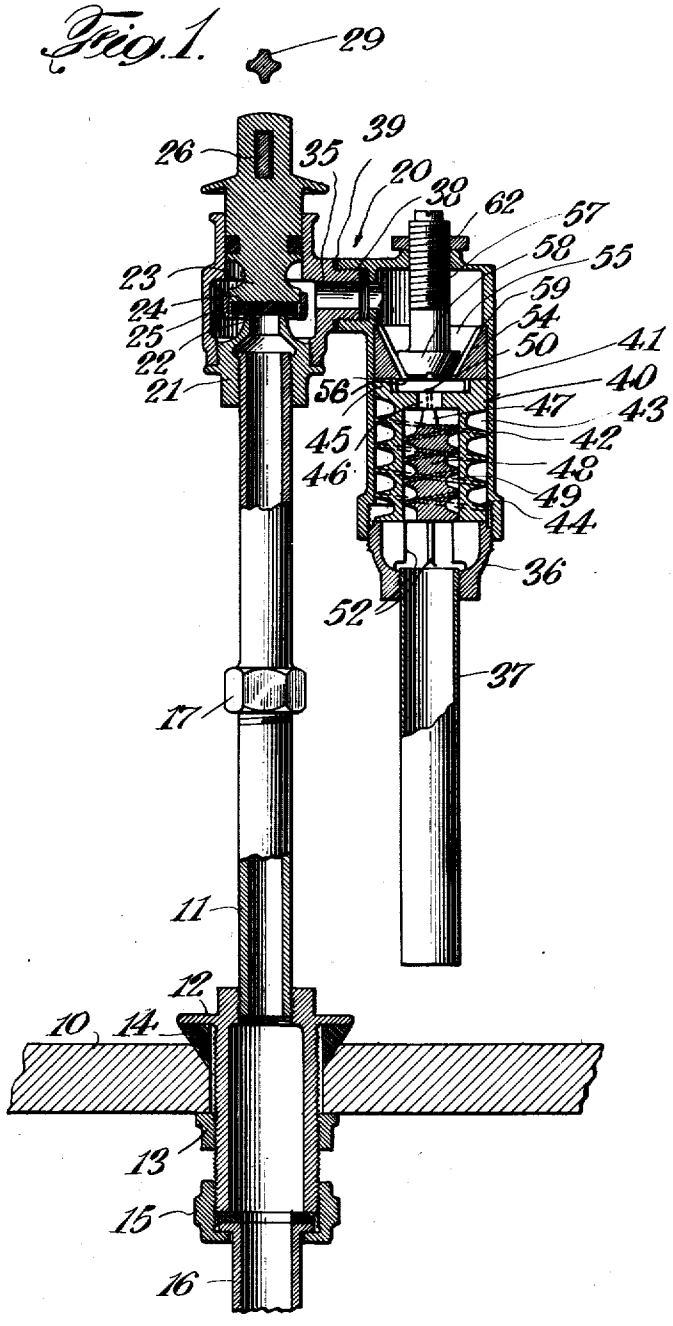
March 14, 1933. H. D. CLEMMONS 1,901,633

BALL COCK

Filed June 4, 1929 2 Sheets-Sheet 1

Fig. 1.



INVENTOR
Herbert D. Clemmons
BY
Emery, Booth, Varney & Whittemore
ATTORNEYS

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Fig. 3.

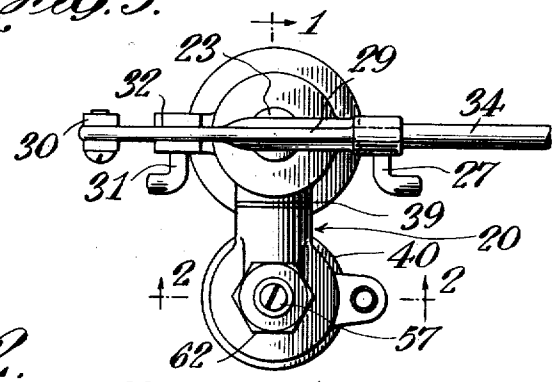


Fig. 2.

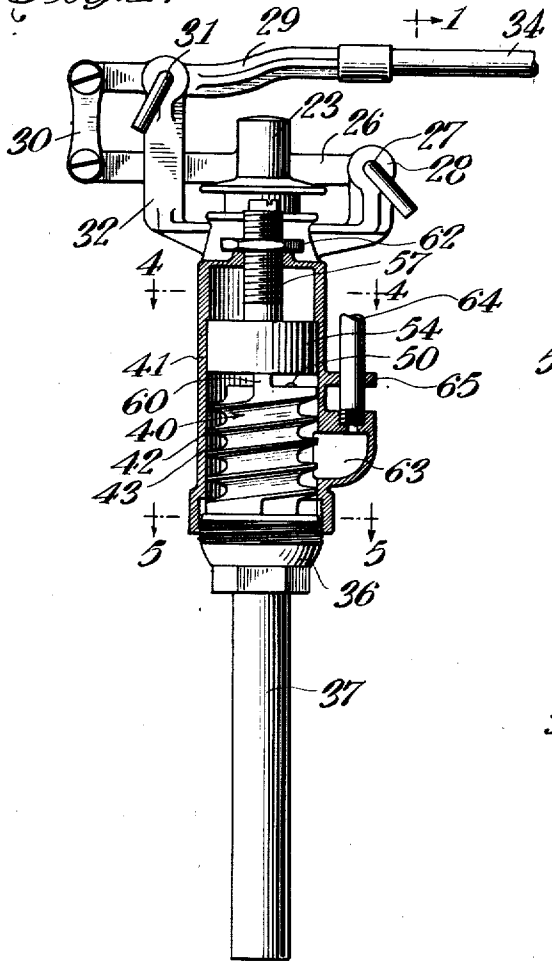


Fig. 4.

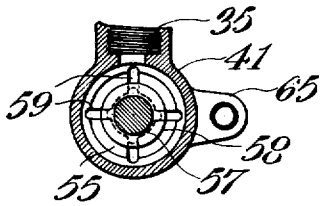
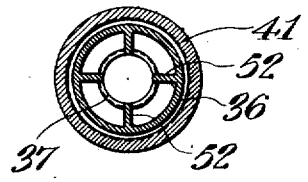


Fig. 5.



INVENTOR
Herbert D. Clemmons
BY
Emery, Booth, Varney & Whittemore
ATTORNEYS

Patented Mar. 14, 1933 1,901,633

UNITED STATES PATENT OFFICE

HERBERT D. CLEMMONS, OF STURGIS, MICHIGAN, ASSIGNOR TO SCOVILL MANUFACTURING COMPANY, OF WATERBURY, CONNECTICUT, A CORPORATION OF CONNECTICUT

BALL-COCK

Application filed June 4, 1929. Serial No. 368,290.

This invention relates to ball-cocks and has for an object the provision of a ball-cock which will operate rapidly and silently at all pressures of the water flowing therethrough.

It has been known for some time that the hissing noise of ball-cocks could be minimized or eliminated by causing the water to flow through retarding passages. These retarding passages have usually been made tortuous and more often spiral. As they have heretofore been designed and operated they function best at a given pressure but are not very effective at other pressures. When installed throughout a tall building where the hydrostatic pressure varies, it has frequently been found necessary to provide a number of different types or models for different pressure ranges. This is expensve and troublesome. Moreover, if the pressure at the source changes, all of the ball-cocks may become noisy. This can only be remedied by replacement. It is, therefore, highly desirable to have a ball-cock which can be installed and adjusted to operate satisfactorily for the different pressures which may exist initially or which may later be imposed.

The present invention provides such a ball-cock which is composed of few and simple parts and which consequently may be economically manufactured and installed and which will give long and satisfactory service.

In order that the enumerated and other objects and advantages of the invention may be understood by those skilled in the art, an illustrative embodiment of the invention will be described hereinbelow, reference being made to the accompanying drawings, wherein:

Figure 1 is a longitudinal sectional view of a ball-cock embodying the invention, the view being taken on the line 1—1 of Figure 3;

Figure 2 is a longitudinal section partly in elevation where the casing has been cut away, the view being taken on the line 2—2 of Figure 3;

Figure 3 is a top plan view;

Figure 4 is a transverse section on the line 4—4 of Figure 2; and

Figure 5 is a transverse section on the line 5—5 of Figure 2.

In the preferred embodiment of the invention illustrated in the drawings the ball-cock is supported within a tank 10 by the supply pipe 11 which is fastened to the tank wall by flanged nuts 12, 13. A packing piece 14 seals the joint between the tank and pipe. A union nut 15 connects the supply pipe 11 with a system pipe 16. A screw joint 17 in the supply pipe 11 provides for removal of the ball-cock assembly without opening the joint between the tank and supply pipe.

The ball-cock proper comprises a casing or body 20 threaded upon a plug 21 secured to the supply pipe. The plug is provided with a raised concentric valve seat 22 cooperating with a float controlled valve 23. The closure disc 24 of the valve is held in place by a flanged ferrule 25.

The valve 23 is operated by a lever 26 fulcrumed upon a pin 27 carried by a short casing bracket 28. The valve lever 26 is actuated by a lever 29 connected thereto by a pivoted link 30. The lever 29 is journaled at 31 to a long casing bracket 32 and supports the stem 34 of a float ball in a threaded socket in its outer end.

The casing 20 is in general U-shaped with one arm longer than the other. The float valve 23 controlling the inlet is in one of the legs of the U and certain parts associated with the outlet are disposed in the chamber forming the other leg of the U. A cross flow duct 35 is located in the connecting bar of the U. An extension of the discharge chamber includes a coupling 36 and a discharge tube 37.

Preferably the valve casing is formed in two parts joined by a nipple 38 forming part of the cross flow duct 35. A packing washer 39 is placed between the adjacent edges of the casing parts to seal the joint.

Means comprising a tortuous retarding channel are provided for silencing the flow of water through the ball-cock. It is one of the features of the present invention that the entire flow of water always passes

through a retarding passage, whatever the pressure adjustment may be.

In the present embodiment the silencing means comprises a structure 40 inserted in the discharge chamber 41. The structure includes an outer member 42 having a spiral passage or groove 43 formed on its outer surface. The member 42 has a bore 44 opening toward its lower end, which bore is partly closed at the upper end by a head 45 provided with a central hole 46. Within the bore 44 and spaced from the head 45 by a lug 47 is an inner member 48 provided on its outer surface with a spiral passage or groove 49. The inner member may be retained in the outer by a rivet 50.

As best shown in Figure 1 both spiral passages terminate at their lower ends in the same transverse plane but are inclined in opposite directions so that the swirling action of the water flowing from one of them is counteracted by the opposite swirling action of water from the other. To further deaden the swirling action of the water flowing out of the spiral passages (see Figure 5) a baffle or rectifying device is placed below the ends of the passages 43 and 49. The baffle comprises a series of radial plates 52 positioned in the reducing coupling 36.

Means is provided for throttling the flow of water through the ball-cock. This means comprises a valve which is turned toward closed position to restrict the flow of water when the pressure is high and turned toward open position to increase the available space for flow when the pressure is low.

As shown in the drawings the preferred embodiment of this means includes a partition 54 insertable in the outlet chamber. The partition is formed with a conical recess 55 on its upper side connecting at its lower end with a bore 56 extending the remaining distance through the partition. The conical portion of the partition thus in effect constitutes a sleeve surrounding the valve head and shaped to change the flow of water as the head approaches a seat in the bottom of the sleeve.

A valve including a stem 57, threaded through the top of the casing, and a conical head 58 cooperates with the conical recess of the partition to regulate or throttle the flow of water. The valve never by itself completely stops the flow of water for, as seen in Figure 4, the conical recess in the partition is provided with grooves 59 which prevent the valve from seating at several points.

If desired, a lug 60 may be provided on the upper end of the retarding structure to hold the removable partition 54 in place.

In assembling, the throttle valve is inserted from the bottom end of the discharge chamber so is provided with a turning slot on the lower end as well as on the upper end. A lock nut 62 threaded on the valve stem holds it securely in adjusted positions.

A refill cavity 63 leading to a refill tube 64 is formed in the discharge chamber below the throttle valve. The throttle valve thus serves to limit the pressure of water to the refill tube as well as to the retarding passages. For additional support the refill tube is braced by a boss 65 formed on the side of the casing and provided with a hole for receiving the tube.

A ball-cock made in accordance with the above description is adapted to operate quietly at all pressures and at the same time to fill the tank quickly. The retarding passages and the throttle valve itself are designed to minimize hissing or gurgling noises for any pressure for which the device may be set. Many other advantages will be obvious to those skilled in the art.

It is also to be understood that the invention may be modified, as for example in the relative disposition of parts and in various other ways within the spirit of the invention as set forth in the subjoined claims.

What I claim is:

1. In a ball-cock, in combination, a valve body or casing in the general shape of the letter U, said body being formed in two parts joined by a nipple and sealed together along the connecting bar of the U, a float controlled stop valve in one stem of the U, float actuated mechanism for operating said stop valve, said mechanism being disposed to leave clear the space above the other or outlet stem of the U, a throttle valve for restricting the flow of water from said stop valve, said throttle valve including a stem threaded through the cover of the body and a head disposed in the outlet portion of the body, a partition in said outlet having a conical grooved seat cooperating with said valve head, a plurality of juxtaposed oppositely directed spiral silencing passages receiving water from said throttle valve, a flow rectifying device including a series of radial plates receiving water from said spiral passages, and a refill channel opening into the body alongside said spiral passages.

2. In a ball-cock, in combination, a valve body having an inlet and an outlet, a float actuated valve for controlling the flow of fluid, an independent throttle valve placed beyond the throttle valve in the direction of flow for restricting the flow of fluid from the float controlled valve and spiral tortuous passage means located beyond the float actuated valve for retarding and silencing the entire flow of fluid from the throttle valve.

3. In a ball-cock, in combination, a valve body having an inlet, a stop valve for said inlet, an outlet chamber, spiral flow-retarding means in said outlet chamber, and means for regulating the flow of fluid from said stop valve to said flow-retarding means.

4. A ball-cock comprising a casing having a water passage, a cut-off valve and a throttle valve for controlling the flow of water therethrough, said throttle valve including a head and stem, a sleeve surrounding the valve head, said sleeve being formed to provide an effective flow space of varying size as the valve head and sleeve move relatively to each other, and a spiral silencing passage beyond said throttle valve.

5. In a ball-cock, in combination, a valve body having a water passage therethrough, said passage including a plurality of separate independent tortuous sub-passages disposed concentrically of each other.

6. In a ball-cock, in combination, a valve body having a water passage therethrough, said passage including a plurality of tortuous sub-passages disposed concentrically of each other, said sub-passages being spiraled in opposite directions.

7. A silencing device for ball-cocks comprising a fluid conduit, and a plurality of separate spiral flow-retarding passages acting in parallel to divide the flow of fluid in said conduit between them, and discharging opposing streams therefrom.

8. A silencing device for ball-cocks comprising a fluid conduit, and a plurality of juxtaposed flow-retarding passages acting in parallel to divide the flow of fluid in said conduit between them, and throttle means disposed immediately above the intake ends of said passages for controlling the flow of fluid.

9. In a valve, in combination, a valve casing having a fluid conduit, and a flow-retarding device in said conduit, including an outer element provided with an external flow-retarding passage and an internal bore partially closed by a head, and an inner element provided with an external flow-retarding passage terminating approximately in the same transverse plane with the passage of the outer element, said inner element being spaced from the head of said outer element.

10. In a valve, in combination, a valve casing having a fluid conduit, a flow-retarding structure in said conduit, a flow-rectifying device disposed near but spaced from one end of said structure, and a valve disposed near but spaced from the other end of said structure.

11. In a ball-cock, in combination, a valve casing, a float controlled valve therein, a tortuous silencing passage in said casing, a throttle valve above said passage, said valve including means to prevent full closing thereof, and a refill opening located alongside the silencing passage.

12. In a ball-cock, in combination, a valve casing, a conical throttle valve therein, a conical seat therefor provided with longitudinal grooves to prevent full closing of the valve, and a member placed in said casing below said valve having spiral silencing passages therethrough.

In testimony whereof, I have signed my name to this specification this 28th day of May, 1929.

HERBERT D. CLEMMONS.

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CERTIFICATE OF CORRECTION.

Patent No. 1,901,633. March 14, 1933.

HERBERT D. CLEMMONS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 119, claim 2, for "throttle" read "float actuated"; and line 122, for "float actuated" read "throttle" and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 25th day of April, A. D. 1933.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)