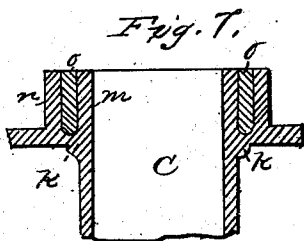
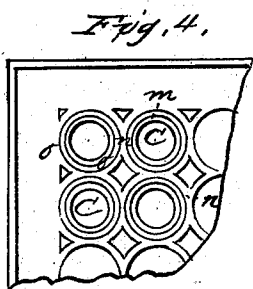
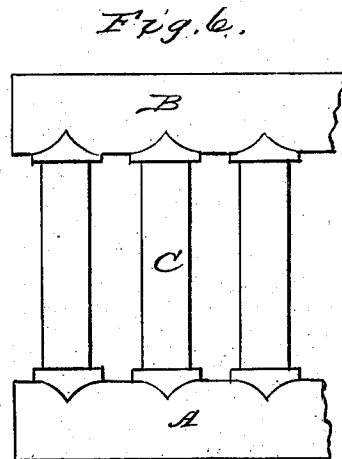
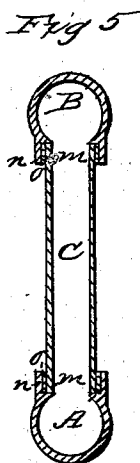
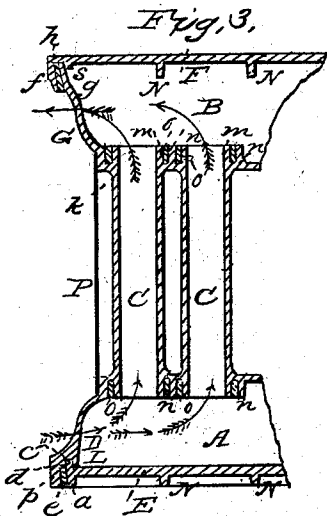
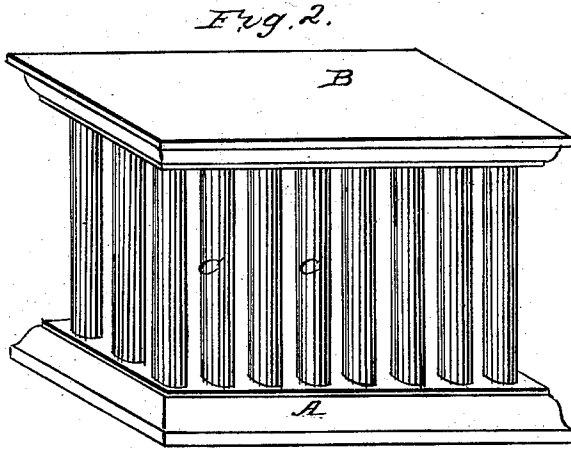
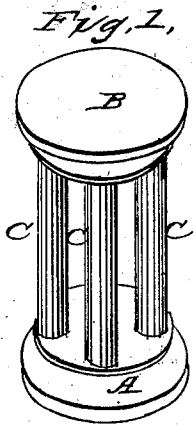


L. M. HILLS.
 Steam Heater.

No. 37,343.

Patented Jan'y 6, 1863.



Witnesses:
 James S. Lusk
 John C. Coe &

Inventor:
 L. M. Hills.

UNITED STATES PATENT OFFICE.

L. M. HILLS, OF NEW HAVEN, CONNECTICUT.

IMPROVEMENT IN STEAM-RADIATORS.

Specification forming part of Letters Patent No. 37,343, dated January 6, 1863.

To all whom it may concern:

Be it known that I, L. M. HILLS, of the city and county of New Haven, and State of Connecticut, have invented new and useful Improvements in Radiators for Heating by Steam; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figures 1 and 2 are perspective views of different forms, but same construction. Fig. 3 is a section. Fig. 4 is a plan with the top covering removed. Fig. 5 is a side view of a still different form, but substantially the same construction. Fig. 6 is a transverse section of Fig. 5. Fig. 7 is an enlarged section, to illustrate the manner of putting together the several parts.

Same letters refer to like parts.

My invention is designed to be used for heating buildings by steam, and has for its object simplicity and cheapness of construction and great radiating-surface in small space.

It consists in the peculiar form and construction of the joints, by which the several parts are joined together, so as to form a dovetail or lock-joint, one part or piece setting into or over another so as to leave a space around the inner one and between that and the outer one, so that when set up the space may be filled with a cement, commonly known as "hard cement," or any other answering the same purpose, and when thus filled with cement, and the cement has become hard, any strain upon the several parts caused by expansion or by the pressure of steam will, owing to the peculiar form of the joints, serve to tighten the joints rather than otherwise, and thus dispensing entirely with the necessity of fitting the joints or using bolts or screws in the construction.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is a steam-chamber which forms the base of the radiator. B is a similar chamber which forms the cap or top of the radiator. C C are pipes or tubes connecting the lower chamber or base A with the upper chamber or cap B. In Fig. 3 is shown more fully the details of construction. The upper plate, H, of the lower chamber, A, and the lower plate, I, of the up-

per chamber, B, are cast with holes, into which to set the tubes C. The tubes C are cast with shoulders K (see Fig. 7) upon each end, the one to rest upon the upper plate, H, of the lower chamber, A, and the other to support the upper chamber, B. Each end *m* of the tubes C are cast in a dovetail form—that is, of a larger diameter at the extreme ends than at the shoulders K—and extend through the plates H and I. On the plates H and I, and around the dovetail ends *m* of the tubes C, are cast flanges *n*, (see Figs. 4 and 3,) and so as to leave a space, *o*, between the ends *m* of the tubes C and the flanges, *n*. This space *o* I fill with hard cement or any other cement or material to answer the same purpose. Having thus joined the chambers A and B, I then complete the lower chamber, A, thus: In and around the edge of the side D is cast a groove, *e*, and upon the bottom plate, E, is cast a tongue, *d*, corresponding to the groove *e*. I do this that the lip L, upon the side D, bearing against the tongue *d*, will strengthen the side of the chamber A to withstand the pressure of the steam. A portion, *a*, of the edge of the plate E, and a corresponding portion, *p*, of the groove *e*, are beveled so as to make the two beveled portions nearly or quite parallel to each other, and of a dovetail or lock form, and so as to leave a space, *e*, between the two beveled portions. This space *e* I fill with cement, as before described, which completes the lower chamber, A. I then complete the upper chamber, B, which may be done in the same manner as the lower chamber, or as represented in Fig. 3. At or near the edge of the plate F, I cast a flange, *f*, to set over the side G of the chamber B. The inner side of the flange *f* is inclined inward, and the upper edge, *g*, of the side G is inclined outward, so as to be nearly or quite parallel to each other, and so as to leave a space, *h*, of a dovetail or lock form between the two inclined portions. This space I fill with cement, as before described. The flange *f* serves a similar purpose to the tongue *d* of the lower plate, E—that is, to strengthen the side of the steam-chamber B. The lip *s* serves as a guide in setting the plate F. My radiator is then complete. If necessary to strengthen the upper and lower plates F and G, ribs N may be cast upon each, of such form as to attain the desired result. It will thus be seen that I can cast all, and every part, of

my radiator so as not to require fitting, and confine the parts together without the use of bolts or their equivalents, and at the same time provide for strain upon or expansion of the several parts for any required pressure of steam.

I do not confine myself to the exact form described, as other forms may be used, involving the same principles of construction, as shown in Figs. 5 and 6, where the upper and lower chambers, A and B, are each cast whole with the flanges *n* open outward, and the ends of the pipes C formed as before, and set within the flanges *n*, and packed as before described; also, if necessary, the pipes or tube C may be horizontal or inclined, instead of perpendicular, or the tubes C may be inclosed by a casing, P, (shown in red, Fig. 3,) and steam admitted within the casing P and around the tubes C, and cold air, allowed to pass into the lower chamber, A, and up through the tubes C, as shown by arrows, will become heated and pass out through openings in the upper chamber, B, made for that purpose.

Steam may be admitted to my radiator in any of the ordinary ways known or used.

I am aware that steam-radiators have been made by connecting two chambers of tubes or pipes. I am also aware of the patent granted to Chas. W. Isbell, July 24, 1860, for coupling

gas and water pipes, for the purpose of making gas and water tight joints. I am also aware of the patent granted to W. A. Lighthall, December 17, 1861, for improvement in setting tubes in condensers, in which a joint is so constructed as to allow the tube to expand and contract independent of the tube-sheets, (one of the requisites of tubular condensers,) and necessitates a slipping joint, the object and claim of Lighthall's invention. I do not, therefore, claim constructing radiators by connecting two separate chambers by means of tubes; neither do I claim coupling pipes for water or other purposes by means of a cement or other joint, as in patent of C. W. Isbell, July 24, 1860; neither do I claim a yielding or slipping joint, as in the patent of W. A. Lighthall, December 17, 1861; but

What I do claim as new and useful, and desire to secure by Letters Patent, is—

The combination of the tube-plates H and I, the tubes C, and plates E and F, when the same are constructed and joined with unyielding joints in the manner and for the purpose substantially as herein set forth and described.

L. M. HILLS.

Witnesses:

JOHN E. EARLE,
GEORGE S. LESTER.