H. A. M. Harris,

Pump Lift,

No. 52,709, Patented Feb. 20, 1866.

Fig. 1

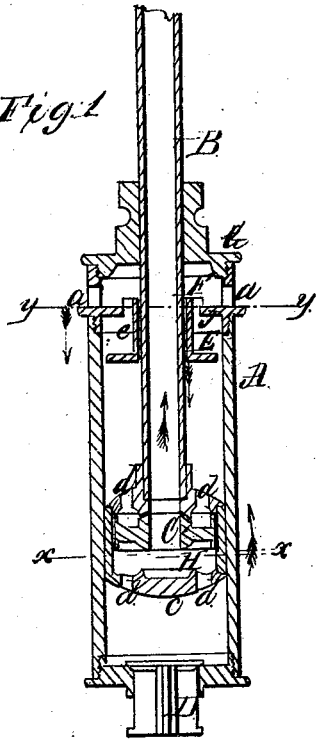


Fig. 2.

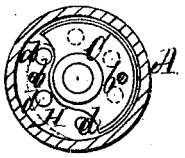
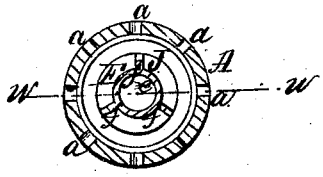


Fig. 3



Witnesses:
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UNITED STATES PATENT OFFICE.

H. A. M. HARRIS, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. **52,709**, dated February 20, 1866.

To all whom it may concern:

Be it known that I, H. A. M. HARRIS, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Pumps for Oil and other Wells; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in in which—

Figure 1 is an elevation of an axial section of a pump made according to my invention, the line of section being seen at *w*, Fig. 3. Fig. 2 is a cross-section taken through the pump and the piston on the line *x*, Fig. 1. Fig. 3 is a cross-section taken through the upper valve-chamber on the line *y*, Fig. 1.

The object of this invention is to produce a pump which can be used when immersed in the liquid to be raised, and which can be worked effectively at great depths. A vacuum is formed both at the top and the bottom of the cylinder without the use of the ordinary outside water-ways, a valve-chamber being formed in the top of the cylinder, and the sides of the cylinder being perforated with numerous holes to admit the liquid to the valve.

A designates a cylinder, the bottom of which is provided with an inlet-valve, D, working in the usual manner.

B is a hollow piston-rod, carrying a hollow piston, H, which may be described as a cylinder with perforated heads *c c*, through the upper one of which heads is also a central opening, which communicates with the foot of the hollow piston-rod.

C is a circular valve set within the piston, and having a central opening through it, which communicates with the hollow space of the piston-rod when the valve is raised to its highest position.

The letter *d* designates the perforations in the heads of the piston. They are arranged circularly in said heads, and are alternately opened and closed by means of the valve C as it alternates from its highest to its lowest position in the piston.

A valve-chamber, F, is formed in the upper part of the cylinder, between its upper head, J, and the cap G. The head J has a central opening in it wide enough not only to permit the passage of the piston-rod through it, but also to leave an annular space between the edge of the opening and the sides of the piston. This annular space forms a valvular passage, which is governed by an annular valve, E, in whose center is placed a thimble or collar, *e*, which moves freely on the piston-rod.

The letters *f* designate ribs, which extend radially from the collars and whose office is to guide the valve in opening and closing. The upper ends of the guiding-ribs are extended outward, so as to form hooks, which engage with the rim of the head J when the valve is down, as seen in Fig. 1, and thus the valve is suspended below its seat.

The letters *a* designate openings made through the sides of the chamber to establish free communication between it and the well.

The operation of the pump is as follows: Supposing the piston to be moving downward, its valve C would be driven upward against the upper head, *c*, of the piston, the perforations *d* in which would then be closed, and any fluid or liquid contained in the lower part of the cylinder would enter the perforations *d* in the bottom of the piston and pass through the center of the valve into the piston-rod. In the meanwhile the descent of the piston will create a partial vacuum in the upper part of the cylinder, and the pressure of the liquid in the well will cause it to enter the chamber through the side openings, *a*, and to open the valve E, so that the upper part of the cylinder will be filled. On the ascent of the piston its valve C will be forced against its lower head, the valve E will become closed, and the liquid in the cylinder above the piston will pass into the piston through the perforations in its top, and thence into the piston-rod.

It will be observed that in operating my invention the column of liquid collected in the piston-rod is effectually prevented, under all conditions of the piston, from reacting on the liquid in the well, and that the formation of the vacuum in each end of the cylinder proceeds without encountering any direct resistance from such column; and, further, that when the fresh supply of liquid in either end of the cylinder is about to be forced into the piston-rod, the same is put, by reason of the

peculiar construction of the piston and its valve, into direct communication with such column.

I claim as new and desire to secure by Letters Patent—

1. The described arrangement in the cylinder A of the lower inlet-valve, D, hollow piston-rod B, hollow piston H, double-acting valve C, annular valve E *e*, and openings *a*, the whole being applied and combined to operate in the manner set forth.

2. The arrangement within the hollow piston H of the double-acting valve C, when said valve is fitted to the bore of the piston and formed with annular recesses at its upper and under sides, as represented.

3. The arrangement of the annular valve E, hollow piston-rod B, head J, cap G, and openings *a*, as and for the purpose set forth.

H. A. M. HARRIS.

Witnesses:

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