



## UNITED STATES PATENT OFFICE

2,306,508

## WATER CONTROL FOR CLOSET TANKS

Bennett Svirsky, Glendale, Calif., assignor to  
Sans, Incorporated, Los Angeles, Calif., a cor-  
poration of California

Application January 27, 1941, Serial No. 376,185

4 Claims. (Cl. 137—69)

My invention relates to improvements in a water control for closets, particularly of the low tank type.

More specifically, the invention pertains to improvements in a water control relating to that part of the closet tank which is known in the trade as a ball-cock.

This application is a continuation-in-part of my co-pending application Ser. No. 313,810, filed Jan. 15, 1940, now Patent No. 2,270,910, granted Jan. 27, 1942.

Among the more important objects of the invention is to improve upon the float valve controlled mechanism of the ball-cock whereby a more efficient control and silencing of the flowing water is accomplished; to improve upon the mechanism of the ball-cock whereby a simpler, easier and more efficient functioning anti-siphoning means is provided; to improve upon the lift lever assembly and associated mechanism whereby a wider range in water pressure systems is accommodated, thereby eliminating the use of water regulators; to provide as an article of manufacture an improved plunger adapted to be sold in the trade with sink faucets and the like for breaking up the water and acting as a silencer; and to provide in a ball-cock an improved parts assembly an improved means whereby such parts may be more quickly and conveniently assembled and disassembled.

Water closets quite frequently come delivered to the customer with the floor portion in a slightly bowed or convex condition. When the shank of the ball-cock is finally seated thereon, the ball-cock, due to this upwardly curved condition of the floor, is not maintained in a truly vertical position. Hence, when it becomes necessary to make repairs, such as replacing washers, valve seats or other parts, it is quite difficult to unscrew the head from the standpipe since portions thereof when rotated contact with the side of the tank preventing complete rotation of the head.

In the parent case too, the seat which screwed into the standpipe permitted irregularities to become established, necessitated by virtue of wear or re-assembly, wherein at times the proper relation between the plunger, its seat and lever for actuating the plunger, ceased to exist whereby the plunger actuating lever if not carefully inspected and checked might fail in its function.

It is therefore a still further object to provide an improved device wherein these difficulties have been remedied notwithstanding the exist-

ance of certain irregularities in construction aforementioned.

With the foregoing and other objects in view, the invention resides in the novel arrangement and combination of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed may be made within the scope of that which is claimed without departing from the spirit of the invention.

Referring to the drawing wherein is shown a preferred embodiment of the invention:

Fig. 1 is a side elevation of the improved ball-cock assembly shown positioned in a closet tank and associated with a conventional flush valve, the tank being shown in section and containing a body of water, the rise and fall of which opens or closes the stop-cock of the assembly.

Fig. 2 is an enlarged vertical mid-section showing the device per se with the parts in closed position like in Fig. 1, a portion of the structure being broken away to shorten the view. Some elements of the device are shown in side elevation and a floor portion of the closet tank is included in the view.

Fig. 3 is an extended view in side elevation on a larger scale of the parts of the ball-cock which are attachable to the head portion of the standpipe and adjacent working parts.

Fig. 4 is a section taken on line 4—4 of Fig. 3.

Fig. 5 is a section taken on line 5—5 of Fig. 1.

Fig. 6 is a plan view of the cup per se showing a modified quick turn thread.

Fig. 7 is a side elevation of the structure shown in Fig. 6.

Referring in detail to the drawing and to the figures as a whole, the water control comprises in general a ball-cock assembly 4, including the float rod 5, the float 6 for actuating the valve or plunger 7 of the ball-cock, and a re-fill tube 8 associated with the overflow pipe 9 of the flush valve 10.

The ball-cock 4 and the flush valve 10 in Fig. 1 are shown mounted and operatively positioned in the closet tank 11. The ball-cock is connected to a source of water supply 12 through the medium of the shut-off valve 13, the supply pipe 14, and the combined conventional coupling nut and washer connection 15. There is also provided a cone washer 16 and lock nut 17 for joining the ball-cock shank 17s in a leak proof manner with the floor portion 11f of the tank.

The numeral 18 indicates the tubular portion of the standpipe 18p of the ball-cock, which is

shown as comprising a piece of standard copper water tubing sweated onto the ball-cock shank 17s at its lower end and sweated onto the valve cup 17b at its upper end. Said cup 17b is shown with a modified quick turn thread 20t in Figs. 6 and 7 wherein a less partial turn disengages the cup and cap. Said standpipe extends from beneath the floor of the tank to the cap structure 19 wherein the breaking up of the water and the anti-syphoning mechanism is housed. The upper end of the cup 19 is externally threaded at 20 (20t in Figs. 6 and 7) whereby to screw the cap structure 19 thereon and by preference the threads are of the quick turn type to permit complete detachability without making a complete turn.

Adjacent the threaded end 21 of the ball-cock shank there is provided an annular flange 22 which has a bottom flat face 23 against which the washer 16 is wedged when the lock nut 17 is tightened, thus compressing the washer to make a leak proof joint with the floor of the tank.

Aside from the quick turn thread 20 or 20t previously mentioned, the cup 17b is provided with a vertically and horizontally extending circumferential flange 20a and 20b. The vertical part 20a forms a shoulder which seats snugly within the bottom opening of the cap, and the horizontal part 20b underlies the lower edge of the cap to form a stop.

The peculiar jointing and sealing of the metal against metal with an application of intervening grease to the parts just described prevents the unscrewing of the quick turn threaded joint due to vibration and functioning of the working parts.

Subjacent the flange 20b the cup is contracted to form a cylindrically shaped body 20d having a horizontal closure wall 20g. The body 20d and flange 20b meet each other at a sharp angle thereby permitting the upper edge of the tubing 18 when sweated onto the cylindrical body to abut said flange 20b.

The wall 20g is provided with a screw threaded bore 20x which is tapped so as to have its axis coincide with that of the tubing into which the body 20d is sweated. Into this threaded bore is screwed one end of the valve seat 25. Said seat is provided with an internal bore 26 concentric with the axis of the standpipe. The body portion 27 of the valve seat is constructed of a polygonal shape and of a suitable size to provide for the application of a socket wrench thereover whereby to render the valve detachable. Thus when the valve is removed for any reason and replaced, the fixed relation of itself with the parts with which it is associated can be unalterably maintained.

The upper end of the valve seat is reduced to a cylindrical shape 28 and the end is rounded off to provide a valve seat 29. The cup 17b is internally machined to provide a working surface along which the plunger travels when it is elevated from time to time. Said plunger is of an inverted cup shape to provide within it a chamber 31, and in said chamber is mounted a washer 32 which normally rests on the seat 29, and at such time a considerable portion of the valve seat extends into the chamber 31 as shown in Fig. 2.

The plunger is provided with a stem 33, and on the stem is slidably mounted the anti-syphon, anti-splash washer 34. The external peripheral wall of the plunger is provided with a pair of

spiral grooves 35 and 35a through which the water passes from the standpipe to the tank.

The function of the grooves is to divide the water into streams so as to silence its flow and although I show a pair of spiral grooves I consider it within the province of the claimed invention to use equivalent water passages of diverse shapes extending in diverse directions formed in the outer face of the plunger which may work equally as well to break up the water and silence its flow.

On the upper end of the standpipe I screw the cap structure 19. Said structure has a cylindrical portion 40 which is threaded at 41 to mate the thread 20, and when the standpipe and cap are fully attached the faced end of the cup forms a seat 42 whereon the washer 34 rests when the ball-cock is not functioning.

The cylindrical part 40 is provided with a closure 43 which is provided with a hole 44 concentric with the axis of the standpipe through which the stem 33 operates.

The stem 33 abuts against the lower side of one of a pair of tandem contacting levers 45 and 46, the closure part 43 being provided with a bifurcation 47 wherebetween to pivot the lever 45 by means of the cotter pin 48.

Arranged circumferentially in the upper part of the cylindrical part 40 adjacent the closure 43 are a plurality of radially extending, anti-syphon holes 49.

To the hexagonal portion 40a of the part 40 I attach as an integral part the spout 50, provided with the passage 51. The outlet end portion of said passage is internally screw threaded and therein is screwed the tank's fill pipe 52. On the spout 50 I provide an upward extension 53 which is bifurcated at 54 and in the bifurcation I mount the lever 46 by means of the cotter pin 55. A stop 56 is provided on said extension whereagainst the lever 46 rests when the tank 11 is empty. The lever 46 is threaded at 57, and the float rod 5 has one end screwed thereinto, while to the opposite end is affixed the float 6.

The washer 34 is provided with a sleeve portion 34s, and this sleeve is slidable on the stem 33 together with its downwardly flared portion 34f of the washer proper. Said washer is cupped in order that the water egressing from the grooves 35, 35a will travel first along its cupped face thereby exerting a lifting action and avoiding any tendency of the washer to tilt, which would promote friction between the sleeve and stem.

An annular stop flange 58 is provided in the inner wall of the cylinder 40 to limit the upward thrust of the washer by the inflowing water at a point adjacent where the opening 51 enters the discharge chamber 59 as shown in Fig. 2. Thus, no air entering the holes 49 is entrapped within the pipe 52, and when the tank has filled the washer gravitates to seating position, thereby permitting air to enter the holes 49 and eliminate any tendency of the water in the tank to be syphoned back into the main supply line.

In order to compensate for variations in water pressures extending over a wide range, I provide the compound leverage system as shown whereby sufficient force is attained by the action of the water against the float at all times to actuate the plunger to a seating position upon the valve's mouth 29.

The lever 46 has its pivoted end extended and rounded at 60 so as to detachably engage with the

free end 61 of the lever 45. The lever 45 has a lower cam face 62a which engages the upper end of the stem 33 to exert a powerful downward pressure thereagainst under the urge of the nose portion of the lever 46.

As the float is elevated, the nose end 60 depresses the free end portion 61 of the lever 45 to force the plunger downwardly with added force to the position shown in Fig. 2.

The pipe 52 has its terminal end 62 somewhat flattened and bevelled in order to direct the flattened stream which issues therefrom against the tubing 18 of the standpipe in a flatwise manner, to produce an additional initial silencing effect. This flattened pipe end also causes the water to build up in the pipe so as to assure a slight overflow feed into the refill pipe 8 to provide for water in the bowl's trap in case it has all been sucked out when the bowl is flushed.

A description of the operation will now be set forth.

In Figs. 1 and 2, the parts are shown in the relation they assume when the tank has been filled.

When the flush valve is operated, the float 6 follows the fall of the water until the lever 46 comes to rest against the stop 56. As the float gradually falls the lever 46 moves about its pivotal joint 55 in a clockwise direction thereby elevating its nose end. Due to the freedom of pressure of the nose against the free end 61 of the lever 45, the pressure of the water in the standpipe, or valve casing 18 acts against the plunger 7 and in turn causes the stem 33 to move upwardly, thereby maintaining the contacting association of numbered parts 60 and 61.

As soon as the washer 32 is elevated from its seat 29, water flows through the grooves 35 and 35a and is broken up and silenced by them. On egressing under the washer 34 the water elevates the washer from its resting position to its working position against the flange 58, said washer being guided in its upward movement by the sleeve 34s until its peripheral edge contacts with the annular stop flange 58, thereby permitting water to flow through the spout opening 51 and through the tank fill tube 52 into the tank. While the tank is filling, water is backed up in the pipe 52, due to its flattened mouth and a sub-flow is created through the refill tube 8 into the overflow pipe 9 for the purpose hereinbefore stated. The washer 34 also prevents the water from being splashed through the anti-syphon holes 49 and further aids in directing the water into the spout's opening.

As the float gradually rises due to the rise of the water in the tank, the nose end of the lever 46 acts on the free end of the lever 45 to depress it, thereby gradually forcing the stem of the plunger downwardly until the washer 32 is fully seated and stops the flow of the water. As soon as the latter operation takes place, the washer 34 due to its weight and free working fit gravitates to rest against its seat 42, permitting air to enter the holes 49 and thereby preventing any tendency of the water to be syphoned from the tank into the main line whereby it might become polluted.

By the peculiar construction of the lever mechanism I am able to control a much wider range of water pressure than is at present accomplishable without the use of auxiliary water pressure controls.

When it is necessary to make repairs, such as renewing washers or in making inspection, the cotter pin 55 is removed preparatory to detaching the lever 46, and the cap alone is unscrewed

by simply effecting a partial turn as a result of the quick turn thread, the other parts remaining in place. After the cap has been removed the plunger and washer may be lifted out and if necessary a socket wrench applied to the valve for unscrewing it from its seat. Thus, little if any lateral stress is placed on the joint connection of the ball-cock with the bottom of the tank whereby its leak-proof condition might become impaired.

What is claimed is:

1. In a ball-cock, a valve containing cup, a valve body, provided with an inlet and a seat at the end of said inlet, detachably mounted in said cup, there being a plunger space in said cup, a plunger provided with a stem, said plunger being slidable in said plunger space and normally closing said inlet, said plunger having divided passages in its external face extending from top to bottom thereof for dividing water issuing from said inlet therethrough into streams, a cap structure screwed onto said cup, said cap structure having a discharge chamber in a vertically spaced relation to said plunger space, said plunger stem extending through said chamber and thence through a hole in said cap structure, a spout attached to said cap structure, there being a plurality of anti-syphon holes in the wall of said chamber, said spout having a passage-way which communicates with said chamber subjacent to said anti-syphon holes, an annular seat in said cap structure between said spout passage-way and said anti-syphon holes, and a washer slidably mounted upon said stem and movable by streams of water from a rest position below the passage-way of said spout to a position against said annular seat thereabove wherein communication is closed between said anti-syphon holes and said passage-way of said spout.

2. The subject matter of claim 1 and, said cup being provided with a quick turn thread and said cap having a corresponding mating thread.

3. The subject matter of claim 1 and, said cup having a vertically extending circumferential flange snugly fitting within the opening of the cap into which the threaded end of said cup is screwed and said cup also having a horizontal flange adjacent said vertically extending flange abuttingly underlying the body portion of the cap forming said opening.

4. In a ball-cock, a valve containing cup, a valve body provided with an inlet and a seat at the end of said inlet detachably mounted within said cup, there being a plunger space in said cup, a plunger provided with a stem, said plunger being slidable in said plunger space and normally closing said inlet, said plunger having divided passages in its external face extending from top to bottom thereof, for dividing water issuing from said inlet therethrough into streams, a cap structure screwed onto said cup, said cap structure having a discharge chamber in a vertically spaced relation to said plunger space, said plunger stem extending through said chamber and thence through a hole in said cap structure, a spout attached to said cap structure, there being a plurality of anti-syphon holes in the wall of said chamber, said spout having a passage-way which communicates with said chamber subjacent to said anti-syphon holes, an annular seat in said cap structure between said spout passage-way and said anti-syphon holes, and a washer slidably mounted upon said stem and movable by streams of water from a rest position below the passage-

way of said spout to a position against said annular seat thereabove wherein communication is closed between said anti-syphon holes and said passage-way of said spout, said cup being provided with a quick turn thread and said cap having a corresponding mating thread, said cup having a vertically extending circumferential flange

5 snugly fitting within the opening of the cap into which the threaded end of said cup is screwed and said cup also having a horizontal flange adjacent said vertical flange abuttingly underlying the body portion of the cap forming said opening.

BENNETT SVIRSKY.