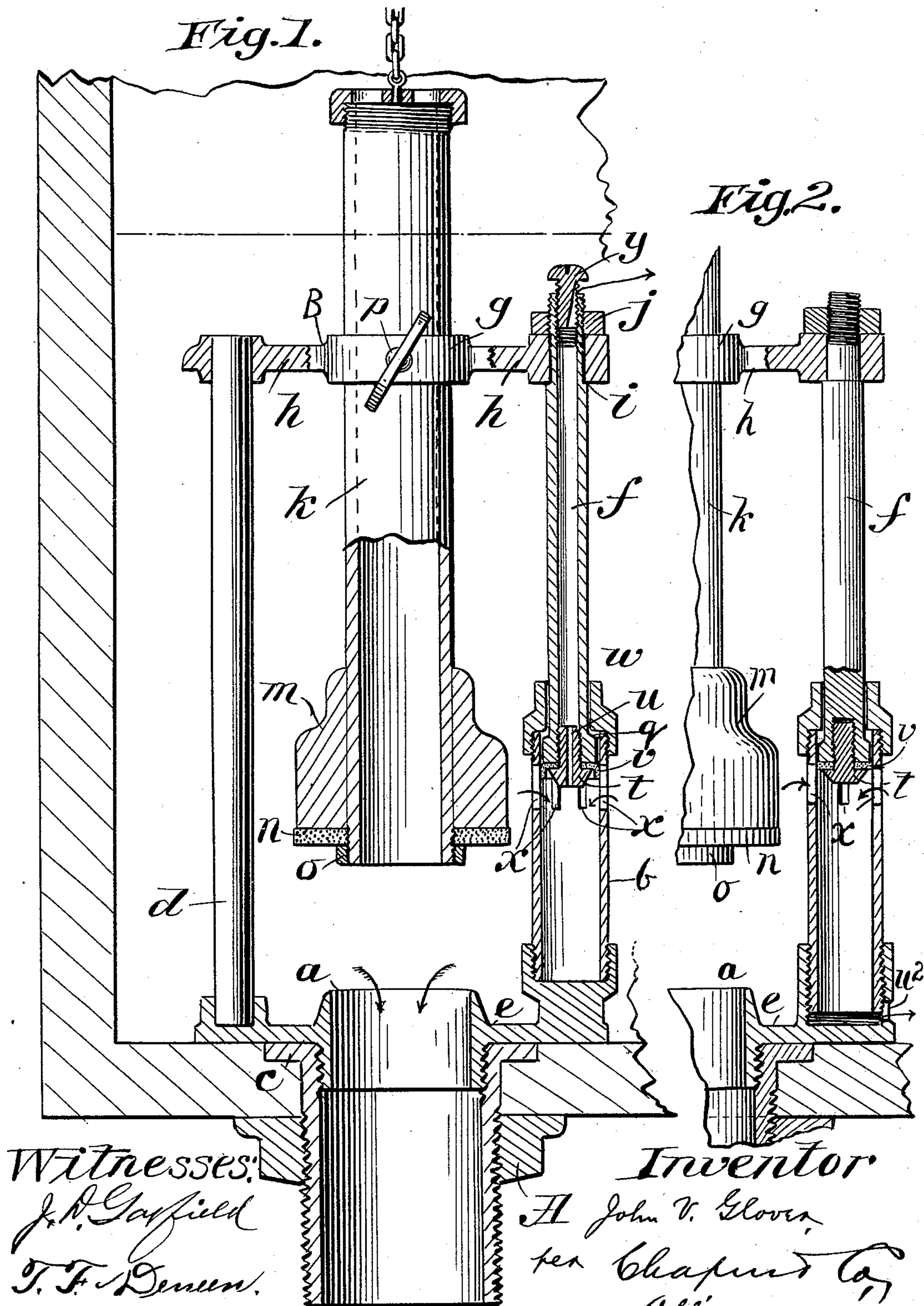


(No Model.)

J. V. GLOVER.  
SLOW CLOSING VALVE FOR TANKS.

No. 478,793.

Patented July 12, 1892.





# UNITED STATES PATENT OFFICE,

JOHN V. GLOVER, OF SPRINGFIELD, MASSACHUSETTS.

## SLOW-CLOSING VALVE FOR TANKS.

SPECIFICATION forming part of Letters Patent No. 478,793, dated July 12, 1892.

Application filed October 14, 1891. Serial No. 408,641. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN V. GLOVER, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Slow-Closing Valves for Tanks, of which the following is a specification.

This invention has for its object the improvement of valves especially designed for use in water-closet tanks, which are of the class known as "slow-closing valves," whereby they have unusual advantages in point of simplicity and economy of manufacture, adaptability for a rapid or slow closing, non-liability of becoming choked up or rendered inoperative by grit or other foreign matter, and in the feature of a more free egress-passage than heretofore usual in valves of this character, and all as will be made fully apparent by the description hereinafter given.

The invention consists in parts formed and combined as will hereinafter be described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is substantially a central vertical section through the valve, the same being shown as open. Fig. 2 is a vertical sectional view of a part of the valve embodying a slight structural modification to be hereinafter referred to.

In the drawings, A represents the tank-section of the valve and egress-opening for the tank constituted by the tubular section which is adapted to pass through the bottom of the tank, receiving therebelow by means of a union-coupling the pipe, as usual. The upper end of said section constitutes the valve-seat *a*. The tank-section A has at diametrically-opposite sides and just below the seat *a* the horizontal extensions *c* and *e*, each provided at its end with an upwardly-extended boss. The boss at the left is shown as socketed and receives therein the rigid vertical post *d*, while the boss at the right, being socketed and screw-threaded, receives the lower externally-threaded end portion of a vertical tube *b*. This tube receives therein a tubular plunger-spindle *f*, the lower end of which is equipped with a piston that is adapted to play vertically in the tube *b*. The upper end portion of the tubular spindle *f* is externally-screw-threaded with a seat, as shown at *i*, below the threaded portion.

B represents a yoke for supporting the valve, the said yoke consisting of a collar *g*, with opposite radially-extended arms *h h* vertically apertured, the one to loosely set about the post *d* and the other to set over the externally-threaded extremity of the tubular spindle *f* and to rest upon the seat *i*. The nut *j*, screwing down about the upper threaded extremity of the spindle *f*, forces the right-hand arm of the yoke and holds the same in confinement against the spindle-shoulder *i*, whereby the spindle is, as it were, a rigid pending extension from the arm of the yoke.

The valve is constituted by a tube *k* of a diameter smaller slightly than the tank-section A, having near its lower end the weight enlargement *m* of a general cylindrical form, the same being usually formed of lead and cast upon the tube *k*, which is of brass. The lower extremity of the tube *k*, which extends below the weight enlargement, is externally threaded, receiving the washer *n* of leather, rubber, or other suitable compressible material about same and to lie closely up against the bottom of the enlargement *m*, the washer being held in place by the confining-ring *o*, which screws upon said tube extremity and clamps inner portions of the washer against the base of the enlargement.

The valve-tube *k* is passed through the ring *g* of the yoke, being secured in its position relative thereto by the set-screw *p* or other equivalent means. The upper end of the tube, even when the valve is in its closed position, stands above the normal level of the water in the tank for constituting the overflow. It is of course much preferable to have the upwardly-extended part of the valve constituted by the tube *k*, as shown, and common in this class of valves; but leaving the capabilities of such part *k* for constituting the overflow out of the question the upwardly-extended part of the valve might be a solid rod.

The piston shown as provided at the lower end of the tubular spindle *f* is constituted as follows: The spindle is internally threaded at and a short distance within its lower end, and at its lower extremity is slightly outwardly enlarged to constitute the shoulder *q*, the diameter of which is somewhat less than the internal diameter of the tube *b*.

*t* represents a plug consisting as to its up-



per portion of a shank externally threaded to screw into the lower end of the spindle and the enlarged lower extremity to lie across the end of the spindle. The plug has a minute opening *u* through it from end to end. The plug clamps between its shoulder and the lower end of the spindle the annular packing *v*, which is of rubber, leather, asbestos, or other analogous material, the flanged edged portions of the packing (which packing is preferably provided) closely hugging the internal wall of the tube *b*, especially as the spindle moves downwardly and forms practically a water-tight partition therein.

*w* represents a thimble internally threaded to loosely surround the tubular spindle *f* or to screw engage the upper externally-threaded extremity of the tube *b*, and constitutes a stop to limit the upward movement of the tube-spindle and piston, being contacted internally upon by the shoulder *g*. The tube *b* toward its upper end, has one or more ports *x* to communicate with the water in the tank. The tube-spindle *f* at its upper end has the screw-plug *y*, one side of which is flattened in a plane which inclines to the axis, so that there may be a greater or lesser opening at the top of the tube-spindle, according as the plug *y* is screwed farther in or out.

The operation of the valve will be plain on an inspection of the drawings, but the same will be briefly described as follows: As the valve is raised through means of the usual chain or other lifting device therefor moving as one with the yoke *B* the left-hand arm *h* slides up on the post *d* and the tubular spindle *f* and piston move upwardly, being guided by the bearing of the piston in the tube *b*, leaving the valve-opening at *a* free for the egress of water from the tank, and it will be noted that the piston is in such a high position relative to the ports *x* that the water from the tank may enter and fill the tube *b*. The force applied to raise the valve having been terminated, the valve will, under its weight, descend in its true vertical line, being guided by the means set forth; but of course the descent will be slow, for the reason that the water in the tube *b* will form a cushion against the free passage of the plunger or tube-spindle and piston, permitting the valve to descend only so fast as the water becomes expelled, which is through the minute opening in the plug *t* and spindle *f* and out of the upper end of the latter, as permitted by the adjustment of the bevel-sided plug *y*. It will be noted that in this valve there is no occasion for any internal spider in the tank-section *A* or spindle internally supported or guided in the tank-section and projected up into the tube *k*, which forms a part of the valve, and which, as usual, also constitutes the overflow or safety pipe for the water-closet tank, and therefore the tank-section *A* and the said overflow-pipe being unobstructed may, in order to secure the discharge of a sufficient

quantity of water in a given time, be of comparatively small diameters. This valve, due to the arrangements of its parts for the manner of operation, substantially as described, requires an unusually small amount of nice and special machine-work, and without detracting from its capabilities for efficient use the parts may be produced at a comparatively low cost.

The grit or foreign matter, which is more liable to be present at the bottom of the tank, is not as likely in this valve as in some others to enter as the deranging factor into the water-cushioning chamber.

The feature of the collar *g*, being adjustable on the upwardly-extended part *k* of the valve, whereby the height of the piston relative to the base of the valve may be variable, is advantageous, as it becomes possible to regulate the extent of upward movement of the valve from its seat before such movement is limited by the lower enlarged part *q* of the spindle *f* contacting with the internal shoulder of the thimble *w*. It will be seen that if the collar *g* is adjusted well up on the tube *k* the piston may be normally maintained in the middle of the water-cushion chamber in tube *b*, when of course the valve cannot be raised as far away from its seat as if the collar *g* were fixed lower on the tube to sustain the piston normally lower in the water-cushion chamber, thereby giving capability to the piston-spindle for a longer play upwardly, and with it the valve, before the enlargement at the piston comes to its limiting abutment at the upper end of the tube *b*.

In lieu of relief of the water from the cushion-chamber upwardly through the spindle which carries the piston, as described, and as shown in Fig. 1, the spindle may be solid, and a minute egress-passage be formed to lead from the lower end of the cushion-chamber in the tube *b*. Thus in Fig. 2 it will be seen that the tube *b* screws only part way to the bottom of the socket therefor formed at the end of the tank-section extension *e*. The wall forming the socket for the reception of the lower end of the tube *b* has a radial perforation *u*<sup>2</sup>. The lower end of the tube may, as the tube is screwed into the socket therefor, leave open or more or less nearly close the said perforation *u*<sup>2</sup>.

I claim—

1. In a slow-closing valve, the combination, with the tank-section formed to constitute the valve-seat and having an unobstructed opening therethrough and an outwardly-extended member, with a vertical tube or cylinder supported on said member, having one or more ports through an upper portion of its wall, of the valve vertically movable to open from and close upon the said tank-section and provided with an upwardly-extended portion which has an outwardly-extended member and which supports a pending spindle and piston that plays in said tube and a passage



leading from the chamber of said tube for the relief thereof, substantially as and for the purposes described.

2. In a slow-closing tank-valve, the combination, with the tank-section having outwardly-projected arms at opposite sides thereof, the one supporting a vertical post and the other a vertical tube, with one or more ports through an upper portion of its wall, of the valve having an upwardly-extended member, with rigid arms outwardly extended therefrom and having a guiding engagement with said post and the other supporting a pending spindle which has at its lower portion a piston that plays in said tube and a passage leading from the chamber in said tube for the relief of the chamber, and means for regulating the degree of freedom of the water-passage from the cushion-chamber through said relief-passage.

3. The combination, with the tank-section and a vertical water-cushion tube supported thereby, of the valve guided vertically to move from and close upon the tank-section, a spindle or plunger and means for securing same adjustably as to height upon the valve and having a piston which plays in said tube, and a passage in communication with the chamber in said tube for the relief thereof, substantially as described.

4. The combination, with the tank-section having an outwardly-extended part and a tube vertically supported thereby, provided at an upper portion thereof with one or more ports, the valve movably guided and having the upwardly-extended spindle-like part and an arm outwardly extended therefrom, a vertical spindle supported by said arm and having its lower end portion exteriorly shouldered and internally screw-threaded, the plug *t*, having the screw-threaded shank and the enlargement at its lower end, a packing applied at the lower end of the spindle and clamped thereon by the union therewith of said plug, the thimble *w*, applied at the upper end of said tube, and the passage communicating with and leading from the water-cushion chamber in the said tube, substantially as and for the purposes set forth.

5. The combination, with the tank-section having an outwardly-extended member *e* and supporting a vertical tube or cylinder having one or more ports at an outer portion thereof, of a valve guided vertically to move from and close upon the tank-section and having the upwardly-extended tube *k*, a spindle or plunger having a piston which plays in said tube and the collar and set-screw for confining the collar on the valve-tube, and said collar provided with an outwardly-extended part which supports the piston-spindle, and a passage in communication with the chamber within said tube, which leads outwardly therefrom for the relief thereof, substantially as described.

6. In a slow-closing valve, the combination, with a tank-section and a vertical water-cushion tube supported thereby, of the valve

guided to move from and close upon the tank-section, a spindle or plunger and means for securing the same adjustably as to height upon the valve and having a piston which plays in said tube, a stop or abutment for limiting the upward movement of the valve and its piston-spindle, and a passage in communication with the cushion-chamber for the relief thereof, and means for regulating the degree of freedom of the water-passage from said chamber, all whereby the play of the valve may be adjusted as to its extent of movement and its rate of movement may be regulated, substantially as described.

7. The combination, with the tank-section having the horizontal arms *c e*, each with an upwardly-extended boss, the one supporting the vertical post *d* and the other the vertical tube *b*, with one or more ports *x*, the valve *m*, with the tube *k*, the collar *g*, having the arms *h h*, one being vertically apertured to have a sliding engagement with the post *d* and the other having rigidly connected thereto the vertical spindle, provided at its lower end with the piston which plays in the tube, the passage leading upwardly through the piston and said spindle, and a regulating device for said passage, substantially as and for the purposes described.

8. In a slow-closing valve, the combination, with the tank-section having outwardly-projected arms at opposite sides thereof, the one supporting a vertical post and the other a vertical tube, with one or more ports through an upper portion of its wall, of the valve having the upwardly-extended tube, with a rigid arm outwardly extended therefrom and being vertically apertured to fit and be guided by said post, and another outwardly-extended arm, also vertically apertured, a spindle having at its lower portion a piston which plays in the said tube and which has its upper portion externally screw-threaded with the shoulder *i* and which threaded portion is upwardly passed through said second-named arm and the confining-nut *j*, and a relief-passage leading from the chamber in said tube, substantially as and for the purposes set forth.

9. In a slow-closing valve, the combination, with the tank-section having an outwardly-extended member and a vertical tube supported thereon, which is provided with one or more ports through an upper portion of its wall, of the valve having the upwardly-extended spindle-like part provided with a rigid outwardly-extended arm, a tubular spindle vertically supported by said arm and having at its lower portion a piston which fits in said tube, a passage leading through the said piston and in communication with the passage through the spindle, and the tapered plug *y*, applied at the upper end of said spindle, substantially as and for the purposes described.

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Witnesses:

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