

E. REYNOLDS.
PUMPS.

No. 177,005.

Patented May 2, 1876.

Fig. 1.

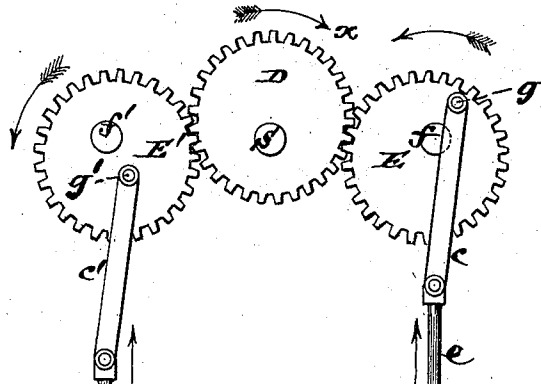


Fig. 2.

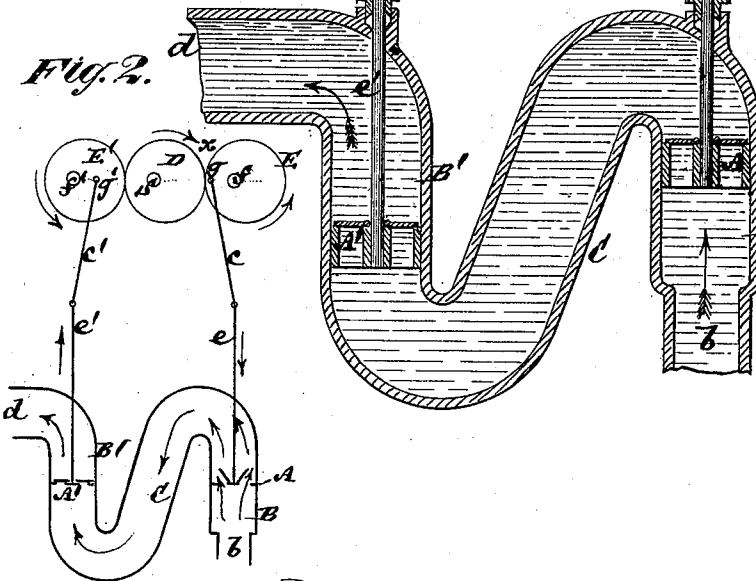


Fig. 3.

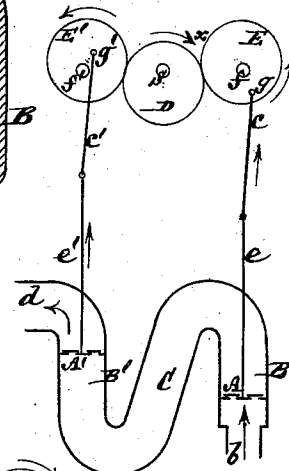


Fig. 4.

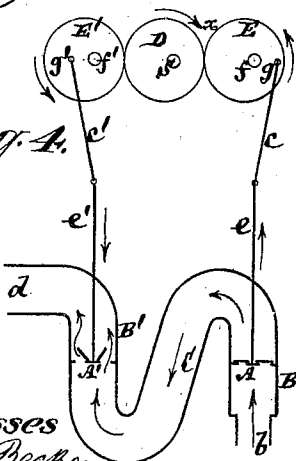
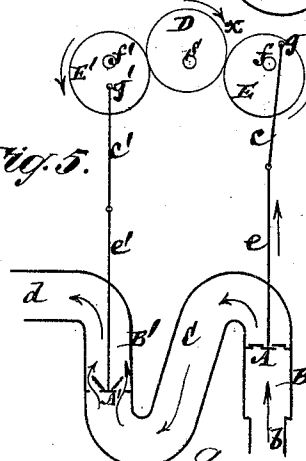


Fig. 5.



Witnesses
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EDWIN REYNOLDS, OF PROVIDENCE, RHODE ISLAND.

IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. **177,005**, dated May 2, 1876; application filed May 17, 1875.

To all whom it may concern:

Be it known that I, EDWIN REYNOLDS, of the city and county of Providence, in the State of Rhode Island, have invented certain new and useful Improvements in 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, which forms part of this specification.

This invention relates to double-acting pumps for raising water and other liquids, in which duplicate reciprocating plungers or buckets are employed; and consists in a novel and advantageous combination, with the two buckets, of triplicate spur-gears and duplicate crank or wrist pins, for operating said buckets.

In the accompanying drawing, Figure 1 represents a vertical section of a double-acting pump constructed in accordance with my invention; and Figs. 2, 3, 4, and 5, diagrams in further illustration of the action of said pump.

A A' are the two buckets, each provided with one or more valves opening upward, and arranged to reciprocate or work up and down within barrels B B', which may either stand at the same or different altitudes, but the one, B, of which has its receiving end below, *b* being the inlet, while the other barrel, B', communicates at its top with the outlet *d*, and the two barrels are connected—that is, the delivery end of the one barrel, B, with the receiving end of the other barrel, B'—by a duct, C. This forms a very simple and convenient or effective construction of a double-acting pump. S is the main or driving shaft, which is rotated by any suitable means in direction of, say, the arrow *x*. This shaft is fitted with an eccentric spur wheel or gear, D, which is intermediate of and gears with two eccentric spur-wheels, E E', arranged in reverse relation, or so that, while an increased velocity during a uniform speed of the driving-shaft S is communicated to the shaft of one of the gears E E', the shaft of the other of said gears moves at a slower velocity—that is, alternately as regards said gears E E'—throughout each entire revolution of their shafts *f f'*. On or connected with the gears E E' are reversely-arranged crank or wrist pins *g g'*, for communicating to the buckets A A', by means of pit-

men *c c'* and rods *e e'*, their requisite reciprocating movements in reverse directions simultaneously—that is, for a portion of their strokes—the eccentric gear giving either one bucket the lead of the other alternately, and causing them to move in like directions at intervals. Furthermore, the eccentric gears give each bucket a more rapid downward than upward movement, as required, and an approximate balancing action is obtained for the driving-gear; but the more particular object of the eccentric gear and their operating wrist-pins is to obtain, in a durable and effective manner, a differential movement of the buckets, whereby they are made to move in like directions at intervals, so that the entire load of the column is insensibly transferred from the one bucket to the other without causing material variation in the speed of the column, and so that the pump maintains practically a uniform and constant lifting action to the approximate equalization of the power applied, the liquid passing through both buckets in succession.

Thus, when the parts are in the position represented in Fig. 1, the buckets A A' are moving simultaneously in an upward direction, and for the moment at a uniform velocity, when the valves of both buckets are gradually closed, free from all slamming or heavy wear and tear, and without any interruption in the flow. From this point the bucket A' continues its upward movement at a greater velocity than the bucket A till the wrist-pin *g* of the latter reaches its top dead-center, causing the valves in the bucket A to open, while the valves of the bucket A' continue closed. When the buckets reach the position shown in Fig. 2, the bucket A' is continuing to rise, with its valves closed, while the bucket A is descending at a greater velocity by means of the eccentric gear, with its valves open, and when the buckets arrive at the position shown in Fig. 3 they again move at a uniform velocity, both buckets rising; and having, for the moment, their valves closed. From this point the bucket A' slackens in its upward velocity till the wrist-pin *g'* reaches its top center, while the upward movement of the bucket A is accelerated, the valves of the latter keeping closed, but the valves of the bucket A' being open, and keeping open during the subsequent

descent of the latter, as shown in Fig. 4, and not only till said bucket A' arrives at its extreme bottom stroke, as shown in Fig. 5, but till the bucket A, which continues to rise, again approximates in velocity the bucket A' during its rising stroke, when the valves of both buckets again momentarily and gradually close, after which the valves of the bucket A open, and subsequently the bucket A descends with its valves open, while the rising bucket A' has its valves closed. Thus it will be seen that the buckets have lead, the one of

the other, alternately at reverse ends of their stroke.

I claim—

The combination of the two eccentric spur-gears E E' with the intermediate spur-gear D, the wrist-pins g g', and the two buckets of a double-acting pump, essentially as described.

EDWIN REYNOLDS.

Witnesses:

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