April 15, 1930. M. ESNARD 1,754,990

REVOLVING FLUSHING TANK

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Fig. 1.

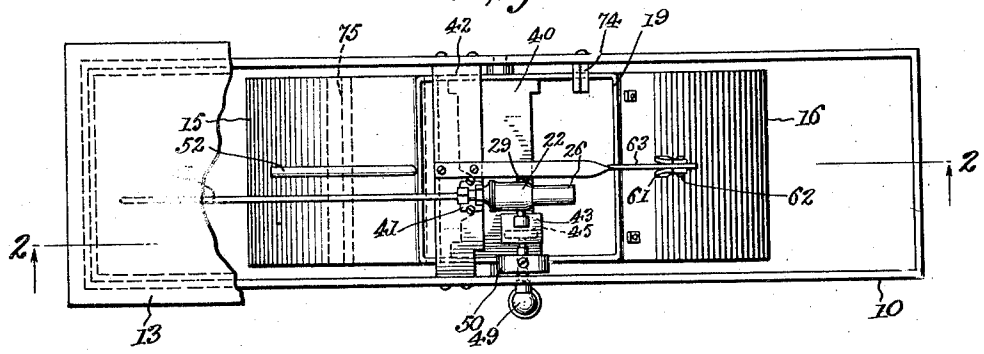

Fig. 2.

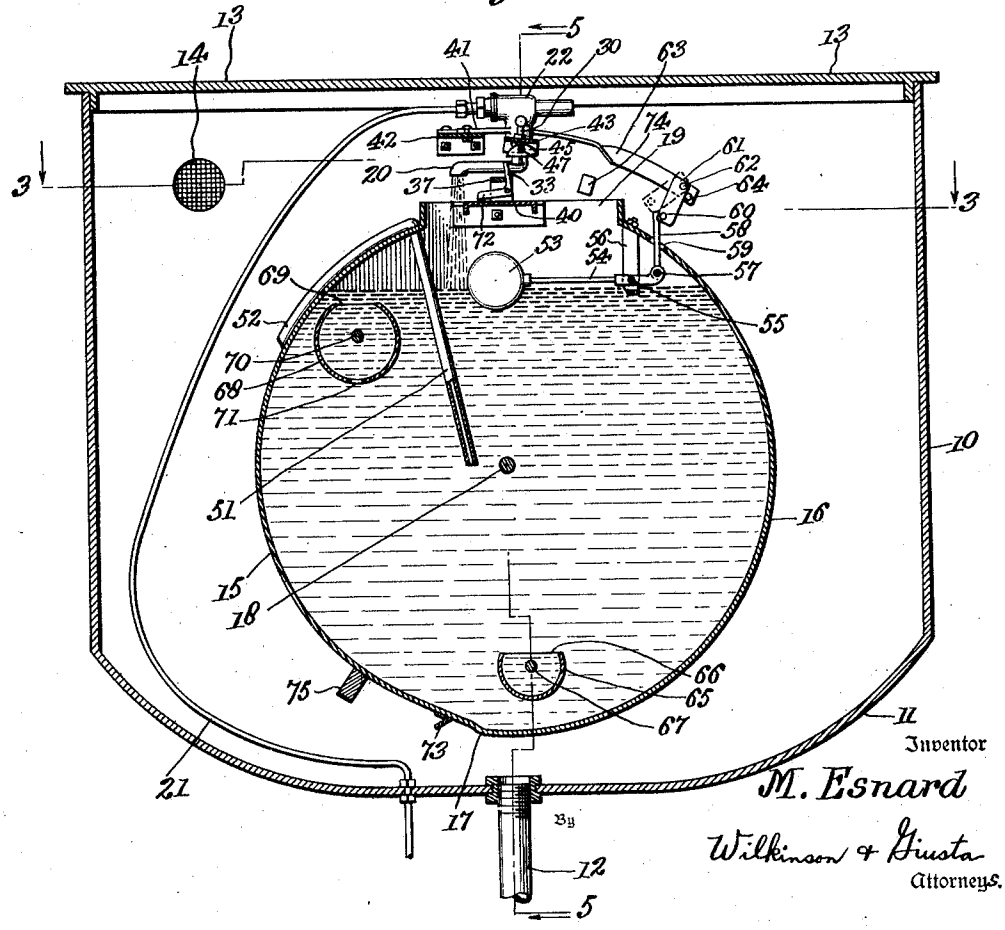

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Fig. 3.

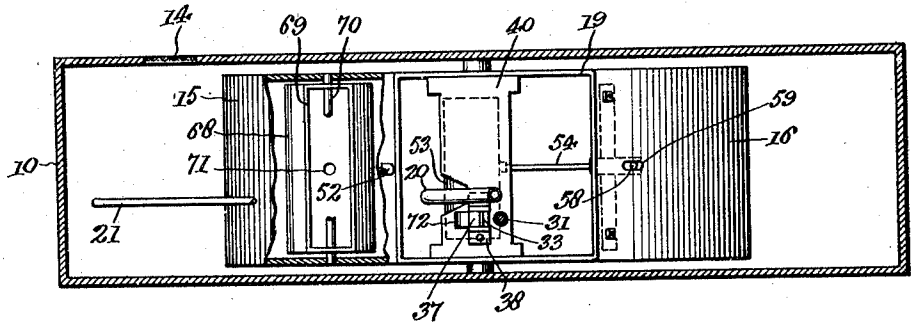
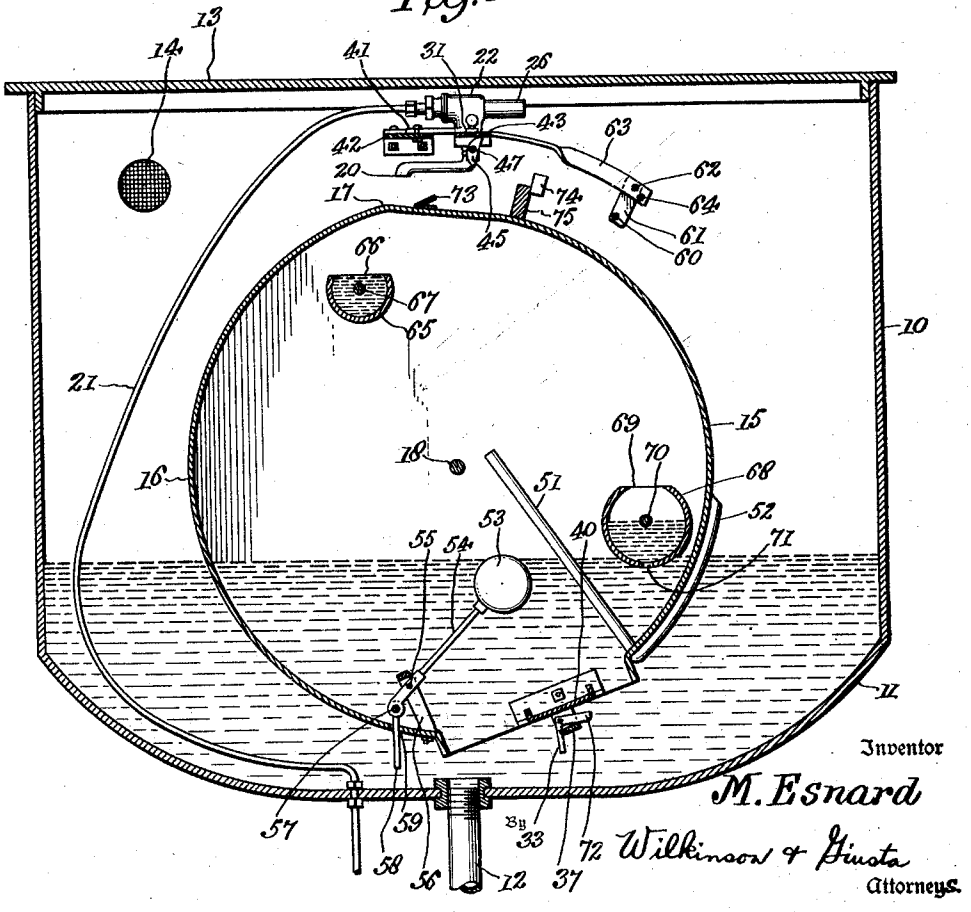


Fig. 4.



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REVOLVING FLUSHING TANK

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Fig. 5.

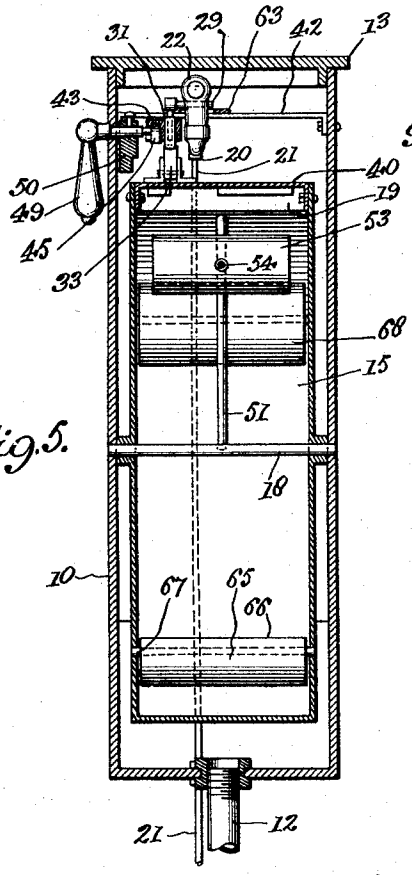

Fig. 7.

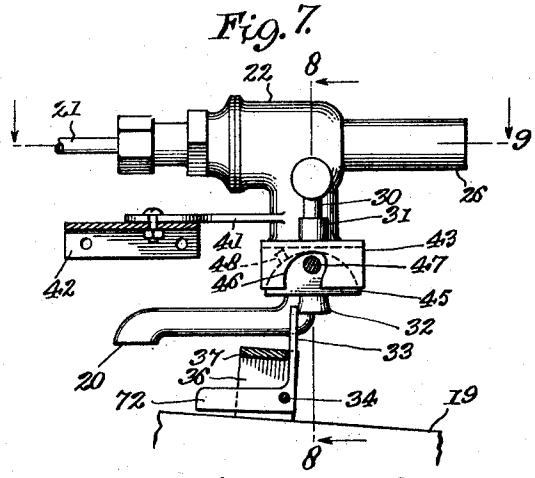

Fig. 8.

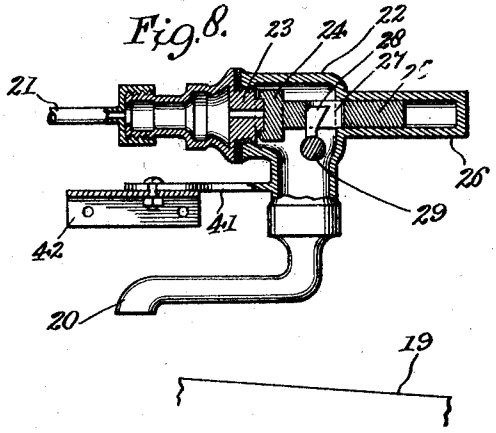

Fig. 6.

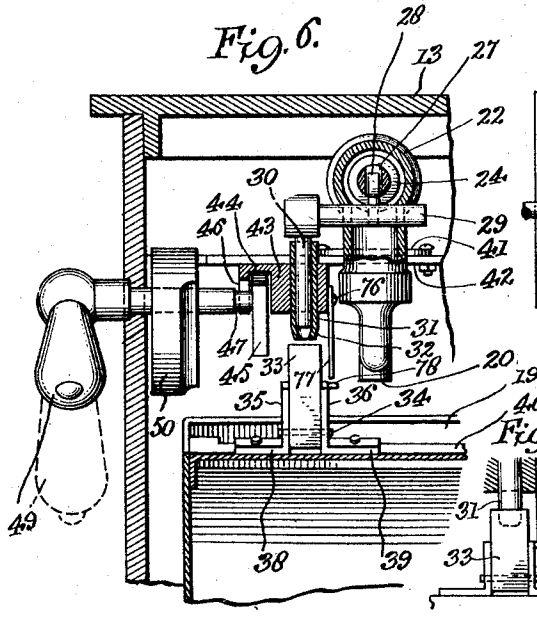

Fig. 9.

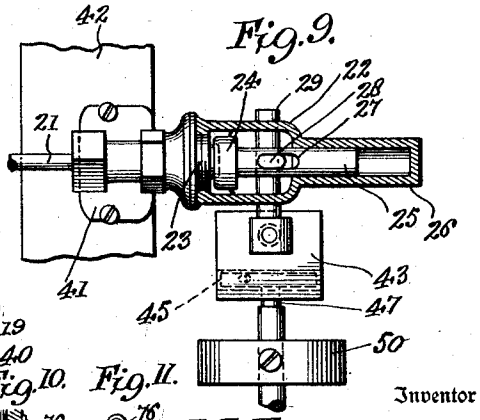

Fig. 10.

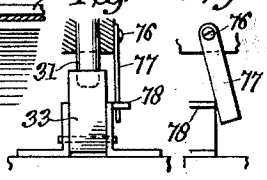

Fig. 11.

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UNITED STATES PATENT OFFICE

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REVOLVING FLUSHING TANK

Application filed October 17, 1929. Serial No. 400,375.

The present invention relates to improvements in flushing tanks, and has for an object to provide an improved flushing tank in which the amount of water necessary for this service is produced upon each operation in a predetermined volume, whereby a uniform sanitary action is had without the use of an undue quantity of water.

It is another object of the invention to provide an improved flushing tank in which the construction and the arrangement of parts is such that the same may be set at the factory to provide for the flushing with a given quantity of water and whereby adjustment of the mechanic or plumber who installs the device, and which adjustments are apt to be variable and erroneous are dispensed with.

A further object of the invention is to provide an improved device of the above character in which no leakage may take place and in which the action is positive.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a top plan view with parts broken away of an improved flushing tank constructed according to the present invention.

Figure 2 is a vertical section taken on the line 2—2 in Figure 1.

Figure 3 is a horizontal section, with parts broken away taken through the device.

Figure 4 is a view similar to Figure 2 but with the parts shown in a subsequent position.

Figure 5 is a vertical sectional view taken transversely through the device with the parts in one position.

Figure 6 is a similar view with the parts in a subsequent position.

Figure 7 is a fragmentary enlarged side view of the valve and its adjacent operating parts, with portions shown in section.

Figure 8 is a cross section taken on the line 8—8 in Figure 7.

Figure 9 is a horizontal section taken on the line 9—9 also in Figure 7.

Figure 10 is a fragmentary side view showing a modification, and

Figure 11 is a front view thereof.

Referring more particularly to the drawings, 10 designates a tank having a sloping bottom 11 leading to the outlet pipe 12, which descends to the bowl, and 13 designates the cover of the tank which is removable to give access to the interior. A screened breathing opening 14 is shown in the upper portion of the tank above the water level. Within the tank is a tumbling or oscillating drum constructed with one side 15 of smaller radius than the opposed side 16, the difference in radius being indicated at the joining point 17 between these two parts. The drum is adapted to oscillate about the pivot point 18 and is provided with an open end 19 for receiving water when in the upright position shown in Figure 2 and for discharging the water when in the inverted position shown in Figure 4.

The tank receives water from the spout 20 from a supply pipe 21 that is connected with the city service mains or other source of water supply. The pipe 21 connects with a valve casing 22 shown more particularly in Figures 7, 8 and 9 and within the valve casing is a valve seat 23 cooperating with a reciprocating valve 24 having the stem 25 which is guided for movement in the socket 26 of the casing. A slot 27 in the stem 25 provides for receiving the upstanding finger 28 on the rock shaft 29 which is disposed transversely through the valve casing and on the exterior thereof carries a depending pin 30. This pin is more particularly shown in Figures 6 and 7.

A sleeve 31 surrounds the pin 30 and is slidable thereon, the sleeve being provided with a lower conical or tapered end 32 for cooperating with a trip finger 33 carried by the drum. This trip finger 33 is pivoted at 34 to the bracket arms 35 and 36. The upper ends of these bracket arms are provided with a bridge piece 37 against which the finger 33 is adapted to rest in one position. The bracket arms 35 and 36 are provided with the feet 38 and 39 which are riveted or other-

wise secured to a plate 40 which spans the opening 19 in the drum and is secured to the side walls of the drum in any appropriate manner.

The valve casing 22 is secured upon a bracket arm 41 and this bracket arm is in turn carried by a bridge piece 42 which extends across the tank above the drum and is secured to the side walls of the tank as indicated. The sliding sleeve 31 is affixed to a block 43 having a socket 44 to receive the crescent-shaped cam 45 and a cut away end wall 46 to receive therethrough the shaft 47 to which the cam 45 is affixed. As indicated in Figure 7 the cam 45 carries a pin 48 for contact with the wall of the socket 44 to eliminate friction and to rest in the position shown in Figure 7 against the wall of the socket 44 whereby to resist movement of the cam.

The shaft 47 extends upon the exterior of the tank where it is provided with the hand lever 49 for rotating the shaft and the cam. A weight 50 on the shaft 47 within the casing is adapted to hold the parts in the normal position and to restore these parts to such position after each actuation.

Within the drum is a vacuum breaking pipe 51 which has one leg extending into the drum and opening near the center of the tank, while the other leg 52 extends upon the exterior of the drum and lies along the exterior wall, whereby its open end may lie above the water level as shown in Figure 4. The open end of the leg 52 may be protected with a baffle or otherwise as desired.

A float 53 is shown in the upper portion of the drum, such float being on a lever 54 fulcrumed at 55 to a bracket 56 carried by the drum. Fulcrumed at 57 on the other end of the lever 54 is a pin 58 projecting up through an opening 59 in the drum wall and adapted to cooperate with a projection 60 on a locking dog 61 pivoted at 62 to a fixed arm 63. The arm 63 may be affixed to the bridge piece 42 or to any other appropriate part. An abutment 64 is carried on the arm 63 to restrict the movement of the dog or detent 61.

A ballast cup 65 is carried within the drum to one side of the drum center 18 and preferably near the bottom of the drum. This cup is cut away and open at its upper portion 66 and its pivot 67 is off center and displaced upwardly, whereby the cup 65 which is always full of water will, by virtue of the weight of the water it contains, always remain in the upright position. In this connection compare Figures 2 and 4.

A second ballasting cup 68 is mounted in the drum to the opposite side of the pivotal center 18. This cup is of larger capacity than the cup 65 and it is mounted in the smaller half of the drum. The upper portion 69 of this cup 68 is cut away and open to receive water from the tank and the pivot 70 is also displaced upwardly so as to at all times maintain the cup 68 in the upright position.

Compare Figure 2 and 4. One or more perforations 71 are formed in the lower portion of the cup 68 to permit of the slow discharge of the water, as indicated in Figure 4.

In the use of the device, the parts may be said to be initially in the position shown in Figure 2, where the drum is upright and water is entering through the spout 20, the valve in the casing being in the open position. It will be noted that this valve is positioned so that it will open automatically by the pressure of the water thereagainst. This open position of the valve causes the pin 30 and the sleeve 31 to swing to the position shown in Figure 2 and the block 43 has a corresponding movement on the surface of the crescent-shaped cam 45. In this position the pin 58 of the float device engages the pin 60 on the dog 61 and the parts are by this means held in the position, shown in Figure 2, until such time as the water level having risen to a predetermined height, the float 53 acts to withdraw the pin 58 downwardly below the companion pin 60; whereupon the drum is released. Due to the greater volume of water held in the right hand larger portion 16 of the drum, the drum is over-balanced and will tend to rotate about its center 18 in a clockwise direction viewed in Figures 2 and 4. However, it will only be permitted to move a very short angular distance before the trip finger 33 engages the lower end of the sleeve 31.

This arrangement is shown in Figure 7 in which the finger 33 has moved the sleeve 31 and consequently the finger 30 over a sufficient distance to close the valve 24 and prevent the further admission of the water. The trip finger will be held by the bridge piece 37 and by the angular foot piece 72 from backing off the sleeve 31. The parts will now remain in this position, with the drum full of water and in readiness for the flushing operation, until the handle 49 is rotated. By rotating the handle, the shaft 47 is rotated together with the cam 45 and the high point of the cam will raise the block 43 and with it the sleeve 31, withdrawing this sleeve from the path of the finger 33. The drum is thus released so that the over-balancing weight of water may topple the drum from the position shown in Figure 2 to that shown in Figure 4. The water will be discharged through the inverted opening 19 into the tank 10. The opening 19, it will be observed, is of greater diameter than the pipe 12 whereby the discharge of water from the drum and into the tank will take place at a greater rate of speed than the departure of the water from the tank 10 and into the pipe 12.

The ballasting device will revolve with the drum and they will also rotate about their

own axes to the position shown in Figure 4. The device 68 being of greater capacity than the device 65 and being situated at a greater distance from the center 18 when the parts are in the inverted position, such ballasting device 68 will assure that the drum remains in the inverted position, until all, or substantially all of the water is discharged into the tank.

The water may be discharged slowly from the ballasting device 68 through the restricted openings 71 and the capacity of the ballasting device 68 may be so proportioned that as soon as desired the smaller ballasting device 65 will over-balance the depleted device 68 and will restore the drum in the opposite direction to the upright position. Now it will be understood that as soon as the drum is released from the upright position that the water valve 24 will again be opened by the pressure of water, and as indicated in Figure 4 the water will continue to flow on the closed bottom of the drum and about the drum into the tank 10 thus providing additional water for the refill operation. This continued flow of water from the spout 20 is also advantageous that such water catches beneath the vane 73 carried by the bottom of the tank and being so shaped and disposed as to react with the discharging water whereby to propel the drum back to initial position.

Stops 74 and 75 are provided to restrict the toppling movement of the drum, the stop 75 being carried by the drum bottom and the stop 74 by the tank. When in the position shown in Figure 4, the interior of the inverted drum above the water column is placed in communication with the upper air space of the tank 10 by means of the pipes 51 and 52 and the interior of such drum may breathe freely through the breather opening 14 of the tank thus preventing the formation of the vacuum which would prevent the ready discharge of the water from the drum and result in the inefficient action in the flushing operation.

When the drum returns to initial position, the pin 58 will strike the pin 60 and lift the detent 61 up to the dotted line position permitting the pin 58 to pass the pin 60; whereupon the detent 61 will fall down against the stop 64 and the pin 58 will get behind the pin 60. Also the trip finger 33 will rotate in a clockwise direction about the pivot 34 to enable it to snap past the conical or tapered end 32 of the sleeve 31. The weighted tail piece 72 of the trip finger 33 will serve to restore it to upright position in readiness to engage the sleeve 31 on the return movement of the drum in a clockwise direction.

Due to the arrangement, the drum in falling to the inverted position will do so quickly but it will be checked by the action of the water and by momentary vacuum formed in the drum whereby the stops 74 and 75 will come together only gently and without noise.

As shown in Figures 6, 10 and 11, the block 43 carries a strip 77 which loosely hangs from the block 43, the strip being hingedly secured to the block as by a screw 76. A seat or ledge 78 for the strip 77 is fastened to the part 36 vertically beneath the pivot point 76. The object of the strip is to keep the block in an elevated position when the handle 49 is turned either to the right or left and the drum at that instant has not been filled to predetermined capacity.

The block being in an elevated position will keep the part 32 out of the way of the part 33 and when the drum has filled will topple over and discharge automatically. On returning to filling position the drum will leave the strip 77 in the position shown in Figures 10 and 11. The advantage of this device is that if the drum is not full when one tries to make it discharge it will not discharge but will leave the parts in such condition that subsequently when the predetermined capacity of the drum is reached it will discharge automatically.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims:—

What is claimed is:—

1. In an improved flushing apparatus, a tank, a tumbling drum in said tank having half portions of differential capacities whereby to over-balance the full drum, a normally open valve for admitting water to the drum, detent means for releasably holding the drum in an upright position with the water valve open, trip means on the drum for acting to close the valve when the drum is full and when said detent means is released and for further acting to hold the drum in the upright position, means to release said trip means, and ballast means for restoring the drum to the upright position.

2. In an improved flushing apparatus, a tank, a tumbling drum in said tank having half portions of differential capacities whereby to over-balance the full drum, a normally open valve for admitting water to the drum, detent means for releasably holding the drum in an upright position with the water valve open, trip means on the drum for acting to close the valve when the drum is full and when said detent means is released and for further acting to hold the drum in the upright position, means to release said trip means, ballast means for restoring the drum to the upright position, and means for breaking the vacuum in the drum when in the inverted position.

3. In an improved flushing apparatus, a tank, a tumbling drum in said tank having half portions of differential capacities whereby to over-balance the full drum, a normally

open valve for admitting water to the drum, detent means for releasably holding the drum in an upright position with the water valve open, trip means on the drum for acting to close the valve when the drum is full and when said detent means is released and for further acting to hold the drum in the upright position, means to release said trip means, a minor constant ballast device situated in the larger half of the drum, and a major variable ballast device situated in the smaller half of the drum.

4. In an improved flushing apparatus, a tank, a tumbling drum in said tank having half portions of differential capacities whereby to over-balance the full drum, a normally open valve for admitting water to the drum, detent means for releasably holding the drum in an upright position with the water valve open, trip means on the drum for acting to close the valve when the drum is full and when said detent means is released and for further acting to hold the drum in the upright position, means to release said trip means, a minor constant ballasting cup pivotally mounted in the larger half of the drum and having a cut away upper portion and a pivot offset upwardly of the cup, and a major ballasting cup pivoted in the smaller half of the drum and having a cut away portion at its upper part and its pivot offset upwardly and eccentrically, said major cup having a restricted opening in its lower portion to permit of the slow discharge of water.

5. In an improved flushing apparatus, a tank, a tumbling drum in said tank having half portions of differential capacities whereby to over-balance the full drum, a normally open valve for admitting water to the drum, detent means for releasably holding the drum in an upright position with the water valve open, trip means on the drum for acting to close the valve when the drum is full and when said detent means is released and for further acting to hold the drum in the upright position, means to release said trip means, ballast means for restoring the drum to the upright position, and a vane carried by the exterior wall of the drum near the bottom thereof for receiving water thereagainst to assist in righting the drum.

6. In an improved flushing apparatus, a tank, a tumbling drum in said tank having half portions of differential capacities whereby to over-balance the full drum, a normally open valve for admitting water to the drum, detent means for releasably holding the drum in an upright position with the water valve open, trip means on the drum for acting to close the valve when the drum is full and when said detent means is released and for further acting to hold the drum in the upright position, means to release said trip means, ballast means for restoring the drum to the upright position, and stop means for arresting the drum in the inverted position.

7. In a flushing apparatus, a tank having a restricted outlet, a tumbling drum mounted eccentrically in said tank and biased by the preponderant weight of water therein to an inverted position, said drum having an opening larger than said restricted outlet, a float lever fulcrumed in the drum adjacent the opening, a pin pivotally carried by said lever and movably mounted through the drum, a pivoted detent disposed in the path of said pin, abutment means for the detent, a water inlet valve constructed to open by the pressure of water, trip means on said drum held by said pin and detent for closing said valve but adapted to close the valve when the float lever releases the pin from the detent, hand actuated means for freeing the drum to be inverted, and means for automatically restoring the depleted drum to the upright position.

8. In a flushing apparatus, a tank having an outlet, a tumbling drum pivoted eccentrically in said tank and having an opening, detent means to normally hold the drum in the upright position, a water inlet valve biased to an open position, a swinging and reciprocating sleeve for closing said valve, a trip device carried by the drum for striking said sleeve to close the valve, and means to move the sleeve out of the path of said trip device.

9. In a flushing apparatus, a tank having an outlet, a tumbling drum pivoted eccentrically in said tank and having an opening, detent means to normally hold the drum in the upright position, a water inlet valve biased to an open position, a swinging and reciprocating member for closing said valve, a pivoted trip finger on the drum for cooperating with said member to close the valve, and hand actuated means for moving said member out of contact with the trip finger.

10. In a flushing apparatus, a tank having an outlet, a tumbling drum pivoted eccentrically in said tank and having an opening, detent means to normally hold the drum in the upright position, a water inlet valve biased to an open position, a pin coupled to close the valve, a sleeve slidable on said pin, a trip device carried by the drum and cooperating with said sleeve, a block fixed to the sleeve and having a socket, a cam in said socket, and means for rotating the cam.

11. In a flushing apparatus, a tank having an outlet, a tumbling drum pivoted eccentrically in said tank and having an opening, detent means to normally hold the drum in the upright position, a water inlet valve biased to an open position, a pin coupled to close the valve, a sleeve slidable on said pin, a block fixed to the sleeve and having a socket, a crescent-shaped cam movable in said socket, means to rotate said cam, and a pivoted trip

finger on the drum adapted to engage the sleeve in the lower position.

12. In a flushing apparatus, a tank having an outlet, a tumbling drum pivoted eccentrically in said tank and having an opening, detent means to normally hold the drum in the upright position, a water inlet valve biased to an open position, an oscillating pin coupled to close the valve, a sleeve slidably mounted on said pin, a block affixed to said sleeve and having a socket therein, a crescent-shaped cam mounted in said socket and having a pin for engaging the socket wall, a shaft for rotating said cam, and a pivoted trip finger carried by the drum and adapted to engage the sleeve in the lower position thereof.

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