Feb. 4, 1958 A. B. NELSON 2,821,721

TANK DISCHARGE VALVE MOUNTING

Filed Feb. 21, 1955

Fig. 1.

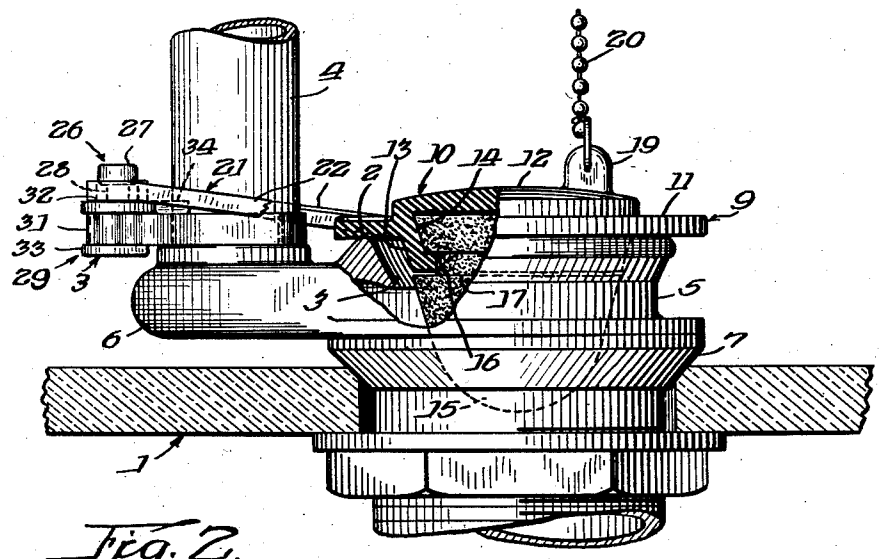
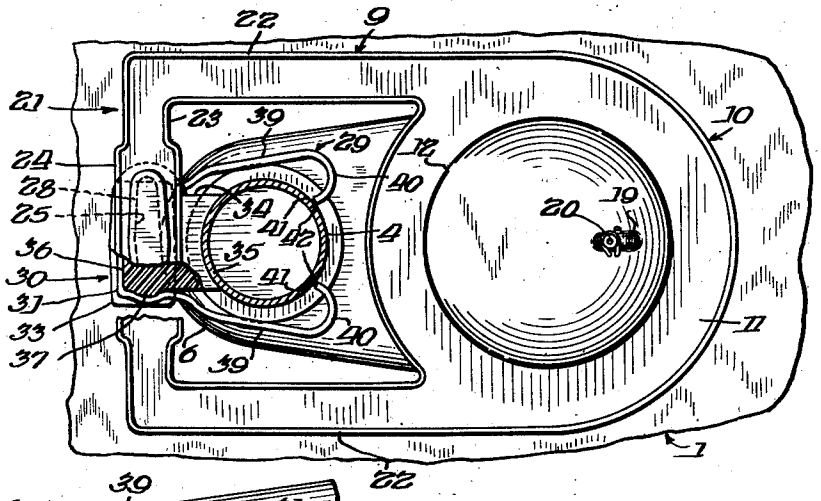


Fig. 2.



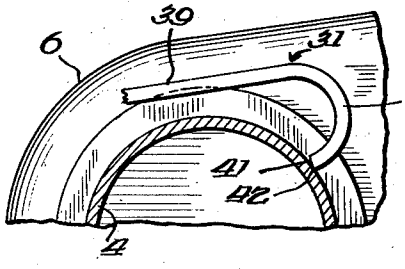


Fig. 3.

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United States Patent Office 2,821,721 Patented Feb. 4, 1958

2,821,721

TANK DISCHARGE VALVE MOUNTING

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Application February 21, 1955, Serial No. 489,553

3 Claims. (Cl. 4—57)

This invention relates to outlet valves for water closet flush tanks or the like, and, more particularly, it concerns novel means for mounting a swinging type closure member on the overflow tube of the tank.

One of the objects of the invention is to provide for fixed positioning of the closure member for the opening and closing movement thereof which is not subject to shifting or working out of position as in the case of certain constructions representative of the prior art.

Another object is to provide such fixed positioning which is not subject to deterioration and loosening as a result of flow of material as in the case of a rubber collar.

Still another object is to provide such fixed positioning by means of a clamping device which is readily attachable and easily removed.

It is a further object to provide such a clamping device which can be quickly and conveniently applied without the use of any tools.

It is still another object to provide attachment means for the valve closure which is easily mountable, sliding freely down the length of overflow tube into place after initial positioning over the top of the tube in contrast with the resistance to movement of the above indicated prior art.

A further object is to provide a single mounting means which will adjust readily to different size overflow tubes in current use.

Another important object of the invention is to provide for the attachment of a single flapper valve member to the overflow tube, which is otherwise attachable to the floor of the tank as where an integral ceramic seat and overflow are provided by a modified mounting, or to the seat member when employed.

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

Fig. 1 is an assembly view of an outlet valve and surrounding portion of a flush tank for water closets or the like, employing the present invention.

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

Fig. 3 is an enlarged detail of the front of the novel clamp employed and its manner of engagement with the overflow tube.

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

Referring more particularly to the drawing, in Fig. 1, the numeral 1 generally designates a flush tank for water closets or the like, shown fragmentarily, said flush tank being provided with a ported seat 2 around the usual outlet or discharge opening 3 and an overflow tube 4. In the conventional arrangement illustrated, the seat surface is formed on a ported seat member 5 to which the overflow tube is connected through the side extension 6. The seat member extends through the floor of the tank in the usual fluid tight relation generally at 7.

A valve closure member generally designated 9 is provided, preferably extending across the outlet opening and

seat surface in overlying substantially flat seating engagement therewith in the closed position as indicated. For this purpose, the valve member is provided with a closure portion 10 for fluid sealing contact over the outlet opening and top of the ported seat, this portion having a flat portion 11 for actual flat seating contact with the seat surface. Inwardly of this flat portion in the form shown is a raised central portion 12 which together with an annular depending skirt portion 13 form a cavity 14 for the reception of the depending float element 15, preferably formed of inherently fluid impervious sealed cellular material, such as foam polyethylene or foam polystyrene. The lower part of the skirt is preferably inwardly turned at 16, being received within the annular groove 17 of the float element so as to further insure retention of the float element within the cavity. Extending from the top of the raised central portion as shown a lug 19 is provided to which a flexible chain 20 is attached for raising of the valve closure from its seat by means of the usual operating mechanism (not shown).

Extending from the rear of the closure portion is the attachment portion generally designated 21 which comprises a pair of spaced arms 22 and a cross member 23 extending laterally therebetween at the extreme end thereof. This crosspiece is provided with a widened portion 24 having an elongated slot-like opening 25 adapted to be received on the upwardly extending post portion 26 of the clamp type attachment member generally designated 29.

As will be noted, the above post portion consists of the reduced part 28 about which the crosspiece of the closure member extends in snug engagement therewith and an enlargement 27 above the reduced portion which retains the said closure member in assembled relation and over which the slotted portion of the closure member, which is of resilient material such as rubber, is applied during assembly for movement therepast into the mounted position shown. The slotted portion is therefore distortable for this button-on type of engagement.

The specific invention has to do with securing a swinging type closure member, such as the above, to the tank overflow tube 4, in such a manner as to maintain the closure member in proper alignment for predetermined seating engagement with the valve seat. This means of attachment comprises the clamping device 29 already referred to, which in turn is made up of a block-like supporting portion 30 at the rear which receives or supports the attachment portion 21 of the closure member by means of the previously described post 27 extending therefrom and an enveloping flat spring member 31 extending around the sides and rear of the block-like portion and engaging the front of the overflow tube for resilient gripping thereof.

More particularly, the block-like or supporting portion 30, which may be constructed of metal, plastic or other suitable material is provided with an upper flat surface or ledge 32 forming an abutment or retention surface for engagement by the bottom of the slotted portion 24 of the closure member. Spaced below the upper shelf-like formation is a lower extending portion 33 also of flat ledge-like formation, being positioned in parallel relation with the first and coextensive therewith. The upper surface of the flanged shelf 32 merges with the top of a forwardly projecting shoe-like portion 34 which terminates in a vertically extending arcuate surface 35 for frictional engagement with and support of the block-like portion against the outer surface of the overflow tube. The block-like portion is reduced between the upper and lower flat extensions or ledges at 36 for reception of the flat spring member 31, the space between these ledges being only slightly greater than the height of the spring member for relatively snug reception of the latter therebetween. The reduced

portion 36 is provided with slight outward projections 37 at opposite transverse sides thereof (only one being shown) for retentive engagement of the flat spring member which is similarly shaped so as to in effect cause a snapping-on of the said spring member when placed in position for attachment to the reduced portion and then pushed forwardly with respect thereto. It is obvious that this spring action provides means of attachment or locking of the two portions together as a unit preparatory to attachment to the overflow tube.

The flat spring member extends forwardly from the block-like portion in a pair of arms 39 disposed at opposite sides of the overflow tube in the mounted relation shown. These arms are formed into inwardly directed portions 40 at the front for engagement with the forward half of the overflow tube. These parts are arranged so that the engagement is between the ends of these portions and the front of the overflow tube. By virtue of the resiliency of the spring member, which should be fairly strong or heavy, and the curved nature of the front of the overflow tube, the inwardly directed portions 40 draw the clamp member into or retain the same in tight engagement with the rear of the overflow tube through the arcuate, shoe like surface 35 of the portion 30 and the rear surface of the overflow tube. Preferably and as shown in the drawing, the arms 39 extend around the overflow tube out of contact therewith except at the ends of the forward portions, the clamping or securing device engaging the overflow tube at three places, namely, the shoe surface at the rear and the two forward points, for stable attachment thereto. Since in effect the end surfaces of the forward portions 40 retain the arcuate shoe surface in tight, abutting engagement with the outer cylindrical surface of the overflow tube, this engagement between the mutually arcuate surfaces affords solid bearing for stable support of the member 30 on said overflow tube. The arcuate surface 35 of the block-like member when in tight engagement with the overflow tube also serves the important purpose of self-alignment of the said member in the proper upright position for attachment of the closure member.

The inwardly directed portions 40 of the spring member are preferably formed into reversely bent curved prongs so as to direct the end surfaces 41 rearwardly for contact with the overflow tube. Further, the curved front ends are so disposed as to provide only line contacts preferably between the ends of the prongs and surface of the overflow tube in the form shown, the line contact on each side being between the innermost edges 42 of the prongs and the overflow tube for a biting action. This engagement is better appreciated by referring to enlarged detail in Fig. 3. If desired, the vertical ends of these forward portions may be serrated so as to provide further gripping action, but it has been found that contact along the edges of these portions, along with the substantial force in the flat spring member bearing against these edges and the frictional engagement of the curved shoe surface 35 at the rear is sufficient to firmly secure the attachment member and the closure member attached thereto in the predetermined aligned position selected. Although the contact is shown between the inner edges of these prongs and surface of the overflow tube, the prongs may be so directed as to make contact at the outer rather than inner edges with a similar effect.

In assembly, the spring member 31 may be snapped on to the base portion 30 in the manner previously described, after which the closure member may be buttoned on over the enlarged button formation 27 onto the reduced stem therebelow, the entire assembly then being held at the top of the overflow tube and the opposite arms 39 of the spring member pulled slightly apart permitting placement of the attachment means over the top of the overflow tube.

In this position, the curved shoe portion at the rear will be in engagement with the rear of the overflow tube, while the two prongs 40 will be contacting the front of the said overflow tube. The assembly can then be easily pushed down along the length of the overflow tube with very little effort until the same is in abutting relation against the top of the offset 6 of the valve member. The valve assembly can then be turned slightly into proper alignment for the opening and closing positions with respect to the valve seat surface. The flapper member may, of course, be attached after assembly of the attachment member, if preferred. Regarding the alignment of the closure member, the elongated nature of the post portion 26 along with the slotted opening of the closure member adapted to engage the same is of sginificance in preventing rotation of the flapper closure member around its point of attachment or support. Obviously, other details of attachment may be provided, but it is essential that whatever means is adapted prevents substantial rotation of the closure member about its attachment to the supporting clamp member.

It is obvious that the present clamp type attachment means may be quickly and conveniently applied and moved down into operative position with a minimum of effort while at the same time providing a rigid fixed positioning for the closure member. It should also be noted that by virtue of the resilient spring arms that the attachment member may be applied to different size overflow tubes with equal effectiveness.

It should be apparent that other detail changes may be resorted to without departing from the overall spirit of the invention, and it is, therefore, desired that the said invention be limited only by the appended claims read in the light of that spirit.

I claim:

1. In a flush tank for water closet or the like including a ported seat and an overflow tube, a valve closure engageable with said ported seat in the closed valve position, said valve closure having means extending therefrom, means securing said valve closure to said overflow tube for swinging movement into the open and closed positions, the latter securing being effective through the extending means of the closure, said securing means comprising a supporting portion engaging said extending means of the closure in support thereof for the opening and closing movement of the closure and a spring element of flat material extending therefrom, said supporting portion being positioned on one side of the overflow tube and including a projecting part terminating in a substantially arcuate surface contacting the exterior of the overflow tube on that side, said spring element of flat material extending around said supporting portion on three sides and resiliently engaging the side of said overflow tube opposite to that contacting the arcuate surface of the supporting portion whereby to hold said arcuate surface firmly against the overflow tube, said spring element terminating in inwardly directed end portions formed so as to apply the ends thereof against the overflow tube for the engagement of said spring element with the side of the overflow tube opposite to that in contact with the arcuate surface of said supporting portion, said supporting portion having upper and lower flange portions and a reduced portion therebetween, said flat spring element being received within the reduced portion and positioned therewithin by the flange portions, said reduced portion being provided with oppositely disposed retaining means past which opposite portions of the spring element extend, said opposite portions of the spring element being formed to spring into retentive engagement with the said retaining means at opposite sides when the spring element is placed between the aforesaid flanges and moved into fully received position within the reduced portion therebetween whereby to resiliently retain the spring element and supporting portion in the assembled relation relative to each other prior to mounting on the overflow tube, said projecting part of the supporting portion extending directly from the spring ele-

ment receiving portion in solid block-like form for directing the arcuate surface against the overflow tube.

2. In a flush tank for water closets or the like including a ported seat and an overflow tube, a valve closure engageable with said ported seat in the closed valve position, said valve closure having means extending therefrom, means securing said valve closure to said overflow tube for swinging movement into the open and closed positions, the latter securing being effected through the extending means of the closure, said securing means comprising a supporting portion engaging said extending means of the closure in support thereof for the opening and closing movement of the closure and a spring element of flat material extending therefrom, the wide surfaces of said spring element extending in an upward direction, said supporting portion being positioned on one side of the overflow tube and including a projecting part terminating in an upwardly extending surface contacting the exterior of the overflow tube on that side, said spring element of flat material extending around said supporting portion on three sides and resiliently engaging the side of the overflow tube opopsite to that contacting the upwardly extending surface of the supporting portion whereby to hold said upwardly extending surface firmly against the overflow tube, said spring element extending along opposite sides of said overflow tube and having inwardly directed means making the contact between the spring element and side of the overflow tube opposite to that contacting the upwardly extending surface of the supporting portion, said supporting portion being relieved on at least the two opposite sides around which the spring element extends to form a reduced portion, said reduced portion terminating at upper and lower abutment surfaces, said flat spring element being received within the reduced portion and positioned therebetween by the abutment surfaces, said projecting part of the supporting portion extending directly from the spring element receiving portion for directing the upwardly extending surface thereof against the overflow tube.

3. In a flush tank for water closets or the like including a ported seat and an overflow tube, a valve closure engageable with said ported seat in the closed valve position, said valve closure having means extending therefrom, means securing said valve closure to said overflow tube for swinging movement into the open and closed positions, the latter securing being effected through the extending means of the closure, said securing means comprising a supporting portion engaging said extending means of the closure in support thereof for the opening and closing movement of the closure and spring means of flat material extending therefrom, the wide surfaces of the spring means extending vertical and the spring means being in retained relation with said supporting portion at least in the mounted condition of the latter on the overflow tube, said supporting portion being positioned on one side of the overflow tube and including a projecting part terminating in a substantially arcuate surface in contact with the exterior of the overflow tube on that side, said spring means of flat material extending along opposite sides of the overflow tube and terminating in inwardly directed end portions contacting the opposite surface of the overflow tube from said projecting part of the supporting portion, said spring means being adapted to resiliently engage said opposite surface of the overflow tube through said end portions for tight clamping engagement of the overflow tube between the end portions of the spring means and the arcuate surface of the supporting portion, said spring means being of sufficient stiffness to draw and retain said arcuate surface of the supporting portion tightly against the overflow tube by engagement of the end portions of the spring means with the curved surface of the overflow tube, the inwardly directed end portions of the spring means being formed and disposed so that there is end contact thereof with the overflow tube, said inwardly directed end portions further being formed and disposed so that there is edge contact between the end surfaces of said portions and the overflow tube for biting action and resistance to rotational movement relative to the overflow tube in addition to the friction derived from the resiliency of the spring means, said spring means being formed to contact the overflow tube solely at the edges of the end surfaces of the inwardly directed end portions thereof to effect stable and effective securing of the supporting portion to the overflow tube, said edges of the end surfaces of the inwardly directed end portions of the spring means engaging vertically along said overflow tube in opposite and spaced parallel relation for the biting and clamping action, said spring means of flat material being in substantially non-rotational, non-sliding relation with the supporting portion when the latter together with the spring means are in mounted position on the overflow tube.

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