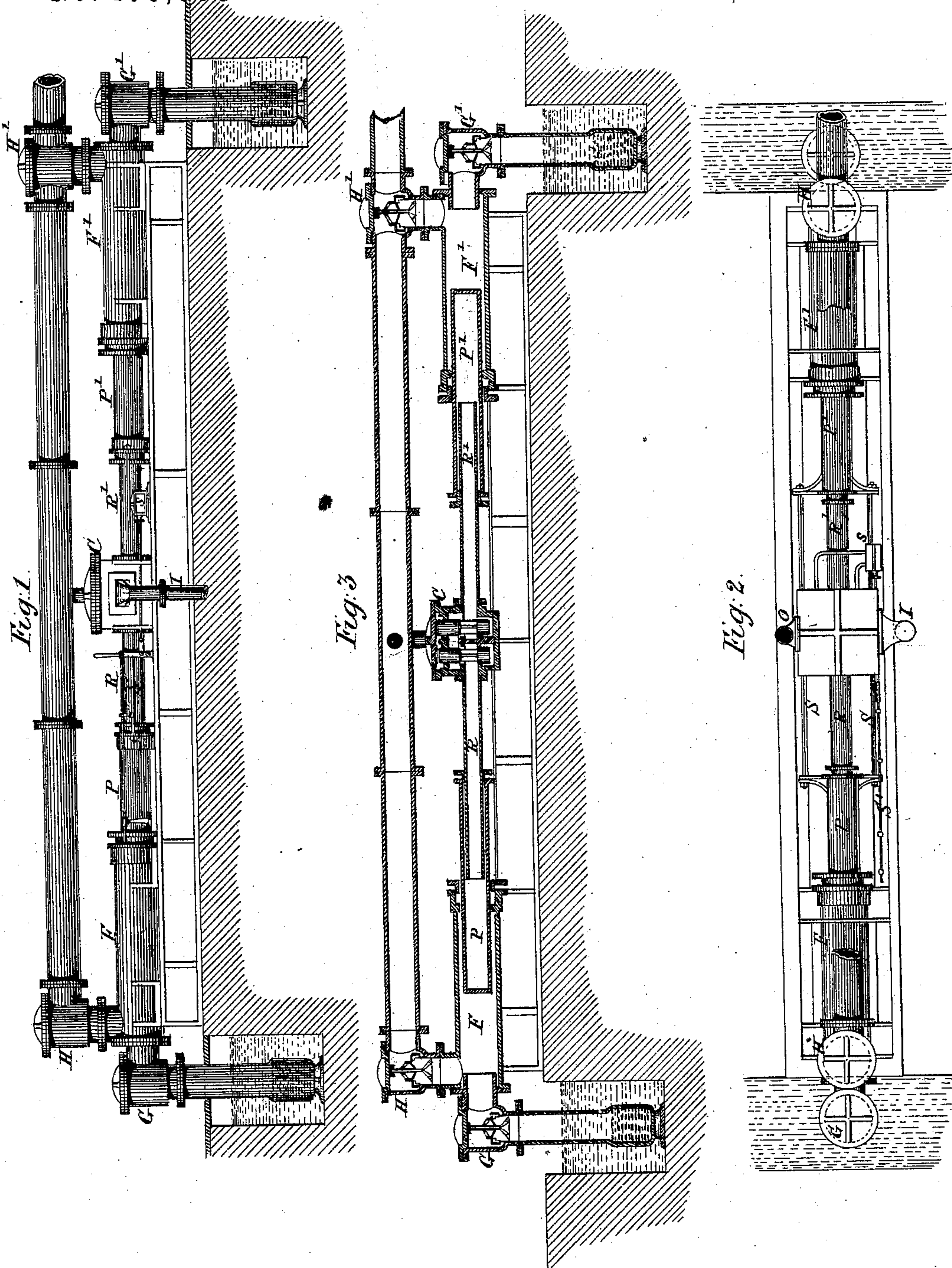


H. DAVEY.

HORIZONTAL WATER-PRESSURE PUMP.

No. 173,596.

Patented Feb. 15, 1876.



Witnesses.
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A. K. Bohm

Inventor:
Henry Davey
By James L. Norris, atty.

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Fig. 4

Fig. 5

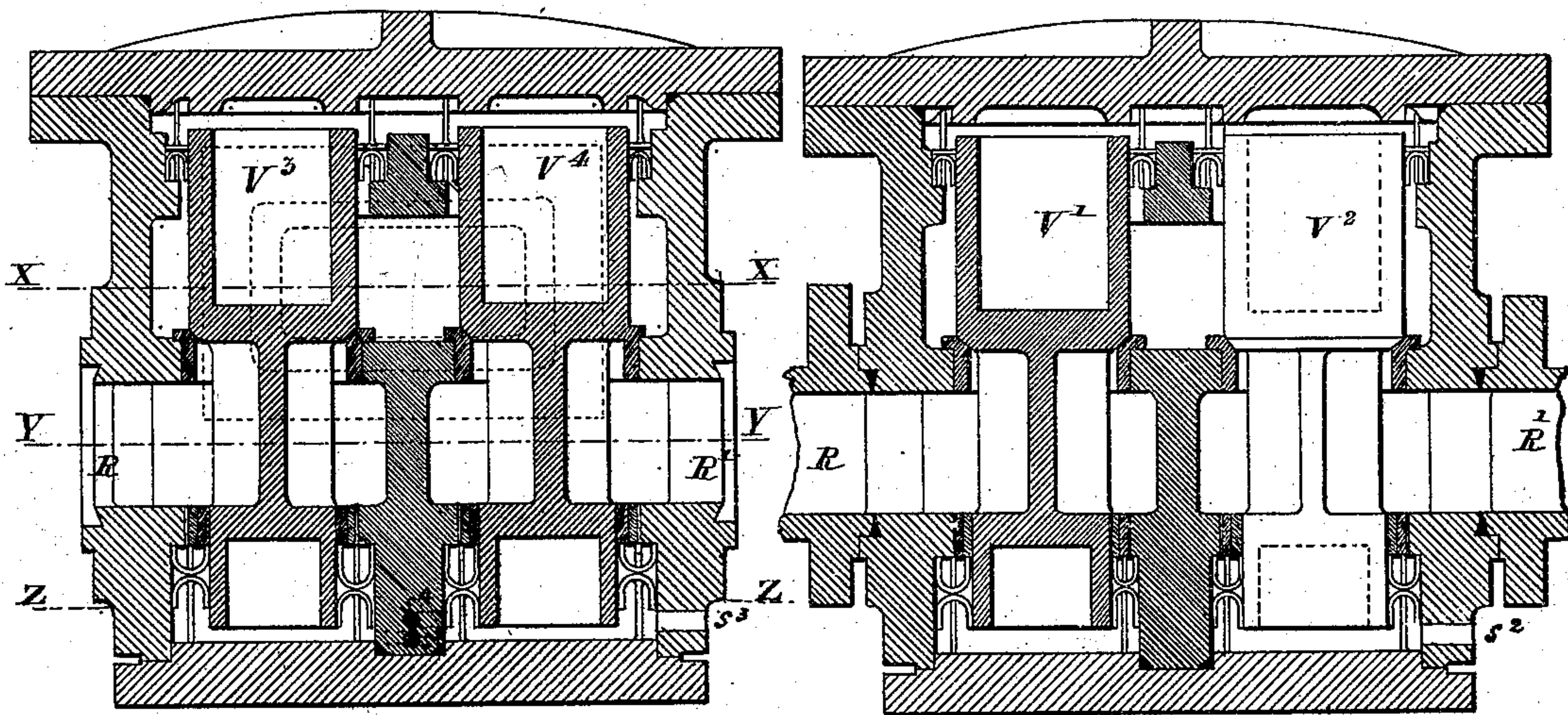
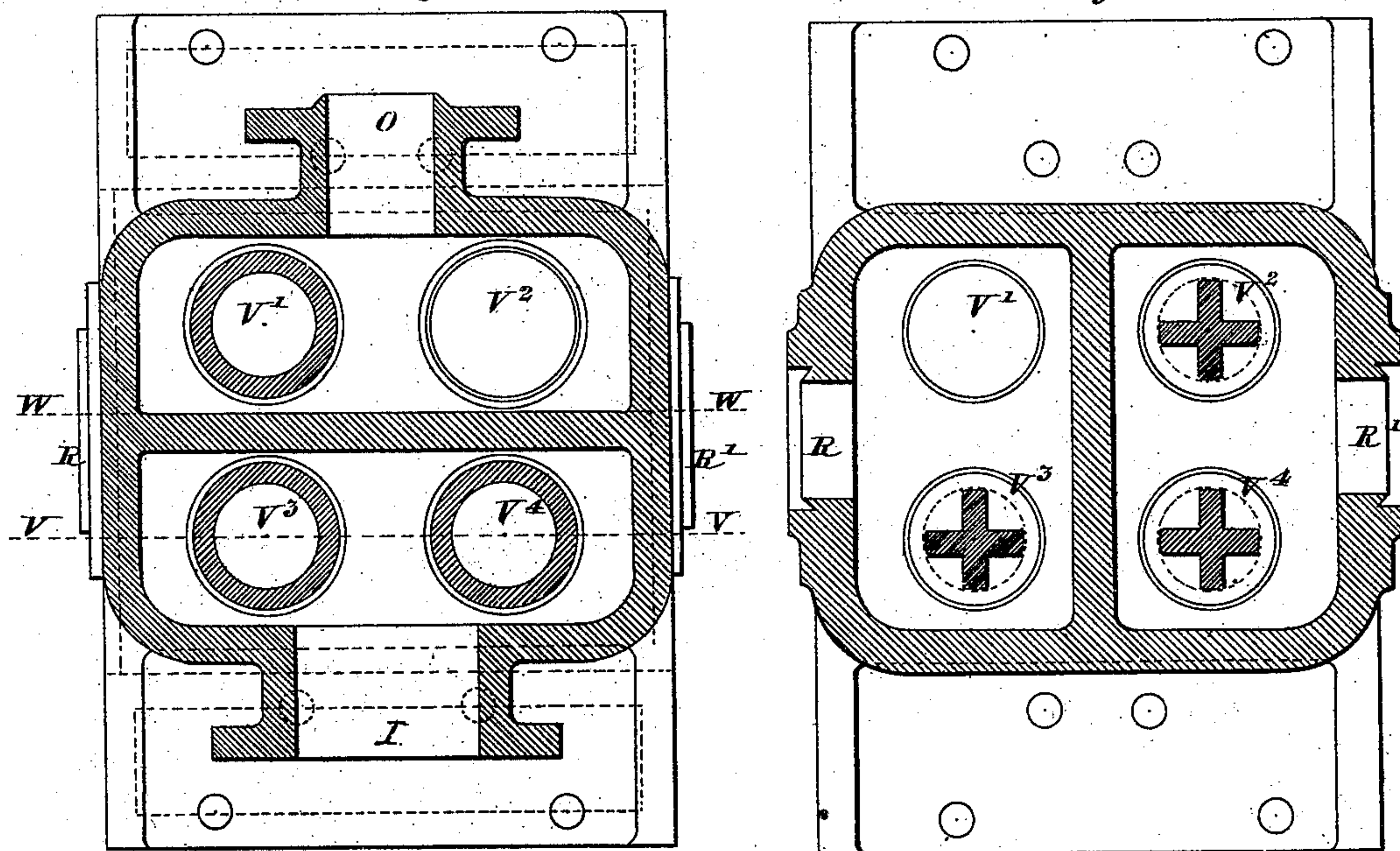


Fig. 6

Fig. 7



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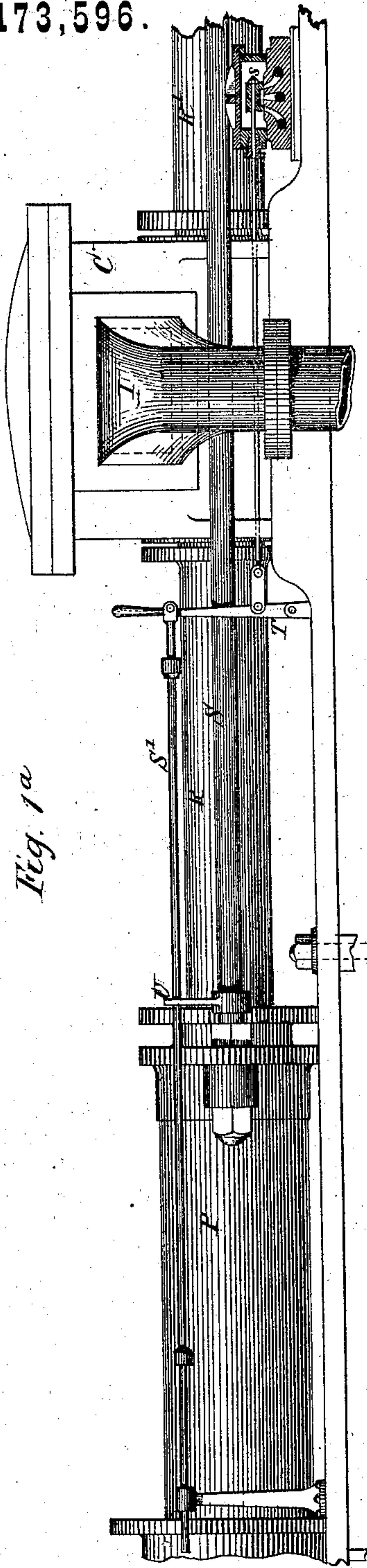
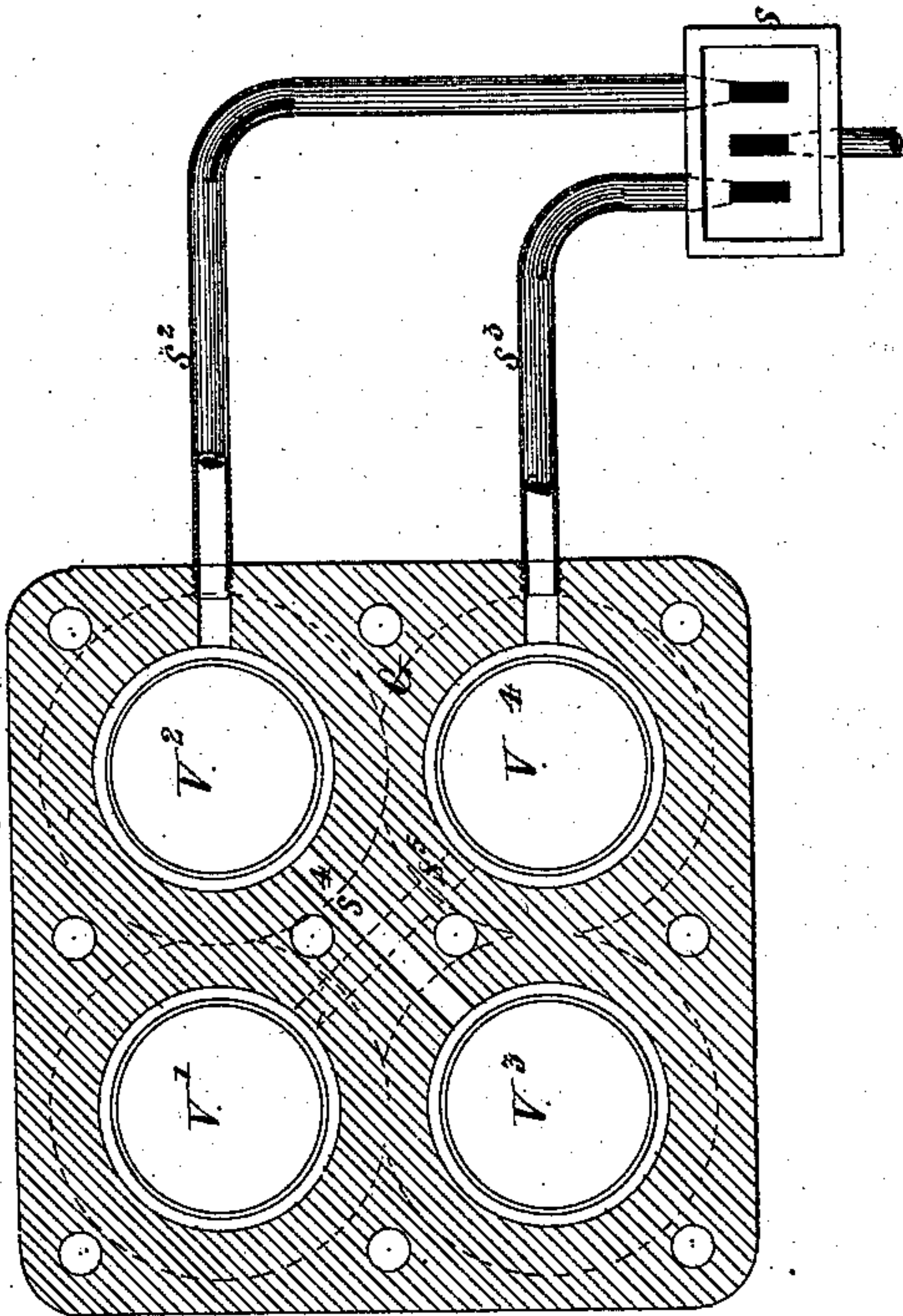


Fig. 1a

Fig. 8.



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UNITED STATES PATENT OFFICE.

HENRY DAVEY, OF LEEDS, ENGLAND.

IMPROVEMENT IN HORIZONTAL WATER-PRESSURE PUMPS.

Specification forming part of Letters Patent No. **173,596**, 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 Horizontal 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:

It often happens that in mines or shafts steam-pumps cannot be safely arranged at a level sufficiently low for suction without being subject to stoppage by being flooded, whereas pumps worked by water-pressure might continue to act, notwithstanding their immersion. My invention relates to pumping apparatus of this kind, applicable under the circumstances which I have mentioned above, and also in other cases where a command of water-pressure can be obtained.

I will describe my improved horizontal water-pressure pump, referring to the accompanying drawings.

Figure 1 represents a side view; Fig. 2, a plan, and Fig. 3 a longitudinal section of the whole apparatus. Fig. 1^a is a portion of Fig. 1 enlarged to show more distinctly the means of working the slide, and the remaining figures represent, to an enlarged scale, the valve-box for alternating the action, Figs. 4 and 5 being vertical sections on the lines V V W W, respectively, and Figs. 6, 7, and 8 being sectional plans on the lines X X Y Y Z Z, respectively.

The apparatus consists of two horizontal pumps arranged one on each side of a central valve-box, C. Each of the two pumps consists of a fixed barrel, F and F', provided at its outer end with supply and discharge valves G G' and H H', of ordinary construction. A hollow plunger, P P', is fitted to work through packing in the mouth of each of the barrels F F', and is itself provided with packing, to work over a fixed tubular ram, R R', these two rams projecting each from one side of the valve-

box C. The two plungers P P' are connected together by tie-bolts S, so that they move together, the one making its instroke while the other makes its outstroke. The valve-box C is divided by horizontal partitions into three compartments in its height. The upper compartment is divided by a vertical partition into two valve-chambers, the one of which communicates with a pipe, I, supplying water under pressure for working the pump, and the other with a pipe, O, by which the water is discharged after it has worked the pump. The middle compartment is also divided by a vertical partition (transverse to that in the upper compartment) into two chambers, the one of which communicates, by the hollow ram R, with the one pump-plunger P, and the other, by the hollow ram R', with the other plunger P'. In the lowest compartment of the valve-box are four cavities, of which each diagonally-situated pair communicates by diagonal passages s^4 and s^5 . There are four valves, $V^1 V^2 V^3 V^4$, fitted in the valve-box C, each of these valves being of cylindrical form, larger in its upper than in its lower part, and having those parts working through packings in the uppermost and lowest chambers of the valve-box, respectively. The valves seat by the shoulders of their enlarged upper parts on seatings provided in the upper horizontal partition of the valve-box. The two lowest chambers under the valves V^2 and V^4 communicate, by small pipes $s^2 s^3$, with ports of a slide, s, which is worked, as I will presently describe, in such a manner that these chambers are alternately subjected to and relieved from the pressure of the water which works the pumps, the chamber V^3 being, by the passage s^4 , put always under the same condition as V^2 , and V^1 being, by the passage s^5 , put always under the same condition as V^4 .

I will suppose that the pipe s^2 is charged with the water under pressure while s^3 is open to discharge; then the pressure acting on the under sides of the valves V^2 and V^3 raises them from their seats, while the other valves V^1 and V^4 are closed down on their seats. By the opening of the valve V^3 water under pressure supplied by the pipe I can flow through the hollow ram R into the plunger P, while by the opening of the valve V^2 water from the other

plunger P' can flow back through the hollow ram R' , and escape by the outlet O . The plunger P being thus subjected to pressure while P' is relieved from pressure, the two plungers are caused to make their stroke in the one direction together, the one P' drawing in water by the suction-valves G' into the barrel F' , and the other P forcing water out of the barrel F by the discharge-valve H . If now the pipe s^3 receive the pressure while s^2 is relieved, then the valves V^4 and V^1 are opened and V^2 and V^3 are closed, whereby the action of the plungers is reversed; and thus by alternating the supply to and discharge from the pipes s^2 s^3 the pump is caused to make its successive reciprocating strokes.

The slide s is of the ordinary **D** kind, commanding two ports leading, respectively, to the pipes s^2 s^3 and a central discharge-port, and working within a jacket supplied with water under pressure. The slide-rod is connected to a lever, T , to which is connected a tappet-rod, S' , having on it stops suitably adjusted to the stroke of the pump, so that a clip, U , projecting from one of the tie-bolts S , and embracing the tappet-rod S' in approaching each end of its stroke, bears against one or other of the stops, and moves the tappet-rod and slide. When, for example, the pump is approaching the end of its stroke to the left hand it moves the slide toward the left, thereby uncovering the right-hand port for the admission of water to the pipe s^2 from the jacket, and putting the left-hand port and pipe s^3 in communication with the discharge. By this action the valves V^2 V^3 are raised and V^1 V^4 are closed, and the movement of the pump is reversed, as already explained.

Having thus described the nature of my invention, and the best means I know of carrying the same into practical effect, I hereby declare that I make no general claim to the

application of hydraulic pressure as a motive power for working pumps; but I claim—

1. A horizontal water-pressure pump consisting of two barrels, F F' , having hollow plungers P P' tied together, and fitted to work in the barrels F F' over tubular rams R R' , communicating, respectively, with a central valve-box, C , substantially as herein described.

2. The valve-box C , having chambers communicating, respectively, with a supply-inlet, I , and a discharge-outlet, O , and with the two hollow rams R R' , and containing four valves, V^1 V^2 V^3 V^4 , arranged to operate in diagonal pairs, so as alternately to put each of the rams R R' into communication with the inlet and with the outlet, substantially as herein described.

3. The combination of the valve-box C with the slide s , and its ports and communicating pipes s^2 s^3 , arranged to operate in such manner that according as the slide s is moved to the right or to the left the one pair of the valves V^1 V^2 V^3 V^4 is subjected to pressure while the other pair is relieved from pressure, substantially as herein described.

4. The combination of the barrels F F' with their supply and discharge valves G G' H H' , the plungers P P' with their tie-rods S , the hollow rams R R' , the central valve-box C with its valves V^1 V^2 V^3 V^4 , the slide s , and its pipes s^2 s^3 , and the tappet-rod I , and lever U , forming a horizontal water-pressure pump, constructed and operating substantially as herein described.

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

HENRY DAVEY.

Witnesses:

CHARLES D. ABEL,
JOHN IMRAY.