July 31, 1956 W. J. MARTIN ET AL 2,756,769

BALL COCK FOR FLUSH TANKS

Filed April 26, 1954 2 Sheets-Sheet 1

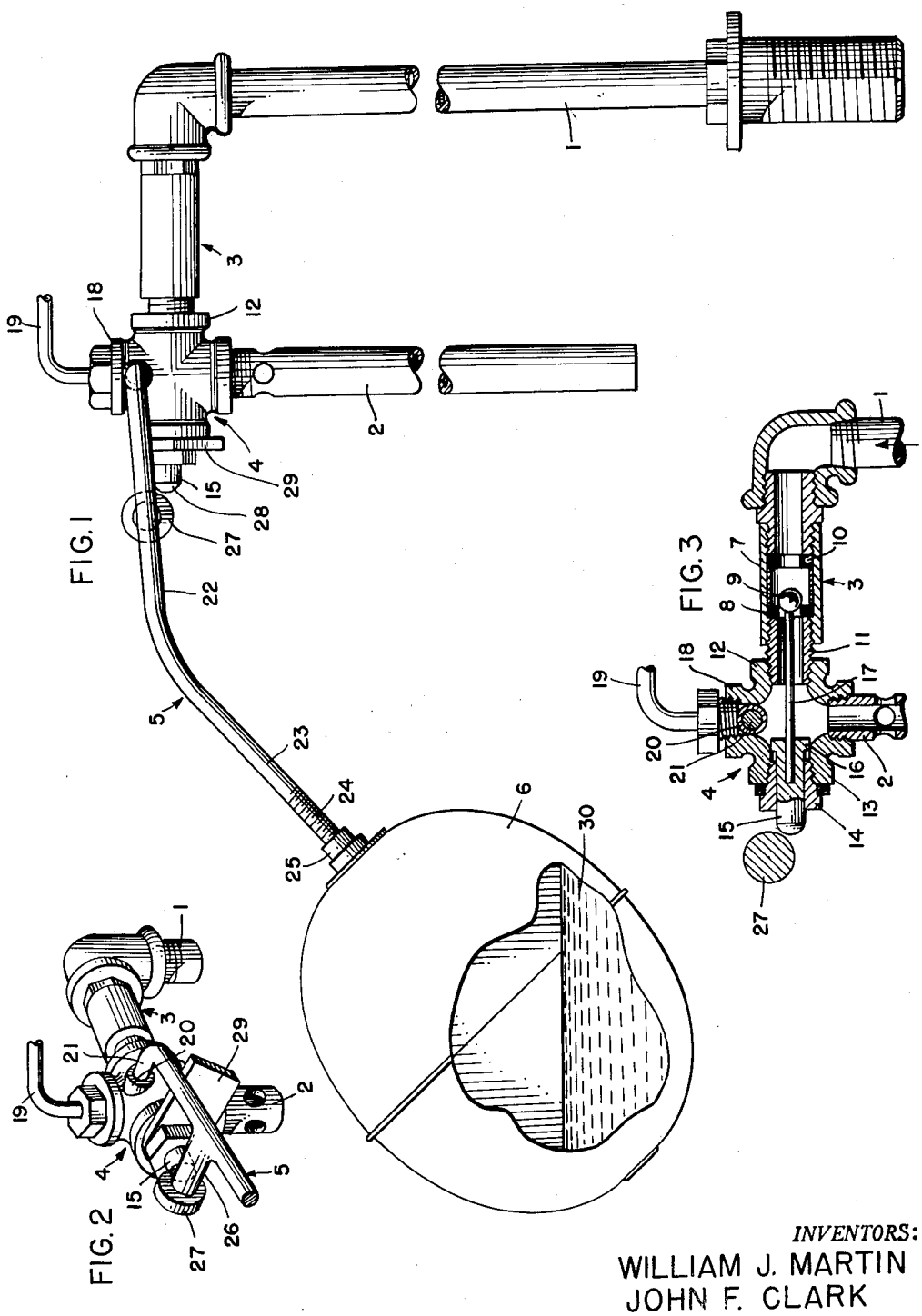


FIG. 1

FIG. 2

FIG. 3

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FIG. 4

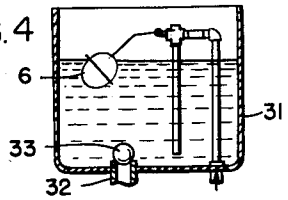


FIG. 5

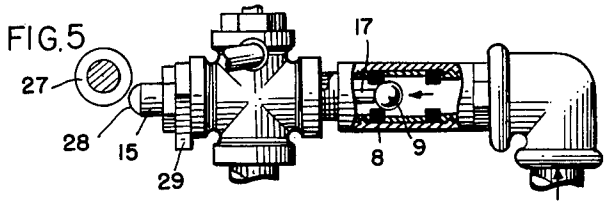


FIG. 6

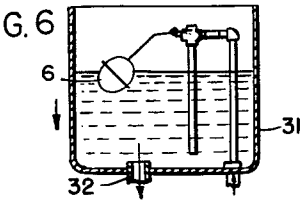


FIG. 7

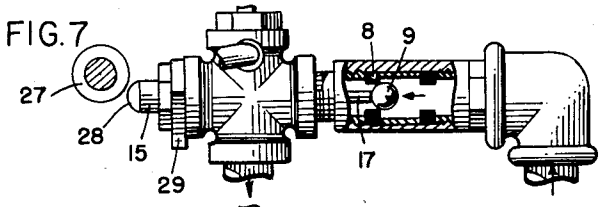


FIG. 8

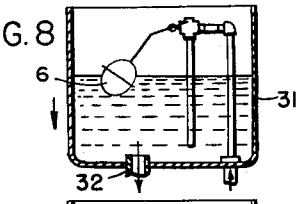


FIG. 9

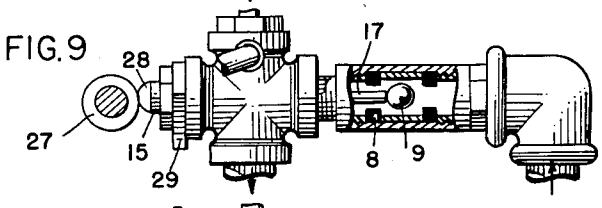


FIG. 10

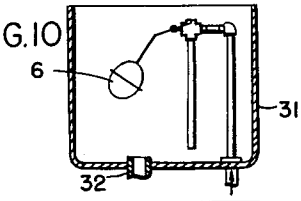


FIG. 11

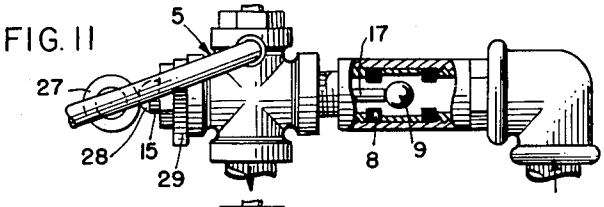


FIG. 12

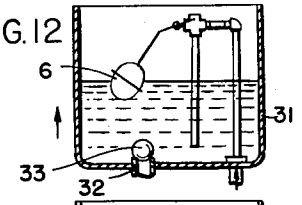


FIG. 13

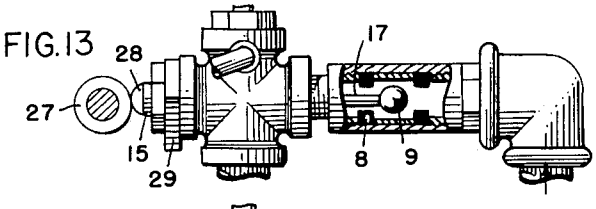


FIG. 14

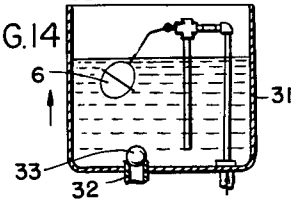


FIG. 15

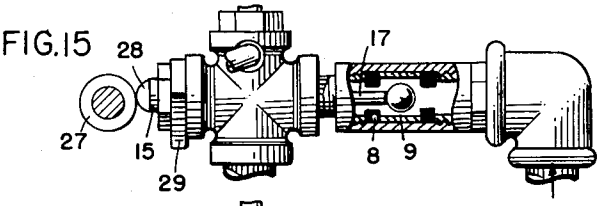


FIG. 16

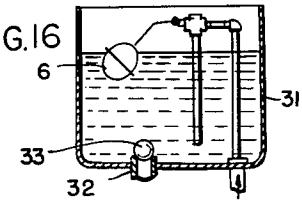
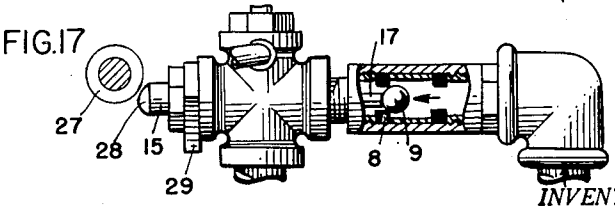


FIG. 17



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BALL COCK FOR FLUSH TANKS

William J. Martin and John F. Clark, Oak Park, Ill., assignors to Circle Valve Co., Chicago, Ill., a corporation of Illinois

Application April 26, 1954, Serial No. 425,422

8 Claims. (Cl. 137—416)

This invention relates to a new and improved ball cock device for use in flush tanks and is of the general character wherein a float member is raised and lowered by the water level in the tank and wherein the movement of the float opens and closes a valve in the water inlet pipe.

The conventional ball cock device is so constructed that as the water level in the tank recedes or moves downwardly the float also moves downwardly therewith. An arm secured to the float operates a valve mechanism in the inlet tube or pipe so that as the float moves downwardly the valve is gradually opened. In such constructions the valve normally opens in the direction of the inlet water pressure and closes against such pressure. When the outlet from the tank is finally closed and the water passes through the valve and into the tank from the inlet pipe, the float gradually moves upwardly with the rising water level and as it does so, the valve gradually closes. When the water level reaches its normal high point in the tank the float will be at its uppermost position and the valve is presumably closed.

When the tank is not flushed for a considerable time it is inevitable that some evaporation of the water in the tank will take place. When this occurs and the water level thus is caused to lower even a slight amount, the float will be lowered also a slight amount sufficient to open the valve slightly and permit water from the inlet pipe to replenish the water supply in the tank.

The conventional construction as just described has numerous disadvantages which have not been able to be overcome in any alleged improvements heretofore conceived. For example, by opening and closing the valve slowly in conformity with the slowly moving float, considerable time is consumed in refilling the tank. This is so because the inlet valve is not completely opened until the tank is about half full or less and begins its relatively slow closing movement when the increasing water level reaches approximately the half-full mark. Thus, the velocity of the incoming water is at its maximum for only a short period of time.

Another disadvantage arises out of this same operation because the noise created by the water flowing through the valve which is open a relatively great distance, reaches a maximum at this point and becomes less only as the valve is moved to closed position. If the valve is opened a lesser amount to minimize the noise, then the time to refill the tank increases.

The fact that the valve opens and closes a slight amount upon slight corresponding movement of the float, creates still another disadvantage due to evaporation of the water in the tank. The float will lower a slight amount to open the valve and will then raise a slight amount to close the valve at relatively small intervals of time so that leakage of the valve is apt to occur.

All of these disadvantages are overcome and additional advantages are obtained in the use of a ball cock device embodying the present invention. Having the foregoing in mind, it is a principal object of the present invention to provide a ball cock for flush tanks which is quick acting for opening and closing the valve therein, thereby enabling the tank to be filled more quietly and in less time than is possible with ball cock devices presently in use.

Another object of the present invention is to provide a ball cock for flush tanks wherein a valve in the water inlet is normally closed but may be opened by movement of the float downwardly and wherein the float is prevented from moving downwardly until the water in the tank recedes a predetermined distance, whereupon the float will drop quickly to its lowermost position.

A further object of the invention is to provide a ball cock for flush tanks wherein a normally closed valve in the water inlet is caused to open by downward movement of the float in response to a lowering of the water level and wherein the float is weighted and is thus caused to remain in its lowermost position until the water level reaches its high point whereupon the float will quickly return to its uppermost position to close the valve.

Still another object is to provide a ball cock for flush tanks wherein a valve normally closed by the water pressure in the inlet is caused to open by downward movement of the float due to a drop in water level in the tank and wherein the distance through which the float moves downwardly may be adjusted, thereby to control the amount that the valve is opened and consequently to control the noise of the incoming water.

Another object is to provide a ball cock device wherein the water inlet valve remains in closed position until the water level in the tank recedes to a predetermined low point whereupon the float will drop downwardly and open the valve which will remain open until the water level again reaches its normal high point, whereupon the float will suddenly move upwardly and close the valve.

Other objects and advantages of the invention will become apparent upon reading the following description taken in conjunction with the accompanying drawings, in which

Fig. 1 is an elevational view of a ball cock embodying the present invention;

Fig. 2 is a fragmentary perspective view of the valve operating means therefor;

Fig. 3 is a vertical longitudinal sectional view through the device shown in Fig. 2;

Fig. 4 is a schematic illustration of the ball cock of the present invention in a tank where the water level is at its normal high point and showing the float in its normal lowermost position;

Fig. 5 is a view partly in elevation and partly in section illustrating the positions respectively of the valve and its operating means when the water level and float are as shown in Fig. 4;

Fig. 6 is a view similar to Fig. 4 but showing the water level after it has receded a predetermined amount and illustrating that the float is still in the same position as in Fig. 4;

Fig. 7 is a view partly in elevation and partly in section illustrating the positions of the valve and its operating means under the circumstances shown in Fig. 6;

Fig. 8 is a view similar to Fig. 6 but showing the water as being at a still lower level and illustrating the float as having moved to its lowermost position;

Fig. 9 is a view partly in elevation and partly in section showing the positions of the valve and its operating means when the float has moved downwardly to the position shown in Fig. 8;

Fig. 10 is a view similar to Fig. 8 showing the tank substantially empty and the float still in its lowermost position;

Fig. 11 is a view similar to Fig. 9 showing that the valve and its operating means are still in the same position when the tank is empty as shown in Fig. 10;

Fig. 12 is a view similar to Fig. 10 but showing the water level as it is rising and indicating that the float is still in its lowermost position;

Fig. 13 is a view similar to Fig. 11 illustrating the valve and its operating means still in the same position as the water level rises as shown in Fig. 12;

Fig. 14 illustrates the water in the tank when it has reached its highest level immediately prior to the movement of the float upwardly;

Fig. 15 is a view similar to Fig. 13 showing the positions of the valve and its operating means when the float is in the position shown in Fig. 14;

Fig. 16 illustrates the water level at the same point as in Fig. 14 and illustrates the return of the float to its uppermost position, and

Fig. 17 is a view partly in elevation and partly in section showing the position of the valve and its operating means corresponding to the position of the float shown in Fig. 16.

The invention herein embodies but few parts but these parts are so arranged as to effectively produce the desired improved results long sought after but not heretofore discovered. The mechanism embodying the invention is so arranged that the valve in the water inlet tube remains completely closed even though the water level in the tank might recede a relatively small amount. Thus, some of the water may evaporate without operating to cause the valve to open. When the water level recedes due to flushing the tank, the float remains in its uppermost position and the valve remains closed until the water level moves downwardly to a predetermined point. When the water level reaches this point, the float will suddenly drop downwardly and quickly open the valve the maximum amount. The tank will drain and the water passing through the inlet and through the valve will refill the tank but the float remains in its lowermost position and the valve remains open until the water level in the tank reaches its high point. When this occurs, the float will suddenly move upwardly to its uppermost position thus quickly closing the valve and stopping further flow of water. Reference will now be made to the drawings wherein a detailed description of the parts will be made so that an understanding may be had of the operation of the present invention.

In Fig. 1 the inlet pipe is shown by the numeral 1 where water under pressure enters for refilling the tank after flushing. The water enters the tank through a hush tube 2 and a valve assembly generally indicated at 3 is connected between the inlet tube 1 and the outlet or hush tube 2. A housing 4 has the hush tube 2 and valve assembly 3 connected thereto and houses the operating means for the valve within the assembly 3. An arm generally indicated at 5 is pivotally supported at one end thereof in the housing 4 and has a float 6 secured to its outer end.

In general these form the principal parts of the ball cock but the details of the valve and its operating means will be more clearly understood by reference to Fig. 3. The valve assembly 3 consists of an outer tubular member 7 having a valve seat 8 therein against which a valve member such as a freely floating ball 9 is adapted to seat by means of the pressure of the water in the inlet tube 1. Thus, the valve is normally closed by the water pressure.

An additional feature may be incorporated into the valve if desired which consists of a second valve seat 10 against which the ball 9 may seat if a drop in pressure sufficient to create a vacuum should occur in the inlet pipe 1. This structure of valve may thus act as a siphon preventer to prevent siphoning of the water out of the tank upon a drop in water pressure in the inlet.

A threaded coupling member 11 threadedly engages one end of the tubular member 7 and is connected at its other end to an internally threaded flange 12 on the housing 4. There is thus communication between the inlet and outlet when the valve is opened so as to permit the water under pressure to flow into the tank.

A similar internally threaded flange 13 is provided in the housing 4 at the opposite side thereof from the flange 12 which receives a guide bushing 14 having an opening therethrough for the reception of a plunger or pin 15. This plunger 15 is mounted for sliding movement within the bushing 14 and has an inner flanged end 16 which will prevent outward movement thereof beyond a predetermined point.

An elongated pin 17, unconnected with the ball 9, is received within a recess in the inner end of plunger 15 and extends toward and terminates adjacent the ball 9. Since the ball 9 is normally urged toward its seat to close the valve by means of the water pressure, it will be clear that inward movement of the plunger 15 carrying with it the pin 17 will unseat the ball 9 due to the movement of pin 17 in a direction opposite to that of the water pressure. When this occurs, water under pressure is allowed to flow through the valve and into the tank through the hush tube 2.

Another internally threaded flange 18 at the upper part of housing 4 may have a refill tube 19 connected therewith in the usual manner. An opening through the flange 18 receives a sleeve 20 adapted to receive in turn the end 21 of the arm 5 which is bent at right angles thereto, thus enabling the arm 5 and the float 6 connected thereto to be rotated and moved upwardly and downwardly.

The present construction of ball cock devices embodies a float arm which is substantially straight. In the present invention, however, it has been found necessary to provide a bend in the float arm in order for the proper functioning of the device. In Fig. 1 it will be noted that the portion 22 of arm 5 extends outwardly from its pivot point for a short distance and at a very slight angle below the horizontal at which point it is then bent downwardly at a greater angle providing the portion 23 thereof. While best results have been found to be obtained when the portion 23 is normally positioned at substantially 45° with respect to the horizontal, it will also operate satisfactorily at other angles. There must, however, be some angular relation between the two portions 22 and 23.

The outer end of arm 5 is threaded as at 24 and threadedly receives a collar 25 secured to the float 6.

The portion 22 of arm 5 has an extension 26 extending outwardly at one side thereof adjacent the outer end of plunger 15 and terminates in a rounded cam portion 27. This cam portion 27 is so positioned when the float 6 and arm 5 are in their normal uppermost position within the tank so that it almost contacts the outer rounded end 28 of plunger 15 above the longitudinal center line thereof.

The natural tendency is for the float 6 to follow the water level in the tank and to move downwardly when the tank is emptied and to move upwardly when the tank is refilled. In order to limit the downward movement of the arm 5 and float 6, a stop member is provided in the form of an arm 29 which has one end thereof surrounding the bushing 14 and which is held in place by the pressure exerted by the outer flanged end of bushing 14 against the flange 13 of the housing 4. This construction enables the stop arm 29 to be adjusted to any desired position for limiting the downward movement of float 6 and arm 5 when the tank is emptied. An important advantage is gained by this adjustable stop arm which will be pointed out more fully hereinafter.

In order for the present structure to function properly the float 6 requires a predetermined weight. This weight may be provided in any one of a number of different ways. A preferable manner is to have the float 6 of hollow formation and to place water or other fluid therein as indicated at 30. This tends to form a ballast for the float and the amount of fluid placed therein may vary depending upon conditions, for example, the amount of water pressure in the inlet pipe 1. Since water pressures vary as between different locations, it will be evident that a greater weight of the float 6 will be required to

unseat the ball 9 and open the valve where the water pressure is relatively great. Where the water pressure is relatively low, it will not require as much force to unseat the ball 9 and therefore the weight of the float need not be as great.

The manner of operation of the ball cock embodying the present invention may be more clearly understood by viewing Figs. 4 to 17 inclusive. It may be stated at the outset that when the water level in the tank begins to fall, the normal tendency is for the float 6 and arm 5 to move downwardly, but in this instance the outer end of plunger 15 being in contact with the cam member 27 below the center thereof will tend to maintain the float and arm in their uppermost or valve closing position. The rounded end of plunger 15 forms a camming surface for cooperation with the cam member 27 and has its high point between the upper and lower sides of the plunger. However, as the water level in the tank falls, the buoyancy tending to support the float will become less. Finally, when the water has receded a predetermined distance the weight of the float takes over and it will suddenly drop downwardly against the pressure of plunger 15 and will immediately assume its lowermost position where the arm 5 is in contact with the stop member 29 and cam member 27 is maintained in contact with the camming surface below the high point thereof. At this point the valve will be completely open and water under pressure will be admitted to the tank through the hush tube 2. Since the outlet from the tank has a considerably greater area than the inlet, substantially all of the water in the tank will be drained until the outlet is closed, whereupon the water level will begin to rise. The weight of the float is regulated so that it will be substantially covered with water before a sufficient buoyancy will be created to move the float upwardly. Thus, when the water level reaches its high point, the float and its arm 5 will suddenly move upwardly to the uppermost position thereof when cam member 27 is above the high point on the camming surface, whereupon the water pressure within the inlet pipe 1 will close the valve thus returned all parts to their normal positions.

This sequence of operations is illustrated in Figs. 4 to 17 where it will be noted that in Fig. 4 there is illustrated the tank 31 having an outlet 32 in the bottom thereof normally closed by suitable closure means 33. All of the parts of the ball cock are in their normal uppermost positions and the water level in the tank is at its high point. Reference to Fig. 5 shows that the cam member 27 is above the high point on the camming surface of plunger 15 and is almost resting on the outer curved surface 28 thereof. The water pressure is maintaining the ball 9 against its seat 8.

Fig. 6 shows the water level in the tank as it is falling depending upon the weight of the float and the angle between the two sections 22 and 23 of the arm 5. The water level may fall as much as one or two inches without affecting the uppermost position of the float and arm. If it is thus assumed that the water level in Fig. 6 has fallen perhaps an inch or so, the cam member 27 will be resting upon the outer curved end 28 of plunger 15 but the weight of the float will not be great enough at this point to force the plunger 15 inwardly against the water pressure. At this point there is still a sufficient buoyancy in the water acting together with the supporting function of plunger 15 to maintain the float and arm in their uppermost positions.

Immediately thereafter, however, as the water level continues to fall, the buoyancy of the water plus the water pressure in the inlet holding the plunger 15 outwardly is overcome by the weight of the float, whereupon it suddenly drops downwardly to the lowermost position thereof as determined by the stop member 29. Thus, the water level and position of the parts are shown in Figs. 8 and 9 where it will be seen that the lowermost position of the cam member 27 is below the high point

on the camming surface of the plunger 15 and has forced said plunger and pin 17 inwardly to open the valve by unseating the ball 9 from its seat 8.

At this point the water under pressure will flow through the valve and into the tank through the hush tube 2. The position of all parts will remain the same as shown in Figs. 10 and 11 while the water level falls to the low point which is at the upper end of the outlet 32. At this point in the operation the closure member 33 again closes the outlet 32 so that the incoming water through the open valve will raise the water level in the tank. The position of the water level in Fig. 12 is substantially the same as that shown in Fig. 8. The weight of the float is such that at this point there is insufficient buoyancy to raise the float upwardly. Thus, the valve remains open as shown in Fig. 13 and the water continues to flow into the tank. Fig. 14 illustrates the water level just as it reaches its high point where the float is substantially covered by the water. In other words, the weight of the float is such that there is insufficient buoyancy to move it upwardly until it is substantially completely covered by the water. At this point the float and arm may have moved upwardly slightly so that the valve is still open but the water pressure is tending to move the plunger 15 outwardly against the cam member 27. When the water reaches this high point in the tank, the buoyancy thereof plus the pressure exerted by the water against the cam member 27 by the rounded end of the plunger 15 will act to suddenly move the float and arm upwardly and return them to their uppermost position as shown in Fig. 16. The position of the valve and plunger is shown in Fig. 17 where it will be seen that they have resumed the same position shown in Fig. 5 with the cam member 27 in its normal position and the valve closed.

It will thus be observed from the foregoing description of the sequence of operations that the valve is always either completely closed or compeltely open. There is not that slow closing and opening of the valve which occurs in ball cocks as presently designed and thus the disadvantages of such ball cocks are defintely overcome.

The same sequence of operations will occur although not to as great an extent when evaporation of the water in the tank takes place and causes the water level to fall. If the water level falls due to evaporation to the point shown in Fig. 6, then the valve will suddenly be completely opened by the dropping of the float and will not again return to its uppermost position until the water has been replenished and the level thereof has reached its high point.

Depending upon the pressure of the water in the inlet, a certain amount of noise will be created by the water flowing through the valve. Thus the greater amount that the valve is opened or the greater distance the ball 9 is moved away from its seat 8, the greater will be the noise created. If the ball moves only slightly away from the seat there will be less noise created by the water flowing therethrough. This rate of flow can be controlled by adjusting the arm 29 a slight amount upwardly or downwardly. Thus, if the arm 29 is moved upwardly it will not permit the arm 5 connected to the float to be dropped downwardly as great a distance and therefore the downward movement thereof will not move the plunger 15 inwardly as great a distance. It thus follows that the ball 9 will then be moved a lesser distance from the seat 8 and the water will flow therethrough more quietly. This, however, must be considered with the fact that with less water flowing through the inlet, a longer time will be consumed in refilling the tank. Conditions, however, will vary so that in some instances the noise is not objectionable and it is more important to refill the tank quickly. In other instances the time element will not be as important, in which case the water can be made to flow more quietly.

From the foregoing it will be clear that the novel ball cock arrangement for opening and closing the inlet valve

embodying the present invention has definite advantages over those heretofore used and overcomes all of the disadvantages thereof as well as having additional features not present heretofore.

Changes may be made in the form, construction and arrangement of parts from those disclosed herein without in any way departing from the spirit of the invention or sacrificing any of the attendant advantages thereof, provided, however, that such changes fall within the scope of the claims appended hereto.

The invention is hereby claimed as follows:

1. A ball cock device for tanks comprising, a water inlet, a valve connected to said inlet and normally urged toward closed position by the water pressure in said inlet, an operating member adapted to be actuated to move said valve to open position, a float adapted to be raised and lowered by the rise and fall of the water level in the tank, a pivotally mounted arm connected to said float, cam means on said arm adjacent one end of said operating member, a camming surface on said one end of said operating member having a high point between the upper and lower sides of said operating member and cooperating with said cam means to support said arm in an upper valve closing position until the water level recedes and reaches a predetermined lower level, the weight of said float being adapted to cause said arm and cam means to drop downwardly to the lowermost position thereof and to actuate said valve operating member when the water level reaches said predetermined lower level thereof, and stops means to limit downward movement of said arm while maintaining said arm means in contact with said camming surface below said high point.

2. A ball cock device for tanks comprising, a water inlet, a valve connected to said inlet and normally urged toward closed position by the water pressure in said inlet, a housing, elongated valve operating means slidable longitudinally within said housing and adapted to be actuated to move said valve to open position, a float adapted to be raised and lowered by the rise and fall of the water level in the tank, an arm connected to said float and pivotally mounted on said housing intermediate the ends of said valve operating means, cam means on said arm adjacent one end of said operating member, a camming surface on said one end of said operating member having a high point between the upper and lower sides of said operating member and cooperating with said cam means to support said arm in an upper valve closing position until the water level recedes and reaches a predetermined lower level, the weight of said float being adapted to cause said arm and cam means to drop downwardly to the lowermost position thereof and to actuate said valve operating member when the water level reaches said predetermined lower level thereof, and stop means to limit downward movement of said arm while maintaining said arm means in contact with said camming surface below said high point.

3. A ball cock device for tanks comprising, a water inlet, a valve connected to said inlet and normally urged toward closed position by the water pressure in said inlet, an operating member adapted to be actuated to move said valve to open position, a float adapted to be raised and lowered by the rise and fall of the water level in the tank, a pivotally mounted arm connected to said float, cam means on said arm adjacent one end of said operating member, a camming surface on said one end of said operating member having a high point between the upper and lower sides of said operating member and cooperating with said cam means to support said arm in an upper valve closing position until the water level recedes and reaches a predetermined lower level, the weight of said float being adapted to cause said arm and cam means to drop downwardly to the lowermost position thereof and to actuate said valve operating member when the water level reaches said predetermined lower level thereof, and adjustable stop means to limit and regulate downward movement of said arm while maintaining said arm means in contact with said camming surface below said high point.

4. A ball cock device for tanks comprising, a water inlet, a valve connected to said inlet and normally urged toward closed position by the water pressure in said inlet, a housing, elongated valve operating means slidable longitudinally within said housing and adapted to be actuated to move said valve to open position, a float adapted to be raised and lowered by the rise and fall of the water level in the tank, an arm connected to said float and pivotally mounted on said housing intermediate the ends of said valve operating means, cam means on said arm adjacent one end of said operating member, a camming surface on said one end of said operating member having a high point between the upper and lower sides of said operating member and cooperating with said cam means to support said arm in an upper valve closing position until the water level recedes and reaches a predetermined lower level, the weight of said float being adapted to cause said arm and cam means to drop downwardly to the lowermost position thereof and to actuate said valve operating member when the water level reaches said predetermined lower level thereof, and adjustable stop means to limit and regulate downward movement of said arm while maintaining said arm means in contact with said camming surface below said high point.

5. A ball cock device for tanks comprising, a water inlet including a valve seat and a freely floating ball, a valve connected to said inlet and normally urged toward closed position by the water pressure in said inlet, an operating member adapted to be actuated to move said valve to open position, a float adapted to be raised and lowered by the rise and fall of the water level in the tank, a pivotally mounted arm connected to said float, cam means on said arm adjacent one end of said operating member, a camming surface on said one end of said operating member having a high point between the upper and lower sides of said operating member and cooperating with said cam means to support said arm in an upper valve closing position until the water level recedes and reaches a predetermined lower level, the weight of said float being adapted to cause said arm and cam means to drop downwardly to the lowermost position thereof and to actuate said valve operating member when the water level reaches said predetermined lower level thereof, and stop means to limit downward movement of said arm while maintaining said arm means in contact with said camming surface below said high point.

6. A ball cock device for tanks comprising, a water inlet including a valve seat and a freely floating ball, a valve connected to said inlet and normally urged toward closed position by the water pressure in said inlet, a housing, elongated valve operating means slidable longitudinally within said housing and adapted to be actuated to move said valve to open position, a float adapted to be raised and lowered by the rise and fall of the water level in the tank, an arm connected to said float and pivotally mounted on said housing intermediate the ends of said valve operating means, cam means on said arm adjacent one end of said operating member, a camming surface on said one end of said operating member having a high point between the upper and lower sides of said operating member and cooperating with said cam means to support said arm in an upper valve closing position until the water level recedes and reaches a predetermined lower level, the weight of said float being adapted to cause said arm and cam means to drop downwardly to the lowermost position thereof and to actuate said valve operating member when the water level reaches said predetermined lower level thereof, and stop means to limit downward movement of said arm while maintaining said arm means in contact with said camming surface below said high point.

7. A ball cock device for tanks comprising, a water inlet including a valve seat and a freely floating ball, a valve connected to said inlet and normally urged toward closed position by the water pressure in said inlet, an operating member adapted to be actuated to move said valve to open position, a float adapted to be raised and lowered by the rise and fall of the water level in the tank, a pivotally mounted arm connected to said float, cam means on said arm adjacent one end of said operating member, a camming surface on said one end of said operating member having a high point between the upper and lower sides of said operating member and cooperating with said cam means to support said arm in an upper valve closing position until the water level recedes and reaches a predetermined lower level, the weight of said float being adapted to cause said arm and cam means to drop downwardly to the lowermost position thereof and to actuate said valve operating member when the water level reaches said predetermined lower level thereof, and adjustable stop means to limit and regulate downward movement of said arm while maintaining said arm means in contact with said camming surface below said high point.

8. A ball cock device for tanks comprising, a water inlet including a valve seat and a freely floating ball, a valve connected to said inlet and normally urged toward closed position by the water pressure in said inlet, a housing, elongated valve operating means slidable longitudinally within said housing and adapted to be actuated to move said valve to open position, a float adapted to be raised and lowered by the rise and fall of the water level in the tank, an arm connected to said float and pivotally mounted on said housing intermediate the ends of said valve operating means, cam means on said arm adjacent one end of said operating member, a camming surface on said one end of said operating member having a high point between the upper and lower sides of said operating member and cooperating with said cam means to support said arm in an upper valve closing position until the water level recedes and reaches a predetermined lower level, the weight of said float being adapted to cause said arm and cam means to drop downwardly to the lowermost position thereof and to actuate said valve operating member when the water level reaches said predetermined lower level thereof, and adjustable stop means to limit and regulate downward movement of said arm while maintaining said arm means in contact with said camming surface below said high point.

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