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C. H. STAATS

MAGNETIC CONTROL OF FLUSH TANKS

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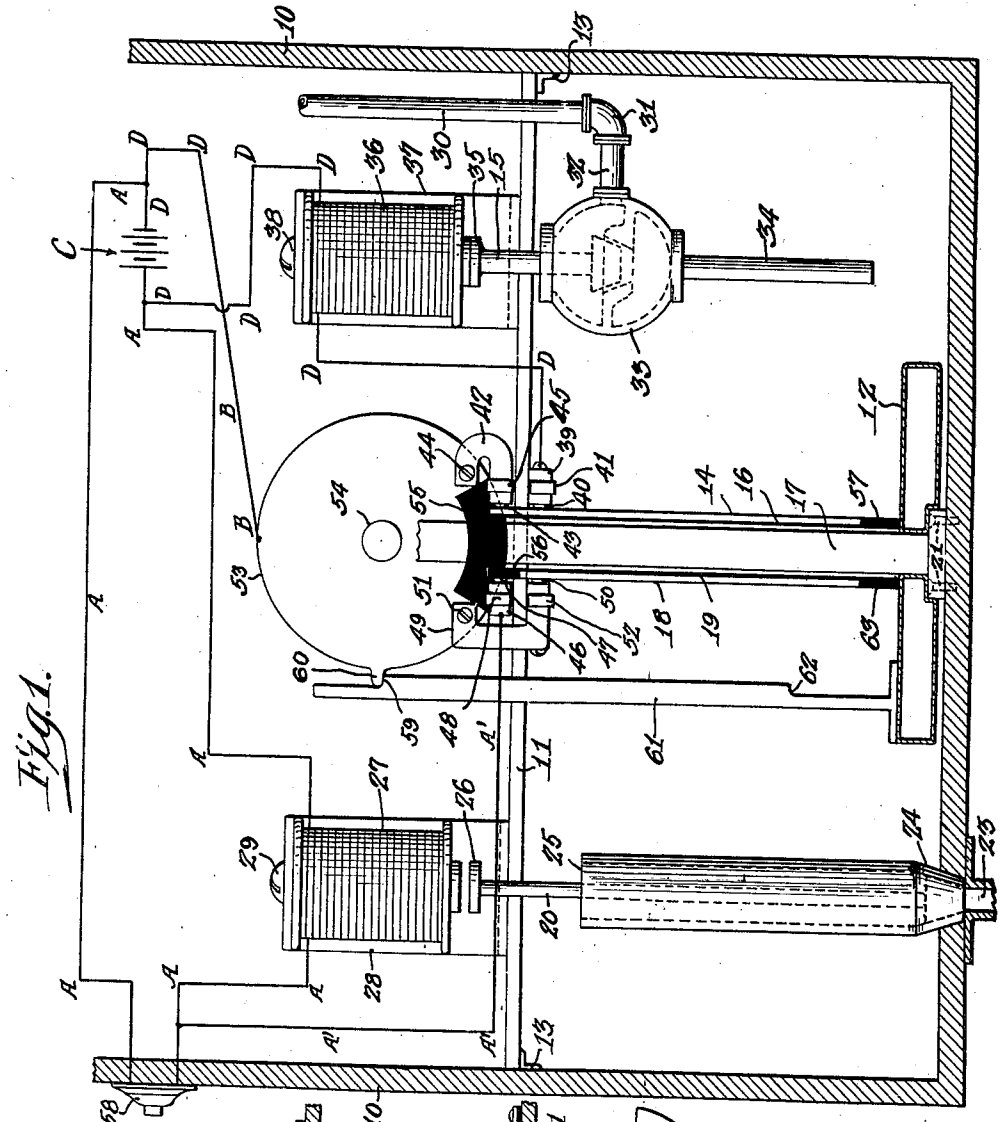


Fig. 1.

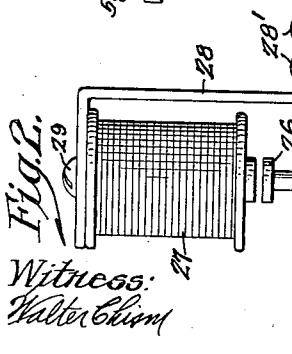


Fig. 2.



Fig. 3.



Fig. 4.

Witness:
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UNITED STATES PATENT OFFICE.

CHARLES H. STAATS, OF COLLINGDALE, PENNSYLVANIA.

MAGNETIC CONTROL OF FLUSH TANKS.

Application filed June 3, 1922. Serial No. 565,695.

To all whom it may concern:

Be it known that CHARLES H. STAATS, a citizen of the United States, residing at Collingdale, in the county of Delaware and State of Pennsylvania, has invented certain new and useful Improvements in Magnetic Control of Flush Tanks, of which the following is a specification.

My invention relates to a new and useful improvement in flush-tanks, and has for its principal object the provision of a device which will be under the control of an electric circuit operated, by a push-button, and so arranged as to discharge a given quantity of water for flushing purposes and then automatically refill the tank and finally cut off the water supply at a predetermined level in the tank.

A further object of the invention is to provide a device of the class described whereby no water may enter the tank while the contents thereof are being discharged and wherein the water supply will be automatically and sharply cut off at a given level in said tank, preventing any waste of water.

A still further object of the invention is to provide a device of the class described that will obviate the employment of the conventional, intricate lever system now in vogue.

A still further object of the invention is to provide a device of the class described whereby the noise usually attendant upon the flushing of a tank will be reduced to a negligible degree.

These objects and other advantageous ends I attain by means of the mechanism hereinafter described, reference to be had to the accompanying drawing, in which:—

Figure 1 is a cross sectional view of a flush-tank with my mechanism installed and in position for filling said tank with water to a given level;

Figure 2 is a front view of a magnet, illustrating the means of securing the same to the transversely extending platform in the tank;

Figure 3 is a view of the bracket employed to secure a brush holder to said platform; and

Figure 4 is a front view of the weighted portion of the oscillatable disc.

Referring to the drawing in detail, wherein like reference numerals refer to like parts throughout the several views, 10 represents a conventional form of a flush tank. A platform, or ledge, 11, preferably constructed of wood, is secured transversely of the tank 10, substantially, medially thereof, to the inner side walls of said tank, in any suitable manner; brackets 13—13 being shown in Fig. 1 for such purpose.

A vertically extending guide post, or pilaster, 17, square in form, is secured to the base of the tank 10, centrally thereof, by means of screws 21—21, or other suitable means.

A disc, or other conventional form of, float, 12, is provided, substantially, centrally thereof, with an opening for the passage of said guide post 17. Vertically extending contact plates 14 and 18 are secured at their bases to the upper portion of the float 12 and are adapted for travel up and down said post 17, in unison with the rise and fall of said float 12 by the action of the water in rising and receding in the tank 10. Vertically extending insulated guide plates 16 and 19, integral with the float 12, are secured to the inner faces of said contact plates 14 and 18.

A conventional type of water discharge valve 24, terminating in a discharge pipe 23 extending through an opening in the base of the tank 10 is provided within said tank 10 and has the usual overflow 25. The valve 24 is provided with a valve stem 20 which projects through an opening in the platform 11 and has on its upper terminal an armature 26, within the magnetic field and adapted for attraction by a magnet 27, secured to the platform 11, by means of a bracket 28 and screws 28′—28′. Said bracket 28 is secured to the said magnet 27 by means of a screw 29.

On the opposite side of said tank 10 an inlet pipe 30 admits water from the main, or other source of supply, to a valve 33, by means of an ell 31 and nipple 32. From said valve 33 water is admitted to the interior of the tank 10 by means of a service pipe 34.

The valve 33 is provided with a valve stem 15, which projects through an opening in the platform 11 and has on its upper terminal an armature 35, within the magetic field of, and adapted for attraction by a magnet 36 secured to the platform 11 by means of a bracket 37 and screws (not shown) similar to the screws 28′—28′ hold-

ing the bracket 28 to said platform; said bracket 37 being secured to the magnet 36 by means of a screw 38. In Fig. 1 of the drawing the valve 33 is shown as of a type having the discharge from the base thereof, but a valve having a lateral discharge, or any valve suitable for the purpose recited, may be employed.

A brush holder 39 is secured to the platform 11, therebelow, by means of a bracket 41 and is adapted for the positioning therein of a brush 40 to contact with the plate 14. A brush holder 42 for the positioning therein of the brushes 43 and 44 is secured above said platform by means of a bracket 45, (vide Fig. 3); brush 43 being in contact with the plate 14 and brush 44 with the disc 53. On the opposite side of the guide 17 a brush holder 49 is secured to the platform 11 by means of a bracket 52 and is adapted for the positioning therein of the brushes 50 and 51, brush 50 being in contact with the plate 18 and brush 51 with the disc 53. A brush holder 46 is secured to the platform 11, thereabove, by means of a bracket 48 and is adapted for the positioning therein of a brush 47 in contact with the plate 18. In Fig. 3 I have illustrated a set screw 42′ to hold the brush in the holder 42.

While I have shown and described the above method of securing and positioning the brush holders, it is to be understood that any suitable method may be employed for this purpose, the intent being that there shall be three brushes on each side of the guide post 17; a single brush on each side of said post 17 in contact with the plates 14 and 18, respectively, and dual brushes on each side of said post, each pair being connected, and one brush in each pair being in contact with the disc 53, the other brush in each pair being in contact with the plates 14 and 18, respectively.

An annular metal disc is mounted for oscillation on a ball bearing 54 secured to a bracket, (not shown), the opposite terminal of which is secured to the platform 11.

The disc 53 is weighted, as indicated at 53′ in Fig. 4, at an angle of approximately 90° with the disc teat 60, and insulating material 55 is secured over such weighted portion 53′ of said disc 53.

The said disc 53 is provided with an integray projection or teat 60 adapted to engage notches 59 and 62 on the inner face of a vertically extending actuating post 61, which is soldered at its base to the upper portion of the float 12 and adapted to rise and fall in unison therewith. The post 61 may be secured in any other suitable manner to said float 12, but it must be rigid therewith.

A represents an electric circuit to energize the magnet 27 to lift the valve 24 and is controlled by a push button 58 positioned on the outer portion of the tank 10.

D is an electric circuit from a battery C, or other source of current, to a magnet 36 to energize said magnet to lift the valve 33 and extends from said magnet 36 to the brush 40, plate 14 and disc 53 and common wire B from disc 53 back to battery C.

A′ is an electric circuit between the magnet 27 and the disc 53, the purpose of which will be hereinafter explained.

In operation:—As disclosed in Fig. 1 the tank 10 is empty. Brushes 40 and 43 are in contact with plate 14 and brush 44 with disc 53. Electric current is obtained from a battery C, or other source of current, and a circuit D is formed between the disc 53 and magnet 36: magnet 36 to brush 40, contact plate 14, brush 43 and disc 53 and common wire B from said disc 53 to battery C. The magnet being thus energized will attract the armature 35 on the valve stem 15 of the valve 33, causing said valve 33 to open and admit water to the tank through the service pipe 34. The float will rise in unison with the water entering the tank and this action of the float will cause the plates 14 and 18 and the disc actuating post 61 to rise in unison with said float, they being connected thereto. The brush 47 is on the insulation 56 on the upper terminal of the plate 18, thus keeping circuit A, controlling the magnet 27 open and the discharge valve 24 closed.

As the float 12 lifts with the rising water in the tank 10, the post 61, rising in unison therewith, will force the disc teat 60 upwardly causing the disc 53 to travel to the right and bringing the insulation 55 to the left and in contact with the brush 51, (brush 47 losing contact with insulation 56), thereby still keeping circuit A to magnet 27 open and the valve 24 closed, preventing any discharge of water through said valve while the tank is being filled. When the water reaches a predetermined level in the tank 10, such level being determined by the latitude of the plates 14 and 18, the insulation 57 at the base of the contact plate 14 will come in contact with the brush 40 breaking the circuit D which will cause the armature 35 to drop and the valve to close, shutting off the water supply to the tank.

As the disc actuating post 61 continues its upward travel with the float 12, the disc 53 travels to the right, as before said, the inner face of said post 61 remaining in contact with said disc teat 60 until the lower notch 62 on post 61 is reached, when by reason of the base of said disc 53 being weighted, as hereinabove described, said disc will travel back to the left resuming its former position, and the disc teat 60 will rest under the notch 62 on said post 61; this will bring the brush 47 on the insulation 63 at the base of the plate 18, still keeping the circuit A open and the discharge valve 24

closed. The flush box 10 is now filled to the height desired and is in a position to be flushed.

Pressure being applied to the push-button 58, electric circuit A is closed which energizes the magnet 27 causing it to attract the armature 26 on valve stem 20 causing valve 24 to lift, thereby permitting the water to leave the tank 10 through the discharge pipe 23.

The float 12 will descend with the receding water carrying with it the disc actuating post 61 and the contact plates 14 and 18. The disc teat 60 being engaged under the notch 62 will be forced to the left causing the disc 53 to travel to the right and bringing the insulation 55 on the brush 44, keeping circuit D to magnet open and the supply valve 33 closed.

At this point the brushes 47 and 50 are in contact with the plate 18 and brush 51 with disc 53 and current is being had from the circuit A′ of circuit A. The purpose of this circuit A′ is to maintain a circuit between the magnet 27 and disc 53 after pressure on the push-button 58 is released, until a full discharge of water is had, or until brush 47 comes again in contact with insulation 56 at the upper terminal of plate 18; otherwise as soon as pressure on said push-button is released the circuit A would be opened and a further discharge of water halted. When brush 47 is in contact with insulation 56 the circuit A is opened causing armature 26 to drop closing valve 24 and preventing any further discharge of water; the disc teat 60 will again rest in notch 59 and disc 53 will have resumed its former neutral position. The valve 33 will then again automatically operate, as hereinbefore described, until the tank 10 is again filled when both circuits A and B being broken or opened, pressure on the push button 58 is required to again flush the tank.

It will be obvious that if pressure is maintained on the push button 58 until the discharge valve 24 has fully discharged and the float 12 rests at the bottom of the tank 10, the auxiliary circuit A′ may be dispensed with.

In lieu of the magnets 27 and 36 solenoids may be employed in which event the armatures 26 and 35 are eliminated and the valve stems 20 and 15 are positioned within the magnetic field of said solenoids. This would prevent the clicking sound made when said armatures are attracted to said magnets.

From the foregoing description taken in connection with the accompanying drawing it will be apparent to those skilled in the art to which the invention appertains, that I have provided a device having features of novelty and utility.

An advantage of the device is that by lengthening or shortening the height of the plates 14 and 18, a greater or lesser quantity of water may be admitted to the tank 10 for flushing purposes. In this way waste of water is prevented. In some localities a minimum amount of water is required by ordinance to be used in flushing a closet—with the use of the present device this amount can be accurately obtained.

An additional advantage of the device is that it may be applied to a number of tanks, as in a large building, and each tank be brought into operation and caused to perform its function of flushing from a central station, such as the janitor's or engineer's room, by a movement of a single switch, the advantage of which will be well understood.

It will now be apparent that I have devised a novel and useful construction which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description, and while I have in the present instance shown and described the preferred embodiment thereof which has been found in practice to give satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit and scope of the invention or sacrificing any of its advantages.

I claim:—

1. An apparatus of the class described, comprising a tank, a float, a vertical guide post, means secured to said float and adapted to travel up and down said post in unison with said float, a valve controlling the water discharge, a valve controlling the water supply, electro-magnetic means to control the action of said valves, a disc mounted within said tank, an electric circuit to energize the magnet controlling the discharge valve to open said valve, means to break said circuit and close said valve when it has discharged, an electric circuit to energize said disc and the magnet controlling the supply valve, and means to cause said disc to automatically open said supply valve when the discharge valve closes and to break said circuit and close said valve when the tank has filled to a predetermined level, substantially as described.

2. In an apparatus of the class described, the combination with a tank of a platform, a vertical guide post, plates secured to said float and adapted to travel up and down said post in unison with said float, a valve controlling the water discharge, a valve controlling the water supply, electro-magnetic means to control the action of said valves, an oscillatable disc mounted on said platform, an electric circuit to energize the magnet controlling the discharge valve to

open said valve, means to break said circuit and close said valve when it has discharged, an electric circuit to energize said disc and the magnet controlling the supply valve, means to oscillate said disc to open said supply valve automatically when the discharge valve closes and to break said circuit and close said valve when the tank has filled to a predetermined level, substantially as described.

3. In an apparatus of the class described, the combination with a tank of a platform, a vertical guide post, plates secured to said float and adapted to travel up and down said post in unison with said float, a valve controlling the water discharge, a valve controlling the water supply, electro-magnetic means to control the action of said valves, an oscillatable disc mounted on said platform, an electric circuit to energize the magnet controlling the discharge valve to open said valve, means to break said circuit and close said valve when it has discharged, an electric circuit to energize said disc and the magnet controlling the supply valve, a projection on said disc and means carried by said float adapted to engage said projection to oscillate said disc to open the supply valve automatically when the discharge valve closes and to break said circuit and close said valve when the tank has filled to a predetermined level, substantially as described.

4. In an apparatus of the class described, the combination with a tank of a platform, a vertical guide post, plates secured to said float and adapted to travel up and down said post in unison with said float, a valve controlling the water discharge, a valve controlling the water supply, electro-magnetic means to control the action of said valves, an oscillatable disc mounted on said platform, an electric circuit to energize the magnet controlling the discharge valve to open said valve, means to break said circuit and close said valve when it has discharged, an electric circuit to energize said disc and the magnet controlling the supply valve, a projection on said disc, disc actuating means carried by said float and movable therewith, comprising a vertically extending post notched on its upper and lower portions to engage the projection on said disc, whereby said disc will be oscillated as the float rises and falls, said disc being weighted at its base to retain contact with said post, causing the supply valve to open automatically when the discharge valve closes and breaking said circuit and closing said valve when the tank has filled to a predetermined level, substantially as described.

5. In an apparatus of the class described, the combination with a tank of a platform, a vertical guide post, plates secured to said float and adapted to travel up and down said post in unison with said float, a valve controlling the water discharge, a valve controlling the water supply, electro-magnetic means to control the action of said valves, an oscillatable disc mounted on said platform, an electric circuit to energize the magnet controlling the discharge valve to open said valve, means to maintain said valve open until a full discharge is had, means to break said circuit and close said valve when it has fully discharged, an electric circuit to energize said disc and the magnet controlling the supply valve, means to oscillate said disc to open the supply valve automatically when the discharge valve closes and to break said circuit and close said valve when the tank has filled to a predetermined level, substantially as described.

6. In an apparatus of the class described, the combination with a tank of a platform, a vertical guide post, plates secured to said float and adapted to travel up and down said post in unison with said float, a valve controlling the water discharge, a valve controlling the water supply, electro-magnetic means to control the action of said valves, an oscillatable disc mounted on said platform, an electric circuit to energize the magnet controlling the discharge valve, a push-button to open said circuit to open said valve, an auxilliary circuit between said disc and said magnet to maintain said valve open, after pressure is released upon said push-button, until a full discharge is had, means to oscillate said disc to close said auxilliary circuit when said valve has discharged, an electric circuit to energize said disc and the magnet controlling the supply valve, the oscillation of said disc in closing the discharge valve automatically opening the supply valve and its further oscillation as the float rises breaking said circuit and closing said supply valve when the tank has filled to a given level, substantially as described.

In testimony whereof I affix my signature.

CHARLES H. STAATS.