W. LOUDON.
Lift-Pump.

No. 207,536. Patented Aug. 27, 1878.

Fig. 1.

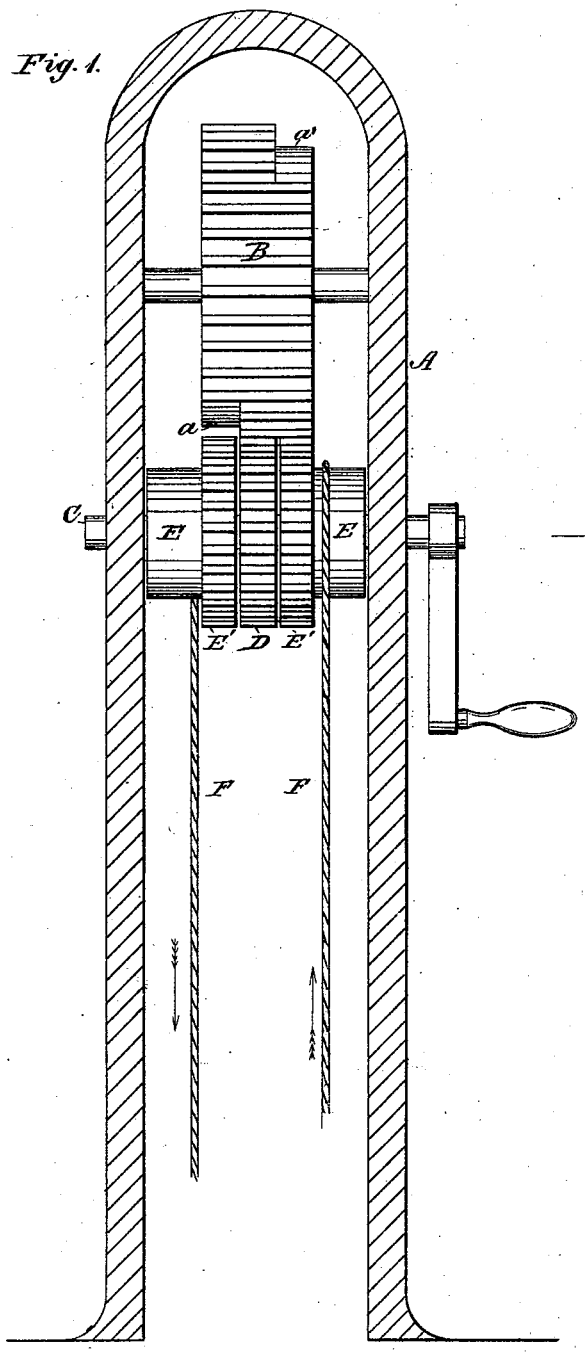
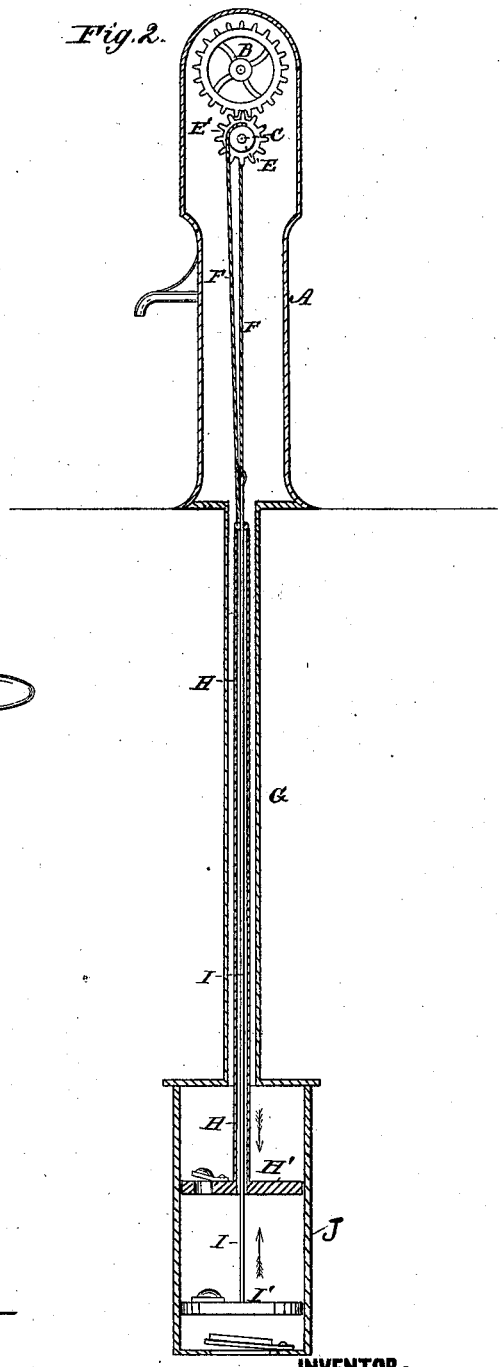


Fig. 2.



WITNESSES:

W. W. Hollingsworth

Solon C. Kemon

INVENTOR:

Wm Loudon

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM LOUDON, OF SUPERIOR, NEBRASKA.

IMPROVEMENT IN LIFT-PUMPS.

Specification forming part of Letters Patent No. **207,536**, dated August 27, 1878; application filed June 18, 1878.

To all whom it may concern:

Be it known that I, WILLIAM LOUDON, of Superior, in the county of Nuckolls and State of Nebraska, have invented a new and Improved Lift-Pump; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical section through the case, showing a front view of the gears. Fig. 2 is a vertical section through the case at right angles to the view in Fig. 1, and showing the application of the devices to a double-acting pump.

It has been found by experience that pumps, such as are now in use, having a short stroke and rapid movement of the piston, cannot be used successfully in the deep wells found throughout the Western States.

The object of my invention is to provide a simple form of pump, which may be operated at any suitable speed with a long stroke.

To this end my invention consists in operating the pistons through a rope or chain and a loose drum, which latter raises the piston to any suitable height by winding up the said rope or chain, the said drum being so constructed and arranged as to be thrown out of gear during a portion of its revolution, at which time the rope or chain unwinds and the piston-rod and piston descend from the gravity of the same.

The invention also consists in constructing and arranging the gears in a double-acting pump provided with my improvements so that the pistons descend in a less time than is required for the elevation of the same, whereby one piston is at the bottom, and commences to ascend before the other has quite completed its ascent. This, it will be seen, secures a continuous flow of water at the spout, which cannot be obtained when the pistons act alternately, and both start and stop at the same time.

In the drawings, A represents the pump-case, in the upper portion of which is journaled the wheel B. Just below the wheel B is arranged a shaft, C, having upon the outside of the case a crank-handle for turning the same. On this shaft is arranged a pinion, D, which is rigidly attached to said shaft centrally below the wheel B, and upon each side of this rigid pinion is arranged a loose drum, E, having a set of gear-teeth, E′, corresponding in diameter and adjacent to the rigid pinion. These three wheels, D and E′ E′, are just equal to the thickness of the upper wheel, B, with which they are geared, and this upper wheel has cogs or teeth in the middle line or part, which engage with the rigid pinion extending all around its periphery. Upon the outer and opposite edges of the wheel, however, which are in the plane of the loose drum-gears E′, the cog-teeth are cut away at diametrical points *a a′*. To the loose drums E are attached the ropes or chains F F, which extend downwardly through the well-tube G, and are attached, the one to the piston-rod H of the piston H′, and the other to the piston-rod I of the piston I′, arranged in the pump-cylinder J down in the well.

As the pistons are arranged concentrically in the pump-cylinder, one of the rods, H, is made tubular, and its piston H′ perforated to admit the passage of the rod I through the same for independent motion.

Now, in operating the double-acting pump as thus described, it will be seen that as the crank is turned the rigid pinion D gives continuous motion to the wheel B. As the latter revolves, its teeth upon one side (the left, for instance) engage the gear-teeth E′ of the drum E, and, by winding up the rope, elevate the piston attached thereto. Just before this first piston has reached its greatest elevation the gear-teeth upon the other side of the wheel B engage with the gear-wheel E′ of the right-hand drum E and start the piston up on this side. By the time the first piston on the left has reached its highest point the plain portion *a* of the wheel B has passed around to the left-hand gear-wheel E′, and, the loose drum being no longer held, the gravity of the piston-rod and piston on this side causes said drum to rapidly rotate in the reverse direction, paying out the rope or chain, and restoring the piston to its lowest point in a less time than is required for the ascent of the other piston, so that it begins to rise again before the other piston has completed its upward stroke. The two pistons are thus operated, partly alternately and partly simultaneously, to produce a constant and uniform flow of water at the spout.

In order to secure the proper registration of the teeth of the gear-wheels E′ and B, and to prevent the apices of two teeth from abutting, said teeth are made sharp or pointed at the top.

It is evident that many slight changes may be made in details of construction without departing from the spirit of my invention, which consists, broadly, in the application of a rope or chain and drum or windlass for the purpose of operating the pump-piston of any ordinary pump, or the pistons of a double-acting pump.

I would have it understood that I do not limit myself to any particular kind of rope or chain, nor to any particular form or kind of roller or windlass.

The double drum-chain in the drawing is, of course, intended for a pump with two pistons, or, in other words, a double-acting pump. For a pump with only one piston a single drum is sufficient.

All double-acting pumps of which I am aware only approximate a continuous flow of water.

The hand-lever, and, in fact, all that receive motion from a crank, either directly or indirectly, are far from perfect, as they contemplate only an alternate movement of the pistons; or, in other words, the pistons in an ordinary double-acting pump operate simultaneously, both moving at all times with equal speed, and both stopping and starting at the same instant.

Now, my idea in a double-acting pump is to allow the pistons, when the stroke is completed, to drop back or descend at a greater rate of speed than when they are ascending; hence one of the pistons would start on its ascending stroke before the other piston had completed its upward stroke, and the result is a piston moving upward all the time, and at no time would both pistons stand still.

Instead of transmitting power to the large wheel B through the lower shaft and pinion D, I may locate the crank directly on the shaft of the wheel B. The large wheel answers simply as a ratchet.

There are many forms or kinds of ratchets which might be used in connection with my drum arrangement; hence I do not limit myself to any particular kind.

Any length of cylinder or stroke of the pistons desired can be obtained by simply varying the size of the ratchet-wheels and drums.

In the drawings I have shown cog-wheels; but it will be seen that ratchet-wheels may be operated by friction-gearing.

Having thus described my invention, what I claim as new is—

1. A pump-piston combined with a rope or chain and a drum, arranged to be alternately rotated by its gears to raise the said piston, and released from the same to permit its rapid descent by gravity, substantially as and for the purpose described.

2. A double-acting pump having its pistons connected, through ropes or chains, with two loose drums provided with gears, substantially as described, to permit the pistons to descend in a less time than is required for their elevation, as set forth.

3. A double-acting pump having two pistons, each of which alternately moves in one direction more rapidly than in the reverse, by means substantially as described.

4. The wheel B, having its cogs cut away at *a a′*, upon the opposite edges of its periphery, in combination with the loose drums E E, having ropes or chains attached to the pistons, and gear-teeth E′ E′, arranged within the plane of the wheel B, to be alternately geared with and detached from the same, substantially as described.

5. The rigid pinion D, arranged on the crank-shaft, combined with the wheel B, constructed as described, and the loose drums E E, having gears E′ E′, and ropes or chains connecting with the pistons, substantially as described.

WILLIAM LOUDON.

Witnesses:
LOUIS CRABILL,
ALFRED E. BERESFORD.