(No Model.)

G. D. HOFFMAN.

FURNACE.

No. 599,965. Patented Mar. 1, 1898.

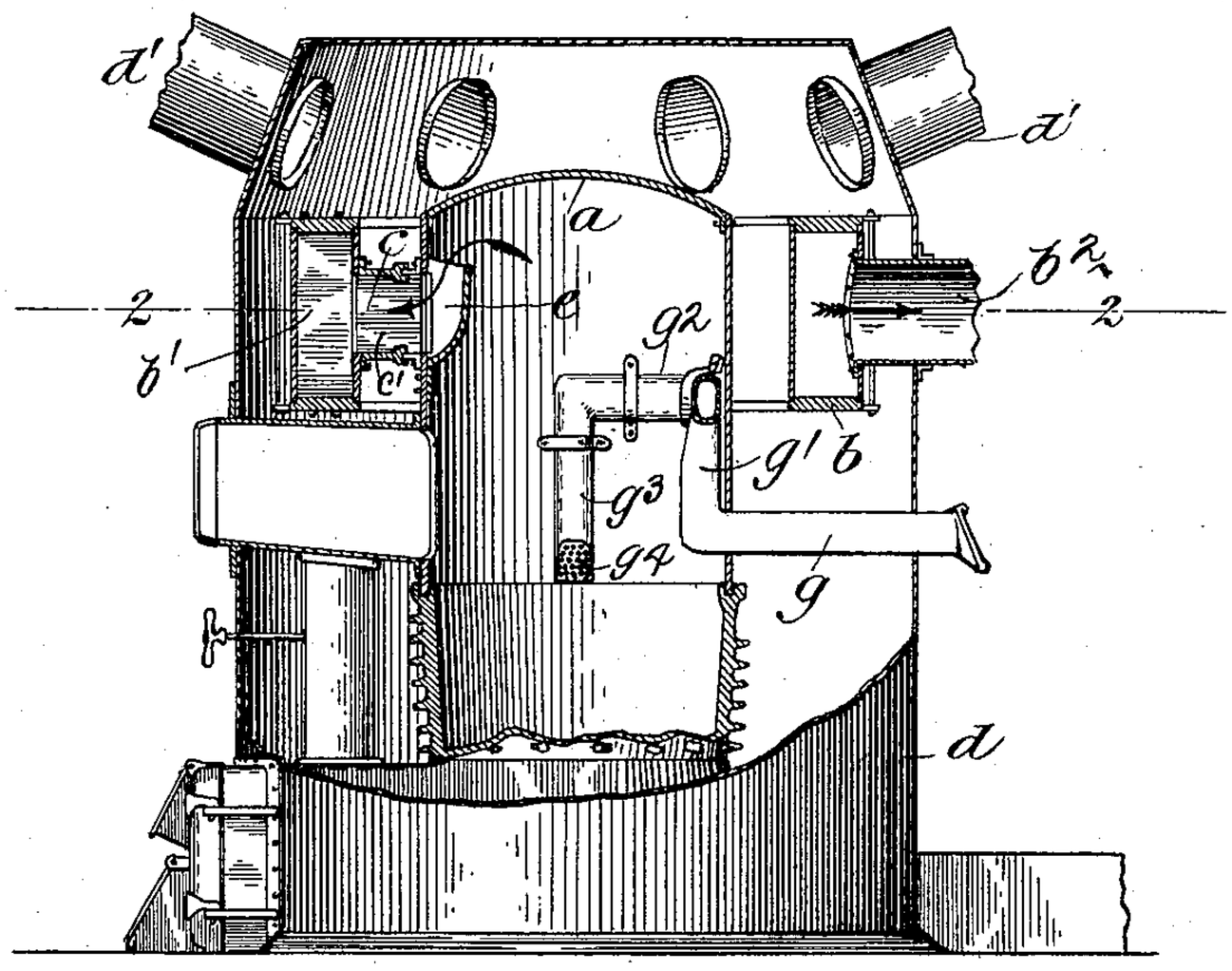

Fig. 1.

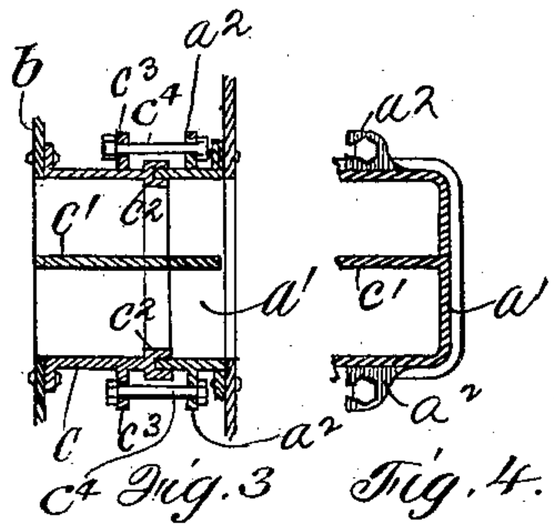

Fig. 3

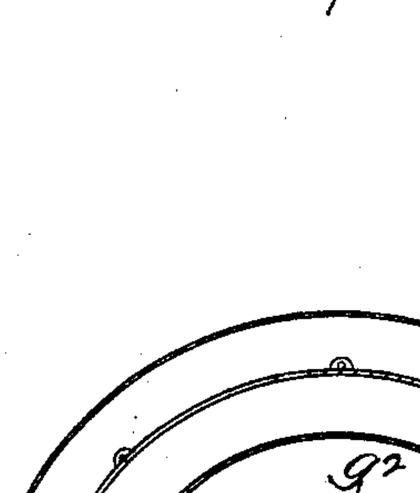

Fig. 4.

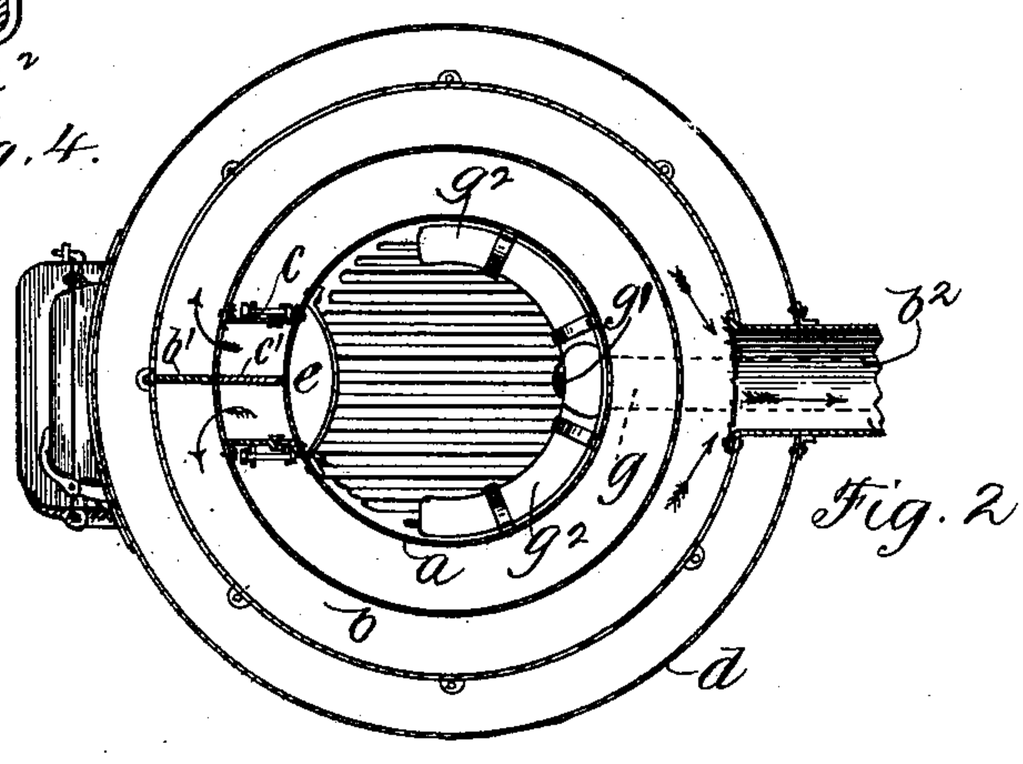

Fig. 2

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UNITED STATES PATENT OFFICE.

GEORGE D. HOFFMAN, OF CHICAGO, ILLINOIS.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 599,965, dated March 1, 1898.

Application filed February 11, 1896. Serial No. 578,845. (No model.)

To all whom it may concern:

Be it known that I, GEORGE D. HOFFMAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Furnaces, (Case No. 1,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to furnaces, and more particularly to hot-air furnaces.

A well-known form of hot-air furnace consists of a stove within which the combustion of the fuel takes place, from which the products of combustion are passed to the chimney-way, and about which is placed a casing of brick or galvanized sheet-iron, within which the air that is distributed to the points of application is heated, suitable flues being led from the casing for the purpose of distributing the heated air. One well-known form of hot-air furnace of this class consists of a fire-pot and a heating-dome disposed above the same, about which is placed an annular radiating-chamber communicating with the heating-dome in such a manner that the products of combustion enter at one point and are circulated through said radiating-chamber in one direction to a flue leading to the chimney.

Generally speaking, one feature of my invention may be described as consisting of an annular radiating-chamber concentrically disposed about a heating-dome placed above the fire-pot, in which radiating-chamber the volatile products of combustion are adapted to circulate in opposite paths to the common point of egress. The annular radiating-chamber is preferably separated several inches from the heating-dome, an inclosed passage affording communication between said heating-dome and said radiating-chamber. At the point where the volatile products of combustion enter the radiating-chamber from the heating-dome a diaphragm is provided to cause the volatile products of combustion to pass in opposite directions within the radiating-chamber. The two currents of the products of combustion meet at the common point of egress and retard each other in their further progress, whereby the heated products of combustion are confined for a longer period of time within the radiating-chamber. The volatile products of combustion being thus confined for a longer period of time within the radiating-chamber impart more of their heat to the air surrounding the radiating-chamber.

I preferably provide an air-blast attachment, which may be described as consisting of a hollow supply-pipe passing through the casing and the wall of the combustion-chamber, where it joins with a riser, to which is connected a heating-pipe, to the ends of which are attached branches which extend downward to the fire-pot. The ends of these branches are provided with perforated plates, preferably placed at such an angle that the superheated air is directed toward the center of the fire-pot. Heretofore one form of air-blast attachment has consisted of a hollow cast-iron supply-pipe, which communicates by means of two branches thereof with a hollow cast-iron ring surrounding the top of the fire-pot at diametrically opposite points. The hollow ring communicates with the interior of the fire-pot by means of a series of apertures. With this form of air-blast attachment the air as it passed through the aforesaid apertures to the fire-pot was too low in temperature to permit of immediate combustion.

My invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a partial vertical sectional view of a furnace constructed in accordance with my invention. Fig. 2 is a sectional plan view thereof on line 2 2, Fig. 1. Figs. 3 and 4 are detail views of portions of the furnace.

Like letters refer to like parts throughout the several figures.

The heating-dome *a* is placed above the fire-pot, as shown, about which dome the radiating-chamber *b* is concentrically disposed. A hollow casing *c* affords communication between the radiating-chamber *b* and the heating-dome *a*. A vertical diaphragm *c'* is provided within the casing *c*, which abuts against a diaphragm *b'*, placed vertically within the radiating-chamber *b*. The diaphragms *b' c'* divide the heated products of combustion—gases or vapors—as they are passed from the heating-dome to the radiating-chamber. A flue b^2 affords communication between the ra-

diating-chamber and the chimney, whereby the products of combustion, after having been circulated through the radiating-chamber, are passed off. A casing *d*, composed, preferably, of galvanized sheet-iron, is provided about the heat-generating portion of the furnace, the air within the casing circulating about the various parts of the heat-generating portion of the furnace. The heated air is passed from within the casing by flues *d' d'* to the points of application.

An apron *e* within the heating-dome *a* is placed before the passage *c*. This apron is secured at its lower extremity to the wall of the dome and flares outwardly toward the top of the dome. The upper edge of the apron is preferably extended close to a plane coincident with the top of the passage *c*, the central portion of the upper edge of the apron being cut away to increase the draft from the dome to the radiating-chamber. I provide the apron *e* in connection with the passage *c* in order that the volatile products of combustion may be directed toward the top of the dome before entering the passage *c*, whereby said products of combustion are brought into contact with a greater radiating-surface. The apron *e* thus forms what I term a "diveway," by which the heated volatile products of combustion are passed from within the heating-dome through the passage *c*, thence by right and left paths within the radiating-chamber on either side of the diaphragm *b'* to the point of egress b^2. The opposing currents of volatile products of combustion within the radiating-chamber, meeting at the opening of the flue b^2, retard each other in their further passage, whereby they are confined within the radiating-chamber for a longer period of time, during which additional heat is imparted therefrom through the walls of the radiating-chamber to the surrounding air.

Referring more particularly to Figs. 3 and 4, the casing *c* is provided with a cup c^2, adapted to contain the extension *a'* of the dome *a*. The casing *c* is riveted to the inner wall of the radiating-chamber *b*. Upon the vertical sides of the casing are provided recessed ears c^3, and upon the vertical sides of the extension *a'* are provided similar ears a^2. In securing the radiating-chamber in its position about the heating-dome asbestos cement is applied to the cup c^2, after which the cup c^2 is placed about the extension *a'*, as shown most clearly in Fig. 3. Bolts c^4 are then disposed within the recesses in the ears c^3 c^3 a^2 a^2, when the union between the casing *c* and extension *a'* is made secure by tightening the nuts upon the bolts. It will be observed that the bolts are dropped in position rather than being passed longitudinally through bolt-holes. This construction is especially desirable in the present instance, since the space between the heating-dome and radiating-chamber is comparatively small.

Referring to Figs. 1 and 2, I will now describe the air-blast attachment that I prefer to employ. A supply-pipe *g* communicates between the external air and a heating passage-way, consisting of a riser *g'*, a semicircular superheating-pipe g^2, communicating therewith, and branches g^3 g^3, extending downward to the fire-pot. The ends of these branches are provided with perforated plates g^4, from which the air is directed upon the burning fuel. The air from the supply-pipe *g* is passed through the riser *g'* and divides at the point of union between said riser and the pipe g^2, passing through said pipe g^2 in two paths and thence through the pipes g^3 and perforated plates g^4 upon the burning fuel. The plates g^4 are preferably placed at an angle to cause the superheated air to be directed toward the surface of the burning fuel. The air from the supply-pipe *g*, after having passed through the passages described, has been heated to such a degree that combustion will take place upon the discharge of the superheated air upon the fuel.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a furnace, the combination of a heat-generating portion, a heating-dome forming a part of said heat-generating portion, with a radiating-chamber surrounding said heating-dome, said radiating-chamber having communication with the chimney-way or external air through an opening and with said heating-dome through an opening or passage-way, a diaphragm placed within said opening or passage-way so as to be within the path of the escaping volatile products of combustion, and an apron *e* placed within the heating-dome before said opening or passage-way, substantially as and for the purpose described.

2. In a furnace, the combination of a heat-generating portion, a heating-dome forming a part of said heat-generating portion, with an annular radiating-chamber completely surrounding said heating-dome, said radiating-chamber having communication with the chimney-way or external air through an opening and with said heating-dome through an opening or passage-way, and a diaphragm *c'* placed within said opening or passage-way and a diaphragm *b'* in said radiating-chamber, said diaphragms being arranged so as to be within the path of the escaping volatile products of combustion as they escape from the combustion-chamber whereby said products of combustion are caused to follow opposing paths within said annular radiating-chamber, substantially as and for the purpose specified.

3. In a furnace, the combination of a heat-generating portion, a heating-dome forming a part of said heat-generating portion, with a radiating-chamber completely surrounding said heating-dome, said radiating-chamber having communication with the chimney-way or external air through an opening and with said heating-dome through an opening or pas-

sage-way, and a diaphagm placed within said radiating-chamber before said opening or passage-way so as to be within the path of escaping volatile products of combustion as they escape from the combustion-chamber, whereby the volatile products of combustion are caused to travel toward the exit-opening in opposing streams, the said streams thus opposing each other in their exit, substantially as described.

In witness whereof I hereunto subscribe my name this 6th day of February, A. D. 1896.

GEORGE D. HOFFMAN.

Witnesses:

W. CLYDE JONES,

D. W. C. TANNER.