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FLUID OPERATED TOILET FLUSHER

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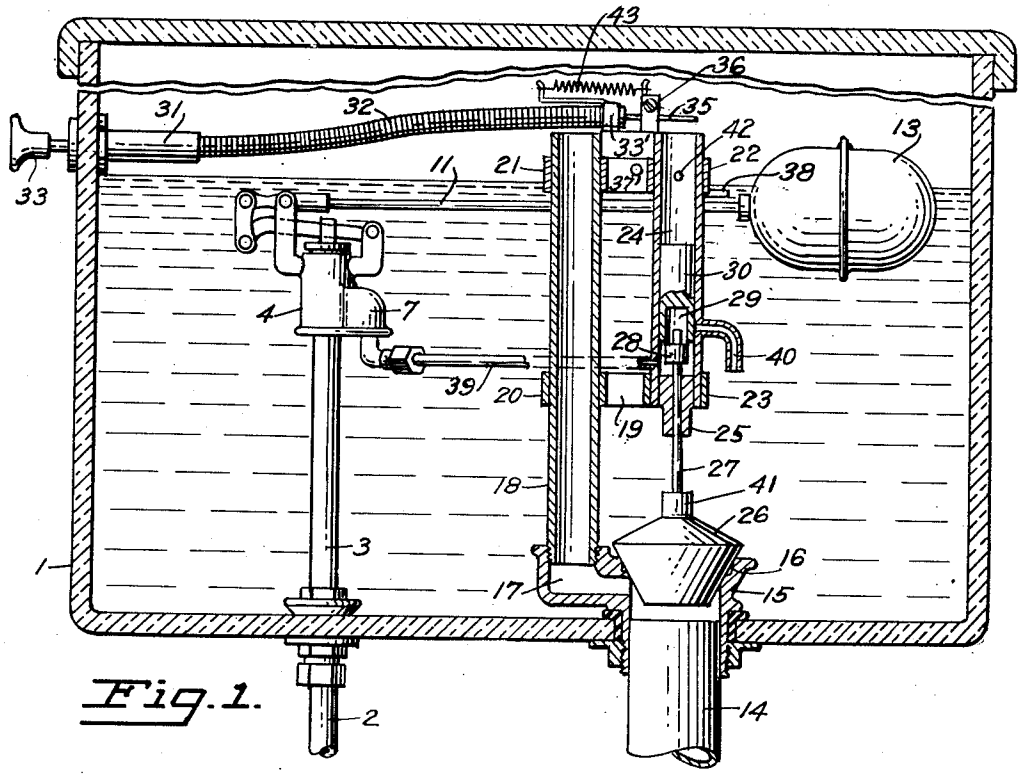


Fig. 1.

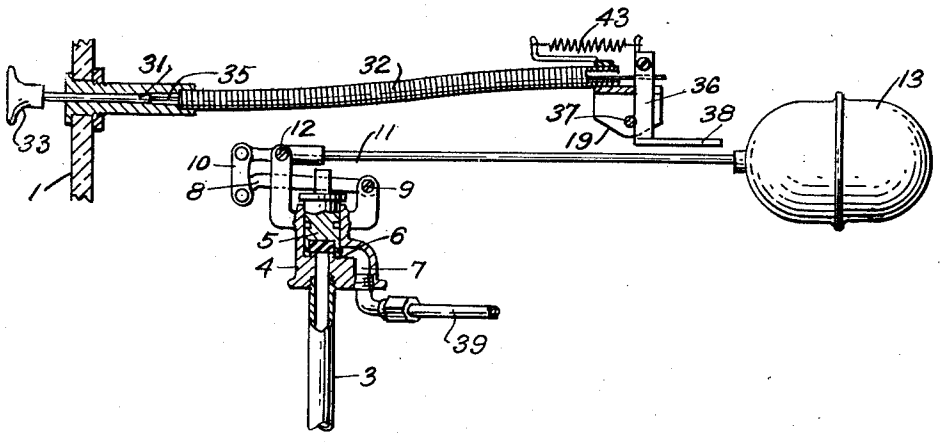


Fig. 2.

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FLUID OPERATED TOILET FLUSHER

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6 Claims. (Cl. 4—30)

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This invention relates to fluid operated toilet flushers and more particularly to the manual and automatic control of the outlet valve.

Among the objects of the invention is to simplify the structure and render the mode of operation more positive in action.

Another object is to eliminate the human factor in the operation of the outlet flush valve.

Another object is to prevent heavy handed operators from jamming the manual control means.

Another object is to prevent water waste by the failure of the flush valve to function.

A further object is the provision of improved means adaptable to present flush tank installations.

Other objects and advantages will appear as the description proceeds. In the specification and drawings the invention is disclosed in its preferred form. But it is to be understood that it is not limited to this form; because it may be embodied in modifications within the spirit of the invention as defined in the claims following the description.

In the one sheet of drawings:

Fig. 1 is a vertical section of a flush tank and the structure controlling the buoyant flush valve, in accordance with this invention.

Fig. 2 is a similar fragmentary view showing the inlet float valve control.

In detail the structure shown in Fig. 1 comprises the usual flush tank 1 having the water service pipe 2 connected through the bottom of tank with the riser 3. The water supply to the tank is through the valve body 4 having the piston valve 5 slidable therein and closing the valve seat at 6, and controlling the flow through the outlet 7. The piston valve is actuated through the lever 8 pivoted to the body at 9, and linked at 10 to the float lever 11 fulcrumed at 12 to the body and controlled by the float 13 adapted to rise with the water level in the tank and depress the piston 5 and shut off the service through the outlet 7.

The flush outlet 14 from the tank to the toilet bowl, not shown, is connected with the valve body 15 within the tank, and having the valve seat 16 in its top portion. The body 15 has the side overflow passage 17, into which the overflow pipe 18 is mounted and extends above the normal water level in the tank 1. The overflow pipe supports the bracket 19, having the collars 20, 21 encircling the pipe 18. Similar collars 22, 23 support the guide tube 24, having the plug 25 fixed in its lower end.

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The buoyant valve 26 is conical in shape and adapted to close the valve seat 15 while the tank is filling. This valve 26 is conventional and is usually composed of a rubber-like compound, and is open at the bottom and adapted to float in the water in the tank after it is unseated at 15. It has the stem 27 freely slidable in the plug 25 which maintains it in axial alinement with the seat 16 at all times.

The upper end of the stem 27 has the soft iron armature 28 fixed thereon contacting the end of the bi-polar magnet 29, fixed in the end of the plunger 30, freely slidable in the tube 24. The magnet is preferably composed of a magnetic metal known as "Alnico," because of its efficiency. Both the magnet 29 and the armature 28 are chrome plated to prevent corrosion.

The manual float control is shown in Fig. 2, consisting of guide 31, fixed in the wall of the tank 1 above the water level. The spiral and flexible wire sheath 32 has its forward end fixed in the guide 31 and its inner end fixed in the clamp 33' on the top of the bracket 19. The external push button 33 has its stem slidable in the guide 31, and attached to the push wire 35 extending through the sheath, with its end clamped in the top of the bell-crank lever 36, fulcrumed at 37 on the bracket 19 and having the flattened extension 38, overhanging the float lever 11.

The water service from the outlet 7 flows through the pipe 39 and is admitted to the guide tube 24, beneath the plunger 30 and flows into the tank 1 through the side outlet 40, when the plunger rises. The offset between the pipe 39 and the outlet 40 impounds water at reduced pressure beneath the piston valve 5, Fig. 2, because this valve lifts slowly until the descent of the float 13 is accelerated by the flushing outflow at 16. The plunger 30 rises slowly until it uncovers the side outlet 40. This retarded action of the plunger 30 prevents a violent upthrust of the plunger that might pull the stem 27 out of the flush valve at 41.

This invention operates substantially as follows: When the button 33 is pushed inwardly the extension 38 depresses the float lever 11.

Acting through the multiplying leverage 8—11 the piston valve 5 is lifted slightly from its seat. This permits the service water under reduced pressure to flow into the guide tube 24 at reduced velocity beneath the plunger 30 that is lifted gently by the impact of the water which lifts the valve 26 until its top 41 striking the end of the plug 25, breaks the magnetic hold at 28—29 and the plunger 30 continues to rise until it is stopped

by the cross pin 42 in the tube 24, where it is held aloft by the water pressure beneath.

Lifting the buoyant valve 26, permits the water in the tank to rush out through the outlet flush valve 16 into the toilet bowl. As the water recedes the buoyant valve 26 returns to the seat 16 and stops the flushing cycle. Meanwhile the service water continues to flow through the outlet 40 until the water level is again restored within the tank 1. This lifts the float 13 and automatically closes the service valve at 6, permitting the plunger 30 to descend and make attractive magnetic contact with the armature 28 on the end of the valve stem 27, restoring the apparatus ready for a repeat cycle of operation when the button 33 is again pushed. The push button control is restored to operative condition by the tension of the spring 43 contracting between its anchorage at the clamp 33' and the attachment of its other end to the bellcrank 36.

The flexible nature of the push-wire type of remote control enables the push button 33 to be located on the tank as shown, or on the wall or beneath the floor for pedal control from above.

The automatic magnetic operation of the outlet flush valve 26, free from all manual interference, assures its positive operation to close the outlet 16 as the water level lowers. This contrasts favorably with prior modes of operation wherein the valve 26 is lifted directly through manual leverage and linkage permitting the valve 26 to drift off axial center during the interval of flushing, too often resulting in the failure to close the outlet, with consequent wastage of water and the failure of the toilet to flush when next used.

Having fully described this invention and its mode of operation, what I claim and desire to secure by Letters Patent is:

1. In combination with a flushing apparatus including a tank having a flushing outlet; a guide tube with a closed bottom and mounted within said tank above said flushing outlet and having a side outlet into said tank; a buoyant valve closing said flushing outlet and having a magnetic stem extending through said closed bottom and into said guide tube; a magnetic plunger slidable within said guide tube and normally closing said side outlet therefrom and contacting said magnetic stem; a water inlet valve discharging into said guide tube beneath said plunger and causing it to rise and open said side outlet, magnetically lift said buoyant valve and open said flushing outlet when said inlet valve is opened; and a float control respectively opening and closing said inlet valve as the water level rises and falls in said tank.

2. In combination with a flushing apparatus including a tank having a flushing outlet duct with a valve seat in its upper end; a guide tube having a closed bottom and mounted within said tank above said flushing outlet valve seat and having a side outlet into said tank; a buoyant valve closing said outlet duct valve seat and having a magnetic stem extending through the closed bottom of said tube; a magnetic plunger slidable within said guide tube and normally closing said side outlet therefrom and contacting said magnetic stem; a self-closing water inlet valve discharging into said guide tube beneath said plunger; and manual means for opening said water inlet valve.

3. In combination with a flushing apparatus including a tank having a float controlled water inlet valve and a flushing outlet; a guide tube having a closed bottom and mounted within said tank above said flushing outlet and having a side outlet into said tank; a buoyant valve closing said flushing outlet and having a stem extending through the closed bottom of said tube and having an armature thereon within said tube; a magnetic plunger slidable within said guide tube and normally closing said side outlet and contacting said armature; a pipe extending from said water inlet valve and discharging into said guide tube beneath said plunger and causing it to rise and open said side outlet, magnetically lift said buoyant valve and open said flushing outlet when said float controlled inlet valve is opened.

4. In combination with a flushing apparatus including a tank having a flushing outlet duct with a valve seat in its upper end; a guide tube having a closed bottom and mounted within said tank above said flushing outlet valve seat and having a side outlet into said tank; a buoyant valve closing said outlet duct valve seat and having a magnetic stem extending through the closed bottom of said tube; a magnetic plunger slidable within said guide tube and normally closing said side outlet therefrom and contacting said magnetic stem; a water inlet valve discharging into said guide tube beneath said plunger; automatic means for closing said inlet valve; a flexible sheath extending through and mounted on the wall of said tank; a push wire extending through said sheath and adapted to overcome said automatic means and open said inlet valve when said wire is manually operated.

5. In combination with a flushing apparatus including a tank having a flushing outlet duct with a valve seat in its upper end; a guide tube having a closed bottom and mounted within said tank above said outlet duct valve seat and having a side outlet into said tank; a buoyant valve closing said outlet duct valve seat and having a magnetic stem extending through the closed bottom of said tube; a magnetic plunger slidable within said guide tube and normally closing said side outlet therefrom and contacting said magnetic stem; a water inlet valve discharging into said guide tube beneath said plunger; a float controlling said valve; a flexible sheath extending through the wall of said tank and having its inner end attached to said guide tube; means mounted on said guide tube for depressing the float controlling said inlet valve; a push wire extending through said sheath and attached to said float depressing means for depressing said float when said wire is manually operated.

6. In combination with a flushing apparatus including a tank having a flushing outlet duct with a valve seat in its upper end; an overflow pipe within said tank and discharging into said duct beneath said valve seat; a guide tube mounted on a bracket on said overflow pipe above said valve seat and having a closed bottom and a side outlet into said tank; a buoyant valve closing said valve seat and having a magnetic stem extending through the closed bottom of said guide tube; a magnetic plunger slidable within said guide tube and normally closing said side outlet therefrom and contacting said stem; a float controlled water inlet valve discharging into said guide tube beneath said plunger and causing it to rise and open said side outlet, magnetically lift said buoyant valve and open said valve in said outlet duct when said inlet valve is opened; a float in said tank and having an arm pivoted

to the casing of said inlet valve for respectively opening and closing said valve as the water level rises and falls in said tank; a sheath extending through and mounted on the wall of said tank with its inner end attached to said guide tube; a bell crank pivoted on said guide tube for depressing the float of said inlet valve control; and a push wire extending through said sheath and connected to said bell crank for depressing said float and opening said inlet valve when said wire is manually operated.

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