

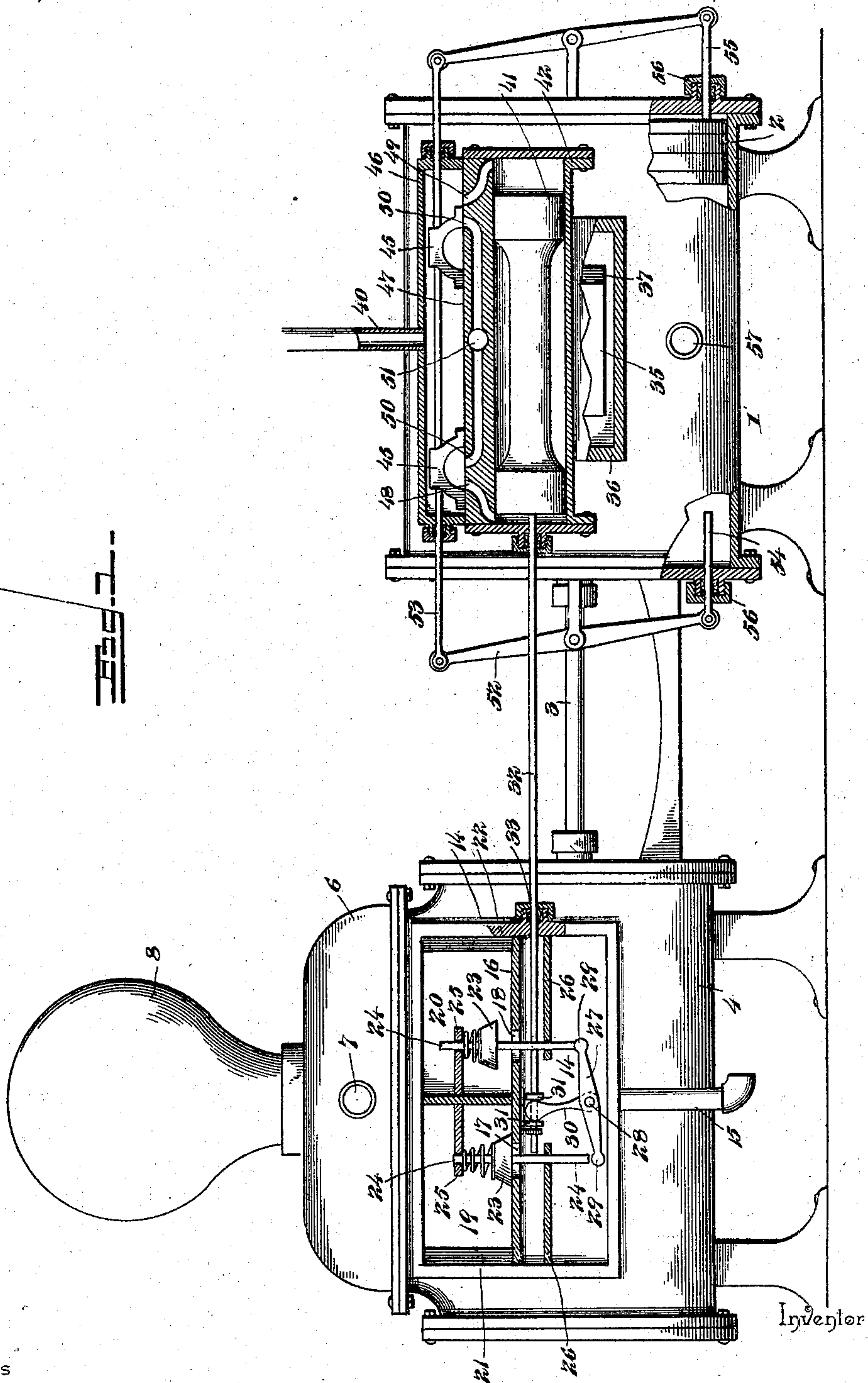
(No Model.)

2 Sheets—Sheet 1.

T. J. OWENS.
STEAM PUMP.

No. 562,554.

Patented June 23, 1896.



Witnesses

E. H. Stewart
D. B. Hays

By *his* Attorneys, *Thomas J. Owens*

Chas. Snow & Co.

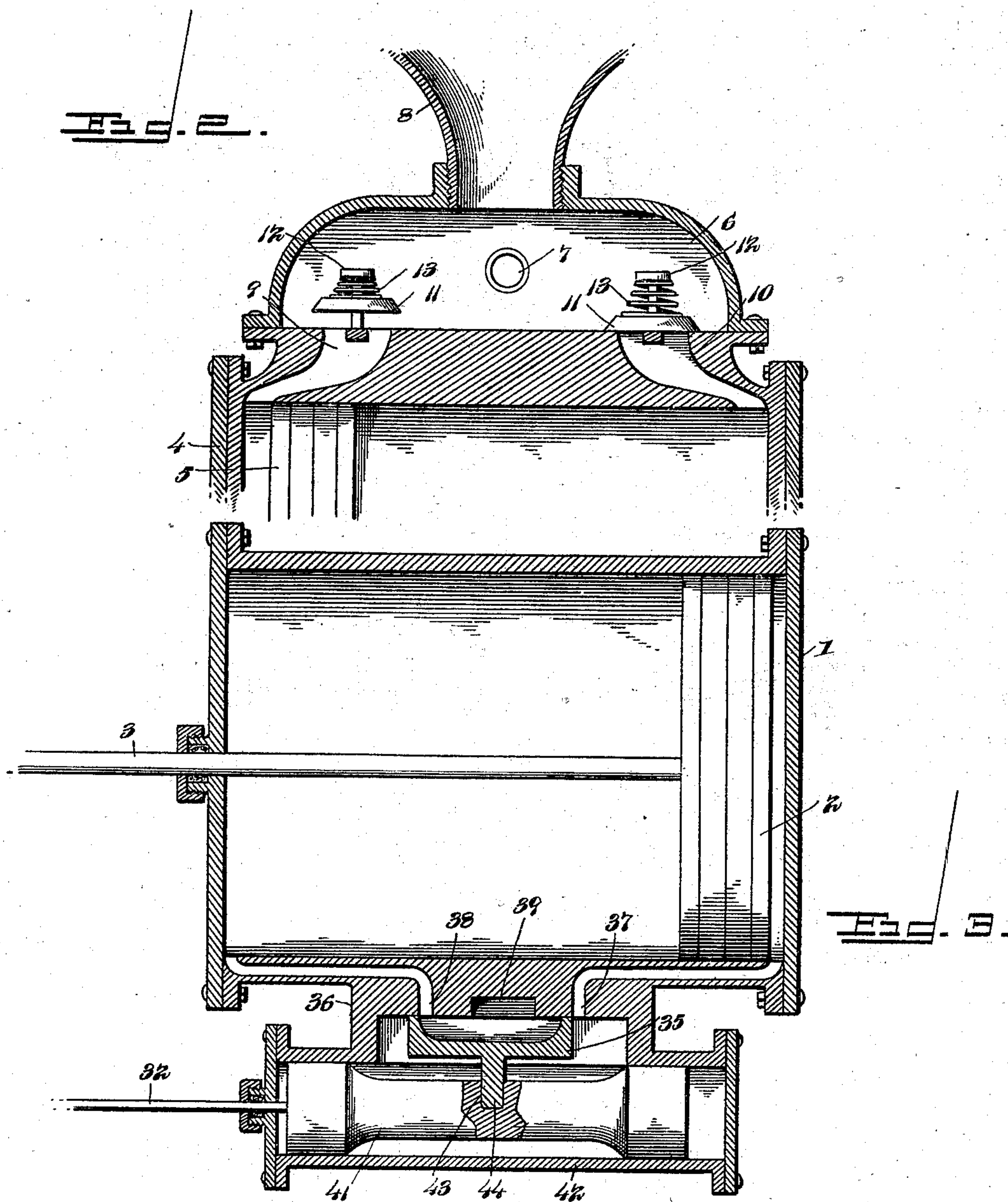
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UNITED STATES PATENT OFFICE.

THOMAS J. OWENS, OF BEDFORD, INDIANA, ASSIGNOR OF ONE-HALF TO
JAMES CATHER, OF SAME PLACE.

STEAM-PUMP.

SPECIFICATION forming part of Letters Patent No. 562,554, dated June 23, 1896.

Application filed March 25, 1896. Serial No. 584,808. (No model.)

To all whom it may concern:

Be it known that I, THOMAS J. OWENS, a citizen of the United States, residing at Bedford, in the county of Lawrence and State of Indiana, have invented a new and useful Steam-Pump, of which the following is a specification.

My invention relates to steam-pumps, and particularly to hot-water feeders for boilers, and the object in view is to provide means for actuating delivery-valves to avoid resistance to the passage of water to the boiler; to provide means for preventing the expansion of the valves from causing inoperativeness thereof, whereby water at any temperature may be pumped without detracting from the efficiency of the apparatus, and, furthermore, to provide such a construction and arrangement of parts as to avoid delay in admitting water to the water-cylinder, whereby the space in rear of the piston is fully occupied by water, and hence the jar or hammer due to a partial vacuum when the direction of movement of the piston is reversed is avoided.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a side view of a pump constructed in accordance with my invention, the valve-chest being shown in section and a portion of the steam-cylinder being broken away to show the tappets. Fig. 2 is a partial section of the water-cylinder. Fig. 3 is a horizontal section of the main and piston valve casings and a portion of the steam-cylinder.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

1 designates a steam-cylinder in which is arranged a piston 2, connected to a piston-rod 3, and 4 represents a water-cylinder inclosing a pump-piston 5, which is connected to said piston-rod to receive motion from the piston operating in the steam-cylinder. In

connection with the water-cylinder is arranged a feed-chamber 6, communicating with a feed-pipe 7, and connected with the feed-chamber is a compressor 8. Communication is established between the water-cylinder and the feed-chamber by means of ports 9 and 10, controlled by check-valves 11, and said valves are mounted upon guides 12 and are normally held seated by means of springs 13.

In connection with the water-cylinder I employ a delivery-valve chamber 14, having a supply-pipe 15 in communication therewith. A valve-seat 16 is arranged within the casing and is provided with ports 17 and 18, which communicate, respectively, with chambers 19 and 20, and said chambers communicate, respectively, by means of cylinder-ports 21 and 22, with opposite ends of the water-cylinder. The ports 17 and 18 are controlled by means of delivery-valves 23, having stems 24 operating in upper and lower guides 25 and 26, arranged, respectively, above and below the plane of the valve-seat.

Arranged in operative relation with the lower extremities of the valve-stems 24 is a rocking lever 27, fulcrumed, as at 28, in the casing 14 below the plane of the valve-seat, with its rounded extremities 29 in position to engage the lower extremities of the stems 24 to unseat the valves. This lever is provided at its center with a slotted arm 30, with which engage collars 31 on a valve-stem 32, said valve-stem extending through a stuffing-box 33 in the end of the casing 14 and operating at its extremity in a guide-eye 34.

The inlet of steam to the steam-cylinder 1 is controlled by a main slide-valve 35, operating in a valve-casing 36, and controlling the inlet-ports 37 and 38 and the exhaust-port 39, a steam-inlet pipe 40 being arranged in communication with the casing; and this slide-valve is operated by means of an actuating-piston 41 operating in a cylinder 42 and provided at its center with a seat 43 to receive a projection 44 on the main slide-valve 35. This actuating-piston 41 is secured to the extremity of the delivery-valve stem 32, and motion is communicated to the actuating-pis-

ton by means of an auxiliary slide-valve 45, operating in an auxiliary slide-valve casing 46 upon a seat 47, in which are formed inlet-ports 48 and 49 and exhaust-ports 50, said inlet-ports communicating, respectively, with opposite ends of the cylinder 42, and the exhaust-ports being united, as at 51, to form a suitable outlet. Motion is communicated to this auxiliary or controlling valve by means of rocking levers 52, connected to opposite extremities of the auxiliary valve-stem 53, and also connected to reciprocatory tappets 54 and 55, operating through stuffing-boxes 56 with their inner extremities in the path of the steam-cylinder piston 2, whereby the tappets are actuated to reverse the position of the auxiliary valve at the limits of the strokes of the main piston. The exhaust-port 39 in the main valve-seat communicates with an exhaust-pipe 57.

This being the construction of the improved pump, the operation thereof, briefly described, is as follows: In Fig. 1 the steam-cylinder piston is shown at the limit of its stroke to the right, the tappet 55 having been forced outward to reverse the auxiliary valve 45. The port 49 in the valve-seat 47 is thereby opened to admit steam to the right-hand end of the operating-piston cylinder 42, and the movement of the piston 41 to the left causes a corresponding movement of the main valve 35 to open the inlet-port 37, whereby steam is admitted at the right of the main steam-cylinder piston 2. The movement of the operating-piston 41 to the left has also opened the delivery-valve controlling the port 18, and hence water admitted to the valve-casing 14 through the supply-pipe 15 is allowed to pass freely through the port 22 to the interior of the water-cylinder in rear of the piston therein. The pump, as above described, is not designed to elevate water, the latter being supplied from an elevated tank or receptacle in connection with the heater, said tank and heater not being shown in the drawings, and hence when the valve controlling the delivery-port is opened water is allowed to flow freely to the water-cylinder in rear of the piston to entirely fill the space and permit the piston to advance without causing a partial vacuum. This forward movement of the piston in the water-cylinder, due to the admission of steam through the inlet-port 37 of the steam-cylinder, causes upward pressure upon the check-valve controlling the port 9 in the water-cylinder, and hence the water is allowed to pass out from in front of the water-cylinder piston for discharge through the feed-pipe 7 to the boiler. (Not shown.) Thus it will be seen that the delivery-valves are opened simultaneously with or slightly before steam is admitted to the steam-cylinder to actuate the main piston, and hence no lost motion or vacuum is caused in rear of the water-cylinder piston, and consequently upon the commence-

ment of the return stroke of the piston there is no jar or hammer due to a vacancy in advance of the piston.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

Having described my invention, what I claim is—

1. The combination with steam and water cylinders having connected pistons, delivery-valves controlling the inlet-ports of the water-cylinder, and a main slide-valve controlling the inlet-ports of the steam-cylinder, of an operating-piston fixed to the main valve and operatively connected with the delivery-valves, an auxiliary or reversing valve controlling ports in communication with the cylinder of the operating-piston to move the latter alternately in opposite directions, and shifting devices including tappets actuated by the steam-cylinder piston for operating said auxiliary or reversing valve, substantially as specified.

2. The combination with steam and water cylinders having connected pistons, delivery-valves controlling the inlet-ports of the water-cylinder and a main valve controlling the inlet-ports of the steam-cylinder, of an operating-piston attached to the stem of the delivery-valves and to the main valve, an auxiliary or reversing valve controlling ports in communication with the casing of the operating-piston, tappets arranged at the opposite extremities of the steam-cylinder in the path of the piston operating therein, and connections between said tappets and the auxiliary or reversing valve, substantially as specified.

3. The combination with a feed-water pump-cylinder, and a piston operating therein, of spring-closed delivery-valves arranged in operative relation with ports communicating, respectively, with opposite ends of the cylinder, a rocking lever disposed at its extremities in operative relation with the delivery-valves, and a stem connected to the rocking lever and adapted to be reciprocated at the limits of the strokes of the piston to reverse the positions of the delivery-valves prior to the commencement of the succeeding stroke of the piston, substantially as specified.

4. The combination with coaxial steam and water cylinders having pistons connected by a common piston-rod, of spring-closed delivery-valves controlling the inlet-ports of the water-cylinder, a rocking lever arranged at its extremities in operative relation with the delivery-valves, a main valve controlling the inlet-ports of the steam-cylinder, an operating-piston attached to the main valve, a rod 32 connected to said operating-piston and having collars arranged upon opposite sides of an arm on the rocking lever, an auxiliary

slide-valve controlling ports in communication with the casing of the operating-piston, tappets arranged at opposite extremities of the steam-cylinder in the path of and in alignment with the piston operating therein, and levers connecting said tappets respectively with opposite ends of the stem of the auxiliary valve, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

THOMAS J. OWENS.

Witnesses:

JAMES CATHER,
JAMES E. BORUFF.