this means an adequate after-wash, which is quite sufficient to fill all the traps of the closet, is secured. If the valves are thrown up to their fullest extent, there would be danger of their failing to drop, and to prevent this I provide the weight W, against which the top of the supplemental valve strikes when the valves are lifted to their greatest extent. This weight will throw the valves forward and start them on their downward movement.

I am aware that prior to my invention a supplemental valve has been provided in the center of the main valve which is to be opened prior to the opening of the main valve, so that the main valve may be opened easily; but I am not aware that any attempt has ever been made to combine said supplemental valve with a slow-closing means, so that an after-wash will be provided.

From the above description it will appear that I have produced a slow-closing means which not only may be cheaply made and is very effective for the purpose intended, but is also very compact and occupies little more room than would the hinged valve alone.

What I claim as my invention is as follows:

1. A closet-cistern having a hinged flushing-valve carrying a rotatable shaft, a ratchet-wheel on said shaft, paddles carried by said shaft, a rack pivoted at one end, said rack being adapted and arranged to engage said ratchet-wheel at all positions of said valve.

2. A closet-cistern having a hinged flushing-valve carrying a rotatable shaft, a ratchet-wheel on said shaft, paddles carried by said shaft, a curved rack pivoted at one end, said rack being adapted and arranged to engage said ratchet-wheel at all positions of said valve.

3. A closet-cistern having a hinged flushing-valve carrying a rotatable shaft, a pinion secured to said shaft, paddles also secured to said shaft, and a movable rack resting on said pinion.

4. A closet-cistern having a hinged flushing-valve carrying a rotatable shaft, a pinion secured to said shaft, paddles also secured to said shaft, a movable rack resting on said pinion, and an adjustable stop for limiting the opening movement of said valve.

5. A closed water-closet tank having a constantly-open supply-pipe, a discharge-pipe, a hinged main valve closing said discharge-pipe, a passage through said valve, a hinged supplemental valve closing said passage, an operating device for lifting said valves from their seats, a finger connected to said supplemental valve and arranged in the path of said operating device so that the supplemental valve will be lifted in advance of said main valve, and a slow-closing device connected to said supplemental valve for holding the same open after the main valve is closed.

6. A water-closet tank having a main valve, a hinged arm connected thereto, a passage through said main valve, a supplemental valve for closing said passage, a hinged arm connected to said supplemental valve, a finger carried by said last-named arm which is adapted to engage said first-named arm when said supplemental valve is partially lifted, an operating device for engaging said finger, and a slow-closing device connected to said supplemental valve.

7. A water-closet tank having a flushing-valve, a shaft journaled thereon, a ratchet-wheel secured to said shaft, a pivoted rack for engaging said ratchet-wheel upon the closing movement of said valve, and paddles secured to said shaft for retarding the rotation thereof.

8. A water-closet tank having a flushing-valve, a rotatable shaft journaled thereon, a ratchet-wheel secured to said shaft, a movable rack which is adapted to engage said ratchet-wheel and rotate the same upon the downward movement of said valve, and a set of paddles secured to said shaft which are adapted to retard the rotation thereof.

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

WILLIAM BUNTING, JR.

Witnesses:

LOUIS H. HARRIMAN,

HENRIETTA J. HARRIMAN.