2 Sheets—Sheet 1.

C. R. BLACKMORE.

Steam-Radiator.

No. 214,806. Patented April 29, 1879.

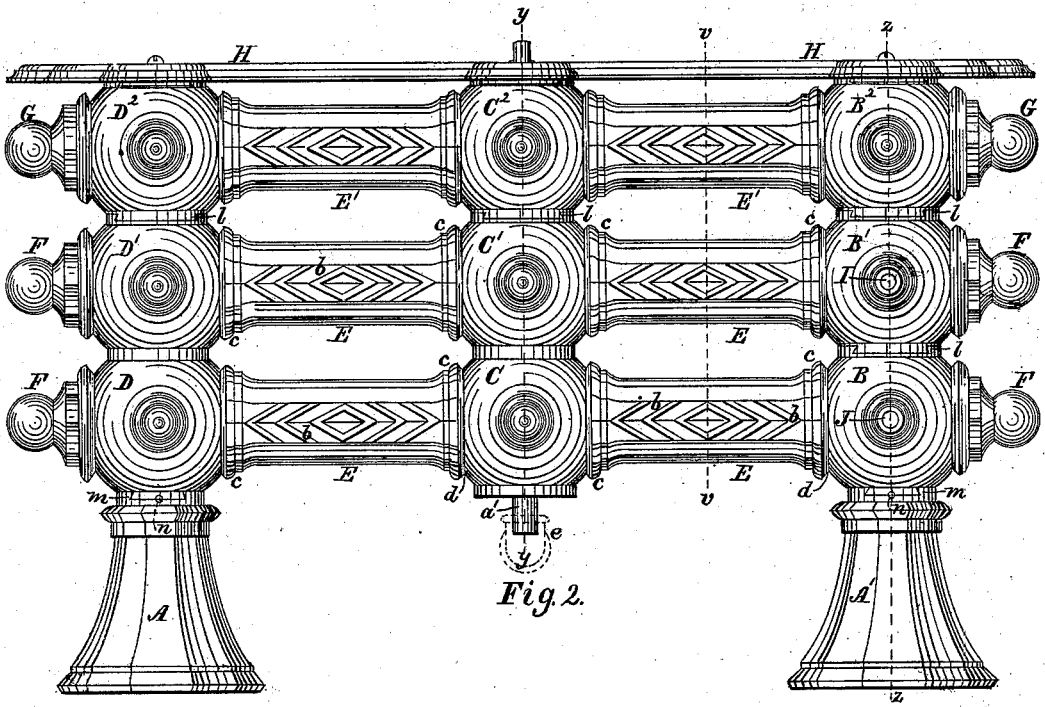

Fig. 2.

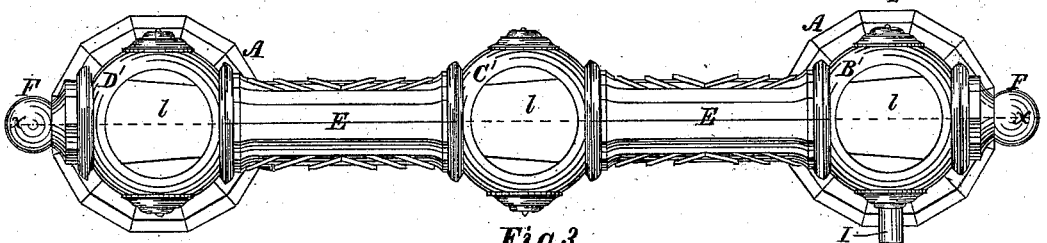

Fig. 3.

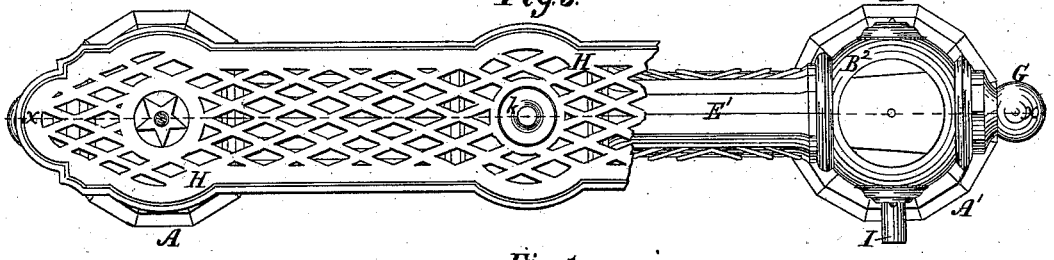

Fig. 1.

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C. H. Dodd.

Inventor:
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by N. C. Lombard
Attorney.

2 Sheets—Sheet 2.

C. R. BLACKMORE.

Steam-Radiator.

No. 214,806. Patented April 29, 1879.

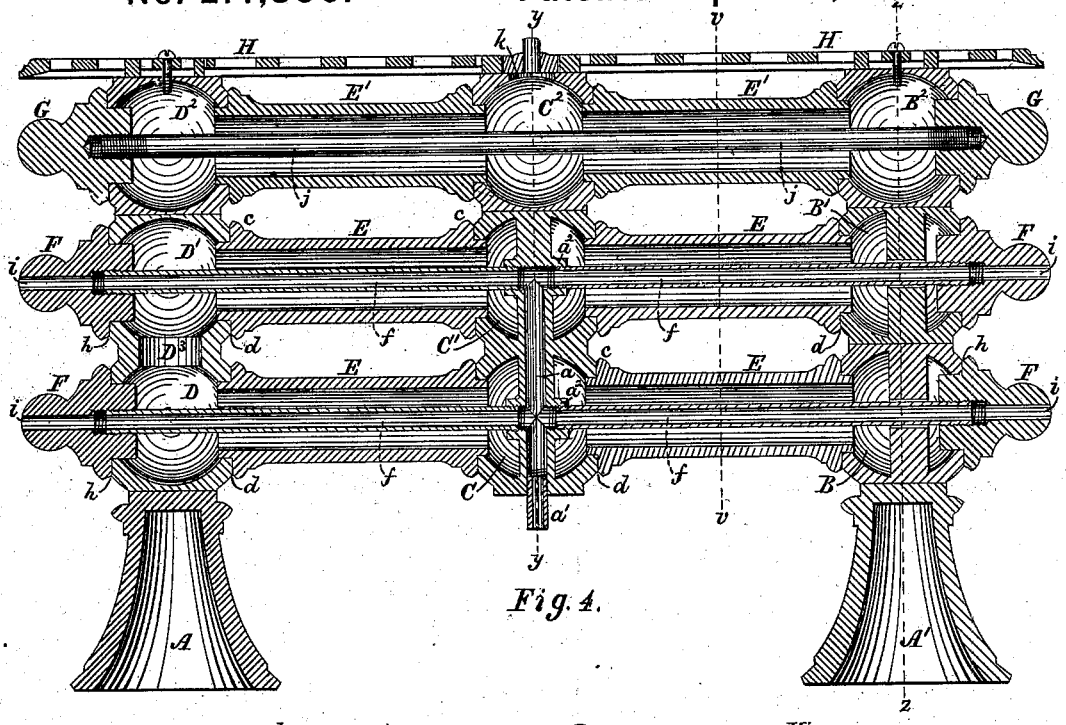

Fig. 4.

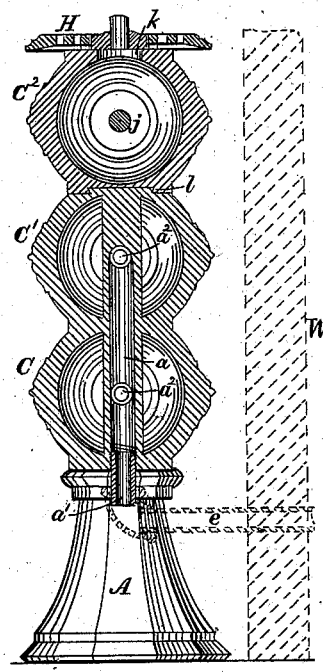

Fig. 5

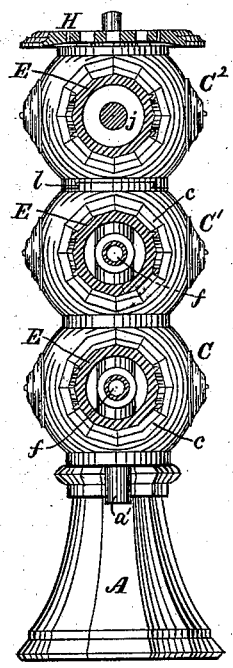

Fig. 7.

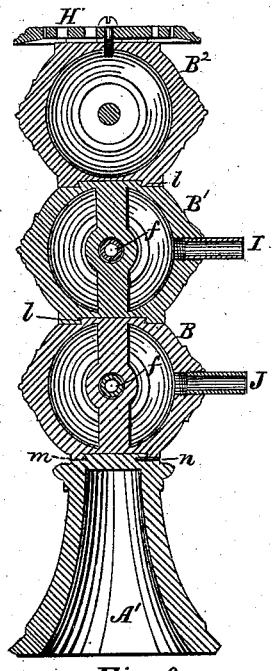

Fig. 6.

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UNITED STATES PATENT OFFICE.

CHARLES R. BLACKMORE, OF LYNN, MASSACHUSETTS.

IMPROVEMENT IN STEAM-RADIATORS.

Specification forming part of Letters Patent No. **214,806**, dated April 29, 1879; application filed January 18, 1879.

To all whom it may concern:

Be it known that I, CHARLES R. BLACKMORE, of Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Radiators, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to the construction of radiators or steam-heaters for warming buildings, and especially to means connected therewith for ventilating the room in which it is placed and moistening the atmosphere therein; and it consists in combining with the steam-pipes of a steam heater or radiator one or more water-pipes adapted to hold water, said water-pipes being built into and forming a part of the structure of the radiator, and so arranged that water contained therein may be heated and caused to evaporate into the atmosphere of the room by the radiation of heat from the steam-pipes, combined with the conducting power of the metal at the points of contact.

It further consists in a peculiar construction of the joints of the several parts, whereby the structure is easily and cheaply fitted together, as will be further described.

It further consists in a novel construction of the main pipes and sections which make up the main structure, whereby the air-pipes are readily and easily applied, without interfering with the heating capacity of the radiator or the tightness of the steam-pipes.

It further consists in the use, in combination with a steam heater or radiator, of two or more horizontal steam-pipes, arranged one above another, and connected together at each end and in the center of their lengths, but supplied with steam communication with each other, or from one pipe to another, only at one point, so that steam admitted to the radiator at the end of the upper or lower steam-pipe will be compelled to traverse the whole length of each of the steam-pipes in succession before being discharged from the radiator, and a system of ventilating-pipes arranged within said horizontal steam-pipes and adapted to receive air at the center of the length of said steam-pipes and discharge it into the room at one or more points at each end of the radiator, as will be described.

It further consists in the combination, in a steam heater or radiator, of spherical, or partially spherical, end and central coupling sections, made hollow and provided with interior pipe or rod connecting and supporting ties, intermediate pipes connecting said spherical sections, made polygonal in cross-section exteriorly, and having thin lips or ribs arranged obliquely in opposite directions upon and projecting outward from two contiguous flat surfaces upon opposite sides thereof, one or more rods or pipes screwed at one end into the central spherical section, and a cap-nut screwed onto the other end of said rod or pipe, and adapted to hold the several sections making up one of the horizontal pipes together, and also to close with a steam-tight joint the outer opening in the end spherical section.

Figure 1 of the drawings is a plan of my improved radiator with a portion of the upper plate broken away. Fig. 2 is a side elevation. Fig. 3 is a plan with the upper or water pipe and plate removed. Fig. 4 is a vertical longitudinal section on line *x x* on Figs. 1 and 3. Fig. 5 is a vertical transverse section on line *y y* on Figs. 2 and 4. Fig. 6 is a vertical transverse section on line *z z* on Figs. 2 and 4; and Fig. 7 is a vertical transverse section on line *v v* on Figs. 2 and 4.

A A′ are the feet or pedestals which support the radiator, which is made up in the case illustrated in the drawings of two steam-pipes and a water-chamber; but it is obvious that other pipes may be added to the height, or two or more sets of pipes may be placed side by side and connected together to form one heater of increased capacity.

The two steam-pipes are composed of two separate hollow spherical, or partially spherical, castings, B and B^1, two hollow partially spherical chambers, C and C^1, combined in one casting and provided with a central pipe, *a*, leading through C to the center of C^1, two other spherical chambers, D and D^1, also combined in one casting, the four intermediate pipes, E E, made polygonal in cross-section exteriorly, and having formed upon and projecting outward from two contiguous flat sursurfaces thereof the obliquely-arranged ribs *b b*, designed to increase the radiating-surface.

The ends of the pipes E E have formed

thereon ornamental moldings *c c*, and are provided with shoulders *d d*, a short distance from the ends of said pipes, which ends are fitted into circular openings in the spherical chambers B B^1, C C^1, D and D^1, whereby packed steam-tight joints may be made between the several parts.

Steam is admitted to the radiator through pipe I, and, after passing through chamber B^1, pipes E, chambers C^1 and D^1, passage D^3, chambers D, C, and B, and pipes E, is discharged through pipe J.

The chambers C and C^1 are separated from each other, though formed in the same casting, and each has cast therein a tubular bridge or tie, forming a vertical pipe, *a*, extending from the under side of C to or above the center of C^1, and having screwed into its lower end the pipe a^1, to which may be coupled the pipe *e*, leading to and through the wall W of the building, as shown in dotted lines in Figs. 2 and 5.

The pipe *a* has formed upon opposite sides thereof, in each of the chambers C and C^1, short branch pipes a^2 a^2, into each of which is screwed a pipe, *f*, extending horizontally therefrom through the pipes E E and chambers B B^1, C C^1, D or D^1, and has screwed thereon the nut F, provided with shoulder *h* and central hole *i*, through which the air admitted to the radiator through pipes *e*, a^1, *a*, a^2, and *f* escapes into the room.

The upper horizontal chamber, composed of the spherical, or partially spherical, castings B^2, C^2, and D^2, and the pipes E′, constructed substantially like the pipes E, and the whole secured together by the rod *j* and nuts G G, has no communication with the steam-pipes beneath it, but is designed to contain water, which may be introduced through the opening *k*, formed in the upper side of the central spherical casting C^2, as shown in Fig. 4.

H is a cap-plate or shelf secured upon the top of the radiator, as shown, and preferably made of open-work, or perforated, to make it light, and to increase the radiating-surface, in a well-known manner.

The spherical chambers B^2, C^2, and D^2 are attached to B^1, C^1, and D^1, respectively, and B^1 to B, by means of horizontal dovetailed joints *l*, made tapering, as shown in Fig. 3, the end dovetails being narrowest at their inner ends, so that the screwing up of the nuts F and G will bind the whole together.

The feet A A′ are also attached to the spherical chambers B and D by similar dovetailed joints *m;* but as there is no binding-bolt to hold them in place they are secured from displacement by a pin, *n*, set in the joint in a position at right angles to the line of movement in putting the two pieces together.

D^3 is a passage, through which steam passes from the upper to the lower steam-pipe.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In combination with two or more steam-pipes, arranged horizontally one above the other, and communicating alternately at opposite ends with each other, to permit free circulation of steam successively through the several pipes, one or more additional pipes placed above and parallel with said steam-pipes, but having no interior communication therewith, each additional pipe being provided with an opening in its upper side, and adapted to hold water, substantially as and for the purposes described.

2. In a radiator or steam-heater composed of two or more pipes or sections divided horizontally, a tapering dovetailed groove formed in one of said sections, in combination with a tapering dovetailed tongue cast upon and forming a part of the other section, and adapted to fit said dovetailed groove to hold said sections together, said sections being adapted to be secured together by moving one or both in the direction of the length of said dovetailed grooves and tongues, substantially as and for the purposes described.

3. The central coupling-sections, C or C^1, provided with the interior pipes *a* a^2, in combination with end coupling-sections, B or B^1 and D or D^1, intermediate steam-pipes, E E, central air-pipes, *f f*, and nuts F F, provided with orifices *i*, all arranged and adapted to operate substantially as and for the purposes described.

4. The combination, in a steam heater or radiator, of two or more horizontal steam-pipes, arranged one above another, and attached to each other at their centers and at each end, but having steam communication with each other only at one end, and a system of ventilating-pipes arranged within said horizontal steam-pipes, and adapted to receive air at the center of the heater or radiator and discharge it at one or more points from each end of the heater or radiator, substantially as and for the purposes described.

5. The combination, in a steam heater or radiator, of coupling-sections B or B^1, C or C^1, and D or D^1, intermediate steam-pipes, E E, made polygonal in cross-section exteriorly, and provided with a series of obliquely-arranged projecting ribs, *b b*, one or more rods or pipes screwed into the central coupling-section, and a cap-nut, F, screwed upon the other end of said rod or pipe, and adapted to hold the several sections together, and to close with a steam-tight joint the outer opening in the end section, substantially as and for the purposes described.

Executed at Boston, Massachusetts, this 16th day of January, A. D. 1879.

CHARLES R. BLACKMORE.

Witnesses:
E. A. HEMMENWAY,
HORACE M. OLIVER.