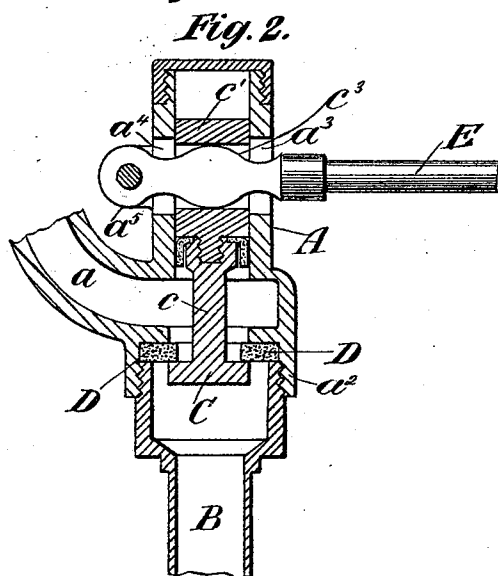
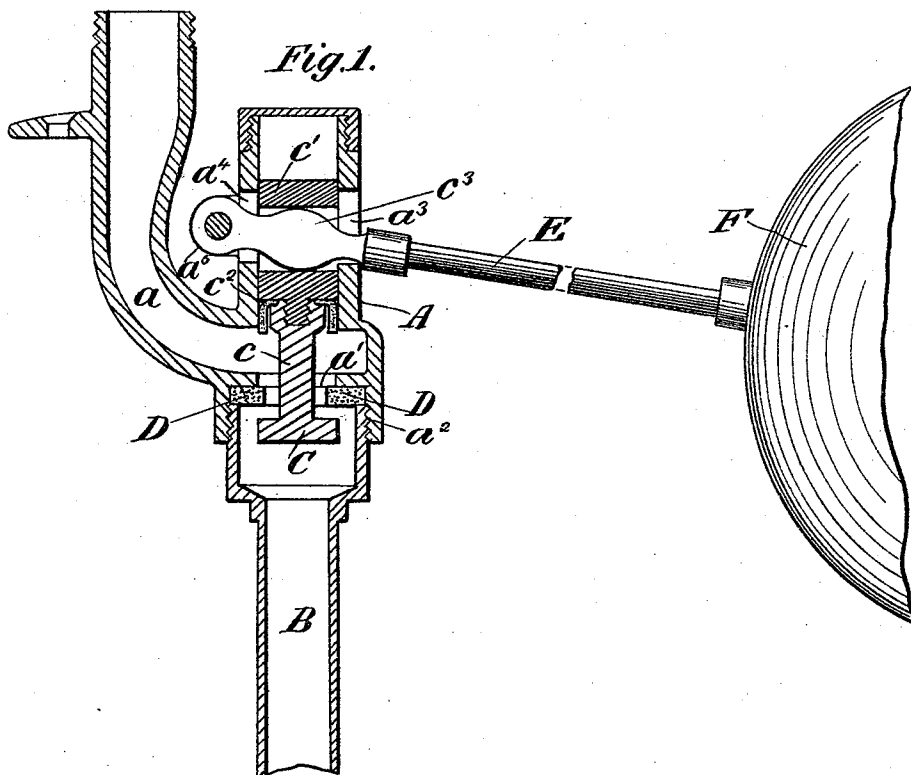


(No Model.)

T. R. KEYWORTH, Jr.  
VALVE FOR WATER CLOSETS, &c.

No. 518,004.

Patented Apr. 10, 1894.



Witnesses:  
George Barry.  
J. Howard Tuttle.

Inventor:  
Thomas R. Keyworth Jr.  
by attorneys  
Brown & Howard

# UNITED STATES PATENT OFFICE.

THOMAS R. KEYWORTH, JR., OF NEW YORK, ASSIGNOR OF ONE-HALF TO  
LUCIEN KNAPP, OF LONG ISLAND CITY, NEW YORK.

## VALVE FOR WATER-CLOSETS, &c.

SPECIFICATION forming part of Letters Patent No. 518,004, dated April 10, 1894.

Application filed February 15, 1893. Serial No. 462,393. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS R. KEYWORTH, Jr., of New York, in the county and State of New York, have invented a new and useful  
5 Improvement in Valves for Water-Closets and Cisterns, of which the following is a specification.

My invention relates to an improvement in valves for water closets and cisterns in which  
10 the valve is arranged to be closed and opened by the rising and falling of a float under the control of the rise and fall of a liquid.

My invention contemplates a valve of the above described character in which there is  
15 an over-balance pressure exerted upon the valve in a direction opposite that in which the liquid is discharged tending to hold the valve to its seat.

A practical embodiment of my invention is  
20 represented in the accompanying drawings, in which—

Figure 1 is a view of the valve and a portion of its operating float in vertical section, the portion of the float being shown in side  
25 elevation, and Fig. 2 is a partial sectional view of the valve, showing the latter closed or seated in distinction from its open position, shown in Fig. 1.

A hollow casing A is provided with an inlet  
30 neck  $a$  at its side and with an opening  $a'$  at its bottom, the latter being in alignment with the interior of the casing A. The casing A is further provided with a depending interior screw-threaded flange  $a^2$  surrounding and spaced  
35 from the inner wall of the opening  $a'$  for the reception therein of the open end of the discharge tube B. The valve C is located within the enlarged upper end of the discharge tube B and its stem  $c$  extends upwardly through  
40 the opening  $a'$  and is provided with an enlarged portion  $c'$  adapted to fit and slide within the casing A. The enlarged portion  $c'$  of the stem may be of the same diameter as the valve C itself and I find it desirable to provide packing  $c^2$  at the lower end of the enlarged portion  $c'$  for making a tight joint between the said stem and the interior of the casing. The valve seat consists of a disk D of suitable yielding material, such for example as leather, and is held in position between  
50 the upper end of the discharge tube C and the face of the casing A around the opening  $a'$ .

It is intended that the opening  $a'$  shall be about the size of the valve C so that the walls surrounding the opening  $a'$  will form an effective support for the seat D when the valve is drawn up against it to make a closure.

The opening in the valve seat D is of less diameter than the valve C, so that when the said valve is closed, as shown in Fig. 2, the  
60 pressure of the water will be exerted upon the surface around the stem  $c$  less than the surface surrounding the upper portion of the stem  $c$ . This will cause an over-balance of pressure, lifting upwardly on the valve against  
65 the lower end of the enlarged portion  $c'$  of the valve stem, the amount of such over-balancing pressure being determined by the size of the opening in the seat D. The enlarged portion  $c'$  of the valve stem is provided with a  
70 slot  $c^3$  therethrough which corresponds with openings  $a^3$  and  $a^4$  in the opposite sides of the casing A. The valve operating rod E is provided with a float F at one end and at its opposite end extends through the openings  $a^3$   
75 and  $a^4$  in the casing and through the slot  $c^3$  in the valve stem and is pivotally secured to a laterally extending lug or ear  $a^5$  on the casing.

In operation, when the ball F is lowered and the valve opened, as in Fig. 1, the water will  
80 rush in through the neck  $a$ , thence around the valve stem  $c$  and valve C into the discharge pipe B and, as it accumulates beneath the ball F, it will gradually lift the latter and it in turn will raise the valve to its seat against  
85 or in a direction opposite that in which the water is flowing past the valve. As the valve reaches its seat, the pressure upwardly upon the valve will be greater than the downward pressure for reasons which have hereinbefore  
90 been set forth and the tendency of the pressure of the water, when the valve is closed, will be to hold the valve tightly seated and prevent any leakage.

What I claim is—

The valve structure comprising a casing  
95 provided with an inletting chamber having a cylindrical extension, an outletting chamber secured to the casing, an opening between the two chambers, a valve seat of disk form  
100 interposed between the adjacent walls of the inletting and outletting chambers around the opening between the two chambers, the opening through the valve seat being of less di-

ameter than the opening through the wall between the inletting and outletting chambers, a valve in the outletting chamber arranged to open in the direction of the flow of the liquid and to close against such flow, the stem of the valve extending through the inletting chamber, a valve operating piston fixed to the stem and adapted to fit the cylindrical extension of the inletting chamber, the said valve  
10 operating disk being of greater diameter than the opening through the valve seat and the float actuated lever connected with the valve

stem to assist in moving the valve toward and away from its seat, the enlarged area of the piston on the valve stem relative to the opening in the valve seat serving to assist in holding the valve closed under the pressure of the liquid in the inletting chamber, substantially as set forth. 15

THOMAS R. KEYWORTH, JR.

Witnesses:

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F. HOWARD TITLAS.