(No Model.)

J. HOPSON, Jr., & L. S. DANIELS.

RADIATOR.

No. 373,070. Patented Nov. 15, 1887.

FIG. 1.

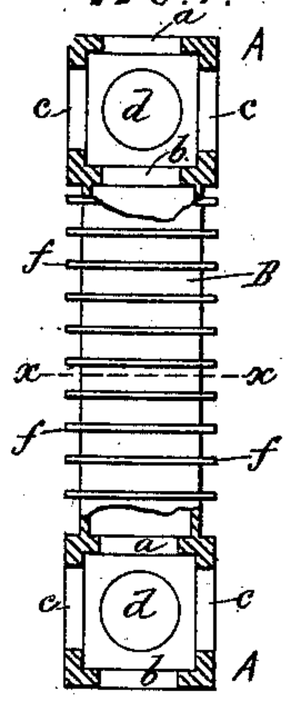


FIG. 2.

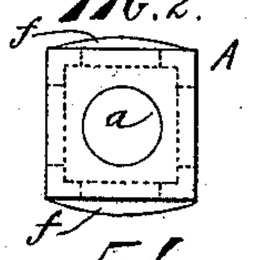


FIG. 3.

FIG. 4.

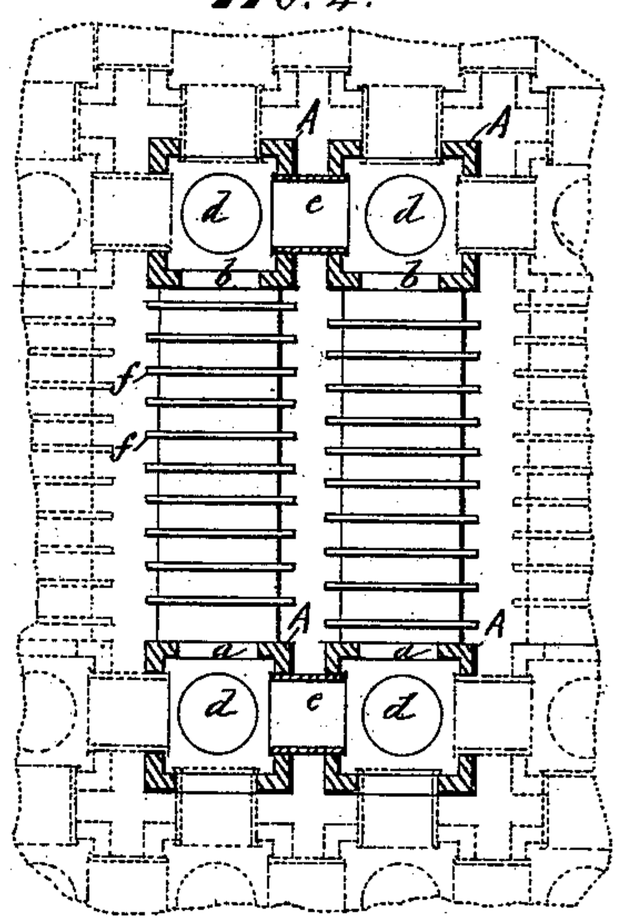


FIG. 5.

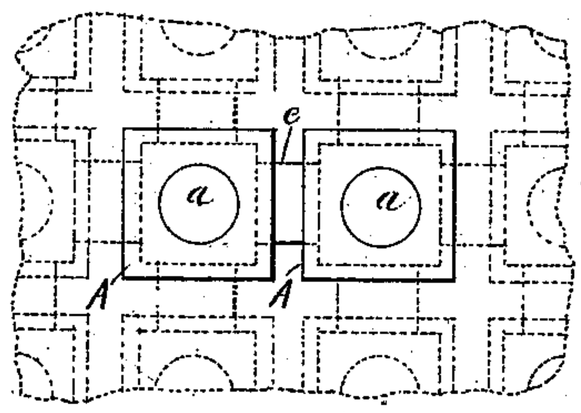


FIG. 6.

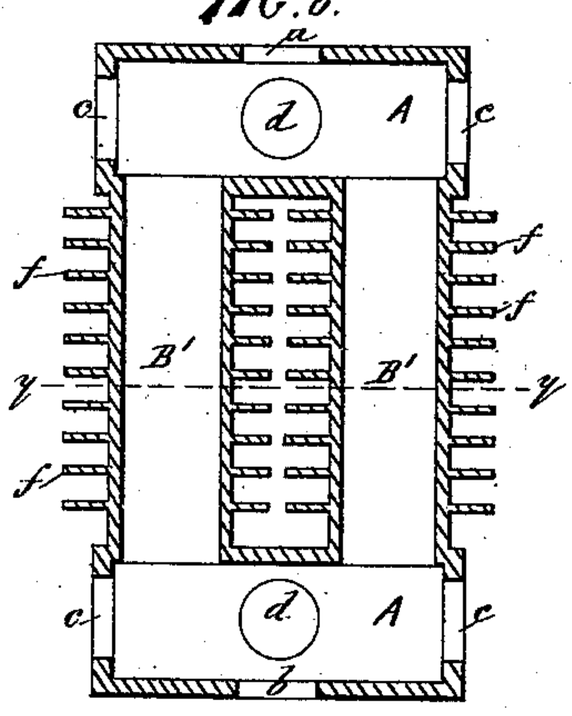


FIG. 7.

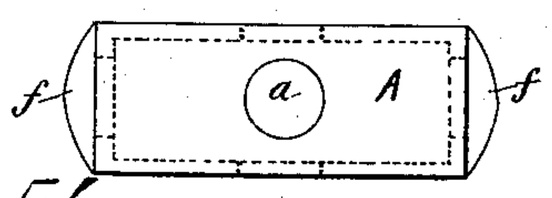


FIG. 8.

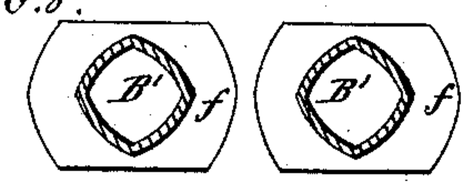


FIG. 9.

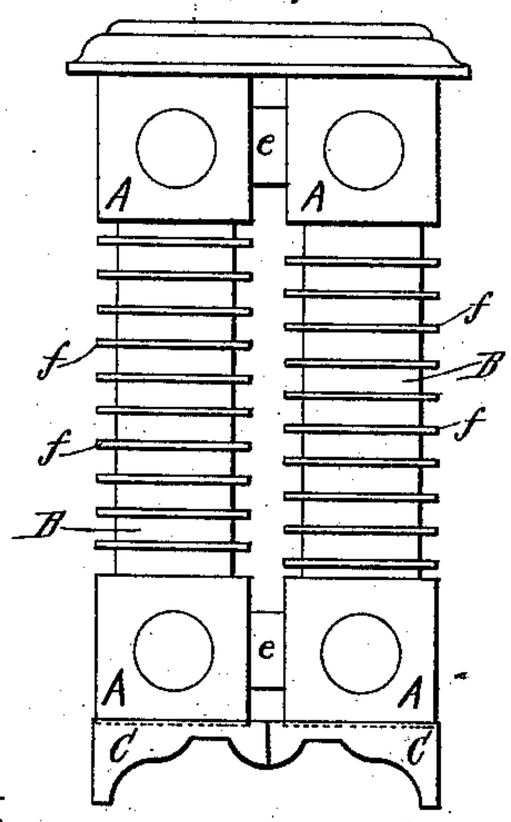


FIG. 10.

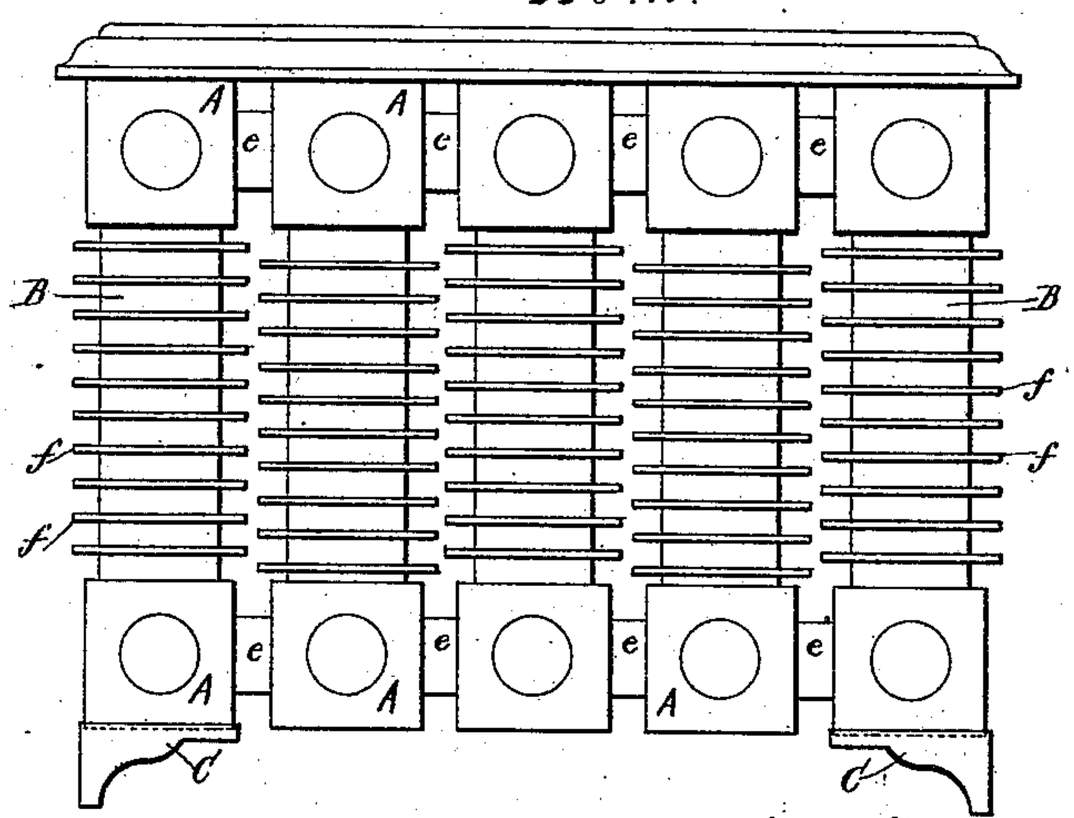


FIG. 11.

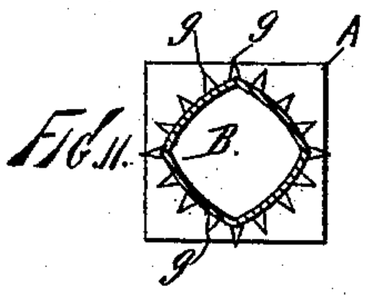
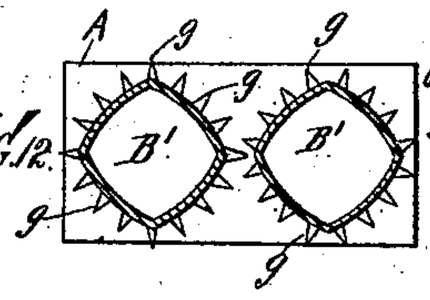


FIG. 12.



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L. H. Osgood.

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By Wm. H. Osgood,
Attorney.

UNITED STATES PATENT OFFICE.

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RADIATOR.

SPECIFICATION forming part of Letters Patent No. 373,070, dated November 15, 1887.

Application filed February 26, 1887. Serial No. 229,044. (No model.)

To all whom it may concern:

Be it known that we, JOHN HOPSON, Jr., and LEWIS S. DANIELS, of New London, county of New London and State of Connecticut, have invented certain new and useful Improvements in Radiators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Our invention has relation to radiators such as are employed for heating purposes in connection with steam or hot-water circulating systems or with systems furnishing other heated liquids or fluids.

The principal object of our invention is to produce a simple, cheap, and efficient radiator which is composed of a number of small sections of similar or nearly similar figure, each capable of being added to on either side, top, or bottom, thus making it practicable to form a radiator of any capacity desired and to restrict it or increase it in any desired direction; and a subordinate object is to provide legs or standards applicable for the improved radiator to whatever size it may be extended.

To accomplish these objects, and to secure other and further advantages in the matter of construction and assembling the parts for use, our improvements involve new and useful peculiarities of construction and relative arrangements or combinations of parts, as will be herein first fully described, and then pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a view of one of the radiator-sections, showing the heads in section and the single intermediate hollow portion in elevation. Fig. 2 is a plan or top view, and Fig. 3 a cross-section and plan, on a plane through line *x x* of Fig. 1. Fig. 4 is a view in section and elevation, showing two sections like that of Fig. 1 united in accordance with our invention, and indicating by the dotted lines other similar sections united at the sides and top and bottom; and Fig. 5 is a top or plan view showing the two sections of Fig. 4 and others in dotted lines united therewith at the sides and front and back, the two figures together illustrating how the radiator may be enlarged in either or any direction. Fig. 6 is a sectional elevation of a radiator-section capable of use in accordance with our invention, and differing from that of Fig. 1 in that the heads are united by two hollow portions or circulating-tubes instead of by a single one. Fig. 7 is a top plan view, and Fig. 8 a horizontal section and partial plan, on a plane through line *y y* of Fig. 6. Fig. 9 is an end elevation, and Fig. 10 a side elevation, of a one-high radiator constructed in accordance with our invention, showing the legs in place beneath the united sections to sustain them above the floor. Fig. 11 is a cross-section and plan of a single-tube section, and Fig. 12 a similar view of a double-tube section, showing the extended heat-radiating surfaces upon the tubes made in the form of points or teeth instead of flanges or disks, as in previous figures.

In all these figures like letters of reference, wherever they occur, indicate corresponding parts.

A A represent the heads or angular portions of the radiator-section, the same being connected by the circulating-tube B, if a single tube be employed, or by two or more, as at B′ B′, if more be desired. The heads and tubes are preferably cast in one piece, making each section solid and complete in itself and ready to be joined with others of like form. With the single circulating-tube the heads are preferably made square in plan, and they are perforated at top and bottom, as at *a* and *b*, on each side, as at *c*, and on the front and back, as at *d*, these perforations serving to receive the connecting-pieces by which any two adjacent sections are united. The perforations in opposite faces are located in line with each other, so that the expanding-tool may be passed through one side or face to reach the nipple entering the other. Being thus constructed, any number of the sections may be connected to form a radiator. Taking any one of these sections, we may add to it at top or bottom, thus making a radiator of any number of tiers or horizontal rows of sections, a single row constituting a "one-high" radiator, two rows a "two-high" radiator, and so on. Again, we may add to the single section

at front or back or on either side, thus making the complete radiator of any desired height, length, or width, and, further than this, the radiator may be made angular in plan or with offsets in either direction by suitably locating the various small sections of which it is composed, as will be readily understood.

The capcity of the radiator or the extent of its radiating-surface is calculated in accordance with the cubic space to be heated. The desirability and advantages of being able to provide a radiator of the required capacity, and at the same time make it conform to any particular location or situation—as, for instance, beneath a window, behind a door, in an angle, around a screen or partition, over an opening, &c., and this without increasing the cost or the number of pieces in the structure or requiring any additional parts—are sufficiently obvious and need not be here enlarged upon.

The particular size of the sections is not material; but they are made of convenient size and proportions, usually in length about equal to the height of the lowest radiator likely to be required. When the tubular portions are doubled, as in Fig. 6, the heads are most conveniently made rectangular and about twice as long as they are broad, being perforated same as the square sections for convenience in uniting them, and these forms are united same as the others.

The perforations not required to be open for circulation or for connecting the inlet or outlet pipes (which may be connected at any point) are closed by suitable plugs.

To connect the various sections in a simple, easy, and efficient manner, instead of employing screw-threaded nipples we employ short thimbles, as at *e e*, and expand these in place successively as the radiator is built up. They make secure and durable unions and obviate the threading of any nipples or seats therefor. The thimbles are reached for expanding through the opposite opening or openings, and any suitable expanding-mandrel may be employed for the work.

The radiator thus made up requires no separate base to which the circulating-sections are connected, as in previous forms, and which determines the width and length and shape of the radiator, requiring a particular base for each particular size or variation of form, and thus adding to the cost.

The tubes which unite the heads, instead of being made circular in cross-section, as is ordinarily done, are made of the general form indicated in Figs. 3, 8, 11, and 12—that is, the cross-section is a four-sided figure made up of curves or arcs of circles. Of course this form is not necessary to the pricipal feature of our invention, the sections being capable of being assembled after the manner of our invention, no matter what may be the form of the circulating-tubes. To add to the radiating capacity the tubes may be provided with the projecting disks or flanges, as at *f f*, or if teeth or points be preferred they may be cast on the tubes, as at *g g*, Figs. 11 and 12. The flanges or teeth project at right angles to the axis of the tube. The angular sections are separated by a little distance, so that air may circulate between them.

C C represent the legs by which the radiator is sustained above the floor. Ordinarily radiators have solid and unchangeable bases, and the legs are affixed to or form part of these bases. Without such fixed base it becomes necessary to supply legs which will sustain any base of any size. We therefore form the legs C C to fit under the corner-sections, and they are placed thereunder when the radiator is set in place for use. No fastening devices are ordinarily required, the weight of the structure being sufficient to keep it in place upon the legs; but any suitable fastening may be adopted if desired. Thus one pattern of leg is made to answer for all sizes and shapes of radiators.

Being thus constructed, the improved radiator has been found to admirably answer all the purposes or objects of the invention, as previously set forth. The small sections are easily molded upon the bench and are fitted and finished without requiring special tools.

Having now fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The herein-described radiator-section composed of two perforated heads united by a circulating-tube, said section being adapted to be joined with other sections of similar form, the said heads each having perforations through the faces opposite the circulating-tube and through the remaining faces, substantially as and for the purposes set forth.

2. In a radiator, the several sections having the heads perforated through each horizontal and vertical face and united in the manner explained, the lowermost row or tier of sections forming the radiator-base, the whole being mounted upon the removable legs, substantially as shown and described.

3. In a radiator, the sections having the heads united in pairs by the circulating-tubes and perforated at top and bottom through the faces opposite those receiving the circulating-tubes and in line with them, substantially as explained, so that one section may be mounted upon another, for the objects set forth.

In testimony that we claim the foregoing we have hereunto set our hands in the presence of two witnesses.

JOHN HOPSON, JR.
LEWIS S. DANIELS.

Witnesses:
WILLIAM T. STRICKLAND,
WILLIAM BELCHER.