(No Model.)

P. HARVEY.

CLOSET FLUSHING VALVE.

No. 375,353. Patented Dec. 27, 1887.

Fig. 1.

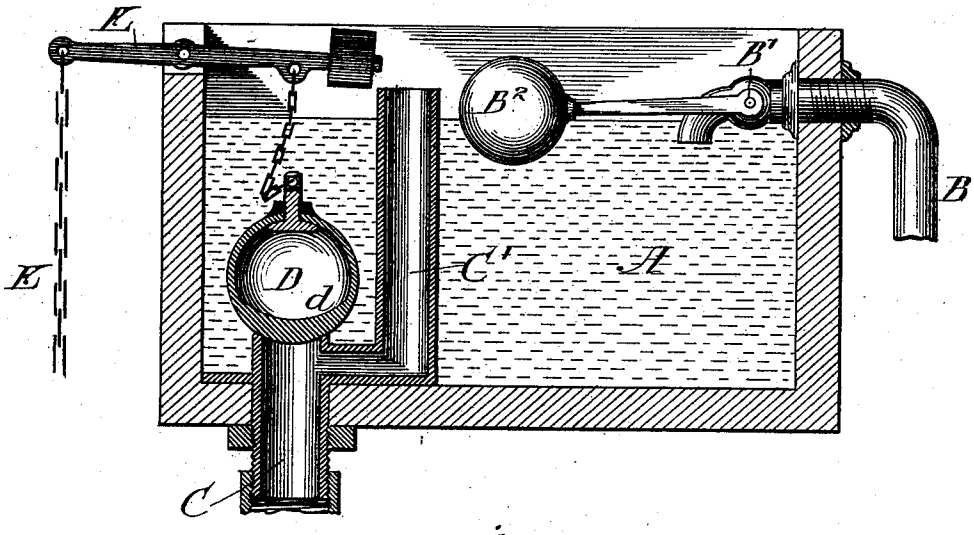


Fig. 2.

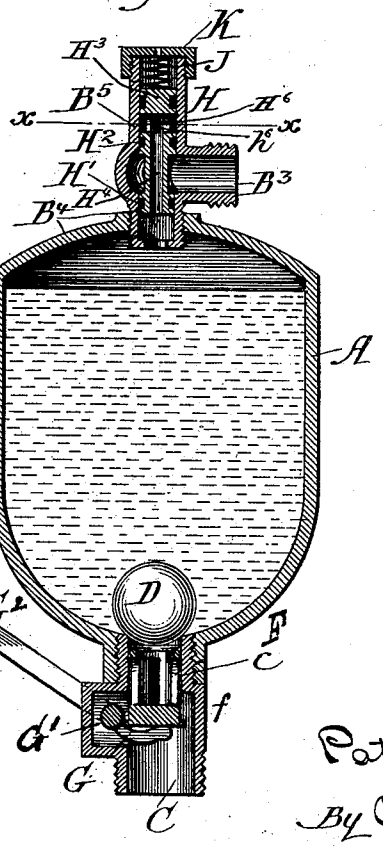


Fig. 3.

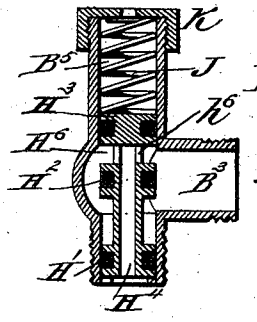
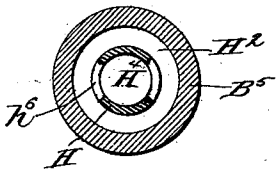


Fig. 4.



Witnesses:
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UNITED STATES PATENT OFFICE.

PATRICK HARVEY, OF CHICAGO, ILLINOIS.

CLOSET FLUSHING-VALVE.

SPECIFICATION forming part of Letters Patent No. 375,353, dated December 27, 1887.

Application filed January 24, 1887. Serial No. 225,370. (No model.)

To all whom it may concern:

Be it known that I, PATRICK HARVEY, a citizen of the United States, residing at Chicago, in Cook county, in the State of Illinois, have invented a certain new and useful Improvement in Closet Flushing-Valves, which is fully described in the following specification, reference being had to the accompanying drawings, forming part thereof.

Figure 1 is a vertical longitudinal section of a flushing-tank and the valve which controls the outflow therefrom located therein. Fig. 2 is a similar vertical section of the flushing tank or reservoir and its controlling eduction-valve, said tank being fully inclosed and designed to be operated under pressure, and having a pressure-regulator attached thereto. Fig. 3 is a detailed axial section of a pressure-regulating device, shown in position to admit water to the reservoir. Fig. 4 is a section through line *x x*, Fig. 2.

A is the tank; B, the supply-pipe leading thereto, controlled by the valve B′, regulated by the float B^2.

C is the flushing-pipe leading from the tank; C′, the overflow-pipe within the tank, connected with said flushing-pipe. D is a float-valve. As illustrated, it has a cylindrical form. This is not essential to its operation.

E is a weighted lever which by suitable connections operates the valve D.

I will describe the operation of this valve first as shown in the open tank in Fig. 1. The valve D is light enough to float upon the water, but when it is seated over the mouth of the flushing-pipe it is exposed to the downward pressure of the water over an area equal to its greatest plane diameter and receives the upward pressure or buoyant effect of the water over an area which is the only difference between the area of the mouth of the flushing-pipe over which it is seated and its greatest plane diameter, and the specific gravity of said valve is such that this difference, which is the net buoyant effect of the water when the valve is seated, is not equal to the downward pressure of the water over the area of the mouth of the flushing-pipe, so that the valve when once submerged and seated is held upon its seat notwithstanding its capability of floating. In this position it is represented in Fig. 1. When thus seated, it shuts off the supply of water from the flushing-pipe and closet, and when the closet is operated and it is desired to admit the flushing-water thereto the lever E, being operated by any convenient means, as by the pull-chain E′, will lift the valve D off its seat over the mouth of the flushing-pipe a sufficient distance so that the inflowing current of water under it and between it and its seat will not be able to draw it back again onto said seat, and, being thus exposed to pressure upon all sides, it will immediately operate as a float, rising to the surface of the water as it is exhausted through the flushing-pipe until it becomes in close proximity again with its seat over the mouth of the flushing-pipe, whereupon it will be drawn downward slightly against the buoyant effect of the water by the inflowing current, and will therefore seat over the mouth of the pipe, and, having seated, it will be still more firmly held upon its seat by the water-pressure, and the tank will again immediately fill from the supply-valve until that is closed by the action of the float B^2 in the usual manner. In order that the float-valve D, after having left its seat and risen to the surface of the water, as described, may with certainty again reach its seat as the water falls, the connecting-chain between the said float-valve and the lever E should be no longer than is absolutely necessary, so that as the water falls the float-valve resting on its surface will take up the slack in the chain, thereby becoming suspended directly underneath its connection with the lever, which is vertical above the center of the flushing-pipe, whereby said valve will be caused without any uncertainty to rest upon the mouth of the pipe and not fall aside from it as the water allows it to reach the proper level to seat. In order more perfectly to accomplish the same result, and in order to cause the valve always to seat with the same portion of its surface in contact with its said seat, I prefer to weight the lower portion of the valve in the vicinity of the surface which is to come into contact with the valve-seat, so that that portion will naturally be the lower portion, and as the valve floats in the water and descends with it it will therefore be caused to reach its seat in the position desired

and described. Such weighted portion is described in Fig. 1 by the letter *d*.

The form shown in Fig. 2 involves two variations from the structure which I have above described, and which is illustrated in Fig. 1:

First. The water-reservoir in Fig. 2 is inclosed and the water therein is supplied under pressure, and the air above the water is compressed by the water which is thus forced into the chamber, and which, reacting from such compression, serves to eject the water when the valve D is opened.

Second. The said valve is removed from its seat by a thrust from beneath, effected by the piston-valve F, which fits closely in the passage *c*, forming the induction-mouth of the flushing-pipe C. Said piston-valve is hollow and forms, in effect, a cup or chamber at the top, its upper edge coming in contact with and lifting the valve and having the lateral ports *f*, which open into the reservoir when the piston is at its highest point, as when it has lifted the valve D, and which open into the flushing-pipe when the piston is at its lowest point, as when the valve is upon its seat. This piston-valve F is operated in any convenient or familiar manner, as by the lever G, rocking upon the pivot G′, suitably boxed and packed in the flushing-pipe and operated by the lever-arm G^2, outside of the said pipe, connected to a suitable pull-chain, E′.

In this construction the operation is as follows: When the chamber is full and the valve upon its seat, as illustrated in Fig. 2, and it is desired to flush the closet, the pull-chain E′ being operated, the lever G actuates the piston-valve F upward, first causing its ports to be covered by the surrounding wall of the passage *c*, then causing the upper edge of said piston-valve to engage the float-valve D and lift it forcibly from its seat a short distance, sufficient only to uncover the ports *f* at the upper end by causing them to pass above the valve-seat, and thereby admitting the water into the cup or chamber of the piston F. By this means the pressure is equalized upon both sides of the float-valve D and it will immediately rise to the surface of the water; but the piston-valve F will now as completely close the mouth of the eduction-pipe as it was before closed by the float-valve D, and this will continue to be the condition of the device so long as the lever G is held in the position to which it was moved by the pull-chain E′ when it lifted the valve D from its seat. As soon as the pull-chain is released the pressure of the water upon the valve F will force it back to the position wherein it is shown in Fig. 1, and the float-valve D, being now at the surface of the water, no longer obstructing the mouth of the flushing-pipe, the water will escape through the piston-valve F out through its ports *f* and pass to the closet. This process will continue until the water falling in the chamber brings the float-valve D again down upon the mouth of the flushing-pipe, where it will be immediately seated, as described in respect to the form shown in Fig. 1, by the friction of the outflowing current of the water, and this having occurred the pressure of the water will hold it still more firmly upon its seat and the chamber will again fill from the supply-pipe. The chamber in the piston F is so small that it will fill almost instantly, so that the form herein described is adapted to be operated either by the pull or by connection with the seat.

At the top of the chamber A in Fig. 2 is located the supply-pipe, which is connected with the pressure-regulator. The form of this pressure-regulator is substantially as described in the patent granted to me May 9, 1882, No. 257,697; but I will herein describe it sufficiently to show its operation in connection with the other devices. B^3 is the induction-pipe. B^1 is the discharge-pipe into the reservoir. H is a piston-stem playing in the chamber B^5, laterally to which is the induction-pipe B^3, and at the end of which is the discharge-pipe B^4. The said piston has rigid with it three pistons, H′, H^2, and H^3, which are provided with the proper packing in the position shown in Fig. 2. One of the said pistons, H′, is between the entrance of the pipe B^3 and the discharge-pipe B^4, cutting off communication in that direction. Another of said pistons, H^2, cuts off connection between the pipe H^3 and the chamber B^5 in the other direction.

Between the pistons H^2 and H^3 is an annular passage, H^4. Longitudinally through said piston-stem is a central passage, H^6, connected by ports h^6 with the annular passage H^4, and leading thence to the end of the piston-stem and opening beyond the piston H′ into the discharge-pipe B^4. Beyond the piston H^3 is located the spring J, which acts longitudinally against said piston, and is stopped by the cap-nut K, which not only serves the purpose of a stop for said spring, but also closes the end of the chamber B^5. When the water is drawn from the chamber A and the pressure upon the piston H′ is thereby diminished, so that it is less than the pressure exerted in the contrary direction by the spring J, said spring will force the piston-stem with all its pistons or valves inward or downward toward the chamber, bringing the piston H^2 to the position shown in Fig. 3 and allowing the water from the supply-pipe B^3 to gain access to the annular passage H^6, and thence, by the way of the ports H^6, the longitudinal passage H^4, and the discharge-passage B^4, into chamber A. This process of supply will continue until the pressure within the chamber is again sufficient to compress the spring J by forcing the piston-stem outward and upward until the piston H^2 is again in the position shown in Fig. 2, cutting off connection between the supply-pipe B^3 and the annular passage H^4. The pressure which will be thus obtained in the chamber A will be determined by the resistant pressure of the spring J, and this may be regulated and adapted to the entire device, and to

the particular situation and character of the closet to which it is to be attached by means of the cap-nut K, which may be screwed down on the end of the chamber b^5, so as to compress the spring J to any desired degree.

In order that there may be no compression of air occurring between the cap-nut and the piston H^3, an air-vent should be made either in the cap itself or laterally through the wall of the chamber H^5. The latter position I consider preferable, because by leakage some of the water may pass the piston H^3 into the space where the spring J is located, and there should be, therefore, a waste-duct in connection with that portion of said chamber to carry off the water, and this waste-duct can be made also to serve as an air-vent; but in order to act as a convenient waste connection it should be lateral, and not at the upper end.

I do not limit myself to this particular form of pressure-regulator, as any other convenient form may be connected with the chamber A, wherein is the float-valve D, in the manner and for the purpose described.

I claim—

1. In combination with the tank, the flushing-pipe leading therefrom, the valve D, lighter than water and adapted to seat over the mouth of the flushing-pipe, the piston F, operating underneath the valve to force it from its seat and having a chamber, F′, opening upward, covered by this valve, and having also the ports *f*, opening into the tank when the piston is in a position to hold the valve D off the seat, whereby water from the reservoir is admitted under the valve and the pressure upon said valve is equalized and it is caused to rise to the surface of the water in the tank, substantially as set forth.

2. In combination with the tank, the flushing-pipe leading therefrom, the valve seating over the mouth of the flushing-pipe, having specific gravity less than water, the piston F, playing underneath the valve in the mouth of the flushing-pipe and having a cavity opening upward and covered by the valve, and having ports leading into said cavity, which are uncovered and open into the tank when the piston is at its highest and into the flushing-pipe when it is at its lowest, and means, substantially as described, whereby said piston is forced up against the valve, lifts it from its seat, and is afterward allowed to fall, substantially as set forth.

3. In combination with the tank completely inclosed except as to its induction and eduction passages, the valve D, located within the tank, adapted to seat over the mouth of the eduction-passage, and made lighter than water, the piston F, located in the eduction-passage and articulating with the valve D, and forming a chamber between said valve and the remainder of the eduction-passage, said piston being adapted at its highest position to hold said valve off its seat and close the eduction-passage and at its lowest position to unclose the eduction-passage, substantially as set forth.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 19th day of January, 1887.

PATRICK HARVEY.

Witnesses:
CHAS. S. BURTON,
FRANCES W. PARKER.