L. J. RUSSELL.

Double-Action Pumps.

No. 197,900. Patented Dec. 4, 1877.

FIG. 1

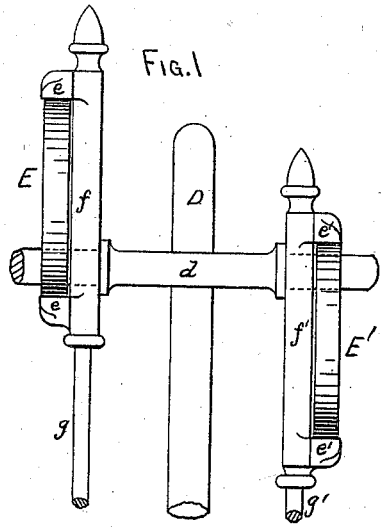


FIG. 3

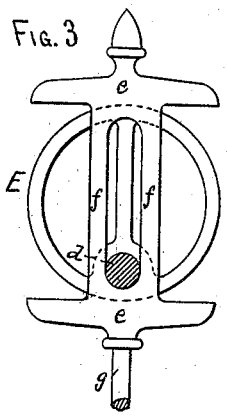
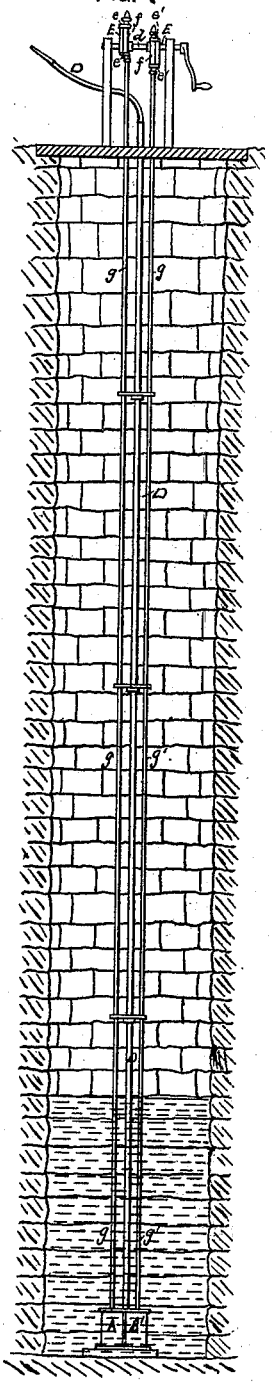


FIG. 4



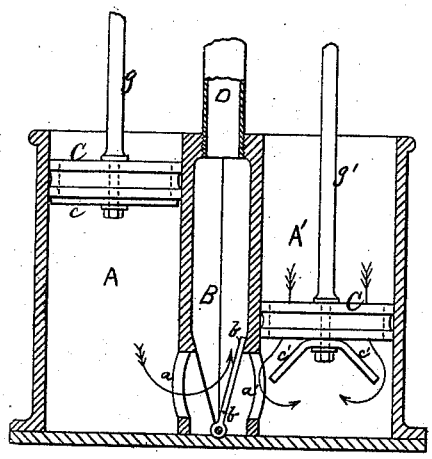
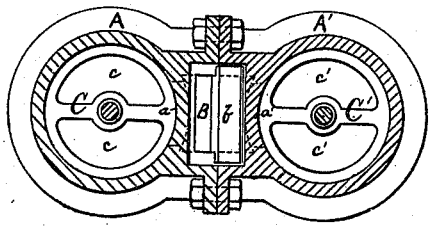


FIG. 2.



WITNESSES.

C. N. Woodward

J. F. Orcutt.

Leonard Johnson Russell,

INVENTOR, By

Louis Fessler Bleo, Atty's.

UNITED STATES PATENT OFFICE.

LEONARD J. RUSSELL, OF REDWOOD FALLS, MINNESOTA.

IMPROVEMENT IN DOUBLE-ACTION PUMPS.

Specification forming part of Letters Patent No. **197,900**, dated December 4, 1877; application filed March 24, 1877.

To all whom it may concern:

Be it known that I, LEONARD JOHNSON RUSSELL, of Redwood Falls, in the county of Redwood and State of Minnesota, have invented a new and useful Improvement in Pumps, which improvement is fully set forth in the following specification and accompanying drawings, in which—

Figure 1 is a sectional elevation. Fig. 2 is a plan view in cross-section. Fig. 3 is a side view of the cam arrangement for operating the pistons. Fig. 4 is a sectional elevation of a well, showing my pump arranged therein.

This invention relates to force-pumps; and consists in two cylinders having valves in their pistons, and connected by exit-ports to one common water-chamber, in which a double-acting valve is so placed as to act for both cylinders, as hereinafter explained.

The invention also consists in the combination and arrangement, with the pump, of a cam apparatus for operating them, as hereinafter set forth.

A A′ are two cylinders, and B a water-chamber formed between them. *a a′* are two ports, one in each cylinder, connecting the interiors of the cylinders and water-chamber together. *b* is a valve, hinged in the center of the bottom of the water-chamber, and having two inclined seats, one on each cylinder, so that both ports *a a′* may be closed alternately by the same valve. C C are the piston-heads, which are provided with downward-working valves *c c*, secured to their under surfaces. D is the conduit-pipe through which the water is forced. E E′ are two eccentrics, mounted upon a shaft, *d*, and having two cross-bars or slides, *e e*, parallel with the shaft, and connected together by yokes *f f*, surrounding the shaft *d*, and connected to the piston-rods *g g′*, by which means a parallel motion is given to the pistons without the use of guides or other apparatus.

The operation is as follows: When used for ordinary purposes, the eccentrics are set on opposite sides of the shaft *d*, as in Fig. 1, so that one piston will be up when the other is down. When the pistons are ascending, the water (which must always cover the cylinders) will force the valves *c c* open and fill the cylinders; but when the pistons are descending, the water beneath will close the valves, and thus be forced through the ports *a a′* into the chamber B, and up through the conduit D.

The pistons being operated alternately, it will be evident that the piston descending will force the valve *b* over against the opposite seat, and thus form an inclined plane, up which the water will be forced, which will thus do away with a large percentage of friction; and when the next piston descends, the valve *b* will be thrown over to the opposite side and form a like incline for the water from that cylinder, thus making the valve double-acting. By this arrangement I use the weight of the water to fill the cylinders, which renders the pump much more simple in construction, and, consequently, less liable to become disarranged than where a vacuum alone is depended on to operate the valves.

In this style of pump it is not necessary that the joints and piston-packing should be so perfectly water or air tight as in a suction or vacuum pump, as a small leak does not materially interfere with its action; consequently the pistons may be made to work much more easily than where they are tightly packed.

The manner of operating the pistons by the cams, parallel bars, and yokes is, so far as I am aware, a new feature as applied to pumps, and is a very important part of my invention, as by this means I do away with the necessity of all additional guides and other apparatus, and, consequently, a very large amount of friction, which is a very important advantage.

When it is desired to obtain a stronger stream, as in cases of fire, &c., both the eccentrics E E′ may be set on the same side of the shaft *d*, which will cause both pistons to be raised and lowered together, and thus force twice the quantity of water through the conduit in the same time, and obtain twice the power, while the valve *b* will remain stationary in the center of the water-chamber B.

The pumps may be used in a horizontal position, in some cases, to advantage.

I am acquainted with the patent of Jonas Haney, July 9, 1872, No. 128,877, who shows a double-acting valve; but it is arranged differently from mine, and is not used as an inclined chute to assist the water in its exit.

I am also acquainted with the patents of E.

Buzby, October 13, 1874, No. 155,923, and of F. J. Underwood, October 8, 1867, No. 69,595; but neither of them shows the valved pistons, nor do they operate in the same manner as mine.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A submerged force-pump, constructed as described, and consisting of the open-topped and closed-bottom cylinders A A′, water-chamber B, arranged between them, the vertical double-acting combined valve and chute *b* in the bottom of the chamber B, and the valved pistons C, all arranged to operate substantially as set forth.

2. The cam E, parallel bars *e e′*, yoke *f*, and shaft *d*, in combination with the piston-rods *g* and pump-pistons C, arranged and operated substantially as hereinbefore set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LEONARD JOHNSON RUSSELL.

Witnesses:

C. N. WOODWARD,

J. F. ORCUTT.