(No Model.)

W. A. TURNER.

BALL COCK VALVE.

No. 520,149. Patented May 22, 1894.

Fig. 1.

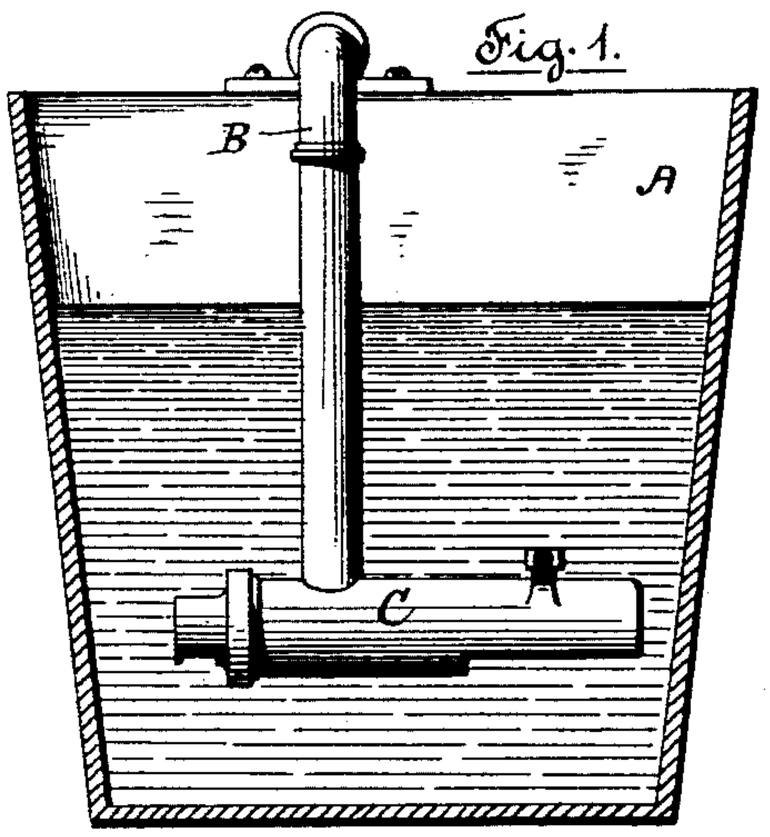


Fig. 2.

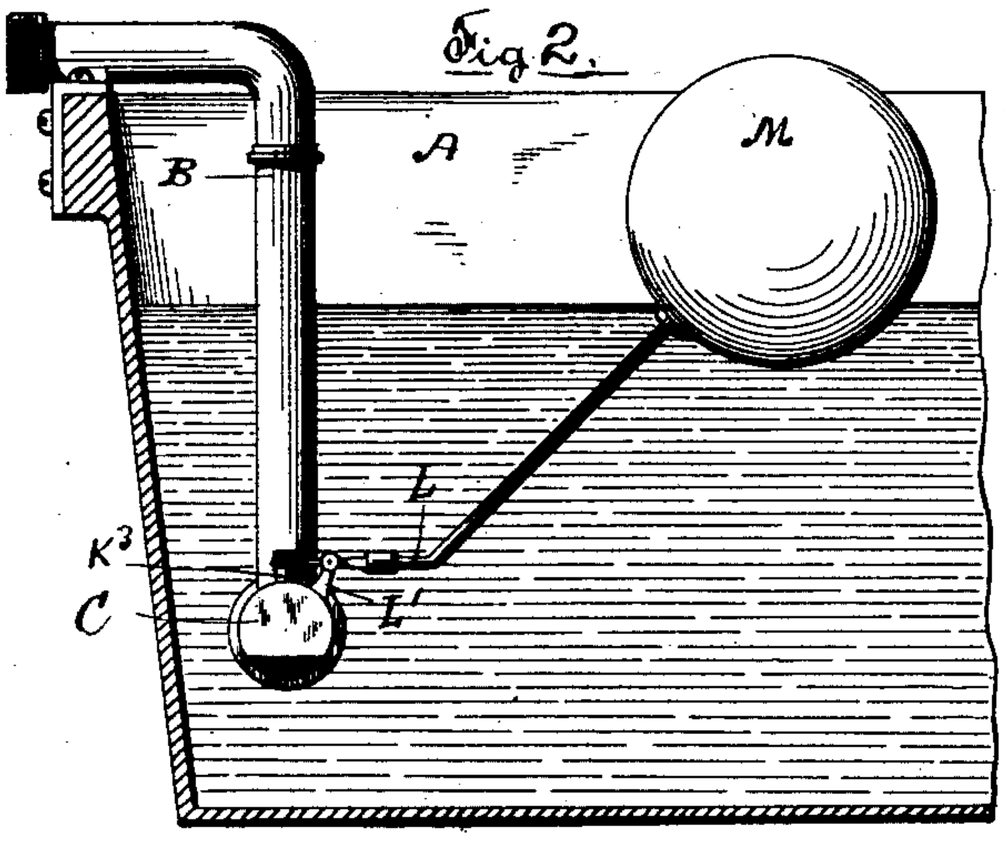


Fig. 3.

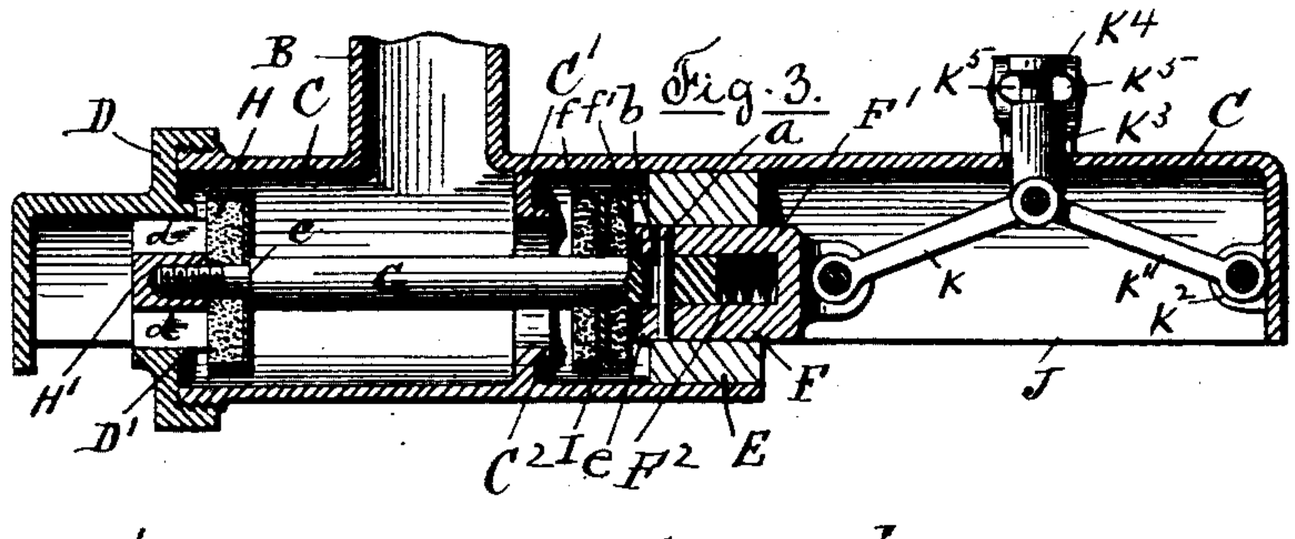


Fig. 5.

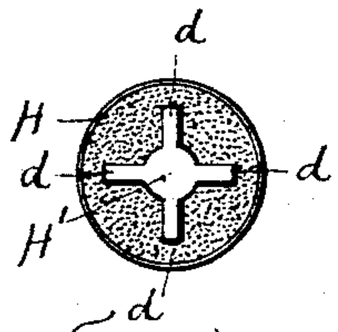


Fig. 4.

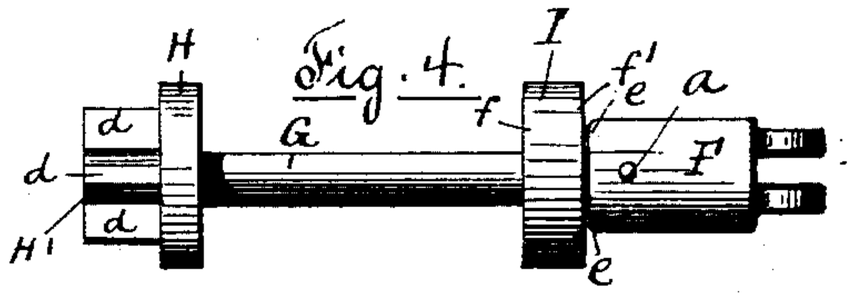
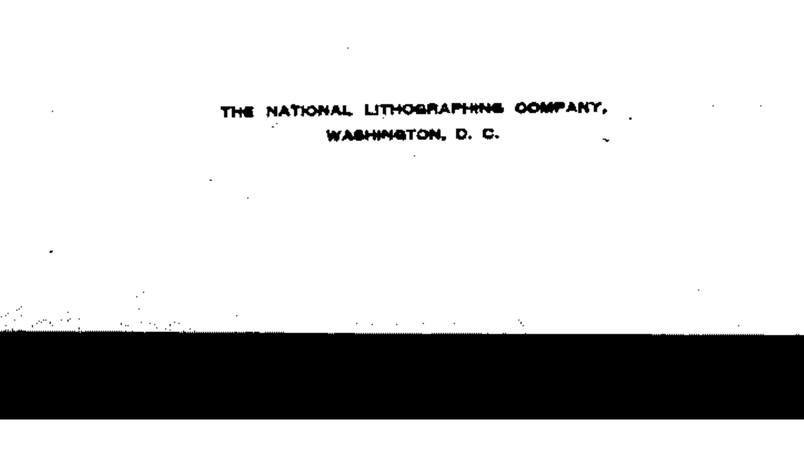


Fig. 6.



Witnesses
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BALL-COCK VALVE.

SPECIFICATION forming part of Letters Patent No. 520,149, dated May 22, 1894.

Application filed October 14, 1889. Serial No. 326,999. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. TURNER, a citizen of the United States, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Ball-Cock Valves, of which the following is a specification, containing a full, clear, and exact description of the nature of my invention, accompanied by drawings, forming a part of the specification and showing a ball-cock valve embodying my invention, and in which—

Figure 1 represents a transverse sectional view of an ordinary flushing tank containing one of my improved ball cock valves. Fig. 2 is a longitudinal sectional view of the same. Fig. 3 is a central, longitudinal sectional view of the valve. Fig. 4 is a detached view of the valve spindle. Fig. 5 is an end view of the same, and Fig. 6 is an end view of the valve.

Similar letters refer to similar parts in the several figures.

The object of my invention is to produce a ball cock valve that can be operated independently of the water pressure and in which the buoyancy of the floating ball shall be applied to force the valve disks upon their seats with increased pressure, and my invention consists in the arrangement and construction of the several parts, as hereinafter described and specifically set forth in the subjoined claims.

Referring to the accompanying drawings, A, denotes an ordinary flushing tank; B the supply pipe through which the supply of water is admitted to the tank.

C denotes the horizontal shell, inclosing the valve chamber and either attached to, or as represented, formed integrally with the supply pipe.

C′ represents a transverse partition having a central circular opening forming a water way and surrounded by a rim C^2 forming a valve seat. Upon one end of the shell is screwed a cap D having a central circular opening forming a water way and surrounded by a rim D′ forming a valve seat.

Within the central portion of the shell C and attached thereto is a bar E provided with a central opening forming the bearing for a sliding spindle, F, having an interior chamber F′, containing the spiral spring F^2 and open at one end to receive the end of the valve stem G, with which it is connected by means of the pin *a* held in the spindle F and passing through the slot *b* in the valve stem G. The tension of the spiral spring F^2 is applied to the end of the valve stem to force it out of the spindle F and the side of the slot *b* against the pin *a*, as represented in Fig. 3, of the drawings. The valve stem passes concentrically through the opening in the diaphragm C′, and is provided with a shoulder *c*, against which the valve disk H is placed and held in position by the nut H′, which is provided with the radial wings *d*, *d*, *d*, with their outer edges bearing against the edge of the opening in the cap D, forming a bearing to support the free end of the valve stem G. The inner end of the spindle F is provided with an annular lip *e*, forming a valve seat and between the valve seats *e* and C^2 is placed a valve disk I having a double face *f* and *f′* to rest upon the opposing valve seats *e* and C^2.

The shell C is cut away at J forming an opening upon the lower side of the shell and within that portion of the shell opposite the opening at J is placed the operative mechanism by which the valve stem G is moved longitudinally and the valve disks carried upon, or removed from their seats in the operation of opening or closing the valve. This mechanism in the present instance consists of the link K pivoted to the outer end of the sliding spindle F and a link K′ pivoted to a lug K^2 projecting from the shell C, the adjacent ends of the links K and K′ being pivoted with a common axis to the link K^3, which is provided at its upper end with a groove forming a neck K^4 to receive the prongs K^5, K^5, of the forked lever L, pivoted in the arm L′ and carrying upon its outer or free end the hollow ball M, which floats upon the water in the tank A and imparts an angular motion to the lever L as the water line in the tank varies, in the usual and well known manner.

In the accompanying drawings the operating parts are shown in their positions with the valve open to admit water through the supply pipe B to the tank A and the ball M

is represented as floating upon the water in the tank at the low water line; as the water line rises the ball M is raised depressing the short link K^3 and straightening the links K, K′, pushing the spindle F into the valve chamber, the tension of the spiral spring F^2 carrying the valve stem G forward and bringing the valve disk I against the valve seat D′ and closing the water passage through the cap D. The continued sliding movement of the spindle F, will compress the spiral spring F^2 and bring the valve seat *e* against the face *f′* of the disk I, carrying the disk against seat C^2 thereby closing the water passage through the partition C′. As the water is drawn from the tank A, lowering the water line, the ball M falls by its own gravity reversing the movement of the spindle F and its connected actuating mechanism and withdrawing the valve seat *e*. The pressure of the water in the valve chamber upon disk I acting against the face *f* will serve to carry the disk away from the seat C^2 thereby opening the water way through the partition C′. The continued reversed movement of the spindle F will bring the pin *a* against the wall of the slot *b* as shown in Fig. 3 of the drawings, and withdrawing the disk H from the seat D′, opening the water way through the cap D. Although the double faced disk I has a slight sliding motion upon the stem G it is not necessary that it be closely fitted upon the stem or that it be packed between the disk and the valve stem, to prevent the passage of water as when the disk is brought against the seat C^2 the seat *e* is pressed against the opposite side or face of the disk preventing the passage of water which may escape around the valve stem. The force exerted by the ball M in closing the valve disks through the intermediate mechanism as shown and described acts to close the disks more rapidly during the first portion of their movement and more slowly, but with an increased pressure at the close of their movement, thereby pressing the valve disks firmly against their seats and preventing the escape of water. This result is accomplished by the action of toggle-joint links K, K′; but it will be observed that so much of my invention as relates to the construction of the valve stem G, spindle F and valve disks H and I, is entirely independent of the method as shown of actuating the same, as any actuating mechanism by which a longitudinal movement can be imparted to the spindle F, will serve to open and close the valve disks upon their seats. The water pressure will be exerted upon the disks H and I in opposite directions, thereby allowing the stem G to be moved independently of the water pressure, and in case of high or moderate pressures the spiral spring F^2 can be omitted as the pressure on the disk H will be sufficient to close the disk upon its seat and hold it in position until withdrawn by the action of the pin *a* in the slot *b* in the stem.

The advantages secured by the use of my improved ball cock valve are as follows: Two water ways are opened affording a double flow of water for the same longitudinal movement of the valve stem required to open one of the water ways; the pressure is neutralized upon the valve disks allowing the valve to be operated independently of the water pressure; the disks are closed consecutively, instead of simultaneously, thereby obviating the necessity of that close adjustment of the valve disks and seats otherwise required; the sliding disk I is carried positively upon its seat and the leakage of water around the valve stem prevented; and an increased pressure is applied to the disks as they are closed upon their seats to hold them firmly in contact with their seats and prevent the escape of water.

What I claim as of my invention, and desire to secure by Letters Patent, is—

1. The combination with a valve chamber having two water ways as described, of a valve stem capable of a longitudinal movement, a valve disk attached to said valve stem, a movable valve disk carried by said valve stem, and a hollow spindle sliding over the end of said valve stem and provided with a valve seat, acting against said movable valve disk to carry it against its seat, substantially as described.

2. The combination with a shell inclosing the valve chamber, and provided with the valve seats C^2 and D′, of a valve stem G, a fixed valve disk attached to said stem, a movable disk carried on said stem and provided with the opposite faces *f*, *f′*, a hollow spindle inclosing the valve stem and provided with a valve seat *e*, and connected actuating mechanism, substantially as described, whereby said spindle is moved on said valve stem and its valve seat brought against said movable disk, thereby carrying said movable disk against one of the valve seats in the shell, substantially as described.

3. The combination with a shell inclosing the valve chamber and having valve seats on opposite sides, of the valve stem provided with a slot *b*, a hollow spindle inclosing the end of the valve stem and carrying a pin *a* passing through said slot in the valve stem, a valve disk attached to said valve stem and arranged to close one of said water ways and a valve disk capable of sliding on said valve and arranged to close the other water way by the action of said hollow spindle, substantially as described.

4. The combination with a shell inclosing the valve chamber, and having two valve seats, of the valve stem capable of an endwise movement, a valve disk attached to said valve stem, a hollow spindle inclosing the end of said valve stem, and being operatively con-

nected as described with said valve stem, and a spring with its tension applied to said valve stem to force it out of said hollow spindle and a loose valve disk carried on said valve stem and interposed between one of said valve seats and said sliding hollow spindle, substantially as described.

Dated at Worcester, county of Worcester, and State of Massachusetts, this 12th day of October, 1889.

WILLIAM A. TURNER.

Witnesses:
E. CONVERSE,
RUFUS B. FOWLER.