

A. D. LAWS & J. C. COOKE.

Improvement in Pumps.

No. 115,745.

Patented June 6, 1871.

Fig. 1.

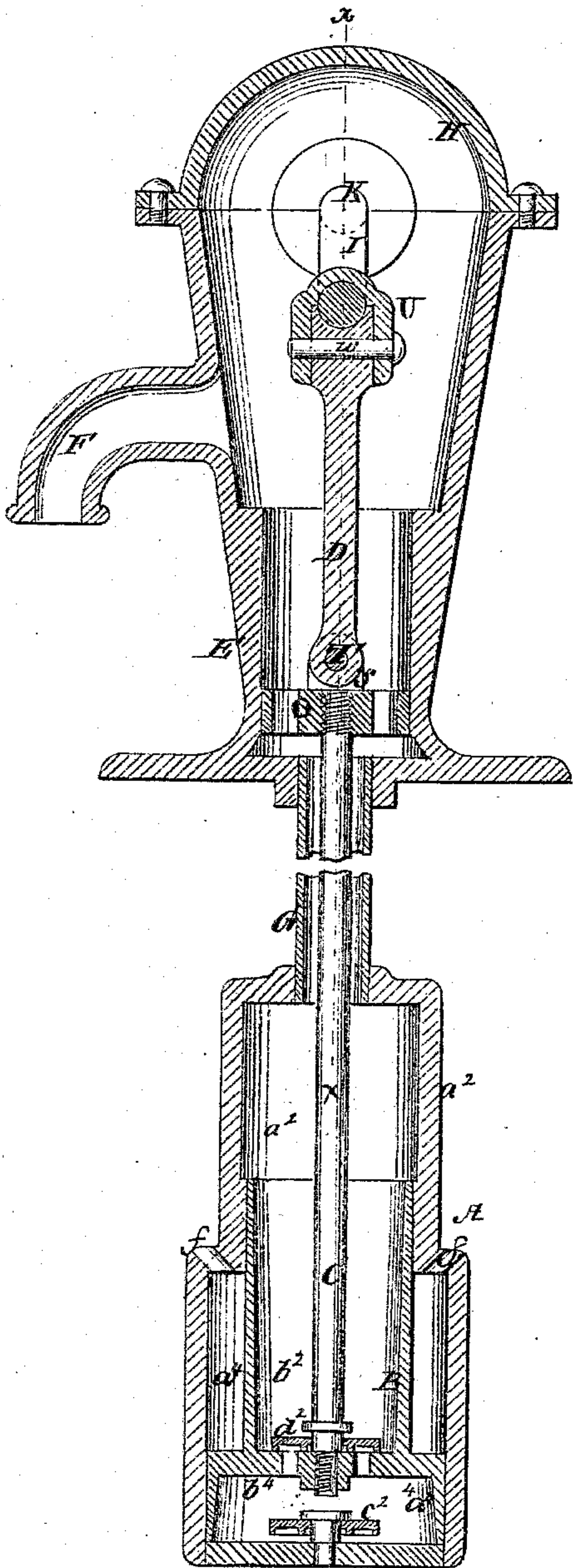


Fig. 2.

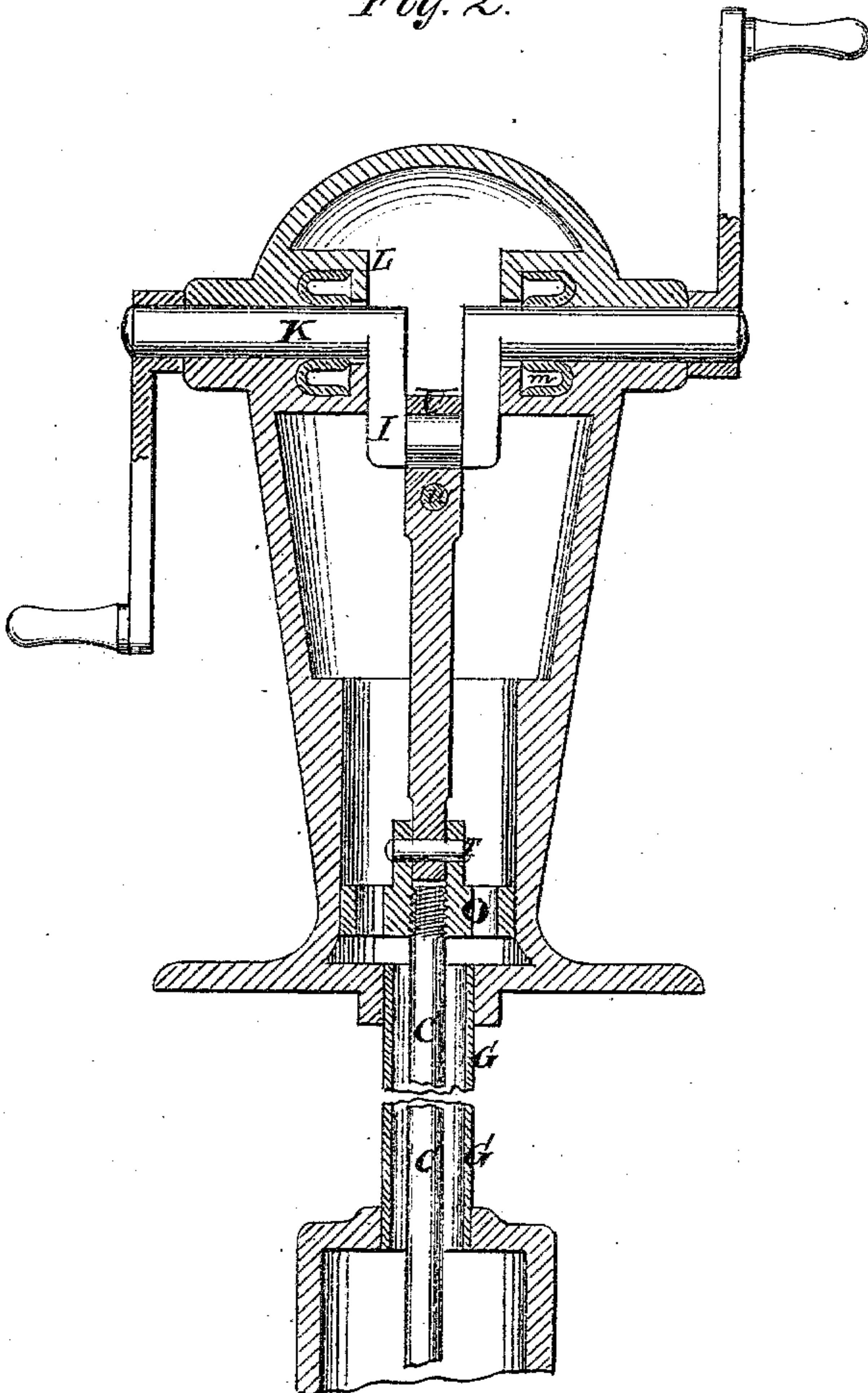
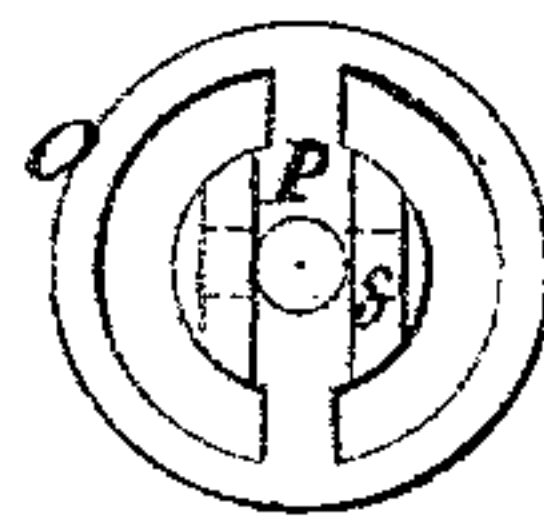


Fig. 3.



Witnesses:

*Alfred B. Furman*

Inventor:

*A. D. Laws & J. C. Cooke.*  
*Per atty. J. W. C. Little.*



# UNITED STATES PATENT OFFICE.

ALBERT D. LAWS AND JAMES C. COOKE, OF BRIDGEPORT, CONNECTICUT.

## IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. 115,745, dated June 6, 1871.

*To all whom it may concern:*

Be it known that we, ALBERT D. LAWS and JAMES C. COOKE, of Bridgeport, Fairfield county, in the State of Connecticut, have invented certain new and useful Improvements in Pumps; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing making part of this application.

Previous to our invention a great variety of pumps has been devised and used, and made the subject of numerous patents, in nearly all of which, however, the same principle or mode of operation has been followed, the machines having been made to be either "single acting" or "double acting." One great objection to a single-acting pump is the loss of power and time in alternately lifting the column of water and allowing it to stand still during the descent of the piston, though it has a vast field of application, in which it answers better than the double-acting pump. It has been suggested to make a pump with a single cylinder, and so as to effect a constant lifting of the column of water by means of two pistons working through each other, one lifting the water while the other descends through it. Our invention has for its main object to so construct a pump with a single piston and one cylinder that the column of water shall be kept in motion continually, being lifted at each up-stroke and forced up at each down-stroke of the piston by means simple and effective; and our invention has for a further object to produce this kind of a pump in a simple and cheap form, and at the same time, so that it will operate as a complete force-pump, and not be liable to derangement, leakage, or undue wear of the parts. To these ends, our invention consists in a pump having a cylinder formed of two portions of different capacities, with a piston adapted to work in the two portions in such a manner that at each up-stroke the column is lifted as usual, while at each down-stroke a quantity of water is displaced below the piston, (about double that lifted at the up-stroke,) and forced up through it, so that the column of water is really lifted at each stroke, (by the piston at each up-stroke and by displacement at each down-stroke,) as will be hereinafter more fully described.

To enable those skilled in the art to make

and use our invention, we will proceed to more fully describe the construction and operation of our improved pump, referring by letters to the accompanying drawing, in which—

Figure 1 is a vertical central section, and Fig. 2, a similar section in a plane at right angles to that in which Fig. 1 is taken.

In the several figures the same part is designated by the same letter of reference.

A is the pump-cylinder, which we propose generally to place at the bottom of the well or reservoir, but which may be otherwise placed, if expedient. B is the piston; C, the piston-rod; D, the pitman; E, the barrel or case from which the water is discharged at F; and G, the tube which connects the barrel E to the cylinder A. The barrel E is covered over at H, so as to have a chamber formed, as will be presently explained, and in this chamber are arranged the driving-crank I with its shaft K, and suitable bearing-boxes L, provided with cup-packings *m*, as shown. The lower portion of the barrel E is cylindrical, and is turned or bored out for the guide-disk O to work in. This disk O is made as seen, so as to fit the bore of E, and with a cross-piece, P, (see Fig. 3,) into which is screwed the upper end of piston-rod C, and is formed with ears or lugs S, to which the lower end of pitman D is coupled by a wrist-pin or pivot T. The other end of said pitman is coupled to the crank I by a strap, U, and key or pin *w*, as clearly illustrated. The cylinder A is made as shown, with about one-half its length of greater diameter than the other half, so that the bore and capacity of the cylinder at its upper portion  $a^2$  is considerably less (about one-half) than at the portion  $a^4$ , (see Fig. 1,) and the piston is formed with a long portion,  $b^2$ , to fit and work in the part  $a^2$  of cylinder, and with a short portion,  $b^4$ , to fit and work in the largest portion  $a^4$  of said cylinder.  $c^2$  is the ordinary foot-valve at the bottom of the cylinder, and  $d^2$  the valve in the piston.  $f f$  are vent-holes for the escape of water or air from the space  $a^4$  during the ascent of the piston.

The operation together of the parts described will be understood to be as follows, viz.: The pump being set in motion by the rotation of the driving-shaft K, the crank I, through the medium of pitman D, imparts the usual reciprocatory motion to the piston-rod C, the lower



end of which is secured to the piston of the pump and the upper end of the guide-disk O. At each up-stroke of the piston the column of water is lifted in the usual manner, and makes its exit at the spout F; and at each down-stroke of the piston, as the valve  $c^2$  closes valve  $d^2$  opens and a given quantity of the water contained in the larger (lower) portion  $a^4$  of the cylinder is forced up and out at the exit. As this last-named operation is going on the annular space created by the descent of the piston between the small portion  $b^2$  of the piston and the interior of the largest portion of cylinder is filled with water or air through the holes  $f$ , and this water escapes or is forced out at the same holes when the piston ascends. We propose to make the relative capacities of the two parts of the cylinder and the relative diameters of the two parts of the piston such that at each down-stroke of the piston the water displaced and forced up through the tube G and out at F shall be about equal to the quantity lifted and discharged by each up-stroke of the piston; and it will be seen that by the mode of operation explained the up-and-down motions or strokes of the piston keep the column constantly moving. The cap or dome of the case H should be attached with a packed joint, as shown, so that when the capacity of the pumping mechanism is sufficient, or the pump is worked at sufficient speed, that portion of said case located above the exit F will serve as an air-chamber, in the same manner as the air-chamber of ordinary force-pumps.

The piston-rod C should, of course, be made stiff enough to work without injury in the forcing down of the piston, and may be braced by guides in the tube G, where the connection at the guides disk O is located, very far from the piston and cylinder. The shaft K is packed perfectly water-tight in its horizontal bearings in the boxes L by means of the annular cup-leather  $m$ , as shown; and it will be understood that by the use of such a packing the desired object is accomplished in not only a perfect manner, but with great economy, and so as to be very durable.

The details of construction of our improved pump may be varied to suit varying circumstances under which our invention is to be employed, and we do not wish to be understood as limiting ourselves to any design or detail of construction so long as the principle and mode of operation of our pump are embodied.

What we claim as new, and desire to secure by Letters Patent, is—

The single cylinder, formed of two diameters, in combination with a single piston, the whole constructed and operating as described.

In testimony whereof we have hereunto set our hands and seals this 22d day of March, 1871.

A. D. LAWS. [L. S.]  
JAMES C. COOKE. [L. S.]

Witnesses:

ISAAC H. WHITING,  
CURTIS THOMPSON.