

(No Model.)

J. LOTHES.
FEED WATER HEATER FOR BOILERS.

No. 577,925.

Patented Mar. 2, 1897.

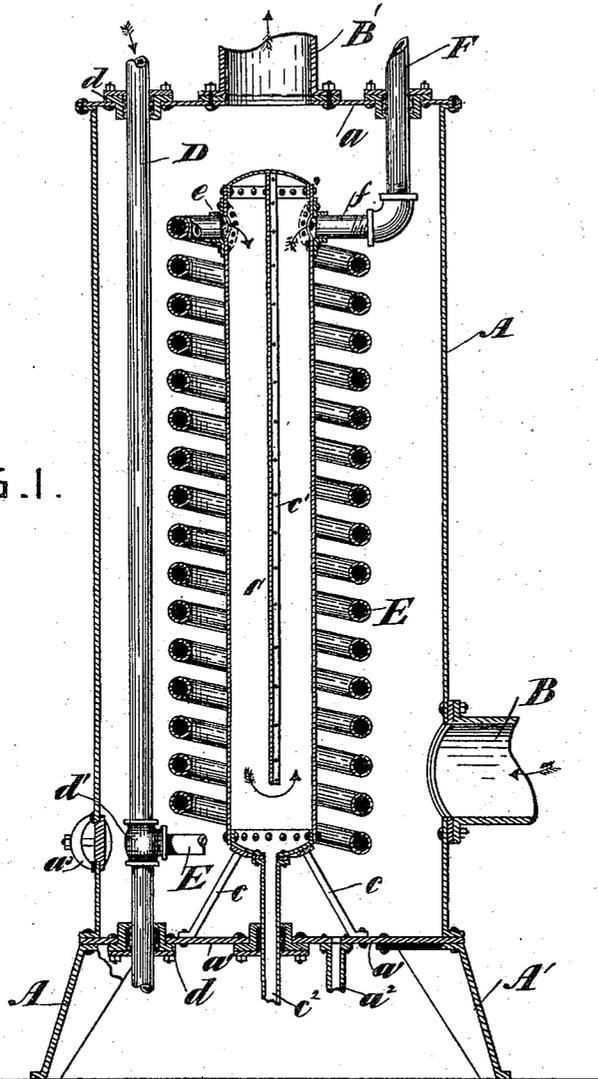
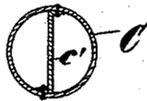


FIG. 1.

FIG. 2.



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FEED-WATER HEATER FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 577,925, dated March 2, 1897.

Application filed May 10, 1894. Serial No. 510,689. (No model.)

To all whom it may concern:

Be it known that I, JOHN LOTHES, a citizen of the United States, and a resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Feed-Water Heaters for Boilers, of which the following is a specification.

My invention relates to feed-water heaters for steam-boilers. Its object is to provide an economical reliable device for utilizing the waste steam from the engine to heat the water as it passes to the boiler; and the invention consists in the peculiar combination and arrangement of parts illustrated in the accompanying drawings, hereinafter described in connection therewith, and pointed out in the claims.

In the drawings, Figure 1 is a central vertical section of a feed-water heater constructed according to my invention. Fig. 2 is a transverse section of the inner cylinder.

Referring to the parts, which are indicated by similar reference-letters wherever they occur throughout both views, A represents the outer case, which is preferably cylindrical in form, consisting of a light sheet-metal cylinder fitted with two branch pipes B and B', one for the admission of waste steam to the interior of the cylinder and the other for its escape therefrom. The body of the cylinder has outwardly-turned flanged ends to receive the top *a* and the bottom *a'*, riveted or bolted to the ends of the cylinder in the usual manner. The bottom of the cylinder has a waste or drip pipe *a²* to carry off the condensed water.

Centrally within the cylinder A is a small cylinder C, supported upon feet *c*, which are secured to the bottom *a'* and to the bottom of the cylinder C. The cylinder C is centrally divided from the top to near the bottom by a partition *c'*. The edges of the partition *c'* are flanged in opposite directions and riveted to the shell of the cylinder.

D is the feed-pipe, leading from any source of water-supply to the inside of the cylinder A, passing through the head *a* and out through the bottom *a'* through packing-glands *d*, which allows for expansion and contraction and at the same time prevents leakage. This pipe communicates with a coil E by means of a union *d'*. The coil E surrounds the central

tube, and its upper terminal is connected to it at *e*. Upon the opposite side from this connection is the branch *f*, which is connected by an elbow to the pipe F, which leads to the boiler. The lower branch of the pipe D, which extends through the bottom of the outer shell, may be fitted with a waste-cock to drain the coil when desired.

The central cylinder C, the coil, and feed-water pipes, at least that portion of them within the cylinder A, are preferably made of copper. The water passing from the source of supply through the coil is delivered into one chamber of the center cylinder C, thence passes down around the lower end of the partition *c'*, up through the opposite chamber, thence through the pipe F to the boiler, as indicated by the arrows, the water being heated in its passage by the wastesteam passing into the cylinder through the pipe B and out through the pipe B', or the position of these pipes B and B' may be reversed. The waste steam may be fed into either one and exhausted at the other.

From the bottom of the cylinder C a waste-pipe *c²* passes through a packed opening in the bottom *a'* of the outer case. This pipe is also fitted with a suitable cock, and the purpose of it is to drain any mud or sediment that may settle in the bottom of the cylinder.

In some localities where the water is heavily charged with sediment the cylinder C should be carried through the bottom *a'* of the case, so as to utilize the whole space within the case A for heating purposes, as the sediment settling in the bottom of the cylinder would act as a non-conductor and limit the heating-surfaces, but where water is reasonably pure the form and proportions shown in the drawings are deemed the best.

I have shown the pipes D and F as passing through the top of the case, but it is obvious that they may be introduced through the sides as well when it is found more convenient to make the connection with either the water-supply or the boiler. The whole apparatus is shown supported upon legs A', but may be supported on brackets or in any convenient manner desired. I have also shown an ordinary manhole-opening in the side of the case at *a³* for convenient access to the interior of the case.

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

1. In a feed-water heater the combination of the outer shell interposed in the escape-pipe of a steam-engine, a cylinder within said shell having a central partition dividing the same into two communicating chambers, the feed-water pipe passing through the shell and terminating in a coil surrounding said inner cylinder the terminal of the coil being connected to one chamber of said inner cylinder, and an outlet-pipe from the opposite chamber of said cylinder passing through the outer case to communicate with the boiler, whereby the water is compelled to travel through the coil and through both chambers of the inner cylinder before passing to the outlet-pipe, substantially as shown and described.
2. The combination of the outer case perforated at opposite ends, the branches of the exhaust-pipe communicating with said case, the inner cylinder supported above the bottom of said case, a partition in said cylinder dividing it into two chambers communicating with each other near the bottom, the feed-water pipe passing through the outer case, a coil surrounding the inner cylinder connected to the feed-water pipe and having its terminal connected to one of the chambers of the inner cylinder near its upper end, the discharge-pipe passing from the top of the opposite chamber, and a waste-pipe connected to the bottom of the inner cylinder and passing to the outside of the case, substantially as shown and described.
3. The combination of the outer shell inter-

posed in the escape-pipe of a steam-engine, an inner cylinder supported within said case, a central partition within said cylinder extending to near the bottom thereof, a feed-water pipe passing into the case and terminating in a coil surrounding the inner cylinder and the terminal of said coil communicating with the inner cylinder near the top of one chamber, a discharge-pipe passing from the top of the outer chamber and through the outer case, a discharge-pipe leading from the bottom of the inner cylinder through the bottom of the outer case, and a discharge-pipe from the bottom of the outer case to carry off the water of condensation, substantially as shown and described.

4. The combination of the outer case interposed in the escape-pipe of a steam-engine, the inner cylinder supported centrally above the bottom of said outer case, the partition extending from the top of said cylinder to near the bottom thereof dividing the cylinder into two chambers, a feed-water pipe passing vertically through the outer case and having a lateral branch terminating in a coil surrounding the inner cylinder and communicating with one of its chambers near the top thereof, a discharge-pipe leading from the top of the opposite chamber through the outer case, and packing-glands for said feed and discharge pipes to prevent leakage and allow for the expansion and contraction of the pipes, substantially as shown and described.

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