July 18, 1961 J. J. KANTER ET AL 2,992,806

VALVE CONSTRUCTION

Filed Jan. 2, 1958

Fig. 1.

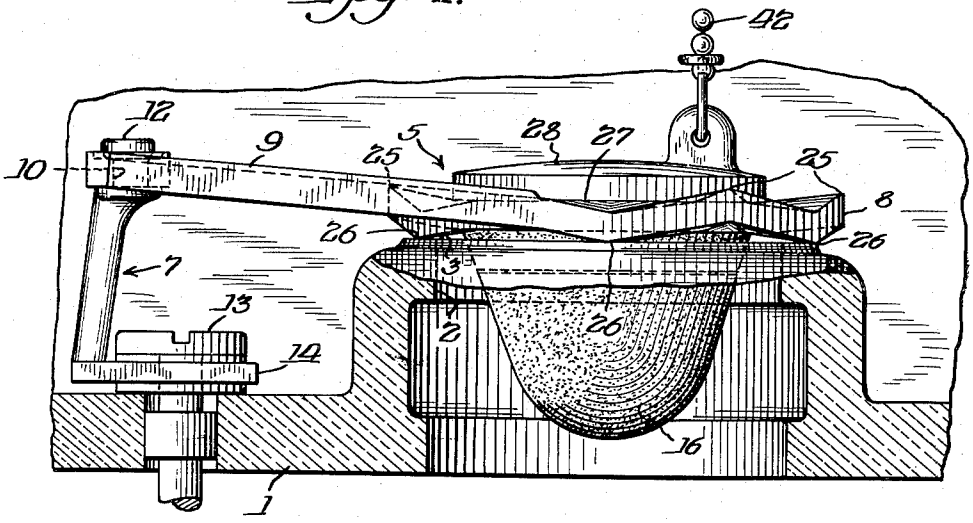
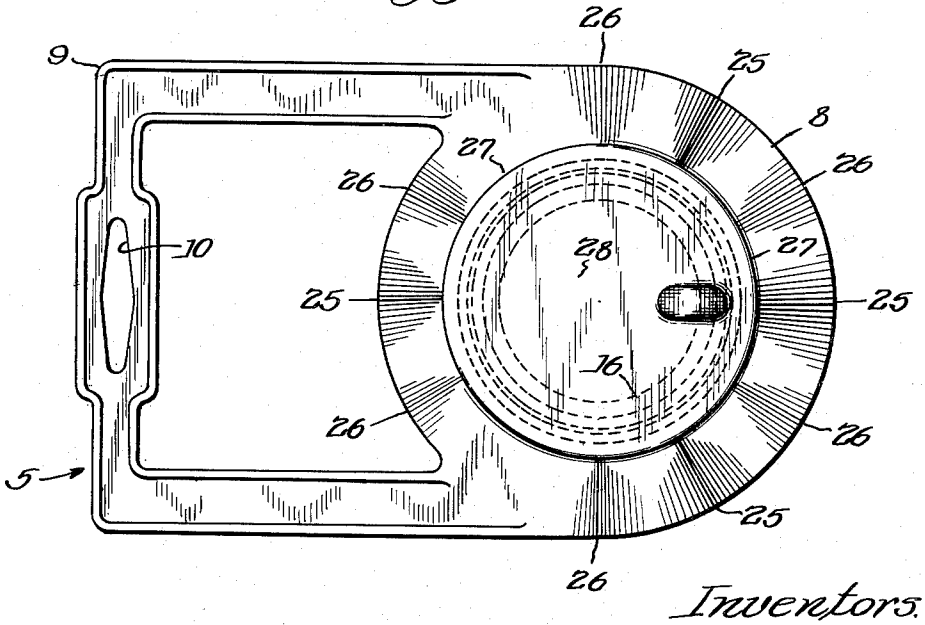


Fig. 2.



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United States Patent Office 2,992,806 Patented July 18, 1961

2,992,806

VALVE CONSTRUCTION

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Filed Jan. 2, 1958, Ser. No. 706,727
2 Claims. (Cl. 251—64)

This invention pertains to a valve construction in which a certain fluid flow or leakage is permitted to pass the closure in one condition thereof, while such flow or leakage is prohibited in another condition of the closure. More particularly, the invention is applicable to water closet flush tanks where it is desired to eliminate the conventional overflow tube or channel and provide refill through the closure member. Although not forming part of the present invention, overflow relief can be had as taught in co-pending application Serial No. 652,281, filed April 11, 1957.

It is accordingly a primary object of the invention to provide a valve construction permitting a limited passage of fluid in one condition to the valve, while permitting fluid sealed engagement between the seat and closure admitting of no passage of fluid in another condition of the valve.

Another important object is to provide, in water closet flush tank constructions, for the necessary refill of the closet by means of a controlled leakage or limited fluid flow past the valve closure in one closed condition thereof, said closure completely closing off in fluid sealed relation with the valve seat in another and fully closed condition of the closure.

Other objects and advantages will become apparent upon proceeding with the following description read in light of the accompanying drawing, which are illustrative of the present invention, in which:

FIG. 1 is a vertical section through a water closet flush tank and outlet valve therefor, the latter being constructed according to one form of the present invention, and

FIG. 2 is a bottom plan view of the closure member of FIG. 1 taken separately.

Referring to the drawing in detail and directing our attention first to FIGURES 1 and 2, the numeral **1** designates a flush tank (shown fragmentarily) as used with water closets for instance, said flush tank being provided with the usual float supply valve or ballcock (not shown) adapted to allow the filling of the tank to a normal full tank level (not shown), at which level the float actuated supply valve normally shuts off.

The flush tank is also provided with an outlet port **2** through which the tank liquid may discharge. The top of the port is defined by a flat annular seat surface **3** for effecting substantially flat seating engagement of a flapper type closure member **5** mounted by means of the mounting post **7** to the floor of the flush tank. The details of the closure member, other than those embraced in the present invention, and of the mounting post may be found in U.S. Patent Number 2,756,437 and co-pending application Serial No. 455,842, filed September 14, 1954, now U.S. Patent No. 2,822,552, granted February 11, 1958. Briefly, the closure member **5** is constructed of a piece of flexible material such as rubber or the like and comprises a forward closure portion **8** spanning the ported seat **3** in the closed valve position and a rearward attachment and hinge portion **9** having a transversely extending slot **10** for distortion or stretching over the enlarged button head **12** at the top of the mounting post **7**. The mounting post is secured to the bottom of the tank by suitable means such as a bolt **13**. In accordance with the above noted co-pending application, the base **14** of the mounting post is made flat on one side (not shown) so as to engage a flat seated lug (not

shown) arising from the floor of the flush tank so as to predeterminedly position the mounting post for proper valve closing and to prevent relative rotation of the post to the tank.

The closure member also includes a dependent buoyant element **16**, preferably of a specially formed, single piece of foam type polystyrene or polyethylene. The means of attachment of this float element and the special formation of the receiving part of the closure, which is pliant for insertion of the float element, form the subject matter of U.S. Patent Number 2,756,437.

It should be noted, at this point, that the conventional overflow tube or an integrally formed overflow channel has not been provided. In accordance with the objectives noted in the preamble, the present invention contemplates the elimination of such overflow provision and provides for refill of the associated water closet by other means.

To accomplish this objective the closure portion **8** is formed with peripheral undulations allowing for flow passage into the port **2** during the initial stage of closing. More particularly, the outer peripheral portion comprises a plurality of alternately raised and depressed portions **25** and **26**, forming relieved portions between the lower points of portions **26** for the inflow of tank water, which portions **25** and **26** taper towards a flat plane at the innermost limit **27**, while still providing for flow passage in the region of the inner edge of the seat. Such closure member is also constructed of flexible, resilient material (except for the interior domed part **28** and float element **16**) for the same flexure as indicated in the first form and in the patents previously noted and also, in accordance with the present invention, to allow the peripheral wave-like portion to become pressed into a flat condition by the action of the hydraulic head after sufficient filling of the tank, to engage the valve seat in fluid sealed relation for the final closing stage of the valve. It is obvious that in the preliminary or first stage of closing, as shown in FIGURE 4, that the controlled or limited fluid passage or leakage will be allowed for refill purposes of the water closet, which leakage will be gradually lessened as the water in the tank rises until the final stage of closing is completed.

Although the peripheral portion of the closure member has been disclosed as undulatory, the same effect may be had by forming it flat and cementing or otherwise affixing to the lower surface thereof a ring of resilient, sealed cellular, water impervious material formed with radially directed grooves or reliefs for liquid passage, which ring would be compressible or deflectable into a substantially flat, relief eliminating condition for fluid sealing engagement with the seat upon the attainment of the above mentioned predetermined level during filling of the tank.

Also, although the undulations are shown in the closure member, a reversal may be had in which the same are formed in the valve seat with the closure member spanning the raised parts in a flat condition and deflecting into fluid sealed engagement with the seat upon attainment of the predetermined level of tank filling.

It should, of course, be understood that for ordinary actuation of the flapper member **8** into the open position the ball chain **42** is pulled upwardly by the usual valve operator (not shown). It should also be explained that in order to provide for overflow relief, inasmuch as no overflow tube or channel has been provided, an additional float such as **27** in co-pending application Serial No. 652,281, filed April 11, 1957, may be suitably attached by a flexible chain to the chain **42** to raise the flapper member for such relief upon the attainment of a predetermined overflow stage. Or, alternate forms for

raising the closure member may be employed as shown in the co-pending application noted.

Although a preferred embodiment of the invention has been described and illustrated, the latter is not to be construed as so limited, but rather to be defined only by the terms of the appended claims read in the broad spirit of the invention.

We claim:

1. A valve combination comprising a ported seat, a closure member movable in operation into a fully opened position for full liquid flow through the port of said ported seat, said closure member extending across the port of the ported seat in a partially closed condition of the closure member relative to said seat and sealingly engaging the seat in a fully closed condition of the closure member relative to said seat, and means interposed therebetween to maintain the said closure member and seat in predetermined spaced apart relation to permit fluid leakage therepast in the partially closed condition of the closure member, said leakage permitting means being positioned within the confines of the ported seat in the partially closed condition of the closure member and

comprising resilient flexible undulatory portions cooperating with the closure member and having alternately raised and depressed areas respectively holding the said closure member in the partially closed position while permitting fluid flow through the depressed areas.

2. The subject matter of claim 1, the said raised and depressed areas extending substantially radially relative to the port of the said seat to communicate therewith and being integral with said closure member to provide the seat contact therefor in the respective partially closed condition and the fully closed condition of the said closure member.

References Cited in the file of this patent

UNITED STATES PATENTS

2,775,979	Stout et al.	Jan. 1, 1957
2,793,649	Hamer	May 28, 1957
2,857,131	Cole	Oct. 21, 1958

FOREIGN PATENTS

19,872	Germany	Oct. 4, 1956