

(No Model.)

H. FAIRBANKS.
FEED WATER HEATER.

No. 290,015.

Patented Dec. 11, 1883.

fig. 1.

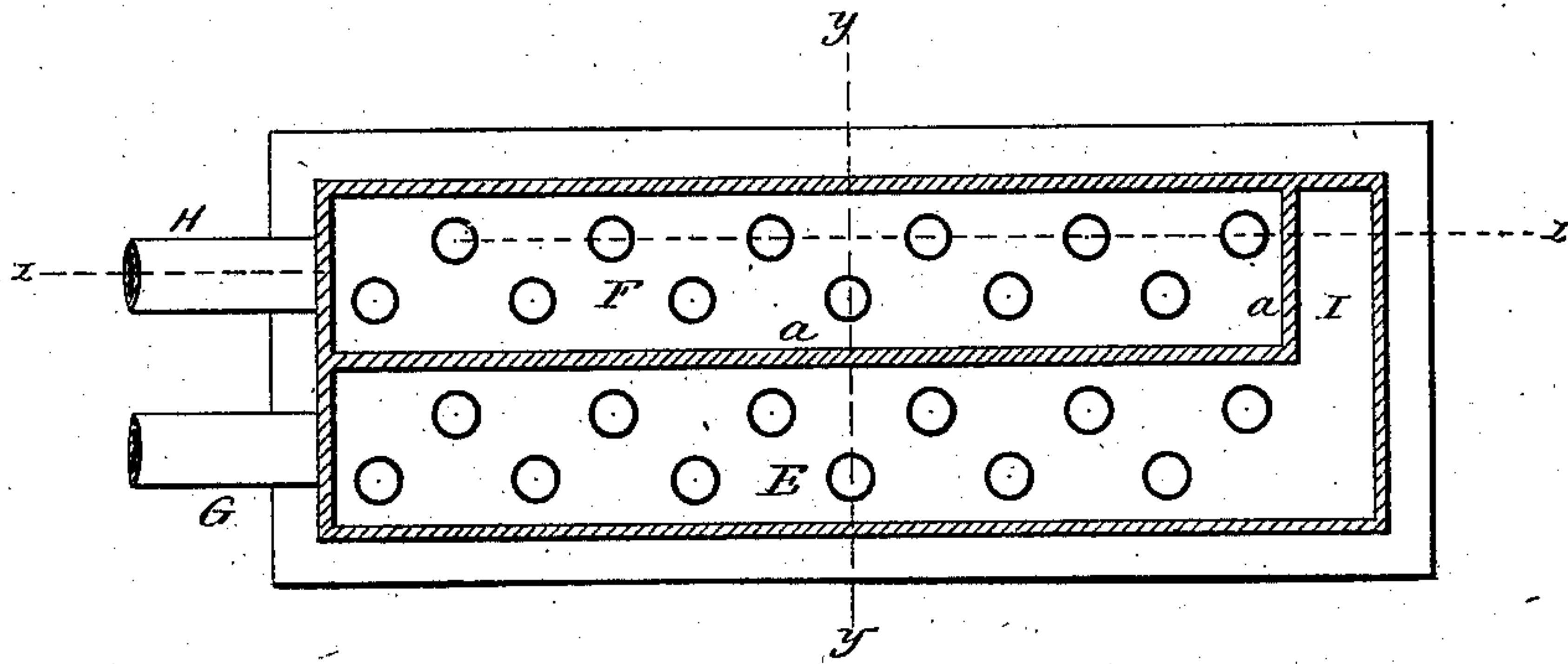


fig. 2.

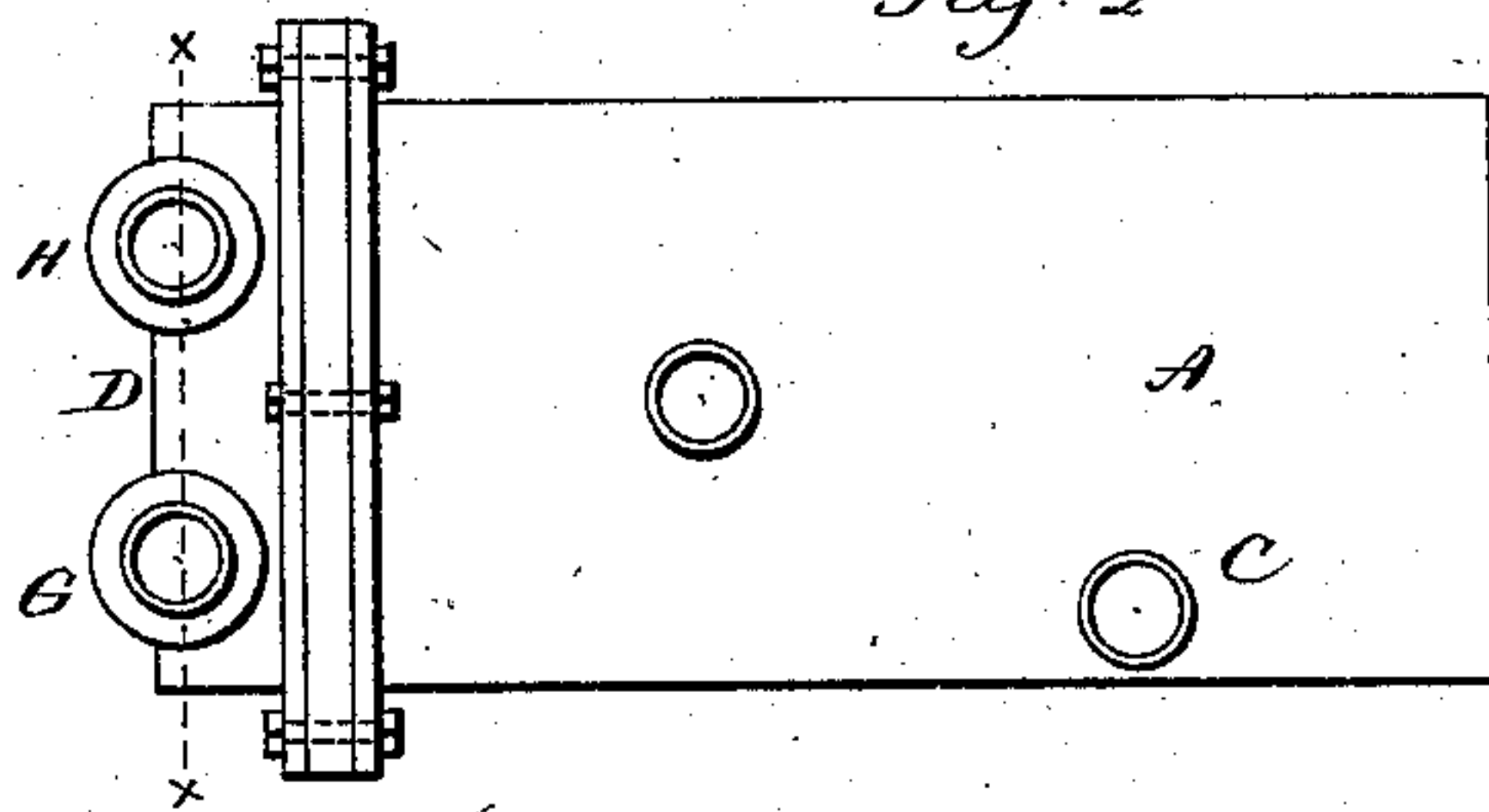


fig. 3.

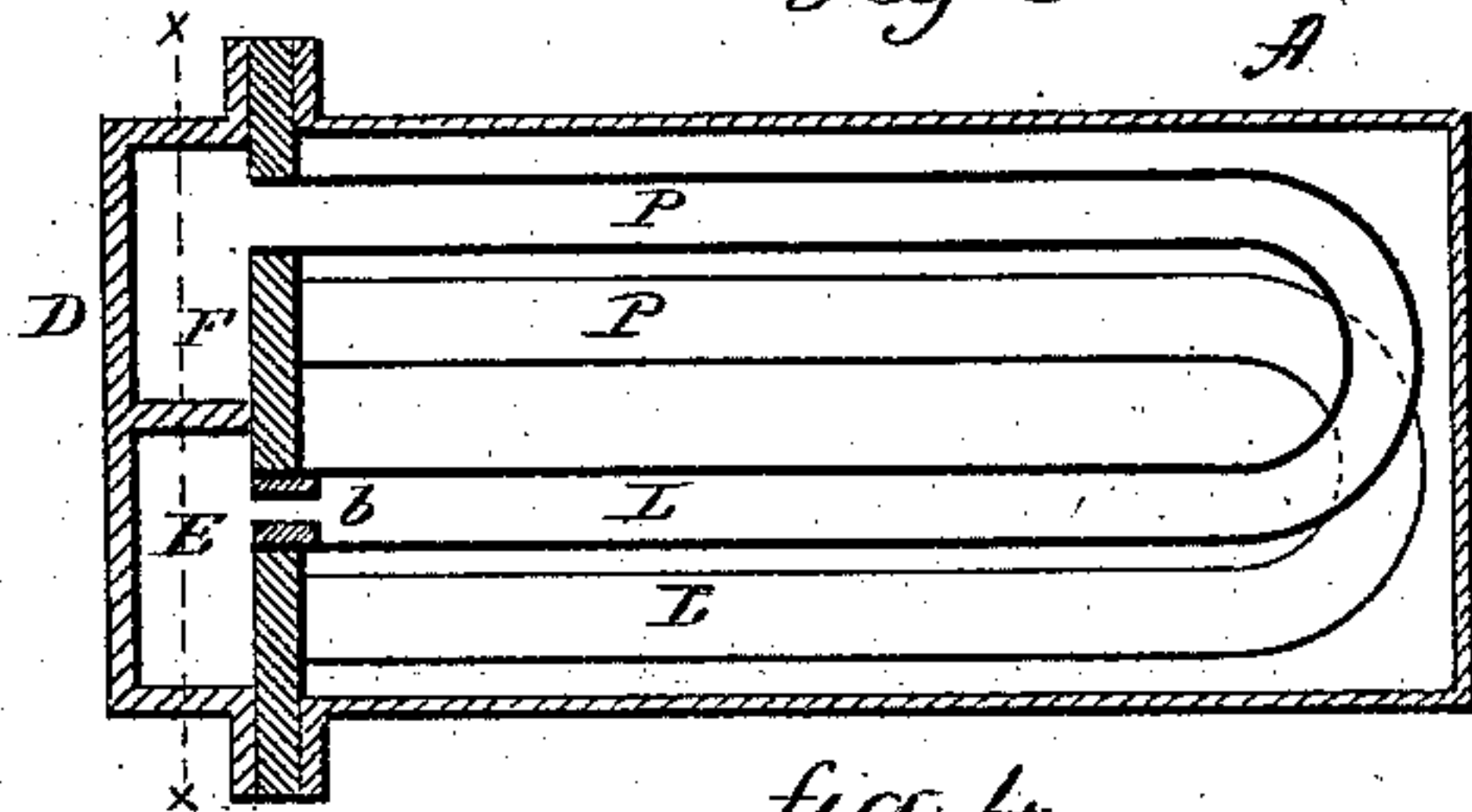
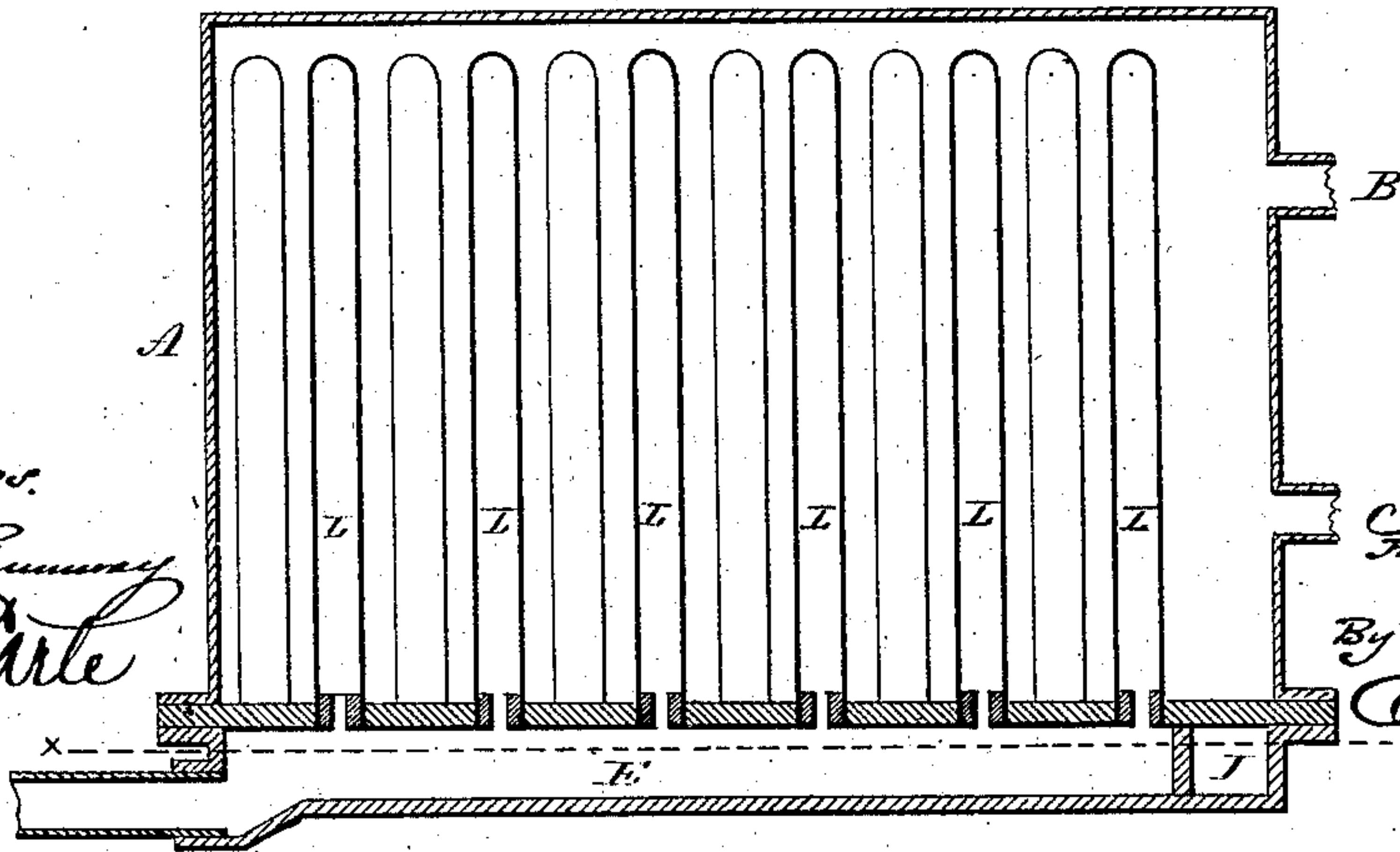


fig. 4.



Witnesses.

J. H. Humphrey
J. A. Carter

Henry Fairbanks
Inventor

By atty
Wm. S. Cat

UNITED STATES PATENT OFFICE.

HENRY FAIRBANKS, OF ST. JOHNSBURY, VERMONT.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 290,015, dated December 11, 1883.

Application filed March 30, 1882. (No model.)

To all whom it may concern:

Be it known that I, HENRY FAIRBANKS, of St. Johnsbury, in the county of Caledonia and State of Vermont, have invented new Improvements in Feed-Water Heaters; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a side view, cutting through line *x x* of Figs. 2, 3, and 4; Fig. 2, an end view; Fig. 3, a vertical central section on line *y y* of Fig. 1; Fig. 4, a horizontal section on line *z z*.

This invention relates to an improvement in the construction of feed-water heaters, and to that class which employ the exhaust-steam as the preliminary heating of the water preparatory to its introduction into the boiler, the improvement being specially adapted to use upon locomotives; and the invention consists in the construction of the heater, as shown in the accompanying illustration, and more fully hereinafter described.

A represents the outer casing of the heater, its size depending upon the capacity required for the heater. It is a flat box-like shape, fitted at convenient point, B, with an inlet for the exhaust-steam, and at C with an outlet for the condensation of the exhaust-steam, and is constructed so as to hang under the boiler back of the smoke-box and cylinders, and may be hung to the cross-head guides of the locomotive. At one side a cap, D, is fitted to the principal casing, with a partition, *a*, forming a lower chamber, E, and an upper chamber, F, as seen in Figs. 1 and 3. Into the lower chamber an inlet, G, opens, and from the upper chamber, F, is an outlet, H. The partition *a*, dividing the upper chamber from the lower, turns up at the end opposite the inlet, to form an upward extension, I, from the lower chamber, E. Within the casing U-shaped tubes are arranged, one leg, L, opening from the lower chamber, E, the other leg, P, opening into the upper chamber, F, as seen in Fig. 3, thus making a circuitous communication through the exhaust-steam chamber from the lower receiving-chamber, E, to the upper discharge-chamber, F. The exhaust-steam circulating through the exhaust-cham-

ber heats the tubes L P, and so that the water forced through the inlet G into the chamber E, and thence through the tubes into the discharge-chamber F, is heated in its passage through the said tubes preparatory to being forced to the boiler through the outlet H. The vertical extension I of the chamber E forms an air-chamber within the heater itself, to aid in equalizing the force of the inflowing water, substantially as do air-chambers applied to pumping devices for other purposes; but arranged as this is, in the heater itself, it occupies no additional space, and performs its office equally as well as if applied between the pump and heater, and without the inconvenience arising from the location of the air-chamber outside the heater. To more perfectly equalize the flow of water through all the tubes, I reduce the mouth of the tubes in the receiving-chamber E by introducing an open plug, *b*, as seen in Fig. 3, which reduces the passage into the tube, but leaves the outlet in the chamber above the full size of the tube. This contraction of the opening into the tubes, to make their area about equal to the capacity of the inlet G, produces a pressure in all the tubes equal one to another, which equalizes the flow of water through the tubes, so that the heating of the water will be correspondingly equal, and not, as in many constructions of heater, greater at some tubes than others, because the flow of water through some tubes is greater than others, the slow flow of the water producing a higher degree of heat than the more rapid flow.

While designed with special reference to locomotives, this heater may be applied as a feed-water heater for other boilers and purposes.

What I claim is—

1. The herein-described feed-water heater, consisting of the exhaust-steam chamber, combined with the water-receiving chamber E and the water-discharge chamber F, and U-shaped tubes arranged in the exhaust-chamber, one leg opening from the water-receiving chamber, the other leg into the discharge-chamber above the air-chamber I, within the heater, substantially as described.

2. The herein-described feed-water heater, consisting of the exhaust-steam chamber, combined with the water-receiving chamber E and

the water-discharge chamber F, and U-shaped tubes arranged in the exhaust-chamber, one leg opening from the water-receiving chamber, the other leg discharging into the discharge-chamber above, the opening from the water-receiving chamber into the tubes reduced to contract the receiving-mouth of the tube to a diameter less than the capacity of the tube itself, substantially as described.

HENRY FAIRBANKS.

Witnesses:

DANIEL CARPENTER,
P. F. BLODGETT.