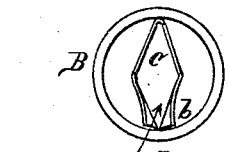
R. E. SHERLOCK & J. E. BOOTH.

Circulating-Tubes for Steam-Boilers.

No. 217,710. Patented July 22, 1879.

Fig 2.



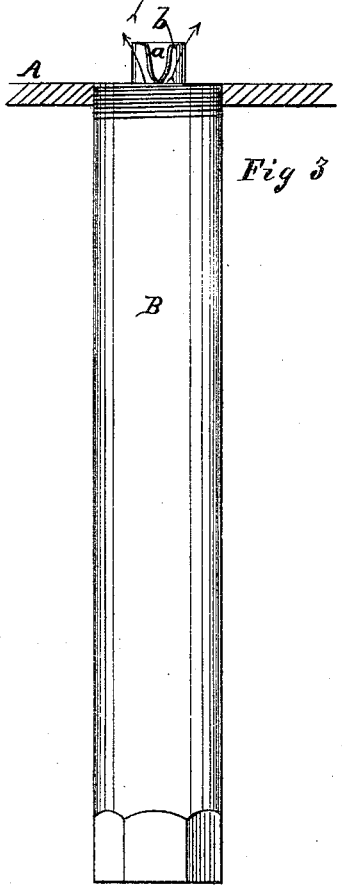


Fig 3

Fig 1.

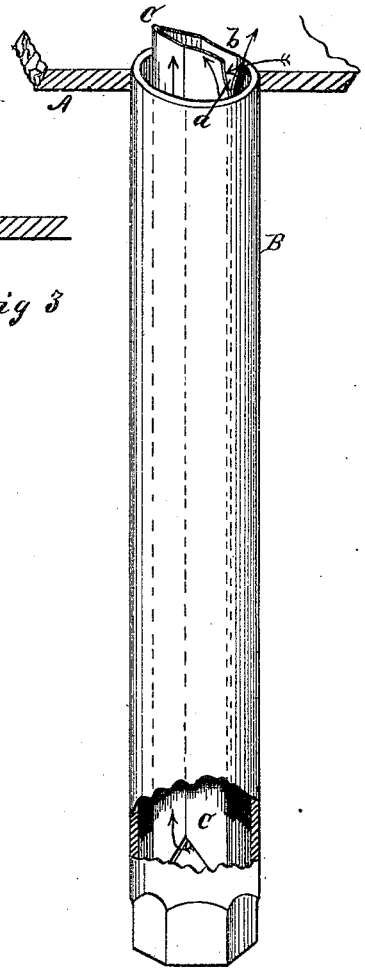
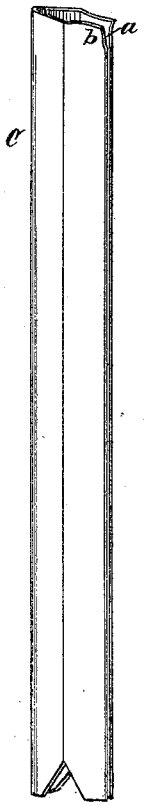


Fig 4.



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UNITED STATES PATENT OFFICE.

ROBERT E. SHERLOCK AND JAMES E. BOOTH, OF ROCHESTER, NEW YORK.

IMPROVEMENT IN CIRCULATING-TUBES FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. **217,710**, dated July 22, 1879; application filed November 18, 1878.

To all whom it may concern:

Be it known that we, ROBERT E. SHERLOCK and JAMES E. BOOTH, of Rochester, in the county of Monroe and State of New York, have invented certain Improvements in Circulating-Tubes for Steam-Boilers, of which the following is a clear and accurate description, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of our invention. Figs. 2 and 3 are, respectively, plan and elevation of the same; and Fig. 4 is a perspective of the circulating-tube.

The object of our invention is to provide a simple and effective circulating device for what is known as a "drop-tube generator," or one in which small vertical water-tubes depend from the crown-sheet directly over or around the fire; and its nature will be apparent from the subjoined description.

It is well known to steam-engineers and others that it is essential to establish a circulation in a drop-tube to prevent its becoming clogged with sediment or the water being forced out by the quick formation of vapor. Small cylindrical tubes have been used for this purpose, located centrally in the drop-tubes, the hot current ascending outside of them and the colder current descending within them. Triangular tubes have also been used, made of three strips of sheet metal, of such a width as to support each other when in position.

The cylindrical tube cannot be readily supported in its central position, and is liable to misplacement, and when one of the strips in the triangular variety becomes rusted away or misplaced the circulation is thereby retarded. Furthermore, on account of the current of vapor and water rising from the inner periphery of the drop-tube just at its upper extremity, the downward current cannot get ready access to the central passage, and the circulation is thus neither strong nor constant.

We obviate these difficulties as follows: B is a drop-tube, permanently closed at its lower end and screwed into the crown-sheet A at the upper end. In this we place a circulator, C, of rhomboidal cross-section, (see Fig. 2,) and made of such a length as to extend a short distance above the end of the drop-tube, a suitable opening being provided at the bottom for the passage of the water in the usual manner. This circulator is formed up from a single sheet of metal in a tinner's folding-machine, or in any other convenient manner, and is left slightly open at the side, as shown in Fig. 4. The outside size of the tube thus folded is such that it will slip easily into the drop-tube when the unclosed side is pressed together, and when in place it will bear against the drop-tube along two diametrically-opposite corners, and, having a tendency to spring outward by being left open, as described, such elasticity retains it firmly in place in the center of the drop-tube, while at the same time it may be readily removed with a pair of pinchers or tongs.

Thus it will be seen that our improved circulator is cheap in its construction, is easily removed and replaced, accommodates itself to variations in the internal diameter of the tubes, and will retain its position when the generator is moved about in shipping or erecting.

That portion of the circulator which projects above the crown-sheet is bent outward along the open edge, so as to form an aperture, *a*, into the side of the tube; and it will be observed that thus the current ascending from the inner periphery of the drop-tube is parted by the curved lips *b*, as indicated by the arrows in Fig. 1. The returning current through the aperture *a* into the circulator thus not being interfered with is rendered thereby strong and constant, and a powerful circulation is obtained.

It is obvious that, to be efficient, the opening *a* should be vertically over that part of the circulator which bears against the drop-tube, thus preventing the upward current, which is divided at that point, from interfering with the downward current.

We do not mean to confine ourselves to the rhomboidal form of the tube C, as a square, triangular, or elliptic section would possess the same characteristics when folded from a single sheet of metal and held in place by its elasticity. The form shown is, however, preferred. Nor do we wish to be confined to any particular shape of the opening *a*, or any special number thereof, as any opening or openings in the side of that part of the circulator

projecting above the drop-tube would operate substantially as above described.

The lips *b* may be a part of the tube C, or they may be separate pieces, attached thereto in any suitable manner.

What we claim as our invention is—

In drop-tube steam-generators, the circulator C, formed from sheet metal, folded in such a manner as to be supported in the drop-tube along its two opposite edges, and provided with side openings *a*, formed by bending the corners *b* outward above the upper end of the drop-tube, substantially as and for the purposes set forth.

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