

No. 624,303.

Patented May 2, 1899.

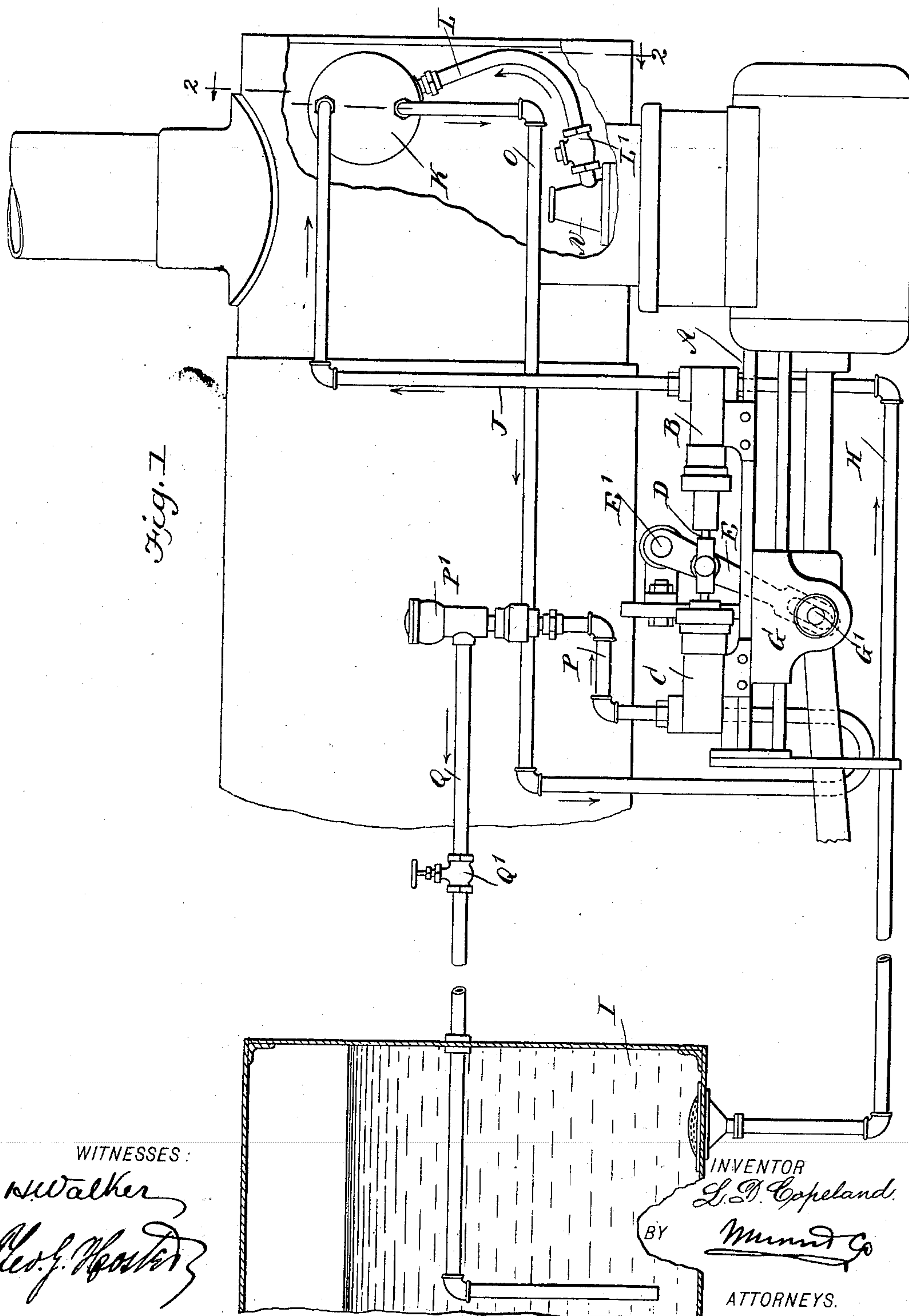
L. D. COPELAND.

FEED WATER HEATER AND PUMP FOR LOCOMOTIVES.

(Application filed Jan. 5, 1898.)

(No Model.)

2 Sheets—Sheet 1.



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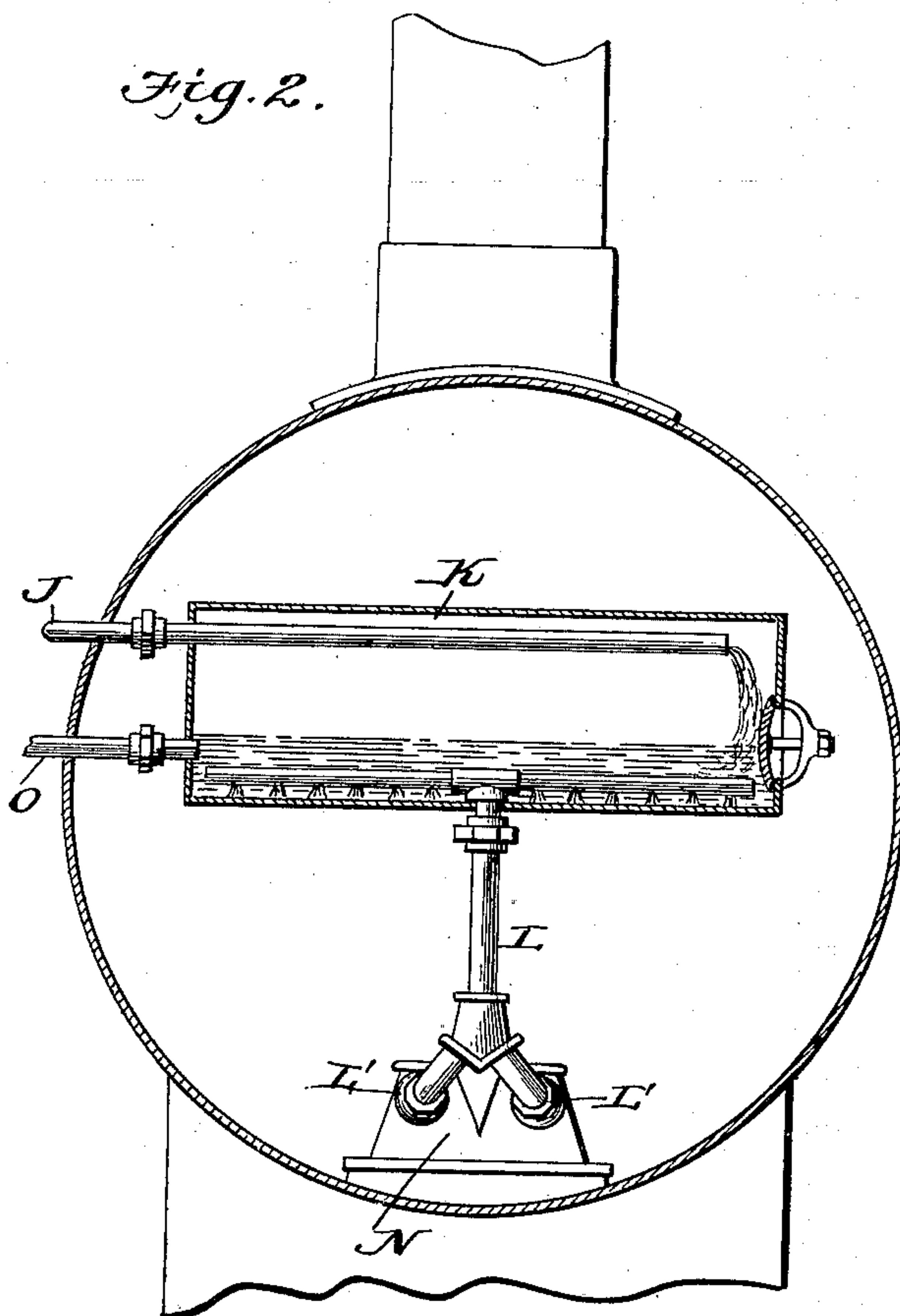
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2 Sheets—Sheet 2.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

LUCIUS DAY COPELAND, OF PHOENIX, ARIZONA TERRITORY, ASSIGNOR OF ONE-TENTH TO JOHN P. McWILLIAMS, OF SAME PLACE.

## FEED-WATER HEATER AND PUMP FOR LOCOMOTIVES.

SPECIFICATION forming part of Letters Patent No. 624,303, dated May 2, 1899.

Application filed January 5, 1898. Serial No. 665,669. (No model.)

*To all whom it may concern:*

Be it known that I, LUCIUS DAY COPELAND, of Phoenix, in the county of Maricopa and Territory of Arizona, have invented a new and Improved Feed-Water Heater and Pump for Locomotives, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved feed-water heater and pump, more especially designed for use on locomotives for delivering the feed-water from the tender-tank in a heated condition to the boiler in a very simple and economical manner.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation of the improvement as applied and with parts in section, and Fig. 2 is a cross-section on the line 2 2 of Fig. 1.

On the frame A of the locomotive are secured the two pumps B and C of different capacity and preferably having their plungers on a common plunger-rod D, pivotally connected with a lever E, fulcrumed at E' on the frame A and attached at its free forked end by a pin G' on the cross-head G of a locomotive-engine, so that when the latter is running the cross-head G imparts a swinging motion to the lever E to actuate the pumps B and C simultaneously. The smaller pump B has its suction-pipe H connected with a water-supply tank I on the tender or other part of the locomotive, and the discharge-pipe J of the said pump delivers the water into the upper portion of a water-heater K in the shape of a drum, located in the smoke-box of the locomotive-boiler, as plainly indicated in the drawings.

Into the bottom of the heater K discharges a pipe L, containing a check-valve L', connected with the exhaust N of the locomotive, so that part of the exhaust-steam from the engine-cylinder passes directly into the water

contained in the heater K, so as to heat the said water and by condensation of the steam increase the volume of water.

From the lower end of the heater K leads the suction-pipe O of the large pump C, connected by a discharge-pipe P with the locomotive-boiler to supply the latter with the necessary amount of water, the said pipe containing the usual check-valve P', as indicated in the drawings. The pipe P is also connected by a pipe Q, containing a valve Q' for the water-supply tank I, so that when the valve Q' is open no water is discharged by the pump C into the boiler, but is pumped back into the tank I.

Now by the arrangement described it is evident that as long as the locomotive is running the water from the tank I is forced by the pump B into the drum or heater K, in which the water is heated by the exhaust-steam from the locomotive-engine, and the heated water is pumped from this heater, by way of the pipes O and P and the other pump C, into the locomotive-boiler, so that the water passes in a heated condition into the boiler. The pump C must necessarily be of a larger capacity than the pump B, as the volume of water increases by heating in the heater K and also by the addition of the condensing-steam passing by the pipe L into the said heater K.

When the desired amount of water has been pumped into the boiler, the operator opens the valve Q', so that the water instead of being pumped into the boiler is returned to the tank I, and a complete circulation of the water takes place between the tank I and the heater K to give a preliminary heating to the water contained in the tank I.

It is evident that the pumps B and C may be actuated by steam from the boiler instead of from the locomotive-engine, as shown and described, and it is also evident that the pipe Q may be dispensed with and the capacity of the pumps so regulated that but the proper amount of water is continually pumped into the boiler to maintain the water-level thereof at all times.



Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A device of the class described, comprising  
5 ing a water-heater located in the smoke-box of the boiler, an exhaust-steam pipe provided with a check-valve and opening into the said heater for discharging the steam into the water, and two pumps of different capacity, the  
10 small pump having a suction-pipe connected with a water-supply and a discharge-pipe connected with the said heater, the other pump having a suction-pipe connected with the said heater and a discharge-pipe connected with  
15 the boiler and provided with a check-valve, substantially as shown and described.

2. A device of the class described, provided with a water-heater comprising a drum located in the smoke-box of the locomotive-  
20 boiler and having a steam connection for heating water, two pumps of different capacity having a common plunger-rod driven from the cross-head of the locomotive-engine, the small pump having a suction-pipe connected  
25 with a water-supply tank, and a discharge-pipe connected with the said heater for supplying the latter with water, the other or larger pump having a suction-pipe connected with the lower portion of said heater and a

discharge-pipe provided with a check-valve 30 and connected with the boiler for delivering the heated water from the heater to the boiler, substantially as shown and described.

3. A device of the class described, comprising a water-heater located within the smoke- 35 box of the locomotive-boiler, a pipe provided with a check-valve and connected with the steam-exhaust of the locomotive the said pipe opening into the lower part of said heater for discharging the steam into the water, two 40 pumps of different capacity, the small pump having a suction-pipe connected with a water-supply tank and a discharge-pipe connected with the upper part of the water-heater, the other pump having a suction-pipe connected 45 with the lower portion of said heater, and a discharge-pipe connected with the boiler and provided with a check-valve, and an auxiliary pipe provided with a valve and connecting the said discharge-pipe with the water-supply, 50 whereby the said heated water can be either conducted to the boiler or returned to the said supply-tank, substantially as shown and described.

LUCIUS DAY COPELAND.

Witnesses:

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