

H. SIMS.
FEED WATER HEATER.
(Application filed May 16, 1899.)

(No Model.)

2 Sheets—Sheet 1.

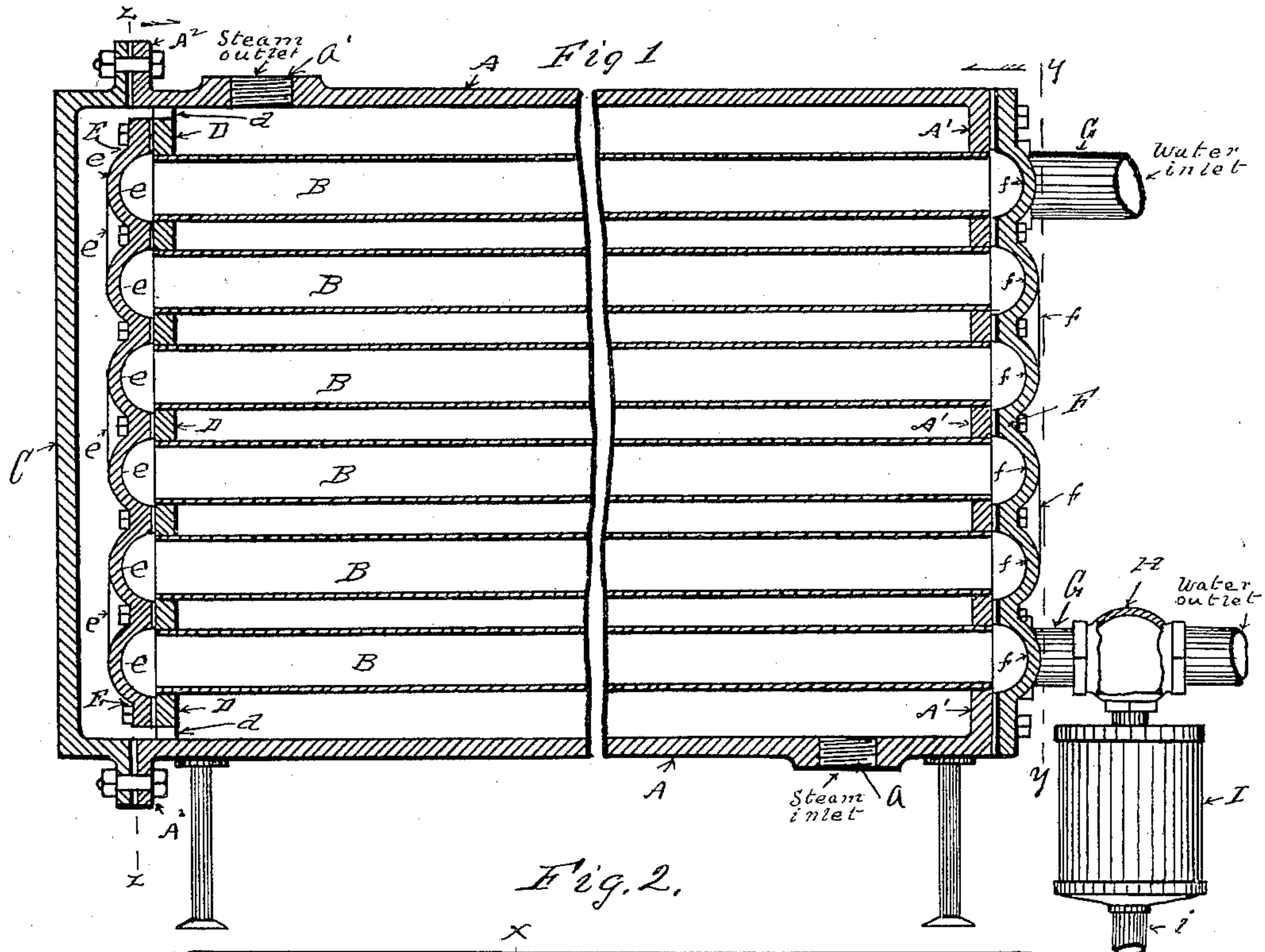
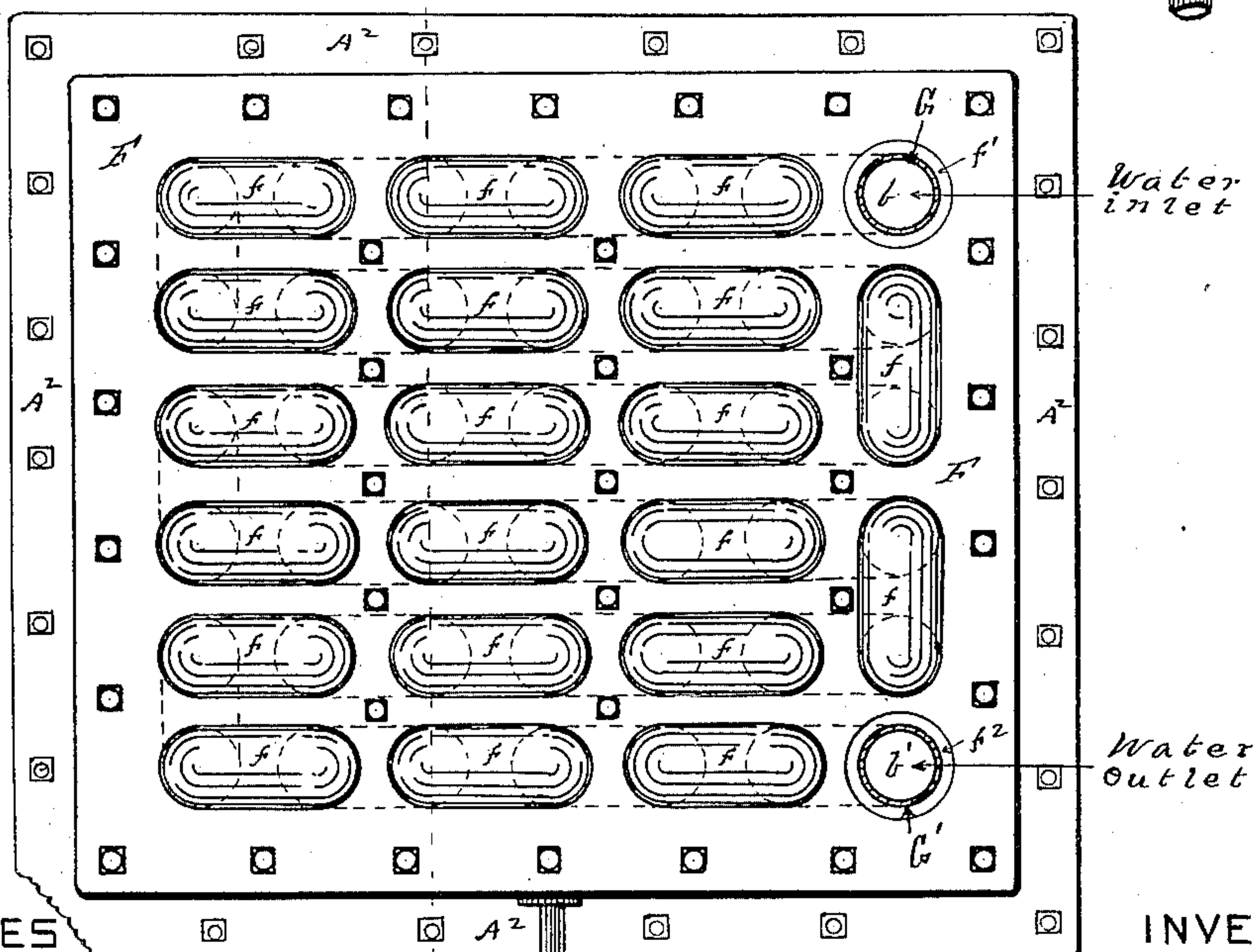


Fig. 2.



WITNESSES

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INVENTOR

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No. 652,296.

Patented June 26, 1900.

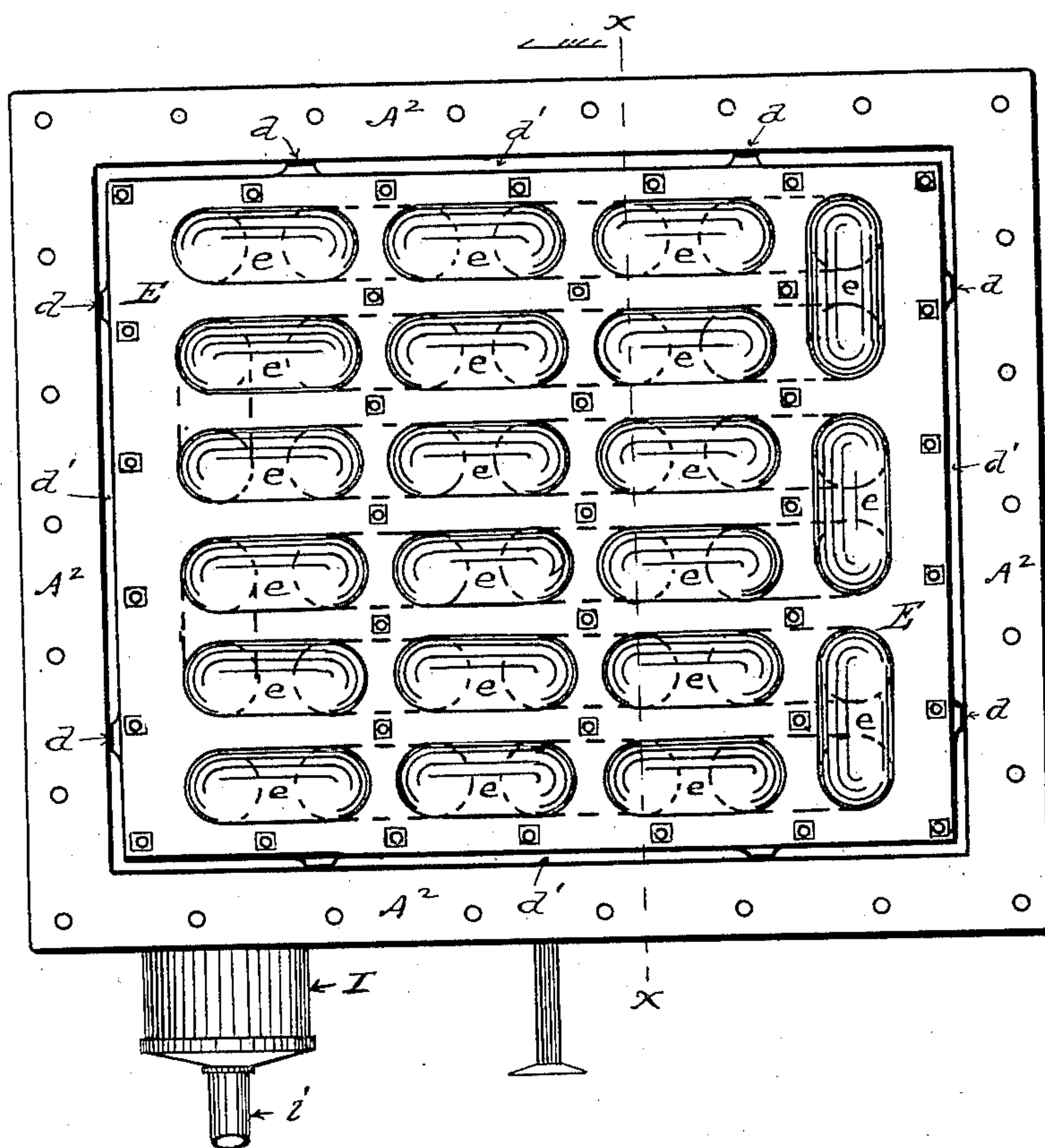
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Fig. 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

HENRY SIMS, OF ERIE, PENNSYLVANIA.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 652,296, dated June 26, 1900.

Application filed May 16, 1899. Serial No. 717,008. (No model.)

To all whom it may concern:

Be it known that I, HENRY SIMS, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Feed-Water Heaters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, forming part of this specification.

My invention relates to feed-water heaters; and it consists, substantially, in the improvements in the construction thereof hereinafter set forth and explained, and illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of my improved feed-water heater on the line xx in Figs. 2 and 3. Fig. 2 is an end view of my improved feed-water heater with the water inlet and outlet pipes in section on the line y in Fig. 1. Fig. 3 is an end view of the same on the line z in Fig. 1.

In the drawings thus illustrating my invention, A is a rectangular shell provided with a steam-inlet a and a steam-outlet a' . One end of the shell A is provided with a fixed head A', in which one end of the open-ended tubes B are secured, and the opposite end of the shell A is provided with an outwardly-extending flange A², to which a removable head C is bolted in the usual manner. In the open end of the shell A there is a loose head D, in which the opposite ends of the open-ended tubes B are secured. This loose head D is somewhat smaller than the inside of the shell A and is provided at its edges with guide-lugs d , which contact with the inside of the shell A, leaving a space d' around the head D, as illustrated in Fig. 3, for the passage of steam. Thus the head D is free to move back and forth in the shell A to accommodate the expansion and contraction of the tubes B. To the loose head D, I bolt a cap E, provided with recesses e in the face thereof, which form return-bends connecting the ends of the tubes B, secured in the head D, in pairs, so as to form a continuous passage from the water-inlet to the wa-

ter-outlet, as illustrated in Fig. 3, and finally the head C is secured to the flange A². To the head A', at the opposite end of the shell A, I bolt a cap F, provided with recesses f in the face thereof, which form return-bends connecting the ends of the tubes B, secured in the head A', in pairs, except two of the tubes b and b' , and opposite the ends of these tubes there are openings f' and f'' , as illustrated in Fig. 2. In the opening f' I secure a water-inlet pipe G, and in the opening f'' I secure a water-outlet G', as illustrated in Figs. 1 and 2. In the water-outlet pipe G', I place an enlarged T H, to which a mud-drum I is secured, having a blow-off pipe i in the bottom thereof, so that as the water passes through the enlarged T H the current is broken up and the mud passes down into the drum I, from which it is blown off.

It will be observed that by this construction I am enabled to get a positive and continuous circulation of the water through all of the tubes, as the water entering the pipe G must travel the entire length of every tube in the heater before its exit from the pipe G', and in case it is desirable to clean the tubes B at any time the caps C and E and the cap F can be quickly removed, so that the tubes B are open at both ends and accessible throughout their entire length.

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

1. The combination in a feed-water heater, of a shell having a fixed head in one end and a loose head in the other, open-ended tubes connecting said fixed and loose heads, and removable caps having recesses therein, each of which connects the ends of two of the tubes covering said fixed and loose heads, substantially as and for the purpose set forth.

2. The combination in a feed-water heater, of a shell having steam inlet and outlet openings therein, a fixed head in one end of said shell, and a loose head in the other, open-ended tubes connecting said fixed and loose heads, removable cap-plates, having return-bend recesses therein, each connecting the ends of two of said tubes covering said fixed and loose heads, a removable cap-plate for closing the open end of said shell, and wa-

ter-inlet and water-outlet pipes entering the cap on the fixed head, substantially as and for the purpose set forth.

3. The combination in a feed-water heater,
5 of a shell having steam inlet and outlet openings therein, a fixed head in one end of said shell, and a loose head in the opposite end of said shell, open-ended tubes connecting said fixed and loose heads, a removable cap se-
16 cured to the fixed head, having water-inlet and water-outlet openings therein, and recesses therein forming return-bends connecting the ends of the tubes in said fixed head in pairs, a cap removably secured to the loose
15 head, having recesses therein, forming re-

turn-bends, connecting the ends of the tubes in said loose head in pairs, so as to form a continuous passage through said tubes and recesses from the water-inlet to the water-outlet, a removable cap-plate for closing the open 20 end of the shell, and a mud-drum connected with the water-outlet pipe, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY SIMS.

Witnesses:

BERRY A. STURGEON,
H. A. STRONG.