Mason & Gill.

Force Pump.

No. 52,431. Patented Feb. 6, 1866.

Fig. 3

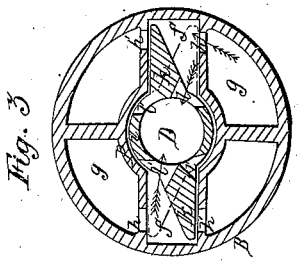


Fig. 6

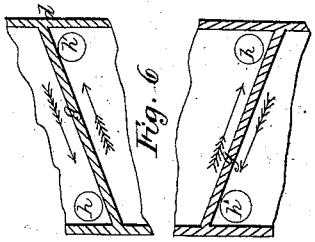


Fig. 4

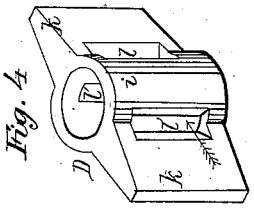


Fig. 2

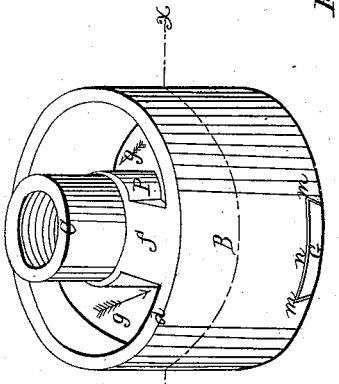


Fig. 5

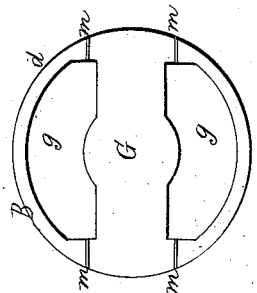
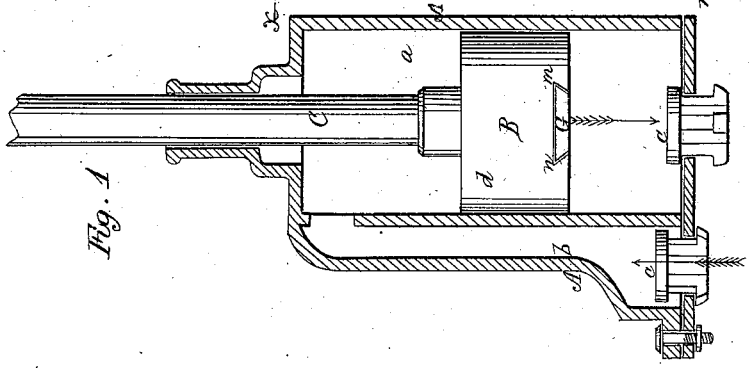


Fig. 1



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UNITED STATES PATENT OFFICE.

SYLVESTER G. MASON AND CALVIN B. GILL, OF ROCHESTER, NEW YORK.

IMPROVEMENT IN PUMPS.

[Specification forming part of Letters Patent No. **52,431**, dated February 6, 1866.

To all whom it may concern:

Be it known that we, SYLVESTER G. MASON and CALVIN B. GILL, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Pumps; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

Figure 1 is a sectional elevation of a double-acting pump-cylinder with our improved piston working therein; Fig. 2, a perspective view of the piston, detached; Fig. 3, a horizontal section of the piston and valve in the plane of line *x x*, Fig. 2; Fig. 4, a perspective view of the valve; Fig. 5, a bottom view of the piston, showing more particularly the method of securing the valve in its chamber; Fig. 6, a diagram representing the inclined partitions of the piston.

Like letters of reference indicate corresponding parts in all the figures.

Our improvement relates to that class known as double-acting force-pumps; and the invention consists, essentially, in the construction of the piston and the valve, their combination, and the manner of securing the valve in place.

The cylinder or case A, in which the piston B works, is of ordinary construction, having the usual cylinder proper *a*, and side passage, *b*, which are provided at the bottom with induction-valves *c c*, that open and close alternately with the corresponding strokes of the piston.

The piston is of peculiar construction. It has an outer rim, *d*, that plays closely in the cylinder. In the center is a vertical valve-chamber, *f*, substantially of the form shown in Fig. 3, and inclosed at the bottom and top, except that from the latter extends a hollow piston-rod, C, through which the liquid is raised.

The piston-rim is divided centrally into two chambers by two inclined partitions or floors, *g g*, inclining in opposite directions, on each side of the central valve-chamber, as clearly indicated in Figs. 2 and 6. Induction-ports *h h'*, Figs. 3 and 6, one above and the other below each partition, open from the extreme angles through the sides of the central valve-chamber, thus admitting water thereto.

In the chamber *f* rests a valve, D, consisting of a central hollow axis or bearing, *i*, which turns closely in a corresponding seat, *p*, of the chamber, and two wings, *k k*, which are allowed considerable play from one side to the other of the chamber, so as to alternately let on and shut off the water. On each side of the hollow axis or bearing of the valve are two ports, *l* and *l'*, opening, respectively, from opposite sides of the wings *k k*, as clearly represented in Figs. 3 and 4. Thus arranged the action of the parts will be readily understood. In the upstroke of the piston the water will strike on the top of the inclined partitions *g g*, and be deflected downward in opposite directions, as indicated by the black arrows, Fig. 6, into the angle, whence it escapes through the ports *h h* into the valve-chamber, forcing the valve backward against the opposite side, thence through the ports *l l* into the elevating tube C, where it finally escapes. In like manner, in the downstroke, the water is deflected upward against the inclined partitions *g g*, as indicated by red arrows, Fig. 6, passes through the opposite ports, *h' h'*, of the valve-chamber, forces the valve around in the opposite position, and then passes through the valve-ports *l' l'* into the elevating-tube.

The most important use of the inclined partitions *g g* is to perfectly balance the piston in its up and down strokes, and at the same time give, as it were, a direction to the water in entering the ports. It will be seen that if the partitions were exactly horizontal, the reaction or resistance of the water would be great, and not only present a great obstacle to the easy working of the piston, but would produce so much friction, by reason of the sharp angles the liquid would have to turn in entering, as to interfere greatly with a rapid elevation of water. The incline of the partitions directs the water to the ports so as to enter easily, and by giving the valve a motion in opposite directions in entering, the piston is exactly balanced, so that no turning motion is produced, and no irregularity of action ensues.

The central chamber, *f*, not only serves as a receptacle for the water entering from the outside, but is also of a particular form and construction, as shown, so as to admit the valve, which is also of a special form.

We are not aware of any other piston in which such a chamber has been employed in combination with partitions *g g*, inclining or otherwise, with the ports alternating above and below the partitions in opposite angles, so as to allow ingress of water at either stroke.

This simplicity constitutes an especial feature in our invention, for our piston can be formed in a single piece at one casting, and requires but little fitting. In all double-acting pumps with which we are acquainted the piston is made up of several parts that have to be accurately fitted together.

The valve, by its peculiar arrangement, can also be formed in a single piece, the construction thus being very simple, and from the regularity of its outline being readily fitted. By the arrangement of its ports *l l'*, as before described, it will be perceived that but very small movement of the valve is necessary to change the induction from one side to the other. No packing is required, and the connection of the valve with the piston is so simple and effective that the ports cannot get out of order or become inoperative under ordinary circumstances.

In order to hold the valve in place in its chamber, we provide a removable bottom, G, Figs. 1, 2, and 5, of the same outline form as the valve-chamber. The ends of this bottom are provided with dovetailed edges *m m*, which slide into corresponding notches *n n* in the rim of the piston. This is the only fastening that we employ to hold the bottom in place, and it is very secure, since, when in place, the bottom cannot slide in either direction on account of the piston fitting closely in the cylinder. This is a very simple and effective means of securing the valve in place in its chamber, requiring no riveting, bolting, or complicated fastening, and allowing the valve to be easily removed at any time, when desired. Thus the piston and valve are composed of but three parts, and these are put together without bolting.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination of the piston, consisting of the rim *d*, chamber *f*, and partitions *g g*, and the valve, consisting of the hollow axis or bearing *i*, and wings *k k*, operating substantially in the manner and for the purpose herein set forth.

2. The special construction of the piston, consisting of the rim *d*, chamber *f*, and inclined partitions *g g*, arranged and operating substantially as described.

3. A piston having partitions *g g*, situated, respectively, on opposite sides, and inclining in opposite directions, with induction-ports *h h'*, in the opposite angles above and below, for the purpose of admitting water at the opposite strokes and balancing the piston, substantially as described.

4. The special construction of the valve, consisting of the hollow axis or bearing *i*, and wings *k k*, and provided with the induction-ports *l l'*, substantially as and for the purpose set forth.

5. Securing the valve D in its chamber *f* by providing the removable bottom G with the dovetailed edges *m m*, fitting in corresponding notches *n n* of the rim, as herein specified.

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