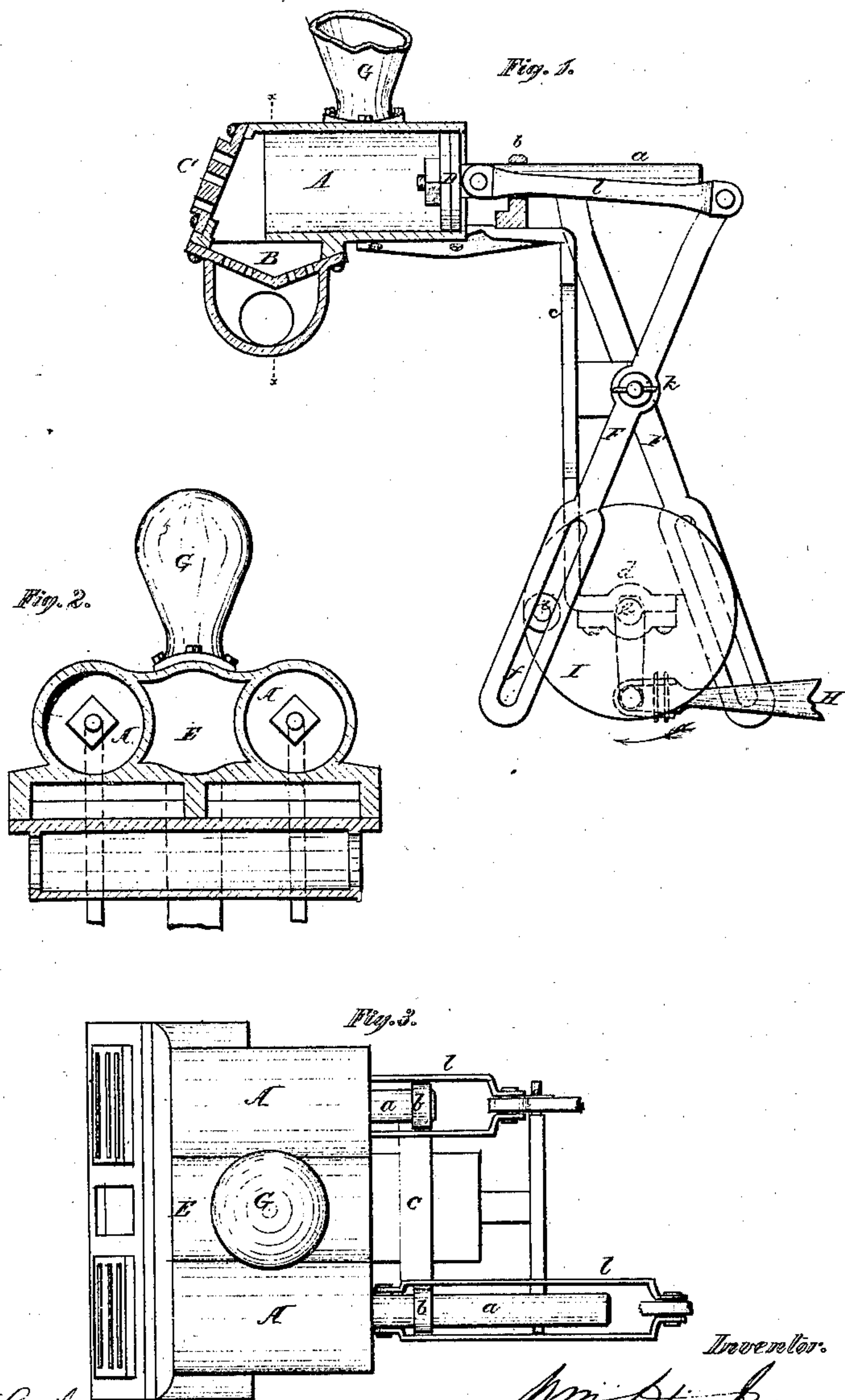


W. H. Ivens,

Double Acting Pump.

No. 99681.

Patented Feb. 8. 1870.



Witnesses.

Chauncy C. Smith,

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# United States Patent Office.

WILLIAM H. IVENS, OF TRENTON, NEW JERSEY.

Letters Patent No. 99,681, dated February 8, 1870.

## IMPROVEMENT IN DOUBLE CYLINDER FORCE-PUMPS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, WILLIAM H. IVENS, of Trenton, in the county of Mercer, and State of New Jersey, have invented a new and useful Improvement in the Construction of "Double Cylinder Forcing-Pumps;" and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, through letters of reference marked thereon, forming part of this specification, and in which—

Figure 1 represents a longitudinal section, taken through one of the cylinders.

Figure 2, a transverse section, taken on the line *x* *x* of fig. 1.

Figure 3, a top or plan view of the same.

The same letters occurring on the several figures indicate like parts.

The object of this invention is to facilitate the discharge of water from the forcing-chamber, which is accomplished by a novel arrangement of the discharge-valves with relation to the cylinder, whereby the passage of the water is continued in the same direction as the travel of the piston, thus avoiding the friction consequent upon the change of its course before entering the hose, and thereby economizing the power required for its expulsion.

It also consists in a novel arrangement of slotted levers, operated by cranks or eccentric wrists, so that by reversing the motion of the propelling-power, a longer or shorter leverage may be applied, as circumstances may require, in proportion to the length of hose through which it is necessary to force the water, or when throwing two or more streams. Also, to prevent what is termed racing, when under light work, giving the cylinder more time to fill, and the piston a more rapid travel, whereby a greater distance may be obtained.

Referring to the drawings—

A represents a cylinder of an ordinary single-acting forcing-pump;

B, its receiving-valve seat;

C, its delivery-valve seat; and

D, its reciprocating piston.

I prefer to arrange two or more cylinders A side by side, and between each pair an intermediate chamber, E, provided with an air-chamber, G, and having their piston-rods *a* passing through guides *b*, attached to the frame *c*, which supports the operating-cranks and levers.

At the lower end of this frame *c*, which may be suitably braced to give it the necessary rigidity, is supported, in suitable journal-boxes *d*, a crank-shaft, *e*, which is operated by a pitman, H, or other suitable propelling-agent, and on either end of this shaft *e* is a flange or crank, I, carrying a wrist-pin, *i*, which, in

the rotation of said flanges, operates in and through the slots *f*, to vibrate the lever F, which are supported on fulcrums *k*, and at their upper ends are connected by forked links *l* with their respective piston-rods.

Between the cylinders A, parallel with their axis, and formed in the same casting, is a passage, E, communicating with and forming part of the air-chamber G, by which the flow of water through the hose is rendered steady and continuous.

Having described the construction of my improved forcing-pump, it will appear that when the crank-shaft *e* is rotated in the direction indicated by the arrow, a quick motion will be given to the piston while expelling the contents of the cylinders, and a slow motion while they are filling, which enables them to work more effectively when a short section or two sections of hose are in use, or when the engine is inclined to race, to steady its motion; and by reversing the motion of said crank-shaft, more power and a slower motion is given to the piston in its forcing-stroke, to compensate for the additional friction in forcing water through a long section of hose, thus enabling the apparatus to reach a much greater distance with a given amount of steam-power than can be obtained by the ordinary unvariable means of connecting the steam-power with the pumps.

It will also be evident that by arranging the discharge-valves of the pumps opposite and in line with the travel of the pistons, the water is discharged therefrom directly into the hose without any change of its course, consequently all friction due to such change in the direction of its flow is avoided, and the power necessary to force a given quantity of water is materially lessened, as compared with the ordinary construction of steam-pumps.

Having thus described my invention,

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

1. The arrangement of the discharge-valve seat C, at the end of the cylinders, and in relation to the receiving-valves in place thereof, substantially as and for the purpose set forth.

2. The arrangement of a chamber or passage, E, between the two cylinders of the pump, for communication with an air-chamber, G, as shown and described, for the purpose set forth.

3. The arrangement and combination of the slotted lever F, wrist-pins *i*, with the piston-rods *a* of the pump, and the driving-shaft *e*, so that by reversing the motion of said driving-shaft, a greater or lesser leverage may be applied, substantially as and for the purpose set forth.

WM. H. IVENS.

Witnesses:

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