(No Model.) 2 Sheets—Sheet 1.

A. H. FOWLER.

SEMI-DIRECT RADIATOR.

No. 479,413. Patented July 26, 1892.

FIG. 1

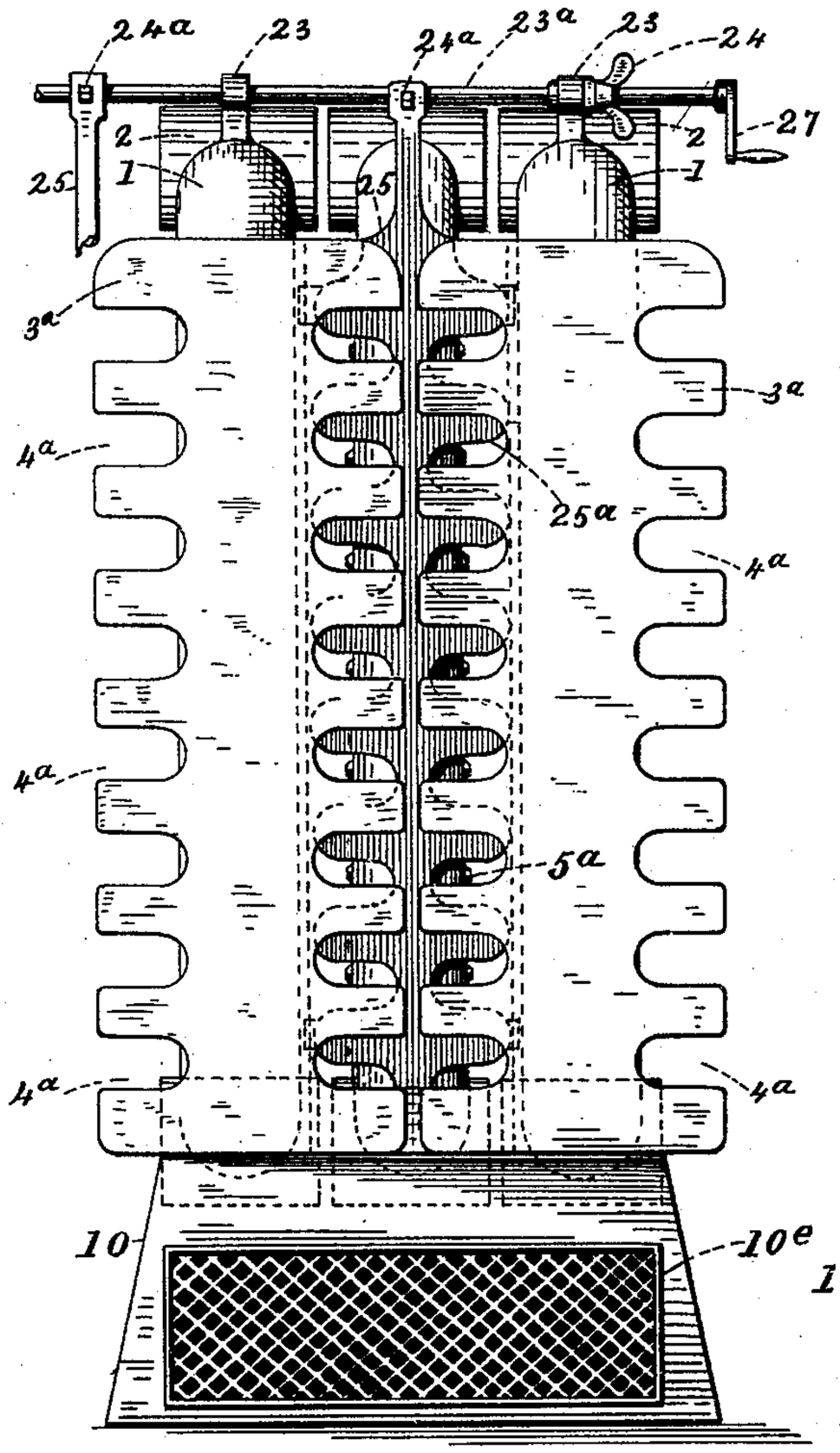


FIG. 2

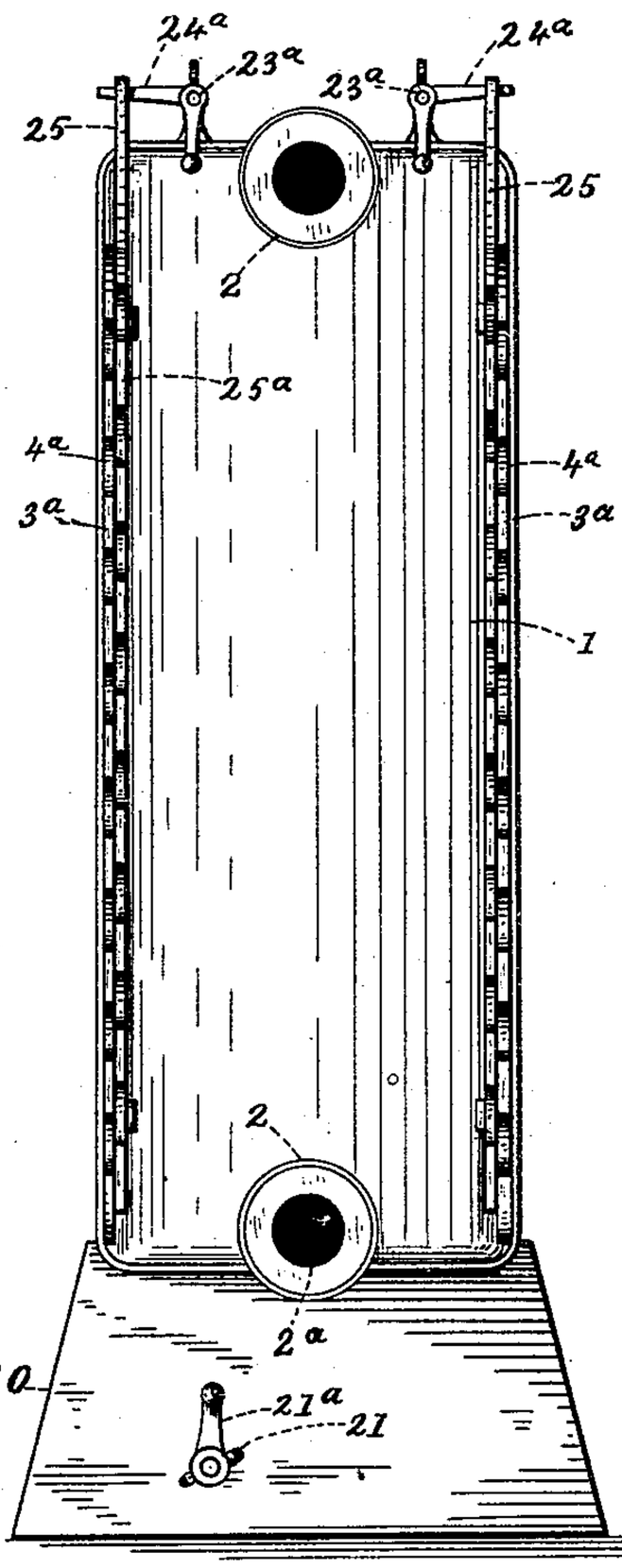
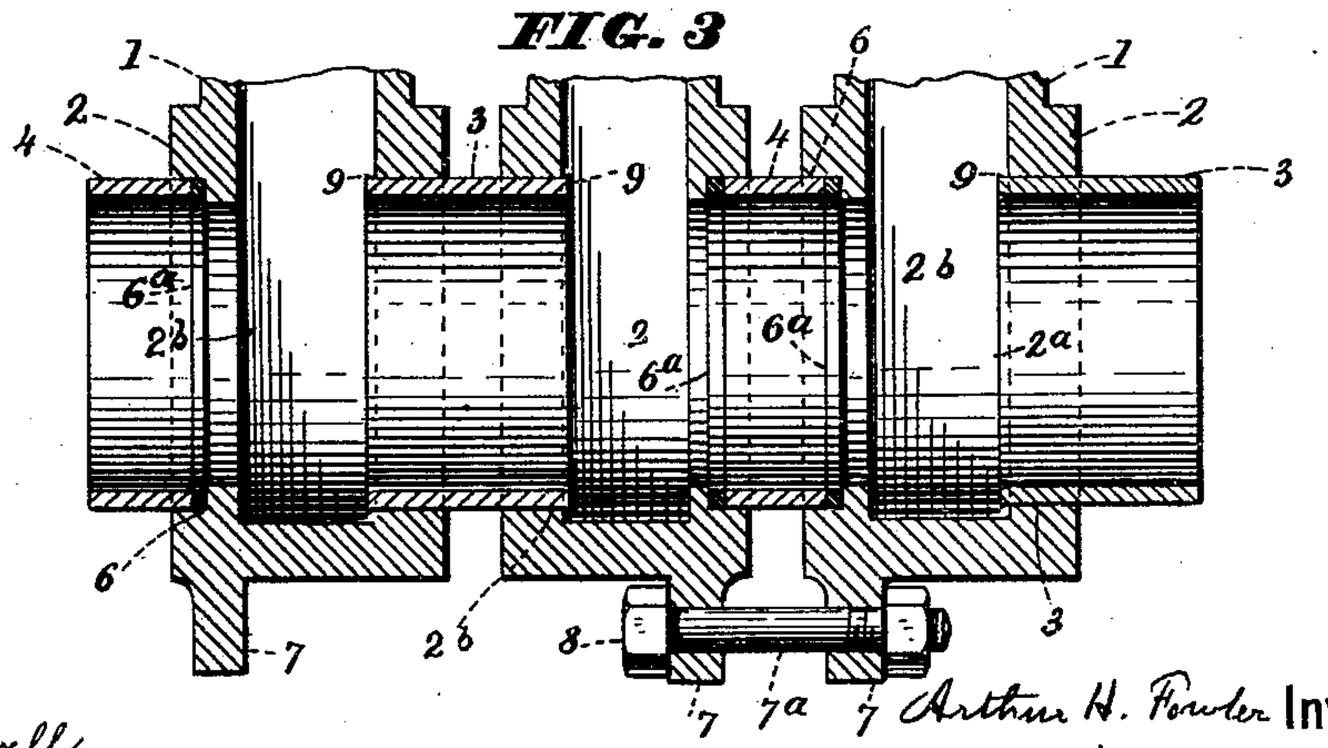


FIG. 3



Witnesses.
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August Fey.

Arthur H. Fowler Inventor.
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(No Model.)

2 Sheets—Sheet 2.

A. H. FOWLER.

SEMI-DIRECT RADIATOR.

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FIG. 4

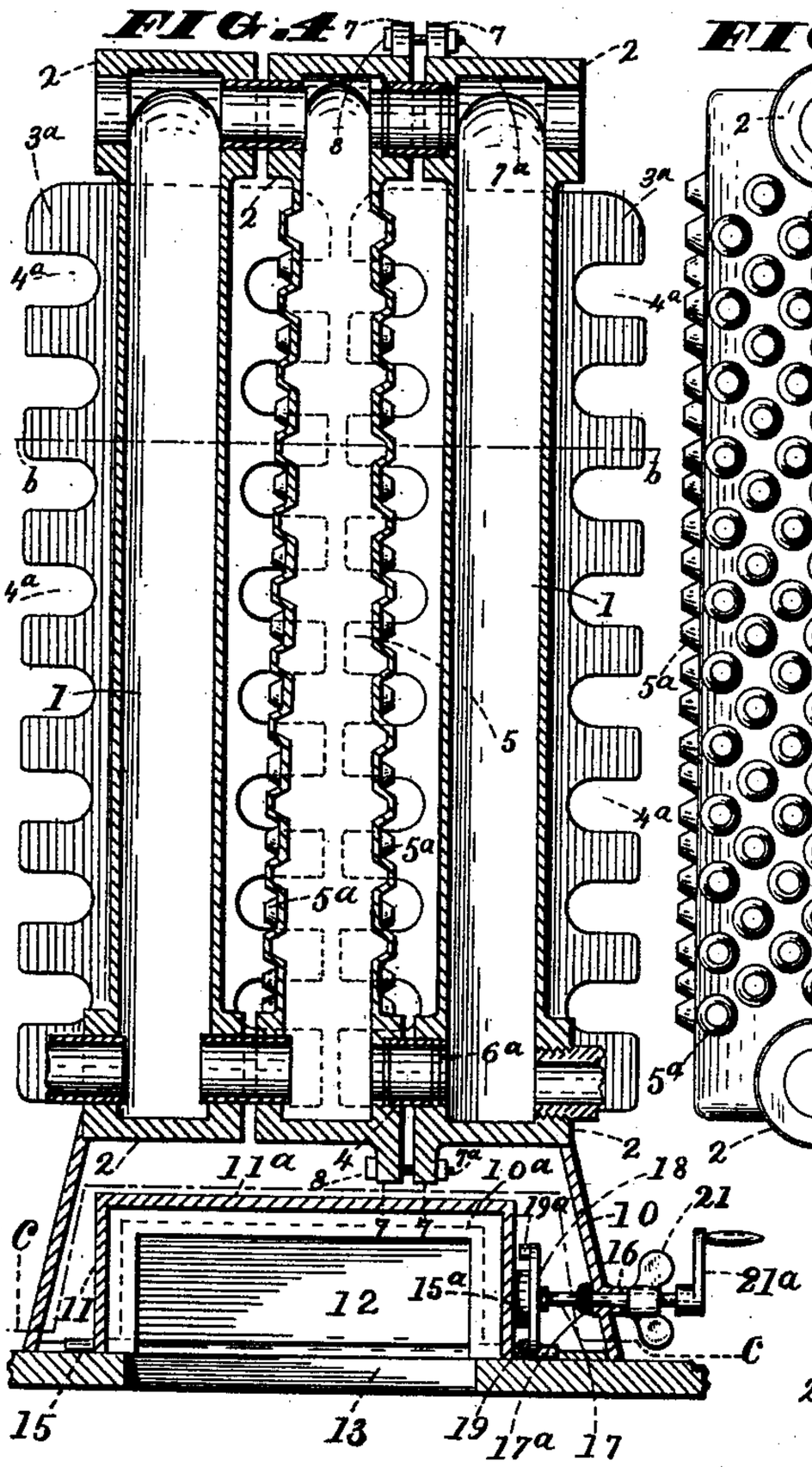


FIG. 5

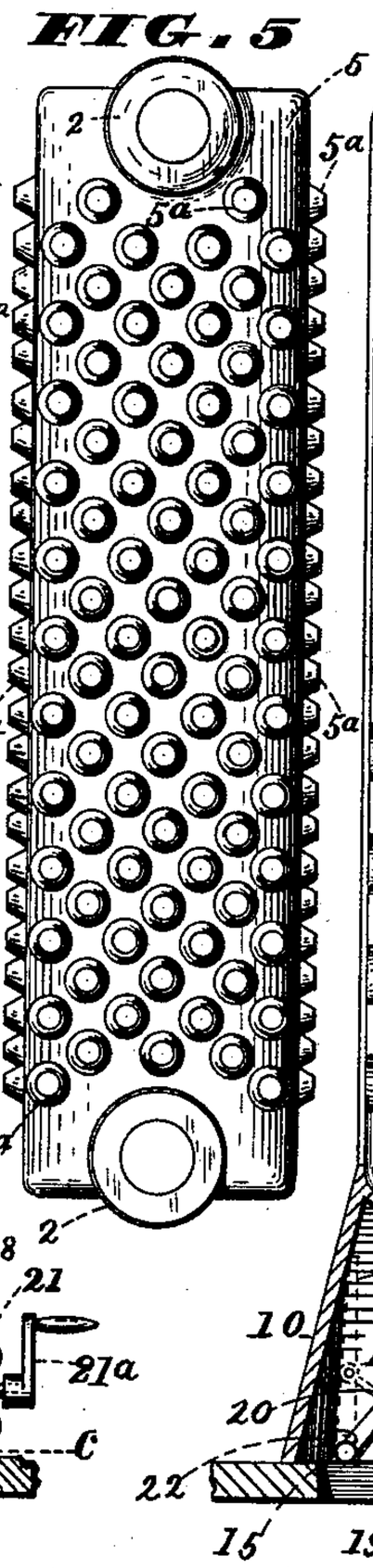


FIG. 6

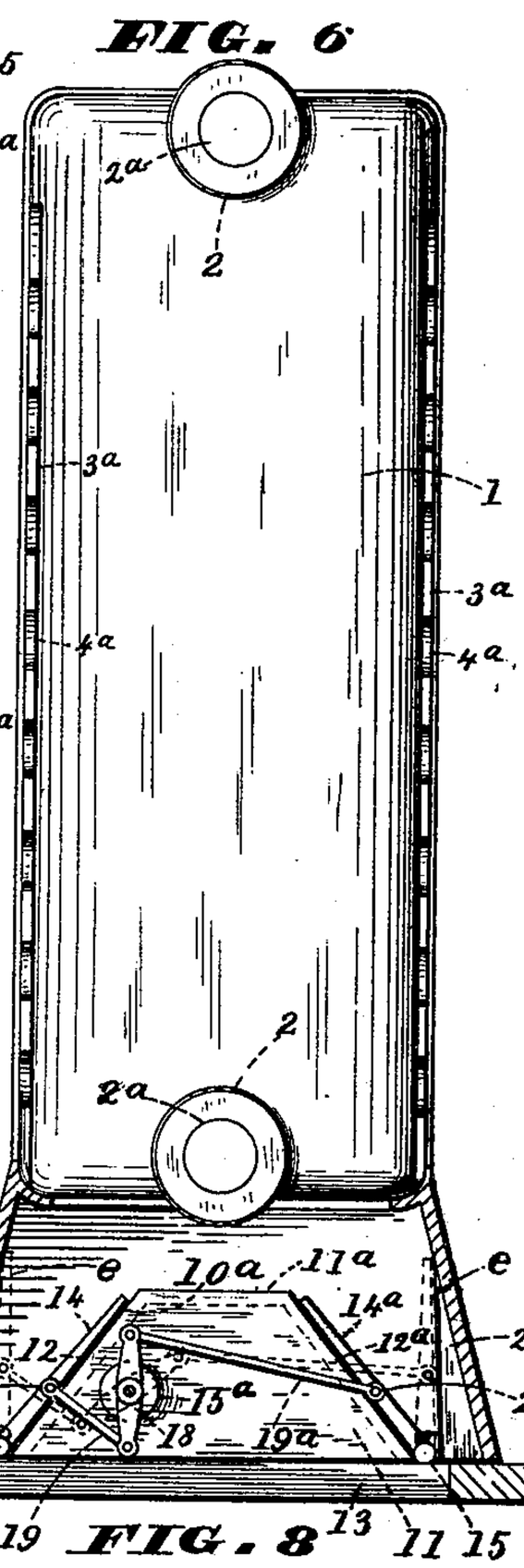


FIG. 8

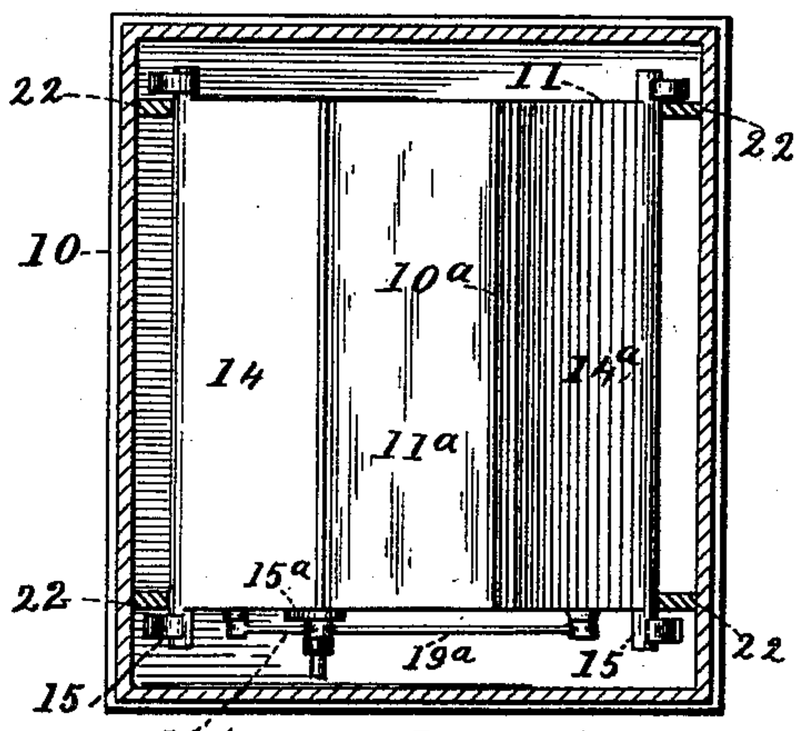
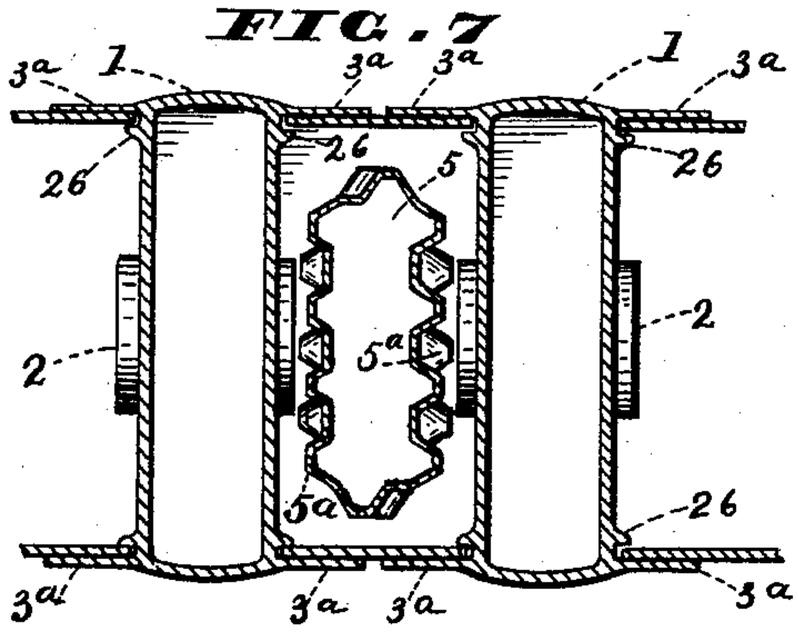


FIG. 7



Witnesses.
J. M. Caldwell.
August Fey.

Arthur H. Fowler Inventor.
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UNITED STATES PATENT OFFICE.

ARTHUR H. FOWLER, OF BUFFALO, NEW YORK.

SEMI-DIRECT RADIATOR.

SPECIFICATION forming part of Letters Patent No. 479,413, dated July 26, 1892.

Application filed June 1, 1891. Serial No. 394,704. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR H. FOWLER, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Semi-Direct Radiators, of which the following is a specification.

My invention consists in certain improvements in steam or hot-water radiators.

Its object is to provide a simple and convenient means for taking the air to be heated in part or wholly either from the apartment it is intended to heat or the pure air from the outside of the building, all of which will be fully and clearly hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of three sections of a radiator complete in itself, showing its several operating parts and the means by which it may be connected with another series or more of such radiator-sections for extending the same, as may be desired. Fig. 2 is a side elevation of the same. Fig. 3 is a sectional elevation cutting through the nipple-connecting portions, showing how a series of two sections or more are made removable for purposes which will more clearly hereinafter appear. Fig. 4 is a sectional elevation showing the interior construction of the radiator. Fig. 5 is a side elevation of one of the intermediate sections of the radiator. Fig. 6 is a sectional elevation showing a side elevation of one of the outer sections and a vertical section through one side of the base of the radiator, cutting through the shaft 17 and removing only enough of the side of the base to expose the mechanism for operating the dampers 14 and 14ª. Fig. 7 is a horizontal section in or about line *b b*, Fig. 4. Fig. 8 is a horizontal section through the base in or about line *c c*, Fig. 4, showing a top plan view of the device for admitting air or shutting it off.

It is well known that by the use of the old style of indirect radiators placed in damp and unhealthy basements or in cellars, their air-supply is taken just above the ground, where it is well known noxious vapors and gases exist. One of the objects of my invention is to avoid this objection by so constructing the radiator that the air it heats can be easily and conveniently taken from the outer atmosphere above the ground, as will be more clearly hereinafter described, or a portion or all of the air already in the room and only partially heated may be caused to pass through the radiator by draft or suction.

One of the prime objects of this invention is to provide a device that can be adjusted and easily operated to quickly control the proportion of air to be heated in the radiator coming from either source or take it all from the outside or all from the interior, as described, by the operation of a single handle or lever. I furthermore (by means of this invention) provide a form of radiator that will cause the heat to pass upward as a whole the entire height of the radiator, thus heating it to a high temperature, and at the same time create a strong draft upward through the openings between the sections, whereby the volume of air drawn from the outside atmosphere into the base of the radiator or from the room in which it is placed may be as great as possible, thereby making it a distinctly semi-direct radiator.

In said drawings, 1 represents the outside radiator-sections. They are what is usually called a "slab-section," being made sufficiently heavy to stand the pressure of steam or hot water, and are preferably made of cast-iron as the cheapest and best material for the purpose. At the opposite ends of all the sections is a cylindrical portion or boss 2, having an opening 2^a in one side and openings 2^b in the opposite side, all of which communicate with the interior of the sections. These openings 2^a and 2^b are also adapted to receive the nipples 3 and 4. (More clearly shown in Figs. 3 and 4.) On each opposite narrow side of the sections 1 is a laterally-projecting flange 3^a, either secured to the section in any well-known way or preferably cast in one piece with it, substantially as shown in Fig. 7.

In the flanges 3^a are a series of openings 4^a, which commence near each of the sides of the section and extend outward through the flange. (See Figs. 1 and 4.) The object of these flanges will appear more clearly hereinafter in describing the radiator when put together. The intermediate sections 5 (see

Figs. 4, 5, and 7) are made to taper slightly from the bottom of the wide sides upward, as shown in Fig. 4. They are also slab-shaped and enough less in width than the outer sections to fit in the spaces between the outer sections and within the flanges 3^a and still leave sufficient vertical air-space all around them and between them and the inclosed faces of the outer sections. The sides of these intermediate sections (see Figs. 4, 5, and 7) are provided with projecting portions 5^a of any suitable form. The form substantially as shown in the drawings answers a good purpose. These projections 5^a may be either hollow, as shown in Fig. 4, or, if desired, they may be solid. The object of this construction is to increase the amount of heating-surface within the flues between the outer sections, and the object in making the intermediate sections tapering from the bottom upward, as above mentioned, is to provide a gradually-increasing area of the air spaces or flues between the sections, as it is well known air expands as it heats, and therefore requires more space to ascend, and thus the friction of the air is reduced to a minimum. These sections are also provided with openings 2^a and 2^b to receive the connecting-nipples, which openings communicate with the interior of the section.

The outside and intermediate sections are put together as follows, (see Figs. 3 and 4, in which these portions are more clearly shown:) Each inner or intermediate section 5 (also the sections 1) is provided with a recess 6, surrounding the opening 2^b in the bosses 2. These recesses are located so that they come directly opposite each other in each pair or more of the sections 1 and 5, and in these recesses is placed a ring of some soft metal, lead or other suitable soft packing material 6^a. (See Fig. 3.) Then a short nipple 4 is interposed between the pair of sections at the top and bottom of the sections, which are each provided with projecting lugs 7, through which a bolt 7^a is passed and secured by a screw-nut 8. These two sections are thus held securely and firmly together; but at the same time they are easily removed when required. The other nipples 3 permanently unite the sections which they connect. They are forced into place in the sides of the two sections, as shown in Fig. 3, and their edges 9 are each expanded by any well-known expander used for such purposes. The object of this construction is to provide the means for extending the radiator indefinitely to any length required, and at the same time permanently connect them in clusters of any desired number of sections, the clusters being easily removable for the purposes of transportation.

The air is admitted through the base 10 of the radiator and may be taken either through the sides of the base from the apartment in which the radiator is located or through the bottom of the base from an opening in the floor communicating with a flue leading to some suitable point outside of the building for obtaining fresh air, preferably a pipe or chimney leading to the top or above the top of the building.

The base is shown in the form of a box-shaped tapering receptacle 10; but it may be made in any ornamental form, and is provided with open-worked sides 10^e, (shown in Fig. 1,) through which the air passes when taken from the room in which the radiator is placed.

Within the receptacle 10 is another receptacle 10^a, secured to the bottom of the base by bolts or in any well-known way. It is provided with substantially vertical sides 11 and a top 11^a, its lower portion being entirely open. The opposite sides 12 and 12^a, (shown in Fig. 6,) which are inclined toward the top, as shown, are left open, so that air passing up through the opening 13 in the floor will pass out between the open sides 12 and 12^a.

Two dampers 14 and 14^a are pivoted to the lower part of the base at or about the points 15. (See Figs. 4, 6, and 8.)

To one side of the receptacle 10^a is a boss 15^a, located in a line with a boss 16 (shown in Fig. 4) on the outside of the base 10. In these two bosses are bearings, in which is mounted a shaft 17, having a collar 17^a (see Fig. 4) to prevent it from being drawn out. On the shaft 17 is rigidly secured an arm 18, which extends equally in opposite directions therefrom, and to each end of the arm 18 is pivoted a connecting-rod 19 and 19^a, the rod 19 having its opposite end pivoted to the damper 14 by a pin 20 and the rod 19^a having its opposite end pivoted to the damper 14^a by a pin 20^a. (See Fig. 6.)

The end of the shaft 17 outside of the base 10 is provided with a screw, upon which is mounted a thumb-nut 21 for tightening it and holding the dampers at any point at which they may be opened, and outside of the jam-nut or thumb-nut is rigidly secured to the the shaft 17 a crank-handle 21^a. From this construction it will be seen that when the dampers 14 and 14^a are closed, as shown in Fig. 6, all the air will be taken from the room in which the radiator is located, passing in through the open-work sides 10^e (shown in Fig. 1) of the base, and when the dampers are partially open the air will pass in from the outside, as well as from the inside; but when they are fully open and resting against the projecting pieces 22 inside of the base, as shown by the dotted lines *e* in Fig. 6, the open-work sides 10^e are closed, so that the air passes into the radiator from the outside of the building or apartment in which the radiator is located.

On the top of each outside section is a bearing 23, in which is mounted a shaft 23^a, (see Figs. 1 and 2,) having a tightening-nut 24, adapted to turn on a screw portion on the shaft 23^a, a collar being rigidly secured to said shaft on the opposite side of the bearing

to prevent the shaft from moving longitudinally in its bearings when tightened by the tightening-nut. The length of the shaft 23^a is limited only by the number of sections put together or the length of the radiator or of a series of radiators.

Directly opposite the intermediate sections, or substantially so, is rigidly secured to the shaft 23^a the crank-arms 24^a. Between the two outside sections, inside of the flanges 3^a, is a vertical damper-plate 25, made of the proper form, as at 25^a. (Shown in Fig. 1 partly in full lines and partly by dotted lines.) This damper is secured in place, so as to slide easily up or down by the overlapping lugs 26. (Shown in Fig. 7.) At the top of these damper-plates is a small hole, through which the ends of the crank-arms 24 project, and at the outer end of the shaft 23^a is a crank-arm 27, (see Fig. 1,) by which the vertical damper-plates are operated. It will be noticed that both sides of the radiator are provided with such damper-plates and their operating parts. The object of this construction is to provide the means of controlling the action of the hot air within the space between the sections, so as to compel the whole of it to pass up through the top of the radiator when those dampers are closed and a portion of it to pass out sidewise into the room when they are opened, and by the means above described they can be opened at any point desired, so as to adjust the size of the openings and then secure them at that point.

I claim as my invention—

1. In a radiator, a series of hollow sections having lateral flanges at each side provided with openings or perforations, the flanges of two sections extending toward each other, a vertically-sliding plate provided with similar openings and located in slideways at the sides of said flanges, and a means, substantially as above described, for moving them so as to cover or uncover the openings, in combination with an intermediate section and a means, substantially as above set forth, for securing them together.

2. In a radiator, a series of three connected hollow sections having passages communicating with each other, the outer sections having open-work flanges projecting laterally in opposite directions from the narrow sides of the same toward each other, so as to inclose the intermediate section and present a perforated wall at each side to permit the air to pass out from the sides, as well as upward through the top, and an intermediate section having a series of hollow projections which extend into the air-space for increasing the heating-surface, substantially as described.

3. The combination of two outside hollow radiator-sections with an intermediate smaller hollow section wholly inclosed within the sides and flanges of the two adjoining sections and made tapering from the bottom up to the top, so as to gradually enlarge the surrounding air-space from the base upward, the whole being closely connected together by nipples at the top and bottom and communicating with the interior, substantially as described.

4. In a radiator, the combination of two outside radiator-sections provided with flanges extending laterally from each side and an intermediate section inclosed between the two outside sections and their flanges, the whole connected together by nipples at the top and bottom which communicate with the interior of the sections, substantially as described.

5. In a radiator, a series of hollow sections secured together so as to have a free passage through the whole, and flanges extending laterally from the outer sections toward each other, the intermediate sections being smaller and substantially inclosed by the outer sections and their flanges, thereby leaving a central air-space surrounding the intermediate section for the air to ascend between the sections through the top of the radiator, substantially as specified.

6. A radiator consisting of two outer sections and a smaller intermediate section located between them, an outer section being permanently connected to one side of the intermediate section by nipples rigidly secured to both and the other side of the intermediate section being secured to the other outer section by a removable joint, substantially as and for the purposes described.

7. A radiator consisting of two outer sections and a smaller intermediate section located between the two outer sections, one outer section being rigidly and permanently connected at one side with one side of the intermediate section by nipples rigidly secured thereto at the top and bottom, the other side of the outer section having an opening provided with an annular recess to receive a short nipple for a removable connection attachment with another radiator-section, the other side of the intermediate section having a removable connection with the opposite outer section, consisting of a short nipple and a bolt and nut for securing them at the top and bottom, and the outer side of the opposite outer section having openings to receive the nipple for a permanent connection with another radiator-section, substantially as described.

8. A radiator consisting of hollow sections connected together, having a passage-way from one to the other, and open-work flanges extending laterally in opposite directions from the narrow sides of the sections, in combination with vertically-sliding plates and mechanism for operating them to open or close the openings in the flanges, a hollow box upon which the radiator stands, an inclosed receptacle having inclined open sides communicating with an opening leading outside, and pivoted damper for opening or closing the inclined openings or closing the openings in the outer box, whereby the air may be taken wholly

from the outside or from the room in which the radiator is located, or both, substantially as described.

9. The combination, with two outside radiator-sections, of an intermediate section inclosed vertically between the inner sides and projecting flanges of the outer sections, so as to leave an air-space surrounding the intermediate section and being provided with a series of projections for increasing the heating-surface, and the whole connected together, substantially as described.

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Witnesses:
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