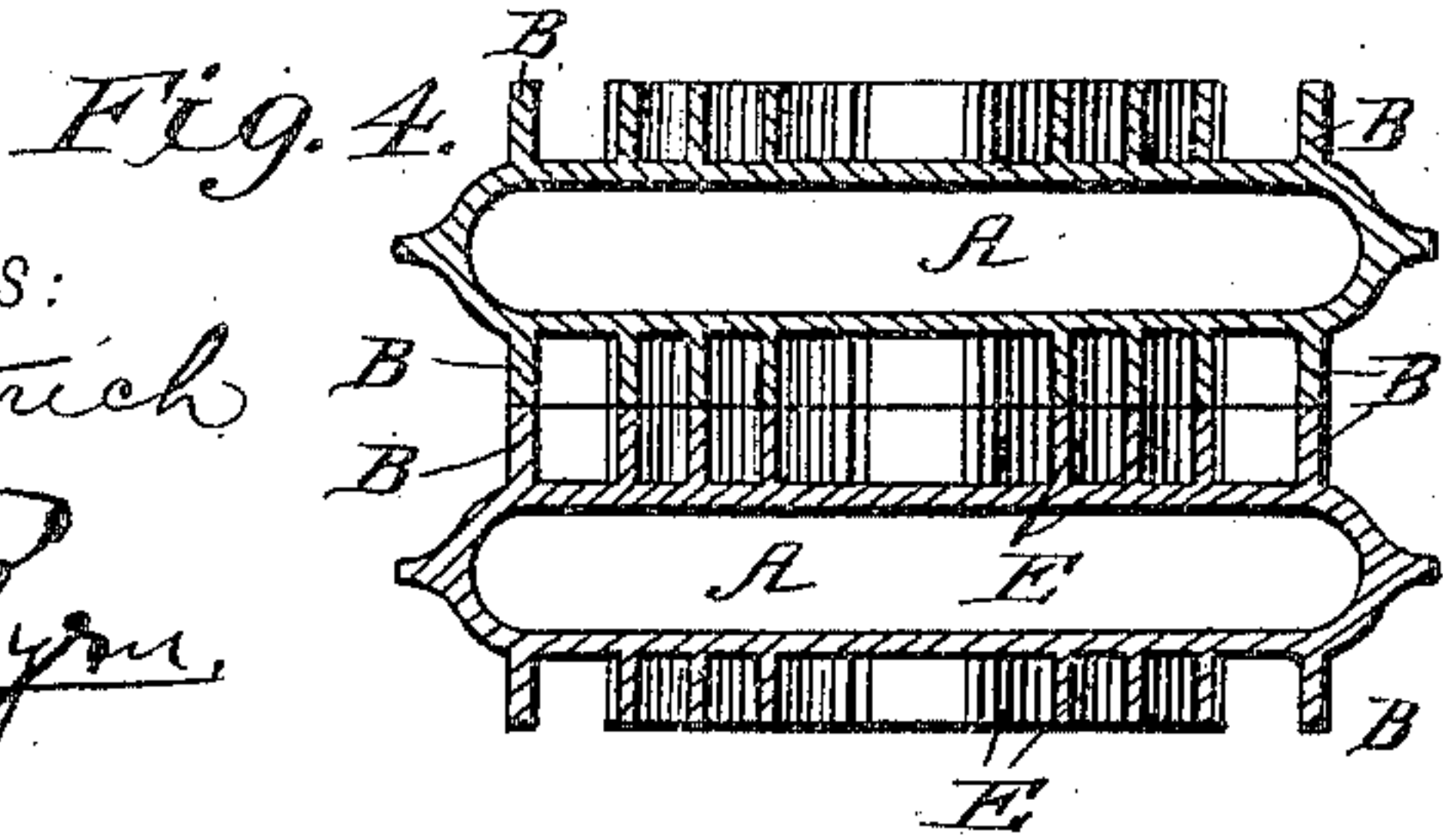
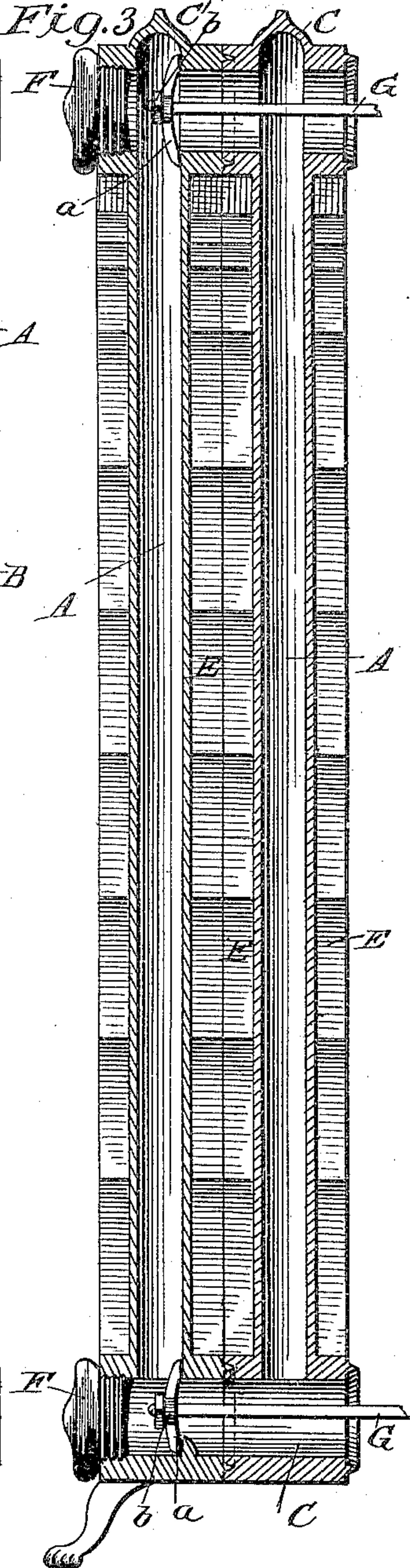
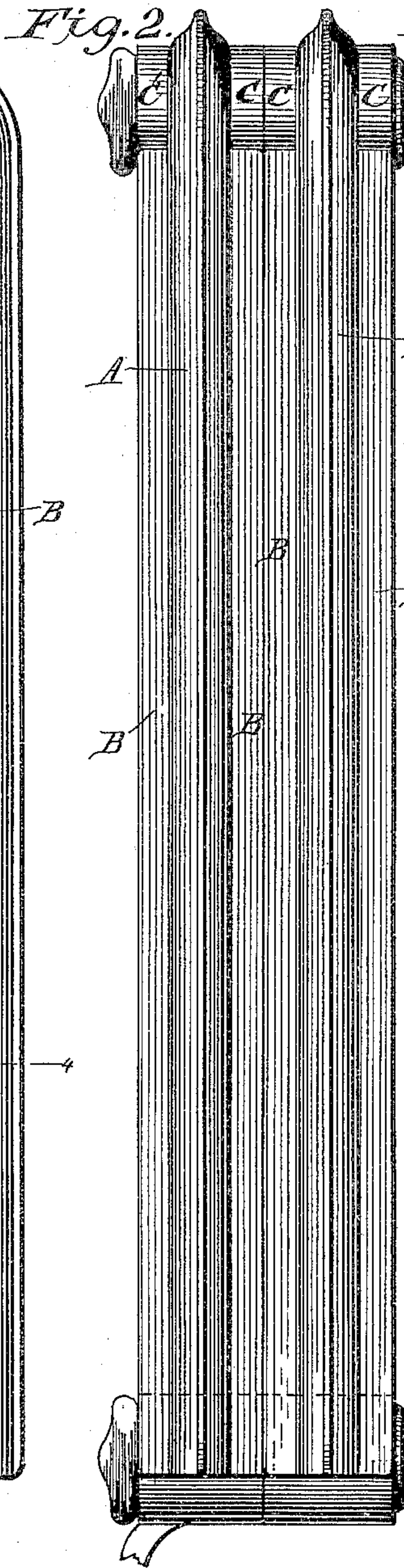
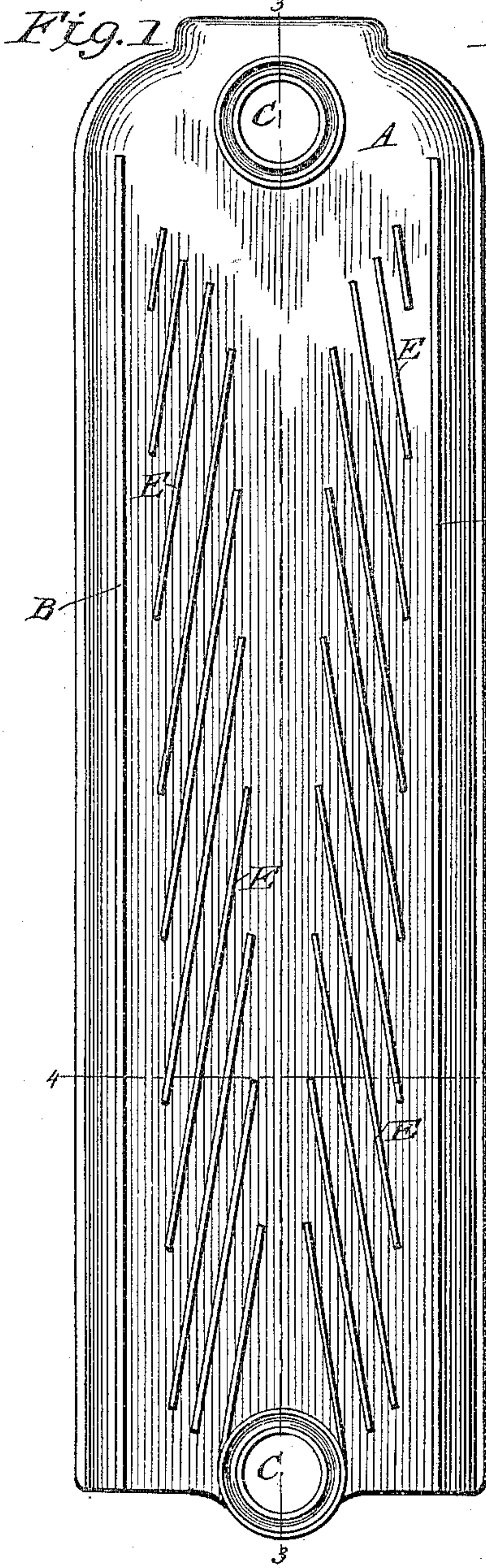


(No Model.)

A. H. FOWLER.
RADIATOR.

No. 446,580.

Patented Feb. 17, 1891.



WITNESSES:
Fred G. Dietrich
Edw. W. Byrnes

INVENTOR:
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ATTORNEYS

UNITED STATES PATENT OFFICE.

ARTHUR H. FOWLER, OF BUFFALO, NEW YORK.

RADIATOR.

SPECIFICATION forming part of Letters Patent No. 446,580, dated February 17, 1891.

Application filed May 31, 1890. Serial No. 353,888. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR H. FOWLER, of Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Radiators, of which the following is a specification.

My invention is in the nature of an improved radiator designed for the circulation of steam or hot water for the purpose of heating buildings.

Its object is mainly to stimulate or quicken the air-currents circulating through or between the hollow sections from convection, thus enhancing its effectiveness as a heater, and also to reduce the cost of constructing and fitting the various parts of the radiator, and at the same time insure perfectly tight joints, free from leakage.

To these ends my improvements consist in the peculiar construction and arrangement of the radiator, which I will now proceed to describe with reference to the accompanying drawings, in which—

Figure 1 is a side view of one of the numerous sections of which the radiator is composed. Fig. 2 is an edge view of an end and intermediate section or a side view of one end of the radiator. Fig. 3 is a vertical longitudinal section of the parts shown in Fig. 2, the view being taken on line 3 3 of Fig. 1; and Fig. 4 is a horizontal transverse section taken on line 4 4 of Fig. 1.

In the drawings, A represents one of the hollow sections, which is made in the form of a hollow vertical column of shallow depth, but quite broad, with a width equal to the thickness of the radiator. These columns are formed at top and bottom with laterally-projecting thimble-couplings C. These couplings are arranged to be in alignment when the sections are brought together to be assembled in the radiator, and where the couplings abut against each other they are formed the one with an annular V-groove and the other with an annular V-flange that fits in this groove with a close joint. In forming these grooves and flanges they are designed to be accurately dressed or milled to a smooth surface that permits a close tight steam fit without the use of gaskets, a coating of paint, cement, or luting only being required. I may, however, use gaskets, if desired. To hold all these sections

together a bridge-piece *a* is adjusted or fixed in the end sections, so as to find an anchorage or bearing in the end section, and through this bridge-piece a tie-rod G extends to a corresponding bridge-piece at the other end of the radiator, the sections being drawn tightly together by means of nuts *b* on the screw-threaded ends of the tie-rods outside of the bridge-pieces. These bridge-pieces may either be cast on the sections or they may be detachable.

To permit the tie-rods to be inserted and the sections to be coupled thereby, the couplings C' of the end sections are screw-threaded interiorly and are provided with detachable screw-caps F for closing the same.

In casting the hollow sections A they are formed near their outer edges with straight vertical flanges B parallel with their outer edges, which, when the sections are fitted together, form between the sections air-chambers which are practically closed upon their sides and open at top and bottom. Within these flanges B there are also formed upon each side of each section two series of inclined flanges E, in which the inclination of the individual flanges of each series is from the bottom inwardly toward the top, while the inclination of the series is from the bottom outwardly at the top—i. e., the space between the lower end of each series E and the outer flanges B is greater than it is between the upper end of the series and the outer flanges B, while the central space between the two series of inclined flanges is less at the bottom than it is at the top. This forms, when two sections are fitted together, a central chamber between the series of inclined flanges that increases in width upwardly and two chambers outside the series of inclined flanges that decrease in width upwardly, and these outer chambers communicate with the inner chamber by a series of parallel air-chutes formed between the inclined flanges E. The object of this arrangement is as follows: As the air passes from the space outside of the inclined flanges to the central space, the volume of air rising in the center is augmented not only by new accessions from the outer spaces, but also by the expansion from heat, and hence needs more space to rise in, while the volume of air outside of the inclined

flanges decreases toward the top. This arrangement throws all the air into contact with the hottest portions of the radiator and causes it to rise swiftly in the central space in a natural, unchoked, and quickened circulation from convection. It also gives in the same height of radiator a much larger heating-surface, thus greatly adding to the effectiveness of the radiator.

I am aware that radiator-sections have been formed with straight vertical and parallel flanges forming passage-ways for the ascent of air of equal transverse dimensions, and I make no claim to any such construction.

I am also aware that it is not new to construct upon a radiating-surface two series of inclined flanges with their upper ends inclined inwardly, but with the series parallel, forming the same air-space between the series both at the bottom and the top, and I make no broad claim to this. When, however, the series are separated a greater distance from each other at the top than they are at the bottom, as in my invention, entirely new results are obtained, as follows: The air rising in the central passage-way not only has room to expand as it becomes heated, but the continued accessions of air taken through the flanges E from the side chambers accelerate the velocity of this rising column of air and gives the maximum flow and heating effect to the air passing through the radiator, avoids all choking or retardation of the air, and secures a uniform distribution of air over all the surfaces of the radiator.

In making use of my invention I do not confine myself to the radiator-sections having the flanges E cast thereon; but said flanges may be made detachable, if desired, and set in grooves or ways formed in the sides of the hollow section or be otherwise arranged to produce the results described. I do not confine myself to a continuous tie-rod passing from end to end of the radiator, but I may use a number of short bolts on the outside of the sections; nor do I confine myself to the method of joining the sections as here shown, but may wish to unite them by screwed nipples entering into the thimble-

shaped projections or by a smooth nipple pressed into smoothly-bored openings in said projections, and the same may be expanded into said openings; or any other well-known method of uniting radiator-sections may be used. Furthermore, I do not desire to confine myself to the plan as here shown of having a connection at top and bottom, but may only wish to unite them at the bottom, and in that case I should use vertical diaphragms extending from the bottom nearly to the tops of the sections inside to provide for circulation of the steam when used only as a steam-radiator.

Having thus described my invention, what I claim as new is--

1. A radiator composed of hollow sections forming air-spaces between them with said air-spaces divided into a central passage-way increasing in width toward the upper end and side passage-ways of decreasing width toward the upper end, and air-ducts inclined toward the center as they rise and communicating at their lower ends with the side passages and at their upper ends with the central passage, substantially as and for the purpose described.

2. A radiator composed of hollow sections having vertical abutting flanges at their outer edges forming closed air-spaces between, with said air-spaces divided into a central passage-way of increasing width toward its upper end and side passage-ways of decreasing width toward the upper end, and intermediate air-ducts inclined toward the center as they rise and communicating at their lower ends with the side passages and at their upper ends with the central passage, substantially as shown and described.

3. A hollow radiator-section having two series of inclined flanges formed upon its sides, with the upper ends of these flanges inclined inwardly and with the two series separated a greater distance from each other as they rise, substantially as described.

ARTHUR H. FOWLER.

Witnesses:

WASHINGTON BARNHURST,
FRANKLIN S. MCCANN.