

No. 631,324.

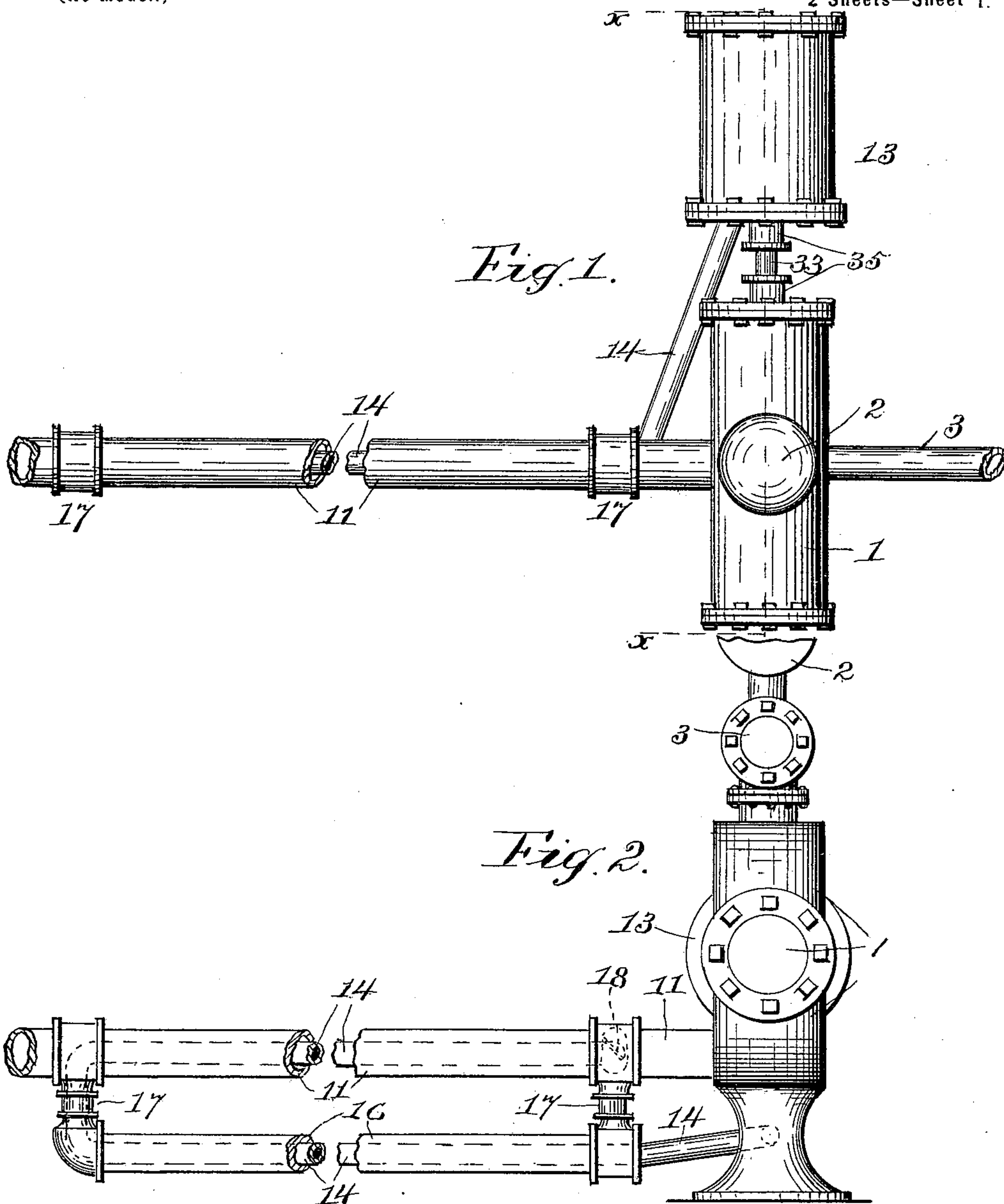
Patented Aug. 22, 1899.

W. F. ROACH.  
PUMP.

(Application filed June 9, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses.

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Inventor.

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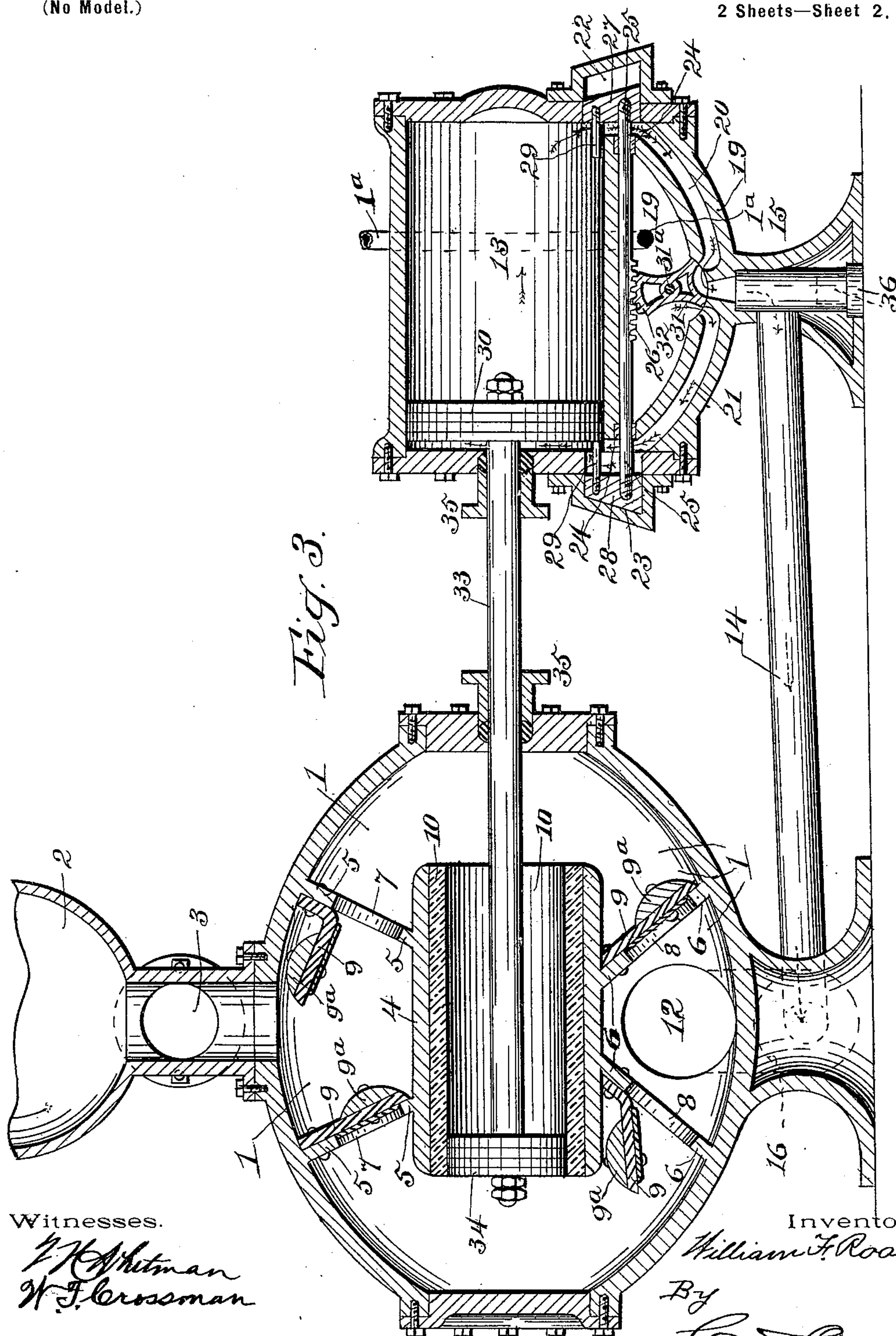
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Witnesses.

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# UNITED STATES PATENT OFFICE.

WILLIAM F. ROACH, OF HASTINGS, PENNSYLVANIA.

## PUMP.

SPECIFICATION forming part of Letters Patent No. 631,324, dated August 22, 1899.

Application filed June 9, 1898. Serial No. 683,022. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM F. ROACH, a citizen of the United States, residing at Hastings, in the county of Cambria and State of Pennsylvania, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

This invention relates to pumps, and particularly to that class of air and steam water-pumps having two separate chambers, one through which water is forced and the other a steam or air chamber for pumping the water, each chamber having a piston operated by one and the same piston-rod.

The object of the invention is to provide improved means for pumping water to great heights either by compressed air or by steam.

The invention consists in the novel peculiar arrangement and construction of the several parts.

In the accompanying drawings, forming a part of this application, Figure 1 is a top plan view. Fig. 2 is an end view. Fig. 3 is a section on the line *x x*, Fig. 1.

The same numeral references denote the same parts throughout the several figures of the drawings.

The water-chamber 1 has the usual air-chamber 2 and a discharge 3. A piston-cylinder 4 is supported centrally in the chamber 1 by top and bottom partitions 5 and 6. The partitions 5 have valve-openings 7 and the partitions 6 have like openings 8. To the partitions above said openings are secured valves 9, composed of rubber or other elastic material and provided with a weight 9<sup>a</sup> sufficient to close them, the elastic material permitting the valves to be forced open by the pressure of the water in the chamber 1.

The cylinder 4 has a glass lining 10 to prevent wear on the cylinder and to obviate repacking of the piston, as well as to preserve the same against the effect of mineral water, which is often so injurious to such parts in a pump, in mining or excavating.

One end of the water-induction pipe 11 enters the chamber 1 at 12 and the other end of said pipe reaches in the usual manner to the water to be pumped.

Steam is conveyed to the steam-chamber 13 by an induction-pipe 1<sup>a</sup>, and the exhaust-pipe 14 is attached to the hollow base 15, from

which said pipe extends through a supplemental pipe 16, connected to the water-pipe 11 by couplings 17, and through the pipe 11 between said couplings, ending in the coupling nearest the chamber 1 and provided with a valve 18, similar to the valves 9 and 10. Thus is formed a combined exhaust and condensing system in the water-supply pipe, which affords a great volume of water close to the pump as long as there is any water to be drawn from, and the exhaust-steam is quickly condensed and discharged through the valve 18.

The semicircular steam-chest 19 has steam-passages 20 and 21 in permanent communication with the steam-cylinder 13, and the ends of the said cylinder are provided with pockets 22 and 23.

Below the cylinder 13 is fitted to slide in bearings 24 a rod 25, having teeth 26. To the ends of the rod are secured blocks 27 and 28, which slide in the pockets 22 and 23, each of said blocks being provided with a tappet-pin 29, which extends into the cylinder 13 without either of them or the said blocks closing the passages 20 and 21, and the said pins are engaged by the piston 30 to slide the rod 25 back and forth and operate the valve 31.

The valve 31 has a segmental toothed portion 32 and is pivoted at 31<sup>a</sup> in the steam-chest, with its teeth engaging the teeth 26 of the rod 25, and the valve is worked by the said rod to open and close communication between the said passages and the hollow base 15, to which the exhaust-pipe is attached.

The rod 33 of the piston 30 has a piston 34, which works in the glass-lined cylinder 4, and said piston-rod is provided with packing-glands 35, as usual, and the other joints and connections not before referred to are made in the ordinary manner, the lower end of the hollow base 15 being closed by a removable plug 36.

When compressed air is employed as a motive power, the pipe 14 is detached and the plug 36 placed in the opening left by said pipe, and the compressed-air pipe is attached to the opening left by the plug, the operation of the machine being the same except as to the condenser. Steam being introduced into the chest 19 through the pipe 1<sup>a</sup> passes into the steam-passage 21, thence into the cylin-



der 13, forcing the piston to the right and the exhaust-steam through the passage 20 and into the hollow base 15. When the piston engages the tappet-pin at the right, the valve 31 is reversed, which reverses the course of the live and exhaust steam through the chest and cylinder.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a steam-cylinder having a piston, and a steam-chest having passages to and from the cylinder, of the toothed valve, the toothed rod, tappet-pins on each end of the rod within the path of the piston, said rod-teeth engaging the teeth of the valve to place the latter in position over the said passages to simultaneously open the exhaust from and to admit steam to the said cylinder.

2. The combination, with the cylinder having a piston, pockets at each end of the cylinder, and a steam-chest having passages to and from the cylinder, of the toothed valve pivoted in the chest, the rod slidable in the chest over the valve, and having teeth engaging the teeth of the valve, the blocks on

the ends of the rod and working in the pockets, and the tappet-pins projecting from the blocks into the cylinder and engaged by the piston to operate the said valve.

3. The combination, with the water and steam cylinders, a piston-rod having a piston working in each cylinder, the water-pipe connected to the water-cylinder, and the condensing-pipes attached to the water-pipe, of the steam-chest having passages in communication with the steam-cylinder, a toothed valve in the chest, a slidable rod, tappet-pins upon each end of the rod within the path of the piston, said rod having a central toothed portion engaging the teeth of the valve to operate the latter when the steam-piston engages the said pins, said valve simultaneously opening communication between one of the said passages and the said chest, and between the other of said passages and the said condensing-pipes.

In witness whereof I hereunto set my hand in the presence of two witnesses.

WILLIAM F. ROACH.

Witnesses:

JACOB CROWANER,

HARRY T. GOULD.