C. R. ELLIS.

Radiator for Steam-Heaters.

No. 164,156. Patented June 8, 1875.

Fig. 1.

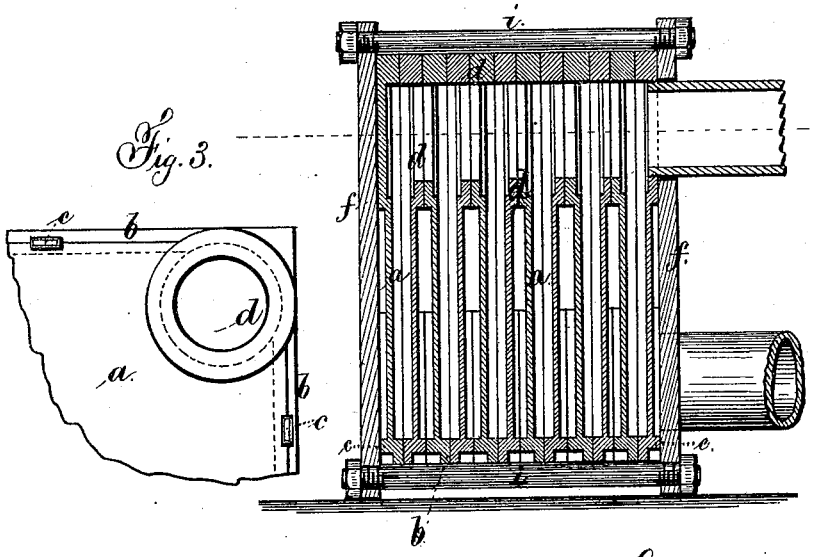
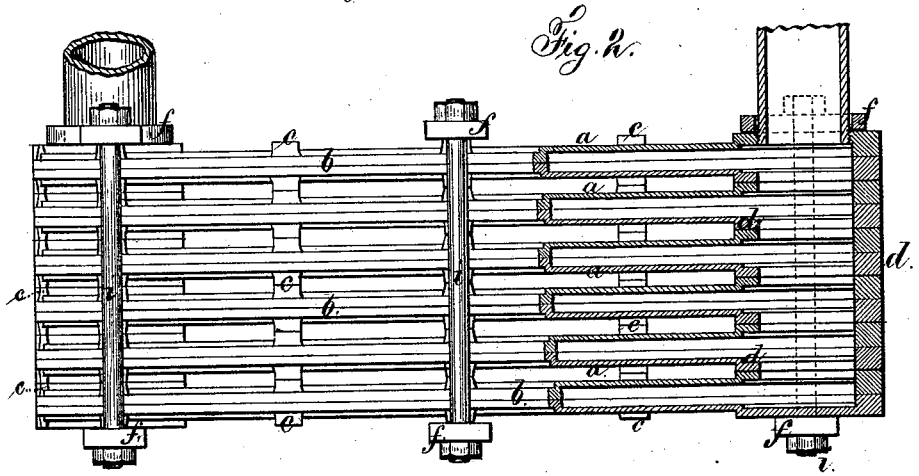


Fig. 3.

Fig. 2.



Witnesses

Chas. H. Smith

Harold Serrell

Inventor

Charles R. Ellis

per Lemuel W. Serrell

attij

UNITED STATES PATENT OFFICE.

CHARLES R. ELLIS, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN RADIATORS FOR STEAM-HEATERS.

Specification forming part of Letters Patent No. **164,156**, dated June 8, 1875; application filed April 29, 1875.

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 an Improvement in Radiators for Warming Apparatus, of which the following is a specification:

This invention has for its object the production of a compact and cheap radiator with a large extent of heating-surface.

Heretofore radiators have been made of wrought-iron plates riveted together in pairs, and placed side by side with intervening supports that keep the plates in shape under the slight variations of pressure; but these plates are liable to rust out, and they are expensive to construct, and difficult to repair. Other radiators have been made of iron, cast hollow, and of a flat shape; but in consequence of requiring a core the casting is expensive, and the side plates cannot be near each other; hence these radiators occupy considerable space for the amount of air-heating surface presented.

My invention consists of a radiator made of cast-iron plates with flanges, set together in pairs, and closed at the joints around the edges by red lead or similar material, and these radiating-tablets are clamped together in gangs, and there are blocks upon the outer surfaces of the respective plates that set together and keep the tablets apart, so as to leave spaces for the atmosphere to circulate between said tablets and become heated.

In the drawing, Figure 1 is a vertical transverse section of the radiator. Fig. 2 is a plan, partially in section; and Fig. 3 is an elevation of a portion of one of the radiator-plates.

The plates *a* are made with flanges *b* around their edges, and with projecting blocks *c* at suitable distances apart, and with openings and surrounding collars *d*. The contiguous surfaces of the flanges *b* and collars *d* are flat, so as to set together sufficiently tightly to only require red lead or similar packing. The surfaces of the collars *d* and of the blocks *c* are in the same plane, so that when packed together the gang of tablets will be parallel, and hence the clamping stay-bars *f* and bolts *i* will compress and hold all these tablets firmly together with uniform pressure, and when so fitted the interior spaces of the tablets open to the cross-tubes formed by the openings and collars *d*.

The gangs of tablets are to be placed with their longest measurement either vertically or horizontally. The latter, however, will generally be preferable, and the collars and openings are to be located at the proper places for the inlet and outlet circulating-pipes; and it is to be understood that this radiator is adapted to circulating hot water, or to steam at a low pressure, and the radiator itself may be placed in the apartment to be warmed, or below the same, so that the air will circulate up into the apartment.

I remark that these plates can be cast much more accurately and thinner than the cored tablets heretofore made, and they are more reliable and cheaper than wrought metal, because they will not change shape under the slight variations in pressure to which they are subjected.

The radiator-plates may be cast with either solid or hollow ribs or projections to increase the radiating-surface, and these may be of a size to touch each other when the radiating-tablets are placed together in the gang.

The blocks *c* and collars *d* may be separate pieces introduced in position between the cast-metal plates; but I prefer to have them cast upon the respective plates, as shown.

I claim as my invention—

The combination, in a cast-metal radiator, of tablets composed of pairs of plates with flanges around their edges, blocks and collars setting together, and clamping bars and bolts to hold the tablets, substantially as specified.

Signed by me this 26th day of April, A. D. 1875.

CHAS. R. ELLIS.

Witnesses:

GEO. T. PINCKNEY,

CHAS. H. SMITH.