(No Model.)

J. W. HILLIKER.

DOUBLE ACTING PUMP.

No. 268,675. Patented Dec. 5, 1882.

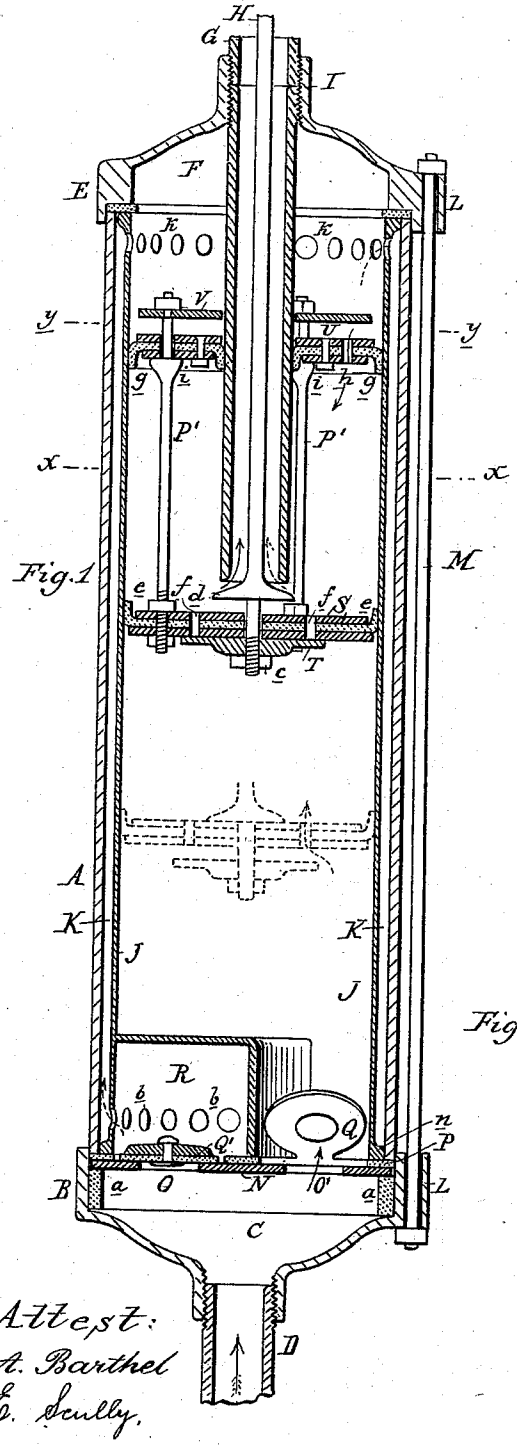


Fig. 1

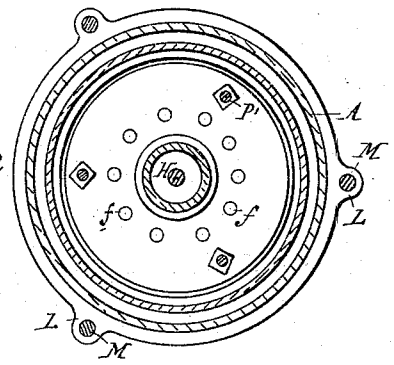


Fig. 2

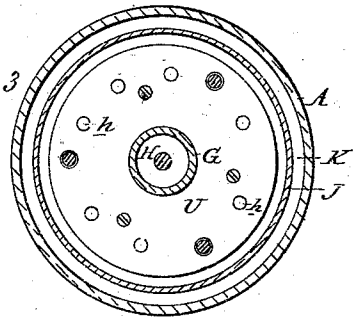


Fig. 3

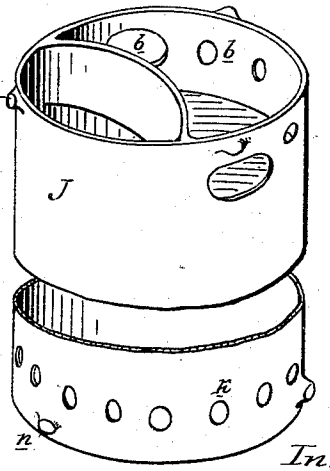


Fig. 4

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UNITED STATES PATENT OFFICE.

JAMES W. HILLIKER, OF ST. JOHN'S, MICHIGAN.

DOUBLE-ACTING PUMP.

SPECIFICATION forming part of Letters Patent No. 268,675, dated December 5, 1882.

Application filed March 15, 1882. (No model.)

To all whom it may concern:

Be it known that I, JAMES W. HILLIKER, of St. John's, in the county of Clinton and State of Michigan, have invented new and useful Improvements in Double-Acting Pumps; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

The nature of this invention relates to certain new and useful improvements in that class of pumps usually denominated "double-acting pumps;" and the invention consists in the new and novel construction of the parts, and their various combinations and operations, as more fully hereinafter described.

Figure 1 is a vertical central section, showing the position of the piston and the valves actuated therewith just before the termination of the upward stroke, and also showing in dotted lines the change in the position of the inlet-valve as found near the completion of the downward stroke. Fig. 2 is a cross-section on the line X X in Fig. 1. Fig. 3 is a cross-section on the line Y Y in Fig. 1. Fig. 4 is a sectional perspective of the inner cylinder inverted.

In the accompanying drawings, A represents an outer cylinder provided at bottom with a cap-bottom, B, which forms a chamber, C, into which the inlet-pipe D admits the water. The upper end of this cylinder A is also provided with a cap, E, forming the chamber F, through which the discharge-pipe G, inclosing the pump-rod H, passes, said discharge-pipe being screwed into the neck I of the cap E, so as to form a tight joint at that point. This cylinder may be made of wood or metal, as may be desired.

J is an inner cylinder fitted within the cylinder A, so as to leave an annular water-space, K, between the two. The caps B and E are provided with suitable ears, L, and bolts N, by means of which the parts are held together.

N is a diaphragm provided with two water-passages, O and O'. This diaphragm fits within the cap-bottom B upon ledges or shoulders *a*, and P is another diaphragm resting upon the diaphragm N, and provided with coincident water-passages, and each of these water-passages is provided with a clap-valve, Q and Q', which, when seated, find a resting-point upon the diaphragm N. The valve Q allows water in the chamber C to pass directly into the interior of the cylinder J at one stroke of the piston, while at the opposite stroke this valve Q is closed, when the valve Q' admits the water from the chamber C into the chamber R, formed within the cylinder J, and the wall of this chamber is provided with a series of openings, *b*, which allow the water therein to pass into the annular space K between the two cylinders. The outlet-pipe G enters the inner chamber of the cylinder J nearly half the length of said cylinder, as shown in Fig. 1, and within this pipe G the pump-rod H has its vertical reciprocating motion. At the lower end of this pump-rod there is sleeved the valve S in such manner that the rod has a vertical play through said valve, which, however, is limited by the nut *c* and the stop *d*. This valve S is provided with suitable packing, *e*, to compel it to work tightly in the barrel, and it is also provided with a series of holes, *f*, which in the reciprocating motion of the pump-rod are alternately closed and opened by means of the disk-valve T, secured on the lower end of the rod and held in place by the nut *c*. This valve S is secured to the valve U by means of the bolts P', and the latter-named valve is provided with packing *g* to form a tight joint between the valve and the wall of the chamber J and the wall of the outlet-pipe H, upon which said valve is sleeved. This valve U is also provided with a series of holes, *h*, for the passage of the water, which holes are alternately closed or opened by means of the disk-valve V, which is secured to the top of the bolts P', which bolts are provided with the stop *i*, and upon these bolts the valve U is sleeved in such manner that in the reciprocations of the pump-rod the valves V and T are alternately forced to close and open their particular water-passages before the rod will compel a reciprocating motion of the plunger which is formed of the valves U T. Around near the top of the cylinder J are a series of holes, *k*, through which the water, which, as before described, has been admitted between the walls of the two cylinders, will pass from such annular space into the chamber of the inner cylinder. This inner cylinder, J, is provided with offsets or knobs *n*, to secure it centrally within the outer cylinder, so that the annular space

between the two will be uniform. Of course it will be understood, although not shown in the drawings, that the upper end of the pump-rod is attached to any brake or other power for giving it a reciprocating motion. Upon the first part of the downward stroke of the rod the disk-valve V closes the water-passages through the valve U, and simultaneously therewith the valve T opens the water-passages through the valve S. When these two valves have been forced downward to a certain limit, controlled by the means already described, the stop *d* impinges against the top of the valve S and forces the plunger formed of the two valves U S downward. This allows the water in the chamber to pass up through the water-passages *f* and into the outlet-pipe G, as shown in dotted lines. During the downward passage of the plunger the valve Q is closed by the pressure of the water thereon, while the valve Q′ opens and admits water into the chamber R, and through the water-passages *b* into the annular space K. This water flows upward through this space and through the water-passages *k* into the cylinder J, and follows the plunger down to the limit of its stroke. Upon the commencement of the upward motion the position of the valves V and T is instantly and simultaneously reversed, and as soon as this is done the rod commences lifting the plunger, which forces the water above it through the water-passages *h* into the space between the two valves U S, whence it is discharged through the pipe G, so that at each alternate reciprocation of the plunger water is admitted into the bottom and top of the chamber and discharged in a nearly-continuous stream through the outlet.

What I claim as my invention is—

1. In a pump composed of an inner and outer cylinder, with a uniform space between the two, the inner cylinder being perforated above and below, and provided at the lower portion with valves which alternately admit water to the main chamber and to the annular space, a plunger formed by means of the two valves U S, having water-ways through each, and the disk-valves T V, adapted to open and close such water-ways by the direct action of the pump-rod before the plunger receives motion, all combined and operating as set forth.

2. The cylinders A J, arranged concentrically, with a water-space between the two, and the latter being perforated above and below, combined with the valves U S and the disk-valves T V, the connecting-rods P′, and the water-ways *f h*, as and for the purpose specified.

JAMES W. HILLIKER.

Witnesses:
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