(No Model.) 2 Sheets—Sheet 1.

W. BISHOP.

VALVE FOR SUCTION PIPES OF PUMPS.

No. 468,926. Patented Feb. 16, 1892.

FIG. 2.

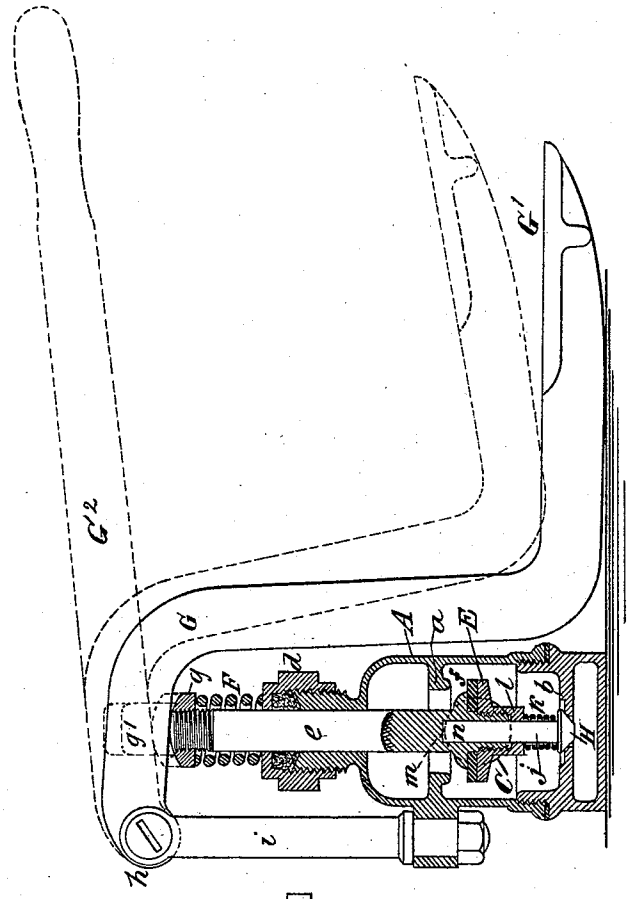
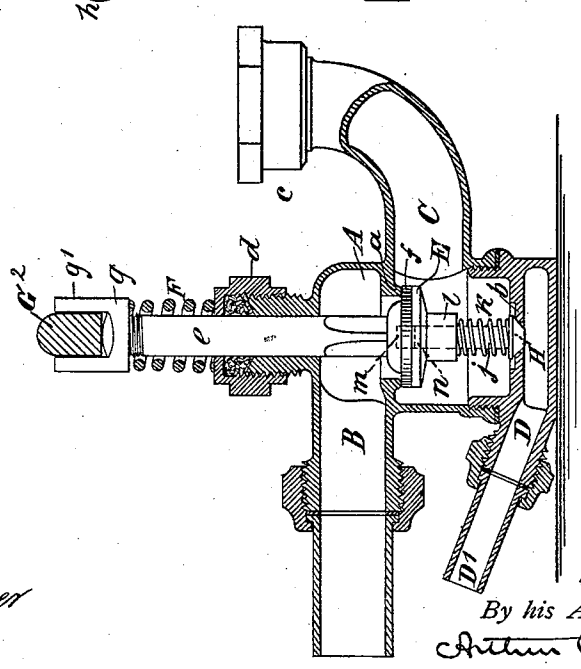


FIG. 1.



WITNESSES:
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Fred White

INVENTOR:
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By his Attorneys,
Arthur C. Fraser & Co.

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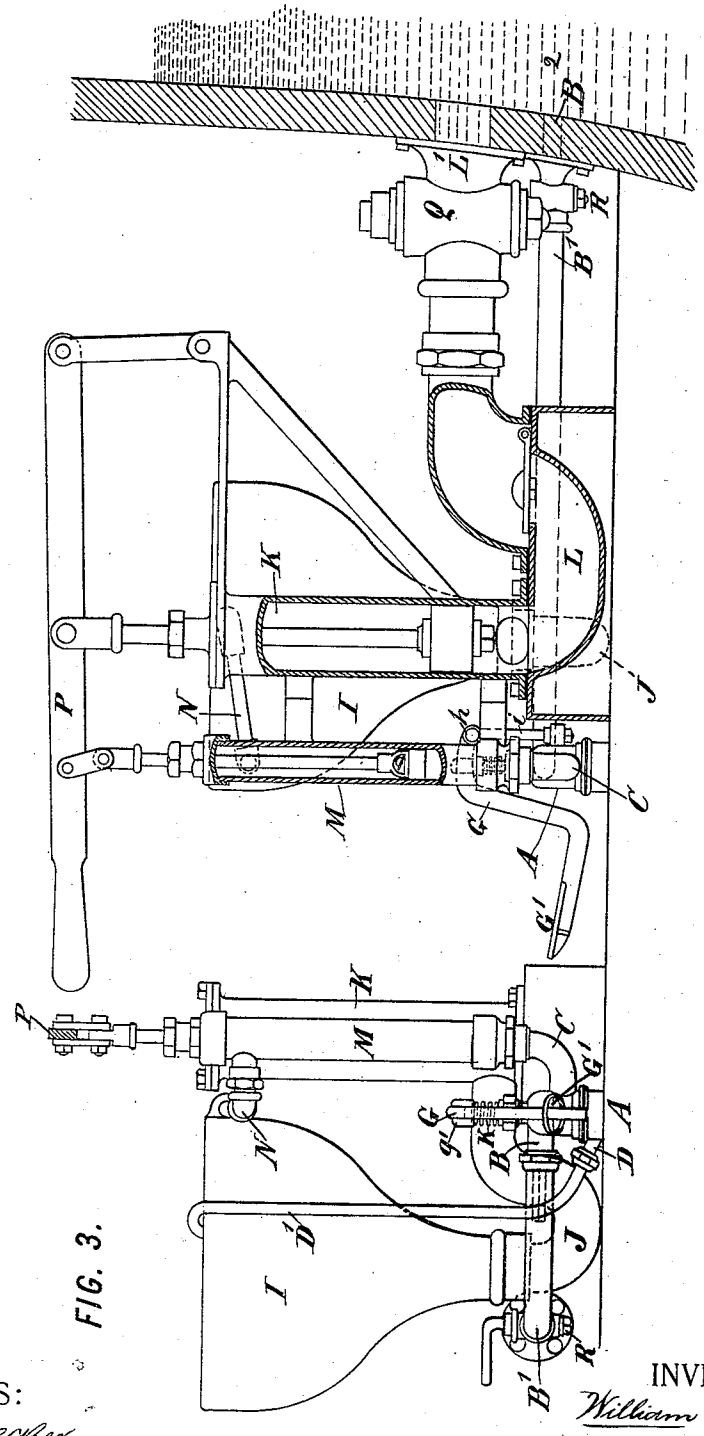

FIG. 4.

FIG. 3.

WITNESSES:
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UNITED STATES PATENT OFFICE.

WILLIAM BISHOP, OF BROOKLYN, NEW YORK.

VALVE FOR SUCTION-PIPES OF PUMPS.

SPECIFICATION forming part of Letters Patent No. 468,926, dated February 16, 1892.

Application filed June 5, 1891. Serial No. 395,205. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BISHOP, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Valves for Suction-Pipes of Pumps, of which the following is a specification.

This invention provides an improved valve for closing the suction-pipe of a pump, its objects being to provide an automatic air-vent, in order that if the pump be operated while the valve is closed it may draw in air instead of water; also, to provide for closing the air-vent by the act of opening the water-valve, so that the pump will then pump water, and also to provide a quick and convenient means for operating the valve in a suction-pipe.

Although applicable to other uses, my improved valve is designed most particularly for use with the pump water-closets used on board ship in those cases where the closet is arranged below the water-level. Such closets are provided with a pump for drawing off the contents of the bowl and forcing it out through the ship's side into the sea, while at the same time fresh sea-water is pumped into the bowl to flush it, this being done, preferably, by a separate pump. The pipe through which the sea-water enters is to be closed by a valve whenever the level of the water in the bowl is lower than the sea-water line, as otherwise the water would flow through this pipe and the pump to the bowl and overflow the latter. Hence in such cases it is necessary to first open this valve before operating the pump and to close it again when the closet has been flushed. My invention provides an improved valve for this purpose, which is conveniently operated by the foot to open it and admit water into the bowl, and when closed permits the pump to be operated to expel the contents of the bowl into the sea, the discharge-pump in this case being the only one that is doing service, the supply-pump serving merely to draw in air.

Figures 1 and 2 of the accompanying drawings are vertical transverse sections of my improved valve, Fig. 1 being viewed from the front and showing the valve closed, and Fig. 2 viewed from the side and showing it open. Fig. 3 is a front elevation of a marine or ship's water-closet to which my valve is applied, and Fig. 4 is a side view thereof, in vertical section, cut in the plane of the line 4 4 in Fig. 3.

Referring to Figs. 1 and 2, let A designate the shell or valve casing, which has a water-inlet B at one side above the valve-seat *a* and a water-outlet C below the valve-seat. This outlet is adapted to be connected by a union *c* or other means to the pump. At the bottom of the casing is an air-inlet D, entering beneath a valve-seat *b*. Through a stuffing-box *d* in the top of the valve-shell passes a rod or valve-stem *e*, to which is fastened a valve proper or valve-disk E. This valve is arranged below the seat *a* and closes upwardly, being faced, preferably, with a yielding substance or composition *f* to form a tight packing. On the top of the stem is a head *g*, between which and the top of the valve-shell is interposed a spring F, which by pressing upwardly against the head forces the valve E tight against its seat. The tension should be sufficient to overcome any pressure of water tending to flow from the inlet B to the outlet C.

To open the valve, it is necessary to press down the valve-stem *e* against the pressure of the spring F. For this purpose other devices known in the art may be employed, such as a hand-lever, a screw, &c.; but by preference I employ an operating-lever G, which is pivoted at *h* on a post *i* or other suitable support, and being engaged between forks or cheeks *g'*, projecting upwardly from the head *g*, is bent downwardly and terminates in a foot-plate G', in order that the valve may be opened by pressing down with the foot on this foot-plate. This is the construction that is preferable when the valve is arranged close to the floor. When otherwise arranged, a hand-lever may be employed, as shown in dotted lines in Fig. 2 at G^2, or this lever might be operated by a pull or other mechanical connection. The means for operating should be such that upon its release it will leave the spring F free to reclose the valve.

The lower or air-valve seat *b* is closed by a valve H, having an upwardly-projecting stem *j*, and pressed down by a spring *k* to close it against its seat. This spring reacts downwardly against the valve H and is most conveniently arranged to react upwardly

against the valve E, although its upward reaction might be exerted against any other suitable part. The stem *j* may be guided in any suitable manner, the most convenient construction being that shown, wherein its upper part passes through a hole in a head or boss *l*, formed on the valve E. The spring *k* is very light relatively to the spring F, so that in case of a suction exerted by the pump through the outlet C the spring *k* will yield and permit the valve H to be turned down against its tension, so that air will enter from the air-inlet D to supply the vacuum. Thus a suction exerted by operating the pump can have no other effect to open the valve E than that corresponding to the tension of the spring *k*, and in the construction shown, where this spring reacts against the valve E, this effect is thereby neutralized.

The construction is such that when the valve E is forced down or opened, the valve H is pressed down and held closed. This might be done in two ways—first, by the downward movement of the valve E, compressing the spring *k* sufficiently, so that it should exert sufficient downward pressure upon the valve H to resist the suction, or, second, by providing abutting stops, so that when the valve E is pressed down it shall encounter some part connected with the valve H and thereby force the latter down unyieldingly against its seat. The construction shown embodies both these effects; but the latter is the one preferably to be relied upon, since the valve H is thereby forced down positively. To effect this, I provide the valve E or some part connected with it with a shoulder or stop *m*, and the valve H or some part connected with it with a shoulder or stop *n*, these stops being so arranged relatively that when the valve E is fully open they will abut and thereby hold the valve H closed. Such abutting stops might be variously arranged; but the most convenient construction is that shown, wherein the end of the valve-stem *j* constitutes the stop *n* and works in a recess within the valve E, the bottom of which constitutes the stop *m*. In the exact construction shown this recess is formed in the lower end of the stem *e*, this end being screw-threaded and projecting below the valve-seat and having a disk screwed upon it to constitute the valve E; but these details of construction may be variously modified.

The valve being applied to the suction of a pump, if it is desired to operate the pump the valve is first opened by pressing down the lever G, whereupon water may be drawn from the inlet B through the valve and outlet C to the pump; or if the water be under pressure it will flow to the pump without operating the pump. If, on the other hand, the pump be operated without first opening the valve, no damage can be done to the pump, because it will simply draw any air from the inlet D through the air-valve H, thereby avoiding the production of a greater vacuum than that which corresponds to the tension of the spring *k*, so that the valves of the pump cannot be strained or injured.

One of the most important applications of my invention is in connection with marine or ships' water-closets or those known as "pump-closets." Figs. 3 and 4 show my invention thus applied. Referring to these figures, let I designate the water-closet bowl, J the soil-pipe leading therefrom to a discharge-pump K, and L the outlet-pipe leading from this pump and communicating with an opening L′ in the side of the vessel, through which the soil drawn from the closet-bowl by the pump may be ejected into the sea. A flush water-pipe B′ communicates with an opening B^2 in the side of the vessel in order to admit sea-water to the suction of a flushing or supply-pump M, from which leads a pipe N, which enters the closet-bowl. The piston-rods of both pumps are connected to a single operating handle or lever P, by working which the two pumps are operated simultaneously, so that as the soil is being pumped out from the bowl by pump K and ejected into the sea clean sea-water is being drawn in through the pipe B′ and forced by pump M through pipe N into the bowl until the bowl has been thoroughly cleansed.

My improved valve (shown in Figs. 1 and 2) is connected in the manner shown at A in Fig. 3 between the water-supply pipe B′ and the pump M, so that when it is closed the sea-water is shut off from this pump. Its inlet B is coupled to the pipe B′, and its outlet C is coupled to the suction of the pump, while its air-inlet D is coupled to an air-pipe D′, which preferably extends upwardly in the manner shown in Fig. 3, and its upper end curves over the upper part of the bowl. After using the closet, the operator should ordinarily open the valve A by pushing down the lever G and then work the handle P to operate both pumps, thereby simultaneously pumping out the soil from the bowl and pumping in fresh water to flush it. When, however, the bowl is below the water-line, as is often the case with marine or ships' closets, the operation of the pump M is not necessary in order to cause water to enter the bowl, it being then sufficient simply to open the valve A by pressing down the lever G, whereupon water will flow through the pump by lifting the pump-valves and will enter the bowl. In such case the operator may first pump out the bowl by working the handle P without first pressing down the lever G, in which case the pump K alone will be operative, the pump M serving simply to pump air. The bowl may then be refilled with clean water by depressing the lever G until the water has entered it to the requisite height. In case of any leakage of water through the air-valve, it will enter the air-inlet pipe D′ and rise therein until it finds its level, or if its level be higher than the top of this pipe it will overflow therefrom into the bowl.

As applied to such closets my invention has

several important advantages. It obviates the trouble of turning a valve or cock by hand before and after using the closet, and avoids the liability that through forgetfulness the supply-valve may be left open, which would result in flooding the closet if its bowl be below the water-line. It also enables the pump K to be operated alone without the trouble of disconnecting the pump M from the operating-handle and without injury to this pump. It also offers a convenient means for flowing water into the bowl when the bowl is below the water-line without having to pump it in.

With my invention it is preferable to use the ordinary sea-cocks Q and R, in order to provide means for closing the openings through the hole for repairs and when the vessel is laid up for the season, but while in use both are left open, it being unnecessary to open and close the valve R, as heretofore, before and after operating the closet.

I claim as my invention the following defined novel features or improvements, substantially as hereinbefore specified, namely:

1. A combined water and air valve comprising a water-valve controlling the flow between a water inlet and outlet, an air-valve adapted to admit a flow of air from a separate air-inlet to said outlet, arranged to open with the flow of air, and an operating device for throwing open the water-valve and closing thereby simultaneously the air-valve, so that a suction at the outlet must draw water and cannot draw air.

2. A combined water and air valve comprising a water-valve controlling the flow between a water inlet and outlet opening with the flow, a spring for holding it normally closed, an air-valve adapted to admit a flow of air to said outlet, a spring tending to hold it closed, and an operating device for opening the water-valve against the pressure of its spring and for closing the air-valve, so that a suction at the outlet must draw water and cannot draw air.

3. A combined water and air valve comprising a water-valve controlling the flow between a water inlet and outlet opening with the flow, a spring for holding it normally closed, an air-valve adapted to admit a flow of air to said outlet, a relatively weak spring tending to hold it closed, so that a suction at the outlet will overcome the tension of the latter spring and draw in air through the air-valve, but cannot open the water-valve, and an operating device for opening the water-valve against the pressure of its spring and for closing the air-valve, so that a suction at the outlet must draw water and cannot draw air.

4. A combined water and air valve comprising a shell having three chambers, a water-outlet from the middle one and water and air inlets to the other two, respectively, and valve-seats communicating between them, two valves in the middle chamber closing against said seats, respectively, a strong spring for pressing the water-valve to its seat, a relatively weak spring for pressing the air-valve to its seat, means for forcibly opening the water-valve against its spring, and abutting stops in connection with the water and air valves, respectively, adapted to be brought together by the opening of the former and thereby to hold the latter closed.

5. The combination of valve-shell A, water-valve E, stem *e* thereof, spring F for closing said valve, operating device G for opening it, air-valve H, its stem *j*, entering and engaged by the valve E, and spring *k* for closing the air-valve.

6. The combination of valve-shell A, water-valve E, stem *e* thereof, spring F for closing said valve, operating device G for opening it, air-valve H, its stem *j*, and spring *k* for closing it reacting against the water-valve.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WILLIAM BISHOP.

Witnesses:
GEORGE H. FRASER,
FRED WHITE.