Feb. 20, 1940. Q. I. WAGNER 2,191,064

HEATING APPARATUS

Filed May 5, 1938 3 Sheets-Sheet 1

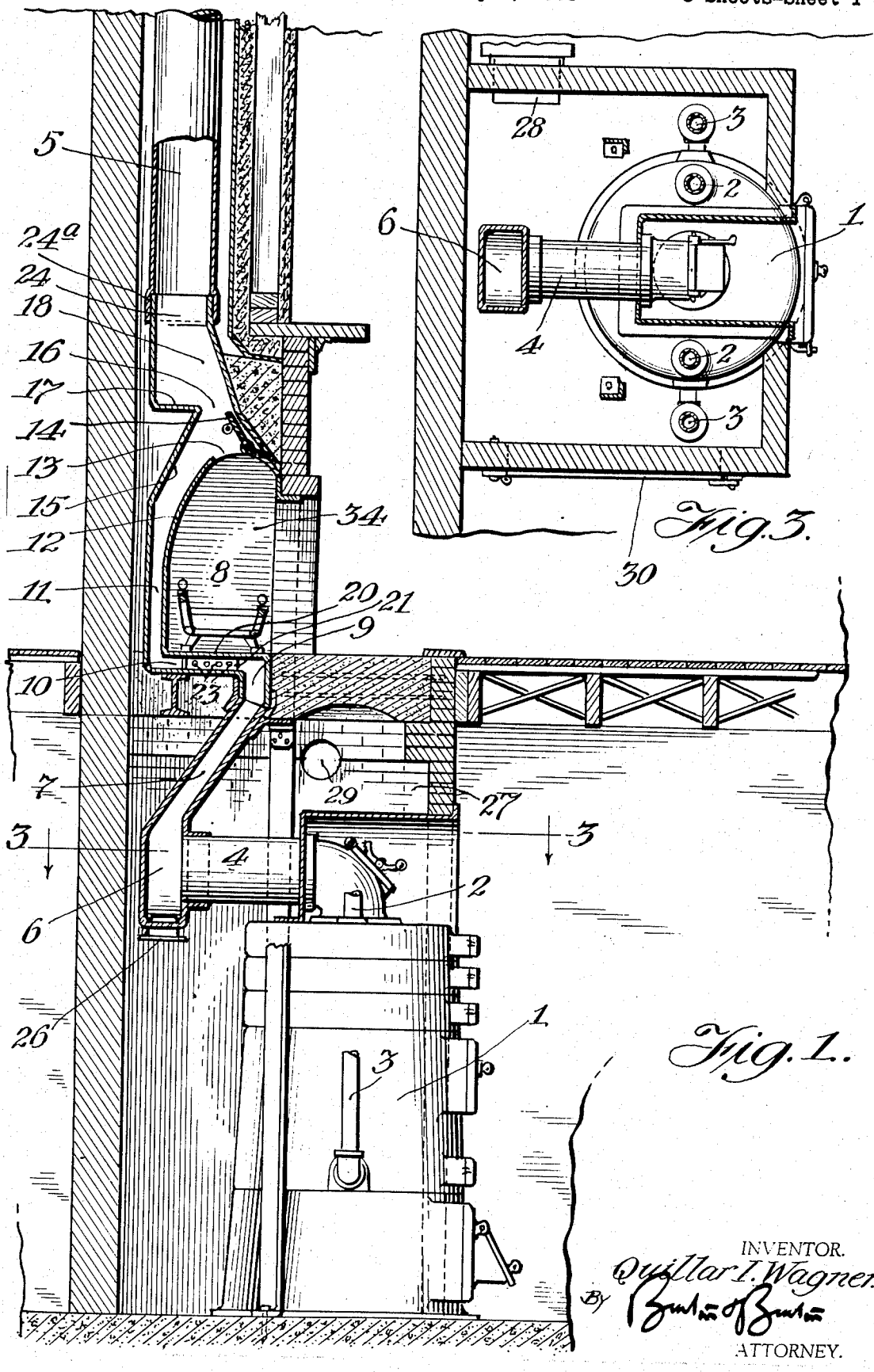


Fig. 3.

Fig. 1.

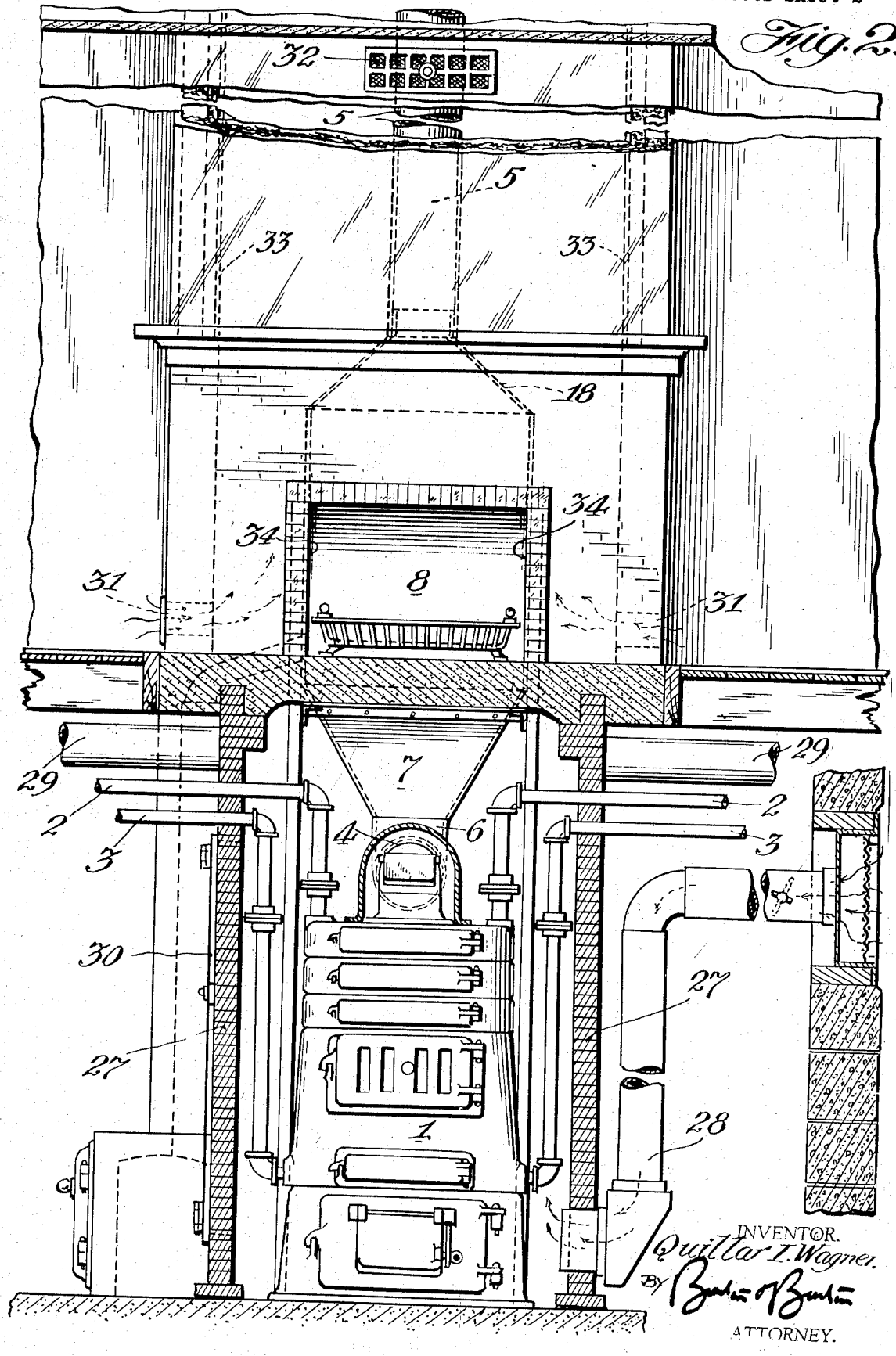
INVENTOR.
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Fig. 2.



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Fig. 4.

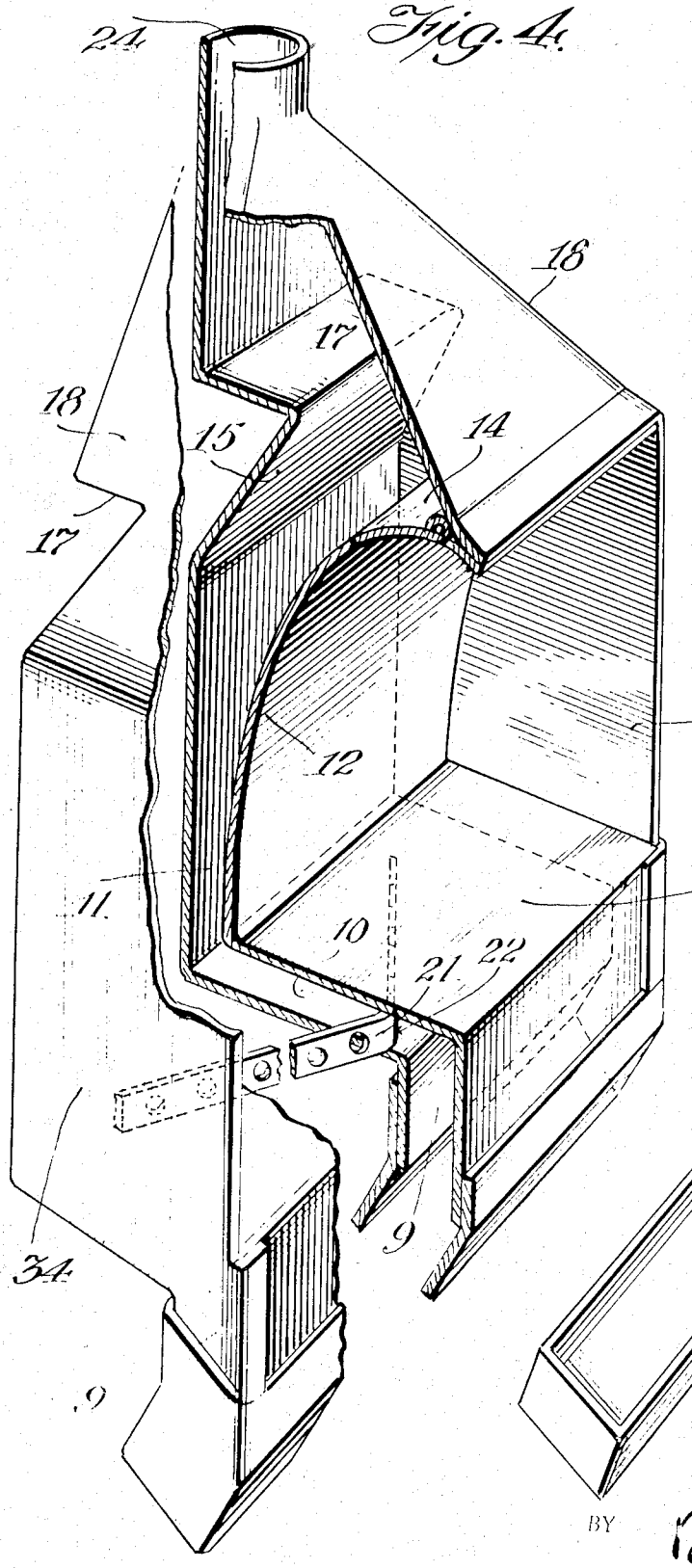


Fig. 5.

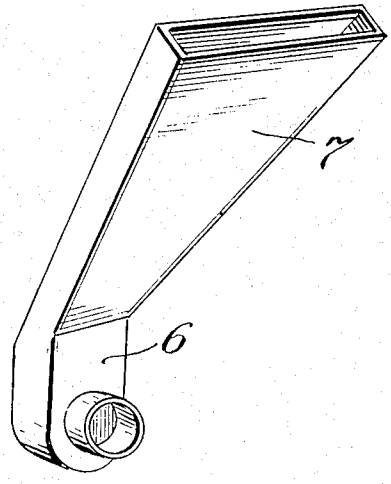
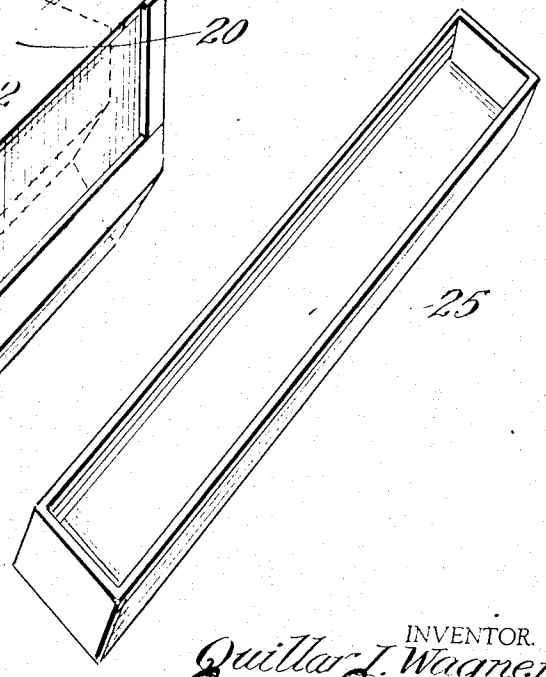


Fig. 6.



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UNITED STATES PATENT OFFICE

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HEATING APPARATUS

Quillar I. Wagner, Villa Park, Ill.

Application May 5, 1938, Serial No. 206,220

10 Claims. (Cl. 237—51)

This invention relates to heating systems, particularly such as are designed for domestic use, and its object is to increase the efficiency of the principal heating plant. Another object is to provide an open fireplace adapted to cooperate with the principal heating plant in distributing the heat therefrom; another object is to improve the circulation of air through the rooms of the building. The invention consists of certain features and elements of construction in combination as herein shown and described and as indicated by the claims.

In the drawings:

Figure 1 is a vertical sectional view of heating apparatus and adjacent portions of a building in which it is installed in accordance with this invention.

Figure 2 is a front elevation of the heating apparatus shown in Figure 1 with portions of the building structure shown in section, and with some parts broken away to condense the view.

Figure 3 is a transverse section taken as indicated at line 3—3 on Figure 1.

Figure 4 is a perspective view partly in section, showing the pre-fabricated fireplace structure as it may be furnished for installation in a building.

Figure 5 is a detail perspective view of a conduit for connecting the smoke pipe of the furnace with the hollow wall of the fireplace.

Figure 6 is a perspective view of a special cap for use when the fireplace is not connected to a furnace.

It is commonly known that in small heating plants, particularly those designed for domestic use, an excessive proportion of the heat goes up the chimney with the products of combustion and is wasted. One important feature of the present invention is that it serves to utilize a part of this heat in a device which is designed to radiate it into a room of the building. This device is constructed in the form of a fireplace, and may be used as an open fireplace with a separate fire of its own, when desired. As shown in the drawings, the principal heating plant is illustrated as a furnace 1 of the hot water type, provided with outlet pipes 2 and return pipes 3, which may be understood as connected with radiators at various points in the building. However, the invention may employ any other form of principal heating furnace. In any case, the furnace will include a smoke outlet pipe such as that shown at 4, leading from its upper portion for connection with the chimney flue. Said flue is indicated at 5, but interposed between it and the horizontally extending outlet pipe 4 of the furnace is the fireplace structure, which, in accordance with this invention, serves to absorb and radiate some of the heat which would otherwise escape in the smoke and other products of combustion.

A special connecting conduit 6 joins the outlet 4 and extends upwardly therefrom in a laterally flaring form at 7. This widening of the conduit at 7 adapts it for connection with the hollow bottom wall of the fireplace 8. A vertical connecting passage 9 leads to the horizontally extending space 10 in the hollow bottom wall of the fireplace, and this, in turn, communicates with the vertical passage 11 of the hollow back wall. The forward sheet 12 of this back wall is arched forwardly near the top and contains a smoke outlet 13, which may be closed by a suitable door or shutter 14 when there is no fire in the fireplace itself, but which will be opened to create a proper draft when wood or coal is burned in the fireplace. Opposite the arched portion of the forward sheet 12 of the back wall, the rear sheet 15 inclines forwardly to the throat-way 16, through which the products of combustion escape to the flue 5. At the level of the throat 16, and directly below the flue 5, the structure includes a horizontal shelf or ledge 17, which operates as a baffle to oppose down-drafts, and thus facilitates starting the fires either in the furnace 1 or in the fireplace 8.

As indicated in dotted outline in Figure 2, and as will be apparent from the perspective view in Figure 4, the upper outlet passage 18 leading from the throat 16 to the flue 5 is of tapering cross-section, contracting toward the flue 5 so as to increase the velocity of the gases as they enter the flue and insure an adequate draft at all times. On the other hand, the fact that the connection at 7 is of flaring form, so that it increases upwardly in cross-section, tends to retard the flow of the hot gases from the furnace, causing them to move more slowly through the passage 10 of the hollow bottom wall and the passage 11 of the hollow back wall of the fireplace. This insures time for the absorption of heat from the gases by the forward sheet 12 of the hollow back wall, and by the upper sheet 20 of the hollow bottom, so that the temperature of these parts is materially raised, and such heat may be then radiated into the room into which the fireplace 8 opens.

The flow of gases through the hollow walls of the fireplace is further controlled by the provision of a baffle member 21 set into the passage 10 in a position to extend transversely of the direction of flow, and to serve as a reinforcement

for the upper sheet 20, which forms the bottom wall of the fireplace. Preferably, the baffle member 21 is made from a rail or strip bent at about the middle of its length and disposed with its apex or angle 22 directed toward the flow of gases from the furnace 1, and with its two portions trending obliquely away from the apex 22 so as to divert the flow of gases more or less toward the sides of the fireplace. The baffle bar 21 is shown with several apertures 23 at intervals in its length, thus permitting a portion of the smoke and other products of combustion to flow through these apertures adjacent the middle portions of the fireplace so as to distribute the heat over the entire area of its bottom wall and back wall.

While it will be understood that a fireplace, providing a hollow bottom wall and hollow back wall, may be constructed in various ways, I have indicated in Figure 4 how this device may be manufactured as a unit, ready for installation in the masonry portion of the building structure. As indicated, it is composed mainly of sheet material, such as sheet iron or steel, formed to provide the open chamber, which is the fireplace itself, and fitted and secured together to compose the passages 10 and 11 with connecting passage 9 and the tapered outlet passage 18. The baffle shelf 17 may thus be provided as an integral portion of the sheet metal structure, and, if desired, instead of relying upon masonry structure for the smoke flue, this element may be in the form of a sheet metal tube or pipe, as indicated at 5 in Figure 1, and may thus connect by the usual form of telescopic joint at 24a with the round terminal 24 of the fireplace unit.

On occasions when the furnace 1 is to be out of service for some time, or when no furnace is included in the building, the connecting conduit 6, 7 may be omitted, and replaced by a cap 25, which is seen in perspective in Figure 6, and which, it may be understood, will fit snugly into the lower end of the passage 9 when the conduit 7 has been disconnected.

For clearing the flue of accumulated soot, the conduit connection 6 is provided with a downwardly opening clean-out which is normally closed by a plug or cover member 26, removably secured in any convenient manner. For additionally conserving the heat generated in the furnace 1 and also for improving the circulation of air in the building, the furnace is shown enclosed in a chamber having side walls 27 of brick, and having a cold air inlet pipe 28 entering the lower portion of the chamber. Warm air outlet pipes 29 may connect into the upper portion of the chamber for conveying warm air to any desired portions of the building. When the furnace is thus enclosed, the clean-out 26 may be rendered accessible by providing a door 30 in one of the side walls 27. The fireplace 8 may also be provided with an air jacket built into the masonry structure associated with the fireplace, such chamber being indicated in Figure 2 as provided with air inlet openings 31 near the floor, and with an outlet grille 32 near the ceiling. The air space is formed between the brick side walls whose thickness is indicated by dotted lines 33, and with the sheet metal fireplace unit centrally located in this space, it will be seen that a fire in the fireplace 8 will contribute substantially to warming the air which circulates through the inlets 31 and outlet 32. The end walls 34 of the fireplace unit are of single thickness, so that the heat will be transmitted directly from the fireplace cavity through these side walls into the air space surrounding the fireplace unit.

Thus it will be seen that I have devised a fireplace unit which can be pre-fabricated so as to be readily installed in a building structure to provide an open fireplace, and which includes hollow passages adapted to serve as portions of a smoke flue from another heating plant, and adapted to absorb the heat from the products of combustion which traverse this flue, so that the fireplace unit may serve as a radiator for the room with which it is associated.

While there is shown and described herein certain specific structure embodying the invention, it will be manifest to those skilled in the art that various modifications and rearrangements of the parts may be made without departing from the spirit and scope of the invention, and that the same is not limited to the particular form herein shown and described, except in so far as indicated by the appended claims.

I claim:

1. In combination, a furnace, an open fireplace and a chimney flue, said fireplace having a hollow floor connecting the furnace with its chimney flue and serving as a passage for the products of combustion from the furnace, the upper wall of said hollow floor being formed of heat-conducting material adapted to transmit heat from said products of combustion to the room in which the fireplace is located.

2. In combination, a furnace, an open fireplace and a chimney flue, said fireplace having a hollow floor and a hollow back wall connecting the furnace with its chimney flue and serving as a passage for the products of combustion from the furnace, the portions of said hollow floor and hollow back wall toward the fireplace being formed of heat-conducting material adapted to transmit heat from said products of combustion to the room in which the fireplace is located.

3. In combination, a furnace, an open fireplace and a chimney flue, said fireplace having a hollow floor providing a passage extending from one edge to the opposite edge of said floor and connecting the furnace with its chimney flue for conveying products of combustion from the furnace thereto, the upper wall of said passage being constructed of heat-conducting material adapted to transmit heat from said products of combustion to the room in which the fireplace is located.

4. In the combination defined in claim 3, the passage in said hollow floor of the fireplace being partially obstructed by a baffle adapted to retard the flow of said products of combustion to afford time for radiation of heat therefrom.

5. In the combination defined in claim 3, a V-shaped baffle extending in said passage of the hollow floor of the fireplace with its apex directed opposite to the direction of flow of said products of combustion therethrough for retarding the flow and distributing it transversely of the passage to facilitate the radiation of heat therefrom.

6. In combination, a furnace, an open fireplace and a chimney flue, said fireplace having a hollow back wall deflected forwardly toward the top of the fireplace and the flue having a transverse shelf at its lower end with an opening laterally adjacent said shelf by which said flue connects with said hollow back wall of the fireplace, together with means providing a pasage for the products of combustion from the furnace into said back wall of the fireplace, said hollow wall being formed of heat-conducting material adapt-

ed to transmit heat from said products of combustion to the room in which the fireplace is located.

7. In combination, a furnace, an open fireplace and a chimney flue, said fireplace having a hollow wall and connections whereby said hollow wall serves to convey products of combustion from the furnace to the chimney flue, the connection from the furnace to said hollow wall expanding in cross-section in the direction of flow of said products of combustion therethrough, and the connection from the hollow wall to the flue contracting in cross-section in the direction of flow, said hollow wall being formed of heat-conducting material adapted to transmit heat from said products of combustion to the room in which the fireplace is located, and the formation of said connections tending to retard the velocity of the flow of said products of combustion through the hollow wall to afford ample time for such radiation of heat therefrom.

8. In combination, a furnace, an open fireplace and a chimney flue, said fireplace having a hollow wall connected to serve as the outlet for products of combustion from the furnace to the chimney flue and formed of heat-conducting material adapted to transmit heat from said products of combustion, the connection between the furnace and the hollow wall expanding in cross-section in the direction of flow of said products of combustion to retard the flow through the hollow wall to afford ample time for the transfer of heat therethrough.

9. In the combination defined in claim 8, baffle means in said hollow wall arranged for further retarding the velocity of flow therethrough.

10. In combination, a furnace, an open fireplace and a chimney flue, said fireplace having a hollow wall extending from the lower portion to the upper portion of the fireplace and connected to serve as a passage for products of combustion from the furnace to the chimney flue, said fireplace being mounted in a chamber provided with an air inlet and an air outlet, and another wall of said fireplace being composed of solid material adapted to transmit heat, said wall being exposed on one side to the interior of the fireplace and exposed on the other side to the interior of the air chamber, whereby heat generated in the fireplace is transmitted to the air chamber for increasing the temperature of air flowing from the inlet to the outlet thereof, and said hollow wall having its portion exposed toward the fireplace composed of heat-conducting material for transmitting heat from the products of combustion of the furnace to the room in which the fireplace is located.

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