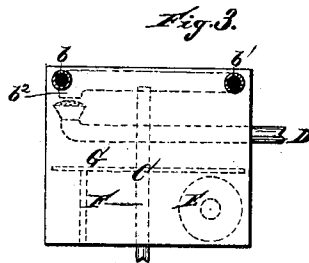
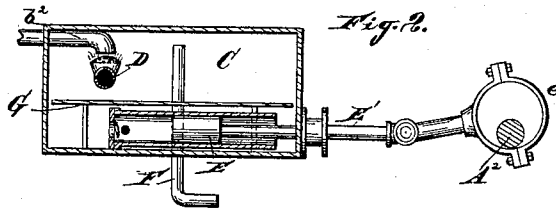
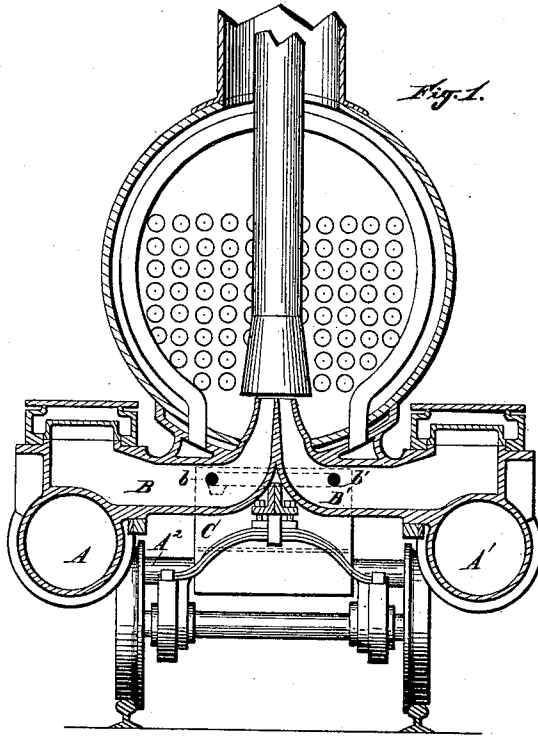


(No Model.)

D. E. RICE.
FEED WATER HEATER.

No. 323,076.

Patented July 28, 1885.



WITNESSES

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UNITED STATES PATENT OFFICE.

DELOS E. RICE, OF DETROIT, MICHIGAN.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 323,076, dated July 28, 1885.

Application filed September 13, 1884. (No model.)

To all whom it may concern:

Be it known that I, DELOS E. RICE, of Detroit, county of Wayne, State of Michigan, have invented a new and useful Improvement in Combined Feed-Water Heaters and Pumps; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to new and useful improvements in a combined feed-water heater and pump, as more fully hereinafter described, and more particularly pointed out in the claims, and is designed more especially as an improvement upon a device patented to me July 31, 1877, No. 193,617, and reissued November 23, 1880, No. 9,476, my object being to adapt my device for use in connection with a locomotive.

In the drawings, Figure 1 is a vertical section of a locomotive embodying my invention. Fig. 2 is a separate longitudinal section, and Fig. 3 an end view of the tank.

I carry out my invention as follows: A and A' are the steam-cylinders of a locomotive. B and B' are the exhaust-pipes communicating therewith. A² is one of the driving-axles. C is a tank secured in any proper manner in suitable proximity to said exhaust-pipes and said axle to lead a desired amount of the exhaust-steam from the exhaust-pipes B and B' into this tank. Said exhaust-pipes are tapped at any proper point and pipes inserted, as at *b* and *b'*, said pipes *b* and *b'* communicating with the tank. The pipes *b* and *b'* may be united, preferably, so as to form a single communication with the tank.

*b*², Fig. 2, represents the pipe by which the exhaust-steam is conducted from the exhaust-pipe into the tank.

D is an inlet or feed pipe by which water is fed into the tanks and, preferably, emitted into the tank beneath the mouth of the pipe *b*², so that the water, as it is injected into the tank, will come directly into contact with the steam.

While I prefer thus to conduct the exhaust-steam and the water from the water-pipe into close proximity, as shown, I do not confine myself to this exact arrangement and location

of the pipes; but such arrangement serves to heat the water more quickly.

E is any suitable pump located within the tank, adapted to pump the heated water into the boiler. Its piston E' is connected eccentrically to the axle A², as shown at *e*.

F is an overflow-pipe, through which surplus water and steam may flow out from the tank. It is evident that the motion of the locomotive would tend to splash the water in the tank. This tendency, if not guarded against, might render it liable that the water in the base of the tank would be displaced, so as to cause the pump to suck air instead of water. To remedy this difficulty I locate a diaphragm, G, above the pump, so as to insure the supply of water to the pump.

It is evident that the pump is operated automatically by the revolution of the driving-axle. Such a device is well calculated to raise the temperature of the water speedily by the contact of the exhaust-steam therewith, while the exhaust-steam itself is condensed in large measure. I would have it understood, however, that I do not confine myself to driving the pump by the driving-axle, as it may be driven in any suitable manner. The overflow-pipe F should always extend above the diaphragm.

What I claim is—

1. The combination, with a locomotive, of a feed-water tank, one or more pipes connected with the exhaust-pipes and communicating with the tank, a feed-water inlet-pipe communicating with said tank, and a submerged pump arranged to pump water from the tank into the boiler, the pump-piston being geared to one of the driving-axles of the locomotive and operated thereby, substantially as described.

2. The combination, with a locomotive, of a feed-water tank, one or more pipes to communicate exhaust-steam thereto, an inlet feed-water pipe, and a pump to feed the water from said tank into the boiler, said tank provided with a diaphragm, G, substantially as described.

3. The combination, with a feed-water tank having one or more pipes to communicate exhaust-steam thereto and an inlet feed-water pipe, of a pump to feed water from said tank into a boiler, said tank provided with a dia-

phragm, G, and an overflow-pipe extended above said diaphragm, substantially as described.

5 4. A locomotive feed-water heater consisting of a tank with a feed-water inlet, an inlet for steam, an exit to the boiler, a horizontally-arranged submerged pump, and a diaphragm arranged across the chamber above the pump to prevent surging of the water and consequent impaired action of the pump, substantially as described.

10 5. In a locomotive feed-water heater, a sub-

merged pump, and a diaphragm located across the interior of the feed-water reservoir, said diaphragm adapted to prevent displacement 15 of the water from the entrance to the pump, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

DELOS E. RICE.

Witnesses:

N. S. WRIGHT,

M. B. O'DOHERTY.