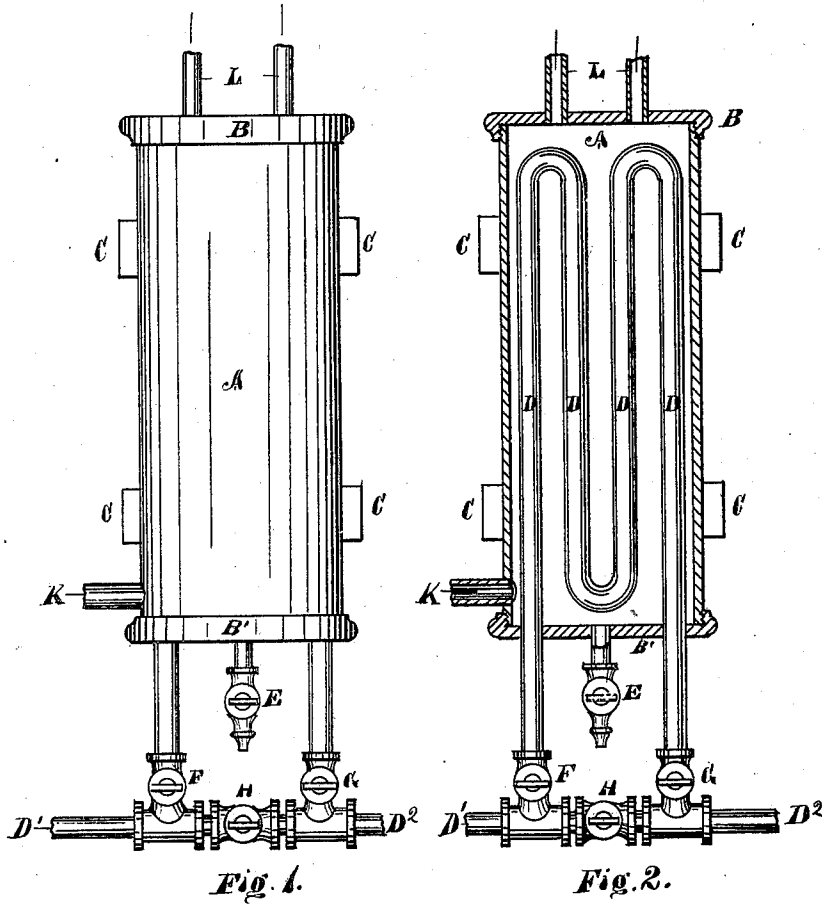


N. W. KIRBY.
FEED-WATER HEATER.

No. 170,743.

Patented Dec. 7, 1875.



WITNESSES;
Jerome Staley
For the Inventor

INVENTOR,
Nahum W. Kirby
Per. E. C. Smith, Atty

UNITED STATES PATENT OFFICE.

NAHUM W. KIRBY, OF INDIANAPOLIS, INDIANA.

IMPROVEMENT IN FEED-WATER HEATERS.

Specification forming part of Letters Patent No. **170,743**, dated December 7, 1875; application filed August 26, 1875.

To all whom it may concern:

Be it known that I, NAHUM W. KIRBY, of Indianapolis, county of Marion, State of Indiana, have invented a new and useful Improvement in Heaters for Heating the Feed-Water on Locomotives, of which the following is a specification, reference being had to the accompanying drawings.

My invention consists of a cylinder secured to the boiler, in which is a coil of pipe, one end of which connects with the feed-pipe of the tank, and the other end with the pumps of the engine, in such a manner that the cold water from the tank becomes heated on its passage through the coils in the heater to the pumps by means of live steam from the boiler, or dead steam from the exhaust of the engines, which surround the coil of pipes in the cylinder.

Previous to my invention heaters of various kinds have been tried on locomotives for this purpose; but I am not aware that the desired effect has been accomplished until my invention was complete and thoroughly tested. A locomotive-boiler is constructed with such an immense fire-surface, in order to make steam rapidly, and the sheets become so intensely hot by rapid firing, that if cold water is used and pumped into the boiler the change in temperature causes a constant strain on the sheets by expansion and contraction, which causes so many leaky boilers and great trouble. It is impossible to keep the water hot in the tanks, because it would use too much steam from the boiler to heat the water in the tank every time it is filled. Hence, the water should become hot after it leaves the tank and before it enters the boiler.

To accomplish this, and save steam and fuel and leaky joints, I have invented a heater, of which the following is a description:

Figure 1 is an elevation of my improved heater complete. Fig. 2 is a sectional view of the same.

A represents the cylinder of the heater, which is provided with lugs C C C C, arranged so as to secure the cylinder to the boiler. The cylinder A is provided with two heads, B B'. The feed-pipe D¹ leads from the tank, and makes connection with the cock F, and the coil-pipe D D D D leads out of the cock F

through the lower cylinder-head B', and has several return-bends, as shown in Fig. 2, and passes out of the cylinder through the head B', and connects with the cock G. The discharge-pipe D² leads out of the cock G to the pump, and from there to the boiler. Between the cocks F and G is another cock, H. The operation and use of these cocks will hereafter be described. In the top of the cylinder A or head B are arranged one or more pipes, L, and at the bottom of the cylinder A is another pipe, K, and a waste-cock, E.

I will now explain the operation of my improved heater. The feed-pipe D¹ is connected with the water-tank in the usual manner, with the ordinary regulating-cock between the tank and heater. If the cocks F and G are opened and the cock H closed the water from the tank will have to pass through the coils D D D D in the cylinder A before it can leave the heater and get to the pumps by means of the discharge-pipe D². If the cocks F and G are closed and the cock H is opened, then the water from the tank can pass direct to the pumps in the ordinary way without passing through the heater.

Having thus described the manner in which the water is conveyed from the tank to the pumps, I will now describe the manner in which the water is heated as it passes through the heater. If the connections are wanted with the steam and water spaces of the boiler, then the pipe K is connected with the water-space, and one of the pipes L connected with the steam-space, and the other pipe L can be removed and the hole plugged. This arrangement allows hot water and steam to circulate in the cylinder A around the coil-pipe D in the same manner as in a Scotch gage; but I do not confine myself to this particular way of conveying heat to the interior of the cylinder A, because the pipe K can be removed, and form no connection with the water-space of the boiler and heater, and the circulation of the steam that enters the cylinder A by means of the steam-pipe L is kept up by the waste-cock E, which regulates the heat of the water according to the amount of circulation kept up in the cylinder A.

The live steam from the boiler can also be dispensed with, and the steam-pipe L can be

connected to the exhaust of the engines, and then the other pipe L acts as an exhaust to the cylinder, thus keeping up the circulation. By this means the waste steam of the engine can be utilized.

It makes no difference which of these devices is used. There will be an immense saving of fuel, and the strain on the sheets by expansion and contraction is overcome to such an extent as to prevent the joints from leaking.

What I claim as new, and wish to secure by Letters Patent, is—

1. The feed-pipe D¹, leading from the tank, and provided with a cock, F, below the cylinder A, in connection with the coil-pipe D in the cylinder A, and the cock G below the cylinder, all in combination with the cylinder A,

and connected with the pump of a locomotive by means of the pipe D², all constructed and operated so as to heat the feed-water in its passage through the coil D in the cylinder A before it is drawn into the pump to be injected into the boiler, substantially as specified and set forth.

2. In combination with the cocks F and G, the cock H, arranged to operate, as described, between them, for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

NAHUM W. KIRBY.

Witnesses:

JOHN F. DICK,
E. O. FRINK.