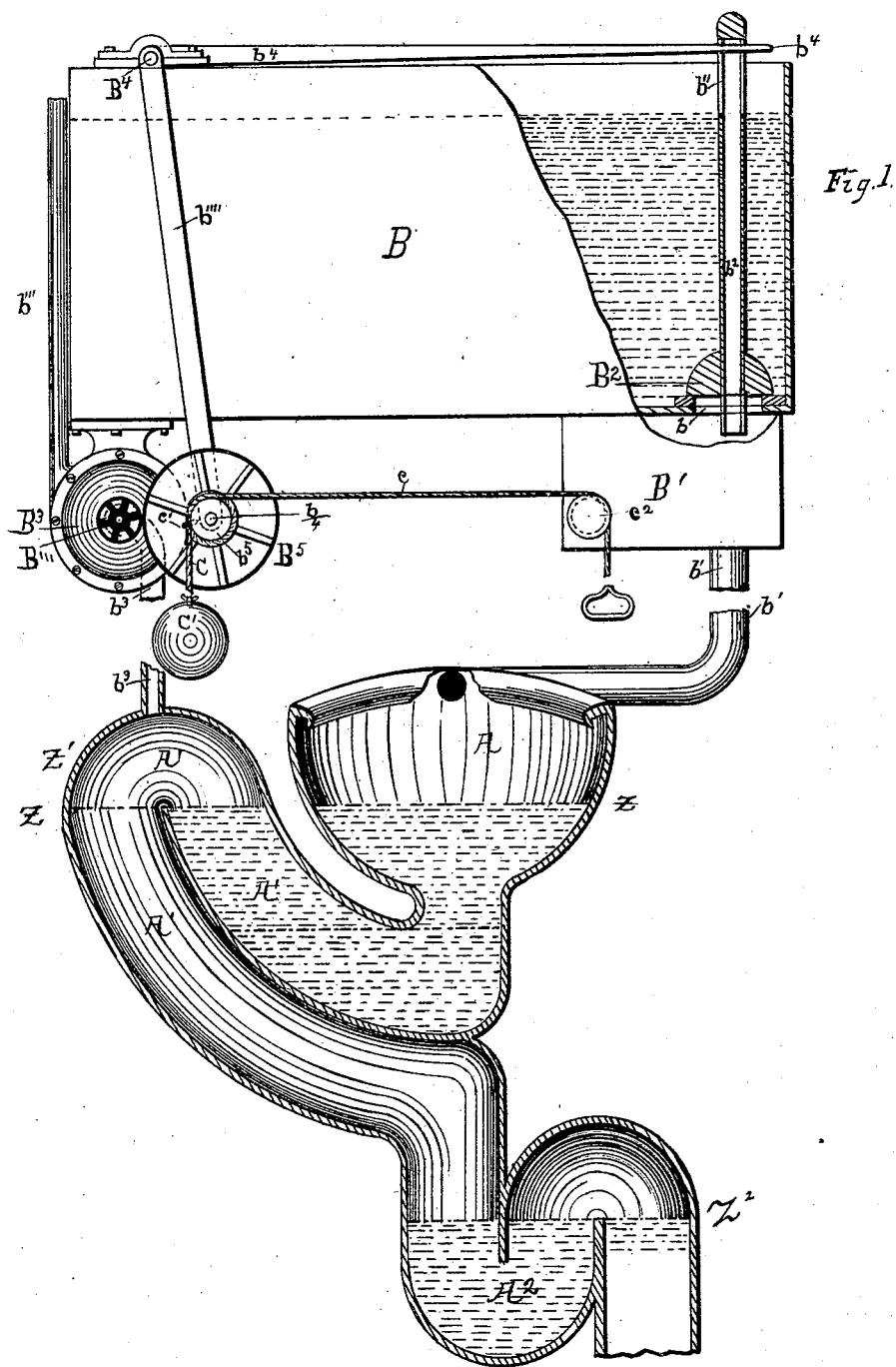


P. HARVEY.

EXHAUST FOR WATER CLOSETS.

No. 343,172.

Patented June 8, 1886.



Witnesses:

L. B. Riggs
N. Husky

Inventor:

Patrick Harvey
by *Chas. S. Burton*
his Atty.

(No Model.)

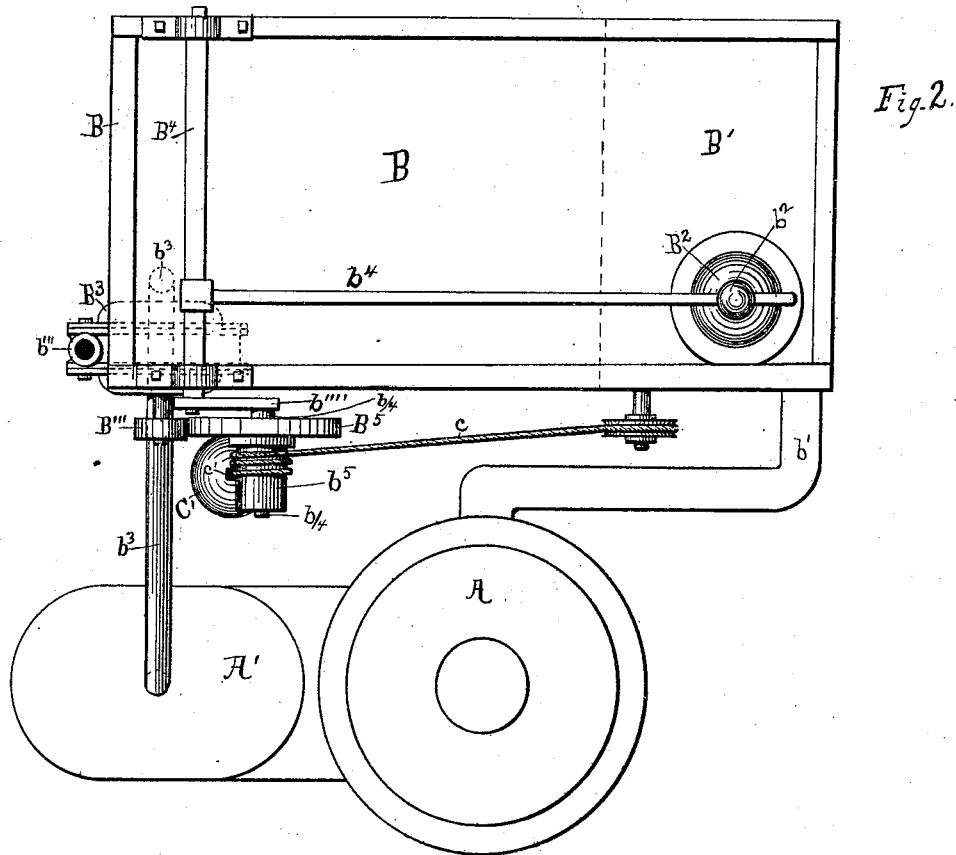
3 Sheets—Sheet 2.

P. HARVEY.

EXHAUST FOR WATER CLOSETS.

No. 343,172.

Patented June 8, 1886.



Witnesses:

L. C. Pigg
N. Husky

Inventor:

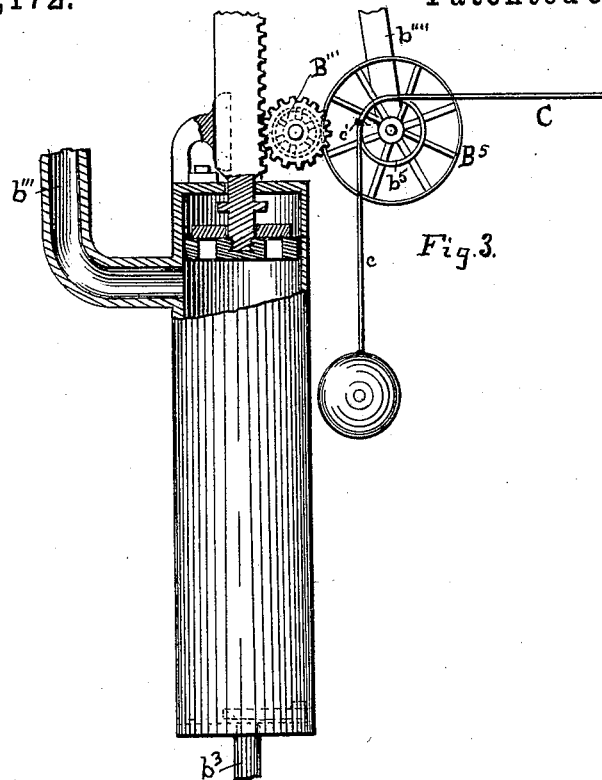
Patrick Kearney
by Chas. S. Weston
his Att'y.

P. HARVEY.

EXHAUST FOR WATER CLOSETS.

No. 343,172.

Patented June 8, 1886.



Witnesses:

H. W. Parker
L. C. Riggs

Inventor:

Patrick Harvey
By *Chas. S. Burton*
his Atty.

UNITED STATES PATENT OFFICE.

PATRICK HARVEY, OF CHICAGO, ILLINOIS.

EXHAUST FOR WATER-CLOSETS.

SPECIFICATION forming part of Letters Patent No. 343,172, dated June 8, 1886.

Application filed February 24, 1885. Serial No. 156,838. (No model.)

To all whom it may concern:

Be it known that I, PATRICK HARVEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Exhausts for Water-Closets, which are fully set forth in the annexed specification.

The purpose of this invention is to provide a device for exhausting the air from the siphon of the so-called "siphon" water-closets, and insure the evacuation of the bowl by means of such siphon, said device to be independent of the flow of water from the reservoir to the bowl, so that it may be available even when the reservoir is empty—water being furnished to the bowl directly from basin or hose—but so connected that it shall be operated by the same mechanism which operates the valve or valves past which the flushing-water is admitted to the bowl when it is so admitted from the reservoir, said device further to be of such construction as to admit air to the siphon, breaking its vacuum and interrupting its siphonic action, after a predetermined flow of water has occurred and before the flow of water ceases.

As the means of accomplishing these purposes my invention comprises, first, a mechanical air-exhauster connected to the siphon by a pipe leading from its induction or suction pipe to the crest of the siphon; second, mechanism for driving such air-exhauster; third, mechanism for winding up such driving mechanism without actuating the exhauster; fourth, mechanism for actuating the valve which admits the flushing-current of water to the bowl, so connected with the winding mechanism that the same movement by the operator will actuate both.

For the first element I prefer to employ a rotary air-pump, commonly known as a "suction and blast" fan connected by pipe with the siphon so as to exhaust it, and having its discharge-pipe continued to the roof or a ventilating-shaft, where any foul vapors or gases may be discharged without causing inconvenience or damage. For the second element I prefer to employ a gear or friction wheel meshing with or bearing upon the pulley of the rotary exhauster, and actuated by a weight attached to a cord secured to and wound around the

axle or on a sheave or windlass rigid with the wheel. For the third element I prefer a cord wound on the axle of the said gear or friction wheel, or on a sheave or windlass rigid therewith, and carried over suitable guide-pulley to a point within reach of the user of the closet; and to render this means sufficient to accomplish the purpose of winding without actuating the exhauster, I prefer to journal the driving-gear or friction-wheel upon the free end of an oscillating arm, whose pivot or point of suspension is in such position that the oscillating end tends to fall toward the air-exhauster pulley, and so placing the first guide-pulley, over which the winding-cord runs from the driving-wheel sheave on the opposite side of the said driving-wheel from the air-exhauster, whereby power applied to draw the cord to wind up the weight tends also to swing the oscillating arm and the driving-wheel journaled thereon away from the driven gear or pulley of the air-exhauster. For the fourth element I prefer to employ a lever-arm connected to the oscillating arm, on the free end of which the driving-wheel is journaled, and adapted to be actuated by the oscillation of said arm, and connected to the valve rod, stem, or other actuating arm or lever by a somewhat lax connection—allowing some play—and to weight the valve or its rod or actuating-arm sufficiently to resist the tendency of the oscillating arm to yield in the direction of the draft of the winding-cord while winding up the actuating-weight, and then by securing the winding-cord positively to the sheave or windlass at the limit of such portion as it is necessary to unwind in winding up the weight, I render positive the draft of the cord upon the oscillating arm when that limit is reached, and enable it to further oscillate said arm, overcoming the resistance of the weighted valve, and opening the same and admitting the flushing-water to the bowl.

In the drawings, Figure 1 is a partly-sectional elevation of the closet-bowl, siphon and trap, reservoir, air-exhauster, and operating connections. Fig. 2 is a plan of the same. Fig. 3 is a sectional front elevation of the air-exhauster and its operating mechanism, a reciprocating pump being employed for such air-exhauster in the place of the rotary pump illustrated in the other figures.

A is the bowl; A', the siphon through which it is evacuated.

A² is the trap in the waste-pipe below the siphon.

5 B is the reservoir; C, the valve-orifice leading to the service-box B'.

b' is the flushing-pipe leading from the service-box B' to the bowl A. B² is the valve closing said orifice, conveniently made heavy to dispense with a separate weight to detain it on its seat. b² is its stem, made hollow and opening above at high-water line of the reservoir, and so serving both as a vent in emptying the service-box and as an overflow from the reservoir B to the service-box and bowl.

15 B³ is the exhaustor; b³, the pipe communicating from its suction-orifice to the siphon A'. b''' is its discharge-pipe leading to a ventilating-shaft or the roof of the building.

20 B⁴ is a rock-shaft journaled for convenience on the top of the reservoir B, and having the lever b⁴ extended rigidly from it and engaging the valve-stem b², which is slotted at the upper end to permit such engagement, the slot b'' being sufficiently elongated above the lever b⁴ to allow the slight play necessary for the movements above described and hereinafter set out more in detail. Outside the reservoir the rock-shaft B' has the depending arm b''', from the lower end of which is extended the horizontal shaft or spindle b⁴, rigid with said arm b'''. On this spindle b⁴ is journaled the driving gear or pulley B⁵, which engages either by contact or intermeshing with the gear or pulley B''' of the fan. Rigid with the pulley B⁵ is the sheave b⁵, upon which is wound the cord C, secured to the sheave and carrying on its depending end the weight C', also secured to the sheave, and suitably wound thereupon is the winding-cord c, which may be, as illustrated, of the same piece with the cord C, the fastening of both or of the one cord, which in that case answers for both, being most conveniently made by a staple, c', striding the cord and driven firmly into the sheave. The winding-cord c runs off the sheave about horizontally to and over the guide-pulley c², whence it depends freely to a point within reach of the user of the closet.

50 The operation of this system of devices will be understood from the preceding statement and description; but for fuller understanding I will further state its operation in detail.

The tank or reservoir B, being supplied with 55 water in any of the familiar ways and its supply suitably controlled, stands filled with water to the high-water line x x, the valve B² is seated, closing the valve-orifice b. The service-box B' is empty, the fan B³ is at rest. 60 The weight C' is at its lowest position, the cord C unwound to the staples c'. The gears or pulleys B⁵ and B''' are in mesh or contact, the cord c is wound to any necessary extent upon the sheave b⁵. The bowl A is filled 65 to the level of the overflow-point z' of the siphon A', and the trap A² is filled to its overflow-point z''. The user pulls the cord

c, with the result, first, of swinging the arm b''' away from the exhaustor B³ and disengaging the gears or pulleys B⁵ and B''' and rocking the shaft B' in its bearings and throwing 70 the lever b⁴ upward until it reaches the limit of its play in the slot b'' of the valve-rod b². The resistance of the weighted valve B² at this point arrests the further rocking of the shaft, 75 and, continuing to pull on the cord c, the user revolves the sheave b⁵ and winds up the cord C, raising the weight C' until the cord c is unwound to the point of fastening—the staple c'—and thereupon the further draft on the cord 80 will swing the oscillating arm b''' farther toward the guide-pulley c² and throw the lever b⁴ upward positively and cause it to lift and unseat the valve B², opening the orifice b and allowing the water to flow freely into the 85 service-box B' and thence through the pipe b' to the bowl A. The flow will thus continue so long as the user detains the cord, thus holding the valve off its seat, but the orifice b, being larger than the pipe b', the service-box B' 90 will be filling with the excess of water admitted to it, while that which flows into the bowl will be escaping by overflowing the point x of the siphon and thence passing out through the trap. When the user releases the cord, the 95 arm b''', tending to assume a vertical position and further compelled by the weight of the valve B², swings over toward the exhaustor, and the gears or pulleys B⁵ and B''' come into engagement and the valve B² is allowed to drop onto its seat. The weight C', 100 now falling, unwinds the cord C from the sheave b⁵, rotating the pulley or gear B⁵ and actuating the fan B³ by the engagement of said gear with the gear B⁵. The rotation of the exhaustor creates a suction upward through the pipe b³ and effects at first a partial and eventually, if sufficiently continued, a complete exhaustion of air from the siphon A'. Meanwhile the flow of water from the service-box 110 B' continues—the vent-tube through the stem b² facilitating such flow—and the water, entering the bowl and being drawn by the suction into the siphon, fills the latter and completes its adaptation to cause evacuation of 115 the bowl down to the line y y. The length of cord wound on the sheave b⁵ and the consequent fall of the weight C' should be such that the exhaustor will cease to revolve before the water has ceased to flow into the bowl. When 120 it does cease, the suction caused by its action, and whereby the siphonic action of the siphon A' has been caused, also ceases, and air, entering freely through the exhaustor, breaks the vacuum of the siphon and allows the water to 125 fill the bowl again up to the line z z, and any further water supplied will overflow over the point z', leaving fresh, clean water in the bowl. The flow will continue until the service-box B' is empty, and the status of all parts 130 will be as at commencing.

A variety of substitutions for the several elements may be made without substantial departure from the invention. Thus for the ro-

tary pump may be substituted a reciprocating pump. For the friction-pulleys or gear-wheels B^a and B^{'''} there may be substituted a clutch-wheel or a ratchet-wheel and pawl—the one fixed and the other loose on the fan or pump driving shaft—and in that case the oscillating lever, which, in the form above described, carries the driving-wheel, may be dispensed with, or, if retained, will be retained only as a convenient means of actuating the valve-rod, and to provide for the winding preceding the lifting the valve the cord may be allowed slack between the connection with the lever which lifts the valve and the connection with sheave which carries the weight and actuates the suction device. For the weight and cord wound on the sheave may be substituted a coiled spring. For the cord arranged to be pulled by the hand may be substituted a suitable connection with the seat, which will render the action automatic.

I claim—

1. In combination, substantially as set forth, the siphon leading from the bowl, the trap between the siphon and the sewer, the reservoir and the conduit therefrom to the bowl, a pump connected to and exhausting the siphon, its actuating mechanism independent of the flow of the flushing-water, and a mechanical motor for the same, winding connection from the motor and operating connection from the valve joined and operated at will, whereby the same movement opens the valve and stores power in the motor.

2. In a water-closet, in combination with an exhaust-pump, its driving gear-wheel or pulley having its journal-bearings movable to carry it out of engagement with the air-exhauster, the winding-up connection reversing the driving-wheel and winding up the actuating mechanism by moving in the direction in which said movable bearings move to disengage the driving-wheel, whereby the same movement of said winding-up connection shall first disengage said driving-wheel and next wind up the actuating mechanism.

3. In a water-closet, in combination with an exhaust-pump, its driving gear-wheel or pulley having its journal-bearings movable to carry it out of engagement with the air-exhauster, the valve-actuating mechanism connected to and moving with said movable journal-bearings, and having beyond such connection a lax or slip joint allowing lost motion, a resistance applied beyond said lax joint to hold the valve on its seat, the winding-up connection reversing the driving-wheel and winding up the actuating mechanism by moving in the direction in which the movable journal-bearings move to disengage said driving-wheel from the exhauster, said winding connection being positively joined to and moving said

driving-wheel and its movable bearings, and thereby the valve-actuating mechanism at the limit of its winding action.

4. In a water-closet, in combination with an exhaust-pump, its driving gear-wheel or pulley having its journal-bearings movable, the valve-actuating mechanism connected to and moving with said movable bearings, a resisting-weight applied to said valve-actuating mechanism to hold the valve in its seat, the winding connection reversing the driving-wheel and winding up the actuating mechanism joined positively to and moving said driving-wheel and its movable journal-bearings at the limit of its winding action, and thereby actuating the valve-actuating mechanism and lifting the valve from its seat against the detaining-weight after the air-exhauster is wound up.

5. In a water-closet, in combination with an exhaust-pump, its driving gear-wheel or pulley having its journal-bearings on an oscillating arm, a lever actuated by said arm and actuating the flushing-valve, and the winding connection with said driving-wheel moving to wind up its actuating mechanism in the direction to oscillate the arm and move the lever to open the valve.

6. In a water-closet, in combination with the exhaust-pump, its driving-wheel, the sheave or windlass rigid therewith, the weighted cable wound thereon, the winding-cable running off the sheave or windlass in the direction away from the air-exhauster, the oscillating arm *b'''*, having the journal-bearings for the driving-wheel, and the lever actuated by said oscillating arm and actuating the flushing-valve.

7. In a water-closet, in combination with the siphon leading from the bowl, the trap between the siphon and the sewer, the exhaust fan or pump connected with the siphon, the reservoir and the conduit therefrom to the bowl, the weighted valve controlling flow through said conduit, the driving-wheel actuating the exhauster and having the sheave or windlass rigid with it, the weighted cable wound thereon, the winding-cable running therefrom away from the exhauster, the oscillating arm having the journal-bearings for the driving-wheel, and the lever rigid therewith and having lax connection with the valve-rod, combined and co-operating substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 1st day of February, A. D. 1885.

PATRICK HARVEY.

Attest:

CHAS. S. BURTON,
F. W. PARKER.