W. F. RAYMOND.
Force-Pumps.

No. 199,380. Patented Jan. 22, 1878.

Fig: 1.

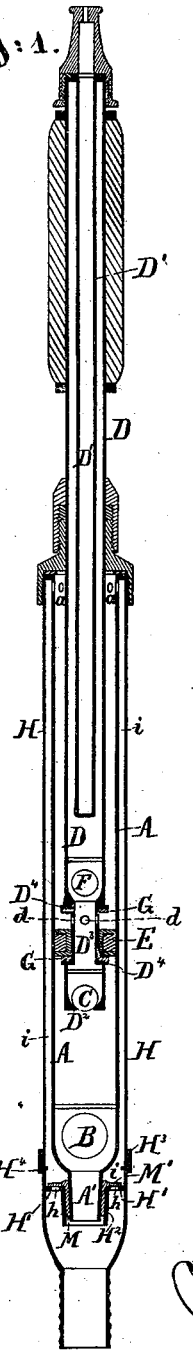
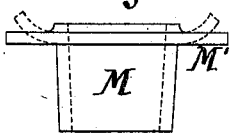


Fig: 2.



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UNITED STATES PATENT OFFICE.

WILBUR F. RAYMOND, OF BROOKLYN, ASSIGNOR TO HIMSELF, CHARLES A. ALLEN, OF NEW YORK, AND AUSTIN G. FOSTER, OF SENECA FALLS, NEW YORK.

IMPROVEMENT IN FORCE-PUMPS.

Specification forming part of Letters Patent No. **199,380**, dated January 22, 1878; application filed June 25, 1877.

To all whom it may concern:

Be it known that I, WILBUR F. RAYMOND, of Brooklyn, Kings county, in the State of New York, have invented certain new and useful Improvements relating to Pumps, of which the following is a specification:

My improvements may be applied with some success to many kinds of pumps; but I have in my experiments applied it only to portable pumps. I believe that it will be by far the most useful in pumps of that class.

I have succeeded in devising an arrangement and construction whereby a strong and continuous stream is thrown with a very compact and reliable mechanism.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a central longitudinal section, and Fig. 2 is one of the details on a larger scale detached.

Similar letters of reference indicate like parts in all the figures.

The barrel is marked A. It is contracted at its lower end, forming a seat for the lower valve B, and extends a little distance below this valve-seat in a slightly-tapered extension, A′, on which tapered part is fitted a short length of rubber tube, M, with a broad rubber flange or annular rim, M′, the functions of which will presently appear.

The top of the barrel is contracted, with a packing and provisions for compressing and adjusting it. Through the packing works a polished tube or hollow piston rod or plunger, D, the upper part of which is adapted to be grasped by the hand for operating it. The extreme top carries a changeable tip or nozzle, which connects with a smaller tube, D^1, extending down the interior of the hollow rod D to about the extent indicated.

This tube D is peculiarly formed and equipped at and near its lower end. At the bottom is a contraction, D^2, forming a seat for a ball-valve, C. A little above the tube is contracted suddenly in diameter, and is continued of that reduced diameter a sufficient length to form thereby a seat, on which the loose annular piston E may freely play within certain limits. This piston E may be mainly of metal packed with a soft fibrous material, and forming a practically-tight fit on its inner edge against the contracted part D^3 of the tube D, and at its outer edge against the interior of the barrel A.

I can employ one or more washers of rubber, G, fitting against slight extensions or flanges D^4 D^4, which aid in making a tight fit when the annular piston E presses against the same.

A series of holes, *d*, are made through the tube near the upper end of the contracted portion D^3.

I form an annular water-chamber, *i*, around the exterior of the barrel A by inclosing it within an exterior casing, H. A series of holes, *a*, near the top of the barrel, put the upper end in communication with the annular chamber *i*.

The exterior casing H is extended downward below the extension A′ of barrel A, and adapted to receive a hose or other suitable connection, as may be required. Within it, a little above the base, is a short tapering tube, H^2, supported by means of an internal flange, H^1, which latter is liberally perforated with holes *h*, and forms the seat for the annular valve M′, before referred to.

When the pump is adjusted for use, the rubber portion M forms a tight-fitting connection between the extension A′ at the lower end of the barrel and the internal tube H^2.

The exterior casing H is formed with a screw-coupling, H^3, which, on screwing down, forms a tight joint by the aid of a slight rubber ring, H^4, applied as represented. On connecting the coupling H^3, the parts come to a tight bearing on the rubber H^4 at the same moment as the tapering extension or socket A′ comes to a tight bearing in the rubber-packed interior of the tube H^2.

To allow for want of mathematical perfection in this respect, the tube H^2 and the ex-

tension A′ are made with only a slight taper, so that by the yielding of the rubber M between them the socket or extension A′ may be thrust deeper down or may be arrested higher up, and still the joint be tightly maintained by the rubber M within considerable limits.

I provide screw-connections with other suitable couplings at the top, and at other convenient places, if desired. The exterior of the structure, being more exposed to injury from blows and otherwise than the internal parts, is liable to become bruised and defaced.

The annular chamber between the exterior casing H and the barrel A performs a double function of allowing considerable indentations in the exterior casing without affecting the barrel, and also of affording a liberal water-passage for the water to reach the holes *a*.

I prefer ball-valves of rubber or other suitable material for the valves B and C, and in such case I can cage them, respectively, by extending a pin across a little above each, as represented.

I propose, in most cases, to employ an additional valve, F, in the position represented, also caged by a pin above, which serves as a check.

Operation: The parts being applied efficiently together, and the pump filled with water, pressing down the hollow piston-rod D causes the valve B to close and the valve C to rise and receive water from the lower portion of the barrel into the hollow piston-rod, and to be discharged through the nozzle or tip at the top. The loose piston E, during the early portion of the descending movement, rises both by the friction of its exterior against the barrel and by the pressure of the water below to the upper end of the contracted portion D^3, in which position it covers the holes *d*, and constitutes for the time being an absolutely tight piston, which, as it descends, not only compresses the water in the barrel below and forces it out through the nozzle at the top, but also draws in water into the upper part of the barrel through the holes *a*, which water is received freely through the annular space between the barrel and the exterior casing H by the lifting of the flexible flange or valve M′.

So soon as the hollow piston-rod D has reached the lower end of its motion, and the force of the hand at the top is applied to draw it upward again, the valve B rises to receive water into the lower portion of the barrel, the valve C closes the lower end of the piston-rod, and the valve M′ drops onto its perforated seat, preventing any back flow through the holes *a*, and imprisoning the water in the upper part of the barrel. At the same time the annular piston E is shifted to the lower end of the contracted portion D^3, and exposes the holes *d*, through which the water in the upper part of the barrel is received freely to be discharged through the nozzle at the top. There is thus a discharge at the top, both with the descent and with the ascent of the hollow piston-rod.

In order to maintain a continuous stream, I provide an air-chamber by utilizing the upper portion of the hollow piston-rod D exterior to its inclosed tube D^1. Care must be taken that in charging the pump it be held upright, so as to retain air in the space referred to.

In pumping rapidly, or forcing the water to any considerable height through a hose coupled on the nozzle, under any conditions where the pressure in the pump is considerable, the water will rise around the lower end of the interior tube D^1; but it will never rise to the top. It will always retain an annular chamber of air, which, by its elastic compressions and expansions, keeps the current of water practically uniform.

Various modifications may be made in the details. Thus, for example, I can solder or otherwise permanently join the upper ends of the internal tube H^2 with the hollow piston-rod D, and thus reduce the chances of leaking the air from the air-chamber.

I can provide a cross-handle adapted to receive both hands, and can equip the pump with a base adapted to receive the feet of the operator. This may be desirable in some peculiar situations; but I prefer the parts as here specified.

Some of the parts may be useful without the others.

For general miscellaneous use all the principal parts should be of brass, and as light as consistent with the proper strength.

The valve F, mounted in the hollow piston-rod D, performs the duties simply of a check-valve, to aid the other valves in resisting a backward flow when the pump is at rest. It may be dispensed with altogether when desired.

I claim as my invention—

1. The valve C, mounted below the movable piston E, in combination with the hollow plunger D, having the holes *d*, and with the barrel A, having the holes *a*, and a suitable exterior casing, H, and valves B and M, as herein specified.

2. The valve M′, with its tubular part M, and the means for confining it between the extension A′ and the tube H^2, extending downward from the seat H^1 *h*, as herein specified.

3. The combination of the screw-coupling H^3 and its packing H^4 in the exterior casing H with the tapering tube H^2, rubber valve M M′, and tapering extension A′, extending downward from the barrel A, as and for the purposes herein specified.

4. In combination with the barrel A, ex-

terior casing H, hollow plunger D, and hollow movable piston E, the delivery-valve C below and the check-valve F above said piston, and carried therewith on the hollow plunger, and with suitable valves B and M′ seated on the fixed parts, as and for the purposes specified.

In testimony whereof I have hereunto set my hand this 19th day of June, 1877, in the presence of two subscribing witnesses.

WILBUR F. RAYMOND.

Witnesses:

THOMAS D. STETSON,

CHAS. C. STETSON.