W. H. D. SWEET.

Feed-Water Heaters.

No. 212,117. Patented Feb. 11, 1879.

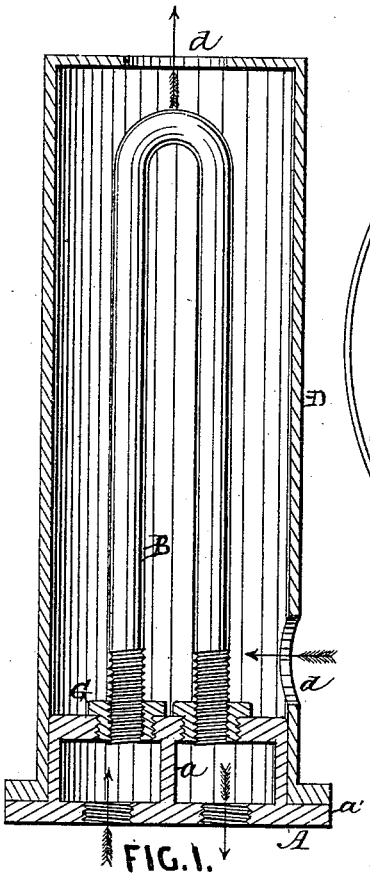

FIG. 1.

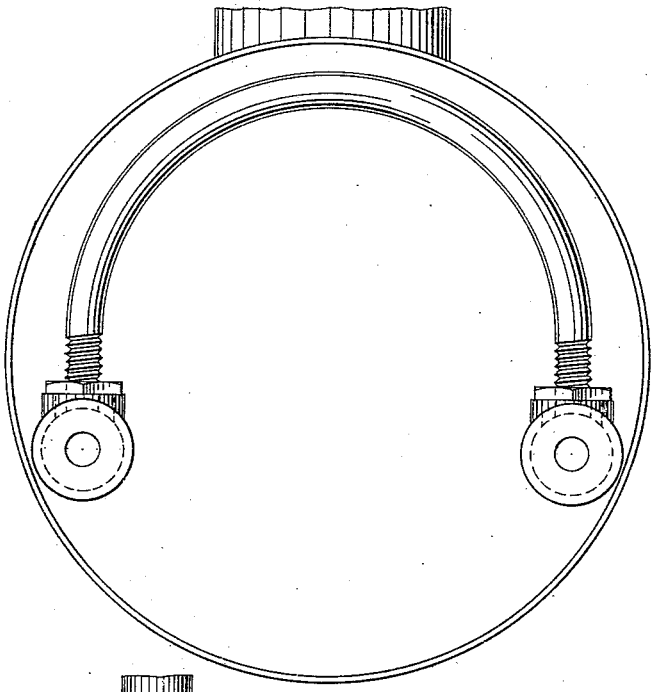

FIG. 2.

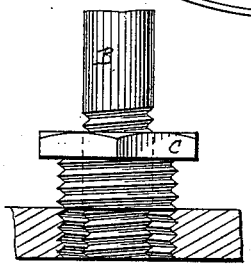

FIG. 3.

Witnesses.

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WILLIAM H. D. SWEET, OF ALBANY, NEW YORK.

IMPROVEMENT IN FEED-WATER HEATERS.

Specification forming part of Letters Patent No. **212,117**, dated February 11, 1879; application filed February 10, 1877.

To all whom it may concern:

Be it known that I, WILLIAM H. D. SWEET, of the city and county of Albany, and State of New York, have invented certain new and useful Improvements on Feed-Water Heaters, of which the following is a full and exact description, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a longitudinal section; Fig. 2, a front elevation of a modification of my invention for use in the smoke-box of locomotive-boilers; and Fig. 3, an enlarged and detached sectional view, showing the manner of securing the tubes.

My invention relates to feed-water heaters in which siphon-shaped tubes are used; and it consists in constructing such heaters with a base-piece consisting of a single casting, in which are included a tube-plate and two independent water-chambers, and to which the bent tubes are secured by means of compound nuts, in the manner herein set forth.

As shown in the drawings, A represents the base-piece, which is cast complete in one piece, the top plate of which forms an integral part thereof, and constitutes the tube-plate, to which the ends of the bent tubes are secured, in the manner hereinafter set forth. A partition, *a*, cast in the base-piece, divides it into two separate and distinct compartments or chambers—one for receiving the water from the feed-pump, and the other for delivering it through the feed-pipes to the boiler; B, the tubes, which are bent into a siphon form, having a long screw-thread cut upon each end of them; C, compound nuts provided with duplex screw-threads—one in the interior portion of them, for screwing upon the ends of the tubes, and another around their exterior, for screwing into the holes formed in the tube-plate of the base-piece for receiving them.

By means of these compound nuts the bent tubes are secured to the base-piece in the following manner: The nuts are first screwed upon the ends of each tube, the long threads of which allow them to be run up on the tube a distance more than equal to twice the thickness of the tube-plate. The two ends of each tube are inserted, as shown in Fig. 3, into the holes for receiving them, tapped in the tube-plate of the base-piece, and arranged in such manner that the opposite end of each tube will communicate with different chambers in the base-piece. The nuts are then screwed into the tube-plate by partially screwing them off from the ends of the tubes. When screwed down to their place they retain a sufficient hold upon the tubes to secure the tubes in position and form a tight joint between the tube and tube-plate.

D is a casing, secured to the flange *a* of the base-piece in the usual manner, and provided with openings *d*, for the induction and eduction of exhaust-steam of the engine by the usual exhaust-pipe.

The operation of my heater is simply as follows: The feed-water is forced into one of the chambers of the base-piece and passes through the tubes into the other chamber, and from thence into the boiler. The tubes being constantly surrounded by the exhaust-steam, the water passing through them becomes thoroughly heated thereby.

In the modification shown in Fig. 2, I use two chambers, E, made in separate castings, and connect them by the bent tubes B, secured thereto in the manner hereinbefore described. When made in this form the heater is intended for use without any exterior casing, to utilize the waste heat escaping into the smoke-box of locomotive-boilers.

I am aware that heaters and condensers have heretofore been constructed with bent tubes secured to tube-plates made independently of their base-pieces, and that compound nuts have been used for securing tubes to tube-plates. Therefore I do not broadly claim such constructions, separately considered; but

I claim as my invention—

In a feed-water heater, the base-piece A, cast in one piece, embracing in its structure a non-detachable tube-plate and two separate water-chambers, as herein described, and the bent tubes B, secured to the base-piece by the compound nuts C, in combination with the casing D, as herein specified.

WILLIAM H. D. SWEET.

Witnesses:
HARRY EDWARDS,
WILLIAM H. LOW.