March 10, 1959 E. G. SCHMIDT ET AL 2,876,458

FLAPPER VALVE

Original Filed March 25, 1953

Fig. 1.

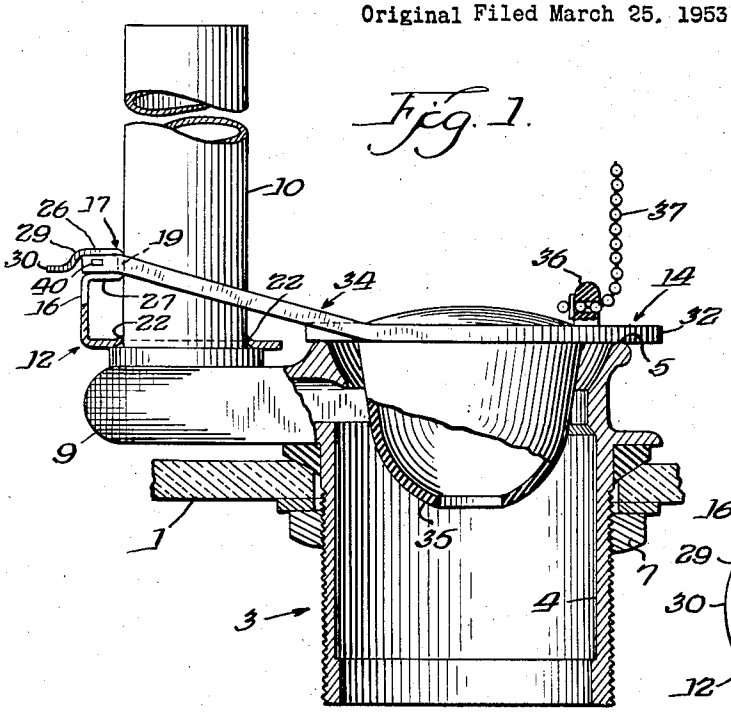


Fig. 3.

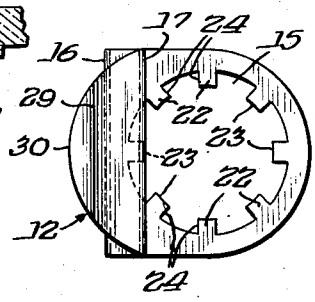


Fig. 2.

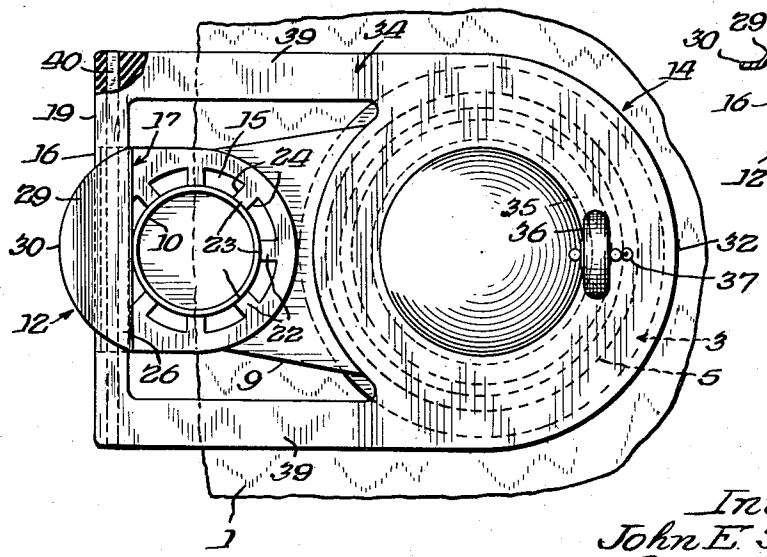
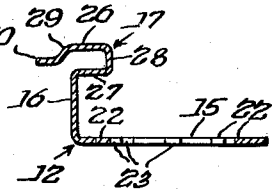


Fig. 4.



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FLAPPER VALVE

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Original application March 25, 1953, Serial No. 344,506, now Patent No. 2,763,872, dated September 25, 1956. Divided and this application February 27, 1956, Serial No. 567,846

9 Claims. (Cl. 4—57)

This invention relates generally to valves, and more particularly, it concerns discharge valves for flush tanks or the like.

The present application is a division of copending application Serial No. 344,506, filed March 25, 1953, which issued as Patent No. 2,763,872, dated September 25, 1956.

The present invention accordingly, is directed to a quick and easily applicable means of attachment of a tank outlet valve to the overflow tube or similar post portion of the tank. Of particular importance is the provision of mounting means which is durable and not subject to deterioration and which positively grips the overflow tube or post for retention of the closure in proper mounted relation.

Other objects and advantages will become more readily apparent upon proceeding with the description read in light of the accompanying drawings in which:

Fig. 1 is a sectional assembly view of a construction embodying the present invention.

Fig. 2 is a top plan view of the same.

Fig. 3 is a top plan view of the mounting member taken separately.

Fig. 4 is a side view of the member shown in Fig. 3.

Similar reference numerals refer to similar parts through the several views.

Referring more particularly to the drawing, the numeral 1 indicates a fragmentary portion of the water closet flush tank of conventional type through the floor of which is mounted an outlet fitting generally designated 3 through which the water in the tank discharges. The said fitting member may be of the conventional type used, being provided with a fluid port 4 and a seat surface 5 at the top thereof extending around the port. This member has the usual fluid tight connection at 7 and is provided with a side extenison 9 to which is connected the overflow tube 10.

The mounting member of the present invention generally designated 12 is adapted to engage the overflow tube for mounting of the closure member generally designated 14. Although the said mounting member is illustrated as engaging and extending around the overflow tube, it should be understood that the same may be mounted on any stationary portion of the flush tank over which the mounting member may be inserted. Such stationary portion or post means may extend directly from the floor of the flush tank if desired, within the spirit of this invention, being integrally formed therewith and solid, for example, or it may be removably secured to the floor of the tank.

Considering the illustrated embodiment of the present invention in greater detail, the mounting member is essentially a thin metallic sheet like means cut out at the center at 15 for insertion over the overflow tube or the like and a rearward upwardly extending portion 16 formed into a rearwardly opening channel like structure 17 at the top for reception of a cross bar or similar portion 19 of the flapper member shown. The mounting

member is provided with inwardly disposed radially extending spaced projections 22 extending around the periphery of the opening 15 in the flat base portion thereof. The inner edges 23 of these projections describe a circle of diameter slightly less than that of the overflow tube to which the member is applied so that the projections are sprung or deflected upwardly slightly as the member is slid down over the tube in mounting so as to resiliently grip or bite into the surface of the tube preventing upward movement of the member. Inasmuch as the inner edges 23 of the projections are cut on a circle, the ends of these edges or more properly the sides 24 of the projections tend to bite into the surface of overflow tube to prevent rotation as well. A certain amount of frictional engagement of the overflow tube by virtue of the resiliency of the projections is of course present which also tends to retain the member in proper position. When pushed tightly down against the top of the extension 9 of the fitting 3 at the bottom, the valve assembly will be retained firmly in that position without dislocation. It should therefore be evident that when the mounting member is inserted over the top of the overflow tube, the same may be easily slid down the length of the overflow tube into the lowermost locked position.

The top of the mounting member is formed into a channel like structure or formation 17 as already noted. This channel structure is made up of oppositely disposed upper and lower legs 26 and 27 and a forward vertical portion 28, which portions extend around three sides of the rectangular cross bar 19 of the valve member in the mounted relation of the member. The upper leg 26 extends downwardly and rearwardly at 29 and terminates in a finger grip portion 30, the purpose of which will be hereafter described.

The closure member 14 is similar to the one described in the said co-pending application and includes a closure portion 32 adapted to seal the top of the outlet fitting, engaging the seat surface 5 thereof, in the closed valve position and rearwardly extending means 34. A float element, such as a hollow rubber portion 35, is provided which depends from the lower surface of the closure portion as shown. Extending from the top of the closure portion is a projection 36 through which a flexible chain 37 is mounted for raising of the closure member into the open position through conventional operating means not shown. The rearward extending means 34 in this form comprises spaced arms 39 joined at the rear by the cross bar 19 previously referred to. The closure member is preferably constructed of flexible material such as rubber or the like so as to provide flexure of the valve member into the open and closed positions as will appear below.

The cross bar 19 of the closure member is adapted to be snugly received at the center part thereof within the channel portion 17 of the mounting member as shown in Figs. 1 and 2. The channel portion preferably is at least somewhat smaller in the inside dimensions than the rectangular cross piece or bar 19 of the closure member and by virtue of its inherent resiliency compresses, pinches, or otherwise grips the latter in effect clamping the flapper member in proper operative position. It is desirable in order to achieve this clamping action for the legs 26 and 27 of the mounting member to be in at least non-parallel relation. Such disposition could either be had initially or put in during assembly or later by pushing down on the finger grip portion 30 or by squeezing the legs together with sufficient force to retain a slight set in the material. Assembly is easily achieved by pushing up on the finger portion grip 30 in order to spring the metal and open up the channel for introduction of the cross arm 19 of the valve member.

It should be noted that the center portion of the cross

arm 19 of the valve member is maintained in a rigid position by the mounting member 12 while the valve member swings to open and closed positions during operation. It should also be noted that there is considerable vertical spacing of the point of support of the valve member within the member 12 above the seat 5 of the outlet fitting upon which the disc-like closure portion 32 of the valve member rests in closed position shown in Fig. 1. Since the supported portion of the cross arm 19 is preserved in the substantially horizontal position, the flapper member is flexted slightly when in the depressed or closed position. This stressing or loading when closed helps in initially lifting the valve member and in overcoming the drag or turbulence of the water entering the outlet opening 4, making operation easier by reducing the force necessary to open. On the other hand, by the horizontal rather than canted or inclined disposition of the cross bar, a flapper member is unstressed when straightened out and less stressed in the opposite direction as it moves above this point than it otherwise would be, to greatly reduce resistance to free flotation of the valve member and the need for additional lift of the operating mechanism. The channel portion 17 and the supported cross bar 19 may of course be angularly disposed upwardly or downwardly to vary the stressing of the flapper member for the best results.

The flapper member 14 is most conveniently and easily removed or replaced by simply lifting up on the finger grip portion 30 and withdrawing or inserting the cross bar 19 thereof and this constitutes one of the novel features of this invention.

To alleviate sticking of the valve member within the seat 5 or more particularly the outlet or discharge port therethrough, bending or distortion of the cross arm 19 and elongation of the valve member is prevented or reduced to allowable limits in this form by the employment of a stiffener member 40 molded or otherwise imbedded within and extending substantially the entire length of the cross arm 19. For maximum rigidity in the direction of the forward pull, the stiffener is preferably a flat wire or metal strip positioned as shown in Figs. 1 and 2, although a round wire or rod may be used, or the stiffener need not be of metal but may be made of other suitable material. For positioning during the molding process, the wire or strip 40 preferably extends beyond the ends of a cross arm or bar 19 and is clipped off flush at each side or end after completion of the process. This does not necessarily have to be done and another technique can be employed if preferred. In this connection, it may be considered desirable to bend the stiffener wire so as to extend into the arms 39 at each end a greater or lesser distance to increase rigidity of the valve member if this is deemed to be necessary. On the other hand, under certain conditions of use or by a variation of material, dimensions and/or the particular support means, a special stiffener such as that described might be dispensed with.

If complete freedom of movement of the closure member is desired along with the more positive gripping action of the present mounting member on the overflow tube, the latter mounting member can be modified in order to extend around and receive the cross bar portion of the flapper member for free pivotal support thereof. In the latter case, of course, the upper formation 17 of the mounting member and the cross bar 19 of the closure member would be of circular form and the mounting member would not be adapted to grip the cross bar but rather receive the same in journaling or bearing contact. Special means such as inwardly facing shoulders on the cross bar would appear necessary in order to retain the cross member in a centered position. The cross bar would be introducible or withdrawable from within the upper formed portion in the same manner explained in connection with the illustrated and previously described form; namely, by pressing up on the finger element 30, in order to expand the formed receiving portion.

For mounting of the closure member shown in the drawing figures, the same may either be secured within the mounting member beforehand and the latter mounting member slid down the length of the overflow tube and rotated into the proper position in which it is intended to be retained, or the mounting member may be so placed in proper position first and then the closure member loosely dropped down the overflow tube and placed in attached relation within the gripping portion of the mounted member. In either case, however, final adjustment should be made by applying pressure on the underside of the projection 30 so as to enlarge the channel formation and loosen the engagement of the cross bar therewithin, after which the closure member and depending float should be centered relative to the outlet portion and port therethrough and properly aligned with respect thereto. After proper alignment has thus been effected, allowing the arms 39 and cross bar 19 to seek their own unstressed positions or by manually moving the same into a straightened relationship, the upper gripping portion 17 of the mounting member may be permitted to so engage the cross bar in its then position by removing the finger from the extension 30 to so lock the closure member in this position.

From the above description, it is thus seen that an improved flapper valve and mounting means has been provided which can be used with existing flush tanks without change and that the same is convenient and easy to install or replace and efficient of operation and further affords longer lasting, more positive connection to the overflow tube and more reliable service.

Although a certain form of the invention has been illustrated and certain variations suggested, it is not desired to limit the invention to these specific details. Inasmuch as yet other forms and variations are contemplated utilizing the basic concepts of novelty, the invention should accordingly be limited only by the terms of the appended claims construed within the broad spirit of the invention and in view of the cited art.

We claim:

1. In combination with a tank or the like having a ported seat, a valve closure engageable with said ported seat in the closed valve position, attachment means mounting said valve closure to the tank, said attachment means comprising a member connected to said tank including formed means extending around and engagingly receiving a portion of said valve closure for attachment thereof, said formed means being partly open at one side and extending around the said portion of the valve closure the rest of the way therearound, one of said portion of the valve closure and said formed means being yieldable and resilient for insertion of the said portion of the valve closure within the formed means through the opening thereof and into attached relation, the size of the said portion of the valve closure being greater than the opening of the formed means when the said portion of the valve closure is in attached relation.

2. In combination with a tank or the like having a ported seat, a valve closure engageable with said ported seat in the closed valve position, attachment means mounting said valve closure to the tank, said attachment means comprising a member connected to said tank including formed means extending around and engagingly receiving a portion of said valve closure for attachment thereof, said formed means so extending around the portion of the valve closure on three sides and at least part of the fourth to retain the said portion of the closure therewithin in the attached relation of the valve closure, said formed means being of resilient material and including means extending therefrom effective to expand said formed means upon the application of force on said extending means for insertion of the said portion of the valve closure within said formed means for attachment of the valve closure.

3. In combination with a tank having a ported seat, a valve closure swingable between open and closed positions and engageable with said ported seat in the closed valve position, said valve closure including an elongated portion extending substantially normal to the direction of swinging movement of the valve closure, attachment means mounting said valve closure to the tank, said attachment means comprising a member connected to said tank including formed means extending around and engagingly receiving said elongated portion of the valve closure, said formed means being partly open at one side and extending around said elongated means the rest of the way therearound, one of said elongated portion of the valve closure and said formed means being yieldable and resilient for insertion of the said elongated portion of the valve closure within the formed means through the opening thereof and into attached relation, the size of the said elongated portion of the valve closure being greater in cross section than the opening in the formed means when the said elongated portion of the valve closure is in attached relation.

4. In combination with a tank having a ported seat, a valve closure engageable with said ported seat in the closed valve position, attachment means mounting said valve closure to the tank, said attachment means comprising a member connected to said tank including means extending around and grippingly engaging a portion of said valve closure, said gripping means so extending around the said portion of the valve closure on three sides in the attached relation of the valve closure, said gripping means being of resilient material and including means extending therefrom effective to expand the gripping means upon the application of force on said extending means for insertion of the said portion of the valve closure within the gripping means for attachment of the valve closure, said valve closure being at least partly constructed of flexible material for effecting swinging movement thereof into the open and closed positions.

5. In combination with a tank or the like having a ported seat and stationary post means, a valve closure engageable with said ported seat in the closed valve position, means attaching said valve closure to the tank, said attachment means comprising a member having a substantially thin portion of stiff sheet-like material extending completely around said post means, said latter portion including a plurality of individual thin stiff resilient elements extending therefrom engaging the post means therearound for retention of the said member having the thin portion, said member having means engaging said valve closure for attachment thereof.

6. In combination with a tank or the like having a ported seat and stationary post means, a valve closure engageable with said ported seat in the closed valve position, means attaching said valve closure to the tank, said attachment means comprising a member having an aperture receiving said post means, said member having a plurality of individual inwardly extending thin stiff elements about said aperture, said latter elements being adapted to automatically, resiliently engage said post means when the member is mounted thereon for retention of the said member, said member having means engaging said valve closure for attachment thereof.

7. In combination with a tank having a ported seat and stationary post means, a valve closure engageable with said ported seat in the closed valve position, attachment means mounting said valve closure to the tank, said attachment means comprising a member having a substantially thin portion extending around said post means, said latter portion including a plurality of resilient elements engaging the post means therearound for retention of the said member having the thin portion, said member having formed means extending around and engagingly receiving a portion of said closure member for attachment thereof, said formed means so extending around the portion of the closure member on three sides and at least part of the fourth to retain the said portion of the valve closure therewithin in the attached relation of the valve closure, said formed means being of resilient material and including means extending therefrom effective to expand said formed means upon the application of force on said extending means for insertion of the said portion of the valve closure within said formed means for attachment of the valve closure.

8. In combination with a tank having a ported seat and stationary post means, a valve closure swingable between open and closed positions and engageable with said ported seat in the closed valve position, said valve closure including an elongated portion extending substantially normal to the direction of swinging movement of the valve closure, attachment means mounting said valve closure to the tank, said attachment means comprising a member extending around said post means, said latter member including a plurality of resilient elements engaging the post means therearound for retention of the said member, said member having formed means extending around and engagingly receiving said elongated portion of the valve closure, said formed means being partly open at one side and extending around said elongated portion the rest of the way therearound, one of said elongated portion of the valve closure and said formed means being yieldable and resilient for insertion of the said elongated portion of the valve closure within the formed means through the opening thereof and into attached relation, the size of the said elongated portion of the valve closure being greater in cross section that the opening in the formed means when the said elongated portion of the valve closure is in attached relation.

9. In combination with a tank having a ported seat and stationary post means, a valve closure engageable with said ported seat in the closed valve position, attachment means mounting said valve closure to the tank, said attachment means comprising a member having an aperture receiving said post means, said member having a plurality of individual resilient elements engaging the post means therearound for retention thereof, said latter member having means resiliently gripping a portion of said closure member for attachment thereof, said valve closure being at least partly constructed of flexible material for swinging movement thereof into the open and closed positions.

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