(No Model.)

E. L. MORSE.

FEED WATER HEATER.

No. 259,706. Patented June 20, 1882.

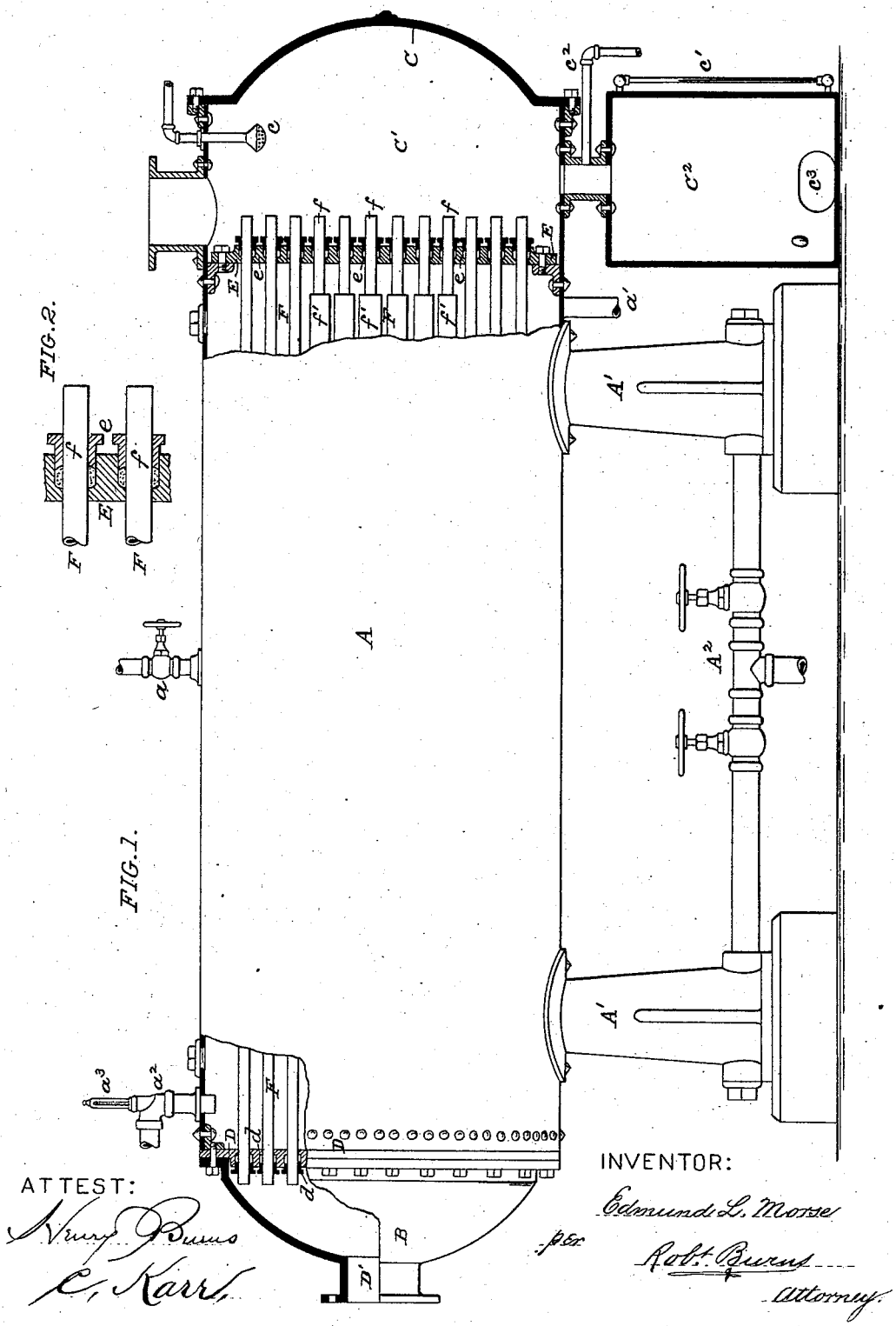

FIG. 2.

FIG. 1.

ATTEST:

Wm. Burns

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UNITED STATES PATENT OFFICE.

EDMUND L. MORSE, OF ST. LOUIS, MISSOURI.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 259,706, dated June 20, 1882.

Application filed April 13, 1881. (No model.)

To all whom it may concern:

Be it known that I, EDMUND L. MORSE, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Feed-Water Heaters, of which the following is a specification.

My invention relates to certain improvements in that class of feed-water heaters in which the feed-water is pumped through the heater into the boiler, so that the water in the heater will be under boiler-pressure; and the objects of my invention are, first, to provide a peculiar construction of heating-tubes, whereby a large heating-surface is obtained within the body of the heater and a small surface for forming the joint with the tube-head; and, second, to provide an improved attachment for heating the feed-water by the exhaust-steam that passes through the main heater before it is taken by the feed-pump. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side view, partly in section; and Fig. 2 is an enlarged detail section of the expansion-joint between the tubes and their heads.

Similar letters of reference indicate like parts in the different figures or views.

The heater consists of a shell, A, having heads B C, and tube-heads D E, in which the tubes F are secured. The exhaust-steam from the engine, &c., enters through the inlet-opening D′ and passes through the tubes F, imparting its heat to the feed-water contained in the shell A and surrounding said pipes. From said pipes the exhaust-steam, or what remains of it, passes into the chamber C′ at the end of the heater, where it is brought into contact with a spray of water from the spraying-nozzle *c*, so as impart its heat to said water, which, as it falls, is conducted into the receiving-tank C^2, from which it is taken by the boiler feed-pump and forced through the heater-shell A into the boiler.

The receiving-tank C^2 is provided with a glass water-gage, *c′*, to indicate the height of the water in the same, a drain-pipe, c^2, either automatic or otherwise, to carry off an excess of water in the tank, and a hand-hole, c^3, for cleaning out.

The main shell or heater A is provided with a surface blow-off, *a*, mud leg or legs A′, and sediment-blow-off pipes A^2 in manner similar to the construction shown in Letters Patent No. 228,831, granted to me June 15, 1880. Water is fed into this shell through inlet feed-pipe *a′* and discharged into the boiler through outlet-pipe a^2, which may be provided with a thermometer, a^3, to indicate the temperature of the feed-water.

The following is the improved construction made use of in attaching the heating-tubes F to their heads, so as to allow for expansion and contraction of said pipes, and at the same time prevent any leakage of water at the point where the joint is made in the tube-head. In this each head is provided with a stuffing-box, *d e*, for each tube, as shown, which stuffing-box may be of any suitable construction, employing any suitable packing material, such as rubber, soft lead, &c.

By securing or attaching both ends of the tubes by means of stuffing-boxes, as above set forth, the following good results are attained: It allows of the use of plain tubes, does not require any skilled labor or tools in fitting or placing the tubes in place, and allows for the ready removal and replacement of the same at any time.

In order to increase the heating capacity or area of the tubes F within the shell, a small pipe, *f*, is used to form a joint, by means of the stuffing-box, with the heads, and is connected inside the shell to a pipe, *f′*, of a larger diameter, as clearly indicated in Fig. 1. This construction allows of the placing of the tubes closely together within the heater-shell, and at the same time allows sufficient space for the formation of the stuffing-boxes on the heads and for the proper manipulation of the same.

Having thus fully described my said invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, in a feed-water heater, of a series of pipes, F, having reduced portions *f*, with the head D, provided with a

series of stuffing-boxes, *d*, for the passage of said reduced portions, for the purpose set forth.

2. The combination, in a feed-water heater, of the heating-tubes F, shell A, and chamber C′, provided with a spray pipe or nozzle, *c*, with a receiving-tank, C^2, substantially as and for the purpose set forth.

In testimony whereof witness my hand this 14th day of March, A. D. 1881, at St. Louis, Missouri.

EDMUND L. MORSE.

In presence of—
ROBERT BURNS,
C. W. BEEHLER.