

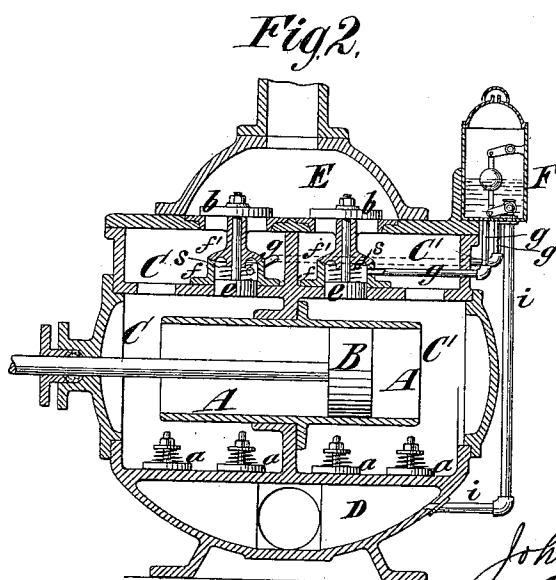
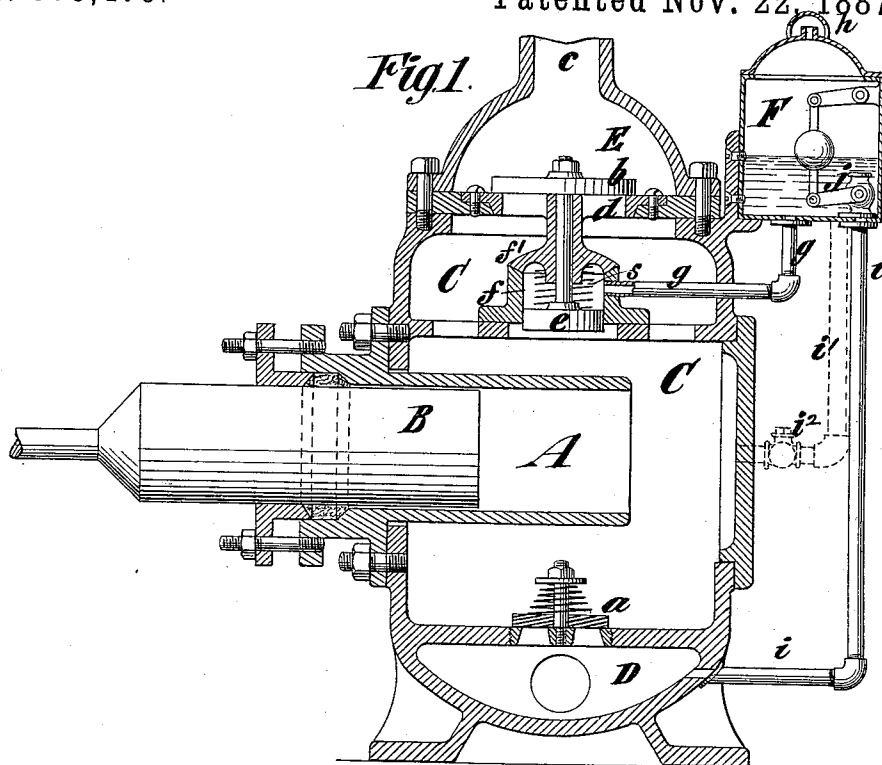
(No Model.)

J. H. PENDLETON.

MEANS FOR RELIEVING PUMP VALVES.

No. 373,479.

Patented Nov. 22, 1887.



Witnesses:

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JOHN H. PENDLETON, OF BROOKLYN, ASSIGNOR TO HIMSELF, AND CORNELIUS TIERS AND ALEXANDER H. TIERS, BOTH OF NEW YORK, N. Y.

MEANS FOR RELIEVING PUMP-VALVES.

SPECIFICATION forming part of Letters Patent No. 373,479, dated November 22, 1887.

Application filed December 15, 1885. Serial No. 185,696. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. PENDLETON, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful
5 Improvement in Means for Relieving Pump-Valves, of which the following is a specification.

My invention is applicable to the discharge-valves of pumps which, when seated, have a
10 larger area exposed to pressure on their backs than upon their faces; and the invention relates to such a valve having combined with it a motor consisting of a cylinder or chamber and a piston or diaphragm which is connected
15 with the valve, and upon which pressure is exerted to assist the valve in opening.

The invention consists in novel combinations of parts, which are hereinafter particularly described, and pointed out in the claims, and
20 all of which include a motor consisting of a piston or diaphragm which is connected with the valve and a chamber containing the piston or diaphragm, and having on one side thereof a vent and on the other side thereof receiving the full pressure of liquid.

In the accompanying drawings, Figure 1 is a vertical section of the cylinder, valves, and piston or plunger of a single-acting pump embodying my invention; and Fig. 2 is a vertical
30 section of the cylinder, piston, and valves of a double-acting pump also embodying my invention.

Similar letters of reference designate corresponding parts in both figures.

35 Referring first to Fig. 1, A designates a cylinder, which has working within it a single-acting piston or plunger, B, and which is contained within a water chest or chamber, C.

D is the suction-chest, with which the chest
40 C communicates through a suction-valve, a, and above the upper portion of the chest C is a discharge-chest, E, with which the chest C communicates by a discharge-valve, b, and from which leads a pipe, c.

45 The valve b is seated upon the seat d, which, as here shown, is made separate from the casing containing the chamber E, and the area exposed to pressure on the upper surface or back of the valve is considerably greater than
50 that exposed to pressure on the under side or face of the valve. In order to balance the

valve and aid in its opening I have connected with it a motor, which, as here represented, consists of a movable diaphragm or piston, e, fitted to and working in a small cylinder, f, 55 and connected by a stem or rod with the valve. The cylinder or chamber f is entirely open on the lower or one side of the movable diaphragm or piston e, so that on one side such movable diaphragm or piston is exposed to the full
60 pressure of liquid produced in the chamber or chest C by the movement of the piston or plunger B. On the opposite side of the movable diaphragm or piston e the cylinder or chamber f is closed by a cap or cover, f', which, 65 as here represented, forms part of the removable valve-seat d, and is connected therewith by a sleeve receiving through it the stem which connects the valve and diaphragm. This cap or cover should close that end of the
70 cylinder or chamber f liquid-tight.

It will be observed that the top of the sleeve which surrounds the stem connecting the valve b with the movable diaphragm or piston e terminates at the top of the valve-seat 75 d, and is closed by the valve b, and hence any leakage downward around the valve-stem which would tend more or less to balance the pressure on the under side of the movable diaphragm or piston e is avoided. 80

From the cylinder or chamber on the side of the movable diaphragm or piston opposite to that on which the working pressure acts leads a vent-pipe, g, which, as here represented, communicates with the bottom of the reservoir 85 or tank F.

The purpose of the vent-pipe g is to make the pressure on the opposite side of the movable diaphragm or piston e available, and this pipe therefore might communicate direct with the
90 atmosphere. In order, however, to save any liquid which might leak between the movable diaphragm or piston and the chamber f, in which it works, I employ the tank or chamber F, which may be closed at the top simply by 95 a loose cap, h, to prevent dirt from falling thereinto, and which therefore contains only atmospheric pressure. If, in lieu of the movable diaphragm or piston e, a diaphragm fixed at its edge in the chamber f were employed, 100 the chamber or tank F would be unnecessary. I have also here represented a pipe, i, leading

from the bottom of the tank or chamber F to the suction-chest D, and controlled by a float-actuated valve, *j*, so that when the water in the tank or chamber F reaches the highest level desired the valve *j* will be opened and the water therein discharged into the suction-chest D. In lieu of employing the pipe *i* and the float-valve *j*, I may connect the tank or chamber F directly with the chamber C by the pipe *i'*, as shown in dotted lines, Fig. 1, and which is provided with a valve, *i''*, said valve being arranged to permit water to flow from the pipe *i'* into the chamber C, and so as to prevent water from flowing in a reverse direction.

In Fig. 2 I have represented a double-acting pump, which comprises a cylinder, A, a piston, B, water chests or chambers C C', which communicate by suction-valves *a* with the suction-chest D, and a discharge-chest, E, which communicates by discharge-valves *b* with the water or pressure chambers C C'. By the reciprocating movements of the piston B pressure will be alternately produced in the chambers C C', and when pressure is thus produced in one chamber the other chamber will be comparatively free from pressure, as the water will be flowing thereinto to fill the space made by the receding piston.

I have represented in both chambers C C' motors, which, as before described, each consist of a movable diaphragm or piston, *e*, working within the cylinder or chamber *f*, which is closed by the cap or cover *f'*. From the two chambers or cylinders *f*, on the side of the pistons which is opposite that exposed to pressure, lead vent-pipes *g*, which communicate, as above described, with the tank or chamber F, from which a return-pipe, *i*, leads to the suction-chest D.

From the above description it will be understood that the area of the movable diaphragm or piston *e* should be at least equal to and preferably slightly in excess of the difference in area between the back and face of the discharge-valve *b*.

I have shown the movable diaphragm or piston *e* as having applied to it a spring, *s*, for

quickenings its return movement after it has been acted upon by pressure and quickly closing the valve *b*.

It is important to have the chamber *f* open directly into the chamber C at one side of the piston or movable diaphragm *e*, because the portion of the chamber which is below the said piston or diaphragm *e* in reality forms a part or continuation of the chamber C, and no pipes or small passages, which are liable to clog in pumping dirty water, are needed to conduct water to act on the piston or diaphragm *e*.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a cylinder and piston of a pump and with the discharge-valves thereof, of a piston connected with the valve, a chamber wherein the piston is fitted, and which receives on one side thereof the full pressure of fluid and is provided on the other side thereof with a vent-pipe communicating with the atmosphere, a chamber with which the vent-pipe communicates, receiving any leakage therefrom, and a pipe for returning from said chamber to the suction-supply of the pump the liquid discharged through said vent-pipe, substantially as herein described.

2. The combination, with a pump-piston, a chamber, C, wherein fluid is put under pressure by the movement of the piston, and a discharge-chest, E, of the valve *b* in the discharge-chest for controlling the discharge from said chamber, and having a stem projecting inward through the valve-seat, a diaphragm, *e*, directly connected with the inner end of the stem, the supplemental chamber *f*, containing the diaphragm, opening at one end directly into the chamber C and at its opposite end closed and provided with a vent, and a sleeve extending inward from the valve-seat and connecting the closed end or top of the chamber *f* with the valve-seat, substantially as herein described.

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Witnesses:

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