A. Knecht,

Lift Pump.

No. 108,365. Patented Oct. 18. 1870.

Fig. 1.

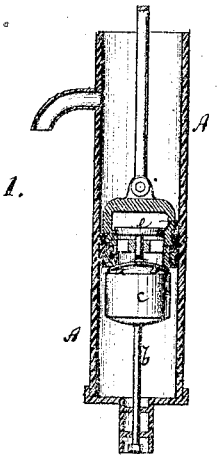
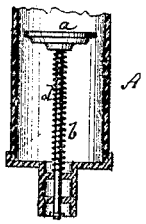


Fig. 4.



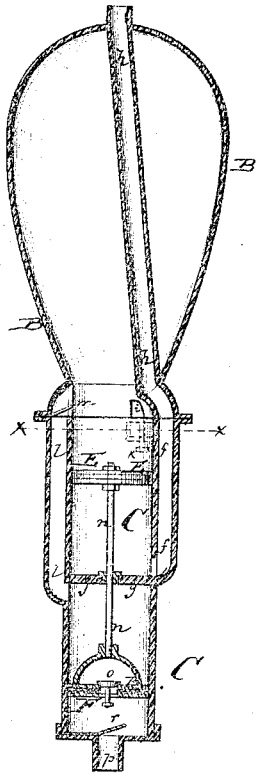


Fig. 3.

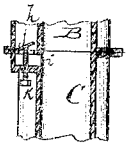
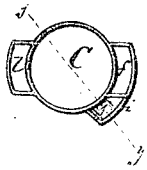


Fig. 2.



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Letters Patent No. 108,365, dated October 18, 1870.

IMPROVEMENT IN 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, ADAM KNECHT, of Ilchester, in the county of Howard and State of Maryland, have invented a new and improved Pump; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing forming a part of this specification.

Figure 1 represents a vertical section of my improved pump.

Figure 2 is a detail horizontal section of the same, taken on the plane of the line *x x*, fig. 1.

Figure 3 is a detail vertical section of the same, taken on the plane of the line *y y*, fig. 2.

Figure 4 is a sectional side view of a modification of the upper valve.

Similar letters of reference indicate corresponding parts.

The object of this invention is to construct a pump for deep wells which will draw water where ordinary pumps are insufficient, and one which may be placed any suitable distance away from the well to convey the water to any desired locality.

The invention consists in such a construction of parts that atmospheric and hydraulic force will be combined for operating the pumps, each force being applied by simple mechanism, but so that the efficiency of the whole apparatus is greatly increased.

The pump consists of three principal parts, a common force-pump, A, an air-chamber, B, and a cylindrical lower part, C.

The force-pump A contains a valve, *a*, in its lower part. This valve is secured to the upper end of a stem or rod, *b*, and is supported by a float, *c*, as in fig. 1, or spring *d*, as in fig. 4.

D is the piston of the pump A. This piston contains a valve, *e*.

The float *c* or spring *d* holds the valve *a* up to the middle of the piston-stroke, but allows it to be easily depressed by the piston D.

The air-chamber B is arranged on the upper end of the cylinder C.

On the side of the upper half of the cylinder is a chamber or pipe, *f*, which communicates at its lower end with the cylinder directly above a horizontal partition, *g*, of the same.

The upper end of the pipe *f* enters a pipe, *h*, that passes longitudinally through the air-chamber.

The upper end of the pipe *h* connects with the lower end of the force-pump, whatever the distance may be between the force-pump and air-chamber.

A short pipe, *i*, connects the upper end of the cylinder C with the lower part of the pipe *h*, and contains a valve, *j*, which can be held open by a screw, *k*.

Another pipe, *l*, containing a valve, *m*, connects the lower end of the air-chamber with the cylinder C directly below the partition *g* of the same.

Within the cylinder C is arranged a double piston, E F, at the two ends of a piston-rod, *n*. The rod passes through a packing in the partition *g*, and has the piston E at the upper and F at the lower end.

The upper piston, E, is solid; the lower is perforated, and contains a valve, *o*.

p is the supply-pipe, leading into the lower end of the cylinder C, and provided with a valve, *r*.

The operation is as follows:

The piston D, before starting the pump, is first depressed until the valve *e*, in the piston, rises. Water is then poured into the pump until the pipe *h* is filled, when the screw *k* is applied to raise the valve *j* and allow the water to pass from the pipe *h* into the cylinder C, above the piston E.

The screw *k* is then again lowered to let the valve operate freely.

The piston D is now moved at half strokes, in order to draw all the water from the air-chamber.

When the air-chamber is empty the piston is set into full motion; when being elevated it works on the atmospheric principle, as there is atmospheric pressure in the air-chamber against the water, the air pressure equalling that of the water in the pipe above it.

When the piston D is being lowered the valve *e* opens, and allows the water to pass through it until the piston strikes the valve *a*. By said valve it is closed, so that no more water can pass through it.

As the piston D descends still further with the valve *a* it will force the water from the pipe *h* into the chamber *e*, and thence into the cylinder C, below the piston E, elevating the latter by hydraulic force. Thereby the lower piston, F is also elevated, and, as its valve, *o*, closes, caused to force water through the pipe *l* into the air-chamber.

The next upward stroke of the piston D will draw the water from the air-chamber, through the small pipe *i*, into the pipe *h*; as the water, however, cannot pass the valve *j* rapid enough to fill the vacuum behind the piston D, pressure is applied to the top of the piston E and the same thereby lowered.

The alternate atmospheric and hydraulic action is thus repeated as long as reciprocating motion is imparted to the piston D.

Having thus described my invention,

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

1. The combination, with a pump having the valves *a e*, of the air-chamber B, partitioned cylinders C *g*, double pistons E F, passages *f h i l*, all relatively arranged and provided with valves, as described.

2. In a pumping apparatus, the combination of partitioned cylinder C *g*, pistons E F, and passages *f l*, provided with the valves and openings specified, as and for the purpose described.

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Witnesses:

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