(No Model.)

W. SCOTT.

VALVE FOR WATER CLOSETS, &c.

No. 297,455. Patented Apr. 22, 1884.

Fig. 1.

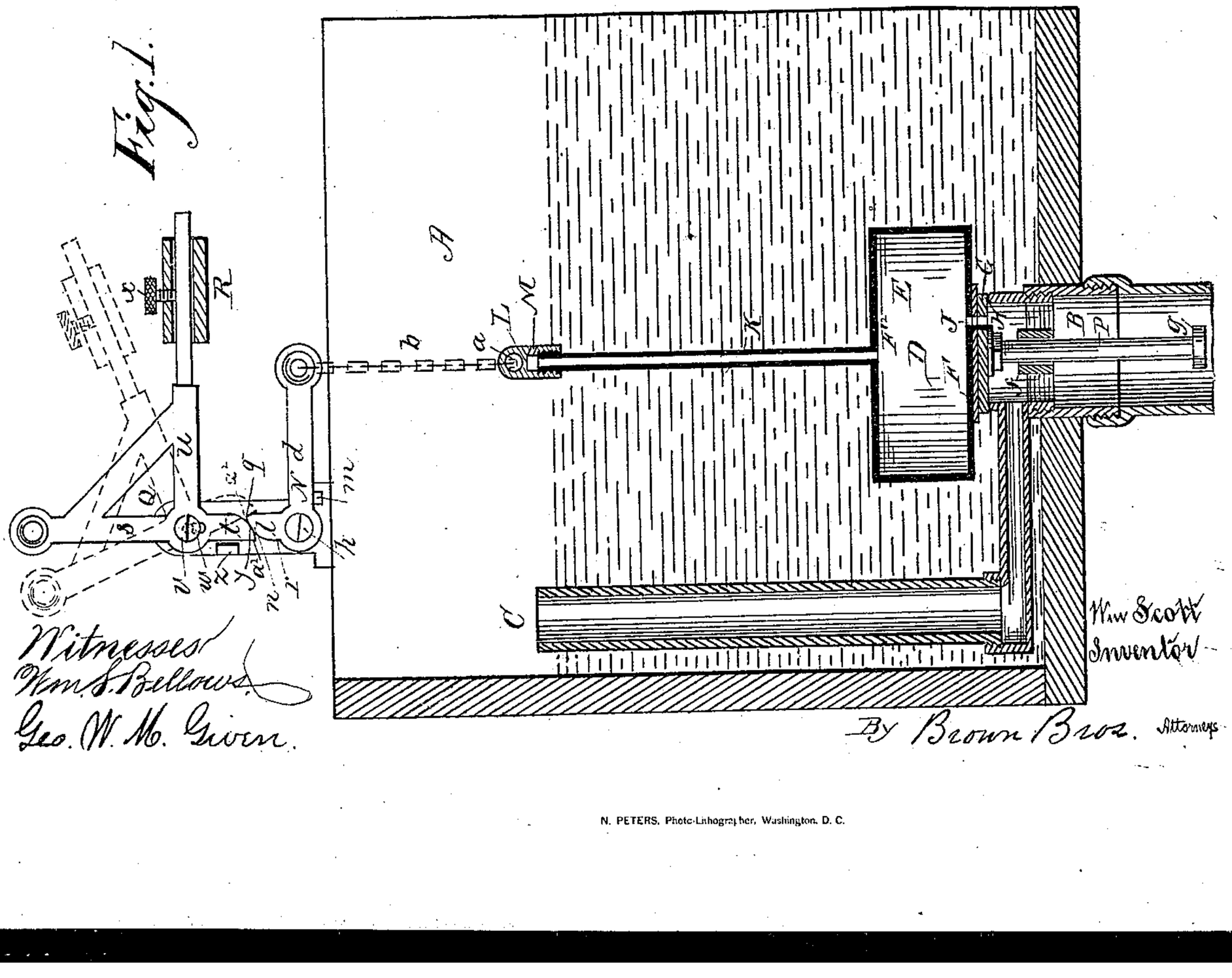

Fig. 2.

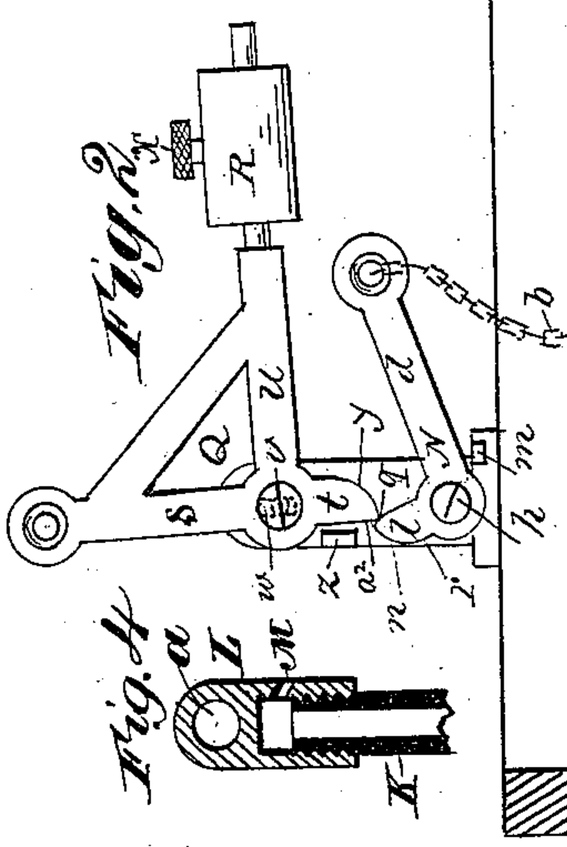

Fig. 3.

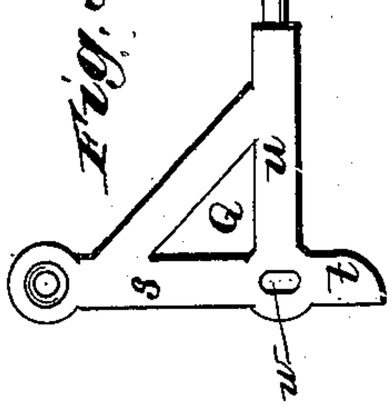

Fig. 4.

Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM SCOTT, OF MALDEN, MASSACHUSETTS.

VALVE FOR WATER-CLOSETS, &c.

SPECIFICATION forming part of Letters Patent No. 297,455, dated April 22, 1884.

Application filed July 21, 1883. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM SCOTT, of Malden, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Valves for Water-Closets, &c., of which the following is a full, clear, and exact description.

This invention relates to valves for the outlet or discharge passages of tanks or cisterns containing water or other liquid, and to the mechanism for operating said valves; and, in substance, it consists, first, in combining with the outlet pipe or discharge of a tank or cistern containing water or other liquid a chambered or hollow valve, which has openings or passages for the ingress and egress of water and air, and is otherwise so constructed and arranged that seated, closing said discharge, it is incapable of floating, but raised from its seat, opening said discharge, it is capable of floating until, from the ingress of water and the egress of air, its floating capacity or power is overcome and it is caused to descend to its seat again, closing said discharge, and the water that had entered the valve while open then passes or discharges therefrom, which thereby renders the valve again capable of floating when it is lifted from its seat, to open said discharge, to be then again closed by the ingress of water and the egress of air, and so on as before; and, second, in combination with a valve mechanism which is constructed and arranged when properly operated to open the valve, and after so opening it leave it free to be closed independently thereof, substantially as hereinafter described.

In the accompanying drawings this invention is illustrated.

Figure 1 is a vertical section of one end of a water-tank, of the outlet and overflow pipes thereto, and of my improved valve for opening and closing said outlet-pipe or water-escape, and an elevation of the mechanism for lifting and opening said valve and allowing it to close. The valve is shown as closed and said operating mechanism in its normal position of rest. Fig. 2 is a similar view to Fig. 1, but showing the valve lifted from its seat and opened and its operating mechanism in its position directly after lifting the valve and just previous to the return thereof in its further movement to its normal position or rest. Figs. 3 and 4 are views in detail, as will hereinafter appear.

In the drawings, A represents a water-tank. This tank has an outlet-pipe or water-escape, B, leading from its bottom, and an overflow-pipe, C, communicating with said outlet-pipe, all as usual in the water system of dwelling-houses, hotels, and other buildings.

D is a hollow or chambered valve, made of sheet metal or other suitable material and of suitable shape, as, for instance, as shown, E being its body, of a round or cylindrical shape, and F F^2 its ends or heads, flat and parallel. The under or bottom head, F, of the valve-case D has a washer or packing, G, of leather or other suitable material, by which the valve rests upon and makes close contact with the end or seat H of the outlet-pipe B opening to the water-tank, and thus said pipe is closed to the escape of water into it from the tank. This seat H is below the water-level of the tank A, and the float, when at rest upon it, is wholly submerged in the water of the tank.

J is a passage leading from the outside to the inside of the valve-shell, through its said washer G, and bottom head, F, and when the valve is closed said passage is in communication with the water-passage of the outlet-pipe.

K is a vertical air-pipe leading through the upper wall, F^2, and from the inside of the valve-case, and to a plane above the established level of the water in the tank, and there it is closed with a screw-cap, L, having a side opening or port, M. This side port, M, of air-passage K has an outward downward incline; and *a* is an eye of the screw-cap connected by a chain, *b*, or other flexible connection to the outer end of an arm, *d*, of a crank or angular lever, N, of the operating mechanism of this invention for the valve D, to be hereinafter described.

P is a central stem projecting downward from the bottom of the valve-shell, and passing through a centrally-located guiding-collar, *f*, of the outlet-pipe B. This stem, at its lower end, has a shoulder or collar, *g*, to limit the upward movement or lift of the valve from its seat upon the outlet-pipe B; and in the operation of the valve said stem and guiding-collar *f* act together to guide the valve in a vertical line.

The vertical air-pipe K and vertical stem P

are preferably in line with each other, and their axes coincident with the vertical axis of the valve-case.

The crank-lever N, having the valve D suspended from its arm *d*, as has been described, turns upon a stationary pin, *h*, and when the lever is in its normal position of rest said arm *d* is horizontal, and its other arm, *l*, is vertical, and the horizontal arm *d* is held from further movement downward by its abutment against a suitably-located stationary rest-pin, *m*. The outer end, *n*, of the vertical arm *l* is made downwardly-rounding or convex, and from its side or edge, *q*, toward the horizontal projecting arm *d* to its opposite side or edge, *r*.

Q is a crank or angular lever having three arms, *s*, *t*, and *u*. The arms *s* and *t* of said crank-lever Q are in the same line, and the arm *u* is at right angles thereto, intersecting them in line with the fulcrum-pin *v* of the lever, and the lever is hung upon said fulcrum-pin by an elongated bearing or slot, *w*, running in the direction of the two arms *s* and *t*. The arm *u* has a weight, R, secured to it by a set-screw, *x*, and otherwise arranged to be adjusted on said arm to increase or decrease its leverage, as may be desired. The crank-lever Q, when in its normal position and at rest, has its weighted arm *u* horizontal and its arms *s t*, which are in continuation of each other, vertical, and the rounded and convex end, *y*, of the lower arm, *t*, of said lever in contact with the rounding end *n* of the vertical arm *l* of the other crank-lever, N, and the crank-lever Q is held in this position by the abutment of its lower vertical arm, *t*, against the stationary rest-pin *z*. The outer end of the upper arm, *s*, is to be connected in any suitable manner for the crank-lever of which it forms a part to be operated—as, for instance, from the seat, or door, or floor of a water-closet, or from a pull-handle, and when so operated it is swung into the position shown in dotted lines in Fig. 1, passing in its said swing or movement by the rounded end *y* of its arm *t* up and over the rounded end *n* of the arm *l* to the other crank-lever N, and finally dropping and coming by the edge or side a^2 of its lower arm, *t*, to a rest against the vertical edge or side *q* of said arm *l* to the other crank-lever, N, when, being free to return to its normal position from the action of its weighted arm *u*, it rocks the crank-lever N as it so returns, and thus through its horizontal arm *d* and chain-connection the valve-shell is lifted, and by the then immediate return of the crank-lever N to its normal position of rest said valve is also immediately released or left free for a return to its seat H.

The swing of the crank-lever Q through the connection attached to its vertical arm *s* is against its weighted arm *u*, and in its said swing its elongated bearing or slot *w* allows it to lift, in order to pass over the rounded end of the vertical arm *l* of the lower crank-lever, N, and after it has so passed over to then drop into a position of abutment against the vertical arm *l* of the under or lower crank-lever, N, and thus, as its said upper crank-lever, Q, returns to its normal position of rest, to rock said lower crank-lever, N, in a direction to lift the valve, and this being accomplished the valve, as before stated, is released or set free to its closing movement, and the crank-levers then come to a rest in their original and normal position for another operation, as before. The valve closed is at rest upon its seat. It is held from rising by the weight of the water above or over it, and the water-passage through its bottom head, F, is in communication with the water-passage of the outlet-pipe or water-escape B. The valve opened is above its seat, in which position the water-passage J, through its bottom head, F, is open for the water of the tank to pass into and fill it, and thereby cause it to drop to its seat and to close upon the outlet-pipe B, when the water which had previously entered the valve-shell D discharges itself through the water-passage J into the outlet-pipe. The valve remains closed during this time, as also afterward, because of the weight of the water above and over it, and until again lifted from its seat and opened, when it again fills with water and drops and closes, as before. The valve emptied of water is filled with air, and being consequently light the instant it is lifted from its seat it floats upward, opening the outlet-pipe B to the free passage of water from the tank, when by the entrance of water through its water-passage, it is rendered heavy, and finally so heavy as to drop to its seat, closing the outlet-pipe to the further escape of water from the tank. The valve so closed then empties itself of water, as before described, and thus is rendered light and capable of floating, when it is again lifted or opened, as has been explained. The water, in entering the valve case or shell through its water-passage, forces the air which is in it out through the air-pipe K, and as the water escapes from the valve-shell the air enters it through said air-pipe. Increasing the diameter of the water-passage of the valve decreases, and decreasing said diameter increases, the time necessary for the filling of the valve, when opened, with water to an extent sufficient to cause it to drop to its seat, and if desired said passage may be adapted to be increased and decreased in its size of opening, for the purpose stated.

The air-pipe K should be of sufficient size for the air to freely pass through it into and out of the valve-shell, and by having its side port, M, made downwardly inclined any water discharging through it will be guided directly into the tank.

The mechanism described for lifting the valve D lifts the valve on its backward or return movement, and this mechanism may be applied to valves constructed and operating otherwise than as herein particularly described; and, again, other arrangements of mechanism for operating the valve D and al-

lowing it to close as described may be used with said valve.

The valve D may be guided in its opening and closing movements in many ways other than that particularly shown and described.

A valve, D, constructed and arranged and operating in a water-tank, A, as has been herein described, obviously secures the discharge of a given quantity of water from the tank, each time the valve is opened the tank being supplied with water in any suitable and in any of the well-known manners.

It is plain from the foregoing description that for the operation of the valve, as explained, communication must be had for the air within the valve to escape from it as water enters it, and that this escape of the air must be at the outside of the water in the tank, and also communication must be had for the water which has entered the valve when opened to pass therefrom when the valve is closed. As particularly shown and described, the said communication for the escape of the air is at and above the water-level of the tank, and the communication for the escape of the water is through the discharge-pipe of the tank; but while both of these forms are efficient it is not intended, however, to limit this invention in these particulars, for said communications may be had in other ways—as, for illustration, by leading the air-pipe from the upper part of the chamber of the valve downward, instead of upward, as shown, and thence to and into the discharge-pipe of the tank, and by providing a pipe separate and distinct from the discharge-pipe, through which to conduct the water from the valve when the valve is closed.

This invention in substance is of a chambered float-valve having air and liquid passages in combination with a tank for water, &c., and its discharge, the whole constructed and arranged and operating substantially as described.

Having thus described my invention, what I claim is—

1. The combination, with the outlet or discharge of a tank for water or other liquid, of a chambered valve which has openings or passages for the ingress and egress of the liquid of the tank and of air, and is otherwise constructed and arranged that seated said discharge is closed and raised said discharge is opened, and from the then ingress of liquid said valve is again seated, emptying its contents, substantially as described, for the purpose specified.

2. The combination, with the seat H of the outlet or discharge B of a tank for water or other liquid, of a chambered valve, D, which has openings or passages J K for the ingress and egress of the liquid of the tank and of air, and is provided with a stem, P, suitably guided, all so that when said valve is seated said discharge is closed and when raised said discharge is opened, and from the then ingress of liquid from the tank said valve is again seated, emptying its contents into said discharge, substantially as described, for the purpose specified.

3. The combination, with the outlet or discharge of a tank for water or other liquid, of a chambered valve which has openings or passages J and K, for the ingress and egress of the liquid of the tank and of air, and the port M of the air-passage made downwardly inclining, and all otherwise constructed and arranged that seated said discharge is closed and raised said discharge is opened, and from the then ingress of liquid said valve is again seated, emptying its contents into said discharge, substantially as described, for the purposes specified.

4. The combination, with a tank for liquid, an outlet-pipe for the liquid, and a valve to said outlet-pipe, of two pivoted levers for operating said valve, one of said levers being constructed to slide at its pivotal point and to act on the other lever to open the valve when moved in one direction and when moved in the other direction to be shifted at its pivotal point, substantially as described.

5. A crank-lever, N, having arm *d*, connected to a valve of a tank for water or other liquid, and arm *l*, rounded at its outer end, in combination with an operating crank-lever, Q, having arms *s*, *t*, and *u*, its arm *t* at its outer end rounded, and an elongated fulcrum-bearing, *w*, substantially as described, for the purpose specified.

6. The pivoted lever N, having long arm *d*, and short arm *l*, rounded at its free end, in combination with a lever, Q, having its short arm *t* rounded at its free end, and formed with an elongated fulcrum-bearing, *w*, whereby said levers are adapted to operate substantially as described.

7. The combination, with a tank for liquid, an outlet-pipe for the liquid, a float-valve for closing said outlet-pipe, provided with an air-inlet pipe and a liquid-inlet, the liquid-inlet being located at such point that when the valve is unseated the liquid will pass from the tank into said valve, and when seated the liquid will pass therefrom into the outlet-pipe of the tank, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM SCOTT.

Witnesses:
EDWIN W. BROWN,
WM. L. BELLOWS.