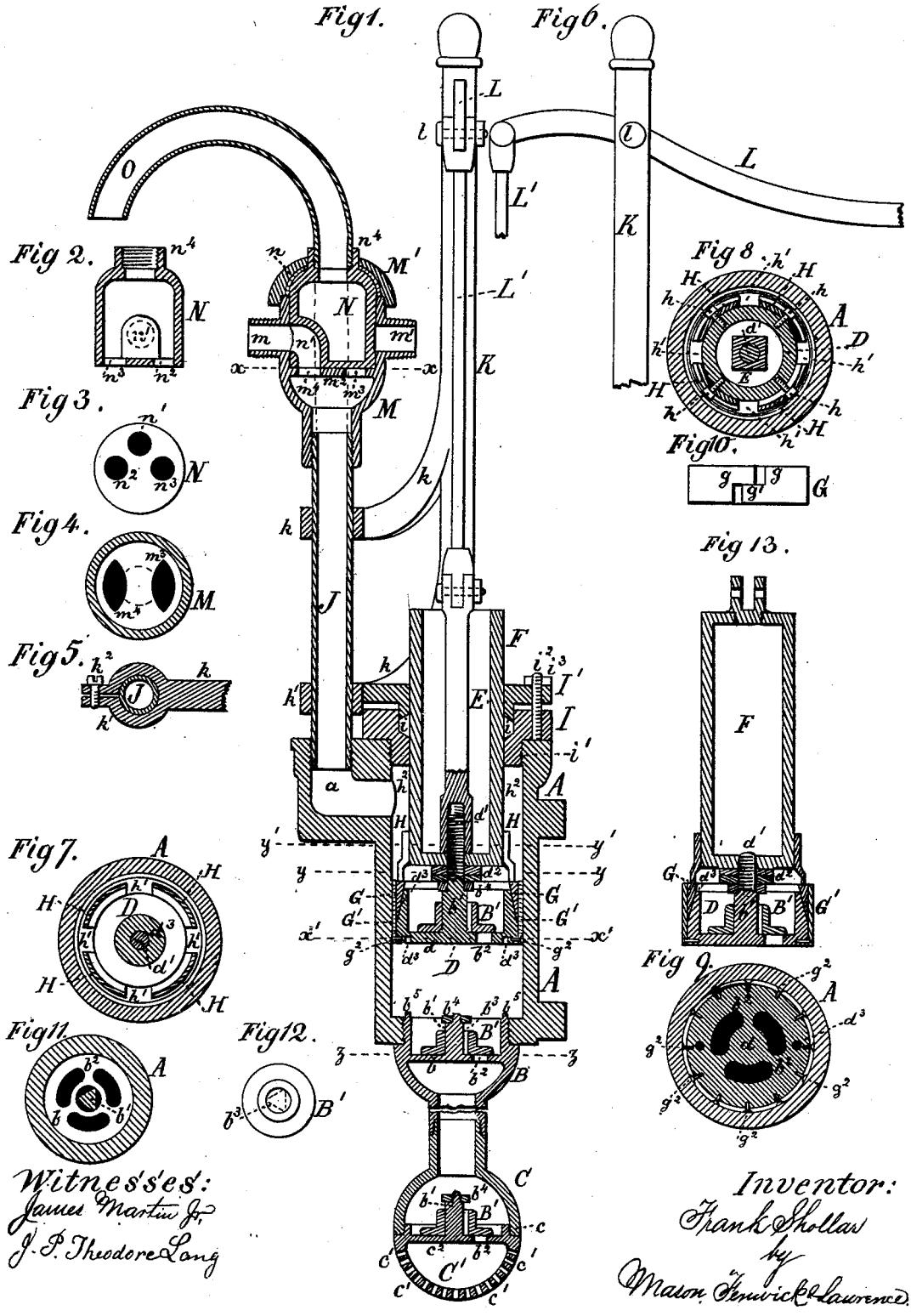
F. SHOLLAR.

Pump.

No. 206,048. Patented July 16, 1878.



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UNITED STATES PATENT OFFICE.

FRANK SHOLLAR, OF OTSEGO LAKE, MICHIGAN, ASSIGNOR OF ONE-HALF HIS RIGHT TO ALBERT M. HILTON, OF SAME PLACE.

IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. **206,048**, dated July 16, 1878; application filed March 11, 1878.

To all whom it may concern:

Be it known that I, FRANK SHOLLAR, of Otsego Lake, in the county of Otsego and State of Michigan, have invented a new and useful Improvement in Pumps, which improvement is fully set forth in the following specification and accompanying drawings, in which latter—

Figure 1 is a vertical central section of one of my improved pumps. Fig. 2 is a detail view of a nozzle-valve used therein. Fig. 3 is a bottom view of the same. Fig. 4 is a horizontal section of its valve-chamber, showing the valve-face. Fig. 5 is a detail view in section, illustrating the means of fastening the fulcrum-stand of the pump-handle. Fig. 6 is a detail view of the upper part of the said fulcrum-stand. Fig. 7 is a horizontal section through the pump-cylinder and piston in the line *y y* of Fig. 1. Fig. 8 is a similar section in the line *y' y'* of Fig. 1. Fig. 9 is a similar section in the line *x' x'* of Fig. 1. Fig. 10 is an elevation of an expansible packing-ring used in the piston of my pump. Fig. 11 is a horizontal section in the line *z z* of Fig. 1. Fig. 12 is a top view of one of the pump-valves, and Fig. 13 is a sectional view of a modified construction of the pump-piston.

The nature of my invention consists in certain constructions, combinations, and arrangements of parts hereinafter fully described and specifically claimed, whereby a pump is produced which is a single-acting lift-pump and a double-acting force-pump of novel and improved construction.

In the drawings, A represents the cylinder of a pump, and B its bottom part, which is of semi-spherical shape, and is divided by a diaphragm, *b*, into two compartments. The diaphragm *b* is provided with a central valve guide-stem, b^1, of triangular shape, as its section shows in Fig. 11, and around the stem a number of ports, b^2, are concentrically arranged, which are closed by a flat valve, B', fitted to slide up and down on the stem b^1. The hole b^3 of the valve B' is round, so as to allow room around the stem b^1 for water-passage. A triangular nut, b^4, screwed to the top part of the stem b^1, limits the stroke of the valve and permits the water to pass out of the hole b^3 of the valve. The described valve and stem are all within the compartment above the diaphragm *b*, and do not project into the cylinder, and therefore cannot be struck by the descending piston. A suction-pipe of ordinary construction connects the lower part of the valve-chamber B with a strainer consisting of two semi-spherical vessels, C C', screwed together at *c*, the lower one, C', of which is provided with openings c^1 and a diaphragm, c^2. The diaphragm c^2 is provided with a central triangular stem, b^1, nut b^4, ports b^2, and valve B', the same in construction and operation as those described in the valve-chamber B.

The piston D has a flat bottom, *d*, provided with ports b^2, valve B', triangular stem b^1, and nut b^4, all as before described, with the only difference that the stem b^1 is made larger and provided with a long screw, d^1, whereby it is fastened to the piston-rod E and a plunger, F. A number of washers, d^2, are placed between the bottom of the plunger F and the nut b^4 in order to adjust the distance between the piston and plunger. The circumference of the piston is conical, as seen at d^3 in Fig. 1, and over it an expansible ring, G, of wedge-shaped section, is fitted. The ends *g* of the said ring are stepped, as seen in Fig. 10, and have a well-fitted water-tight joint, g^1, at their horizontal parts. Around the exterior cylindrical surface of the said ring G a leather packing, G', is fitted, which below the ring is fastened, by screws g^2 or otherwise, to the piston D. A number of stays, H, Fig. 8, are fastened by means of screws *h* to the lower part of the plunger D, touching with their lower ends the upper surface of the ring G, thereby keeping it in place, while the spaces h^1 between them serve as water-passages.

The plunger F has its packing *i* in an annular packing-chamber, I, which at i^1 is screwed to the top of the cylinder A, and to which the gland I' is attached by means of screw-bolts i^2 and nuts i^3. The upper surface of the valve-chamber B has two or more small projections or lugs, b^5, and the piston D has in its bottom two recesses, d^3, of the same size, and directly opposite the said lugs, so that by letting down the piston and giving it a slight turn to the right or left (after the pis-

ton-rod is disconnected from the operating-lever) the recesses d^3 are caused to slip over the lugs b^5 and lock the piston, or prevent it from turning, while the piston-rod E is unscrewed in order to exchange or remove the washers d^2.

By unscrewing the piston-rod E in this manner the plunger becomes disconnected, and by unscrewing the packing-chamber I both may be removed from the cylinder A without disturbing the piston D, and the operator can now easily make such change of the washers d^2 as he deems necessary to effect the desired adjustment of packing. The change of the washers from thicker to thinner, and vice versa, brings the piston D nearer to the plunger or farther from it; and in consequence thereof the stays H will either press the expansible ring G farther down or allow it to move up higher, whereby the leather packing G′ becomes more or less expanded. By this means the leather packing may be used until it is almost if not quite worn out.

The cylinder A has near its top a side chamber, *a*, to which a discharge-pipe, J, is fastened. A fulcrum-stand, K, is, by means of two arms *k*, with split clamps k^1 and set-screws k^2, as seen in Fig. 5, fastened to the discharge-pipe J, and, with the fulcrum-pin *l*, supports the pump-lever L, which is, by means of a connecting-rod, L′, connected with the piston-rod E.

To the top of the discharge-pipe J a valve-chamber, M, is attached, which has two opposite hose-connections, *m* m^1, and a diaphragm, m^2, with ports m^3 m^4, of elongated shape and contracted at their ends. A cylindrical valve, N, is fitted into the chamber M, and held down upon the diaphragm m^2 by means of a lid, M′, screwed to the chamber M, the friction of the said parts being reduced by inserting an elastic washer, *n*, between the lid M′ and the top of the valve N. The bottom of the valve N (see Fig. 3) is provided with three ports, n^1 n^2 n^3, equidistant from the center of the valve, two of which ports, n^2 n^3, are diametrically opposite and open into the inner space of the valve, while the third one, n^1, is located between them, as shown in said figure, and terminates at the side of the valve at the same height with the hose-connections *m* m^1. The top of the valve N is provided with a central socket, n^4, into which a curved nozzle, O, is fastened.

In Fig. 13 a modified construction of the plunger is shown, whereby the piston-rod is rendered unnecessary, the plunger being hollow in order to save metal.

Operation: In order to start the pump efficiently, the suction-pipe and the space above the valve B′ in the valve-chamber B must be filled with water. When the piston D moves down, the water below is forced through the ports b^2, the valve B is lifted, and the water ascends around the edge of the valve and through the spaces between the triangular stem b^1 and the round central hole b^3 of the valve; thence through the spaces h^1 (see Fig. 7) between the stays H into the annular space h^2 between the plunger F and the cylinder A.

The space h^2 having less area than the space below the piston, the water rises much higher above the piston than it was below, and when the pump is in full operation the downward stroke of the piston effects a discharge of water at the nozzle O, as well as the upward stroke. When the piston D moves up the water above it is forced out of the cylinder A into the discharge-pipe J, and the valve B′ in the valve-chamber B is lifted by the water ascending from the strainer C C′, the valve B′ of which is also lifted by the water of the well entering through the holes c^1 and ports b^2 into the suction-pipe. The water which leaves the pump passes through the chamber *a* and the discharge-pipe J into the valve-chamber M, and, according to representation in the drawing, it passes through the port n^1 into the connection *m*, to be conducted hence by means of hose to its place of destination. If the other connection, m^1, is to be used, the valve N is turned half around, whereby the port n^1 is brought opposite the said connection. If a discharge of water from the nozzle O is desired, the valve N is turned ninety degrees, or at a right angle with its former position. This will bring the ports n^2 n^3 opposite the ports m^3 m^4 or m^4 m^3, causing the discharge-water to enter the inner space of the valve N and pass out of it through the nozzle O.

As my pump has no air-vessel, I have provided precautionary means against accidents by "bursting" in shaping the ports m^3 m^4 (see Fig. 4) in such manner that they always communicate either with the port n^1 or the ports n^2 n^3, and consequently the discharge can never be wholly cut off. Thus, if during a powerful operation of the pump the valve N should suddenly be turned, the small leakage allowed the ports between the changes of their relative position will be sufficient to prevent an accident to the machinery. The valves B′, having central passages for the water around the triangular stems b^1, are thereby adapted to a shorter stroke, as less water has to pass around the outer edge of the valve.

Having described my invention, what I claim is—

1. The combination of the piston D, having a stem, b^1, and screw d^1, the plunger F, and the piston-rod E, whereby the said parts are united, substantially as set forth.

2. The combination of the plunger F, having stays H, the piston D, having a conical surface, d^3, stem b^1, screw d^1, adjusting-washers d^2, and expansible wedge-shaped ring G, and the piston-rod E, whereby the packing G′ of the piston is expanded or relieved, substantially as set forth.

3. The combination of a valve-seat diaphragm, having ports b^2, triangular valve-stem b^1, and check-nut b^4, and the valve B′, having a cylindrical central hole, b^3, substantially as and for the purpose set forth.

4. The combination of the piston D, having recesses d^3, and the valve-chamber B, having lugs b^5, substantially as and for the purpose set forth.

5. The strainer C C′, being united at c, and having diaphragm c^2, ports b^2, stem b^1, and valve B′, having check-nut b^4, substantially as set forth.

6. The pump-cylinder A, in combination with the removable valve-chamber B, having diaphragm b, ports b^2, stem b^1, and valve B′, substantially as set forth.

7. The combination of the pump-cylinder A, discharge-pipe J, fulcrum-stand K, having arms k, clamps k^1, and set-screws k^2, substantially as set forth.

8. The valve-chamber M, in combination with the pump and its conducting or discharge pipe J, having diaphragm m^2, ports m^3 m^4, hose-connections m m^1, and adjustable lid M′, in combination with the valve N, having ports n^1 n^2 n^3 and pipe-socket n^4, whereby the use of an air-chamber can be dispensed with and the discharge of the water is never entirely cut off, and thus bursting prevented, substantially as and for the purpose set forth.

9. The expansible wedge-shaped packing-ring G, having stepped ends g and a water-tight joint, g^1, substantially as set forth.

Witness my hand, in the matter of my application for a patent for a pump, this 6th day of March, A. D. 1878.

FRANK SHOLLAR. [L. S.]

Witnesses:

NELSON R. GILBERT,

CHAS. S. BRINK.