

Oct. 27, 1936.

F. M. HEATH

2,058,449

FLUSH TANK

Filed Feb. 18, 1936

2 Sheets-Sheet 1

Fig. 1.

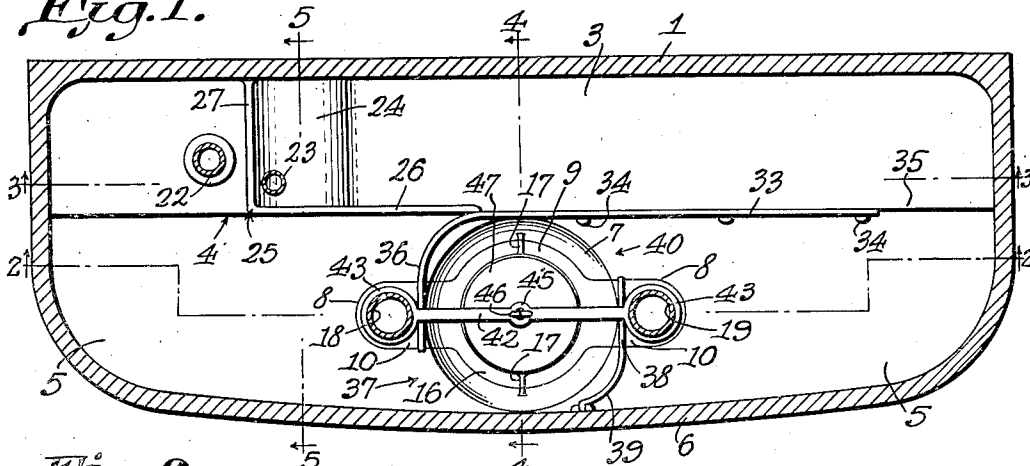
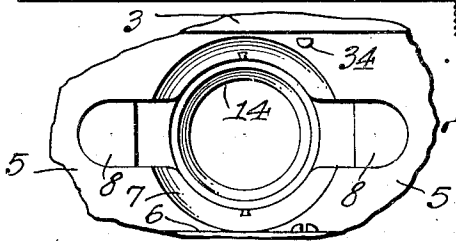
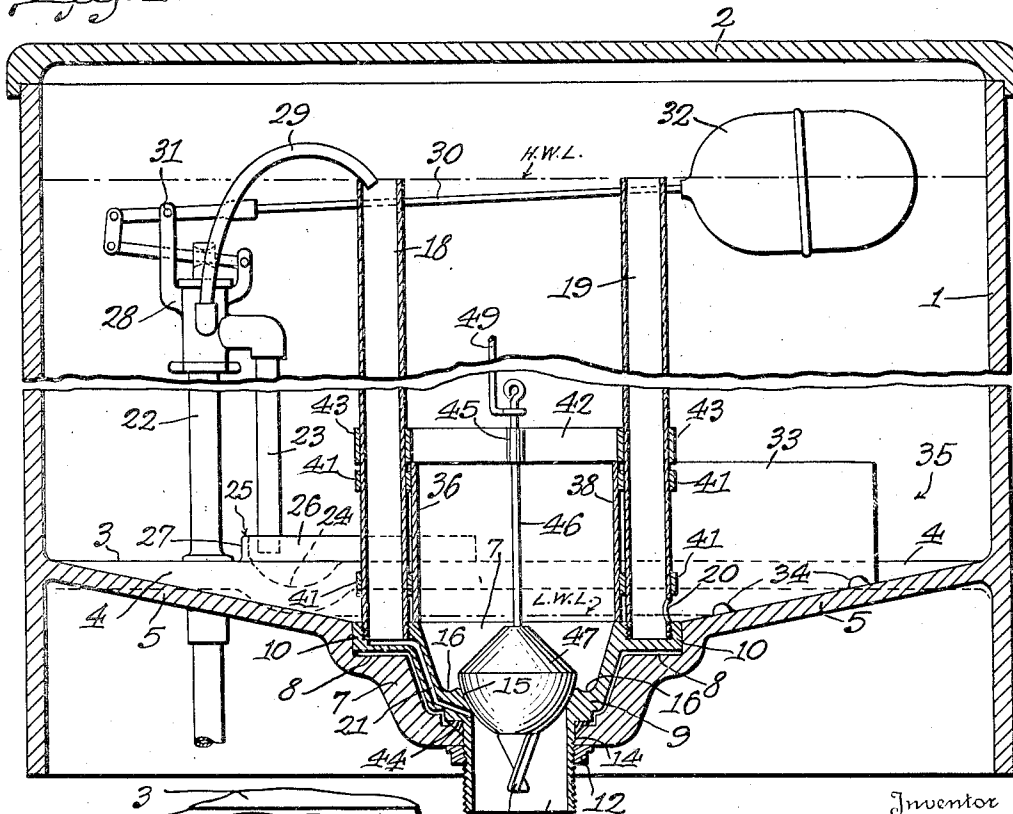


Fig. 2.



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Fig. 6.

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2 Sheets-Sheet 2

Fig. 3.

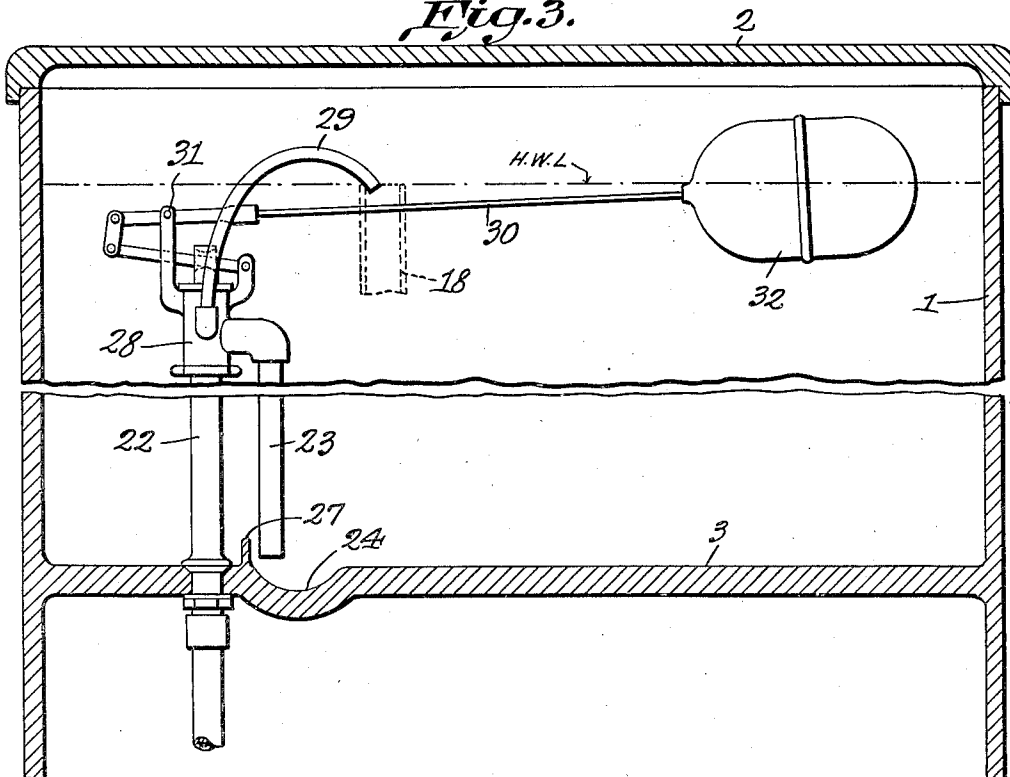


Fig. 4.

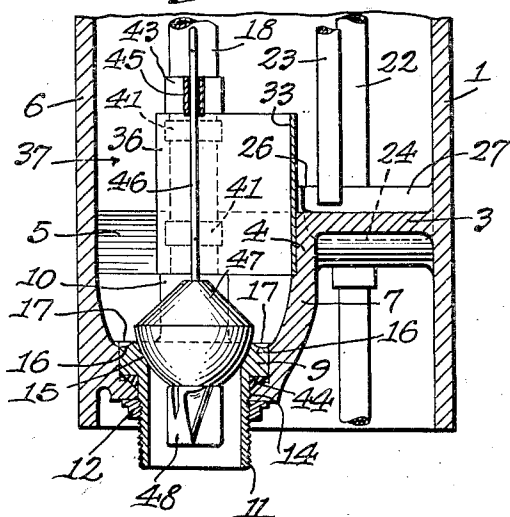
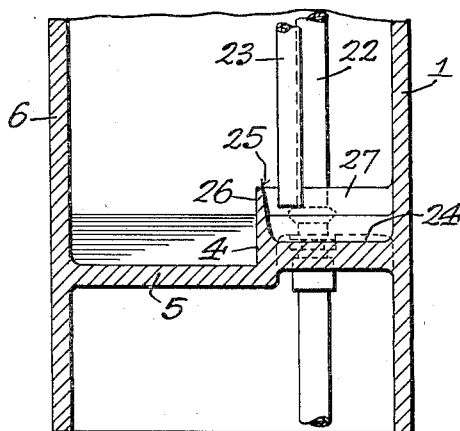


Fig. 5.



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UNITED STATES PATENT OFFICE

2,058,449

FLUSH TANK

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Application February 18, 1936, Serial No. 64,595

10 Claims. (Cl. 4—68)

Although considerable attention has been directed toward flush tank apparatus, generally stated, there has been a minimum amount of useful invention in the direction of improving the tank proper, in a flush tank apparatus. The present invention aims to provide improvements in the tank, whereby the water, as it flows out of the tank, will exert an even pressure on all sides of the bulb or valve and, at the same time, cause the bulb or valve to rotate. Another object of the invention is to provide novel means whereby the pressure will be put around the top of the bulb, at the proper time, to cause it to seat quickly and positively. Another object of the invention is to secure a proper vertical movement of the bulb stem, thereby preventing binding, and insuring a proper dropping movement or seating of the bulb. Another object of the invention is to supply novel means whereby the water is made peculiarly effective for flushing purposes, without wasting the water.

It is within the province of the disclosure to improve generally and to enhance the utility of devices of that type to which the invention appertains.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, may be made within the scope of what is claimed, without departing from the spirit of the invention.

In the drawings:

Fig. 1 shows in horizontal section, a flush tank constructed in accordance with the invention;

Fig. 2 is a vertical longitudinal section on the line 2—2 of Fig. 1;

Fig. 3 is a vertical longitudinal section on the line 3—3 of Fig. 1;

Fig. 4 is a vertical transverse section on the line 4—4 of Fig. 1;

Fig. 5 is a vertical transverse section on the line 5—5 of Fig. 1;

Fig. 6 is a top plan showing the sump in the bottom of a tank.

In carrying out the invention, there is provided a tank 1 which may be surmounted by a lid 2. At the back of the tank (Figs. 1, 4, and 5) there is a raised horizontal table 3 extended part way across the tank from front to back, the table having a front wall 4, extended downwardly to bottom members 5, which slant downwardly from the ends of the tank to a depressed, bowl-like

sump 7. The bottom members 5 extend between the front wall 4 of the table 3 and the forward wall 6 of the tank 1. Oppositely disposed seats 8 are formed in the inner ends of the bottom members 5 and in the sump 7, as Fig. 6 shows.

A valve seat ring 9 is mounted in the bottom of the sump 7 and has oppositely disposed, upwardly and outwardly prolonged extensions 10, which are received in the seats 8, the ring 9 having an outlet tube 11 extended through an opening 14 in the bottom of the sump 7. A nut 12 is threaded on the outlet tube 11 and engages the lower surface of the sump 7 to hold the ring 9 in place. A washer 44 is interposed between the bottom of the sump 7 and the ring 9, to make a water tight joint. In the ring 9 there is a seat 15, surrounded by a shallow annular trough 16, across which projects dams or barriers 17, the dams being disposed transversely of the tank, as Fig. 1 will show.

Parallel, vertical, tubular standards 19 and 18 are mounted in the extensions 10 of the ring 9. The standard 19 has no function in discharging water, but is provided at its lower end with an opening 20, through which the water in the standard 19 can drain away into the tank 1. One of the extensions 10 and the ring 9 have a duct 21, leading from the standard 18 and discharging into the outlet tube 11, below the seat 15.

An inlet pipe 22 extends upwardly through the table 3, near to one end thereof, and is provided with a depending spout 23, opening into a depressed channel 24 formed in the table 3. A baffle 25 is provided, and includes a longitudinal arm 26, extended along the table 3 at the forward edge thereof, to a point inwardly of the channel 24, as shown in Fig. 1. The baffle 25 has a transverse arm 27, extended backwardly from the forward edge of the table 3, along the outer edge of the channel 24, near to the rear wall of the tank 1, between the inlet pipe 22 and the spout 23.

The inlet pipe 22 carries a valve mechanism 28, having a nozzle 29 discharging into the standard 18, the water finding its way through the duct 21, into the outlet 11, below the valve seat 15, to fill the trap (not shown), in the usual way, if the trap happens to syphon out. The valve mechanism 28 embodies a lever 30, fulcrumed at 31 on a fixed part of the valve mechanism, the lever extending longitudinally of the table 3. A float 32 is attached to one end of the lever 30. The valve mechanism 28 has not been described in great detail, because its operation is well known,

and because many standard valve mechanisms may be used at the place indicated.

A baffle 33 is secured in place at 34 and extends along the forward edge of the table 3, one end of the baffle 33 being spaced at 35 from one end of the tank 1. The baffle 33 (Fig. 2) upstands with respect to the table 3 and extends inwardly to the arm 26 of the baffle 25, the baffle 25 being considerably lower than the baffle 33. The baffle 33 has an arm 36, disposed approximately at right angles to the baffle 33 and extended forwardly along one of the slanting bottom members 5 at a point closely adjacent to the sump 7, the forward end of the arm 36 being spaced, as at 37, from the forward wall 6 of the tank 1. The standard 18 is located outwardly of the arm 36 of the baffle 33, in close relation thereto. A baffle 38 is disposed parallel to the arm 36 of the baffle 33 and has a laterally curved end 39, extended toward the sump 7 and secured to the forward wall 6 of the tank 1. There is a space 40 between the rear end of the baffle 38 and the front wall 4 of the table 3. The baffle 38 is located inwardly of the standard 19, in close relation thereto. Collars 41 on the standards 18 and 19 engage the baffle parts 36 and 38, respectively, the standards and the said baffle parts being disposed in mutual sustaining relation.

A bridge 42 is provided and has broad sleeves 43 at its ends, receiving the standards 18 and 19 closely. The bridge 42 may rest on the upper edges of the baffle parts 36 and 38. The bridge 42 may or may not be fixed to the standards 18 and 19, as desired. Intermediate its ends, the bridge 42 has a guide 45 in which fits closely but slidably, the stem 46 of a buoyant tank bulb 47 adapted to engage the seat 15. The tank bulb 47 may be supplied with any suitable means 48 whereby rotation will be imparted to it by the outwardly passing water, although, due to the way in which the baffles 33—36 and 38—39 operate, the bulb 47 will be rotated to some extent, even though it is not supplied with the means shown at 48. The rotator for the tank bulb 47 need not be described in great detail, because this construction is developed fully in my former Patent No. 1,997,728, issued on April 16, 1935.

As to general operation, the bulb 47 is lifted by the stem 46 and the lifting rod 49 and floats for a time on the surface of the water in the tank, water flowing away through the outlet tube 11, to effect the flushing operation. Ultimately, the level of the water lowers sufficiently so that the bulb 47 is carried downwardly on the seat 15, by the outwardly flowing water.

In ordinary constructions, as distinguished from the device shown in this application, when the tank bulb (represented by the part 47) descends with the escaping water, as the level approaches such a part as the seat 15, the effective size of the outlet is reduced to such an extent that the water falls away from under the bulb. The bulb, thus, is left with less floating support than is required to support the bulb, and the bulb drops into the region of partial vacuum or diminished pressure about the upper end of the outlet pipe. It is best, when this happens, that the bulb should engage the seat while a little water remains in the tank, for the reason that the bulb usually is drawn into the wake or current of the escaping water. The bulb, however, does not always seat properly, for reasons set forth in my aforesaid Patent No. 1,997,728. One additional reason that I have discovered is that the effect of the escaping water does not bear a proper

ratio to the buoyancy of the bulb, the bulb seats too quickly, leaving too much water in the tank; or else so much water has escaped that the bulb does not seat with sufficient force. It may happen that, since the portion of the bulb is resilient, the bulb will rebound and permit the inflowing water (in the ordinary tank) to come horizontally against the easily flexible lower portion of the bulb, thus compressing the bulb horizontally and establishing an outlet before the weight of the water comes on top of the bulb. The leak thus created usually continues to a greater or less degree. This is especially true (in the ordinary tank) when the trip lever, represented by the part 30, is held until all the water has escaped from the tank.

In the device forming the subject matter of this application, when the level of the water has fallen low enough, some of the water from the spout 23 follows the baffle 26 and the baffle 33, along the table 3, passes through the opening 35, is discharged down to the corresponding bottom member 5, passes through the opening 40, and follows the arm 36 of the baffle 33 around behind the bulb 47 and at the left hand side of the bulb; and some of the water overflows the baffle 25, flows downwardly along the corresponding bottom member 5, and passes through the opening 37, the water being deflected by the front wall 6 of the tank and being caused to follow around inside the baffle 39—38, the water flowing along in front of the bulb 47 and at the right hand side of the bulb, the general direction of the water in both instances being counter-clockwise with respect to the bulb. Due to this operation, and due to the provision of the sump 7, and because the sump tapers toward its lower end, the water is constrained to circle rapidly around the bulb 47, a vortex is set up, and the bulb is carried definitely and positively to a perfect seat on the part 15. As the bulb 47 is seated, it is rotated and caused to seat properly for the reasons stated in my aforesaid patent, and for the reasons hereinbefore set forth. The rotator 48 is useful in promoting perfect operation, but the bulb 47 will rotate to an appreciably useful degree if the rotator 48 is omitted.

Even though the lever 30 be held accidentally until the tank is emptied, the positive closing of the bulb 47 is brought about. The normal inrush of water, replenishing the tank, flows immediately to the sump 7 and catches the blades of the rotator 48, causing at least some rotation. Simultaneously, the bulb is submerged, thus preventing the recoil of the bulb hereinbefore referred to.

The channel shown at 24 prevents spitting of the water discharged through the spout 23, and tends, also, to direct the water to the right in Fig. 1, along the baffle elements 26 and 23.

It is obvious that if the bulb 47 is to seat properly, some adequate means must be provided for preventing the stem 46 of the bulb from binding in the guide 45. By providing the bridge 42, and by supplying the bridge with the wide sleeves 43 that receive the standards 18 and 19, the bridge 42 can be maintained always in a truly horizontal position, the guide 45 being parallel to the axis of the stem 46, and a smooth and almost frictionless downward movement of the bulb 47 results.

The device forming the subject matter of this application is efficient in operation and wastes little or no water.

One object in rotating the bulb 47 is to wipe it clear of slime or sediment, and thus permit it to seat tightly. If, while the bulb 47 is seated, slime

or sediment settles downwardly within the sump 7, the slime or sediment will not come into contact with the bulb 47 and adhere to it, because the material referred to is caught in the trough 16 of the sump. The next time that the bulb 47 is raised, the outflowing water will wash the trough 16 clean, and at that time, the bulb 47 is raised, so that the slime or dirt cannot come into contact with it. The small dams or barriers 17 of Fig. 1 tend to keep the slime or sediment from going around in an orbit in the groove 16, while the bulb 47 is raised. The parts 17, rather, tend to direct the flowing water slightly toward the axis of the outlet tube 11 and wash out the sediment while the bulb 47 is raised.

Having thus described the invention, what is claimed is:

1. A flush tank having oppositely-disposed walls, a bottom, and an outlet in the bottom, a bulb mounted to seat in the outlet, and baffles on the bottom, each baffle extending from one of said walls part way around the bulb, and having an end spaced from the wall opposite to the one from which said baffle extends, thereby forming an opening at said end of each baffle, through which water may enter between the baffles and circulate around the bulb.

2. A flush tank having oppositely-disposed walls, a bottom, and a depressed sump in the bottom, the sump being provided with an outlet, a bulb mounted to seat in the outlet, and baffles on the bottom, each baffle extending from one of said walls part way around the bulb, and around the sump, and having an end spaced from the wall opposite to the one from which said baffles extends, thereby forming an opening at said end of each baffle, through which water may enter between the baffles and circulate in the sump, around the bulb.

3. A flush tank provided intermediate its ends with a depressed sump having an outlet, the tank having bottom members, disposed on opposite sides of the sump, and slanting downwardly toward the sump, a bulb mounted to seat in the outlet, and baffles on the bottom members of the tank, the baffles extending part way around the bulb and the sump, from opposite walls of the tank, thereby forming an opening at one end of each baffle, through which water may enter between the baffles and circulate around the bulb, in the sump.

4. A flush tank having oppositely disposed walls and a table extended along one wall, the tank having a bottom provided with an outlet, a bulb mounted to seat in the outlet, the bottom being located between the table and the other of said oppositely disposed walls, the table being raised with respect to the bottom, a first baffle on the table and extended from said one wall toward the inner edge of the table and along the inner edge of the table, a second baffle spaced at one end from that end of the tank which is remote from the first baffle, the second baffle being ex-

tended from the inner end of the first baffle, along the bottom, and part way around the bulb, at one side of the bulb, and terminating in spaced relation to said other of the oppositely disposed walls, and a third baffle on the bottom and extended from said other of the oppositely disposed walls part way around the baffle at the opposite side of the bulb, toward the table, and terminating in spaced relation to the table, and means for discharging water on the table, within the first baffle.

5. A device of the class described, constructed as set forth in claim 4, and wherein the bottom is provided intermediate its ends with a depressed sump wherein the outlet is located and wherein the bulb is disposed, the bottom comprising members located on opposite sides of the sump and slanting downwardly toward the sump.

6. A flush tank provided with a depressed sump in its bottom, the sump having an outlet and having a seat disposed about the outlet, baffles on the bottom and extended part way around the sump, oppositely disposed standards, one of which is tubular, means for mounting the standards at their lower ends on the sump, means for discharging water into the tubular standard, means for conducting water from the tubular standard to the outlet at a place below the seat, a bridge having sleeves receiving the standards, the sleeves being supported on the baffles, the bridge being provided intermediate its ends with a guide, and a bulb cooperating with the seat and having a stem slidable in the guide.

7. A flush tank provided with an outlet in its bottom, a bulb mounted to seat in the outlet, and baffles on the bottom and disposed about the bulb there being inlets at opposite ends of the baffles, and the baffles being so located and shaped as to cause the water proceeding through the inlets to the outlets to circle about the bulb.

8. A flush tank provided in its bottom with a depressed sump having an outlet, a bulb mounted to seat in the outlet, and baffles on the bottom and disposed about the sump and the outlet, there being inlets at opposite ends of the baffles, and the baffles being so shaped and located as to cause the water proceeding through the inlets to the outlet to circle in the sump, about the bulb.

9. A flush tank constructed as set forth in claim 8, and wherein the bottom has oppositely-disposed portions which slant downwardly toward the sump.

10. A flush tank provided in its bottom with a sump having an outlet, and a bulb mounted to seat in the outlet, the sump being provided at its lower end with a shallow, annular trough located close to the outlet and close to the bulb when the bulb is seated, the sump being provided with barriers disposed in substantially radial relation with respect to the outlet and extended across the trough.

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