(No Model.)

P. HARVEY.

SUPPLY VALVE FOR CLOSET TANKS.

No. 501,507. Patented July 18, 1893.

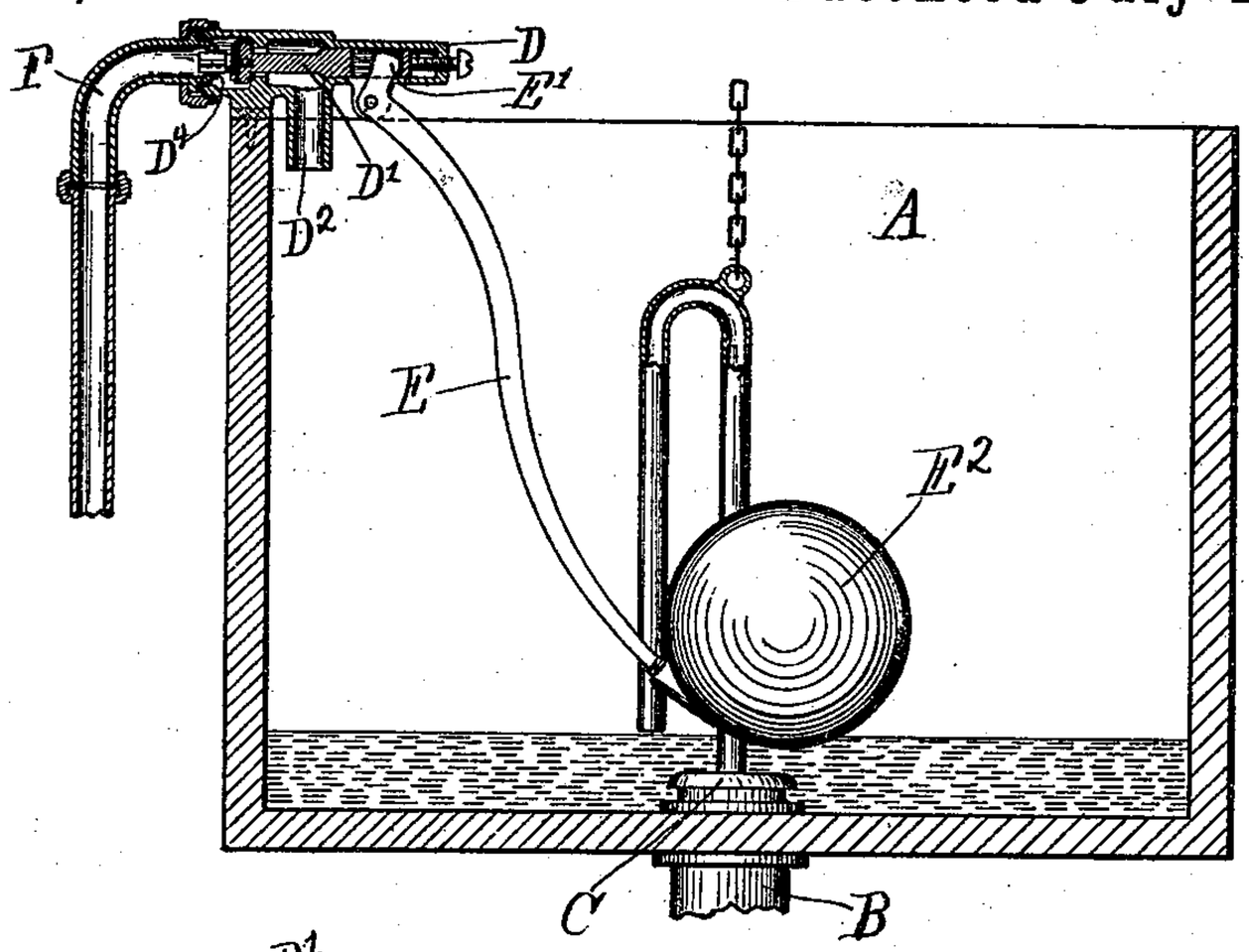

Fig. 1.

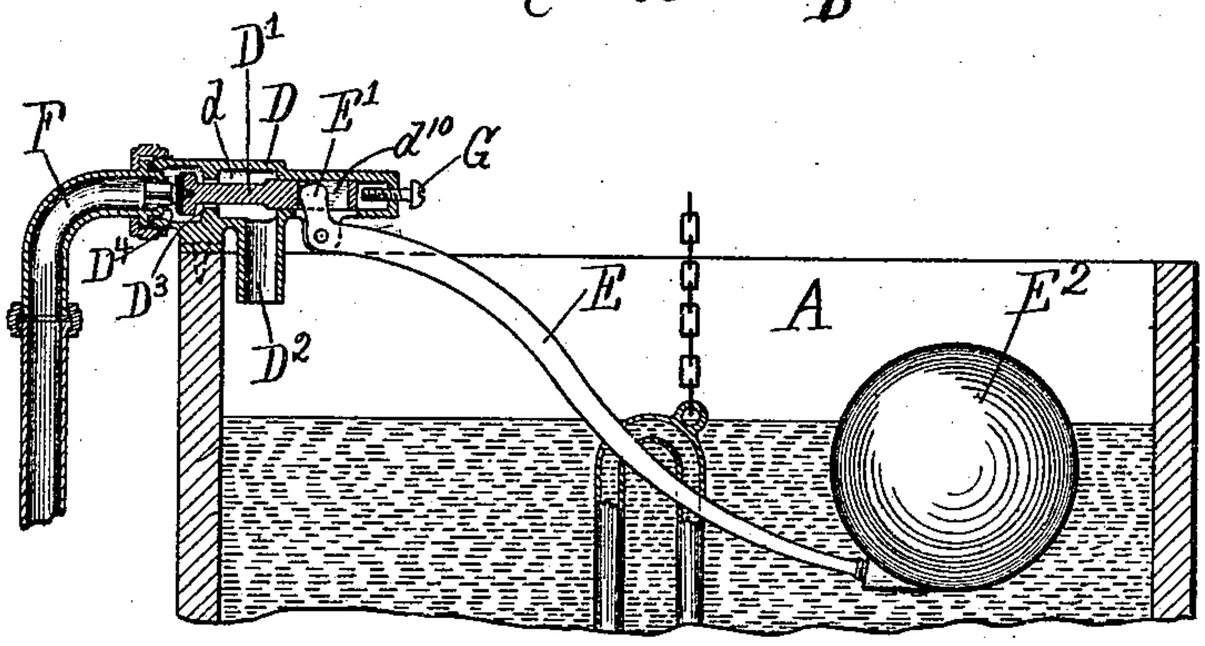

Fig. 2

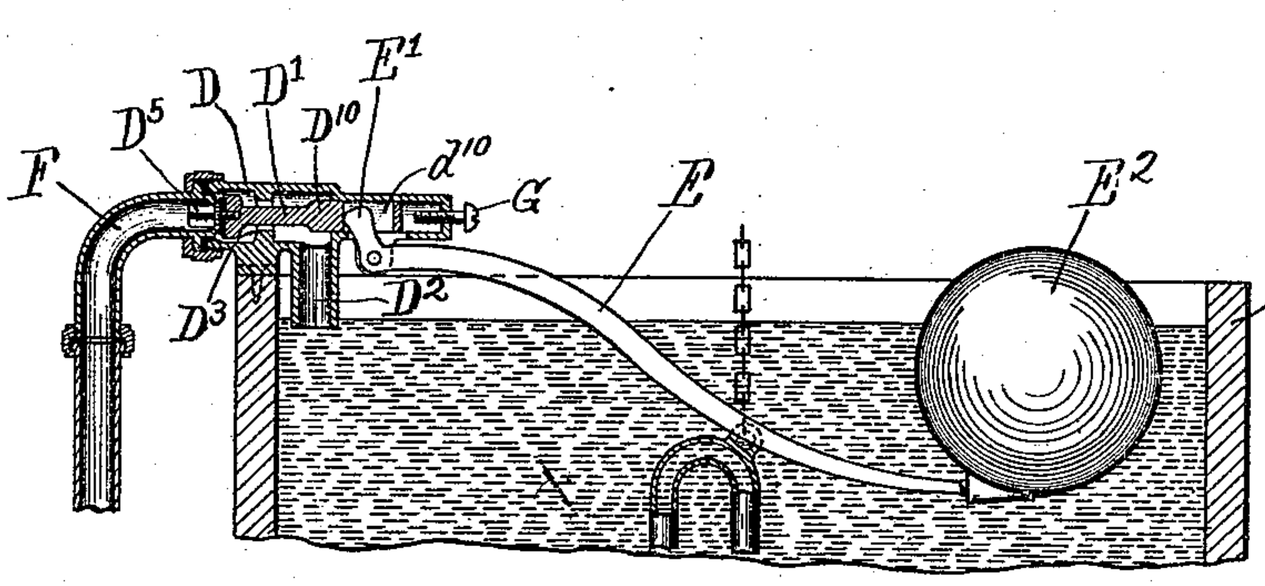

Fig. 3.

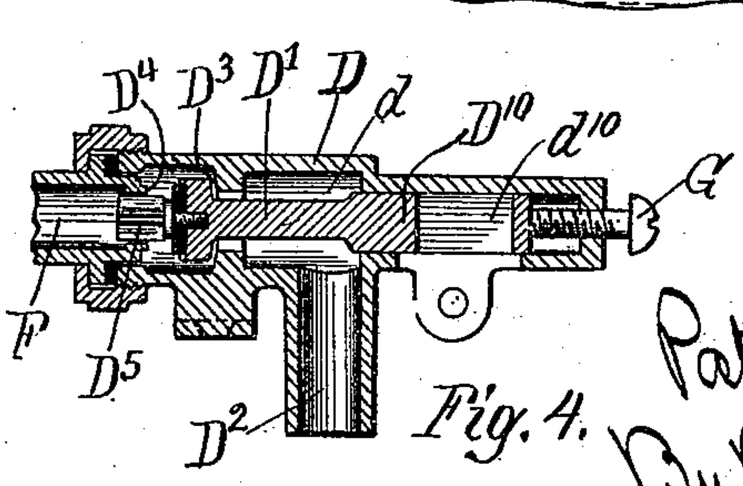

Fig. 4.

Witnesses:
E. T. Wray.
Jean Elliott

Inventor
Patrick Harvey
By Burton & Burton
his attys

UNITED STATES PATENT OFFICE.

PATRICK HARVEY, OF CHICAGO, ILLINOIS.

SUPPLY-VALVE FOR CLOSET-TANKS.

SPECIFICATION forming part of Letters Patent No. 501,507, dated July 18, 1893.

Application filed November 2, 1892. Serial No. 450,714. (No model.)

To all whom it may concern:

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

This invention relates to valves which are designed to control automatically the supply of water to closet or urinal flushing tanks, and it is particularly designed to be used in connection with periodic flushing devices which are operated siphonically, and depend for the period intervening between successive flushes upon the rate at which the tank fills up to the level necessary to prime and operate the siphon. This valve, however, is not limited in its use to such combination.

Figure 1 is a vertical section through a tank provided with my improved supply valve, and having a siphonic discharge or flushing valve such as is adapted to produce periodic flushing action. The supply valve is shown in position occupied during the filling of the tank, and in the interval between periodic flushes. Fig. 2 is a similar view showing the parts in the position occupied at the instant the siphon is primed and siphonic action commences. Fig. 3 is a similar view showing the action which would occur in case of stoppage of the flushing pipe, in which case the supply valve is automatically shut off and overflow of the tank prevented. Fig. 4 is an enlarged vertical section of the valve.

A is a tank; B the flushing pipe leading therefrom.

C is a simple and familiar form of siphonic flushing valve, that is to say, the valve which controls the outflow from the tank having connected with it, a siphon which may afford the outflow without lifting the valve when the siphon is primed by the rise of water in the tank.

D is the body of my improved supply valve, which is shown mounted upon the edge of the tank in a familiar manner.

D′ is the valve proper. The valve body D has the discharge passage D^2 which leads from the valve chamber *d*. This chamber is extended beyond the discharge passage to form the cylindrical guide bearing or seat for the stem D^{10} of the valve D′, and to permit the introduction of the end E′ of the lever E to operate the valve.

E^2 is the customary ball float secured at the opposite end of the lever E.

It is not essential that the stem D^{10} should fit water-tight in the cylindrical seat because it is immaterial whether the water escapes around that stem and through the opening in the valve body, through which the end E′ of the lever E protrudes, or escapes through the discharge passage proper, since in either case it enters the tank, and in either case the seating of the valve would prevent or limit such discharge.

Two seats are provided for the valve D′; D^3 formed on the body proper, and the other D^4 formed on the end of the elbow coupling F, which is the supply passage, and which is coupled to the valve body in a familiar manner. It will be understood that the portion thus joined by the coupling to the valve body is in effect a part of the valve body, and only made in a separate piece for convenience of introducing the valve, whose head, or the valve proper, when the parts are assembled, stands between the two seats, and would prevent its being introduced into position unless the body were divided between those seats, which is the construction described. The valve has a triangular guide stem D^5 protruding through the valve seat D^4, so that it is guided accurately to its seats without regard to the accuracy of the fitting of the cylindrical stem D^{10}. The segmental spaces around the triangular stem D^5 within the seat D^4 are sufficient to permit the freest ingress of water which is deemed necessary to afford a sufficiently rapid supply. Through the end of the body opposite the elbow fitting F, I insert a set-screw G which protrudes into the cylindrical chamber in which the stem D^{10} of the valve plays and constitutes an adjustable stop to limit the movement of the valve in that direction. This screw may be set so as to permit the valve head to come fully to the seat D^3, or to stop it at any distance short of the seat and permit the entrance of water past the valve when it is as near as it can approach to this

seat, and the distance at which the valve is thus arrested short of the seat determines the rate at which the water will enter.

The operation of this device, when used in combination with the siphonic flushing discharge from the tank, is as follows: Assuming first that the tank has just been evacuated through the siphon down to the point at which the siphon has been broken; that is, the water level having fallen below the mouth of the shorter limb of the siphon, the adjusting screw G will be set to regulate the inflow of water according to the interval desired between successive flushes. The water is therefore entering slowly past the valve, and the water level gradually rising in the tank. When it has risen high enough to lift the ball float operating the lever to which it is attached, that lever will first move without actuating the valve through whatever space may be allowed in the slot d^{10} in which the end E′ of the lever plays, and when that limit of play is reached further rise of the ball, as the water rises in the tank, will move the valve away from the seat D^3, increasing the opening through which the supply enters. The parts will be so adjusted that this will not occur until the water has risen in the tank nearly to the point at which it would overflow the crest of the siphon, and as soon as the valve does begin to move under the action of the float lever, the supply increasing will cause it to move at an increasing rate, and very soon it will be wide open; that is, it will be in a position about midway between the two seats D^3 and D^4, and will permit the most rapid supply possible at any point. Although the valve will not stand still at this position, the capacity of the valve and of the siphon will be so adjusted to each other that it will not have gotten past this position and begun to appreciably shut off the supply by approaching the seat D^4, before the rise of water in the tank will have primed the siphon and caused the evacuation of the tank through the siphon to commence. The capacity of the siphon to evacuate the tank should be considerably greater than that of the supply valve to fill it, so that notwithstanding the evacuation may be commenced while the supply valve is at its position of maximum operation, the water level will fall rapidly and thus cause the valve to move back toward the seat D^3, which it will approach until arrested by the adjustable stop screw G and will stand at this position, the supply being cut down to the minimum, determined by the adjustment of the screw G, while the siphon continues to operate evacuating the tank. When the water level has fallen below the receiving mouth of the siphon, and the siphon is broken and evacuation ceases, the slow supply will again fill the tank and cause the operation to be repeated. It will be understood that the interval between successive flushes will be substantially the interval necessary to fill the tank at the rate of supply determined by the adjustment of the stop screw G, because the valve will not be moved from the stop screw by the action of the ball float until the tank is filled nearly to the crest of the siphon, the remainder of the supply necessary to prime the siphon being made very quickly as soon as the valve begins to open under the action of the float. The necessity of this action,—that is, the slow filling until the water is nearly to the crest of the siphon, followed by very rapid filling from that point on until the siphon is primed and begins to operate,—arises from the fact that if the slow filling were to continue unchanged the overflow at the crest of the siphon might equal such slow supply, and the siphon never being flooded would never be primed, but the water would simply waste through it as fast as it entered past the supply valve. On the other hand, a sufficiently rapid supply to prime the siphon at this stage, if it continued throughout the whole filling process, would make the interval between successive flushes too short for most purposes. The construction of this valve, therefore, makes it possible to so adjust the supply at its minimum as to give any desired length of interval between the flushes without in the slightest degree endangering the proper action of the siphon when the tank is properly filled. An advantage of this mode of providing the slow filling, and yet permitting the quick priming, is that the aperture through which the slow filling occurs,—being the aperture between the valve head and the seat D^3, when the valve is against the stop screw G,—is enlarged by the moving of the valve to the maximum at each operation, and is therefore not liable to be stopped up, as a permanently small aperture would be, but is flushed by a full stream at each action of the valve. Another advantage of the construction is that in case the discharge passage, either the siphon or of any portion of the flushing pipe, should become obstructed so that notwithstanding the priming of the siphon, there would be no evacuation of the tank, the further rise of the water in the tank, which would occur, would carry the valve head beyond the position to which it would be moved in the normal action,—midway between the two seats—and cause it to reach the seat D^4 and shut off the water positively and completely and retain it thus shut off until the water level in the tank should fall. This valve is also adapted to be used in connection with other than periodic flushing devices, as where the priming of the siphon is effected by first lifting the valve having the siphon off its seat, and inducing the siphonic action by the draft of water past the discharge mouth of the siphon in a manner which will be understood without further description upon reference to the form of flushing or discharge valve shown in the drawings. In such case the ball float will be located on the lever so that the valve will close against the seat D^4 when the tank has filled to the desired level,

and will open in the same manner as above described when the tank is voluntarily evacuated, and will fill slowly or rapidly according to the adjustment of the screw G after the siphon is broken,—in short will operate as an ordinary ball valve under such circumstances, with this difference and advantage,—that the fall of the water in the tank while it is being evacuated through the siphon, or past the open discharge valve will not set the supply valve wide open unless the screw G be adjusted expressly to accomplish that purpose, and will not therefore unduly lengthen the period of flushing; that is, the time necessary for the water to fill in the tank below the receiving mouth of the siphon, but, on the contrary, the first quick fall of water having the effect to cause the ball lever to move the valve the full distance which it can move from the seat D^4 to the stop screw G, the supply will be cut down to the minimum, determined by the adjustment of the stop screw, while the evacuation of the closet is continuing, and until it is again filled up to nearly the maximum height when the completion of the filling will be quick through the wide open valve which will also quickly close against the seat D^4.

I claim—

1. A supply valve for tanks comprising the body having the induction and eduction passages; the valve seat D^4 through which the induction passage leads, and the valve seat D^3 between the seat D^4 and the eduction passage, in combination with the valve playing between the two seats and the buoy-operated lever which actuates it with the stop screw set through the body and adjustable in the direction of the movement of the valve to limit the approach of the latter to the seat D^3 substantially as set forth.

2. In a supply valve for tanks, the body comprising the induction and eduction passages; two valve seats located between the two passages; a buoy-operated lever, and a valve in said body actuated by the lever adapted to be moved toward the seat nearest the eduction passage when the buoy falls and away from said seat when the buoy rises, and a stop to limit the approach of the valve to said seat; whereby a minimum continuous flow is maintained through a passage which is flushed by a maximum flow through it at each opening movement of the valve: substantially as set forth.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 12th day of August, 1892.

PATRICK HARVEY.

Witnesses:
CHAS. S. BURTON,
E. T. WRAY.