A. & M. KNECHT.

Pump.

No. 166,786. Patented Aug. 17, 1875.

Fig. 3.

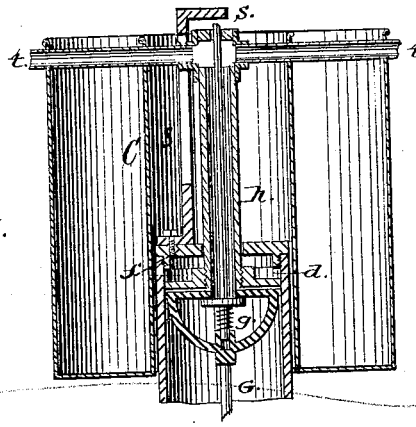


Fig. 1.

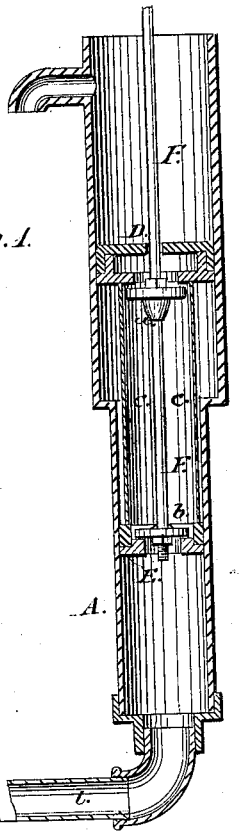
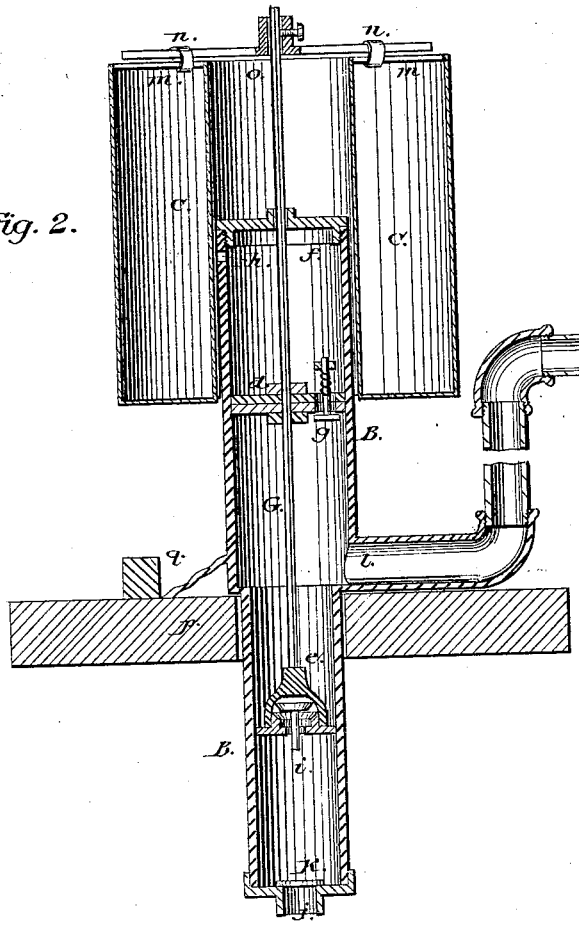


Fig. 2.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. **166,786**, dated August 17, 1875; application filed April 10, 1875.

To all whom it may concern:

Be it known that we, ADAM KNECHT, of Ilchester, in the county of Howard and State of Maryland, and MICHAEL KNECHT, of Grantsville, in the county of Garrett and State of Maryland, have invented a new and useful Pump; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing making a part of this specification.

The object of this invention is to construct a combination-pump which can be set and operated more than thirty-three feet above the surface of the water—that is, above the atmospheric allowance—and one which can be placed at any suitable distance from the well or spring, as the case may be, and operated wherever desired. To accomplish this we use an auxiliary pump combined with a force-pump. The auxiliary pump we place not more than twenty-five feet above the surface of the water, and the force-pump wherever it is desired to operate it, and connect both pumps by a pipe. The force-pump we operate by hand or otherwise, and the auxiliary pump we operate by applying hydraulic force to the pistons by means of the force-pump, and by using the water in the pipe as a piston-rod, as it were, on the principle that water is non-elastic. For great altitudes we add a weight, compressed air, or a spring to the piston of the auxiliary pump.

Figures 1 and 2 are vertical sections of our pump. Fig. 3 is a modification of the piston *d* and valve *g* of Fig. 2.

Similar letters of reference indicate corresponding parts.

The pump consists of three principal parts—a force-pump, A, an auxiliary pump, B, and a weight, C, or its equivalent. The pump A has one portion of the cylinder larger than the other, and contains one large and one small piston, respectively, D and E. These pistons are connected by the rods *c c*. Two valves, *a* and *b*, are secured to the rod F. This pump can also be connected directly with a steam-cylinder vertically or horizontally, and used as a steam-pump. The auxiliary pump B has one portion of the cylinder larger than the other to correspond with the force-pump A. Two pistons, *d* and *e*, are connected to the piston-rod G, which latter extends through the cap *f*. There is a safety-valve, *g*, held up by a spring, which opens when it meets with the cap *f*, and relieves the pressure in case the piston *d* should rise too high. The waste water escapes through the port *h*. This safety-valve may be arranged in the communicating pipe at any suitable point, being controlled, as in the case shown, by the extent of stroke of the piston *d*. The piston *e* contains a valve, *i*. Below the piston *e* is the supply-pipe *j*, which has a valve, *k*. In the center of the cylinder, and between the two pistons, is a port, *l*, which connects with the supply-pipe of the force-pump A. The weight C is a truncated cylinder, and surrounds the upper part of the auxiliary pump B. This cylinder is made of sheet metal, is closed below and open above. It has two cross-pieces, *m m*, around which are two loose rings, *n n*. To the upper end of the piston-rod G is secured the cross-piece *o*, which supports the weight C by means of the rings *n n*. The pump rests on a plank or foundation, *p*. There is a rest, *q*, for the weight C when down.

Instead of the piston *d* and valve *g*, a piston and valve, as in Fig. 3, can be used. The stem of the valve passes through the pipe *h*, and a check, *s*, is arranged on the cap *f*, against which the stem will strike and open the valve in case the piston should rise too high, and the waste water will escape through the pipe *h*, and thence out at the pipes *t t*. The weight C has holes at the upper end, through which the pipes *t t* pass to support it.

The operation is as follows: The pump is filled either by pouring water into the pump A or by pumping water into it, by raising and depressing the piston-rod G of the pump B. When both pumps and pipe are filled with water, gravel or other material is put into the cylinder C until it balances the water in the pipe *l*. This done, the pump is ready for use. In the downward motion of the rod F in the force-pump the valve *b* meets the piston E, and, closing it, the water below is forced down the pipe *l* and into the pump B between the two pistons. The area of the piston *d* being

greater than that of the piston *e*, the former will rise by hydraulic pressure, and carry with it the latter *e*, which, by atmospheric pressure, draws water through the pipe *j*. In the upward motion of the rod F the valve *a* meets with the piston D and closes it, while the valve *b* opens to let the water through and fill the vacuum formed by the piston D as it rises, and the water above the piston is discharged through a pipe or nozzle. Thus the upward motion of the piston D takes the atmospheric pressure off the pipe *l*. The weight C thereby released causes the piston *d* to descend, forcing the water into and along the pipe *l*. The alternate atmospheric and hydraulic action is thus repeated as long as reciprocal motion is imparted to the rod F.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent of the United States, is—

1. The force-pump A, having cylinder of differing bores, and open connected pistons fitting said bores, and double-valved rod applied to said pistons, as shown, in combination with an auxiliary differential pump, and both receiving its water from, and operating said auxiliary pump through, a single communicating pipe, *l*, all substantially as set forth.

2. The auxiliary differential pump B, having cylinder of different bores, and provided with valved piston *e* and piston *d*, containing automatic regulating or safety valve *g*, both upon the rod G, with or without the weight attached, in combination with a force-pump and communicating pipe, substantially as and for the purpose described.

3. The pump B, having one portion of the cylinder larger than the other, for the purpose of setting the pistons in motion by applying pressure between the two pistons, as shown and described.

4. In a compound pump, as shown, a valve controlled by the stroke of the piston, and arranged to act automatically to regulate the volume of water in the cylinders and connecting pipe, substantially as described.

5. A weight, C, made and constructed in the shape of an annular vessel, or of any suitable form, to be filled with gravel or some other substance, in combination with the compound pump described and shown, for the purpose set forth.

6. The combination of the piston G, a rod or tube extended therefrom through the cylinder-head, and a cross-bar or tube suitably attached thereto and to the weight, as and for the purpose set forth.

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