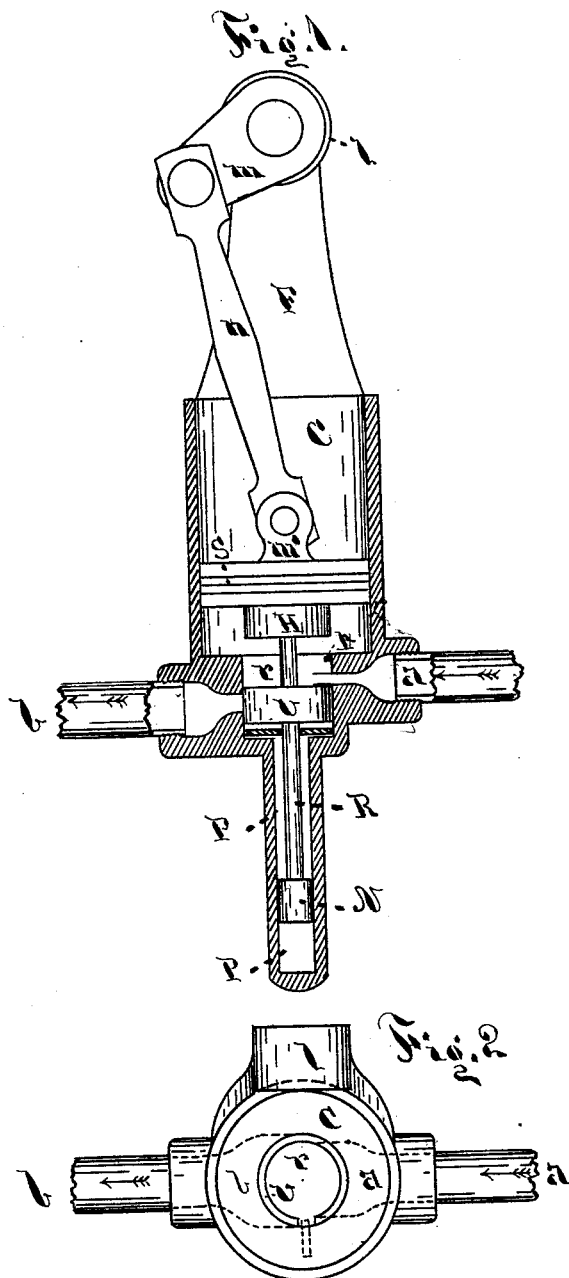


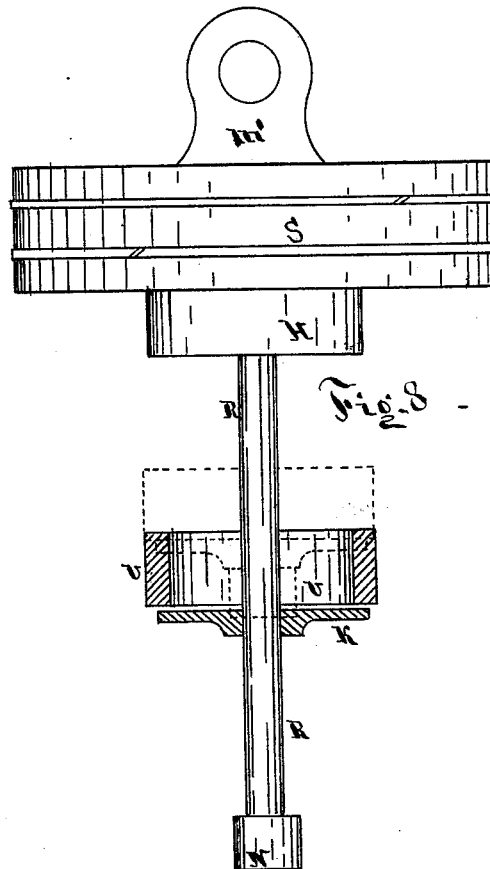
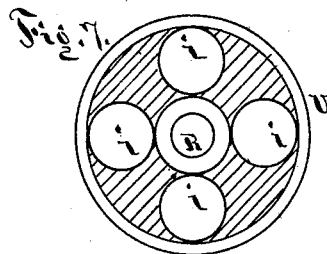
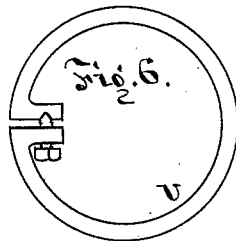
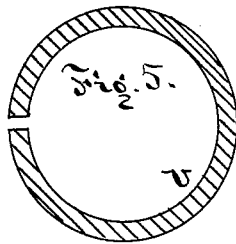
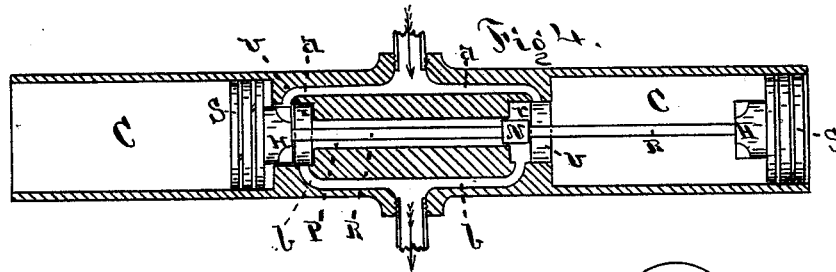
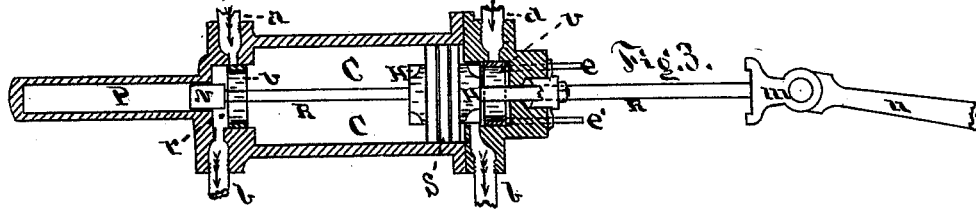
A. G. WATERHOUSE.
Steam or Water Engine.

No. 220,777.

Patented Oct. 21, 1879.



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Witnesses,

Carlton B. Ward
 Elmer V. Buckley

Inventor.

Adison S. Waterhouse,

UNITED STATES PATENT OFFICE.

ADDISON G. WATERHOUSE, OF SACRAMENTO, CALIFORNIA, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO BENJAMIN B. BREWER, OF SAME PLACE.

IMPROVEMENT IN STEAM OR WATER ENGINES.

Specification forming part of Letters Patent No. **220,777**, dated October 21, 1879; application filed February 8, 1879.

To all whom it may concern:

Be it known that I, ADDISON G. WATERHOUSE, of the city of Sacramento, State of California, have invented a new and useful Improvement in Steam or Water Engines and Pumps, of which the following is a specification.

The invention relates primarily to the form and method of working the valve by which the steam, gas, or liquid used to run the same can be shut on and off; and, secondly, in the form in which the engine is to be constructed in order to adapt the same to the different purposes and the form of valve, together with the method of working the same.

The object of the invention is to form an engine or pump that will be more simple in form, having less parts in its construction, less liable to derangement, and more durable in wear.

The invention consists in providing the cylinder and piston with an annular valve-chamber and ring at one end of the cylinder for a single-acting pump or engine, and at each end when the same is made double-acting—that is, to take steam, or whatever is used to run it, at each side of the piston, in case of an engine, or when both sides of the piston are used, in case of a pump; and in providing a rod or equivalent means, so that the piston will act upon the valve at each end of the stroke in order to change the valve and produce the proper opening and closing of ports or passages.

In the description of the accompanying drawings, showing different forms and parts of my invention, Figure 1 is a sectional elevation of a single-acting crank-engine embodying my invention. Fig. 2 is a sectional plan of the same, as Fig. 1, with part cut away, showing the valve-chamber and steam or water passages. Fig. 3 represents a double-acting crank-engine. Fig. 4 represents two single-acting engines combined, making together a double-acting engine. Figs. 5, 6, and 7 are details of different forms of valves. Fig. 8 is a detail drawing, showing the piston and valve with rod and parts for working the same.

Fig. 1 represents a single-acting crank-engine, composed of the frame F, crank *m*, rod R, cylinder C, and piston S, provided with a

rod-joint, *m'*, said parts being propelled by the entrance of steam, or whatever may be used as a prime motor, through the port *a*, which causes the piston to be forced upward in C, thus causing the rotation of the crank *m*. When the crank is upon its top center the piston S is at the upper end of the cylinder C, and the rod R, which is attached to the piston S, acts as a guide for S by playing in the tube P, said rod being provided with a step or plunger, N, which rises up with the piston S, and forces the annular-valve *v* upward, so as to close the passage *a* and open the exhaust-port *b*, thus allowing the steam to pass out of the cylinder C, and letting the momentum of *m* (when a crank is used, or any other force or mechanism which may be applied) force the piston S down to the lower or inner end of the cylinder C, when the lug H, which is a part of piston S, strikes against the valve *v*, forcing it down again, and closing the exhaust-port *b* and opening the receiving-port *v*, when the piston ascends again, as at first. Before giving a more complete explanation of the valve and movement of the same, I will describe the following figures:

Fig. 2 is a plan of Fig. 1 with part cut away, showing the eye *l*, forming the crank-bearing; also the cylinder C, with the bottom cut away, showing the receiving-port *a* and exhaust-port *b*; also, the valve-recess *r* and the annular valve *v*. The ports *a* and *b* can be made by having round holes drilled in, or by coring them so as to be flat, as shown in Fig. 1, and wide the other way, as shown in Fig. 2; and if desired, these ports may be cored, so as to pass clear or part the way around the valve-recess *r*, thus allowing steam to pass in and out from all sides of the recess *r*, and also causing the pressure on the valve to be balanced.

The advantage of making the ports wide one way and narrow the other, as shown, is that the valve *v* will be able to open and close them without traveling as great a distance as it would have to travel if they were made round. In all the drawings, the supply and exhaust ports are indicated by the direction of the arrows.

In Fig. 3 is shown another form of the same invention, in which the engine is made double-

acting by means of having its left end arranged the same as shown in Fig. 1, while its right end is also arranged in a similar manner, with the exception of the tappet-rods $e e'$, which are attached to the valve v , and are acted upon by the cross-head m striking the rods $e e'$ and forcing the valve one way, while the hub H , attached to the corresponding side of piston S , forces the valve in the other direction, thus causing each end of the cylinder to take steam and exhaust, making it double-acting; and, as will be seen, both ends of the cylinder are provided with receiving and exhausting ports.

Fig. 4 is a combination of two single-acting engines worked on the same plan, provided with passages $a a$ and $b b$ for both cylinders, the rod R , connecting the two pistons, being provided with a central knob, N , which moves the valves of each cylinder outward as it passes through the tube P , while the hubs $H H$ on each piston S force their respective valves inward, as above described.

Fig. 5 is the form of valve used in Fig. 1. Fig. 6 is a modification of the same, being provided with screw for adjusting the same.

Fig. 7 is a detail of one form of valve that may be used in place of Figs. 5 and 6. This valve is provided with a hub and an eye, through which the rod R may work. It is also provided with openings $i i$, through which the exhaust may pass in escaping from the cylinder.

Fig. 8 is a detail of Fig. 1, showing the piston S , hub H , for moving the valve v downward, the rod R , provided with knob N , for drawing the valve v upward. In this is shown a plate, K , which is used when ring-valves are used such as shown in Figs. 5 and 6, said plate being used to transmit the lift of N to the periphery of the ring or valve v , and then fall back to the bottom of the valve-chamber

v (see Fig. 1) with the receding motion of N , so as to admit the passage of steam through the ring or valve v and out of the exhaust-port, which would be between the valve v and the plate K while the cylinder was exhausting.

It will be seen that the above forms of engines can be run by water or gas as well as by steam, and that they can also be used for pumps by using the supply-port for suction and the exhaust-port for expelling the water.

In case of constructing a low-pressure or condensing engine, I claim the use of the rod R and plunger N and pipe P for a pump, to be used in combination with the cylinder C , for condensing the exhaust-steam in the same, or in using said parts as a pump for any other purpose.

When the engines are made to run on fast motion I insert a pin, p , (see Fig. 1,) or other obstacle in the valve-chamber, so that the valve v will strike against it at its upward extremity, and thus be prevented from being thrown out of the chamber.

When two of these engines are made to work together, I find it practicable to arrange them so that one can be made to exhaust in the other, thus making a better use of the steam employed.

What I claim as my invention is—

1. The piston S , hub H , rod R , and knob N , with the annular valve v , constructed and arranged substantially as and for the purposes set forth.
2. The annular valve v and plate K , in combination with the piston S , rod R , knob N , and hub H , arranged substantially as and for the purposes set forth.

ADDISON G. WATERHOUSE.

Witnesses:

BARTON B. WARD,
ELISON V. BUCKLEY.