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TOILET TANK FLUSH VALVES

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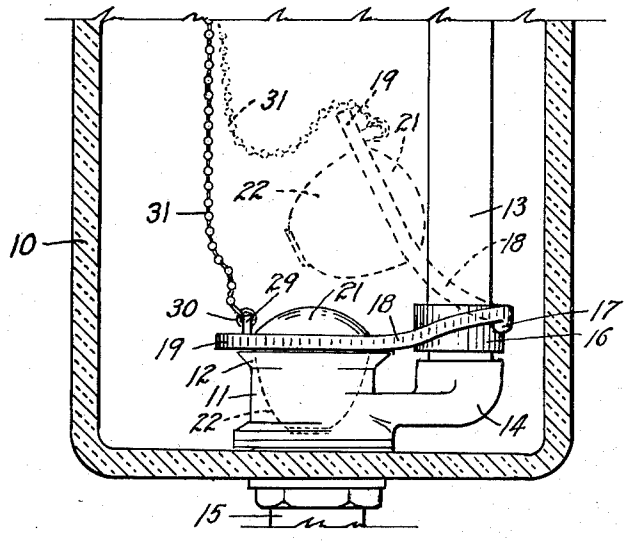


FIG 1

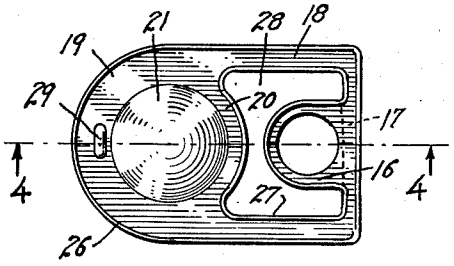


FIG 2

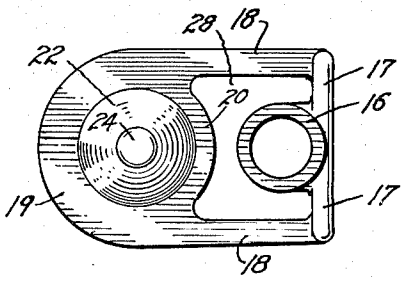


FIG 3

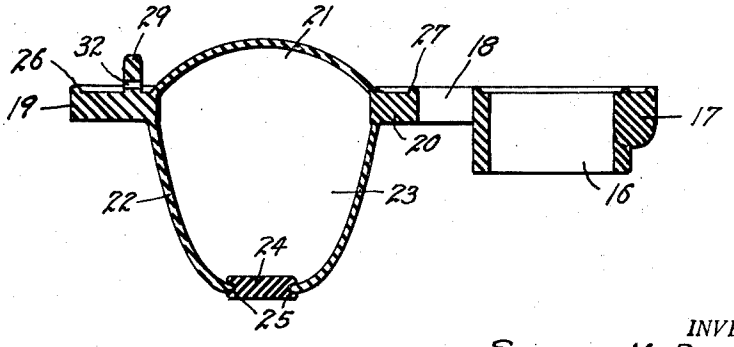


FIG 4

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TOILET TANK FLUSH VALVES

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2 Claims. (Cl. 4—57)

This invention relates to a toilet tank flush valve, and more particularly to the type of toilet tank flush valve illustrated and described in applicant's Patent No. 2,598,967. The principal object of this invention is to provide a flush valve for toilet tanks which can be quickly and easily inserted in the conventional tank by an unskilled person without the use of tools, and to provide a flush valve which will eliminate the usual flush valve rods and guides employed on conventional flush tanks.

Another object of the invention is to construct a flush valve of the type illustrated in the applicant's said prior patent which will have greater buoyancy and greater flexibility than the valve illustrated in the said prior patent, and to provide a flush valve of the latter type which will retain its buoyancy indefinitely, and which can be conveniently and economically manufactured as a complete unit on standard rubber molding equipment.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention, reference is had to the accompanying drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing:

Fig. 1 is a cross-section through the lower portion of a conventional toilet flush tank, illustrating the closed position of the improved toilet flush valve in solid line, and the open position thereof in broken line;

Fig. 2 is a top plan view of the improved valve;

Fig. 3 is a bottom view thereof; and

Fig. 4 is an enlarged, longitudinal section, taken on the line 4—4, Fig. 2.

In Fig. 1, a conventional toilet flush tank is illustrated in section at 10 containing the usual flush valve fitting 11 with its flared upper extremity 12 originally designed to receive the conventional flush ball valve of the tank. In a conventional tank, an overflow pipe 13 arises from an elbow 14 formed on the fitting 11, and the fitting 11 communicates through the bottom of the tank with the conventional toilet flush pipe 15.

The improved toilet flush valve is designed to be mounted about the overflow pipe 13 and to resiliently rest upon the upper annular edge of the flared portion 12 of the fitting 11. The improved valve is molded as a very flexible, unitary structure, and comprises a cylindrical overflow pipe collar 16 upon which a flexible cross bar 17 is molded so as to extend oppositely outward across one side, which will be herein designated the rear side, of the collar 16.

Two exceedingly flexible hinge arms 18 extend forwardly from the upper portion of the extremities of the cross bar 17. These arms support a semi-circular sealing disc 19. The bottom of the disc 19 and the bottoms of the arms 18 are smooth, unobstructed and in alignment with each other. The mid-portion of the valve is open as indicated by the opening 28.

The sealing disc 19 is provided with an arcuate, rear shelf portion 20 having a lesser peripheral radius than the remainder of the disc. A peripheral stiffening bead 26 is molded on the upper surface of the valve about the entire periphery thereof, and a similar stiffening bead 27 is molded about the opening 28 in the valve.

A chain attachment lug 29 is molded on the upper surface of the valve adjacent the forward extremity thereof to receive an attachment ring 30 of a flexible lifting chain 31.

A flexible air dome 21 is integrally formed on and arises from the upper surface of the disc 19. A semi-egg-shaped, hollow float bulb 22 extends downwardly from the disc 19 and opens to the interior of the dome 21 to form a relatively large, internal air chamber 23. The float bulb 22 is provided with a round opening in its bottom through which the die which molds the interior of the air chamber 23 is removed.

The round opening in the bottom of the float bulb 22 is closed by means of a flat, circular rubber plug 24 provided with an indented peripheral groove 25 into which the annular wall of the bottom opening is received to retain the plug is place. The plug is not sealed to or cemented in position, but is simply retained therein by the natural resiliency of the rim of the bottom opening.

The improved flush valve is installed by stretching the collar 16 about the overflow pipe 13 and sliding the collar downwardly on the pipe until the sealing disc 19 easily rests upon the upper extremity of the fitting 11 with the float bulb 22 extending there within. The chain 31 is then connected to the conventional flush lever of the toilet in any desired manner so that a slight looseness or slack is retained in the chain.

It can be seen that when the valve is in the closed position of Fig. 1, the weight of the water in the tank will hold the sealing disc 19 snugly against the fitting 11 to prevent leakage. It can also be seen that when the flush lever is operated for the usual toilet flushing operation, the chain 31 will be pulled upwardly to release the disc 19 from the fitting 11 and cause the air cavity 23 to displace water so as to become buoyant. The natural buoyancy of this air cavity will then cause the latter to float upwardly, flexing the arms 18 and twisting the extremities of the bar 17 to the broken line position of Fig. 1. As the level of the water in the tank 10 lowers, the air cavity will gradually float downwardly until the sealing disc 19 again rests upon the fitting 11 to prevent further discharge of the water.

The speed with which the valve closes can be regulated to provide any desired flushing interval by raising or lowering the position of the collar 16 on the overflow pipe 13. The higher the collar is positioned on the pipe, the slower will be the closing action. It is preferred to position the collar slightly above the top of the fitting 11 so that the arms 18 will be slightly flexed, as shown in Fig. 1, when the disc is in the closed position. By reason of the exceeding flexibility of the hinge arms 18 and the flexible cross bar 17, the weight of the float bulb 22 and disk 19 is sufficient to seat the valve when the water in the tank is sufficiently discharged. Thus the valve will be properly seated even though the arms 18 are flexed different amounts in accordance with the adjustment required for the desired regulation of the flushing interval.

It is desired to call particular attention to the dome 21, which can be formed with any desired capacity, and which serves to displace water above the sealing disc even when the valve is closed so as to increase the buoyancy of the entire valve and provide a more rapid and positive opening action.

Should the float bulb 22 become compressed or indented from rough handling or the like, the natural resiliency thereof will slowly expand the bulb, drawing air therein

about the unsealed periphery of the plug 24. The plug, however, prevents water from splashing or flowing into the bulb, since at no time is there any pressure on the water tending to force it therein.

While a specific form of the improvement has been described and illustrated herein, it is to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what is claimed and desired secured by Letters Patent is:

1. A flush valve for toilet tanks comprising; an integral unitary flexible resilient valve structure having a vertical sleeve formed therein adapted to closely fit the overflow pipe of a flush tank; a narrow flexible bar formed on the rear of said sleeve and extending horizontally on both sides thereof; a pair of narrow exceedingly flexible hinge arms extending forwardly from the extremities of said bar and merging integrally with a valve disk adapted to seat on the mouth of the fitting through which the water is discharged; a semi-egg-shaped hollow float bulb extending downwardly centrally of said valve disk and adapted to enter the mouth of said fitting when the valve is seated thereon; the flexibility of said hinge arms and said bar being of a degree to permit the weight of the disk and bulb to seat the valve upon its seat, when the level of the water discharging through said fitting drops below the point where it is sufficient to float the valve; the weight

of said disk and bulb being sufficient to drop below the horizontal plane of the arms, said weight overcoming the resiliency of said arms and bar which tend to maintain said arms and disk in the same horizontal plane; said sleeve being adjustable vertically on said overflow pipe to vary the time of discharge of water from said tank without disturbing the proper closing of the valve when the level of the water drops as aforesaid.

2. A flush valve for toilet tanks as defined in claim 1, in which said bulb is formed with a bottom opening; and a grooved plug interlocking with the rim of said opening to prevent the entrance of water into the bulb when the valve is swung about its flexible hinge for flushing the tank.

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