

Double-Acting Pump.

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IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. 38,308, dated April 28, 1863.

To all whom it may concern:

Be it known that I, WILLIAM M. HENDERSON, of Baltimore city and State of Maryland, have invented a new and useful Improvement in Double-Action Suction and Force Pumps; and I do hereby declare the following to be a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a longitudinal section, and Fig. 2 a transverse section through the line Y Z of Fig. 1.

The object of this improvement is to simplify, first, the construction, and, secondly, the operation of double-action suction and force pumps, first, by casting in one piece the barrel, air-vessel, and connecting-ports of a double-action suction and force pump in such manner that the barrel and air-vessel shall be parallel to each other and separated only by a simple diaphragm or partition, which is both the top wall of the pump-barrel and the bottom wall of the air-vessel, having openings at its ends which are short and direct connecting ports between the barrel and the air-vessel; secondly, by the peculiar arrangement of the valves, in connection with the suction port, forcing directly into the air vessel the entire body of water propelled by the piston at each stroke, as hereinafter more fully described.

A is the pump-barrel; B B', passages communicating with C, the air-chamber.

D D' are the pump-heads.

E is a piston-rod working through a stuffing-box in the front head, D', on which are placed at a distance apart equal to the stroke of the pump the buckets F F', with the suction-valves G G' attached and opening outward from each other. These buckets or pistons are similar to the air-pump buckets used on condensing-engines. The delivery-valves H H' are of the same description, and are secured at each end of the barrel by the projections on the heads, as shown.

I is the suction, and J the discharge pipe.

In case of derangement or need of repairs to any of the valves, they are all readily got at by removing the heads.

The operation of this pump is as follows: The water enters by the suction-pipe I into the space between the pump-buckets, and when

the rod is moving in the direction indicated by the arrows it forces open the suction-valve G', filling the vacuum created by this movement, and by the same operation of the rod the bucket F is expelling whatever may be in the other end of the barrel through the delivery H. When the stroke is reversed, this valve closes, and the water from the suction-pipe forces open the suction-valve G by the created vacuum, and so fills this end of the barrel in readiness for the change of the stroke. The valve G' is closed by its pressure against the water, which is then driven in a mass through the delivery-valve H' into the air-chamber. A repetition of this operation will cause the water to flow in a steady stream from the discharge-pipe.

As regards the first object of this improvement, the more nearly a perfect pump can be cast in one piece the less will be the cost of fitting it. There would be, however, great difficulty in extracting the cores in casting any air-vessel having narrow communicating passages with the pump-barrel, through which passages the bulk of the sand has to be withdrawn after the casting is made, that would render it altogether unattainable with the usual-shaped air-vessel. The arrangement here shown presents, on the contrary, no greater difficulty in this respect than is generally met with in the run of ordinary castings, as the core of the air-vessel can all be readily scraped out through the openings B B' and at the discharge-pipe connections. The advantages arising from this plan are that less metal is required, it makes a more compact pump, and saves expense of fitting.

In regard to the second part of this improvement, I have ascertained by numerous practical experiments that the closer the piston of any pump works to the discharge-valves at the ends of the stroke, thereby driving out, as near as possible, all the water from the pump at each stroke, the nearer will the really discharged quantity of water approach the absolute force used in working the pump, and this, too, with a great saving of power, since the force given out by the piston is expended solely on the discharged water and not consumed in moving backward and forward a dead mass of water which is not discharged. It is also very common for air to occupy this excess of space,

which is even worse on the pump than the moving of the water would be, as the first part of the stroke is expended in compressing this air before the water can be acted upon, thus virtually shortening the effect of the stroke and entailing a wasteful expenditure of power. Again, the velocity acquired by the motion of the water in the suction-pipe is in this pump turned to account in doing work, for it will be seen by reference to the already-described operation of this pump that the current flows in a continuous direction from the suction-pipe through the discharge-pipe, avoiding thereby all reversing of current and all concussion.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The arrangement of the pump-barrel A and the air-vessel C, as herein set forth.

2. Two suction valvular pistons connected and moving together in the same line in a single barrel, the valves opening at different times and in opposite directions, yet moving with their pistons through the cylinder at the same time and in the same direction at any one stroke, in combination with a cylinder having a central suction-pipe attached thereto, so as to be always between the two suction valvular pistons at all points of the stroke, as described.

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Witnesses:

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