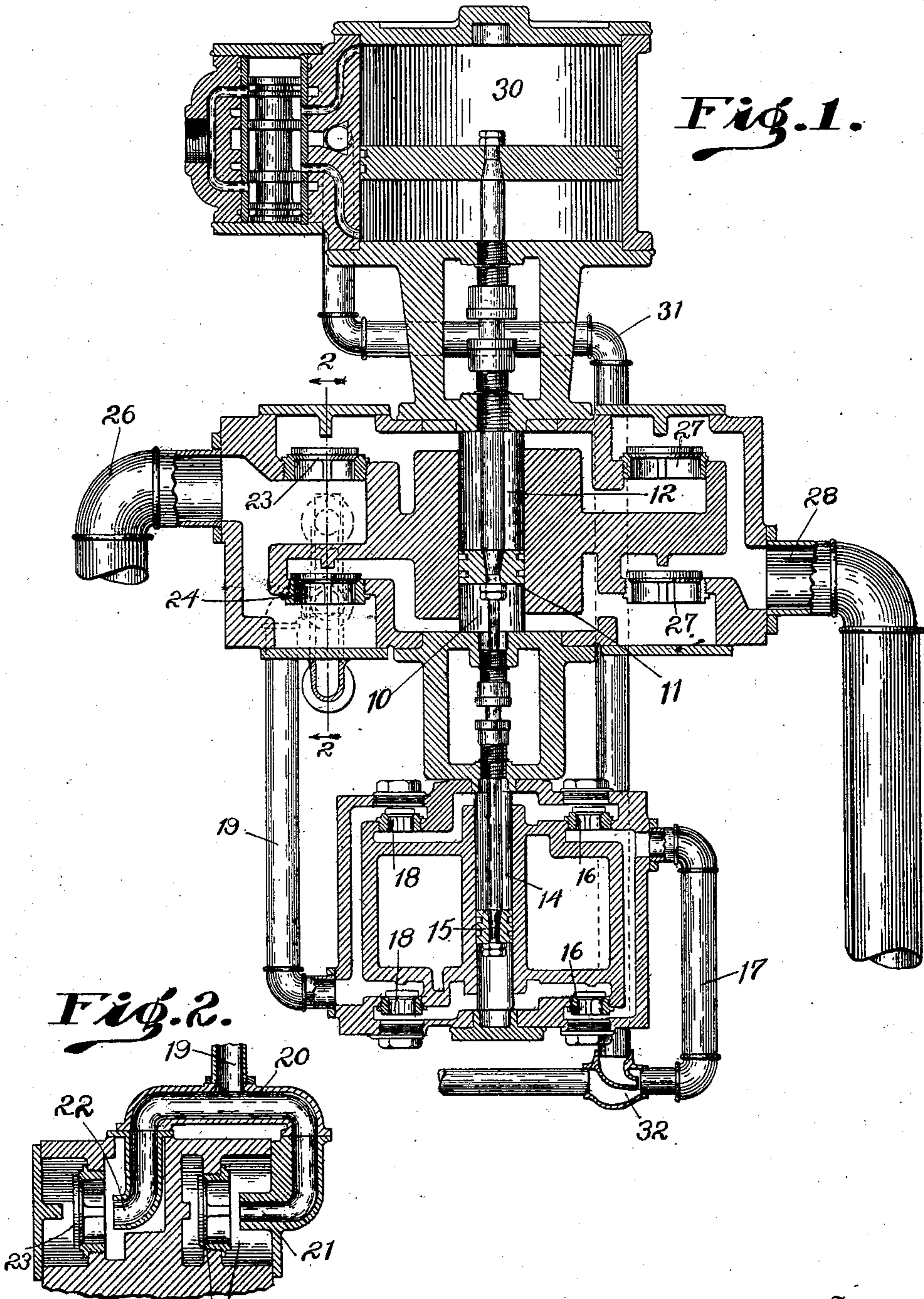


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APPLICATION FILED JUNE 24, 1907.

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Patented Mar. 23, 1909.
2 SHEETS—SHEET 1.



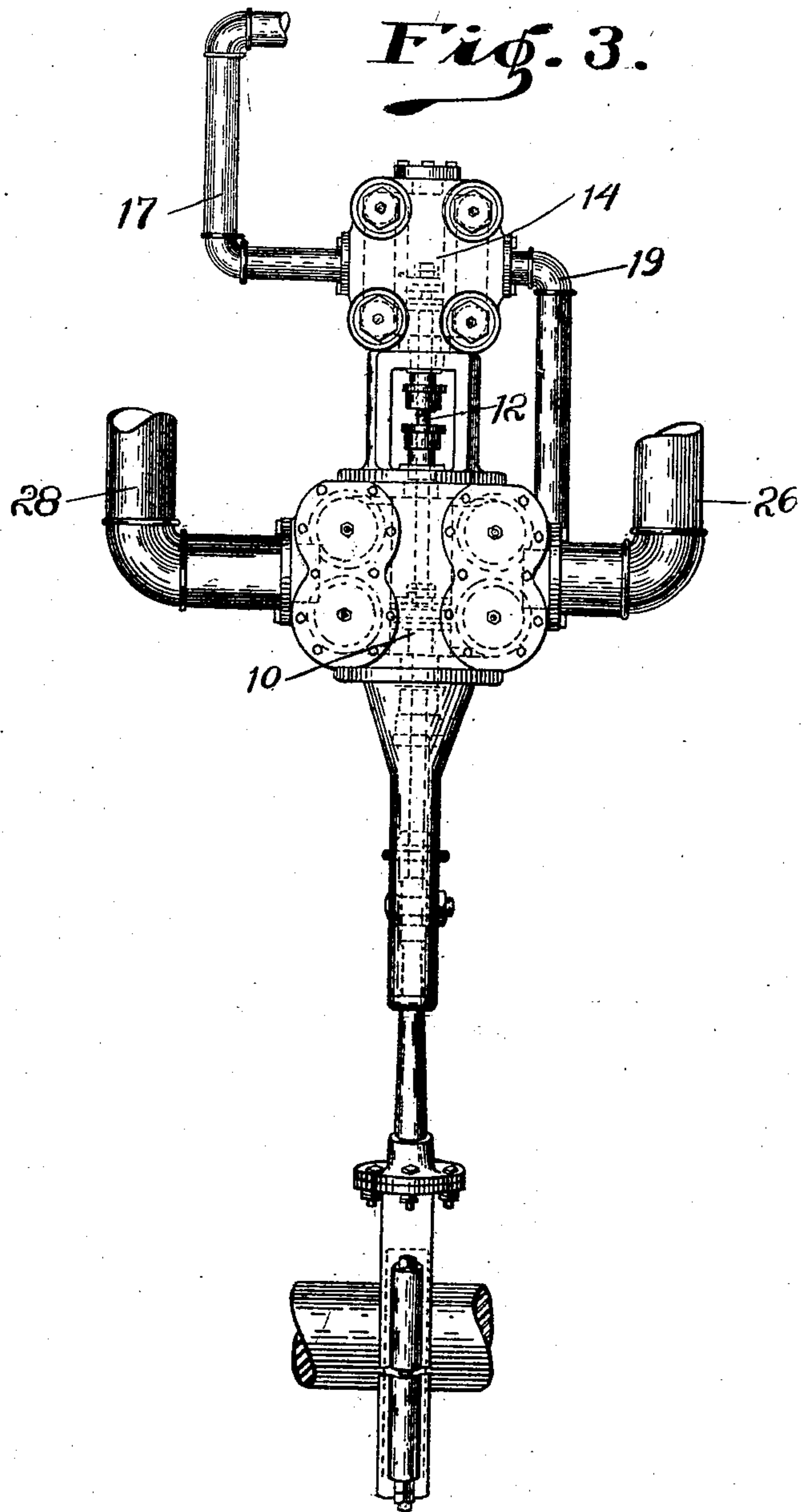
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UNITED STATES PATENT OFFICE.

WILLIAM T. HARRIS, OF LOUISVILLE, KENTUCKY, ASSIGNOR TO CHARLES C. McCHORD, OF JEFFERSON COUNTY, KENTUCKY.

PUMP FOR EXHAUST-STEAM AND FEED-WATER.

No. 916,309.

Specification of Letters Patent.

Patented March 23, 1909.

Application filed June 24, 1907. Serial No. 380,486.

To all whom it may concern:

Be it known that I, WILLIAM T. HARRIS, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Pumps for Exhaust-Steam and Feed-Water, of which the following is a specification.

The object of my invention is to produce a pump by means of which the exhaust steam from an engine, as well as the feed-water, may be fed into the boiler, my invention being especially designed for, but of course not limited to, use in connection with locomotives.

The accompanying drawings illustrate my invention.

Figure 1 is an axial section of a pump embodying my invention and provided with a steam engine for operating the same; Fig. 2 is a section on line 2—2 of Fig. 1, and Fig. 3 an elevation of the pump, mechanically driven.

In the drawings, 10 indicates a pump cylinder having a piston 11 mounted therein, the rod 12 of said piston extending through the heads of the cylinder, through desirable packing glands. Arranged in alinement with cylinder 10 is a smaller cylinder 14 having a piston 15 carried by the extended rod 12. The cylinder 14 is provided with suitable inlet valves 16 which communicate with a pipe 17 leading from the water tank, and with suitable outlet valves 18 which lead to an eduction pipe 19. Pipe 19 delivers to a passage 20 which leads to a pair of nozzles 21 and 22 which are directed toward inlet valves 23 and 24, respectively, for the opposite ends of cylinder 10, the said nozzles 21 and 22 lying within a chamber 25 into which the exhaust from the locomotive or other engine is delivered through a pipe 26. Leading from cylinder 10 are outlet valves 27 which lead to the eduction pipe 28 which leads to the boiler.

The piston rod 12 may be reciprocated by means of an eccentric, or other mechanical driving train, or may be driven by means of a steam engine 30, as shown in Fig. 1. When the piston rod 12 is driven by the steam engine, as shown, I prefer to exhaust said engine through a pipe 31 which delivers to an aspirating nozzle 32 arranged in the water supply pipe 17. The engine 30 may be driven by exhaust steam from the locomotive.

In operation: reciprocation of the piston rod 12 will cause piston 15 to draw water from pipe 17 into cylinder 14 and to discharge the same through valves 18 and pipe 19 to nozzles 21 and 22. The exhaust steam from the engine is delivered to chamber 25 through pipe 26 and a stream of water will be directed by said nozzles against the inlet valves 23 and 24, and acting against that valve which is free to be moved by reason of the particular direction of movement of the piston 11, will have an aspirating effect upon the exhaust steam in chamber 25 and will draw said exhaust steam into cylinder 10 from whence it is ejected through valves 27 to the boiler 28. The exhaust steam from the engine 30 is also saved by passing into the water stream going through pipe 17.

In order to avoid the use of springs I prefer to arrange the piston rod 12 vertically, as shown in the drawings, this arrangement making the axes of the various valves vertical. With this arrangement, and in order to properly equalize the flow from the nozzles 21 and 22 I deem it advisable to make the nozzle 21 somewhat smaller than the nozzle 22 so that there will be a sufficient restriction to produce an equal flow from the two nozzles. The water cannot accumulate in the lower part of chamber 25 to any great extent because it will be drawn in to the cylinder 10 by the action of piston 11. It will be noticed that, when the engine 30 is driven by exhaust steam, no energy (beyond that used ordinarily) is drawn from the boiler and that there is such a mixture of exhaust steam and feed-water that the feed water is heated to a high degree before entering the boiler.

I claim as my invention:

1. The combination of a pair of pumps, each having suitable inlet and outlet valves, a supply pipe leading into one of said pumps, a discharge pipe leading from said pump into the other pump and placed to deliver a jet directly against the inlet valves of said other pump in such manner as to tend to open said valves, a discharge pipe for said other pump, and a vapor supply pipe leading to the inlet valves of said other pump.
2. The combination of a pair of pumps, each having suitable inlet and outlet valves, a supply pipe leading into one of said pumps, a discharge pipe leading from said pump into the inlet chamber of the other pump, aspirating nozzles placed at the discharge end of

said discharge pipe and close to the inlet valves of said other pump in such manner that flow from said nozzles will operate against said valves to open the same, a discharge pipe for said other pump, and a vapor supply pipe leading to the inlet valves of said other pump.

3. In an apparatus of the class described, the combination of a pair of pumps, one discharging into the other, a supply pipe for one of said pumps, a discharge pipe leading from said pump to the other pump, a discharge pipe for said other pump, a vapor supply pipe also leading into said other pump, a steam engine for operating said pumps, and an exhaust pipe leading from said steam engine and delivering into the supply pipe of the first pump through an aspirating nozzle.

4. The combination of a pair of pumps, each having suitable inlet and outlet valves, a supply pipe leading into one of said pumps, a discharge pipe leading from said pump and delivering against the inlet valves of the other of said pumps through aspirating nozzles, a discharge pipe for said other pump, a vapor supply pipe leading to the inlet valves of said other pump, a steam engine for operating said pumps, and an exhaust pipe leading from said steam engine and delivering into the supply pipe of the first pump through an aspirating nozzle.

5. The combination, with a pair of pump cylinders, one smaller than the other and arranged in tandem, a piston rod passing through said cylinders and carrying a pair of pistons fitting the two cylinders, inlet and outlet valves for the smaller cylinder, inlet valves for the larger cylinder, outlet valves therefor, a supply pipe for the smaller cylinder, a discharge pipe leading from the smaller cylinder, a discharge pipe leading from the larger cylinder to the inlet valve chamber of the larger cylinder and a vapor supply pipe leading into the inlet valve chamber of said larger cylinder.

6. The combination, with a pair of pump cylinders, one smaller than the other and arranged in tandem, a piston rod passing through said cylinders and carrying a pair of pistons fitting the two cylinders, inlet and outlet valves for the smaller cylinder, a pair of inlet valves for the larger cylinder, outlet valves therefor, a supply pipe for the smaller cylinder, a discharge pipe leading from the smaller cylinder to the inlet valve chamber of the larger cylinder, a discharge pipe leading from the larger cylinder and a vapor supply pipe leading into the inlet valve chamber of said larger cylinder.

ply pipe leading into the inlet valve chamber of said larger cylinder.

7. The combination with a pair of pump cylinders, one smaller than the other and arranged in tandem, a piston rod passing through said cylinders and carrying a pair of pistons fitting the two cylinders, inlet and outlet valves for the smaller cylinder, inlet valves for the larger cylinder, outlet valves therefor, a supply pipe for the smaller cylinder, a discharge pipe leading from the smaller cylinder to a pair of aspirating nozzles arranged within the inlet valve chamber of the larger cylinder, a discharge pipe leading from the larger cylinder and a vapor supply pipe leading into the inlet valve chamber of said larger cylinder.

8. The combination, with a pair of pump cylinders, one smaller than the other and arranged in tandem, a piston rod passing through said cylinders and carrying a pair of pistons fitting the two cylinders, inlet and outlet valves for the smaller cylinder, inlet valves for the larger cylinder, outlet valves therefor, a supply pipe for the smaller cylinder, a discharge pipe leading from the smaller cylinder to an inlet valve chamber of the larger cylinder and directed toward the said inlet valves, a discharge pipe leading from the larger cylinder and a vapor supply pipe leading into the inlet valve chamber of said larger cylinder.

9. The combination, with a pair of pump cylinders, one smaller than the other and arranged in tandem, a piston rod passing through said cylinders and carrying a pair of pistons fitting the two cylinders, inlet and outlet valves for the smaller cylinder, inlet valves for the larger cylinder, outlet valves therefor, a supply pipe for the smaller cylinder, a discharge pipe leading from the smaller cylinder to a pair of aspirating nozzles arranged within the inlet valve chamber of the larger cylinder, a discharge pipe leading from the larger cylinder, a vapor supply pipe leading into the inlet valve chamber of said larger cylinder; and a steam engine connected to the piston rod for operating same.

In witness whereof, I have hereunto set my hand and seal at Indianapolis, Indiana, this twenty-first day of June, A. D. one thousand nine hundred and seven.

WILLIAM T. HARRIS. [L. s.]

Witnesses:

ARTHUR M. HOOD,
THOMAS W. McMEANS.