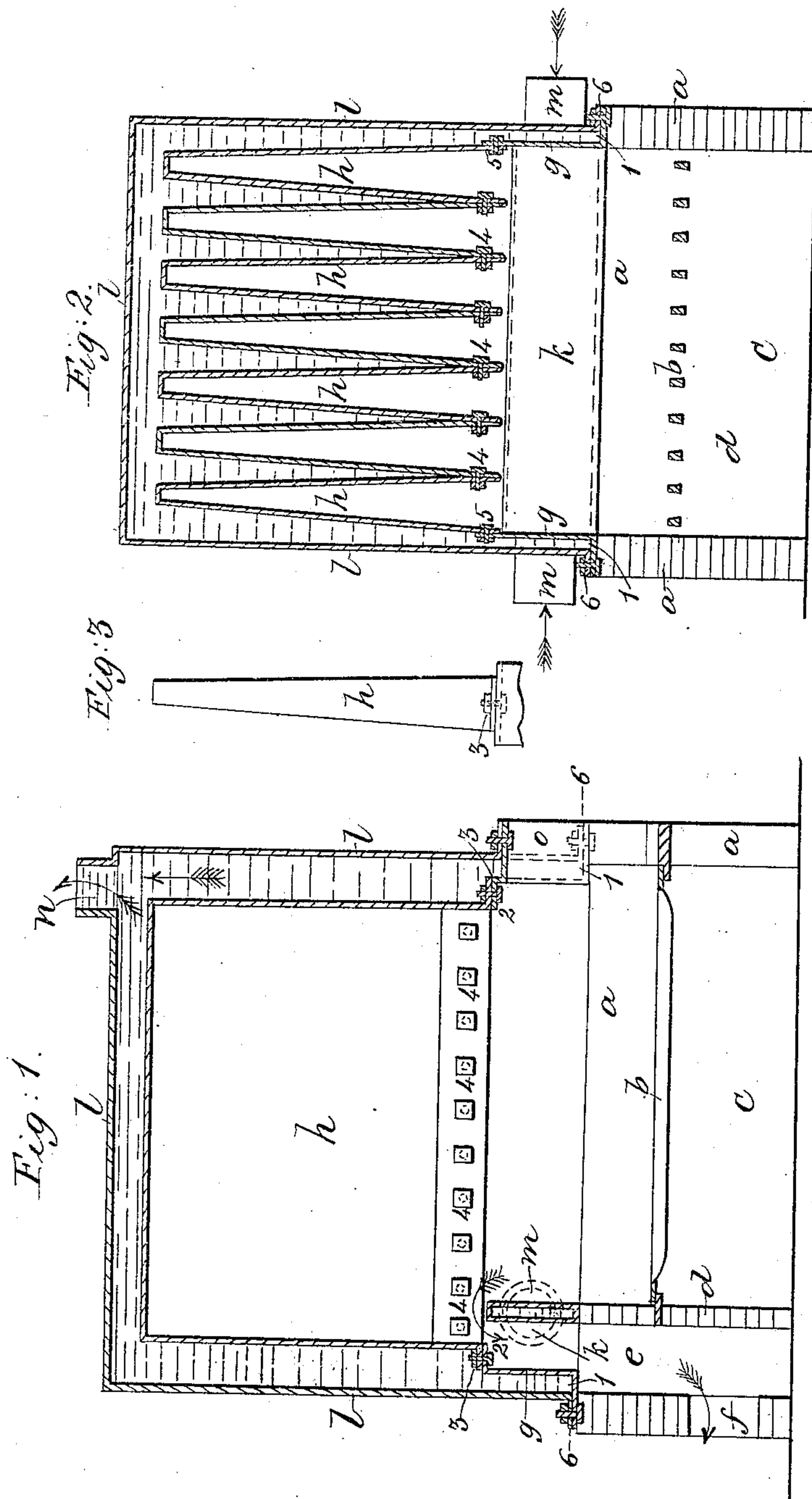


C. R. ELLIS.
Steam Heater.

No. 44,083.

Patented Sept. 6, 1864.



Witnesses.
Lemuel H. Gentry
Chas. H. Smith

Inventor.
Chas. R. Ellis.

UNITED STATES PATENT OFFICE.

CHARLES R. ELLIS, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN BOILERS FOR HOT-WATER FURNACES.

Specification forming part of Letters Patent No. 44,083, dated September 6, 1864.

To all whom it may concern:

Be it known that I, CHARLES R. ELLIS, of Brooklyn, in the county of Kings and State of New York, have invented, made, and applied to use a certain new and useful Improvement in Boilers for Hot-Water Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the said invention, reference being had to the annexed drawings, making part of this specification, wherein—

Figure 1 is a longitudinal section, and Fig. 2 a cross-section, of my said boiler.

Similar letters refer to like parts.

The boiler to which my invention relates is adapted to use in hot-water warming apparatus in which it is desired to obtain a large amount of heating surface that will be sufficiently near the fire to act the most efficiently in heating the circulating water, and at the same time not be subject to accumulations of soot, ashes, or dust upon the flue-surfaces, that, if not removed, check the efficiency of the fire by forming a non-conducting strata on the said flues. Boilers for this character of warming apparatus are not subjected to steam-pressure; hence the thinner and lighter the flues can be made the better, so long as they are sufficiently strong to resist the pressure of the circulating column of water. Heretofore the boilers of this character have been very heavy and costly, because they could not be cast thinner and lighter without risk of cracking under the expansion and contraction to which they are subjected.

The nature of my said invention consists in a series of cast-metal flue-boxes over the fire receiving the heated gases that ascend from such fire, and between which flue-boxes the water circulates; and I employ a hollow bridge-wall, through which the water also circulates, the parts being of such a construction that sufficient strength can be obtained without the thickness, weight, and cost of material heretofore involved.

In the drawings, *a* is the fire-place, of brick-work, with the grate-bars *b* and ash-pit *c*, and *d* is the lower portion of the bridge-wall, behind which is the chamber *e*, leading the products of combustion away by a pipe or opening at *f* to a chimney in any convenient manner. Around the fire place and resting upon the

brick-work *a* is a shallow metal box, *g*, with a flange, 1, around the outside of its lower edge, resting upon such brick-work, and at the upper, front, and back ends, flanges 2 2 project inward and receive the hollow flue-boxes *h*. Each box *h* is formed with two sides and a top piece, and the box is narrower at the top than at the bottom, and said flue-box also has nearly vertical end pieces with flanges 3 (see the detached Fig. 3) at the lower edges of the ends, that set upon and are bolted to the flanges 2 2 of the box *g*, and at the lower edges of the sides of these flue-boxes are holes coinciding with holes in the adjacent flue-boxes, so that these edges can be bolted or riveted together as at 4 4, and the outer flue-boxes have the lower edges of their outer sides riveted or bolted to the top edges of the box *g* at 5 5. All the joints between the respective flue-boxes, and between them and the box *g*, are to be packed with the usual cement of ammonia and iron filings or borings, the same being driven in and forming a very tight joint, so that the flue-boxes *h* and box frame *g* are nearly the same as if cast together, but the advantage by this construction is that the parts can be of thinner metal than heretofore, and present much more heating surface than in other boilers. Across the box *g* is a hollow flat bridge wall, *k*, forming a pipe for the circulating water. This may be cast with the box *g* or attached to the same by flanges. The boiler is completed by the inclosing-case *l*, in which is cast the opening or openings *m* for the reception of the return circulating pipe or pipes, and the opening *n* for the flow-pipe, through which the heated water circulates away from the boiler and passes into the various circulating-pipes in any usual manner, returning by the pipes *m*. The bottom edges of this case *l* are provided with flanges 6 6, that set upon and are bolted to the flanges 1 1 of the box *g*, the parts being packed as usual. The box *g* and case *l* are arched up or formed with a rectangular opening at *o*, to allow for introducing coal to the fire through any usual chute or slide. It will now be seen that the water-spaces between the flues *h* and within the case *l* are such that the water can circulate freely and can also pass through the hollow bridge-wall *k*, the pipe or pipes *m* return-

ing the cooled water directly to the end of this hollow bridge-wall, so that said bridge may be kept as cool as possible and thereby prevent much heat passing away by the flue.

It is an advantage in a boiler for this kind of apparatus to have but little water in it, because the apparatus will heat up more quickly. In my apparatus this object is attained. There is ample room for circulation, and at the same time a small quantity of water will fill the boiler. The flue-boxes are close to the fire, and there is no opportunity for ashes and dirt to lodge in the flue-boxes; hence the surfaces are always in a good condition for conducting heat.

What I claim, and desire to secure by Letters Patent, is—

1. The hollow flue-boxes applied above the fire, substantially in the manner and for the purposes specified.

2. The hollow bridge forming a circulating-pipe extending from one side of the box *g* to the other, as specified.

3. The pipe or pipes *m*, in combination with the cross-flue bridge, for returning the circulation-water to the boiler near the said hollow bridge, as specified.

In witness whereof I have hereunto set my signature this 20th day of April, 1864.

CHAS. R. ELLIS.

Witnesses:

LEMUEL W. SERRELL,
CHAS. H. SMITH.