Oct. 25, 1927. 1,646,691

W. L. GILCHRIST

AUTOMATIC HYDRAULIC BALL COCK

Filed Nov. 15, 1926

Fig. 1

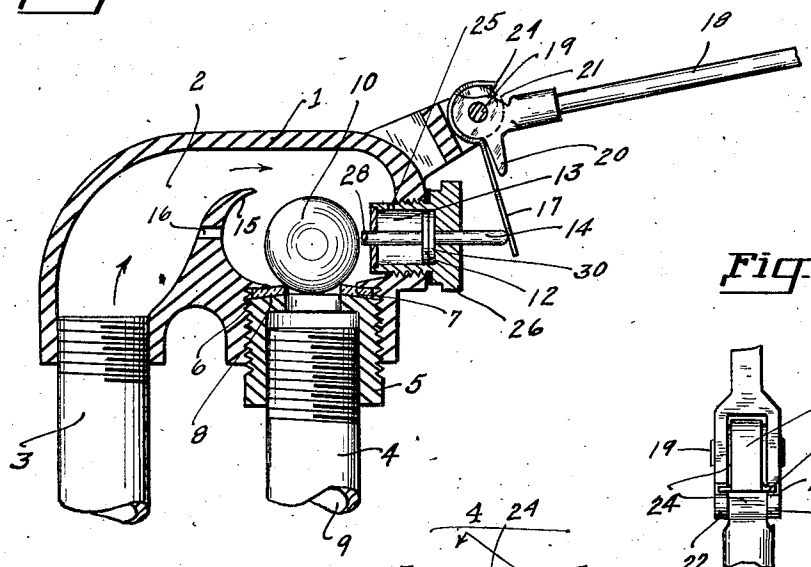


Fig. 4

Fig. 2

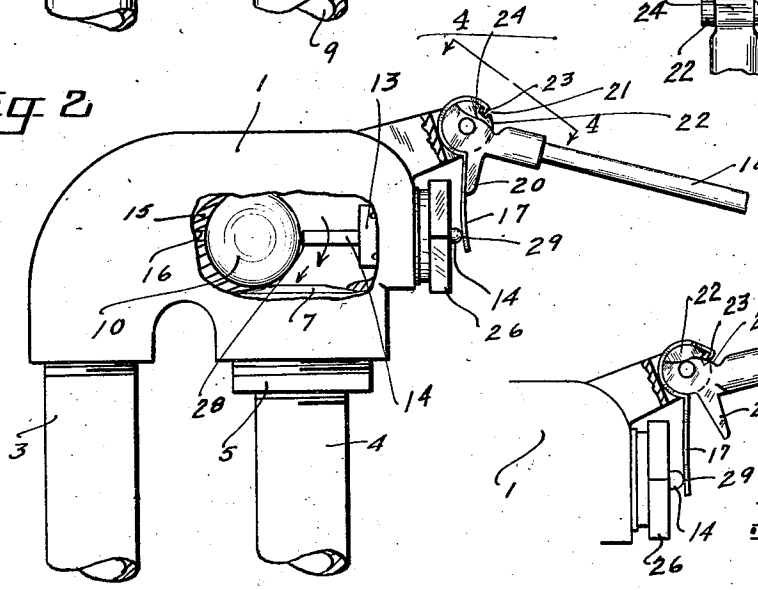


Fig. 3

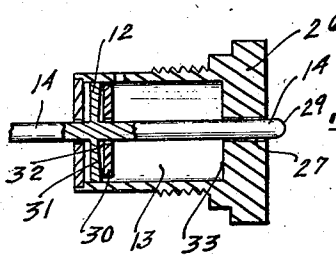


Fig. 5

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UNITED STATES PATENT OFFICE.

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AUTOMATIC HYDRAULIC BALL COCK.

Application filed November 15, 1926. Serial No. 148,597.

My present invention relates to my pending application in United States Patent Office filed under date of June 2, 1925, Serial Number 34,398, for automatic hydraulic ball cocks, and further relates to my pending application in United States Patent Office filed August 28, 1926, Serial Number 132,222, for automatic hydraulic measuring valves.

My present invention is intended for use in flushing tanks on toilets and for other similar purposes.

The primary object of my present invention consists in providing a simple device and one that is economical in construction and with but few parts, adapted to be automatically actuated by a float ball.

A further object of my invention consists in providing simple and efficient means for the engagement and disengagement of the device with and from the source of water supply under pressure.

Still further objects of my invention consist in providing a ball valve and means for actuating the same.

A further object of my invention consists in providing means to prevent a water hammer in the device, and one that will be substantially free from operating noises.

With these and incidental objects in view, the invention consists in certain novel features of construction and combination of parts, the essential elements of which are set forth in the appended claims, and a preferred form of embodiment is hereinafter shown with reference to the drawings which accompany, and form a part of this specification.

In the drawings:

Fig. 1 is a fragmentary sectional view of the device.

Fig. 2 is a side elevation partially in section of the mechanism illustrated in Fig. 1.

Fig. 3 is a side elevation of the actuating mechanism illustrating the camming end of the float ball carrying rod and the actuator for tripping and opening the ball valve.

Fig. 4 is an end view taken on line 4—4 of Fig. 2, looking in the direction indicated.

Fig. 5 is a cross section view through the actuating cylinder.

Like reference characters refer to like parts throughout the several views.

1 is the valve casing having a chamber 2 disposed therein and having an inlet pipe 3 secured thereto as by being threaded therein. The pipe 3 is directly connected to a source of liquid supply under pressure not here shown. The outlet pipe 4 is also indirectly secured to the valve casing 1 through a bushing 5. An annular shoulder 6 is disposed in the lower side of the valve casing and a compressible washer 7 is disposed between the upper end 8, of the bushing 5, and the shoulder 6. This is preferably made of flexible and compressible material. A central opening passes through the member 7 and in registerable alignment with the opening 9, passing through the outlet pipe 4. A ball valve 10 is normally seated upon the compressible member 7 and is adapted to be moved into and out of engagement with the central opening passing therethrough. A cylinder 11 is removably secured to the valve casing and a piston 12 is reciprocably disposed within the cylindrical chamber 13. The piston rod 14 passes through the cylinder and in alignment with the ball valve 10. When the piston rod 14 is in position as illustrated in Fig. 2 the ball 10 is out of engagement with its seat and contacts with the wall 15 of the valve casing 1. An opening 16 passes through the wall 15 to permit of the free engagement and disengagement of the ball 10 with the wall 15. The piston rod 14 is actuated through the action of the lever 17. A float ball arm 18 is pivoted about a journal pin 19, and a projecting lug 20 is disposed upon the under side thereof and is adapted to engagement with the lever arm 17. A notch 21 is disposed in the outer periphery of the bearing surface 22, and a projection 23 on the lever 17 is adapted to engagement within the notch 21. The camming surface 24, disposed upon the inner end of the ball lever is adapted to disengage the lug 23 from engagement in the notch 21, thus permitting the free movement of the piston rod 14 outwardly. Liquid enters the cylindrical chamber 13 through a free opening 25. The high pressure liquids are maintained within the chamber 2 of the valve casing. The piston rod 14 passes through the outside wall 26 of the cylinder and a space 27 exists be-

tween the wall 26 and the piston rod 14, the cross sectional area of which is less than that of the free opening 25. Since the inner end 28 of the piston rod 14 is under high pressure and the outer end 29 of the piston rod is free or under extremely limited pressure, the piston 12 will be moved longitudinally of the cylinder; the liquid within the cylindrical chamber 13 escaping through the opening 27 disposed around the outer end of the piston rod, until the piston 12 passes the free opening 25, after which the piston movement will be slowed down for the remainder of the stroke. The liquid flowing through the outlet pipe 4 will have a tendency to draw the ball back into its seat after the inner end 28 of the piston rod has moved free of the ball. To form a tight seal between the piston rod and the outer wall 26 of the cylinder, a compressible washer 30 is placed within the cylinder about the piston rod and adjacent the piston 12 and slidable on the rod. The inner wall 31 of the piston is preferably made not at right angles to that of the piston rod thus forming a recess 32 in the side of the piston facing the compressible washer. Therefore, the piston will engage the compressible washer on or about its outer peripheral edge and will compress the same against the inner wall 33 of the cylinder head when in its outer position thus preventing further leakage of the liquid from the cylinder through the outlet 27 disposed about the outer end of the piston rod 14.

The primary purpose of the piston operating in the cylinder consists in means for the prevention of a water hammer, for after the piston passes the free opening within the cylinder wall the outward movement of the piston will be retarded and the speed of the same will be controlled by the escapement of the trapped liquid within the cylinder passing through the space disposed between the piston rod and the cylinder head.

While the form of mechanism herein shown and described is admirably adapted to accomplish the objects primarily stated, it is not intended to confine the invention to the specific form herein described, as it is susceptible of embodiment in various ways all coming within the scope of the claims which follow.

What I claim is:—

1. In a device of the class described, the combination of a valve casing, inlet and discharge outlets associated with the casing, a valve seat of compressible material associated with the valve casing, a ball valve associated with the seat, a cylinder disposed through the valve casing wall and closed at its outer end, a piston and piston rod associated with the cylinder and the rod passing through its outer end, and automatic means for actuating the piston and piston rod to unseat the valve when moved in one direction and for permitting the valve to seat when moved in another direction.

2. In a device of the class described, the combinaton of a valve casing, inlet and discharge outlets associated with the casing, a valve associated with the discharge outlet, a cylinder disposed through the valve casing wall and closed at its outer end, a piston and piston rod associated with the cylinder and the rod passing through its outer end and automatic means for actuating the piston and piston rod to unseat the valve when moved in one direction and for permitting the valve to seat when moved in another direction.

3. In a device of the class described, the combination of a valve casing, a removable cylinder associated with the casing, inlet and outlet passageways associated with the cylinder, a piston and piston rod reciprocably associated with the cylinder, actuating means for reciprocating the piston and piston rod longitudinally of the cylinder and a compressible element adjacent the piston and about said piston rod adapted to close the outlet passageway when the piston has moved to the outer end of said cylinder.

4. In a device of the class described the combination of a valve casing, a cylinder having a reciprocable piston and piston rod associated therewith disposed through the wall of the valve casing, said cylinder being provided with an inlet passageway communicating with the interior of the casing, and an outlet passage way leading to the exterior of the casing; a washer associated with the piston and piston rod, and said piston being provided with a recess to provide a peripheral portion to engage said washer to permit said washer to close said outlet passageway when the piston is moved in one direction.

5. In a device of the class described, a valve casing, including inlet and outlet passageways in said casing, a ball valve normally seated over the outlet passageway, a cylinder removably disposed within the wall of said casing, said cylinder being provided with a reciprocable piston and a piston rod whose opposite ends extend beyond the ends of the cylinder; means to cause said piston rod to engage said ball valve to move it from its seat comprising a fulcrumed float ball arm, a rockable lever adapted to engage one end of said piston rod, and means permitting a cooperative movement of the arm and lever in one direction of movement of the float ball arm, means for retaining the lever in its position for holding the valve open upon the opposite movement of the arm, and means for releasing the lever upon completion of the opposite movement of the arm to permit the valve to close.

6. In a device of the class described, a

valve casing including inlet and discharge passageways, a ball valve normally seated over the outlet passageway, a thrust member to unseat said valve; means to cause said thrust member to unseat said valve comprising a fulcrumed arm, a rockable lever engaging said thrust member, and a projecting lug formed on said arm to engage said lever when the arm is moved in one direction; means for retaining said lever in its position to maintain the valve open; and means actuated by said arm when moved in the opposite direction to release said retaining means to permit the valve to close.

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