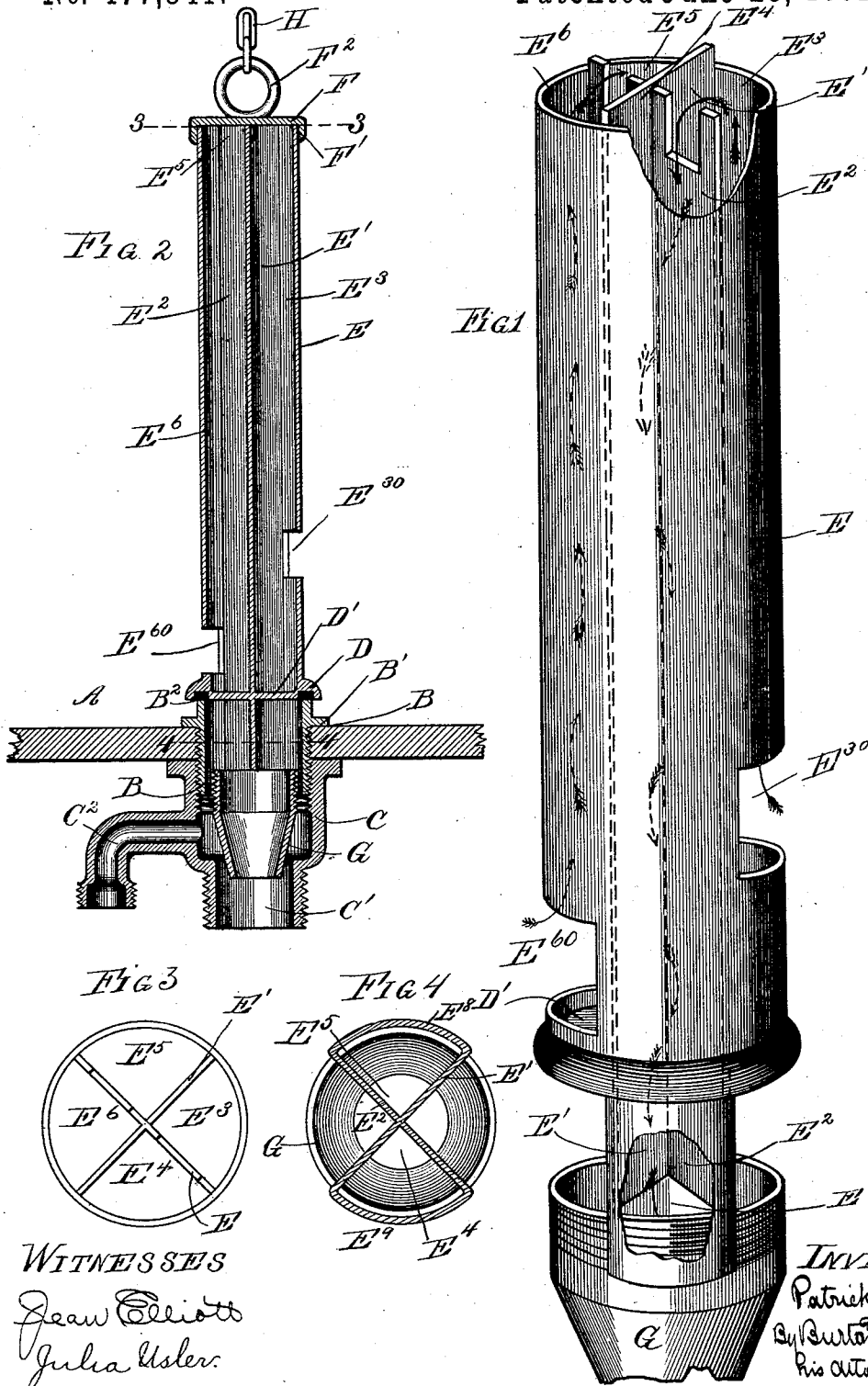


P. HARVEY.
SIPHON FOR WATER CLOSET TANKS.

No. 477,841.

Patented June 28, 1892.



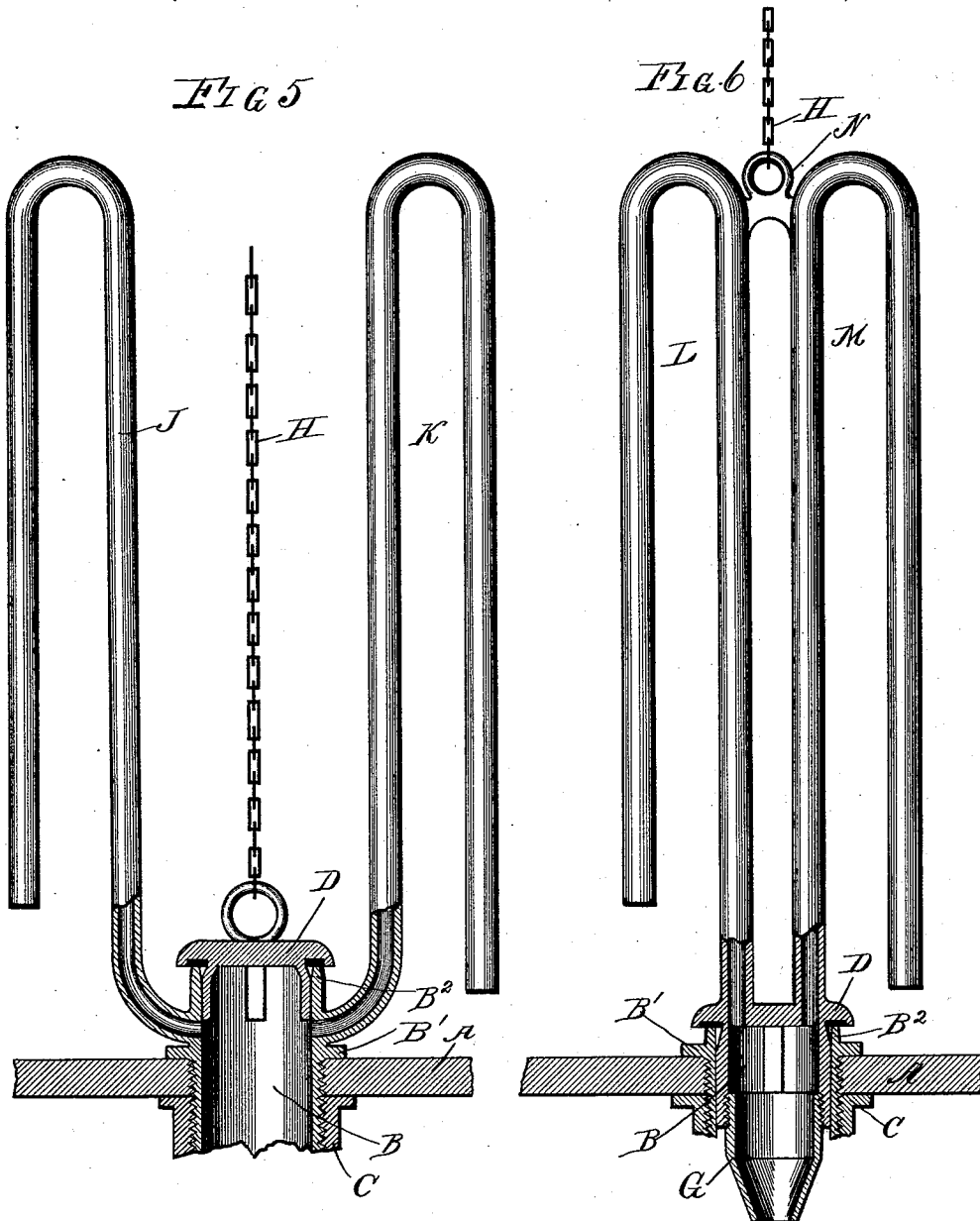
(No Model.)

2 Sheets—Sheet 2.

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WITNESSES.

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UNITED STATES PATENT OFFICE.

PATRICK HARVEY, OF CHICAGO, ILLINOIS.

SIPHON FOR WATER-CLOSET TANKS.

SPECIFICATION forming part of Letters Patent No. 477,841, dated June 28, 1892.

Application filed June 29, 1891. Serial No. 397,872. (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 Siphons for Water-Closet Tanks, 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 a siphon adapted to serve as the means of taking the water from the service-tank of a water-closet and discharging the same into the pipe which leads to the closet, the siphon serving, as is usual in such constructions, as the overflow of the tank, such siphon being in my invention adapted automatically to give first a heavy and afterward a light flow of water, as is desirable in several forms of closets—for example, in what are known as “pneumatic” siphon-closets. The heavy flow is necessary to prime and bring into action the siphon of the closet to cause it to operate to evacuate the bowl, and the lighter flow of an insufficient quantity of water to prime the closet-siphon is necessary for what is technically known as the “afterwash,” needed to fill the traps and bowl to a proper point for sealing the passages. In what are known as “washouts” the heavy flow is needed first for the primary discharge effected by the momentum of the water, and the lighter flow is needed afterward for the purpose of filling the water-space in the bowl. In what are known as “siphon-jet” closets the heavy flow is needed to give a forcible jet by the action of which the siphonic action of the closet is set up and the closet vacuated, and the lighter flow is needed for the filling or afterwash, as in pneumatic siphons. My invention, therefore, is adapted to be used in connection with any of these closets; and it consists in a compound siphon or two siphons whose discharge-limbs both lead into the main water-pipe from the tank to the closet, the supply which one of said siphons is capable of affording being insufficient to fully occupy the space through which the discharge is made, and the supply afforded by both the siphons being more than sufficient to occupy said space, so that dis-

charge is effected by the pressure of accumulated water behind the discharge.

In the drawings, Figure 1 is a perspective of a preferred form of my compound or double siphon. Fig. 2 is a vertical section at the line 2 2 on Fig. 1. Fig. 3 is a section at the line 3 3 on Fig. 2. Fig. 4 is a section at the line 4 4 through the siphon-tube, only without the valve-seat or thimble. Fig. 5 is a vertical section of a modified form of my invention in which the two siphons are independent mechanically and both discharge through the thimble which contains the valve-seat below said seat. Fig. 6 is a vertical section of a second modified form in which the two siphons are mechanically independent, but both discharge through the valve.

I will describe first the construction shown in Figs. 1 to 4, inclusive: A represents the bottom of a tank or service-box of ordinary construction; B, a threaded thimble having a flange B', by which it is adapted to be clamped to the bottom plank A, and having a vertical flange B², which constitutes the valve-seat. C is a fitting which is employed in pneumatic siphon-closets, being the initial fitting of the water-supply pipe adapted to be screwed onto the thimble B, and thereby to clamp the latter firmly to the bottom, and having the water-discharge terminal C', adapted to be connected to the service-pipe of the closet, and having the air-exhaust intake C², whose terminal is adapted to be connected to the air-exhaust pipe to draw the air from the closet to set up siphonic action therein in a manner which is familiar. So far as already described the construction is a familiar one. D D' is the valve, adapted to seat upon the valve-seat B². It is formed as an annular flange D upon the diaphragm D' of the cylinder E. This cylinder has its interior space divided by two vertical diametrical partitions E' and E² at right angles to each other, whereby the interior cavity of the cylinder is divided into four quarters, which would be non-communicating, except for the fact that the partition E² is cut away at the upper end, so that the two spaces E³ and E⁴ on opposite sides of said partition and on the same side of the partition E communicate at their upper ends, and likewise the two spaces E⁵ and E⁶ on the opposite

side of the partition E from the spaces E³ and E⁴ and on opposite sides, respectively, of the partition E² communicate with each other at their upper ends. The diaphragm D' of the valve closes the lower ends of the chambers E³, E⁴, E⁵, and E⁶, and the cap F is provided to close their upper ends, except as to the communications already described through the cut-away portion of the partition E². This cap has the flange F' fitting around the upper end of the cylinder, and in order to make it easily practicable to join the diaphragm E² into the cap it is provided with a diametrical furrow, which receives the upper end of said diaphragm, which projects a little above the margin of the cylinder at the upper end, in order that it may enter said furrow, so that the cap may be readily soldered and make a water-tight junction with both the cylinder and the diaphragm. Through the wall of said cylinder an opening E³⁰ is made into the chamber E³, and a similar opening E⁶⁰ is made into the chamber E⁶, the latter opening being at a lower point than the former.

In practice I prefer to cast the two diaphragms E' and E² together with segmental walls E⁸ and E⁹, so that the entire structure, which is seen in the cross-section of the same in Fig. 4, may be inserted into a plain cylinder E and the segmental walls E⁸ and E⁹ joined by solder to the inner surface of the cylinder, thus in a simple manner making the longitudinal chambers described in the cylinder. When so constructed, I make the said interior section, having the partitions E' E² and walls E⁸ and E⁹, protruded beyond the cylinder at the lower end, so that the protruding portion forms a guide for the entire siphon as it is lifted and lifts the valve for the purpose of priming the siphon in the usual manner of such structures. The said protruding portion fitting within the thimble B' and being guided by its walls and in order to concentrate the discharge from the siphons properly toward the outlets C' of the fitting C—that is, toward the entrance of the discharge-pipe proper as distinguished from the fitting—I provide the funnel G, which I screw into the segmental walls E⁸ E⁹, making those walls project somewhat beyond the partitions E' and E². If the partitions are inserted without the segmental walls E⁸ and E⁹, as they are shown in Figs. 1 and 2, the portion of the wall of the cylinder bounding the chambers E⁴ and E⁵ is extended below the valve into the thimble B', the portion bounding the chambers E³ and E⁶ being cut away below the valve, and the said extended portion of the cylinder wall may be further extended below the partitions far enough to permit the funnel G to be screwed in between them just as it is screwed in between corresponding segmental walls E⁸ and E⁹, when the construction is as above described and illustrated in Fig. 4.

The operation of this structure is as follows: The service-box, whose bottom is shown

at A, contains water. When it is desired to admit water to the closet to operate the same, the valve and siphon will be operated by the usual mechanism provided for that purpose (indicated by the part F² on the cap F) and the chain H connected thereto to lift it. The valve D D' being thereby lifted off its seat, and the rush of water through the opening thus made having the effect to draw the air from the down limbs E⁴ and E⁵ of the two siphons contained in the cylinders E, thereby priming the siphons and causing them thereafter and after the reseating of the valve to continue to draw water through their respective intakes E³⁰ and E⁶⁰, the full quantity which both siphons can furnish being discharged through the funnel G and producing the designed effect of a funnel-discharge—that is to say, if the closet is of the pneumatic-siphon class such as employed, a fitting C—the flow of water will draw the air through the air-intake C² and set up siphonic action in the closet. The exhaust of air effected by the flow of water will continue so long as the flow is sufficient to fill the funnel G and prevent the possibility of any air being drawn down through the same channel through which the water comes—that is, it will continue so long as both siphons are operative. This will be continued until the level of water in the service-box falls far enough to admit air through the intake E³⁰ into the siphon E³ E⁴. This siphon will then be broken without affecting the operation of the other siphon E⁵ E⁶, but the quantity of water which the latter siphon can supply being insufficient to occupy in its flow the opening of the funnel G or, to state the same generically, to stop the passage leading to the closet said flow will not have any effect to draw air in through the intake C², and the siphon in the closet will be thereby broken and the diminished quantity of water supplied through the one siphon E⁵ E⁶ will enter the closet as an afterwash, the quantity of such afterwash being that which the tank or service-box contains between the level of the intake E³⁰ and the level of the intake E⁶⁰. By the "level" of these intakes it will be understood is meant the level at which the access of air through them is sufficient to break the siphons to which they respectively pertain.

The operation of the device will be the same substantially whatever be the form of closet supplied by it. In a jet-closet the two siphons will furnish water enough to afford a sufficiently forcible jet to inaugurate and maintain a sufficient action of the closet, and the one siphon alone will be insufficient to produce such a jet, so that the siphonic action will not be repeated after the siphon E³ E⁴ is broken. In a washout the quantity supplied by the two siphons will be sufficient to produce a discharge with momentum adapted for the purpose of evacuating the closet and with one siphon will furnish a quantity insufficient for such action, but suf-

ficient to produce a moderate flow and make an after flush and fill.

The form above described is compact, convenient, and simple; but the same action may be performed by either of the forms of siphon shown in Figs. 5 and 6. In Fig. 5 two independent goose-neck siphons J and K are connected into the thimble below the valve-seat, having their intakes at different levels, and operate in the same way as above described. In the form shown in Fig. 6 the two siphons L and M are both connected directly to the valve and lead through it and have their intakes at different levels, and being connected at the upper part by a yoke N, to which the lifting-chain is attached, operate also in the same manner.

One advantage of the construction which I have herein shown in respect to the forms shown in all the figures except Fig. 5 is that the funnel G, which concentrates and directs the flow of water to the flushing-pipe, is made fast to the valve and is removable with the latter, so that if the air-pipe C² or any other by-pass or vent pipe which may be employed in such connection should become obstructed, as is liable to happen, by particles of soil or fibrous matter being sucked up into the air-pipe from the discharge-passage of the closet and lodging in the air-pipe, accumulating until said pipe is throttled, or by frost crystals forming and accumulating in the air-pipe with the same result, the valve being wholly withdrawn from its seat and carrying with it the funnel permits the flushing-stream to enter and flush out such air, by-pass, or vent pipe, and by an occasional such action the air-pipe may be kept perfectly clear without discharging any connection or performing any awkward or difficult operation of rodding or swabbing, and the valve may be arranged to be lifted high enough at each operation to permit the first flow of water past the valve to in part enter the air-pipe and flush it.

I claim—

1. In combination with the water-closet tank and the service-pipe leading therefrom to the closet, the compound siphon and valve comprising the cylinder E, subdivided by two intersecting longitudinal partitions into four passages, the passages on the same side of one

of said partitions communicating at their upper ends across the other partition, whereby said communicating passages constitute two non-communicating siphons, the intake of one of said siphons through the wall of the cylinder being at a higher level than at the other, substantially as set forth.

2. A water-closet tank, a valve closing the discharge-aperture thereof, a service-pipe leading from said aperture, a siphonic duct having its discharge-limb leading through the valve, the funnel G, connected to the valve at the lower side thereof and receiving the discharge from the siphonic duct and adapted to pass freely through the valve-seat, combined with the fitting C, having direct downward connection with the flushing-pipe and lateral connection for the air, by-pass, or vent pipe, the funnel extending past the opening to the latter pipe, whereby when the valve is seated the funnel directs the flow to the flushing-pipe only and is removable with the valve to permit the water to enter the by-pass or vent pipe, substantially as set forth.

3. In a water-closet tank, a valve which closes the discharge-aperture thereof, and the service-pipe leading from said aperture, and two siphonic ducts having their discharge-limbs leading through the valves and their intakes at different levels, the combined capacity of said ducts being greater than that of the discharge-passage, and the capacity of the one which has the lower intake being less than that of the discharge-passage, the funnel G, connected to the lower side of the valve and receiving the discharge from both siphonic ducts and terminating in position to direct said discharge into the service-pipe, combined with the air, by-pass, or vent pipe C², leading off from the service-pipe in such position that the funnel diverts the water past its intake when the valve is seated, said funnel being removable with the valve, substantially as set forth.

In testimony whereof I hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 27th day of June, 1891.

PATRICK HARVEY.

Witnesses:

JEAN ELLIOTT,
JULIA USLER.