W. S. RICE.

BALL COCK.

APPLICATION FILED JUNE 14, 1912.

1,067,273. Patented July 15, 1913.

Fig. 1.

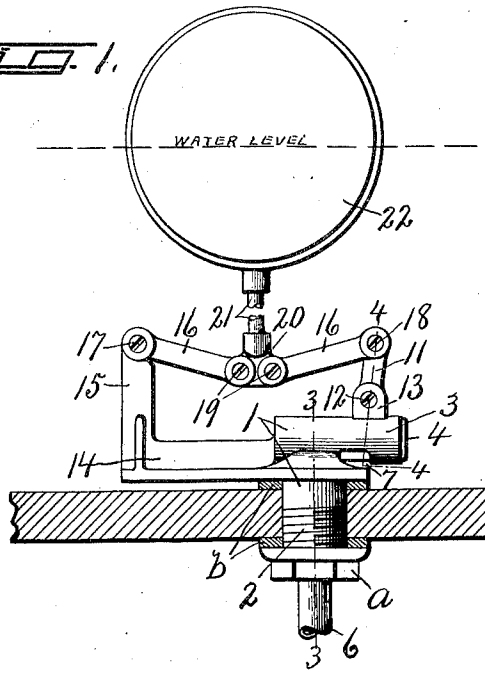


Fig. 5.

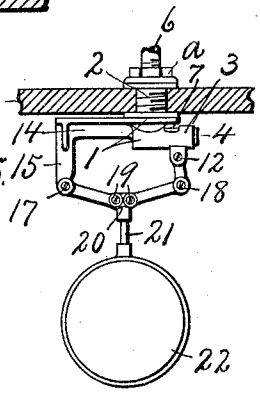


Fig. 2.

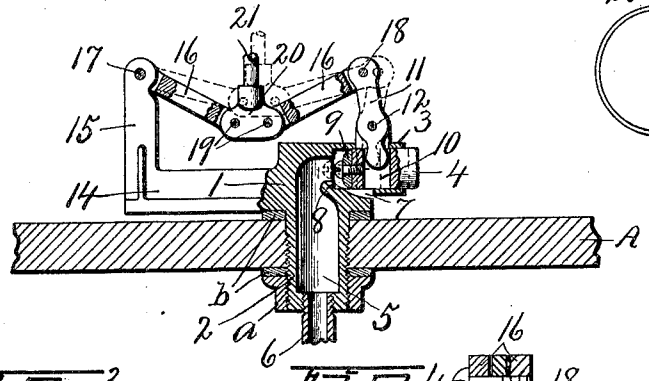


Fig. 3.

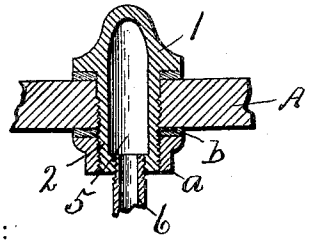
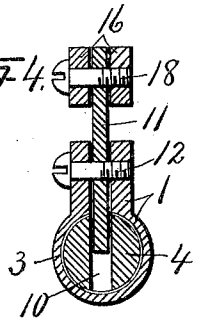


Fig. 4.



Witnesses:
E. J. Staub
H. E. Chase

Inventor
Wm. S. Rice
By Attorney
Howard P. Denison

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM S. RICE, OF ADAMS, NEW YORK.

BALL-COCK.

1,067,273. Specification of Letters Patent. Patented July 15, 1913.

Application filed June 14, 1912. Serial No. 703,693.

To all whom it may concern:

Be it known that I, WILLIAM S. RICE, of Adams, in the county of Jefferson, in the State of New York, have invented new and useful Improvements in Ball-Cocks, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in ball cocks for flush tanks and similar reservoirs in which a predetermined level of water or other liquid is maintained through the medium of a float and suitable connections with a valve in the supply pipe leading to such tank or reservoir. In the use of these ball cocks in flush tanks and similar reservoirs, it is desirable to have the valve located near the bottom of the tank and to superpose the float, but in water feeders for steam boilers and similar uses, it is desirable to have the valve in the top of the boiler and the float suspended therefrom into the water chamber of the boiler so as to be operated upon by the rise and fall of the water level. In all cases, however, the valve must be opened by the recession of the liquid and consequent downward movement of the float and closed by the rise of the liquid and consequent elevation of the float in order to maintain the liquid at a predetermined level.

The main object of my invention is to simplify the action of this type of valve and at the same time to increase its efficiency in opening and closing by causing the float to move in a direct reciprocatory path at substantially right angles to the level of the liquid.

Another object is to render the action of the valve more readily responsive to the action of the float through the medium of a toggle to which the float is directly connected, thereby operating the valve with a minimum degree of power through the medium of a relatively small number of parts.

Another object of equal importance is to enable the valve to be used either side up for flush tanks or boiler feeds without disconnecting any of the parts of the valve.

Other objects and uses relating to specific parts of the device will be brought out in the following description:

In the drawings—Figure 1 is an elevation of my improved ball cock as applied to a flush tank, a portion of which is shown in section, the central portion of the float stem being broken away. Fig. 2 is a longitudinal vertical sectional view of the same ball cock omitting the float. Figs. 3 and 4 are enlarged vertical sectional views respectively taken on lines 3—3 and 4—4, Fig. 1. Fig. 5 is an elevation on a reduced scale of the same device as applied to boiler feeds in which the device is inverted from the position shown in Fig. 1.

This ball cock comprises a valve case —1— having a threaded nipple —2— and a valve chamber —3—, which, in this instance is disposed at substantially right angles to the nipple —2— for receiving a reciprocatory valve or plunger —4—. The nipple —2— is provided with an inlet —5— having one end connected to a supply pipe —6— and its other end communicating with the valve chamber —3— which is provided with an outlet —7— discharging into the tank or reservoir in which the level of the liquid is to be maintained. The valve case —1— is also provided with a valve seat —8— for the inner end of the valve —4— having the usual rubber packing tip —9— for positive closing against the seat when the valve is forced to its closed position. The valve chamber —3— and its valve —4— are preferably cylindrical and of uniform diameter from end to end for economy in manufacture and freedom of movement, the body of the valve being made of brass or equivalent material and is fitted with an easy sliding fit in its chamber —3— so as to open in the direction of pressure of the inflowing liquid. This valve —4— is movable across the outlet —7— and is provided with a vertical slot or opening —10— in which is fitted the rounded end of a rock arm or lever —11—, the latter being pivoted intermediate its ends at —12— to outstanding ears —13— on the valve case —1—. This valve case is provided with a radial arm —14— projecting laterally from the side thereof opposite that in which the valve —4— is located and terminating in an outwardly projecting offset —15—. A pair of toggle links —16— of substantially equal length are pivoted at their outer ends respectively at —17— and —18— to the offset —15— and to the outer end of the rock arm or valve operating lever —11— and extend inwardly toward each other, their inner ends being pivoted at —19— to a suitable head —20—. This head is provided with a threaded socket in which is secured the adja-

cent threaded end of a float stem or rod —21— having its opposite end secured to a suitable float —22— as shown more clearly in Fig. 1.

The distance between the fulcrum of the lever —11— and its point of engagement with the valve —4— is considerably less than the distance between said fulcrum and pivotal connection —18— with the adjacent toggle link —16— for the purpose of increasing the leverage and reducing the power required in opening and closing the valve. The combined distance in direct lines through the pivots —17—, —19— and —18— is less than the distance in a direct line between the pivots —17— and —18— when the valve —4— is moved to its closed position so that when the float is elevated in a direct line or in a direction axially of the rod —21— by the rising level of the liquid, the engagement of the valve with its seat will limit the upward movement of the adjacent ends of the toggle links to a plane at one side; that is, above or below, as the case may be, the direct line between the pivots —17— and —18—, thereby producing a positive closing of the valve when the liquid reaches a predetermined level and preventing the movement of the adjacent ends of the link past such direct line, which would again open the valve. On the other hand as the water recedes from such predetermined level, the weight of the float and its supporting parts is concentrated directly upon the free ends of the toggle links, thereby depressing the same and opening the valve. The inner end of the lever —11— is movable in an elongated slot in the adjacent side of the valve case —1—, said slot being of sufficient length to allow the valve to close positively against its seat, while the outer end of the slot serves as a limiting stop co-acting with the adjacent portion of the lever to limit the opening movement of the valve.

In Figs. 1 and 2, the nipple —2— of the valve case is shown as passed through an aperture in the bottom of the tank as —A— and firmly secured in operative position by a clamping nut —*a*— with suitable packings —*b*— to prevent leakage.

When the device is used in connection with a flush tank or a similar reservoir requiring a float to be superposed, the pivotal connections between the float rod and toggle links are always in a plane below a direct line between the pivots —17— and —18—, the engagement of the valve with the valve seat serving to limit the upward movement of such pivotal connections, the float being spherical and its connecting rod with the toggle links being straight and radial of the float whereby the upward pressure of the liquid on the float causes said float to travel in a substantially vertical line or in a direction axially of its rod —21—. When the device is used, however, to maintain a predetermined water level in boilers, it is usually secured in an inverted position to the top of the boiler with the float depending therefrom as shown in Fig. 5 in which case it is necessary to bring the pivotal connections between the float rod —21— and toggle links to the opposite side of a direct line between the pivots —17— and —18— from that shown in Figs. 1 and 2, and for this purpose I provide the two pivotal connections —19— spaced a sufficient distance apart to enable the head —20— to be rocked at an angle other than a right angle to a direct line between the pivots —17— and —18—, thereby moving the two pivots —19— closer to a medial line between them and thus permitting the adjacent ends of the toggle levers to be rocked through the direct line between the pivots —17— and —18— to the opposite side of such direct line as previously stated. It, therefore, follows that when the water recedes in the boiler, the float and adjacent ends of the toggle levers will gravitate downwardly in a direct line co-axial with the float rod, thereby opening the valve to admit additional water and thereby raise the float until the water assumes a sufficient height to close the valve through the medium of the float actuated by such rising water.

The operation of my invention will now be readily understood upon reference to the foregoing description taken in connection with the accompanying drawing.

What I claim is:

1. A ball cock comprising a valve case having a valve chamber therein, an inlet passage communicating with the valve chamber, an outlet for said valve chamber, a valve movable in the chamber, a valve operating lever pivoted to the valve case and having its inner end engaged with the valve, a fixed projection on the valve case, toggle links pivoted respectively to said projection and to the outer end of the valve operating lever, and a float having a head pivoted to the adjacent ends of the toggle links.

2. A ball cock comprising a valve case having a threaded nipple and a valve chamber at substantially right angles thereto, the nipple having an inlet passage and communicating with the valve chamber, said valve chamber having an outlet, a slide valve movable in the chamber, a valve operating lever pivoted to the valve case and having its inner end engaged with the valve, a fixed projection on the valve case, toggle links pivoted respectively to said projection and to the outer end of the valve operating lever, and a float rod having a head separately pivoted to the adjacent ends of the toggle links.

3. A ball cock comprising a valve case having a valve chamber therein, an inlet passage communicating with the valve chamber, an outlet for said valve chamber, a valve movable in the chamber, a valve operating lever having an end engaged with the valve, toggle links, one of the same pivoted to the valve operating lever, the other pivoted to a fixed bearing, a float and a head operated thereby, said head pivoted to the free ends of the toggle links.

4. Valve operating mechanism for ball cocks comprising a fixed support, a valve operating lever, toggle links between and pivoted to said fixed support and valve operating lever respectively, a float, and a head operated thereby, and separate pivotal connections between the head and toggle links.

In witness whereof I have hereunto set my hand on this sixth day of June 1912.

WILLIAM S. RICE.

Witnesses:
J. L. HENDRICKS, JR.,
L. A. LA FOUNTAIN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."