

Aug. 22, 1961

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2,996,727

POSITIVE CLOSING TOILET TANK VALVE

Filed Nov. 3, 1958

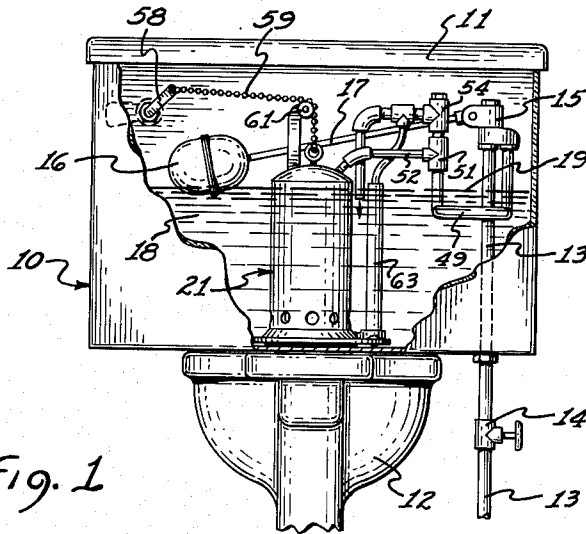


Fig. 1

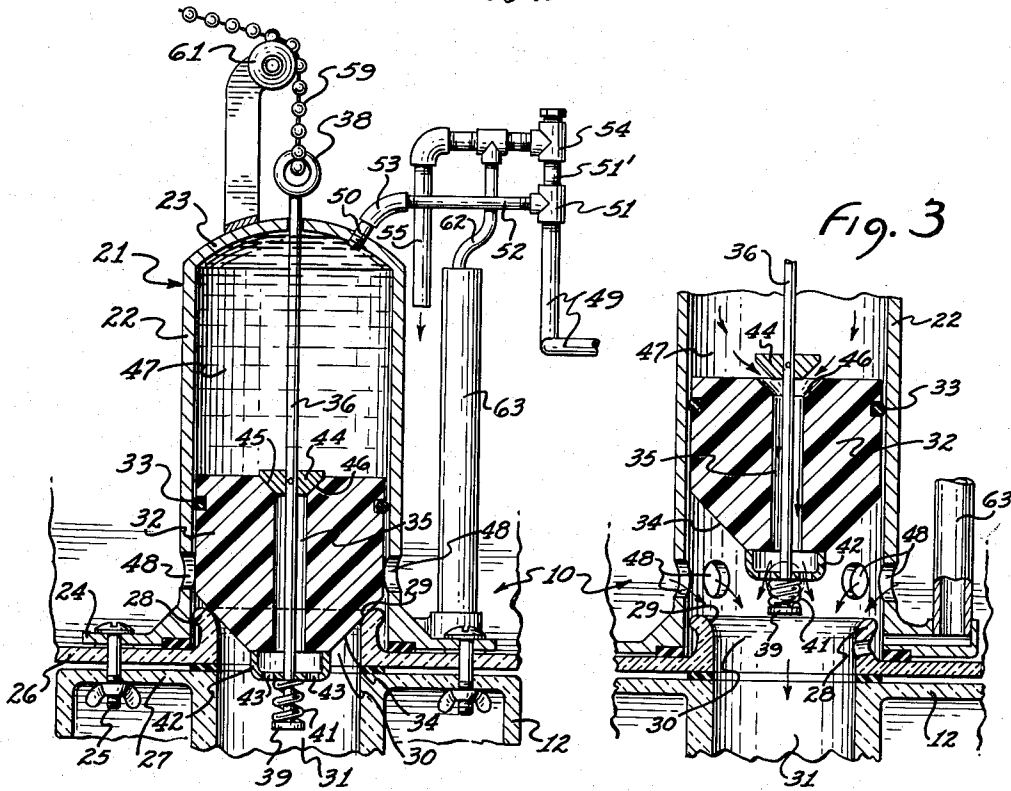


Fig. 2

Fig. 3

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2,996,727

POSITIVE CLOSING TOILET TANK VALVE

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Filed Nov. 3, 1958, Ser. No. 771,618

2 Claims. (Cl. 4-41)

The present invention relates to a valve of the type employed for opening an outlet passage for the discharge of liquid from a container and for closing the outlet and operating to close the outlet when subjected to pressure of liquid admitted to the container, the present valve being so constructed and arranged as to assure positive action, and finding use in connection with a toilet flush tank.

In flush tanks of this type, it has been the practice, to a great extent, to provide what is termed a flush ball which is actuated manually and caused to rest on a flush valve seat to close the tank discharge outlet, and lifted to permit the discharge of water from the tank. Flush tanks of this general type are subjected to extensive use, and it has been found that after continued use the operation becomes erratic and fails to give the positive action required to give satisfactory results to prevent the waste of water when the closure is not complete, as often happens.

An object of the present invention is to provide a positive acting valve for the opening and closing of a liquid discharge outlet.

Another object of the invention is to provide a discharge outlet of a container with means actuated by liquid pressure to close the outlet prior to the flow of liquid into the container proper.

A further object of the invention is to provide a toilet flush tank with a cylinder aligned with the tank discharge outlet and a movable member within the cylinder for closing the discharge outlet when the member is subjected to pressure caused by liquid entering the cylinder.

Other objects and advantages of the invention will be more fully understood by reference to the following description together with the accompanying drawing in which:

FIG. 1 is a rear elevational view of a toilet tank and bowl with the tank partly broken away to show the present flush valve in position to close the tank discharge outlet;

FIG. 2 is an enlarged view of the flush valve shown in vertical cross section with the valve parts in position to close a tank discharge outlet; and

FIG. 3 is a fragmentary view of the flush valve parts, and shown in vertical cross section, in position to open the flush valve discharge outlet.

One practical example of the invention is shown as applied to the well-known flush tank. As illustrated in the drawings, a tank 10, having the usual cover 11, is supported above a bowl 12 which connects to a main discharge outlet (not shown).

A water inlet pipe 13, having hand valve 14, admits water into the tank or container 10. At the upper end of pipe 13, which may be termed the primary conduit for the tank, is provided the usual float actuated valve 15, operated by float 16 on valve lever 17, which operates to cut off the flow of water through pipe 13 when water 18 in the tank reaches a predetermined level 19 as is the practice in flush tanks of the type in which the present invention may be employed, as will be explained.

The present invention provides what may be termed a positive acting flush-valve 21 located in alignment with the discharge outlet of tank 10. As shown in detail in FIGS. 2 and 3, this flush-valve includes a cylindrical chamber or housing 22 having an end wall 23 and a base flange 24. Bolts 25 passing through this flange 24, bot-

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tom wall 26 of the tank, and wall 27 of bowl 12 secure the chamber 22 in position over tank discharge outlet 30. Suitable packings are provided to insure water tight contact between the parts clamped together by bolts 25.

5 The bottom wall 26 of the tank is formed with the outlet 30 surrounded by an annular collar or rib 28 having beveled edge 29. The outlet 30 is in alignment with passage 31 leading to bowl 12. Thus water may be discharged through passage or outlet 30 into bowl 12.

10 Within the chamber 22 is disposed a piston or plunger 32 hermetically fitting the inner surface of the chamber by means of a packing ring 33. The normally lower end of the piston is formed with a beveled or conical surface 34 to seat on beveled edge 29 of annular collar or rib 28 when the piston is in its lowermost position. The piston may be of a relatively solid material, as for example, hard rubber or plastic, but having sufficient resiliency to make water tight contact with the beveled surface 29 of rib 28, when the piston is in position as shown in FIG. 2.

20 The piston is formed with an axial aperture 35 to serve as a relief fluid passage in which is positioned a pull-rod 36 having a diameter less than that of the aperture 35. One end of the pull-rod 36 extends through end wall 23 of the chamber 22, and having an eyelet 38, the purpose of which will be later described. The other end of rod 36 is provided with a flange 39 for contact with one end of a helical spring 41. The other end of spring 41 is in contact with a cup-member 42 having apertures 43.

30 Intermediate the ends of rods 36 is secured a movable closure for axial aperture 35, in the form of a valve-disk 44 secured to rod 36 and having a beveled surface 45, normally held in contact with seat 46, at one end of axial aperture 35, by helical spring 41, thus closing the aperture 35. Movement of rod 36 in opposition to force exerted by spring 41 serves to lift the disk from its seat to open aperture 35, resulting in a fluid passage from interior 47 of chamber 22 to discharge outlet 31. The chamber 22 is provided with outlets 48, which when the piston is lifted as shown in FIG. 3, connect outlet passage 31 with the interior of the tank 10.

45 As stated previously, water under pressure is supplied to tank 10 by means of primary conduit 13, and when the water reaches a predetermined level as indicated by reference numeral 19, the supply is cut off by float valve lever 17. The present arrangement, however, provides for the initial flow of water into chamber 22 above piston 32, the axial aperture of which is normally closed by disk 44. For this purpose, pipe 49 leads from the main or primary conduit 13 by means of T 51 to pipe 52, elbow 53 and pipe 50 threaded in top wall 23 to serve as a secondary conduit for the flow of water under pressure to chamber interior 47. The T 51 is connected by pipe section 51' to a standard relief valve 54 in the primary conduit. Since the initial flow of water may pass freely into the chamber 22, the valve 54 is not subjected to pressure and prevents water from entering the tank 10. When the chamber interior 47 above the piston has been filled, water pressure is applied to the relief valve which then operates to permit the flow of water through outlet pipe 55 to fill the tank to the controlled level.

60 In operation, assuming the tank has been supplied with water to a given level and the water discharged, the lever 17 moves to open the float valve 15 (FIG. 1), in the usual manner. Water flowing through pipe 13 of the primary conduit passes through pipe 49 and would ordinarily pass through pipe 55 for discharge into the tank.

70 With the present arrangement, in accordance with the present invention, relief valve 54, as stated above, prevents the passage of water into the tank. The water being free to flow through pipe 52 into chamber interior 47

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above the piston which is in its raised position as shown in FIG. 3, but with disk 44 closing the axial aperture 35, results in subjecting the piston to water pressure sufficient to force the piston 32 down into position to close the outlets 48 and seat on annular rib 28 to close discharge outlet 31, as shown in FIG. 2.

The flow of water into chamber interior 47 having caused the piston to move and close all outlets from chamber 22, the full water pressure is then applied to the relief valve 54 which, as stated previously, opens to permit the flow of water through pipe 55 to supply the tank 10 with water to a given level controlled by the float valve 15.

When water is to be discharged from the tank, hand-piece 58 is actuated to cause chain 59, passing over roller 61, to lift pull-rod 36. The initial movement of the pull-rod lifts disk 44 from its seat permitting water to pass through axial passage 35 and through apertures 43 in the cup-member 42, thus relieving the pressure in chamber interior 47 and permitting further actuation of the hand-piece 58 to lift the piston 32 above the chamber outlets 48 as shown in FIG. 3.

The water in the tank then flows through chamber outlets 48 and through discharge outlet 31 to toilet bowl. As will be evident, the disk 44, by reason of spring 41, is moved to close axial passage 35 when hand-piece 58 is released, whereupon the piston is conditioned to be moved when subjected to water pressure in the chamber interior 47.

When the water level in the tank has been lowered due to discharge through outlet 31 to a predetermined degree, the float valve 15 is opened and, as stated above, water under pressure passing through pipe 52 by reason of check valve 54 causes piston 32 to move to its lower position and again close discharge outlet 31. When the interior 47 of chamber 22 has been filled, check valve 54 then operates under full water pressure to admit water for discharge through pipe 55 to tank 10. Intermediate pipe 55 and the check valve 54 is a relief discharge pipe 62 for the flow of water into standpipe 63, as is the practice in flush toilets of the type to which the present invention is shown applied.

From the foregoing, it will be evident that the present invention provides a control or flush valve which operates with positive action to control the discharge outlet of a toilet flush tank.

Although a preferred embodiment of the invention is shown and described herein, it will be understood that modifications may be made therein without departing from the spirit and scope of the invention as set forth in the appended claims.

What is claimed is:

1. In combination with a toilet flush tank having a primary conduit for the flow of water under pressure into said tank, said tank having a discharge outlet, a relief valve in said primary conduit, a float valve for controlling the flow of water into said tank, a flush-valve for controlling the flow of water through said discharge outlet,

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said flush valve including a cylindrical chamber, a piston movable in said chamber, an end wall closing one end of said chamber, the opposite open end of said chamber disposed in alignment with said discharge outlet, said chamber having an outlet passage through the side wall of said chamber and adjacent to the open end thereof, said relief valve in said primary conduit operating, when subjected to full water pressure, to permit a flow of water into said tank, a secondary conduit connecting said primary conduit with said chamber for the flow of water into said chamber rendering said relief valve temporarily inoperative to prevent the flow of water into said tank and causing water under pressure to move said piston to close said outlet passage and said discharge outlet, said piston having an axial passage, a pull-rod movable in said axial passage, one end of said rod extending through the end wall of the chamber, a valve-disk intermediate the ends of said rod for closing said axial passage when said piston is positioned to close said outlet passage and discharge outlet and means for moving said pull-rod to lift said valve-disk for the flow of water through said axial passage.

2. In combination with a toilet flush tank having a primary conduit for the flow of water under pressure into said tank, said tank having a discharge outlet, a relief valve in said primary conduit, a float valve for controlling the flow of water into said tank, a flush-valve for controlling the flow of water through said discharge outlet, said flush-valve including a cylindrical chamber, a piston movable in said chamber, an end wall closing one end of said chamber, the opposite open end of said chamber disposed in alignment with said discharge outlet, said chamber having an outlet passage through the side wall of said chamber and adjacent to the open end thereof, said relief valve in said primary conduit operating, when subjected to full water pressure, to permit a flow of water into said tank, a secondary conduit connecting said primary conduit with said chamber for the flow of water through said end wall into said chamber rendering said relief valve temporarily inoperative to prevent the flow of water into said tank and causing water under pressure to move said piston to close said outlet passage and said discharge outlet, said piston having an axial passage, a pull-rod movable in said axial passage, one end of said rod extending through the end wall of the chamber, a valve-disk intermediate the ends of said rod for closing said axial passage when said piston is positioned to close said outlet passage and discharge outlet and means external of said tank for moving said pull-rod to lift said valve-disk for the flow of water through said axial passage and for lifting said piston to open said outlet passage and said discharge outlet.

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