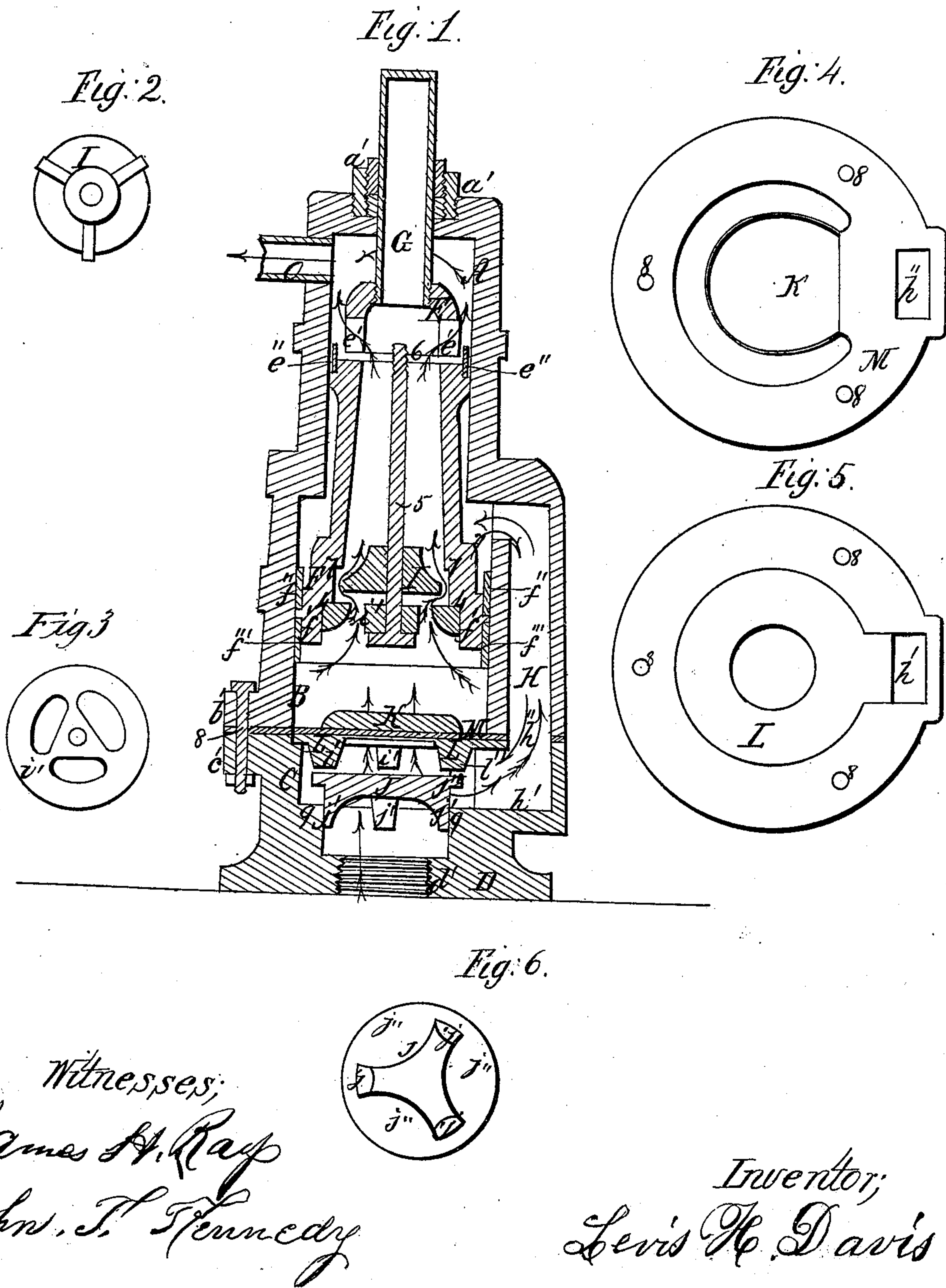


*L. H. Davis.*

*Pump.*

*N<sup>o</sup> 87,828.*

*Patented Mar. 16, 1869.*





# United States Patent Office.

LEVIS H. DAVIS, OF NEWARK, DELAWARE.

Letters Patent No. 87,828, dated March 16, 1869.

## 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, LEVIS H. DAVIS, of Newark, in the county of New Castle, and State of Delaware, have invented a new and useful Improvement in Double-Acting, or Lift-and-Force Pumps; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a vertical central section of the said improved pump, and

Figures 2, 3, 4, 5, and 6, respective plan views of certain parts of the same detached.

Like letters and numbers of reference indicate the same parts when in the different figures.

The object of my improvement is to afford a simple, strong, and reliable vertical double-acting, or lift-and-force pump for wells, that will admit of more ready access to all its interior parts when necessary.

My invention consists in the peculiar construction, arrangement, and combination of the certain devices hereinafter specified and shown.

Referring to the drawings—

A B is the case, or body, of the pump;  
C D, its supporting-base;  
E F, its piston;  
G, its air-chamber and piston-stem;  
H, a passage-way to the outside of the piston;  
I, the piston-valve;  
J, the foot-valve; and  
K, an intervening valve between the piston-valve and the foot-valve.

### Construction.

The case, or body, of the pump consists of two hollow communicating iron cylinders, A and B, of different diameters and capacities, and the side passage-way, all cast or united together in one piece.

The lower, or larger cylinder, B, and the passage-way H are fully open at their lower ends, and the said end of the cylinder cast with a flange, b', around it, for the purpose of affording a means for bolting it down upon the base, C D.

The upper end of the smaller cylinder, A, is cast with a suitable opening, or hole, in its centre, for the reception of any suitable packing-box, a', through which the hollow piston-stem G will work, water-tight, up and down, the length of the required stroke.

The capacity of the lower cylinder, B, is double that of the upper one, A, and the upper end of the side passage-way H opens into the upper part of the larger cylinder, B.

The piston E F is a hollow conical frustum of iron, cast in one piece, and has, around the outside of its lower end, a cylindrical projection, f', to which two bands, f'' f'', of leather, or any other suitable flexible material, are riveted fast, so as to form suitable packings around between the larger end, F, of the piston and the inner side of the larger cylinder, B.

The upper end, E, of the piston is fixed to the hollow stem G, so as to form an open communication therewith; and, in two opposite sides of this upper part of the piston, there are two openings, e' e', and, just below the said openings, there is a projecting cylindrical portion, around the outside of the piston, to which is riveted a surrounding band, e'', of leather, or other suitable flexible material, so as to form a packing between the smaller end, E, of the piston and the inner side of the chamber in the smaller end, A, of the body A B of the pump.

The valve I is metallic, and rests upon a perforated plate, i', which is held firmly up against a shoulder, 4, by means of a screw-bolt, 5, which screws, at its upper end, into a cross-bar, 6, the ends of which rest in the holes e' e' above.

This valve I has a hole in its centre, through which the bolt 5 passes loosely, so as to keep the valve concentric, and allow it to rise and fall within a limited space provided for it between the plate i' and the shoulder 7. (See fig. 1.)

The base, C D, is also of iron, cast in one piece, with a flange, c', around its upper end, which corresponds with the flange b' on the body A B, and the two afford the means, in connection with suitable screw-bolts 8, of securing the said body firmly down upon the base, with water-tight packing between.

The base has a recessed, or shouldered opening down through its middle, which is screw-cut at its lower end, d', for the purpose of attaching, in an air-tight manner, the usual well-tube, (not shown in the drawing;) and, just above the screw-threads, the opening through the base, C D, is recessed for the stems j' j' of the metallic valve J, a flange, j'', around the upper end of the said valve, fitting flatly down upon a shoulder, 9, produced by another recess just above the first-named one.

Over the upper part of the recess which is above the shoulder 9, a flat plate, L, having three studs, l' l' l', on its under side, and an opening through its centre, is fixed horizontally in the base, C D, so as to prevent the stems j' of the loose valve J from being lifted up entirely out of their recessed seat, and also for the purpose of serving as a seat for the "intervening valve K."

In one side of the base, C D, there is a recess, h', in a projection which corresponds with that of the side passage-way H in the body A B, and this recess h' communicates with the way H, and the open space which is between the valve J and the plate L, when the two parts A B and C D are bolted together, as shown in fig. 1.

The valve K is a disk, or block, of wood, secured to the upper side of a flap cut in a piece of thick leather, M, or any other suitable flexible material, so as to allow the valve to rise and fall, as in a hinge, and, at the same time, so that the surrounding leather will afford a sufficient packing between the body A B and the base, C D, and has an opening, h'', also, to correspond with the side passage-way H and recess h', when the parts are secured together, as represented in fig. 1.



A hand-lever of the second class, (not shown,) is intended to be articulated to one side of the upper end of the body A B, and also to the hollow piston-stem G, in the usual manner, for the purpose of operating the pump.

#### Operation.

The packing  $e'' f'' f'''$ , around the smaller and the larger ends, respectively, of the piston E F, causes them to fit water-tight in their respective cylindrical chambers in the body A B of the pump, and, consequently, when the piston is moving upward, the water will be forced, by the pressure of the atmosphere upon the water in the well, (the pump being, of course, supported within a properly-limited height from the surface of the water,) upward through the valves J and K, to fill the vacuum produced immediately below the closed valve I; and, on the subsequent downward movement of the said piston, the upper valve, K, will be closed, as shown in fig. 1, and the water above K will be forced up, through the valve I, into the hollow space which is between the said valve and the air-chamber G, thence onward and upward, through the holes  $e' e'$ , into the space being left in the smaller cylinder, A, of the body of the pump by the descent of the piston, and, finally, through the outlet O, until the piston reaches the end of its downward stroke, water, during the descent of the said piston, rising from the well, and passing upward through the foot-valve J and the side passage-way H, and filling the vacuum as it is formed around the outer side of the said piston, as indicated by the faint arrows; and, on the piston again rising, water from the well follows the lower end of the piston, as before; but, the chamber in the upper end of the body A B being now filled with water, the rising piston, also filled, forces the said water out of the space between the piston and the communicating air-chamber G, and onward through the outlet, O; and, while the piston is rising, as just described, it forces back the water which previously entered the vacuum around the outer side of the body of the piston through the side passage-way H; and this water, mixing with the water rising from the well, follows the upward movement of the piston, as indicated by the faint arrows, and consequently the foot-valve J is open during both the upward and the downward strokes of the piston, and closes only when the motions of the piston cease, and thus preventing the pump from losing its water by leaking around the packing of the piston, or through its valves.

The lengths of the two hollow cylinders A B are about equal, and, the capacity of the cylinder B being about double that of the cylinder A, and the downward stroke being more easily given under the second-class

lever intended to be applied to operate the pump, the flow of water through the outlet, O, will be nearly uniform, or equal, during both motions of the piston, the downward stroke operating, also, to draw water from the well, by means of the side passage-way H, and the vacuum produced around the outer side of the descending piston, which communicates with the upper end of the said side passage-way.

It will, therefore, be seen that this is a very easy-working and effective double-acting, or lift-and-force pump, of comparatively simple construction, not liable to get easily out of order in use, and affording ready access to its interior by simply withdrawing the three screw-bolts, 9, which hold the body A B and the base, C D, together.

I wish it to be understood that I do not intend to confine the construction of this pump to the use of the flexible packing-bands  $e'' f'' f'''$ , as metallic bands will do, or even the piston itself may be cast larger at the parts, and then turned off, to fit the respective cylinders, for the same purpose; nor to the specified location of the foot-valve J, as it may be placed in the tube below; but, having thus fully described my improved pump,

What I claim as new, and desire to secure by Letters Patent, is confined to the following, viz:

1. I claim, in a double-acting, or lift-and-force pump, a piston, consisting of the hollow case E F, with its respective fittings, or packings,  $e''$  and  $f'' f'''$ , around its smaller and larger outside diameters; the valve I, with its seat  $i'$ ; and the screw-bolt 5, with the supporting cross-bar 6; the said parts being constructed, arranged, and combined together substantially as set forth and described.

2. In combination with the piston, as claimed in the preceding clause, I claim the body of the pump, the same consisting of the two hollow cylinders A B, of different diameters, corresponding with the two respective outside diameters of the said piston, as described, and the side passage-way H, opening into the upper end of the larger cylinder, B, substantially as set forth and described.

3. In combination with the piston and the body of a pump, as claimed in the preceding clause, I claim the hollow base, C D, communicating with the side passage-way H, as described, the valve K, the plate L, and the foot-valve J, or its equivalent, the said parts, or devices, being constructed and arranged to operate together, as set forth and described, for the purposes specified.

LEVIS H. DAVIS.

Witnesses:

JAMES H. RAY,  
JOHN T. KENNEDY.