(No Model.) 2 Sheets—Sheet 1.

P. V. DWYER.

FURNACE.

No. 330,969. Patented Nov. 24, 1885.

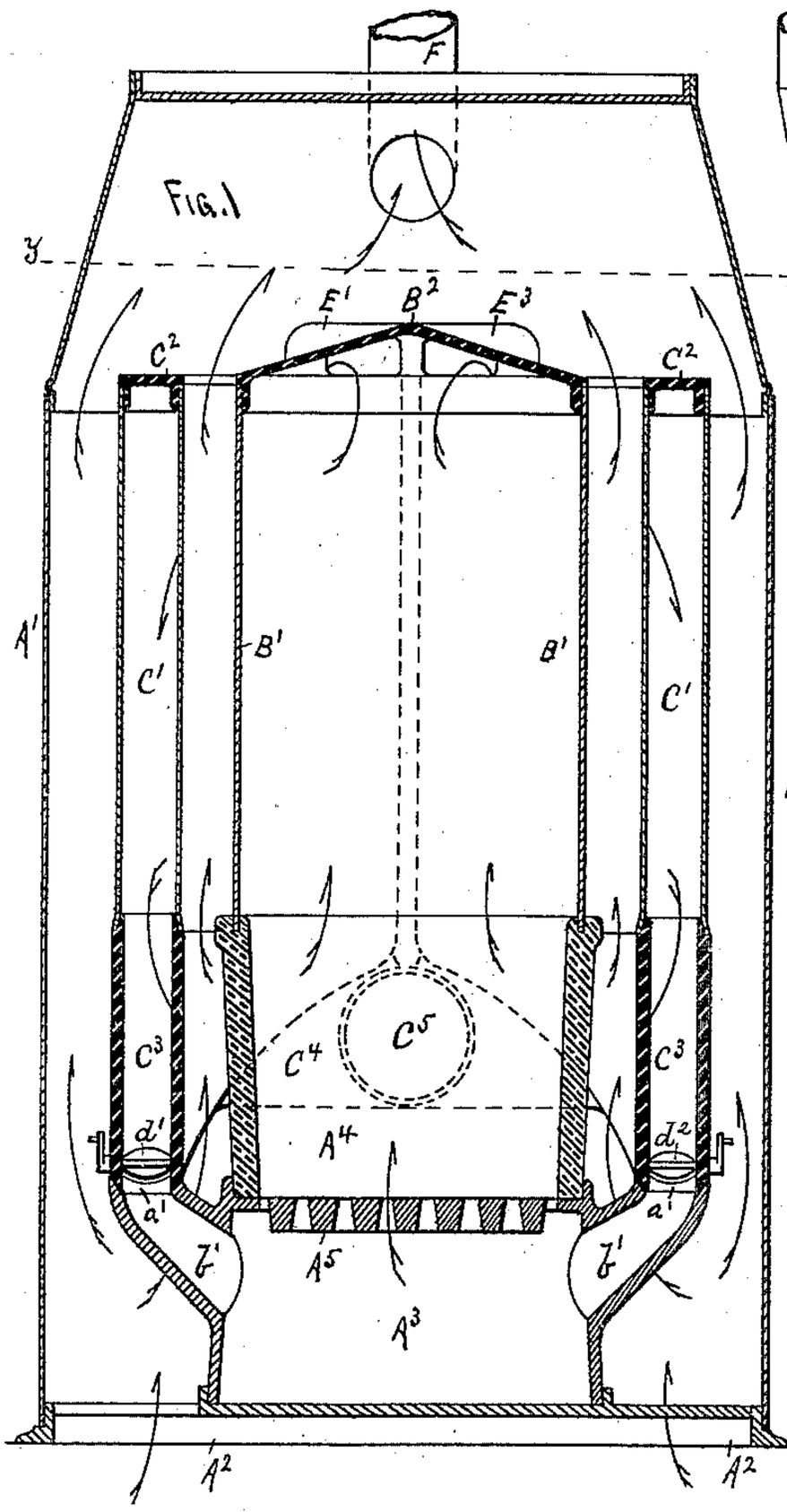


Fig. 1

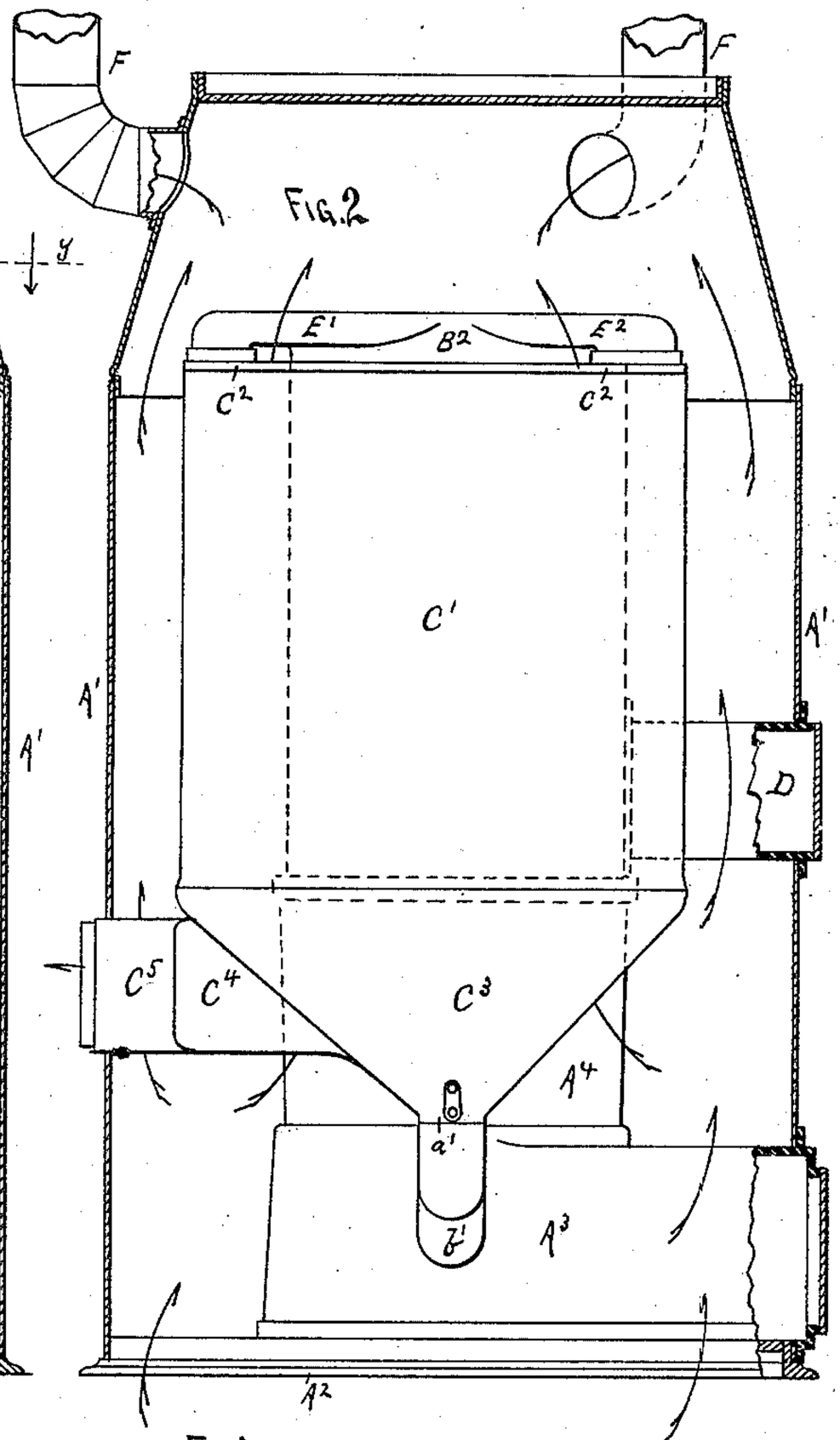


Fig. 2

Fig. 4

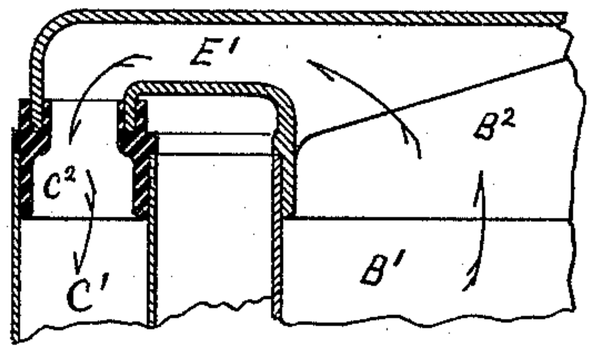
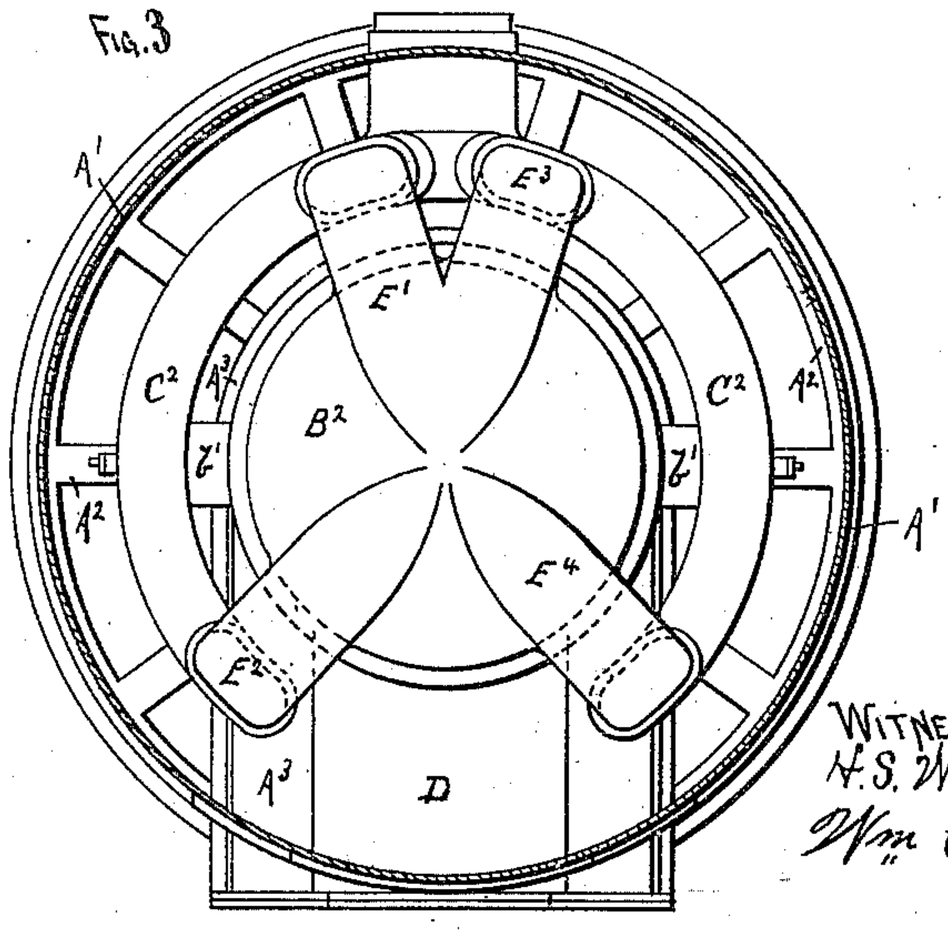


Fig. 3



Witnesses.
H. S. Webster.
Wm. C. Brown

Patrick Vincent Dwyer,
Inventor. By
Charles N. Woodward
Atty.

(No Model.) 2 Sheets—Sheet 2.

P. V. DWYER.

FURNACE.

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Fig. 5

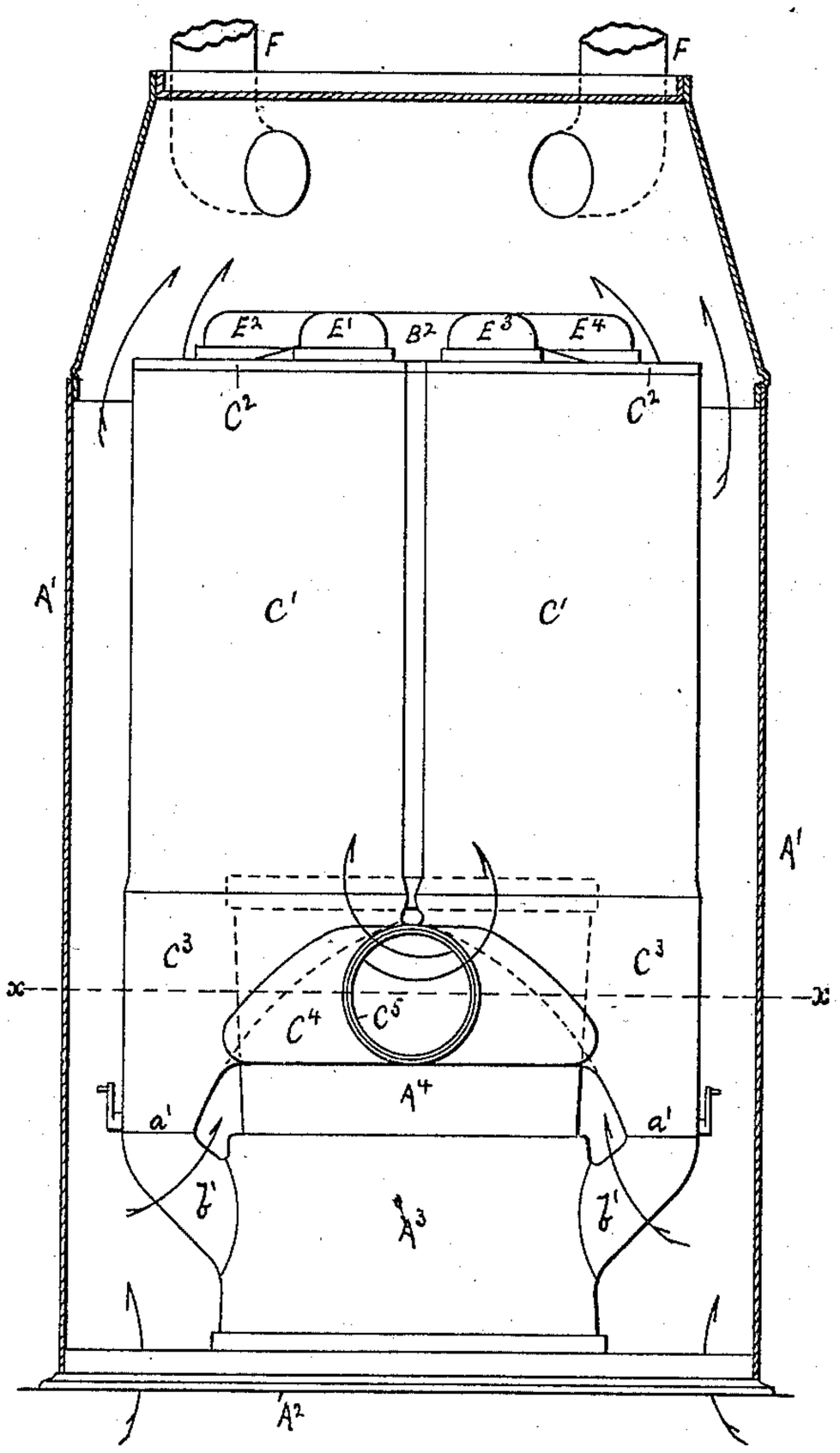
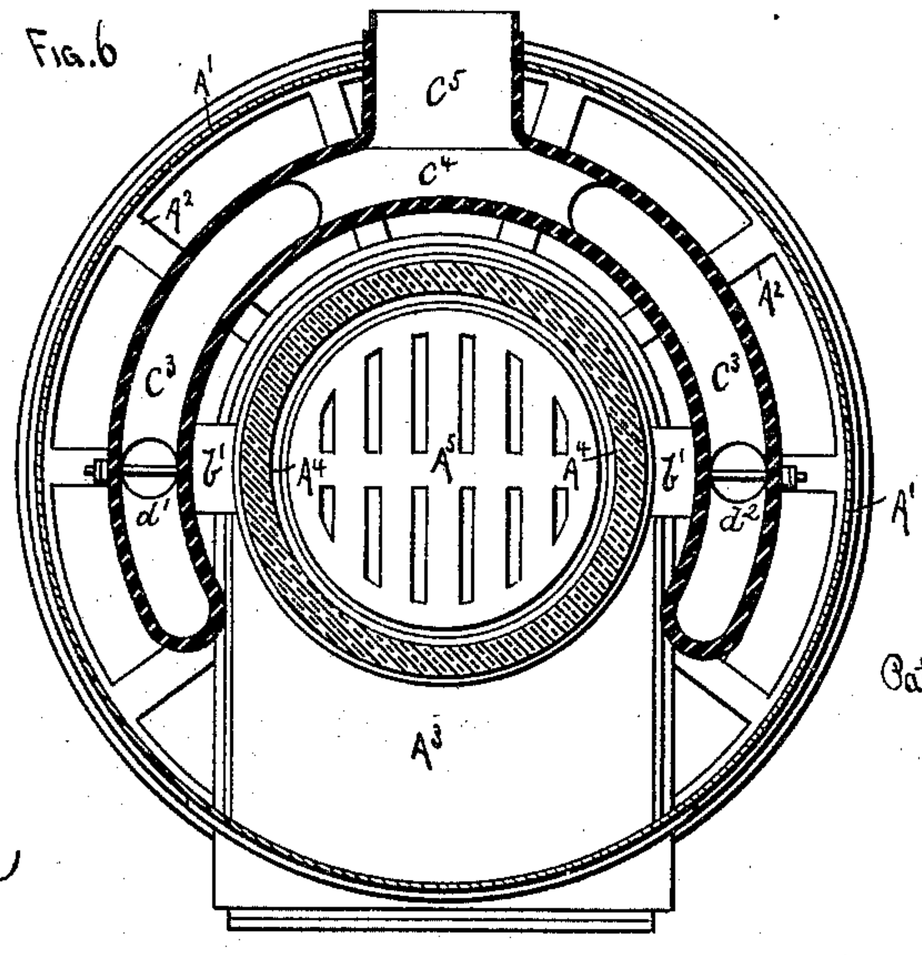


Fig. 6



Witnesses.
N. S. Webster.
Wm C. Brown

Patrick Vincent Dwyer,
Inventor, By
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UNITED STATES PATENT OFFICE.

PATRICK VINCENT DWYER, OF ST. PAUL, MINNESOTA.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 330,969, dated November 24, 1885.

Application filed January 16, 1885. Serial No. 153,106. (No model.)

To all whom it may concern:

Be it known that I, PATRICK VINCENT DWYER, a citizen of the United States, and a resident of St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

Figure 1 is a sectional front elevation. Fig. 2 is a sectional side elevation. Fig. 3 is a cross-sectional view on the line *y y* of Fig. 1. Fig. 4 is an enlarged sectional detail of portions of the upper part of the dome and one of the radiators, illustrating the manner of uniting them. Fig. 5 is a sectional rear elevation, and Fig. 6 is a cross-sectional view on the line *x x* of Fig. 5.

A′ is the outer casing or shell setting upon an open base, A^2, the latter supporting the usual ash-pit, A^3, fire-pot A^4, and grate A^5, as shown.

Setting upon the top edge of the fire-pot A^4, and rising upward therefrom, is the dome, consisting of a cylindrical wrought-iron shell or side, B′, and a conical cast-iron top, B^2.

Partially surrounding the shell B′ of the dome on each side are two hollow radiators, consisting of wrought-iron sides C′ C′, and cast-iron tops or heads C^2 C^2, and with "hopper" or "funnel" shaped cast-iron bottoms C^3 C^3, the latter ending in mouths *a′ a′*, fitting into short tubes *b′ b′*, rising from the sides of the ash-pit A^3, as shown. By means of these funnel-shaped bottoms and the tubes *b′ b′* all the ashes, dust, &c., which are carried into the radiators will be conveyed into the ash-pit, as hereinafter shown. At their rear edges the radiators are as close together as it is possible to arrange them and still have them separated, and at their front edges they are as close together as the presence of the fuel-door D will permit them to be placed; or, in other words, the radiators occupy all the available space surrounding the shell B′ of the dome, so as to make them as large as possible.

E′ E^2 E^3 E^4 are four tubes connecting the top B^2 of the dome with the ends of the tops C^2 C^2 of the radiators, as shown, through which tubes all the smoke, gas, and other products of the combustion rising from the fuel in the fire-pot A^4 passes to the radiators. At their rear sides the funnel-shaped bottoms C^3 C^3 are connected together by a horizontal tubular section, C^4, from the center of which the smoke-exit flue C^5 leads through the casing A′. By this arrangement all the smoke, gas, &c., and their accompanying heat rise up into the dome B′ B^2 and pass through the tubes E′ E^2 E^3 E^4 down into the radiators, and thence out through the exit-flue C^5. It will be observed that the exit-flue C^5 is about on a line even with the top of the fire-pot A^4. By this arrangement I am enabled to retain the gas, smoke, &c., for a longer period of time in the radiators, and thus insure the radiation of a greater quantity of the heat and utilize to the fullest possible extent all the products of combustion. Spaces of from two and one-half to five inches, according to the size of the furnaces, are left between the radiators and the shell A′, and between the radiators and the dome, up through which the air is drawn by the action of the heat radiated from the dome and radiators, and discharged through the hot-air pipes F in the ordinary manner. The courses of the smoke, gas, &c., and also the air-currents, are indicated by arrows in the different figures of the drawings.

I attain several very important advantages by the manner shown of constructing the radiators. First, by making the radiators in two distinct parts and connecting each part to the dome by its own independent set of tubes E′ E^2 and E^3 E^4 the heat, smoke, gas, &c., pass to each radiator in equal quantities, so that the heat is radiated uniformly from both sides of the furnace; secondly, I attain a great advantage by the construction of the radiators with the funnel-shaped bottoms C^3, since by this means all the ashes, dust, &c., which settle in the radiators fall of their own volition into the funnel-shaped bottoms, and from thence into the ash-pit A^3; thirdly, the funnel shape of the bottoms of the radiators prevents the accumulation of dust and ashes therein, which would choke them and interfere with their efficiency. Tight-fitting dampers *d′ d²* will be arranged in the lower parts of the funnel-shaped bottoms C^3, to close communication between the tubes *b′* and the radiators, to prevent air-currents passing up into the radiators from the ash-pit and checking the draft. The dampers *d′ d²* also perform two other very important functions—viz., by opening them a check-draft is formed between the

ash-pit and the exit-flue, which is very useful when it is desired to check or reduce the force of the fire, while at the same time this check-draft also carries into the exit-flue C^5 and thence into the chimney all or nearly all the dust which accumulates in the radiators or from the shaking of the grate.

Another important feature of my invention is found in the manner of arranging the tubes E′ E^2 E^3 E^4, by leading them all to the center of the conical top B^2 of the dome, as I thereby obtain a much more extended heating-surface than could be obtained if the tubes connected the dome and radiators directly, and at as short a distance as possible.

I have stated above that the shell B′ of the dome and the body parts C′ of the radiators are of wrought-iron, while their tops and the funnel-shaped bottoms are of cast-iron; but all the parts may be of wrought-iron or cast-iron, if preferred. Generally, however, it will be better to construct them partially of wrought-iron and partially of cast-iron, as described and shown, as the thin wrought-iron permits a more free radiation than the necessarily thicker cast-iron.

All the joints will be cemented together, so as to make them gas and dust tight.

The connecting-tube C^4 may be cast in one piece with the radiator, or separately, as preferred.

The manner of forming the joint between the radiator-shell C′ and the funnel-shaped bottoms C^3 is another feature of my invention, and consists in forming on the upper edges of the bottoms C^3 an inwardly and upwardly inclined rib or rim, and flaring the lower edge of the radiator C′ outward and downward to fit tightly over it. By this means a tight joint is insured and its closeness increased by the weight of the radiator and dome-top. Thus a very easily-made and at the same time efficient joint is secured. This form of joint also allows for unequal expansion and contraction of the different metals without danger of the opening of the joints.

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

1. In a hot-air furnace, an outer casing, A′, having fresh-air inlets and hot-air flues leading therefrom, a fire-pot, A^4, ash-pit A^3 beneath said fire-pot, and dome B′, rising from said fire-pot, in combination with radiators C′ C′, surrounding said dome and fire-pot, within the outer casing, whereby air-spaces are formed between the radiators and the outer casing and between the radiators and the dome and fire-pot, radiating tubes or flues E′ E^2 E^3 E^4 leading from the center of the dome to the radiators, a tubular section, C^4, connecting the lower ends of the radiators, and an exit-flue, C^5, communicating with said section C^4, substantially as set forth.

2. In a hot-air furnace, an ash-pit, a fire-pot above said ash-pit, and a dome rising from said fire-pot, in combination with radiators surrounding said dome and fire-pot, and communicating with said dome at their upper ends, said radiators being formed with funnel-shaped bottoms which communicate with said ash-pit, dampers which close said bottoms, and an exit-flue communicating with the lower ends of said radiators, substantially as set forth.

3. In a hot-air furnace, a fire-pot, A^4, and a dome consisting of a shell, B′, and top B^2, the latter having tubes E′ E^2 E^3 E^4 radiating from the center thereof and cast in one piece therewith, in combination with radiators C′ C′, having cast-iron tops C^2 C^2, which communicate with said tubes E′ E^2 E^3 E^4, and cast-iron bottoms C^3 C^3, a tubular section, C^4, connecting said bottoms, and an exit-flue, C^5, communicating with said section, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

PATRICK VINCENT DWYER.

Witnesses:
C. N. WOODWARD,
FRANK P. BLAIR.