(No Model.)

P. HARVEY.

SIPHON JET CLOSET OPERATING DEVICE.

No. 597,499. Patented Jan. 18, 1898.

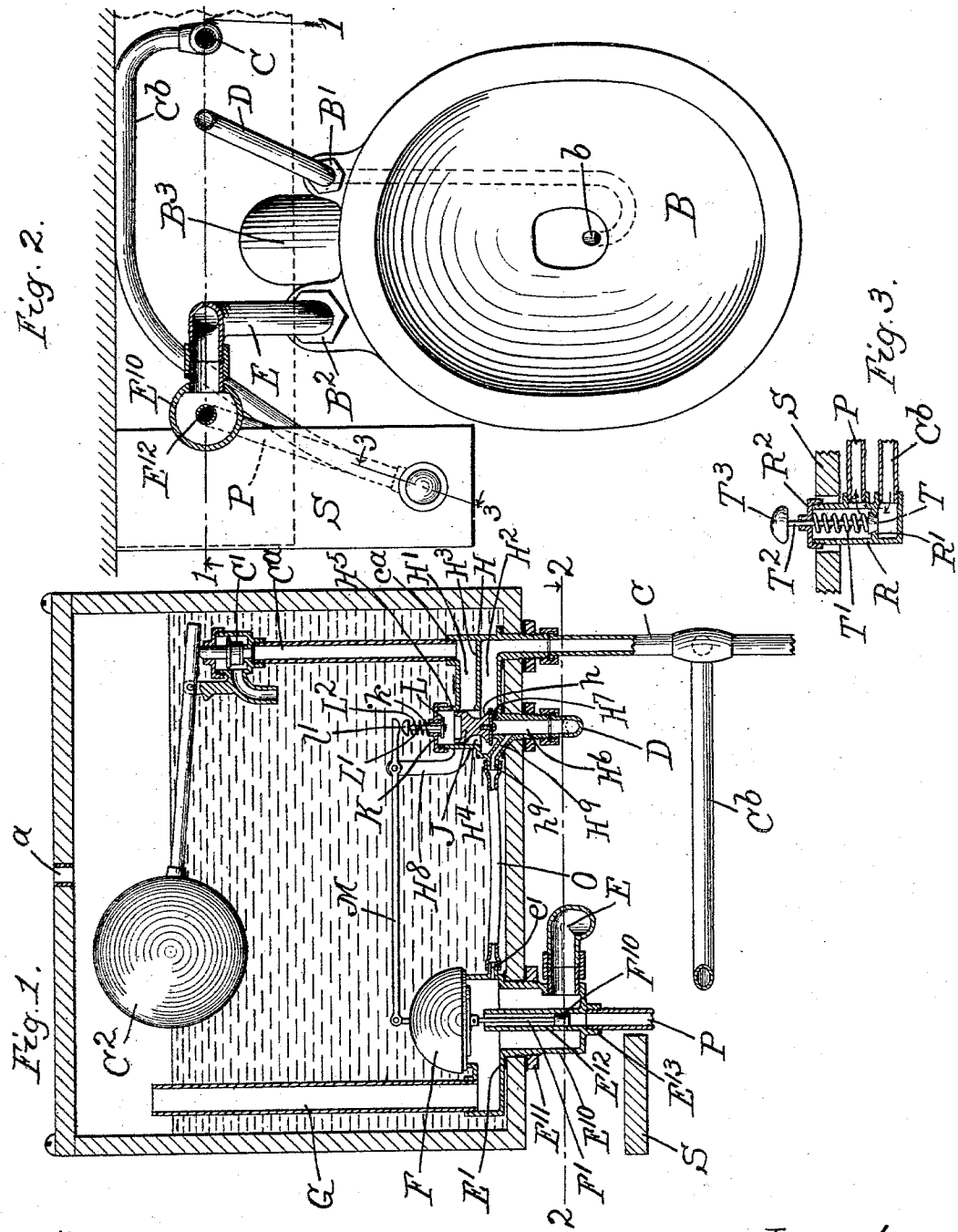


Fig. 1.

Fig. 2.

Fig. 3.

Witnesses.
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SIPHON-JET-CLOSET-OPERATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 597,499, dated January 18, 1898.

Application filed February 24, 1897. Serial No. 624,838. (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 Siphon-Jet-Closet-Operating Devices, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide improved means for operating a so-called "siphon-jet" closet—that is to say, a water-closet in which the bowl is evacuated by siphonic action, such action being initiated by a forcible jet of water injected upward through the discharge-limb of the trap, which is the up-limb of the siphonic discharge-passage.

In general the invention consists in means for supplying the jet from a source of water under pressure—usually the water-supply system of the house—and means for flushing the closet from a low tank or supply-box which would not afford the necessary pressure for the jet, thus permitting the use of such low tank without sacrificing the advantages of the siphon-jet mode of action in many situations where a tank sufficiently elevated to operate the jet is impracticable.

It consists, further and more specifically, in means for operating the jet from the source of water under pressure which supplies the tank and in means of communication between the jet service-pipe and the tank-supply service-pipe by which the supply of water under pressure is diverted to the jet and shut off from the tank during the flushing action and is cut off from the jet and returned to the tank when the principal flushing action ceases.

It consists, further, in devices for operating the flushing-valve by means of the supply-pressure and novel means for preventing siphonic action in the supply-pipe which might tend to evacuate the closet-trap when the water-supply is wholly drawn from a lower point in the service system.

It consists, further, in details of construction which are set forth in the claims.

In the drawings, Figure 1 is a vertical section through a tank and closet-operating device associated therewith involving my invention, section being made at the line 1 1 on Fig. 2. Fig. 2 is a horizontal section at the line 2 2 on Fig. 1, showing below the plan of the section the closet-bowl and connections in plan view. Fig. 3 is a detail section at the line 3 3 on Fig. 2.

A is the tank, which is closed at the top, but provided with an air-vent *a*.

B is the closet-bowl; *b*, the siphon-operating jet-orifice; B′, the jet-supply-pipe connection; B^2, the flushing-pipe connection. The top of the siphonic discharge-passage appears at B^3.

C is the water-supply pipe, which affords under pressure for the jet-pipe D and also supplies the tank, being controlled in the latter by the valve C′, controlled by the float C^2 in a manner which requires no explanation.

E is the flushing-pipe, connected with the tank by the valve-fixture E′, on which the flushing-valve F seats and with which the overflow and vent pipe G is connected.

H is a fitting having passages which constitute part of the water-supply passage, the pipe C being connected to said fitting below the tank, and the continuation of said supply-pipe within the tank (indicated by the letter C^a) being connected to said fitting at c^a within the tank. Said fitting H contains a by-pass chamber H′ H^2, partitioned by a diaphragm H^3, through which a port H^4 is formed, in which a valve J reciprocates. In line with said valved port the fitting H has an upper open boss H^5 and lower a more elongated boss H^6 and in line with the latter a slight inwardly-protruding boss H^7, which constitutes a seat for the valve J. The jet-supply pipe D is coupled to the lower end of the boss H^6, and a cap K is screwed into the upper end of the boss H^5. Said cap has a port *k*, which is closed by a valve L, which seats at the inner side of the port under the cap, having a stem L′ extending out through the port, said stem being provided with a head *l*′, and a spring L^2 being interposed between the head and the cap, tending to hold the valve seated upwardly to close the port *k*.

The valve J is adapted to seat, as stated, upon the boss H^7, and when so seated to cut off communication from the supply-pipe C to the jet-pipe D, such communication being afforded, but for the seating of the valve, through the passage H^2 of the by-pass cham-

ber below the diaphragm H^3. The valve has a peripheral groove *h*, which spans the plane of the diaphragm H^3 when the latter is seated on the boss H^7 and affords a communicating passage for the water from the pipe by way of the passage H^2 to the passage H′ and thence to the upper portion C^a of the supply-pipe and thence past the valve C′ into the tank when said valve is not held closed by the float. Said valve J extends up past the passage H′ into the boss H^5, but does not fit tightly within the latter, sufficient leakage being permitted around it to admit the pressure into the boss above the valve and under the cap K, this supply-pressure being experienced over the area of the entire cross-section of the valve, with a tendency to seat the valve, and over the area which is the difference between said cross-sectional area and that of a circle whose diameter is the outer diameter of the seat H^7, with a tendency to unseat the valve, resulting in the valve being held seated with a pressure which the water can exert over the last-mentioned area.

The flushing-valve F, which is operated in a manner which will be hereinafter explained, is pivotally connected to a lever M, fulcrumed on a bracket-arm H^8 of the fitting H and operating at its end beyond the fulcrum upon the head of the stem of the valve L. When the valve F is lifted from its seat, the opposite end of the lever M is brought into contact with the head of the valve-stem and forces the valve L off its seat. The area for the escape of water through the port *k* when the valve is off its seat is considerably greater than the leakage area around the valve J in the boss H^5. When, therefore, the valve L is thus unseated, the downward pressure upon the valve J is relieved and reduced to the mere pressure of the water in the tank. The upward pressure upon the valve, however, measured by the excess of the cross-section of the valve where it enters the boss H^5 above the area of a circle whose diameter is the outer diameter of the seat H^7, remains as before and is the excess of the downward pressure of the water in the tank upon the entire area of the valve and causes the valve to open, admitting water to the jet-pipe D, thereby operating the jet and priming the siphon simultaneously with the supply of water to the flushing device. This action continues until the valve F again descends so near its seat as to relieve the valve L from the pressure of the lever M and permit it to become seated and close the port *k*. Thereupon immediately the leakage around the valve J admits the water-pressure above the latter and seats the valve as before, cutting off the jet-supply and admitting the supply from the pipe C by way of the annular groove *h* to the upper portion C^a of the supply-pipe and past the valve C′ into the tank, in which, being now nearly empty, the float C^2 is depressed, so that the valve C′ opens with the water-pressure and admits the supply, closing when the tank has become refilled.

In order that the siphon, which is formed by the jet-pipe D, supply-pipe C, and communicating passages in the fitting H, may not operate to evacuate the trap in the bowl to which the jet-pipe leads when the water is withdrawn from the jet-pipe C by opening the faucets below the fixture in question, I provide a by-pass vent-passage H^9 in the fitting H, leading from a point below the valve-seat H^7 to a nipple H^9 within the tank, and I provide the fitting E′ with a similar nipple *e′*, leading into said fitting below the seat of the valve F, and I connect the nipples *e′* and h^9 by a piece of pipe, preferably merely a rubber tube O, slipped over both ends. Through the passage thus afforded an entering through the overflow-pipe G is admitted to the jet-pipe D, breaking the siphon, which would otherwise operate to evacuate the trap.

The valve F may be operated by any familiar means. I have shown, however, a novel means for this purpose, which I will now describe. The fitting E′ has a cylindrical portion E^{10}, extending through the bottom of the tank, and is clamped to the latter by a lock-nut E^{11}. Within the cylindrical portion E^{10}, preferably cast integral with it, is a concentric E^{12}, and in line with the same the lower end of the cylinder is provided with a protruding boss E^{13}, and the boss and central cylinder are bored through axially. The flushing-pipe E is connected into the cylinder E^{10} laterally, opening into an annular space around the inner cylinder E^{12}. The valve F has a stem F′, which terminates in a piston-head F^{10}, fitting easily in the bore of the cylinder E^{12} and assisting in guiding the valve F, which is, however, fairly guided by the lever M, fulcrumed to the bracket H^8, above described. The stem F′ may be connected pivotally to the valve F to avoid possibility of cramping, in view of the short movement of the lever F on the long arm of the lever M. The pipe P is connected to the boss E^{13}, communicating thus with the axial bore of the cylinder E^{12}, and extends thence to a valve-chamber R, mounted on the slab S at or near the level of the closest-seat. From the supply-pipe C a branch C^b leads to the same valve-chamber R, the branch C^b entering below the valve-seat R′, while the pipe P leads from the chamber above said valve-seat. The valve T, seated thus between the points of communication of the pipes C^b and P, is held normally seated by a spring T′, coiled about its stem T^2, which passes out through a suitable stuffing-cap R^2 and provided with a handle T^3. It will be observed that the valve is seated by the spring T′ against the supply-pressure which enters through the pipe C^b. After being pulled off its seat said supply-pressure will operate through the pipe P against the piston F^{10}, and, the area of said piston being properly calculated, in view of the supply-pressure and the depth of water maintained in the tank, said supply-pressure may be ample to

lift the valve F off its seat against the pressure of the tank-water, which alone tends to hold it on its seat. The operator, opening the valve T by means of the handle T^3, causes the flushing-valve to be opened by the supply-pressure and, the opening of the flushing-valve in turn causing the valve L to be opened, causes the supply-pressure to open the valve J, thus admitting said pressure to the jet-pipe. The operator having immediately dropped the valve T as soon as the flushing-valve opened and the piston F^{10} being an easy fit and permitting some leakage past it, the valve F can seat again in the usual manner, notwithstanding the presence of water in the pipe P and under the piston, thus bringing about the action above described, whereby the supply-pressure is cut off from the jet and applied to the tank to refill the same.

I claim—

1. In combination with the bowl of the siphon-jet closet, a tank having a flushing-pipe connection with the bowl, and a valve which controls the flow of water from the tank into the flushing-pipe; a pipe which supplies water to the tank from a source of pressure; connections from said pipe to the jet-passage of the bowl, and a valve which controls said connection; and mechanical connections from the flushing-pipe-controlling valve to the jet-controlling valve, by which the movement of the former operates the latter.

2. In combination with the bowl of a siphon-jet closet, a tank and a flushing connection therefrom to the bowl; a pipe affording a supply of water under pressure to the tank, and a connection from such pipe to the jet-passage of the bowl; the valve which controls said connection; a valve which controls the flushing-passage to the bowl, and means by which the operation of said flushing-valve operates the valve which controls the jet connection.

3. In combination with the bowl of a siphon-jet closet, a tank and flushing connections therefrom to the bowl, and a valve which controls said connections; a pipe which supplies water from a source of pressure to the tank; a connection from said pipe to the jet-passage of the bowl; a valve adapted at one position to cut off communication from the pressure-supply pipe to the jet and admit the supply to the tank, and at another position to cut off the supply to the tank and admit it to the jet-passage, and connections by which the flushing-valve causes the jet-controlling valve to take the first-mentioned position when the flushing-valve is opened and the second-mentioned position when the second valve is closed.

4. In combination with the bowl of a siphon-jet closet, a tank and a flushing connection therefrom to the bowl; a pipe affording a supply of water under pressure to the tank, and connections from said pipe to the jet-passage of the bowl; a valve which controls such connection adapted at one position to cut off communication from the pressure-supply pipe to the jet and admit the supply to the tank, and at another position to cut off the supply from the tank and admit it to the jet-passage, and adapted to be seated in the first-mentioned position by the supply-pressure, the chamber of said valve having communication with the tank on the side at which the supply-pressure operates to so seat the valve; and a vent-valve controlling such communication; and suitable means for operating the same to relieve the pressure upon that side.

5. In combination with the bowl of a siphon-jet closet, a tank and flushing connections therefrom to the bowl and a flushing-valve to control said connection; a pipe which supplies water from a source of pressure to the tank, and connections from said pipe to the jet-passage of the bowl; a jet-controlling valve adapted at one position to cut off communication from the pressure-supply pipe to the jet and admit the supply to the tank, and at another position to cut off the supply from the tank and admit it to the jet-passage and adapted to be seated in the first position by the supply-pressure; the chamber for said valve having a valved communication with the tank, through which the supply-pressure may be vented from one side of the jet-controlling valve, and connections from the flushing-valve for opening such vent-valve when the flushing-valve is opened.

6. In combination with the bowl of a siphon-jet closet, a tank and flushing connections therefrom to the bowl, and a valve which controls said connections; a pipe which supplies water to the tank from a source of pressure; a connection from said pipe to the jet-passage of the bowl; a valve which controls said connection adapted at one position to cut off communication from the pressure-supply pipe to the jet and admit the supply to the tank, and at another position to cut off the supply from the tank and admit it to the jet-passage, said valve being exposed at one area to the supply-pressure in a direction to seat it in the first-mentioned position, and at a less area in a direction tending to unseat it from said position, the chamber of said valve having communication with the tank on the side from which the pressure operates over the first-mentioned area, and a valve which controls such communication adapted to vent the supply-pressure at that side, and means for operating such valve, whereby the jet-controlling valve is operated in both directions by the supply-pressure and the direction of its action is determined by the opening and closing of the vent-valve.

7. In combination with the supply-pipe C and jet-pipe D, the by-pass chamber H through which they communicate, having the partition H^3 and the valve-chamber H^5; the valve J reciprocating loosely in said chamber and adapted at one limit to seat over the mouth of the jet-pipe, and at the opposite limit to substantially close the tank-inlet; the vent-

valve L controlling communication between said chamber and the tank; means for holding said valve normally seated and for unseating the same.

8. In combination with the bowl of a siphon-jet closet, a tank and connections therefrom to the bowl; the valve which controls said connections, and an overflow and vent pipe leading from the top of the tank past the flushing-valve; a pipe which supplies water to the tank from a source of pressure; a connection from said pipe to the jet-passage of the bowl; a valve which controls such connection, and a duct leading from the jet-pipe between said valve and the bowl into the flushing-passage between the flushing-valve and the bowl.

9. In combination with a supply-pipe and two discharge-pipes, a connecting-fixture between them having a valve-chamber; a valve therein adapted to effect communication at one position from the supply-pipe to one of the discharge-pipes, and at another position from the supply-pipe to the other discharge-pipe; said valve being exposed at one area to the supply-pressure in a direction tending to seat it in one of said positions and at the less area in a direction tending to unseat it from said position, the valve-chamber having a vent-port adapted to vent the supply-pressure on the side from which said pressure operates over the first-mentioned area, and a valve which controls said vent-port.

In testimony whereof I have hereunto set my hand, at Chicago, Illinois, in the presence of two witnesses, this 18th day of February, 1897.

PATRICK HARVEY.

Witnesses:
CHAS. S. BURTON,
JEAN ELLIOTT.