

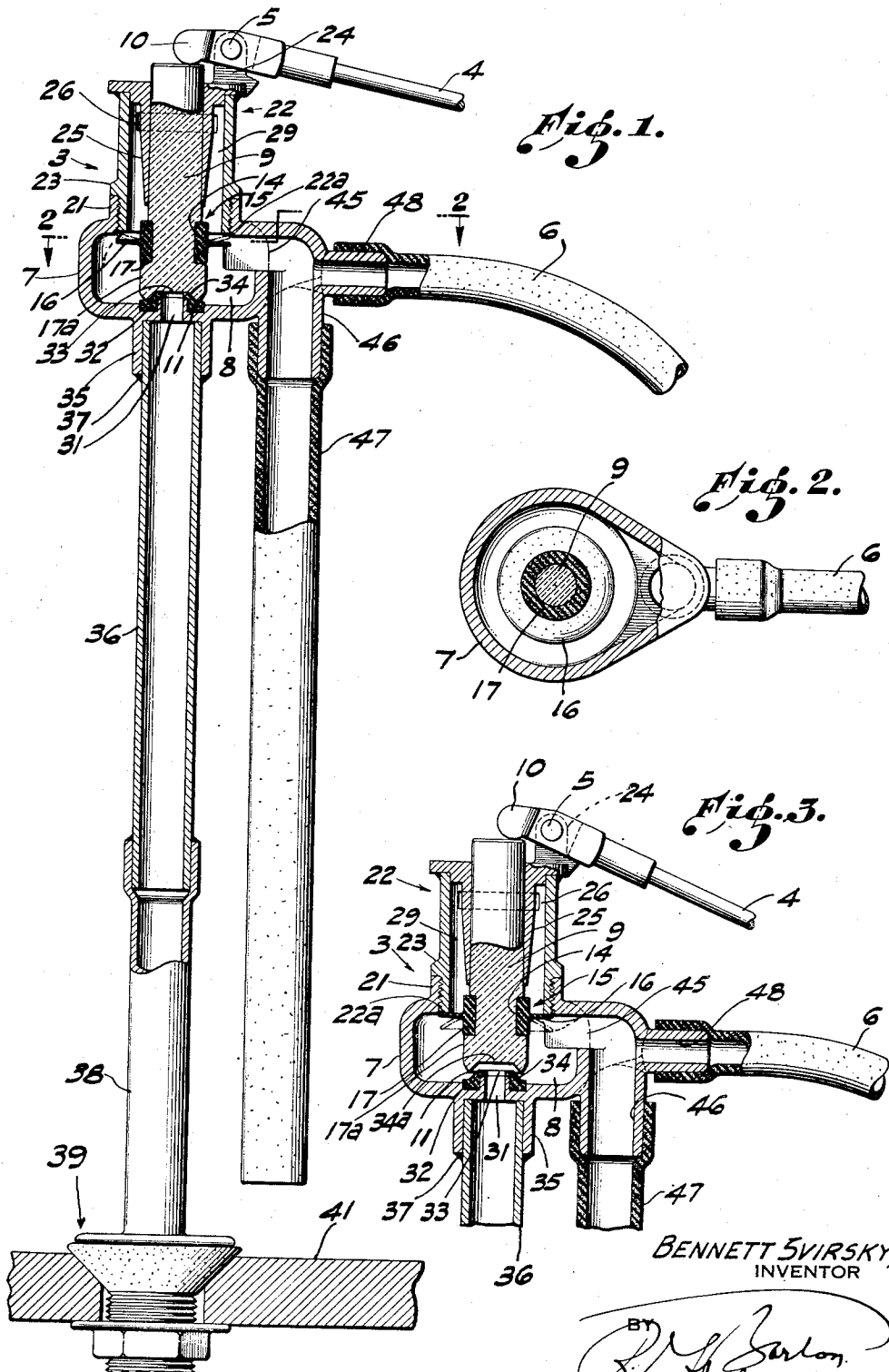
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BALL COCK DEVICE

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BALL COCK DEVICE

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This invention relates to improvements in ball cock devices.

Among the objects of the invention are: To provide an improved arrangement of a compressible gasket in relation to the movable closure member of the valve and to the seat therefor, so that said gasket will be protected from being worn by the friction of the vertical streams of liquid, the abrasive action of which is often augmented by sandy particles therein; to provide a simplified and more positively operating means to prevent all anti-syphoning; to provide means to effectually safeguard against an objectionable or injurious discharge of water through the valve structure in case the cotter pin of the float arm breaks; and to provide a minimum number of parts in an assembly capable of performing the required functions.

A further object of the invention is to provide for a ball cock structure a valve element having a lip portion which is capable of flexion in opposite directions from an intermediate position, in response to a vacuum pull or a water pressure push thereby contributing to the more efficient performance of the desired anti-syphon and anti-splash functions.

A more specific object is to provide a valve structure wherein a vitreous or vitreous like closure member may be more advantageously employed by reason of being non-corrosive, smooth and incapable of picking up particles such as sand and grit tending to improperly seat it.

Still other objects, advantages and features of invention will hereinafter appear.

Referring to the accompanying drawing, which illustrates what is at present deemed to be a preferred embodiment of the invention;

Fig. 1 is a view of the device partly in side elevation and partly in vertical mid-section, parts being broken away in order to contract the view, the valve controlling the inlet being shown closed, and the anti-syphon valve being shown open.

Fig. 2 is a transverse section taken on line 2-2 of Fig. 1.

Fig. 3 is a reproduction, mostly in vertical mid-section of the parts shown in the upper part of Fig. 1, the inlet valve being open, and the anti-syphon valve being closed.

Referring in detail to the drawing, the invention is embodied in a general ball-cock assembly 3 including the float rod 4 fulcrumed on the cotter pin 5, and the refill tube 6. The circular casing 7 of the ball cock has within it a current directing chamber 8 axially of which extends the glass plunger or valve closure member 9 the upper

end of which is engaged by the foot portion 10 of the rod 4, and the lower face of which is furnished with a circular seat engaging rib or lip 11 that extends in an inwardly spaced, adjacent, parallel relation to the periphery of that end of the said closure member.

In an upwardly spaced relation to its lower end said plunger 9 is surrounded by a broad, shallow channel 14 within which is seated an annular valve body 15 surrounded by an annular radially extending lip portion or fin 16 which forms an anti-syphon valve, said lip portion being capable of flexion in opposite directions from an intermediate position, in response to a vacuum pull or a water pressure push. Below its channel 14 the lower end portion of the valve body 9, by preference and as shown, is slightly greater in diameter than it is above said channel. The annular body 15, desirably made of rubber, has a hub portion 17 which closely fits around said diametrically reduced portion of the plunger 9 and this aids in keeping the rubber member 15 in place within the channel 14.

The ball cock casing 7 has a large central circular opening in its upper side which is surrounded by an internally screwthreaded flange 21 into which screws the lower end of the cap structure 22, which has around it a stop shoulder 23. Said cap structure desirably has integral therewith the mounting lugs 24 for the cotter pin 5. Through the top of said cap structure is a central passage surrounded by a depending flange 25 within which slidably fits and above which projects the upper portion of the plunger 9, and lateral anti-syphon holes 26 passing through said cap are provided at a higher level than the lower end of said flange 25. When the cap structure 22 is fully screwed down the lower end thereof is properly positioned to form a cove seat 22a for the fin valve 16 when the plunger 9 is at the upper limit of its travel, or when the fin portion of the valve is flexed into a contactable relation therewith, thereby at such times separating the chamber 8 of the casing 7 from the chamber 29 within the cap structure.

Through the lower wall of the casing 7 leads a central passage 31, the upper face of this wall being annularly grooved to receive a valve seat gasket 32 with which cooperates the lower end surface of the valve body or plunger 9, including its already mentioned lip 11. Said gasket has through it a central passage 33. The lower base of said gasket is flat and its upper side is furnished with a frusto-conical rise 34, the lower

end of the valve body having a frusto-conical recess 34a to fit said rise.

From the lower side of the casing 7 projects a central mounting flange 35 which fits over the upper section 36 of the stand pipe and is shown secured thereto in any suitable manner as for example by welding 37. The lower stand pipe section 38 is shown provided with a conventional fitting 39 where it passes through the tank bottom 41.

The ball cock casing 7 has a radial outflow passage 45 leading from its upper portion, this passage communicating with a nipple 46 which forms the upper hush tube section, of which the lower hush tube section 47 forms a downward continuation. From the upper part of said nipple 46, at the side thereof opposite to the passage 45, projects an outlet nipple 48 over which is fitted the adjacent end of the refill tube 6. Said hush tube 47 and refill tube 6 being in the present instance preferably constructed of rubber tubing.

The operation of the device will be for the most part readily understood from the foregoing description, but a few features thereof may require brief additional mention.

As the rod 4 lowers and the part 10 rises after a flushing operation the plunger 9 moves vertically upward under the urge of the water from the standpipe 36 entering the opening 31 into the ball cock casing 7. Since the rising of the plunger 9 is no faster than the lowering of the rod 4, there is a short lapse of time in which the anti-syphon valve 16 has to move from the full line position shown in Fig. 1 to that shown in Fig. 3. During this short lapse of time the water entering the ball cock chamber would pass by the anti-syphon valve and out through the anti-syphon holes 26 were it not for the fact that as soon as the water under pressure enters the ball cock chamber 8 the valve 16 is immediately flexed as shown in dotted lines in Fig. 1, thus causing the periphery of the valve to seat within the cove seat 22a incident to the flat seating thereof as shown in full lines in Fig. 3, by which time the tank has been emptied enough to permit the full uptravel of the plunger, which will then remain in such position until the tank has filled sufficiently to cause the float rod to rise and actuate the plunger in the reverse direction.

During the time the valve 16 occupies the position shown in full lines in Fig. 3, if for any reason a vacuum should occur in the pipe line 36, the valve 16 would flex downwardly as shown in dotted lines in Fig. 3, on account of air passing through the anti-syphon holes 26 causing an anti-syphoning condition thereby preventing water in the tank from being drawn into the main water supply line.

During the filling of the tank the plunger 9 is gradually pressed downwardly causing the central part of the valve 16 to be carried therealong but permitting the periphery thereof to prevent flow therepast in view of the dotted line seating as shown in Fig. 1 until the water pressure in the chamber becomes nil permitting the periphery of said valve to assume its normal position as shown in full lines.

During the final seating of the plunger 9 against its resilient seat in the base of the valve chamber the water acts against the smooth frusto-conical recess on the underside of the plunger, such smooth surface preventing the adhesion of sand and grit particles which might clog within the water passage and prevent proper seating of the plunger, as would be the case if

a pitted or worn washer occupied such recess, as has previously resulted from the custom of otherwise constructing such valve seats or washers.

Since the plunger is made of glass, it is non-corrosive and will not pit when subjected to sulphuric water, as would brass or other metals. The elimination of these pits also eliminates the chance of lodgement of sand and grit therein, which would cause an improper seating of the plunger against its valve seat.

If for any reason the cotter pin 5 should become displaced the movement of the plunger upwardly would cause the valve 16 to flex in a cup-shaped manner wherein it would close the annular passage around the plunger 9 and prevent an anti-splashing through the anti-syphon holes, such uptravel being limited to the abutment of the flange of the valve against the guide 25, or in case the valve 16 should become displaced the uptravel of the plunger would be limited to the abutment of the enlarged portion 17a of the plunger with the guide 25.

The term anti-splash refers to a condition wherein the structure prevents water from passing through the holes 26 and splashing against the walls of the tank 41.

The term anti-syphon refers to a condition wherein the structure prevents water from being drawn into the main line when a vacuum occurs therein, by the employment of the anti-syphon holes 26 permitting air to enter through them and break the seal of the valve fin 16 with its seat before such vacuum would be of such magnitude as to draw the water from the tank.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the subject matter claimed.

What is claimed is:

1. In a ball cock valve structure, a valve casing having a bottom port, there being a valve seat which surrounds said port, a plunger mounted within said casing for vertical reciprocation to and from a position wherein it contacts with said valve seat, there being within said casing an annular chamber around the lower end of said plunger when the latter is seated, an annular anti-syphon valve body encircling said plunger and secured thereto in an upwardly spaced relation to its lower end, said valve body carrying a circumferential horizontal fin, the upper portion of said casing being diametrically contracted, thereby forming an annular valve seat with which said fin contacts when the plunger is at the upper limit of its travel, there being above the latter valve seat an upward tubular extension of said casing which forms an annular passage around said plunger, said extension having a top wall through which is a central passage, said passage being surrounded by a depending tubular flange of said wall, said casing extension having anti-syphon outlets above the lower end of said flange and the aforesaid fin of the anti-syphon valve being sufficiently flexible so that, in case said plunger is forced upwardly beyond the normal limit said fin will close the annular passage within said casing extension and will prevent outflow of water through said anti-syphon openings.

2. In a ball cock device, a ball cock chamber having a water inlet and outlet, a plunger guide chamber provided with anti-syphon holes in its exterior wall portion and forming an upward continuation of said ball cock chamber, a re-

silient gasket provided with a frusto-conical rise and mounted in the base of said ball cock chamber, there being alined openings through said rise and the base wall of said chamber forming said inlet, a plunger slidably mounted in the guide portion of said plunger guide chamber, said plunger having its lower end projecting into said ball cock chamber and provided on its under side with a frusto-conical recess which occupies at times a seat on the frusto-conical portion of said gasket, said upward continuation of said ball cock chamber being constructed and arranged to form at its juncture with the lower part of said ball cock chamber an annular recess, and a valve element mounted upon the end of said plunger which projects into said ball cock chamber, said valve element having a lip seatable across said recess when said plunger is at the upward limit of its travel and capable of flexion in opposite directions from an intermediate position to open communication between said chambers when said plunger is at the upward limit of its travel by vacuum pull and to flex upwardly to a position to close communication between said chambers when said plunger is at a lower level than its upward limit, the latter flexion being caused by the water inflowing through said inlet.

3. In a ball cock device, a ball cock chamber having a water inlet and outlet, a plunger guide chamber provided with anti-syphon holes in its

exterior wall portion and forming an upward continuation of said ball cock chamber, said upward continuation of said ball cock chamber being constructed and arranged to form at its juncture with the lower part of said ball cock chamber an annular recess, a resilient gasket mounted in the base of said ball cock chamber, there being alined holes through said gasket and the base wall of said ball cock chamber forming said inlet, a plunger slidably mounted in the guide portion of said plunger guide chamber, said plunger having its lower end projecting into said ball cock chamber and occupying at times a seat upon said gasket to close said inlet, and a valve element having a body portion mounted in a recess upon the end of said plunger which projects past said annular recess into said ball cock chamber, said valve element having an annular diaphragm seatable across said recess when said plunger is at the upward limit of its travel and capable of flexion in opposite directions from an intermediate position to open and close communication between said chambers.

4. The subject matter of claim 3 and said outlet being located below the lower limit of travel of the diaphragm of said valve element.

5. The subject matter of claim 3 and, said diaphragm at the lower limit of travel of said plunger being capable of flexion into an abutting relation with said annular recess.

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