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VALVE DEVICE FOR TOILET FLUSH TANKS

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2 Sheets-Sheet 2

FIG. 5.

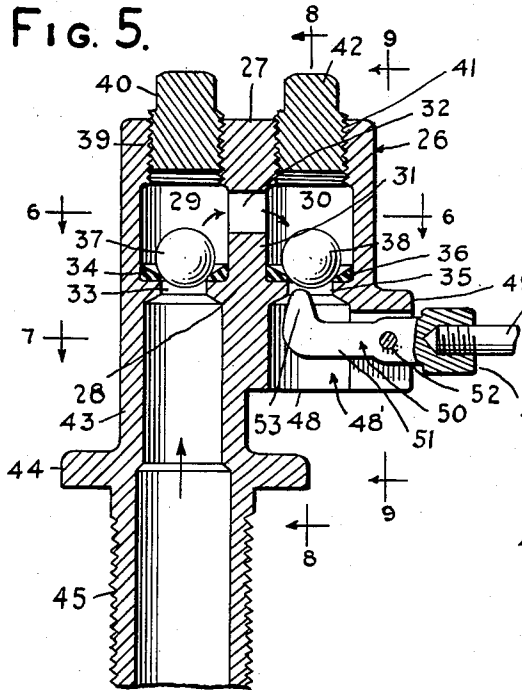


FIG. 8.

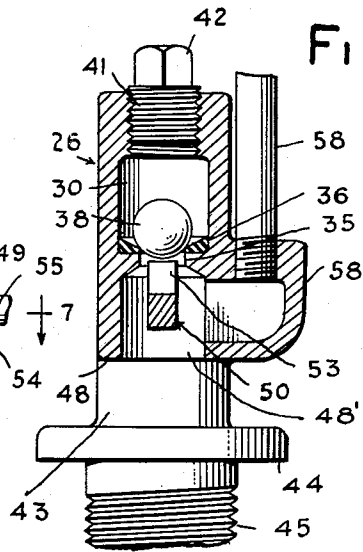


FIG. 6.

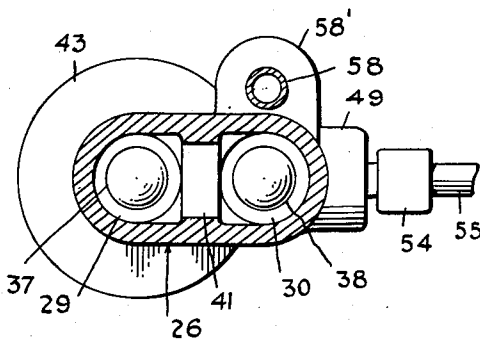


FIG. 9.

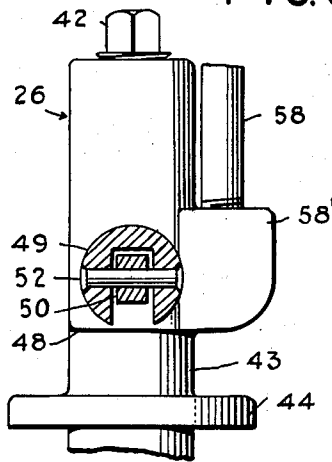
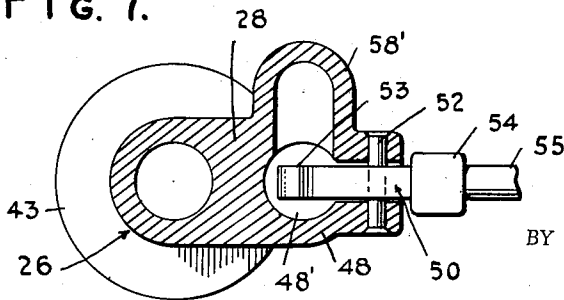


FIG. 7.



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# UNITED STATES PATENT OFFICE

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## VALVE DEVICE FOR TOILET FLUSH TANKS

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2 Claims. (Cl. 137-416)

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My invention relates to float operated valves for use in toilet flush tanks.

An important object of the invention is to provide a valve device which is extremely simple, reliable in operation, durable, extremely easy to service and cheap to manufacture.

An important object of the invention is to provide a valve device of the above-mentioned character which is located close to the bottom of the tank and will directly discharge the water into the bottom of the tank, reducing the noise of operation to the minimum.

A further object of the invention is to provide a valve device having connection with a tube which discharges into the overflow pipe, for the purpose of insuring a proper seal and will also supply air to break a back water siphon in the event that a leak occurred in the water supply pipe.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout same,

Figure 1 is a side elevation of a toilet flush tank equipped with a float operated water inlet valve embodying my invention, parts of the tank being shown in section,

Figure 2 is a plan view of the water supply valve device,

Figure 3 is a side elevation of the same,

Figure 4 is an end elevation of the water supply device,

Figure 5 is a central vertical longitudinal section through the same taken on line 5-5 of Figure 2,

Figure 6 is a horizontal section taken on line 6-6 of Figure 5,

Figure 7 is a horizontal section taken on line 7-7 of Figure 5,

Figure 8 is a vertical transverse section taken on line 8-8 of Figure 5, and,

Figure 9 is a similar view taken on line 9-9 of Figure 5.

In the drawings, where the purpose of illustration is shown a preferred embodiment of my invention, the numeral 10 designates a toilet flush tank of conventional construction, provided in its bottom with a discharge pipe or sleeve 12, secured in place by a coupling nut 13. Formed integral with the discharge sleeve 12 is an upwardly directed conical valve seat 14 for the usual conical flush valve element 15 of rubber or the like. This valve element is carried by an upstanding vertical guide tube 16, slidably receiv-

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ing a rigid vertical guide rod 17, rigidly held by a horizontal support arm 18 in turn rigidly secured to a vertical overflow pipe 19. This overflow pipe 19 is equipped at its bottom with a tubular extension 20 leading into the discharge sleeve 12 below the valve seat. The extension 20 is permanently rigidly secured to the discharge sleeve 12 and is preferably formed integral therewith.

A vertical pull or trip rod 21 has its lower end attached to the guide tube 16 and its upper end is pivotally connected at 22 with the free end of a vertically swinging lever 23, rigidly secured to a horizontal rock shaft 24, journaled in the forward side of the tank 10 and operated by an exterior hand lever 25, as shown.

My inlet valve device embodies a unitary casing 26 which is preferably substantially elliptical in horizontal cross section. The casing includes a horizontal top 27 and a horizontal bottom 28, forming chambers 29 and 30, separated by a vertical web 31, having a large opening 32 at its top, placing the chambers 29 and 30 in communication. The bottom 28 is provided with a vertical opening 33 leading into the lower end of the chamber 29 and the bottom serves to support a conical valve seat 34 formed of rubber or the like and surrounding the opening 33. The bottom 28 has an opening 35 formed therein leading into the chamber 30 and this bottom supports a conical valve seat 35 formed of rubber or the like and surrounding the opening 35. Arranged within the chamber 29 is a check ball valve 37 which may be formed of metal such as stainless steel or the same may be formed of rubber or other suitable material. When the check ball valve 37 is seated, it covers the opening 33. A check ball valve 38 is mounted in the chamber 30 and is adapted to engage the valve seat 36 and may be formed of stainless steel, rubber or any other suitable material.

At its top, the casing is provided with a screw-threaded opening 39, of a size to permit of the passage of the ball check valve 37 and the valve seat 34 is flexible and may be folded to pass through the opening and may be manipulated by a tool passed through the opening 39 so that the same will be properly arranged upon the bottom 28. The opening 39 is closed by a removable plug 40. The top 27 is also provided with a large screw-threaded opening 41 for the similar passage of the ball check valve 37 and valve seat 36 and the opening 41 receives a removable plug 42.

Arranged beneath and formed integral with the bottom 28 is a vertical tubular extension 43, having a horizontal flange 44 to engage the bot-

tom of the tank 10. Formed integral with the tubular extension 43 is a vertical sleeve 45, receiving a rubber gasket 46 and a clamp nut 47. The gasket 46 engages the interior of the bottom of the tank and forms a water-tight connection. The sleeve 45 extends below the bottom of the tank to receive the usual water supply pipe connected therewith by the usual water-tight coupling. Formed integral with the bottom 28 and extending below the same is a vertical housing 48, forming a chamber 48' which is open at its bottom and outer side. A vertically slotted guide 49 is formed integral with the bottom adjacent to the outer side of the chamber 48' and the slot of the guide leads into the chamber 48'.

The numeral 50 designates a check ball valve lifter including a short arm 51 pivoted to swing in a vertical plane upon a horizontal pin 52, secured to the slotted guide 49. The inner end of this arm has an upwardly directed extension 53, to enter the opening 35 and lift the check ball valve 38. The arm 51 extends for a short distance beyond the slotted guide 49 and is equipped with a screw-threaded sleeve 54, receiving the screw-threaded end of a vertically swinging rod 55, extending upwardly within the tank and having a horizontal extension 56, carrying a float 57.

A tubular coupling 48' is formed integral with one side of the housing 48, and has the lower end of its bore leading into the chamber 48' while its upper end extends through the top of the coupling. A tube 58 is tapped into the upper end of the bore of the tubular coupling and is therefore in communication with the chamber 48'. This tube 58 extends upwardly and has a downturned end leading into the upper end of the overflow pipe 18. The purpose of this tube is to insure a water seal in the toilet bowl.

The operation of the apparatus is as follows:

When the flush valve 15 is raised, the water discharges from the tank 10 and passes to the toilet bowl, as is well known. As the level of the water descends, the rod 55 is swung upon its pivot 52 and the upwardly directed extension 53 of the arm 51 engages the outlet check ball valve 37, unseating the same and placing the chamber 30 in communication with the tank 10. The pressure of the water from the water supply pipe passes into the tubular extension 43 and lifts the check ball valve 37. The water then passes from the chamber 29 through opening 32, through chamber 30 and through opening 35 to the tank. Particular attention is called to the fact that the water is supplied into the tank 10 very close to the bottom of the tank reducing the noise to the minimum. As the water level in the tank rises, the rod 55 swings upwardly upon its pivot and when the desired level is obtained, the extension 53 disengages the outlet check ball valve which is seated and cuts off the supply of water. The check ball valve 37 will seat when the pressure in the chamber 29 above the check valve builds up to equal that beneath the check ball valve 37. This check ball valve 37 serves to prevent a back siphoning of the water from the tank.

When the float 57 descends a sufficient distance, to unseat the check ball valve 37, the weight of the rod 55 and float 57 will retain this check ball valve unseated until the desired elevation of the water is restored to again raise the float 57 to the top position for seating the check ball valve 37.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred embodiment of the same and that various changes in the shape, size and

arrangement of parts may be resorted to, without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In a float operated valve device, a valve casing having substantially vertical fluid inlet and outlet passages arranged in side-by-side relation, the valve casing having a transverse passage connecting said inlet and outlet passages near their upper ends, annular valve seats formed upon the valve casing within said inlet and outlet passages and spaced below said transverse passage and arranged at substantially the same elevations, vertically shiftable ball check valve elements disposed within the inlet and outlet passages above said annular valve seats and normally resting upon the valve seats, the valve casing being provided in its upper end with openings in alignment with the inlet and outlet passages, removable plugs mounted within said openings and permitting the ball check valve elements to enter the tops of the inlet and outlet passages, and a vertically swingable float operated lever pivoted to the valve casing near the lower end of said outlet passage and adapted to engage the ball check valve element within such passage to unseat the same.

2. In a float operated valve device, a valve casing having substantially vertical fluid inlet and outlet passages arranged in side-by-side relation and opening through the bottom of the valve casing, the valve casing having a transverse passage connecting said inlet and outlet passages near their upper ends, annular valve seats formed upon the valve casing within the inlet and outlet passages at substantially the same elevations and spaced below said transverse passage, compressible washers mounted upon the annular valve seats, vertically shiftable ball check valve elements disposed within the inlet and outlet passages above said compressible washers and adapted to rest upon the washers, the valve casing being provided in its upper end with screw-threaded openings in substantial vertical alignment with the inlet and outlet passages and large enough to permit the passage of the ball check valve elements into the tops of the inlet and outlet passages, screw-threaded plugs removably mounted within said screw-threaded openings and normally closing the upper ends of the inlet and outlet passages above said transverse passage, the valve casing being provided in its side wall with a slot opening into the lower end of the outlet passage below the annular valve seat of the outlet passage, and a vertically swingable float operated lever pivoted to the valve casing and extending through said slot and having an upturned extension arranged within the outlet passage below the annular valve seat of the outlet passage and adapted to engage and unseat the ball check valve element of said outlet passage.

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