No. 657,670. Patented Sept. 11, 1900.

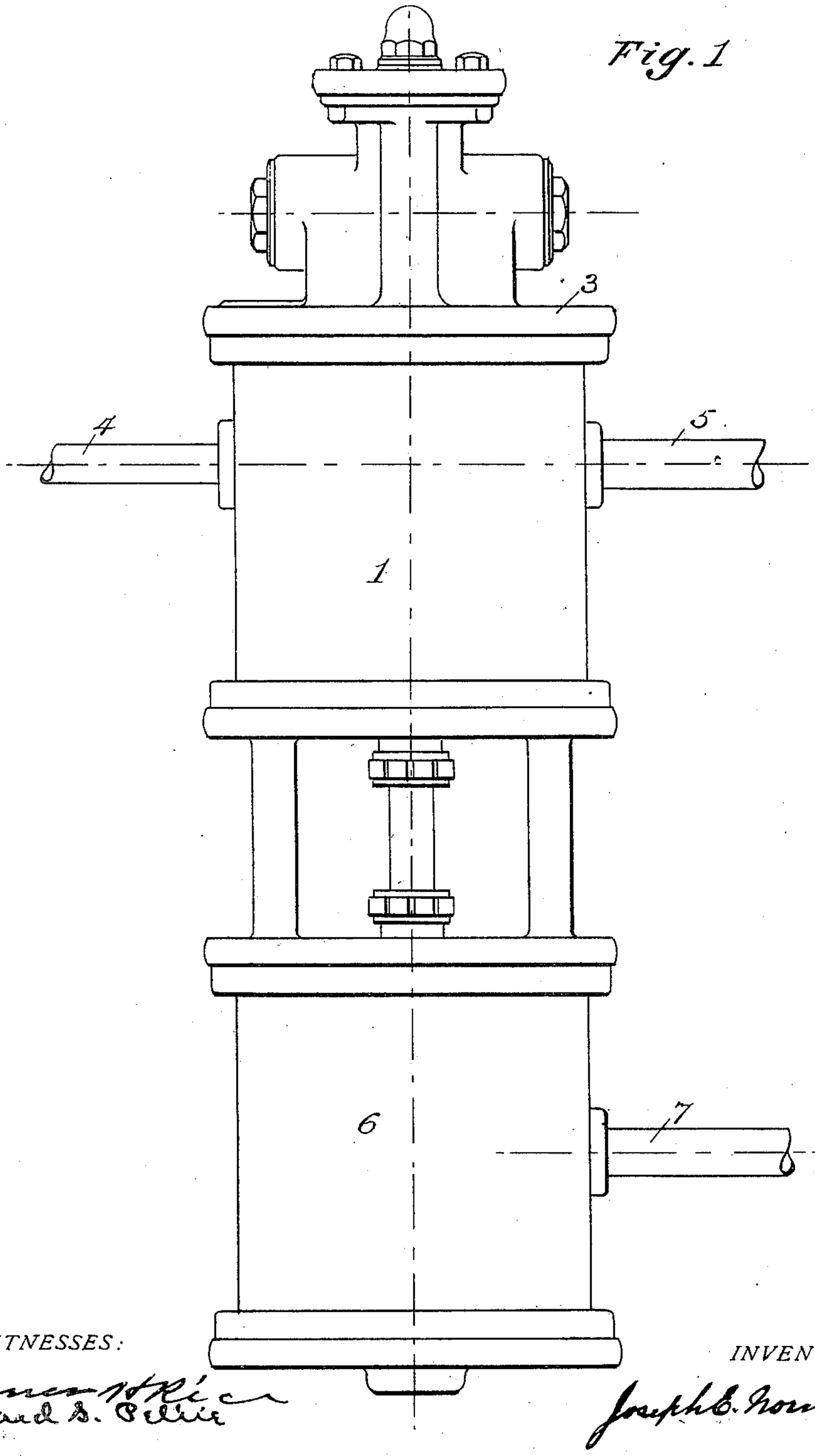
J. E. NORMAND.

STEAM ENGINE FOR PUMPS.

(Application filed Aug. 19, 1896.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1



WITNESSES:

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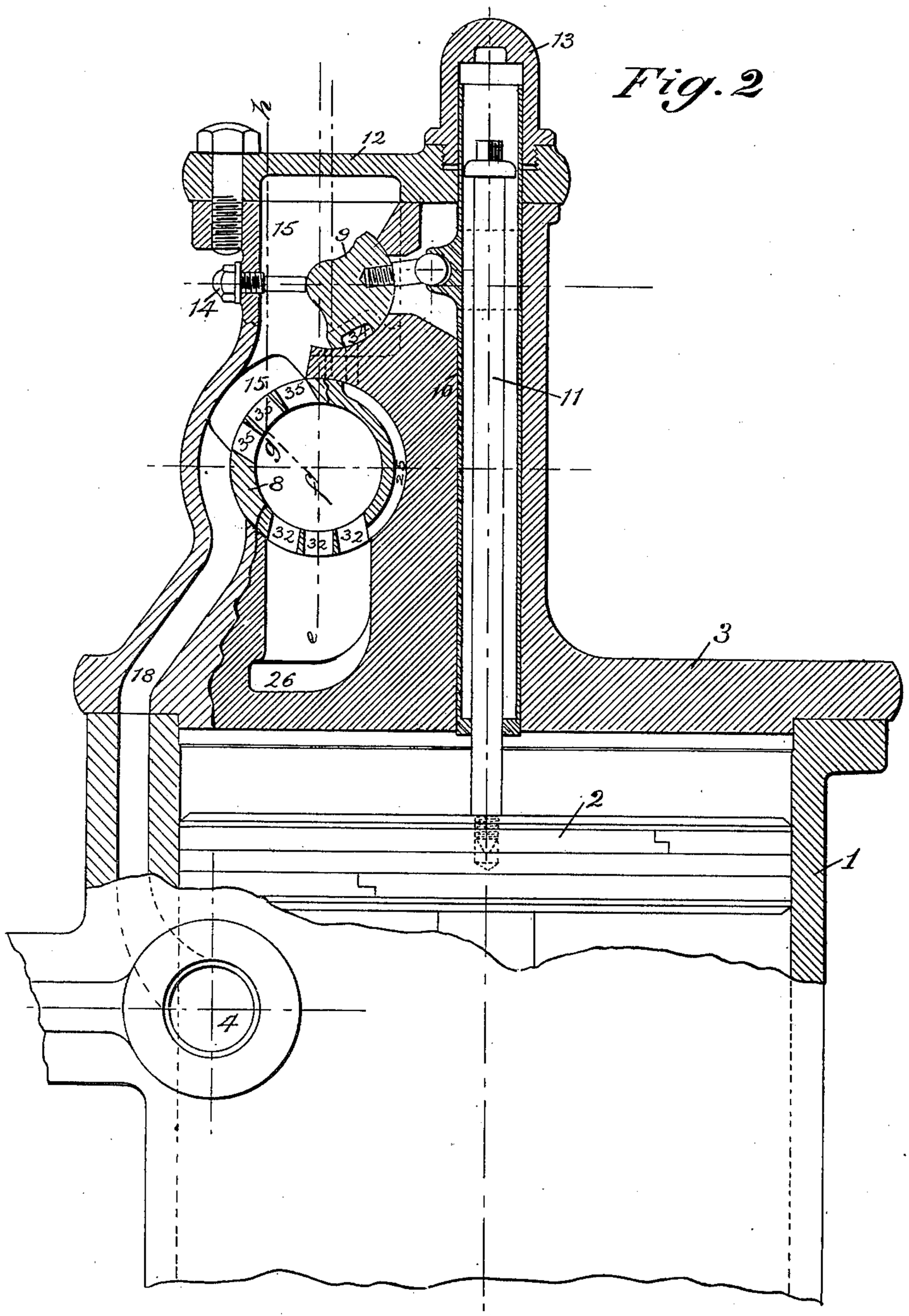
(No Model.) 4 Sheets—Sheet 2.

Fig. 2



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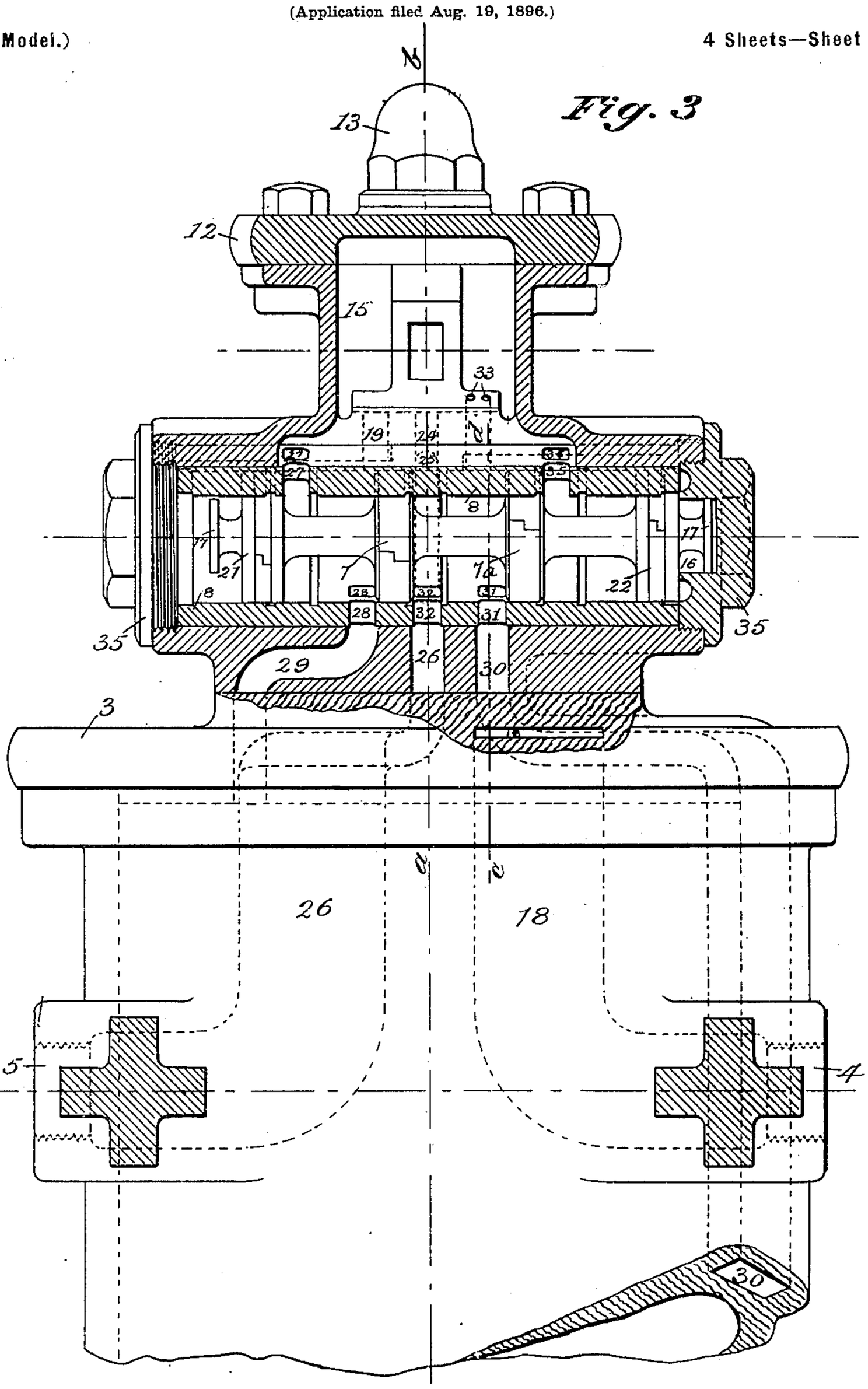
STEAM ENGINE FOR PUMPS.

(Application filed Aug. 19, 1896.)

(No Model.) 4 Sheets—Sheet 3.

Fig. 3



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No. 657,670. Patented Sept. 11, 1900.

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(Application filed Aug. 19, 1896.)

(No Model.) 4 Sheets—Sheet 4.

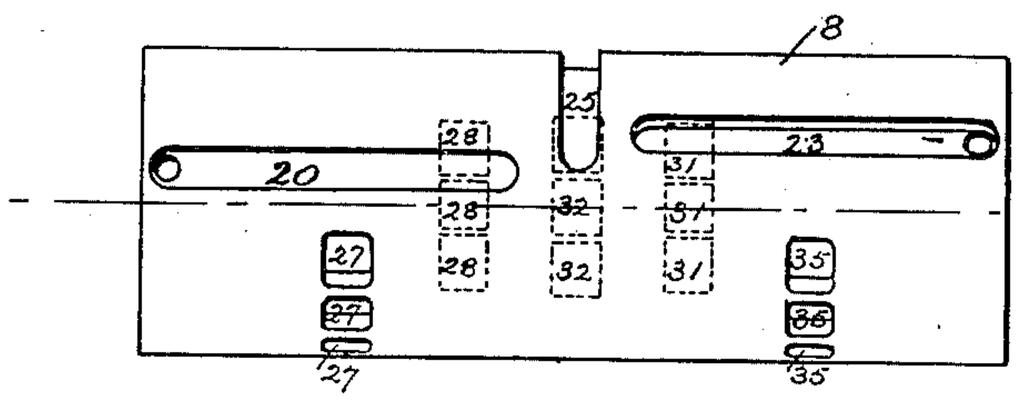


Fig. 4

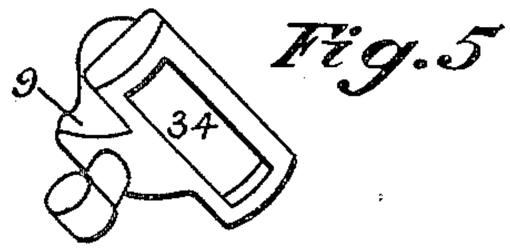
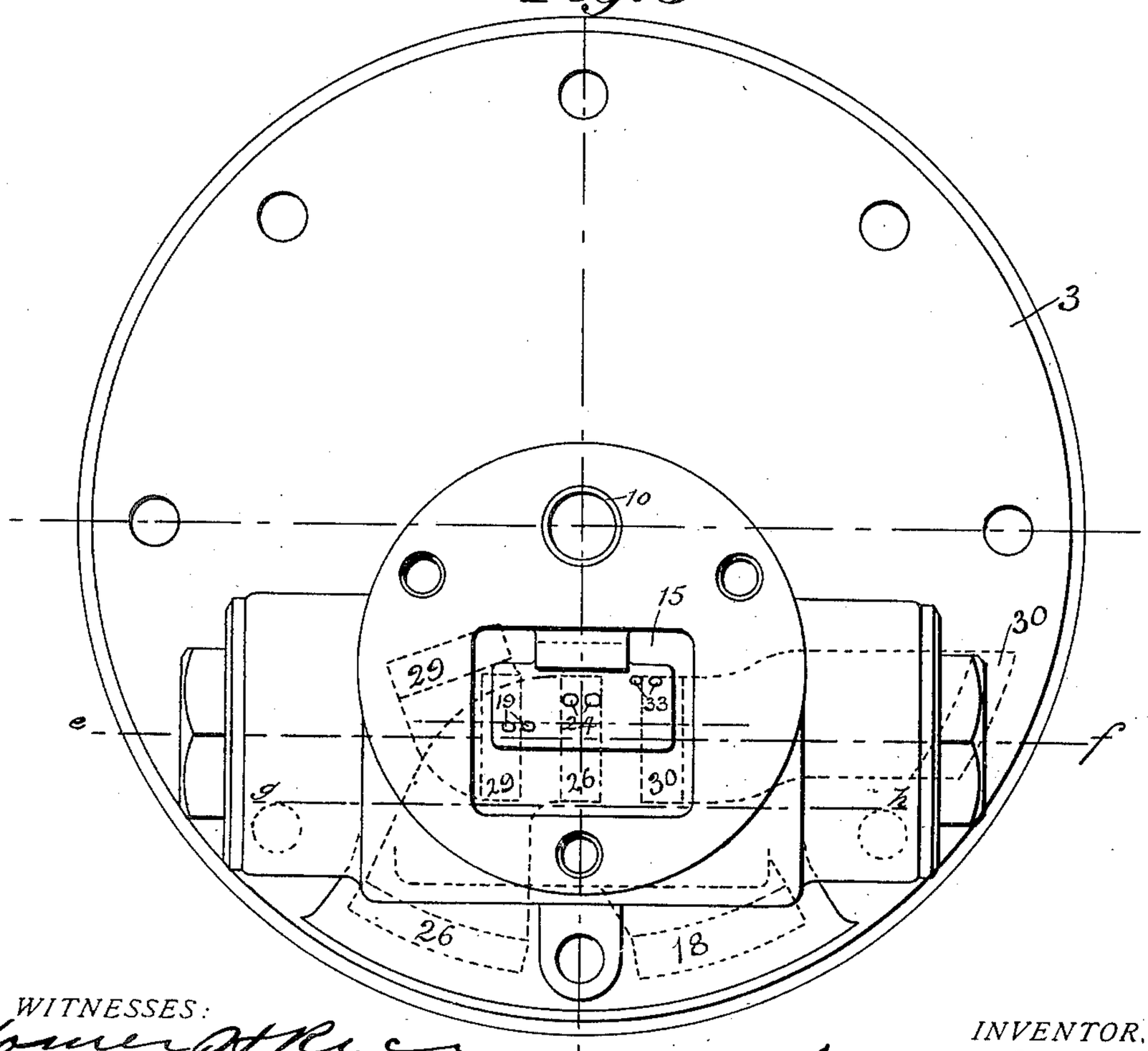


Fig. 5

Fig. 6



WITNESSES:

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Joseph E. Normand

UNITED STATES PATENT OFFICE.

JOSEPH E. NORMAND, OF WATERTOWN, NEW YORK, ASSIGNOR OF ONE-HALF TO JOSEPH R. ELLICOTT, OF NYACK, AND CHARLES A. BALL, OF NEW YORK, N. Y.

STEAM-ENGINE FOR PUMPS.

SPECIFICATION forming part of Letters Patent No. 657,670, dated September 11, 1900.

Application filed August 19, 1896. Serial No. 603,197. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH E. NORMAND, a citizen of the United States, residing at Watertown, in the county of Jefferson and State of New York, have invented new and useful Improvements in Steam-Engines for Pumps, of which the following is a specification.

My invention relates to improvements in air or water pumps in which a steam-operated main valve controlling the admission and exhaust of steam to and from the cylinder operates in conjunction with a primary valve, which in its movement controls the movement of the main steam-valve.

My invention consists in certain novel details of construction and combination of parts to be hereinafter more fully described and as illustrated in the accompanying drawings, in which—

Figure 1 is a general view of the complete apparatus. Fig. 2 is a vertical section of the steam-head 3 through lines *ab* and *cd* and viewed in Fig. 3. Fig. 3 is a section through line *ef gh* and viewed in Fig. 6. Fig. 4 is a top view of bushing 8. Fig. 5 is a perspective view of primary valve 9, showing cavity 34 quite large to insure that the steam-pressure will hold valve on its seat strongly. Fig. 6 is a top view of pump-head 3 with steam-chest cover 12 removed.

In the views, 1 indicates the steam-cylinder; 2, the main steam-piston; 3, the steam-cylinder head; 4, the steam-pipe; 5, the exhaust-pipe; 6, the air or water cylinder, as the case may be; 7, the discharge air or water pipe to receiver; 7, 7^a, 21, and 22, the steam-operated main valve for controlling the action of main steam-piston 2; 8, the bushing for the steam-operated main valve; 9, the primary valve; 10, the reach-sleeve; 11, the actuating-rod; 12, the steam-chest cover; 13, the cap-nut to allow the admission of a socket-wrench to unscrew rod 11 when desired; 14, the primary valve-lock; 15, the steam-chest; 16, the cushion-cylinder; 17, the cushion-piston.

The operation is as follows: Steam is admitted in the steam-chest 15 through port 18. (Shown in Fig. 2.) In the present position of the parts, as shown, the steam-pressure is admitted through ports 19 and 20 against steam-operated main valve 21, and at the same instant the steam-pressure on steam-operated main valve 22 is exhausted through ports 23, 33, and 34 and exhaust-ports 24, 25, and 26, causing steam-operated main valve to be instantly reversed and to admit steam through ports 27, 28, and 29 on the upper side of main piston 2 and to exhaust the bottom side through ports 30, 31, 32, and 26, whereby piston 2 is forced downward. The primary steam-valve 9 is reversed at the completion of the downward stroke of piston 2 by means of reach-sleeve 10 and actuating-rod 11, admitting steam-pressure through ports 33 and 23 against balanced piston 22 and at the same instant exhausting the steam-pressure from steam-operated main valve 21 through ports 20, 19, and 34 and exhaust-ports 24, 25, and 26, causing steam-operated main valve to be instantly reversed and to admit steam through ports 35, 31, and 30 on the bottom side of main piston 2 and to exhaust the upper side through ports 29, 28, 32, and 26, whereby piston 2 is forced upward.

The steam-operated main valve can be located along the side of the steam-cylinder 1 instead of in the cylinder-head and can be operated by the primary valves now in use.

What I desire to secure by Letters Patent is—

1. The combination in a steam-engine for pumps with a cylinder and piston mounted therein, of a steam-operated main valve for controlling the admission and exhaust of steam to and from the cylinder, a primary valve adapted in its movement to control the movement of the steam-operated main valve, a reach-sleeve and an actuating-rod adapted to move the primary valve at or near the end of a stroke of the piston, substantially as specified.

2. The combination in a steam-engine for pumps with a cylinder and piston mounted therein, of a steam-operated main valve for controlling the admission and exhaust of steam to and from the cylinder, a rotary primary valve adapted in its movement to control the movement of the steam-operated valve, a reach-sleeve adapted to partially rotate said primary valve at or near one end of

a stroke of the piston and an actuating-rod adapted to partially rotate the said primary valve at or near the other end of a stroke of the piston, substantially as specified.

3. A bushing, adapted to receive a piston-valve, having a cross-over port or passage in its outer periphery, communicating at one of its ends with a port leading to the interior thereof and at the other of its ends adapted to register with a port in the casing or support in which the bushing is arranged to be mounted, substantially as specified.

4. The combination in a steam-engine for pumps with a cylinder and piston mounted therein, of a steam-operated main valve for controlling the admission and exhaust of steam to and from the said cylinder, the said steam-valve comprising four piston-heads, a bushing in which the said piston-heads are mounted and arranged to reciprocate, ports leading from the interior of the bushing to the exhaust and to the opposite ends of the said cylinder, said ports terminating in the bushing at points between the outer piston-heads of the main steam-valve in any position in which the said valve may be, ports in open communication with the steam source of supply and communicating with the interior of the bushing between the outer piston-heads of the main steam-valve, a primary valve having a cavity always in communication with the exhaust, and ports communicating with the outer piston-heads of the main steam-valve and with the steam source of supply or the exhaust, the said primary valve arranged to control the said last-named ports so that when one of the ports leading to one of the outer piston-heads is in communication with the steam source of supply the other is always in communication with the exhaust, and vice versa, substantially as specified.

JOSEPH E. NORMAND.

Witnesses:
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EDWARD S. PETRIE.