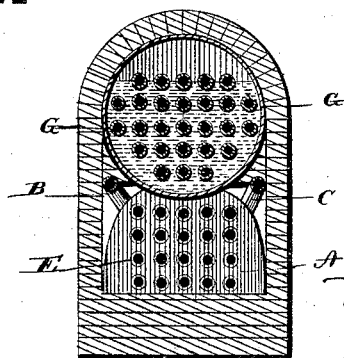
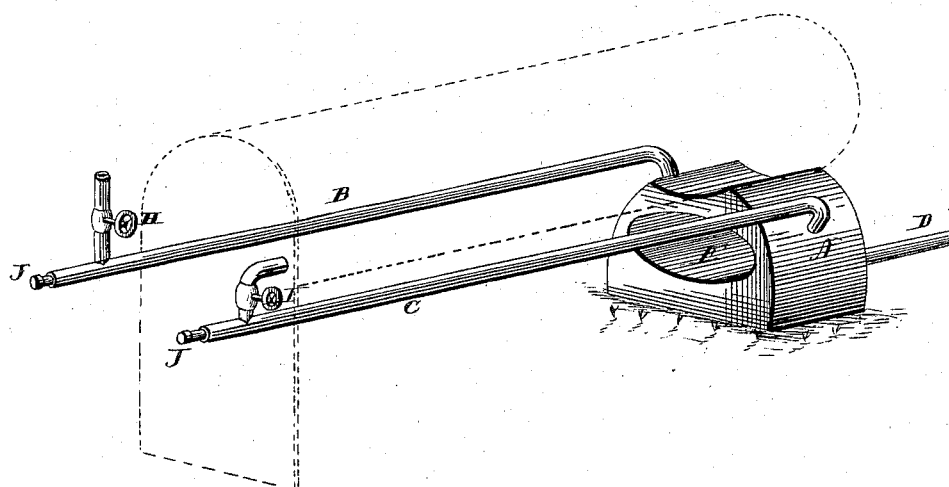
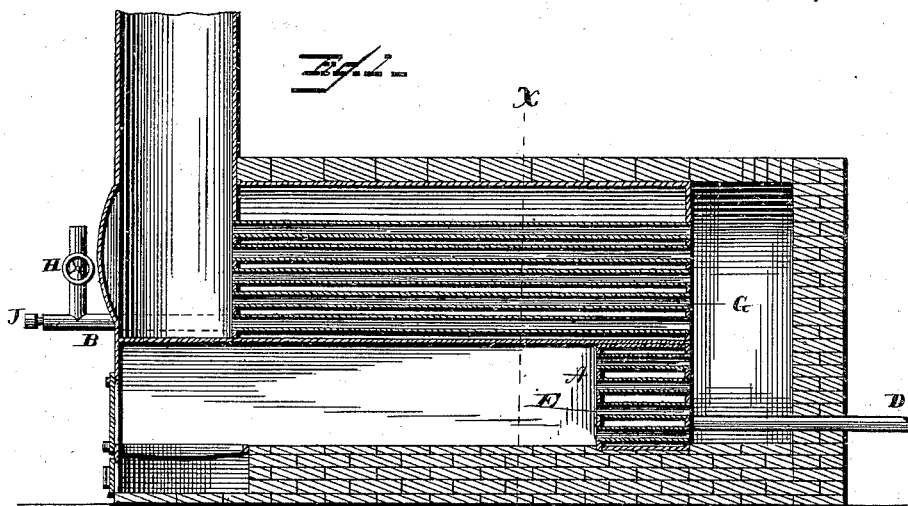


(No Model.)

I. D. SMALL.  
FEED WATER HEATER.

No. 344,686.

Patented June 29, 1886.



WITNESSES  
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# UNITED STATES PATENT OFFICE.

ISAAC D. SMALL, OF OLENA, OHIO, ASSIGNOR OF ONE-HALF TO WILLIAM MYERS, OF SAME PLACE.

## FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 344,686, dated June 29, 1886.

Application filed May 22, 1886. Serial No. 203,016. (No model.)

*To all whom it may concern:*

Be it known that I, ISAAC D. SMALL, a citizen of the United States, and a resident of Olena, in the county of Huron and State of Ohio, have invented certain new and useful Improvements in Feed-Water Heaters; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a longitudinal sectional view of a boiler, showing my improved heater attached thereto. Fig. 2 is a perspective view of the heater and connecting-pipes, dotted lines showing the boiler in position; and Fig. 3 is a vertical cross-section taken on line *x x* of Fig. 1.

Like letters of reference indicate like parts in the three figures.

My invention has relation to feed-water heaters; and it consists in the improved construction and combination of parts, as will be hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, A represents the heater, which is placed in the arch under the back end of the boiler, Figs. 1 and 3; B, the cold-water pipe leading from the pump or injector to the heater; C, the hot-water pipe leading from the heater to the front end of the boiler, where it enters the same, and D the blow-off pipe leading from the back end of the heater.

The heater is made of boiler-iron and in such form as will enable it to support the back end of the boiler. It has a series of tubes, E, Figs. 1 and 3, or one large tube, F, Fig. 1, extending through it from end to end, through which tubes the currents of heat and flame pass on their way to the mouth of the boiler-tubes G. The pipes B and C extend from in front of the boiler along on either side thereof through the arch to the heater, which they enter near its top. By this arrangement the cold water entering through the pipe B into the heater comes by small quantities into immediate contact with the strongest heat, as nearly all the heat must pass through the tubes of said heater as it

passes on its way to the boiler-tubes. Nor can the hot-water on its way to the boiler lose any of its heat, since the only portion of the pipe C exposed to the air is the end in front of the boiler. In fact, by passing the water at a moderate speed through the heater it can be heated even above the boiling-point before entering the boiler. The outer ends of said pipes B and C have connected thereto offset-pipes provided, respectively, with stop-cocks H and I, which cocks serve for controlling the amount of water to be fed to the boiler and for cutting off the heater, if desired. By attaching the offsets to the sides of the pipes A and B the ends of the latter are left straight, thus allowing easy access to the pipes for the purpose of keeping them clean, said ends being closed, except during the cleaning operation, by means of screw-plugs J.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. The combination, with a steam-boiler, of a feed-water heater adapted to be placed in the arch as a support for the back end of the boiler, and provided with a series of tubes extending from end to end thereof, a pipe extending from the pump or injector along by the side of the boiler inside the arch to the top of the heater, and a like pipe similarly located extending from the top of the heater to the front end of the boiler, where it enters the same, substantially as shown and described.

2. The combination, with a steam-boiler, of a feed-water heater adapted to be placed in the arch as a support for the back end of the boiler, and provided with a large tube extending from end to end thereof, a cold-water pipe, a hot-water pipe, offset-pipes near the outer ends of said pipes having stop-cocks located therein, and screw-plugs closing said outer ends, substantially as described and set forth.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

ISAAC D. SMALL.

Witnesses:

A. B. GRIFFIN,  
H. L. CANFIELD.