

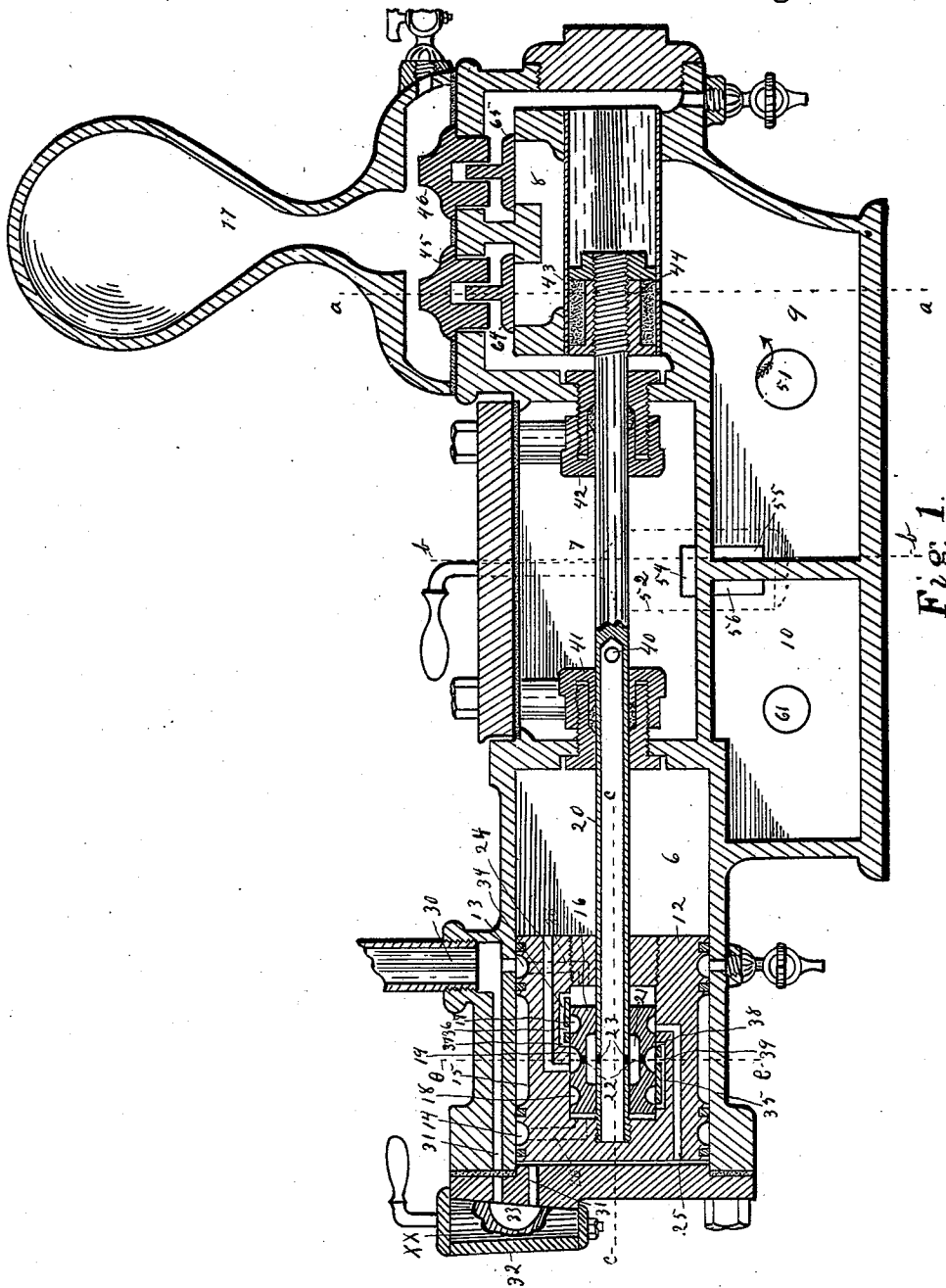
(No Model.)

2 Sheets—Sheet 1.

J. B. RHODES.
STEAM PUMP.

No. 565,391.

Patented Aug. 4, 1896.



Witnesses:
Joseph P. Phillips
Thos. L. Stewart

Inventor:
Jay B. Rhodes
By his Attorney Lucius C. West

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Fig. 5.

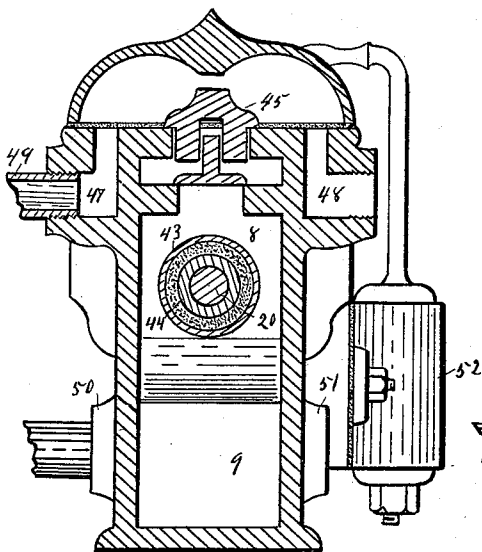
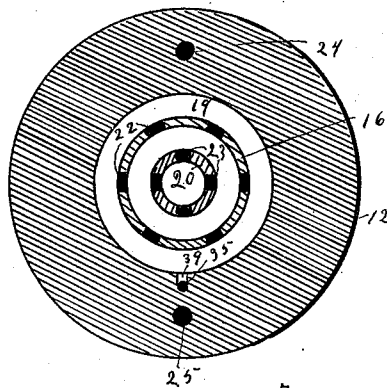


Fig. 2.

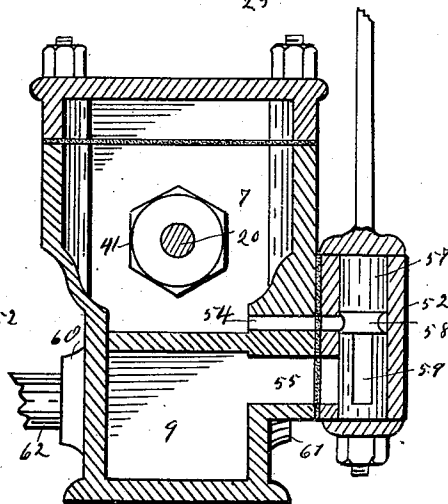


Fig. 3.

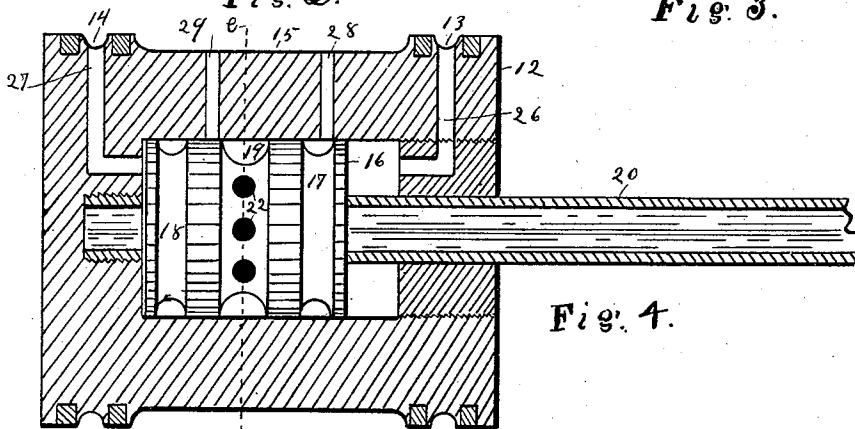


Fig. 4.

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UNITED STATES PATENT OFFICE.

JAY B. RHODES, OF KALAMAZOO, MICHIGAN.

STEAM-PUMP.

SPECIFICATION forming part of Letters Patent No. 565,391, dated August 4, 1896.

Application filed April 18, 1896. Serial No. 588,183. (No model.)

To all whom it may concern:

Be it known that I, JAY B. RHODES, a citizen of the United States, residing at Kalamazoo, in the county of Kalamazoo, State of Michigan, have invented a new and useful Steam-Pump, of which the following is a specification.

This invention relates to that class of steam-pumps used for pumping and forcing water into the boiler, and in which the exhaust-steam is passed into a water-compartment for heating the water before it goes into the boiler.

One object of this invention is to improve the valve as a cut-off and the method of its exhaust into the hollow piston-rod.

Another object is to devise means for conducting or directing the exhaust-steam either into the water-compartment or into another compartment and thence into the open air on either side most convenient.

In the drawings forming a part of this specification, Figure 1 is a longitudinal central section of the pump; Fig. 2, a section on line *a a* in Fig. 1 from a point at the right; Fig. 3, a section on line *b b* in Fig. 1 from a point at the right; Fig. 4, a section on line *c c* in Fig. 1 from a point above and showing the piston-rod and head in section, while the valve remains whole, the right-hand end of the piston-rod being broken away; Fig. 5, a cross-section on line *e e* in Fig. 1, enlarged, and only showing the piston-head and interior parts, looking from a point at the right.

Referring to the parts of the drawings pointed out by numerals, 6 is the cylinder; 7, main exhaust-compartment; 8, the pump-compartment with its water-compartment 9; 10, the secondary exhaust-compartment, all attached together compactly, as in Fig. 1, the parts 6, 7, and 8 being end to end on a line and the parts 9 and 10 being beneath. The ordinary air-chamber over the pump is shown at 11.

In the cylinder 6, at 12, is the piston-head, having an annular port 13 and 14 around each end and a wide annular port 15 central between them. This piston-head is hollow and has the cut-off valve therein at 16. The cut-off valve 16 has an annular port 17 and 18 around each end and an annular port 19 central between them. The valve 16 slides on

the hollow piston-rod 20 and has a hollow steam-space between it and the valve 21. A series of ports 22 lead from the annular port 19 through the body of the valve 16 into the space 21, and holes or ports 23 lead into the hollow piston-rod from said space 21. The piston-head is provided with a port 24, leading from one end of the head into the hollow space occupied by the cut-off valve 16, and another port 25, leading from the other end of the head into said hollow space, Fig. 1. The object of these ports will be explained in the operation. The piston-head is also provided with live-steam ports 26, leading from the annular port 13 into one end of the hollow space occupied by the valve 16, and also a live-steam port 27, leading from the other annular port 14 of the piston-head into the other end of the space occupied by the valve 16. These ports are shown in Fig. 4 and are employed to throw the valve from one end of the space it occupies to the other, as will be explained in the operation. The piston-head also has two ports 28 and 29, leading from the annular port 15 into one side of the space occupied by the valve 16, Fig. 4. These ports form a continuation of the live-steam ports 26 and 27, or rather act, as formerly, after the latter ports cease to act.

The main induction-port to the cylinder 6 is shown at 30, Fig. 1.

There is a live-steam port 31 leading from the port 30, through the cylinder-body, as here shown, but this is a matter of choice, into a throttle-valve chamber 32 at the end of the cylinder 6, and from said chamber back into the end of the cylinder, so that steam passing through it would press against the end of the piston-head 12 and throw it over to the other end of the cylinder, which is sometimes desirable, or would rarely be so in case the valve 16 should stop at a central point in its space when the engine stopped. When the piston-head was thus thrown over, as soon as the annular port 13 or 14 registered with the main induction-port 30 the valve 16 would be thrown off its center and the engine would continue to run; but, as stated, this is a contingency that rarely happens, but very annoying when it does happen. In some instances, in case the pump was used on traction-engines, the jar might throw the valve

in this position. The port 31 is controlled by the throttle-valve 3^{xx}. When its hollow recess 33 registers with the ports 31, then the steam passes from port 30 into the end of the cylinder, as in Fig. 1, and by turning said valve until its solid body comes against the ports 31 they are closed.

One exhaust-port for the valve 16 is shown at 34, leading from one end of the valve-space in the piston-head through the body of said head and into the same space nearly central. The other exhaust-port 35 for the valve 16 extends from the opposite end of the space occupied by the valve 16 and extends through the piston-head a short distance like the other and enters said space. These exhaust-ports 34 and 35 have two points of entrance into the space for the valve 16, one at 36 and 37, the other at 38 and 39. The object of this is best explained in the operation. This cylinder and piston-head part of the construction is operative as a steam-engine for other purposes than pumping by having the piston-rod attached to other desired mechanism. I will now describe the operation of this part of the invention and then proceed to give the details of the balance of the construction.

Referring to Figs. 1 and 4, live steam has entered port 26 and tripped the valve 16 to the left. Some of the steam now passes through exhaust-port 34 for the valve 16 and passes through its delivery-opening 37 into the annular port 17 of the valve and thence out through the piston-head port 25, which will have the effect to start the piston-head to the right until its central annular port 15 registers with the main induction-port 30, at which time the live steam will pass through port 28, Fig. 4, and around the annular port 17 of the valve and on out of port 25 to continue the movement of the piston-head to the right. During the movement of the valve 16 to the left its exhaust was through port 35, Fig. 1, and out of its delivery-opening 39 into the annular port 19 of the valve and thence through ports 22 and 23, Fig. 5, into the hollow piston-rod 20. I have now started the piston-head 12 to the right, and the piston-head exhaust during this movement will be through port 24 into the annular port 19 of the valve and thence through the same ports 22 and 23 as the valve-exhaust into the hollow piston-rod 20. The valve 16 is tripped to the right for the continued movement of the engine by steam passing through port 27, Fig. 4, and the valve-exhaust will be through port 34, the same as through port 35 for the other movement and into the hollow piston-rod. The initial movement of the piston-head to the left would be caused by steam passing out of the delivery-opening 39 of the valve-exhaust port 35 into the annular valve-port 18, thence through port 24 to the right-hand end of the piston-head 12. Then as soon as the annular port 15 of the piston-head registers with the main induction 30 the live

steam will pass through the piston-head port 29 and on out of port 24 and continue the movement of the piston-head to the left. The piston-exhaust during its movement to the left is through port 25, annular port 19 of the valve, and on through the valve and piston-rod ports 22 and 23 into the hollow piston-rod.

The piston-rod is hollow until it gets into the main exhaust-compartment 7, and the exhaust-steam passes out of the hollow rod into said compartment through hole 40, Fig. 1, said piston-rod having bearings in the stuffing-box 41. The piston-rod 20 need not be hollow throughout the rest of its length and is not so shown here. It extends on through the main exhaust-compartment 7, through stuffing-box 42, and into a pump-cylinder 43 in the water-compartment 8. The end of the piston-rod 20 in the pump-cylinder 43 is provided with the usual suction-head 44 for pumping water. The water-space which surrounds the pump-cylinder 43 communicates with the water-compartment 9 and with the space in the air-chamber 11, or dome, through check-valves 45 and 46 in the usual manner, Fig. 2. There are two check-valves 64 and 65 beneath the valves 45 and 46, closing the induction-ports of the incoming water, as will be explained in the operation.

At 47 and 48 are the water-discharge ports, one on either side. The object of this is that a pipe can be attached to whichever one desired, according to the position and location of the pump, said pipe running to the boiler or other place of delivery. Such a pipe is shown at 49 broken away, Fig. 2. When in use, the other discharge would be plugged up. So, also, there is a water-induction port at 50 and 51, one on each side leading into the water-compartment 9, the object being that whatever port desired may be used the same as with ports 47 and 48.

The operation of the pump is similar to other pumps of this class. Referring to Fig. 1, when the piston-rod 20 moves to the right, the water will be drawn into port 51 and into the water-compartment 9 and up through the port of the check-valve 64 and on into the left-hand end of the piston-cylinder 43. During this action the water forward of the plunger was forced up through the port of the valve 46 and out through the discharge-pipe 49. When the piston-rod moves to the left, the water forward of the plunger will pass up through check-valve 45 and out through the discharge-pipe 49. During this action the water was drawn into the right-hand end of the cylinder 43 through the port of the check-valve 65.

On one side of the pump at the juncture of the compartments 7, 9, and 10 is a throttle-valve chamber 52, Figs. 2 and 3, the latter figure showing it in section. It is shown in dotted lines 52 in Fig. 1. A port 54 communicates with the main exhaust-compartment

7, a port 55 communicates with water-compartment 9, and a port 56 communicates with the secondary exhaust-compartment 10. A throttle-valve 57 is in the chamber 52, and has an annular port 58, registering with the port 54, and a communicating-port leading down from the annular port 58 at 59, which register with one or the other of the ports 55 or 56 during the operation of the pump, as desired, Figs. 1 and 3. As shown in Fig 3, the port 59 does not register with either port 55 or 56, and hence these ports are closed. By turning the throttle-valve 57 so the port 59 of the valve will register with port 55, the exhaust-steam from the main exhaust-compartment 7 will pass into the water-compartment 9 and heat the water being pumped. By turning the valve 57 so the port 58 will register with the port 56, then the exhaust-steam will pass into the secondary exhaust-compartment and out into the open air through port 60 or 61, Fig. 3. Either one of these ports 60 or 61 may be used, according to which side of the pump the exhaust-pipe 62 is attached, and this is governed by the location of the pump. When the port 60 is employed as here shown, of course the port 61 will be plugged up. Providing these compartments so as to pipe on either side is very important from a point of convenience, and it is very important to be able to exhaust into the water or out into the open air.

Having thus described my invention, what

I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A steam-pump having a main exhaust-compartment, a secondary exhaust-compartment, and a water-compartment, a valve-chamber at the juncture of said compartments, ports leading from the main exhaust-compartment through said valve-chamber and into the secondary exhaust-compartment and the water-compartment, and a valve in said chamber adapted to direct the exhaust-steam either into the water-compartment or the secondary exhaust-compartment, substantially as set forth.

2. A steam-pump, comprising a steam-cylinder and exhaust-chamber, a hollow piston-head, a hollow piston-rod, a steam-actuated valve in the hollow piston-head and adapted to slide on the hollow piston-rod, steam-ports coacting with the slide-valve, said valve having radial ports leading into the hollow piston-rod, steam-passages whereby the steam actuates the valve, exhaust-passages leading into the hollow piston-rod, and said piston-rod exhausting into the exhaust-chamber, substantially as set forth.

In testimony of the foregoing I have hereunto set my hand in the presence of two witnesses.

JAY B. RHODES.

Witnesses:

E. D. LEWENFELD,
M. I. O'NEILL.