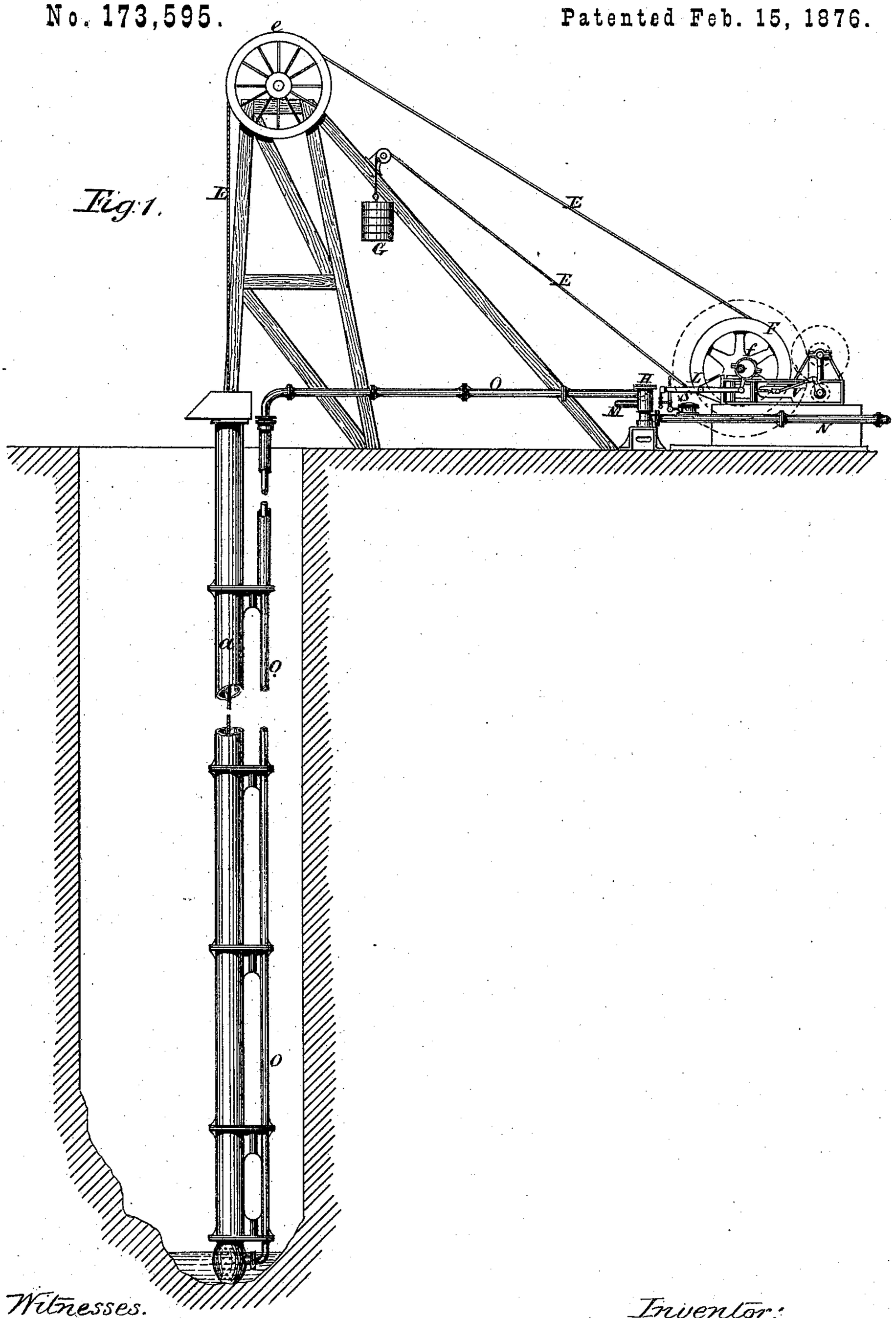
3 Sheets—Sheet 1.

H. DAVEY.

WATER PRESSURE-PUMP.

No. 173,595. Patented Feb. 15, 1876.

Fig. 1.



Witnesses.
A. L. Coomes
A. K. Cohen

Inventor:
Henry Davey
By James L. Norris.
Atty.

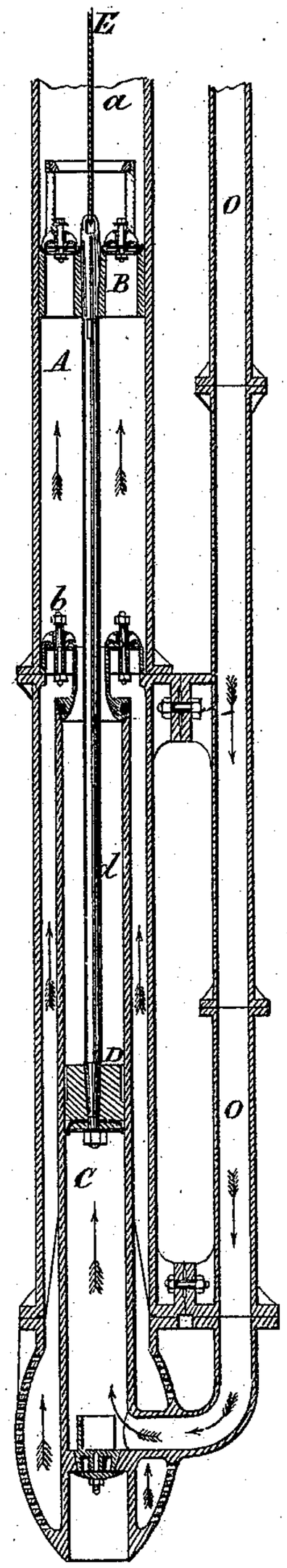
3 Sheets—Sheet 2.

H. DAVEY.

WATER PRESSURE-PUMP.

No. 173,595. Patented Feb. 15, 1876.

Fig. 2.



Witnesses.
W. L. Coombs
A. K. Cohen

Inventor;
Henry Davey
By James L. Norris.
Atty

3 Sheets—Sheet 3.

H. DAVEY.

WATER PRESSURE-PUMP.

No. 173,595. Patented Feb. 15, 1876.

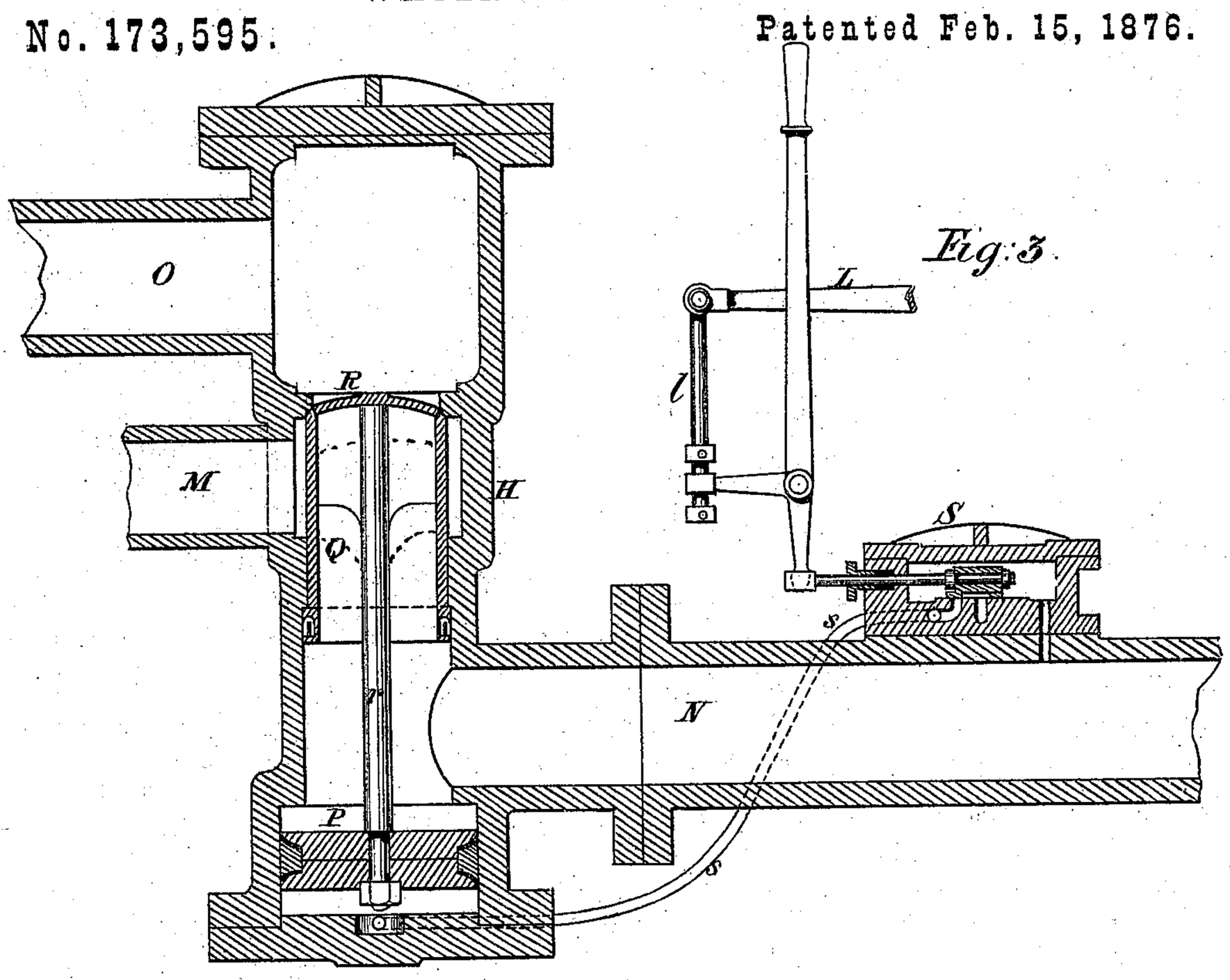


Fig. 3.

Fig. 4

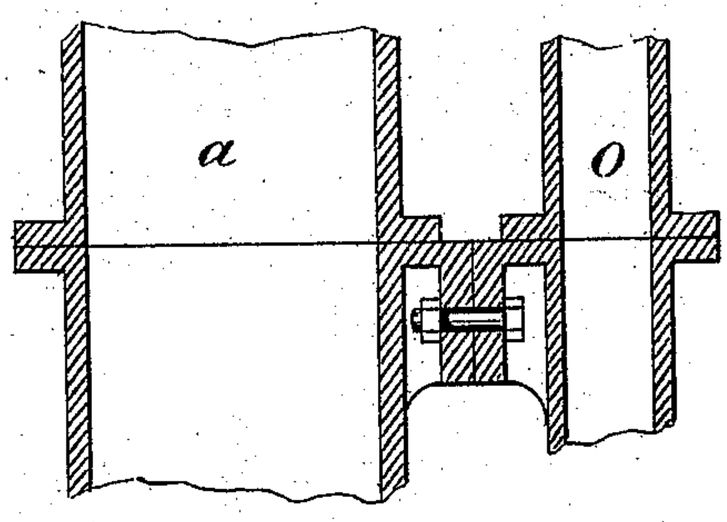
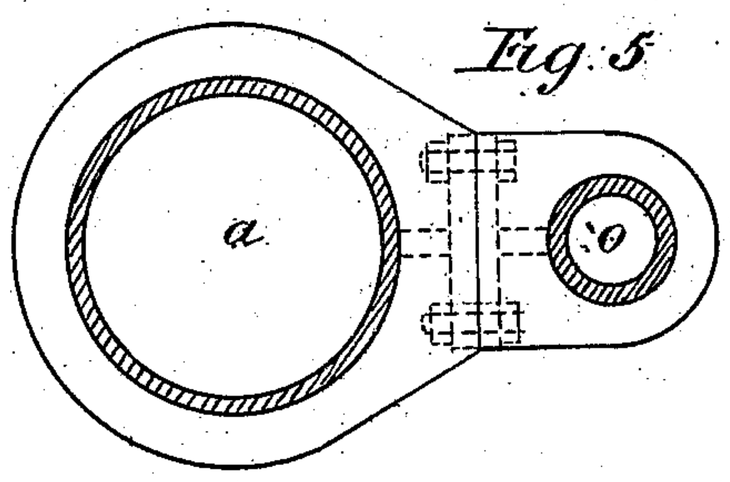


Fig. 5



Witnesses
Jos. L. Coombs
N. K. Cohen

Inventor:
Henry Davey
By James L. Norris
Atty.

UNITED STATES PATENT OFFICE

HENRY DAVEY, OF LEEDS, ENGLAND.

IMPROVEMENT IN WATER-PRESSURE PUMPS.

Specification forming part of Letters Patent No. **173,595**, dated February 15, 1876; application filed December 2, 1875.

To all whom it may concern:

Be it known that I, HENRY DAVEY, of Sun Foundry, Leeds, in the county of York, England, engineer, have invented an Improved Vertical Water-Pressure Pump; and do hereby declare that the following description, taken in connection with the accompanying sheets of drawings, hereinafter referred to, forms a full and exact specification of the same, wherein I have set forth the nature and principles of my said improvement, by which my invention may be distinguished from others of a similar class, together with such parts as I claim and desire to secure by Letters Patent—that is to say:

My invention relates to a construction of vertical pump worked by water-pressure, applicable in such situations as a deep well or mine shaft, and capable of being conveniently applied during the sinking of such well or shaft. The chief object of my invention is to provide for removing and replacing the bucket and valves, and for extending the pump downward as the shaft is deepened without the loss of time and labor involved when these operations have to be effected on pumps worked by rods.

I will describe the said construction, referring to the accompanying drawings.

Figure 1 represents a section of a shaft, with an elevation of the pump placed therein, and of the framing and gear connected with it at the top of the shaft. Fig. 2 is a vertical section of the pump; Fig. 3, a vertical section of the valve-box, valves, and slides for effecting the reciprocation of the pump-bucket; and Figs. 4 and 5 show, respectively, a vertical section and sectional plan of the joints of the discharge-pipe and pressure-pipe.

The body of the pump consists of two parts—the upper part A, in which the bucket B works, and the lower cylindrical part C, in which works a piston, D, connected to the bucket B by a rod, *d*. Around the lower cylindrical part C is an annular passage, by which water ascends to the body of the pump through the suction-valves *b*. The delivery-valves are fitted on the bucket B. The discharge-pipe *a* extends upward to the top of the shaft, of a diameter somewhat greater than the bore of the barrel A, so that the bucket can be readily raised by a rope or chain, E, the whole height of the shaft. When it is so raised the piston D, catching under the seating of the suction-valves *b*, brings them up with it; and thus all the working parts of the pump can be conveniently raised for inspection or repair, and replaced, without breaking any joints or connections. The bucket B is attached to the rope or chain E, which passes over a pulley, *e*, and round a drum, F, and has attached to it a counter-weight, G, which balances a portion of the weight of the bucket and its attachments. On the shaft of the drum F is an eccentric or crank, *f*, which works a lever, L. To the end of this lever is jointed a tappet-rod, *l*, that, by means of a bell-crank, works a slide, S, of ordinary D-form, which commands a discharge-port and a port communicating by a pipe, *s*, with the bottom of a valve-box, H. The slide-jacket is supplied with water under pressure from the pipe N, which leads from an accumulator or head at a high level, and which communicates with the middle of the valve-box H. From the upper part of the valve-box H a pipe, O, is led down the shaft to the lower part of the pump C; and from the same valve-box H there is a side branch, M, for discharge of the water after it has worked the pump. Within the valve-box H is a sliding valve, Q, on which seats a clack-valve, R, connected by a rod, *r*, to a piston, P, of larger diameter than the valve R, fitted to work in the lower part of the valve-box.

In order to explain the working of the pump, I will suppose that the piston D and bucket B are at the extreme of their down-stroke; also, that the piston P is at the bottom of the valve-box, having drawn down the clack-valve R and the sliding valve Q, and so having closed the pipe O from the pressure-pipe N, but having opened it to the discharge M. But the bucket in descending, by drawing the rope or chain E, has caused the drum F to make a partial revolution, and the crank or eccentric *f* on its shaft has moved the slide S so as to uncover the port to the pipe *s*. Water under pressure now flows by this pipe to the space under the piston P, which, being also pressed on by the water from the pipe N, is put in equilibrium. The unbalanced press-

ure, then acting on the slide Q and clack-valve R, raises them, covering the opening of the discharge-pipe M, and opening a communication from the middle of the valve-box H to the pipe O. Water under pressure now flows from N past the open valve R into O, and down the shaft to the bottom of the pump, where it presses on the under side of the piston D, raising it and the bucket B connected to it. The bucket, in rising, draws water into the pump through the suction-valves *b*, and discharges a portion of the water above it by the discharge-pipe *a*, and at the same time slacking the rope or chain E allows the counter-weight G to descend, turning the drum F backward. By this movement of the drum F and its eccentric or crank *f*, the slide S is moved so as to cut off the pipe *s* from the water-supply and put it in communication with the discharge-port of the slide. The under side of the piston P being thus relieved of pressure, it is forced down by the superior pressure on its upper surface, and in descending it closes the clack-valve R and moves down the slide Q so as to open the pipe O to the discharge M. The under side of the piston D being thus relieved of pressure, that piston and the bucket B descend, drawing down the rope or chain E, which turns the drum F, and its crank or eccentric *f* again moves the slide; whereupon the action of the pump is repeated, as already described.

To facilitate the extension of the pump downward as the shaft becomes deepened, I prefer to make the upper part of the pipe O to slide telescopically. When the shaft becomes deepened to the extent of a length of pipe it is necessary only to undo the upper joints of the pipe O and insert a fresh length of pipe; also, to add to the discharge-pipe *a* and to the rope or chain E. To facilitate the lifting of the bucket, piston, and valves of the pump for inspection or repairs, I prefer to provide on the frame of the drum F a hydraulic engine, V, (or it might be a steam-engine,) connected by gearing to the drum, which can by this means be caused to revolve, as occasion may require, so as to haul the rope or chain E.

Having thus described the nature of my invention, and the best means I know of carrying it into practical effect, I hereby declare that I make no general claim to the working of pumps by hydraulic pressure; but I claim, in respect to water-pressure pumps for wells or shafts—

1. The vertical pump, constructed substantially as hereinbefore described, consisting of the barrel A, fitted with the bucket B and discharge-valves thereon, the cylindrical extension C, fitted with its piston D, connected to the bucket B, and the suction-valves *b*, all arranged in relation to the discharge-pipe *a* in such manner that the working parts can be readily raised by a rope or chain, E, for purposes of inspection or repair.

2. The combination of the pump C, piston D, pump-bucket B, rope or chain E, drum F, and eccentric or crank *f*, with the slide S, valve-box H, and pipe O leading from the valve-box H to the pump C, substantially as and for the object specified.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 19th day of October, 1875.

HENRY DAVEY.

Witnesses:

CHARLES D. ABEL,

JOHN IMRAY.