

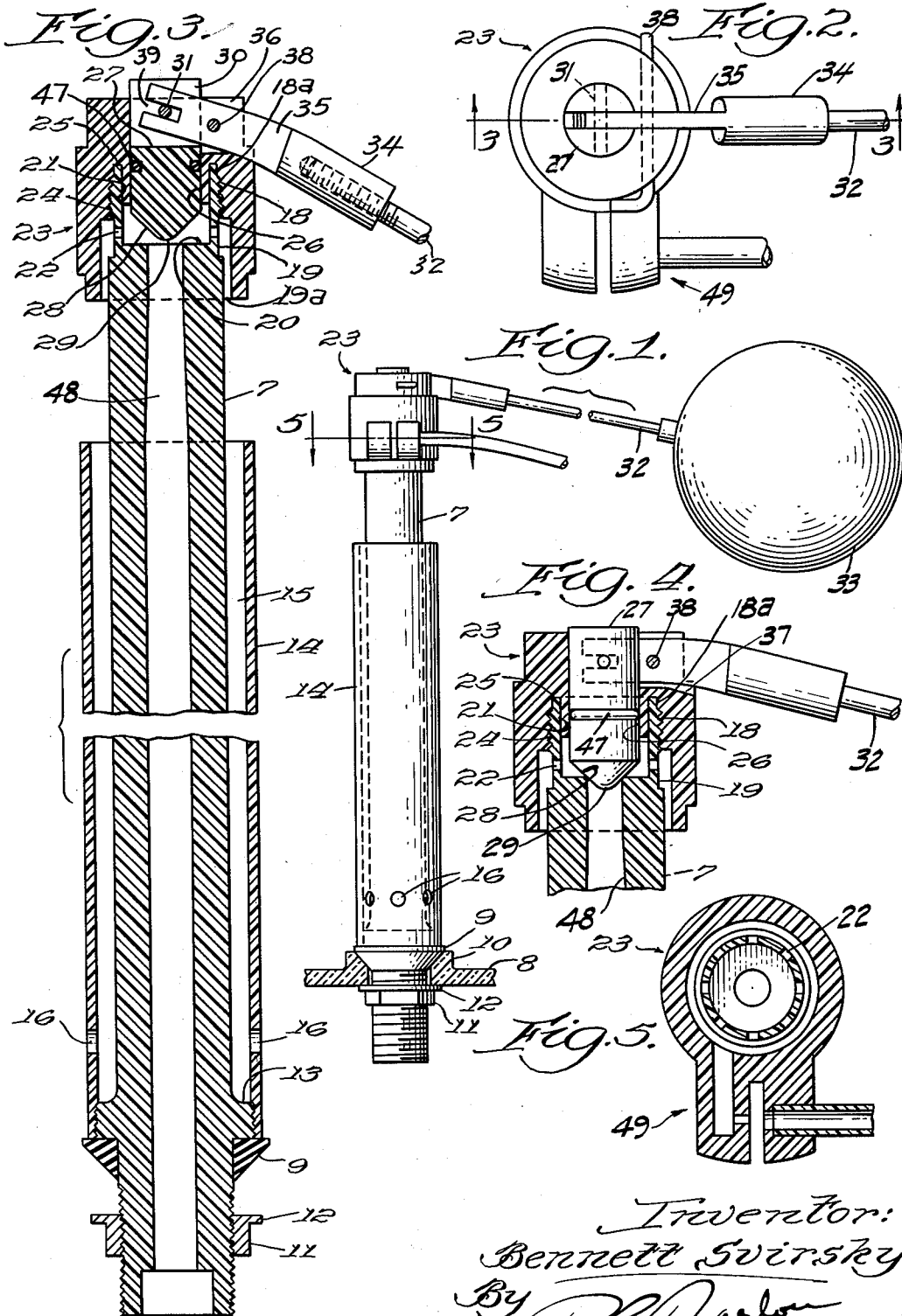
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WATER CONTROL FOR CLOSET TANKS

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WATER CONTROL FOR CLOSET TANKS

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My invention relates to improvements in ball cock structures for flushing tanks.

This invention particularly relates to that portion of the ball cock structure which functions independently of the antisiphon refill tube structure.

At the present time it is difficult, if not prohibitive, to obtain metal for the manufacture of ball cocks and those metals which are available under certain circumstances are not desirable because of being corrosive along with other faults.

In the present invention the art is advanced through the use of a nonmetallic plastic material for the main parts which is moldable to shape without any machining whatsoever. By eliminating the manual and/or automatic machining to provide bores, seats, screwthreads, reaming and the like, I greatly reduce the cost of manufacture and prolong the useful life of the article without need of repair and thereby produce a ball cock at a price heretofore unapproached when compared with similar devices now in the market.

From the foregoing it will be apparent that important objects of the invention consist in the provision of a mainly nonmetallic ball cock providing the aforementioned advantageous improvements.

A further important object is to improve upon my patented device entitled Antisiphoning Refill Tube patented October 20, 1942, #2,302,274 by simplifying the structure in reducing the number of parts; improving upon the manner of assembly to reduce wear on parts slidably related to each other; and to improve upon the sound muffling structure in such a manner that functioning of the antisiphoning feature of the refill tube will not be impaired.

In conjunction with the aforementioned improved features, it is a specific object to provide an intake tube, the lumen of which is tapered in such a manner as to facilitate removal of the core therefrom and also to eliminate any injury to the part as a whole.

Still another object of the invention is to provide a novel water inlet pipe, upstanding from the floor of the toilet tank, said pipe having a relatively thick wall so that it will be sufficiently strong when made of an inexpensive nonmetallic preferably plastic material and the lumen of said pipe being tapered from bottom to top, thus thickening the upper end portion of said wall so that it can be more advantageously used for a valve seat. A specific object, related to the object just stated, is to provide, within a cap carried by the upper end portion of said pipe, a combined, slidable one piece plunger and valve, one end of said plunger forming a valve element which cooperates with a valve seat formed directly upon the upper end of said pipe, thus eliminating the use of any additional part to form the valve proper; and thus constructing the valve and its seat is made practicable by forming both said pipe and said plunger of a wear resistant composition of high impact styrene copolymer.

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Other objects, advantages and features of invention will hereinafter appear.

Referring to the accompanying drawing, which illustrates a preferred, reduced to practice embodiment of the invention,

Fig. 1 is a side elevation, on a smaller scale than the remaining views, of the complete device, showing the same installed in its operative position in a toilet tank the bottom of which is fragmentarily shown, a portion of the float carrying rod being broken out to contract the view. In this view the valve is shown in the closed position.

Fig. 2 is a fragmentary top plan view of the device.

Fig. 3 is a fragmentary vertical section on line 3—3 of Fig. 2, the bottom of the tank being omitted and the valve being shown in the open position.

Fig. 4 is a reproduction of the upper portion of Fig. 3, except that the valve is shown in the closed position.

Fig. 5 is an enlarged, horizontal section on line 5—5 of Fig. 1.

Referring in detail to the drawing, the embodiment of the invention therein shown comprises an upstanding toilet tank inlet pipe 7, which, in its mounted position has its threaded lower end portion projecting downwardly through the floor 8 of a toilet tank, a rubber gasket washer 9 being seated in an annular, internally beveled, raised, apertured portion 10 of said floor 8. A lock nut 11, having a flange 12 underlies said apertured portion of said floor, to draw said intake pipe 7 into a clamped relation to the floor of the toilet tank.

Said intake pipe 7 has, adjacent to its lower end, an external annular, threaded shoulder or diametrically enlarged portion 13, the lower face of said shoulder resting upon said gasket washer 9 when in the operative position. Externally screwed onto said shoulder is the lower end portion of a sound muffling filling tube 14 having an internal diameter considerably greater than the external diameter of the inlet pipe 7 which it concentrically surrounds, so that an annular space 15 is provided between said pipe 7 and said sound muffling tube 14. Adjacent to its lower end the water muffling tube 14 is provided with a circumferentially extending series of submerged holes 16 through which the water flowing into the tank passes in a silent manner.

The upper end portion of said inlet pipe 7 is externally screwthreaded at 18 and, subjacent to this threaded portion is externally, circumferentially undercut throughout a zone 19. Also, the upper end portion of the lumen of said pipe 7 is enlarged so as to provide a wide upwardly facing annular shoulder 20.

In said undercut portion 19, adjacent to said shoulder 20 of the inlet pipe 7, is provided a circumferential series of apertures 22 through which the water flows from the inlet pipe 7.

Upon the upper end portion of the inlet pipe 7 is mounted a cap structure 23 consisting of a double inverted ring having an internal screwthreaded portion 24 which cooperates with the threads 18 on the aforesaid inlet pipe to secure said cap structure thereto. Superjacent to said threaded portion or zone 18 is an unthreaded terminal or zone 18a of said pipe 7, the upper end of which, when the pipe 7 is fully unscrewed, abuts the upper end of the inverted annular well which it occupies, thus insuring that the mouth portion of said cap is in a truly concentric relation to the pipe 7 which it surrounds.

Subjacent to the threads of the cap which co-operate with said pipe threads 18, the cap is interiorly diametrically enlarged to provide in conjunction with the undercut 19 an annular water outlet space 19a.

It will be seen that the lower end portion of the cap 23 forms a skirt which is in an upwardly spaced relation

to the upper, intake end of the pipe 14. This wide spaced arrangement safeguards against malfunctioning of the antisiphoning feature, and at the same time saves material, lowers cost of manufacture and facilitates assembling.

Said cap structure has through its upper end portion an axial cylindrical bore 26 in which is mounted, for vertical reciprocation, a cylindrical plunger 27, the lower end portion of which is annularly beveled at 28 so as to form integral with said plunger, a valve element adapted, at times, to seat upon said shoulder 20, as shown in Fig. 4, to co-operate with the valve seat surrounding the upper end of the passage through the inlet pipe, said bevel terminating in a rounded nose 29. The wearing quality required for the long life of the valve and valve seat just described is obtained by marking both said plunger and pipe out of a wear resistant plastic composition of high impact styrene copolymer.

Said plunger is provided across its upper end with a deep diametrical slot 30 and with a diametrical pin 31 which extends across said slot. The float rod 32, which carries the float 33, is screwed axially into a cylindrical shank 34 having, opposite to said rod a narrowed extension 35. The cap 23 has a radial slot 36 extending downwardly into its upper portion, the radially outer part of this slot being inclined downwardly at 37 (see Fig. 4). A horizontal pin 38 carried by the slotted cap portion 36, serves swingably to attach the aforesaid float rod carrying shank parts 34 and 35 to the cap 23, said inclined part 37 affording a stop shoulder which arrests the downswing of the float rod when the tank empties. The aforesaid narrowed shank part 35 has a deep horizontal slot 39 extending across its end, the aforesaid cap pin 31 slidably fitting within this slot. The specific operating connections between the float rod and cap which have just been described, do not form a part of the claimed subject matter of the present application, but are desirable accompaniments thereof.

Referring in further detail to the portion of the aforesaid internal cap bore 26 in which the gasket 47 travels, said portion affords a smooth, jointless surface across which said gasket moves thus avoiding wear thereon. Said surface forms the interior side of an inverted well into which the aforesaid upper end portion of the aforesaid intake pipe 7 is securely screwed.

It will be seen that, superjacent to the aforesaid ledge 20, the pipe 7 terminates in a thin annular wall in a concentric outwardly spaced relation to the valve seat, and that the upper portion of this annular wall is contained within the innermost part of the aforesaid inverted annular well.

The external diameter of the water inlet pipe 7 is of a substantially uniform external diameter, but the lumen 48 of said pipe is slightly tapered from bottom to top to facilitate removal of the core therefrom after molding as well as enlarging the surface available for forming the valve seat and at the same time not damage the valve seat at the top thereof.

In Figs. 2 and 5 is shown an antisiphoning refill tube structure 49, the subject matter of which is fully shown and described in my aforementioned patent. Therefore a detailed description of said structure is not necessary in the present application.

One important feature of the present invention resides in the provision, as aforesaid, of a ball cock structure, of a nonmetallic material which possesses the advantages of lowering cost of manufacture and of rendering more durable the structure of which it forms a part. The material of which the cap 23, plunger 27 and intake pipe 7 is made is a high impact styrene copolymer. It is possible by the use of this material to mold into the structure all the screwthreads used, thus eliminating machine making of said threads. Furthermore, this material is non-corrosive, will not crack or otherwise deteriorate in cold water.

I claim:

1. In a ball cock valve structure, a thick-walled inlet pipe upstanding from the floor of a toilet tank, the internal diameter of said pipe being abruptly enlarged in a downwardly spaced relation to the upper end of the pipe thus providing an upwardly facing annular ledge at the lower end of said diametrical enlargement, there being outlets through the pipe superjacent to said ledge, and an exterior slightly undercut zone surrounding the part of the pipe which is provided with said outlet means, the part of the pipe superjacent to said zone being exteriorly screwthreaded, a cap having an internally screwthreaded portion screwed onto said exteriorly screwthreaded pipe portion, said cap having a skirt portion with a somewhat greater internal diameter than the part of said pipe subjacent to said undercut zone, said skirt portion surrounding said zone and pipe portion subjacent thereto thus providing an annular, downwardly opening outlet passage the mouth of which is located below said zone, and a valve having a cylindrical body portion terminating in a conical portion having a rounded nose carried by said cap, said conical portion adapted to be inserted into the opening through said annular ledge to close said opening, said cap consisting of a double inverted ring having an inverted annular well with an internal wall which forms a guide for said cylindrical body portion of the valve, said screwthreaded portion of said cap terminating short of the closed end of said inverted well and the upper end portion of said pipe being unthreaded and occupying said unthreaded portion of said well when said cap is fully screwed on, thus to lock said cap and pipe together to maintain the concentricity of said skirt portion of the cap in relation to said pipe.

2. In a ball cock structure of the kind described, a water inlet pipe upstanding from the bottom of a toilet tank, said pipe being provided in its upper end portion with a concentric internal annular ledge forming a valve seat, said pipe having superjacent to said ledge a thin annular wall in an outwardly spaced concentric relation to said seat, and an inverted double ring applied to the upper end portion of said thin annular wall, said inverted double ring being provided with an inverted annular well in a concentric, upwardly spaced relation to the lower end of an axial bore through said inverted double ring, said well containing the upper end portion of said thin annular wall portion of said pipe, there being a screwthreaded connection between said thin annular wall and the part of said ring exteriorly surrounding said well.

3. In a ball cock valve structure of the kind described, a water intake pipe of nonmetallic moldable material attached to the floor of a toilet tank in an upstanding position, said pipe having, extending downwardly from its upper end, an external circumferentially undercut zone, the upper part of which is externally screwthreaded and an inverted double ring, having an internally screwthreaded midlength portion screwed onto said screwthreaded part of said pipe, the part of said inverted double ring below its said screwthreaded portion being larger in inside diameter than the part thereabove thus providing said inverted double ring in its applied position with a skirt which extends downwardly below and is outwardly spaced from that part of the upper end portion of said pipe which is subjacent to its said circumferentially undercut zone, there being water outlet openings through said undercut zone of said pipe.

4. The subject matter of claim 3 and a valve vertically reciprocally mounted within said cap, said valve having a cylindrical body portion terminating in a conical portion having a rounded nose, said conical portion adapted upon downward movement thereof to enter and seal off the narrow upper end of said water intake pipe.

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