

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) ANTI CORROSION BALL COCK FLUID FLOW CONTROL ASSEMBLY

(71) We, ADOLF SCHOEPE of 1620 North Raymond Avenue, Fullerton, California, and FREDRIC EDWARD SCHMUCK of 535 Century Drive, Anaheim, California, both of United States of America and both citizens of the United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an anti-corrosion ball cock fluid flow control assembly used for controlling the flow of water into and the water level within a water tank or flush tank. More particularly, but not especially, this invention relates to an improved ball cock fluid flow control assembly which may be formed having anti-corrosion characteristics which may be incorporated in a ball cock installed for controlling the flow of relatively corrosive liquids such as sea water and the like.

In the particulars of configuration of the water outlet member of a prior ball cock construction, a series of spaced fingers are formed in a water chamber thereof adjacent the outlet to a refill hose with the portion of water flow passing from an outlet chamber to the refill hose being filtered therethrough. In addition, an annular series of spaced slots are formed in the outlet member within the outlet chamber in the path of flow of said water through said outlet chamber and outwardly to the tank interior, again filtering the water prior to entering the tank interior. As a result, a portion of the water entering the outlet chamber passes through the filtering fingers into the refill hose and the remainder of such water passes through the filtering slots, circuitously downwardly within the outlet member and around the outer side of the inlet member, and ultimately outwardly through a series of outlet member openings into the tank interior.

Not only does this double filtering outlet member configuration require relatively com-

plex part-moulding techniques, but the overall multiple part flow control assembly requires a somewhat complicated production assembly operation wherein alignments are critical. Also, due to the fact that the water inlet member and the valve housing lower half are formed of metal, some noise of water flow is encountered despite the fact that the water is directed circuitously through the water outlet member for a reduction of such fluid noise. Still additionally, and extremely important where relatively corrosive waters are involved such as sea water and the like, the metal formation of the water inlet member and valve lower housing have presented some corrosion problems.

It is, therefore, an object of this invention to provide an anti-corrosion ball cock fluid flow control assembly wherein all of the main parts thereof are formed of a corrosion-resistant plastic with the exception of the sealing member which is formed of a corrosion-resistant resilient material. As a result thereof, attack from corrosive waters is obviated or mitigated so that the control assembly is adapted for handling such waters as sea water and the like. Also, with the use of plastics material nearly exclusively in the flow control assembly, a large portion thereof may be produced by a unitary injection moulded part, greatly simplifying the production assembly operations.

According to the present invention there is provided a ball cock for controlling the flow of water into and the water level within a water tank, including a unitary water flow unit including a water inlet portion and a water outlet portion and at least a part of a valve lower housing portion, said water outlet portion surrounding said water inlet portion and forming an annular water outlet chamber therebetween opening into said valve lower housing portion, said valve lower housing portion being formed as an integral extension of said water outlet portion, said water inlet portion opening into said valve lower housing portion and having an end in

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said valve lower housing portion forming an annular valve seat, water outlet opening means through said water outlet portion to provide communication between said water outlet chamber and an interior of said tank; valve means actuatable between open and closed positions, said valve means including said valve lower housing portion and an upper housing portion assembled thereto to enclose a sealing member mounted for movement against and away from said annular valve seat to prevent water flow between said water inlet portion and said water outlet chamber in said valve closed position and permitting said water flow in said valve open position, said valve means being operably connected to float means for actuating said valve means between said open and closed positions; and an annular filtering member positioned in said water outlet chamber between said water inlet and outlet portions to form a part of said water outlet chamber into a filtering chamber, said filtering chamber opening into said valve lower housing portion outwardly of said valve seat and communicating outwardly through said filtering member with said outlet chamber, said filtering member having a part in said lower housing portion blocking the flow of water outwardly of said valve seat into said outlet chamber other than through said filtering chamber.

An embodiment of the present invention will now be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 is a side elevational view of a ball cock mounted in a water or flush tank shown in vertical section with a ball cock refill hose being mounted for directing water into a refill tube;

Fig. 2 is an enlarged, horizontal sectional view looking in the direction of the arrows 2-2 in Fig. 1;

Fig. 3 is an enlarged, horizontal sectional view looking in the direction of the arrows 3-3 in Fig. 1;

Fig. 4 is an enlarged, fragmentary, vertical sectional view, part in side elevation, showing the details of the fluid flow control assembly of the ball cock of Fig. 1; and

Fig. 5 is enlarged, exploded vertical sectional perspective view of a part of the fluid flow control assembly of the ball cock of Fig. 1.

Referring to Fig. 1 of the drawings, a ball cock includes a lower fluid flow control assembly generally indicated at 10 secured extending through a bottom wall 12 of a usual water or flush tank generally indicated at 14. The ball cock lower assembly 10 supports an upright mast or guide 16 which vertically slidably mounts a float 18 operably connected to the ball cock lower assembly 10 through a connecting arm 20 and a valve operating

lever 22 so that as the water level in the tank 14 drops moving the float downwardly the ball cock lower assembly is opened permitting water to flow therethrough into the tank and a rise in the tank water level closes the ball cock lower assembly sealing off water flow therethrough. During the open position of the ball cock lower assembly 10 and the flow of water therethrough into the interior of the tank 14, a portion of the water flow is directed by the lower assembly into a flexible refill hose 24 and upwardly into an open upper end 26 of a usual refill tube generally indicated at 28.

The ball cock lower assembly 10 is formed by a unitary, preferably injection-moulded plastics material, water flow director 30 comprised of a central water inlet portion 32 and an integral outwardly surrounding water outlet portion 34 having an integral upward extension forming a valve lower housing portion 36. Both the water inlet and outlet portions 32 and 34 are tubular in configuration, the water inlet portion being secured extending through the tank bottom wall 12 connected to a usual supply of water and the overall water flow director 30 being supported at the tank bottom wall on a horizontal flange surface 38 at the lower end of the water inlet portion. The water inlet portion 32 terminates upwardly within the tank interior at the valve lower housing portion 36 in an upper end 40 opening into the valve lower housing portion and forming an annular valve seat 42, with the water outlet portion 34 being spaced outwardly surrounding an outer side 44 of the water inlet portion and forming a water outlet chamber 46 also opening upwardly into the valve lower housing portion but in an annular zone outwardly of the valve seat 42.

A water filter member 48, also formed of plastic by injection moulding, is slidably assembled downwardly into the water outlet chamber 46 through the valve lower housing portion 36. The filter member 48 is comprised of an annular upper clamping flange 50 outwardly sealingly engaged with the water outlet portion 34 and forming an upper clamping surface 52 at the valve lower housing portion 36 spaced outwardly of the valve seat 42. The filter member 48 also includes a cylindrical slotted wall 54 extending downwardly along, but spaced outwardly from, the outer side 44 of the water inlet portion 32, engaging said water inlet outer side by a series of circumferentially spaced inward projections 56 adjacent the valve seat 42 and terminating downwardly in a continuous, annular intermediate baffle 58.

Below the intermediate baffle 58, the filter member 48 continues downwardly outwardly abutting and surrounding the inlet portion outer side 44, having a series of circumferentially spaced water flow openings 60 opening inwardly against the inlet portion outer side

and communicating downwardly with a series of circumferentially spaced flow slots 62 opening downwardly into a lower portion of the water outlet chamber 46 inwardly of a lower, annular baffle 64 outwardly engaged with the water outlet portion 34. Thus, the filter member 48 outwardly seals the upper end of the water outlet chamber 46 blocking outward flow of water within the valve lower housing portion 36 over the valve seat 42 and forcing the water to flow downwardly into a filtering chamber 66 formed by the filter member adjacent the inlet portion outer side 44 and within or as a part of the water outlet chamber. From the filtering chamber 66, the water is forced to flow and be filtered outwardly through the filter member slotted wall 54 into the main part of the water outlet chamber 46 by the filter member intermediate baffle 58 so that all water entering the main part of the water outlet chamber 46 is subject to such filtering.

At the lower termination of the water outlet chamber 46, an upright annular baffle is formed intermediate the water inlet and outlet portions 32 and 34, and the water outlet portion is provided with a series of circumferentially spaced water outlet slots or openings 68 communicating outwardly with the interior of the water tank 14. Furthermore, spaced below the upward extension forming the valve lower housing portion 36, the water outlet portion 34 is provided with a refill outlet 70 therethrough formed partially by an integral, angularly upwardly projected, refill hose nipple 72. The refill hose nipple 72 is telescoped by an end of the refill hose 24 so that the refill outlet 70 directs a portion of the water within the water outlet chamber 46 into the refill hose and upwardly into the upper end 26 of the refill tube 28 when water is flowing through the water outlet chamber.

An injection moulded plastics material valve upper housing portion 74 is assembled received downwardly within the valve lower housing portion 36, being bayonet joint secured therewith and with said lower housing portion enclosing a resilient material sealing member 76. During the assembly of the valve lower and upper housing portions 36 and 74, the valve upper housing portion clamps an outer annular zone of the sealing member 76 downwardly against the filter member clamping surface 52 as shown in Fig. 4, thereby completing the blocking of the water flow over the valve seat 42 and outwardly of the upper open end of the filtering chamber 6. As best seen in Figs. 2 and 4, the mast 16 is formed integral with the valve upper housing portion 74 with the valve operating lever 22 pivotally mounted thereon and being operably connected controlling the upward and downward movement of the sealing member 76 away from and against the valve seat 42. In operation of the ball cock described

above, therefore, downward movement of the float 18 permitted by a drop in the water level within the water tank 14 pivots the outer end of the valve operating lever 22 downwardly and permits movement of the valve sealing member 76 upwardly away from the valve seat 42. Water flows inwardly through the water inlet portion 32 of the water flow director 30, over the valve seat 42 beneath the valve sealing member 76 and downwardly into the filter member filtering chamber 66 where the slotted wall 54 provides restrictures which tend to trap debris within the chamber 46, and debris so trapped falling to the bottom of this chamber. From the filtering chamber 66, the water flows outwardly into the main portion of the water outlet chamber 46 within the water outlet portion 34, it being particularly noted that all of such water flowing into the water outlet chamber is filtered through the slotted wall 54 of the filter member 48.

A portion of the water flowing into the water outlet chamber 46 is passed directly into the refill outlet 70 and the refill hose nipple 72 into the refill hose 24 for ultimate direction into the refill tube 28. The remainder of the water flowing into the water outlet chamber 46 through the filter member 48 is directed circuitously downwardly through the filter member flow openings 60 and flow slots 62, over the lower baffle 64 and outwardly of the water outlet portion 34 through the water outlet openings 68 into the interior of the water tank 14. A rise in the water level of the water tank 14 moves the float 18 upwardly pivoting the outer end of the valve operating lever 22 upwardly and ultimately moving the valve sealing member 76 downwardly against and sealing over the valve seat 42, thereby sealing off the flow of water from the water inlet portion 32 of the water flow director 30.

According to the embodiment described above, therefore, a ball cock is provided having an improved fluid flow control assembly thereon in the form of the water flow director 30 which is highly corrosion-resistant due to the major parts thereof being formed of plastics material so as to be adapted for use with the more corrosive waters such as sea water. Furthermore, the water flow director 30 is of a greatly simplified form, having the water inlet portion 32 thereof, the water outlet portion 34 thereof and the valve lower housing portion 36 thereof all formed as a unitary assembly, with a single filter member 48 being slidably assembled therewith and serving the dual purpose of filtering all of the water flow through the assembly and the major part of the circuitous water directed through the assembly. Still further, the single filter member 48 performs an added function with or as a part of the valve lower housing portion 36 of outward clamping and sealing of the valve resilient and movable sealing

member 76, said sealing member also resisting corrosion by being formed of a resilient plastics material.

5 Still in addition to all of the foregoing advantageous features, the water flow director 30 of the ball cock serves to reduce the flow noise of the water flowing through the water flow director. By the provision of all the major parts thereof of plastics material, metal surfaces are completely eliminated with noise deadening plastics surfaces replacing the same. Thus, the plastics material elements of the ball cock water flow director 30 not only provide the corrosion-resistant qualities, but also the noise reducing qualities, highly desirable in ball cocks of the type herein involved.

WHAT WE CLAIM IS:—

1. A ball cock for controlling the flow of water into and the water level within a water tank, including a unitary water flow unit including a water inlet portion and a water outlet portion and at least a part of a valve lower housing portion, said water outlet portion surrounding said water inlet portion and forming an annular water outlet chamber therebetween opening into said valve lower housing portion, said valve lower housing portion being formed as an integral extension of said water outlet portion, said water inlet portion opening into said valve lower housing portion and having an end in said valve lower housing portion forming an annular valve seat, water outlet opening means through said water outlet portion to provide communication between said water outlet chamber and an interior of said tank; valve means actuatable between open and closed positions, said valve means including said valve lower housing portion and an upper housing portion assembled thereto to enclose a sealing member mounted for movement against and away from said annular valve seat to prevent water flow between said water inlet portion and said water outlet chamber in said valve closed position and permitting said water flow in said valve open position, said valve means being operably connected to float means for actuating said valve means between said open and closed positions; and an annular filtering member positioned in said water

outlet chamber between said water inlet and outlet portions to form a part of said water outlet chamber into a filtering chamber, said filtering chamber opening into said valve lower housing portion outwardly of said valve seat and communicating outwardly through said filtering member with said outlet chamber, said filtering member having a part in said lower housing portion blocking the flow of water outwardly of said valve seat into said outlet chamber other than through said filtering chamber.

2. A ball cock as claimed in claim 1, in which said filtering member is provided with an annular baffle blocking said water outlet chamber, the baffle having water flow passages formed therethrough.

3. A ball cock as claimed in claim 1 or in claim 2, in which said water flow unit is a unitary moulded plastic material assembly forming said water inlet portion and said water outlet portion and said part of said valve lower housing portion.

4. A ball cock as claimed in any one of claims 1 to 3, in which said annular filtering member has an annular end part in said valve lower housing portion clamping an annular part of said valve means sealing member.

5. A ball cock as claimed in any one of the preceding claims, in which the water outlet portion and the water inlet portion are tubular.

6. A ball cock as claimed in any one of claims 2 to 4 in which the annular filtering member has a series of slots formed therein.

7. A ball cock as claimed in any one of claims 3 to 6, in which said valve means sealing member is a resilient material sealing member; and said annular filtering member is a moulded plastic material member.

8. A ball cock substantially as hereinbefore described with reference to the accompanying drawings.

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member 76, said sealing member also resisting corrosion by being formed of a resilient plastics material.

Still in addition to all of the foregoing advantageous features, the water flow director 30 of the ball cock serves to reduce the flow noise of the water flowing through the water flow director. By the provision of all the major parts thereof of plastics material, metal surfaces are completely eliminated with noise deadening plastics surfaces replacing the same. Thus, the plastics material elements of the ball cock water flow director 30 not only provide the corrosion-resistant qualities, but also the noise reducing qualities, highly desirable in ball cocks of the type herein involved.

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outlet chamber between said water inlet and outlet portions to form a part of said water outlet chamber into a filtering chamber, said filtering chamber opening into said valve lower housing portion outwardly of said valve seat and communicating outwardly through said filtering member with said outlet chamber, said filtering member having a part in said lower housing portion blocking the flow of water outwardly of said valve seat into said outlet chamber other than through said filtering chamber.

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