

July 3, 1956

D. L. CAGE

2,752,913

CORNER FIREPLACE CONSTRUCTION

Filed Sept. 4, 1951

3 Sheets-Sheet 1

FIG. 1.

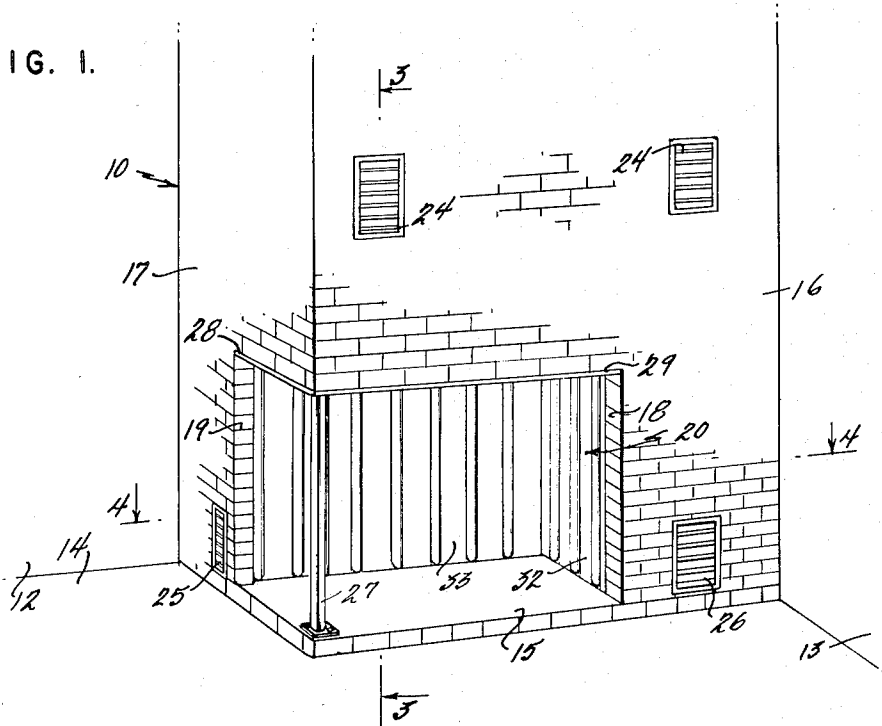
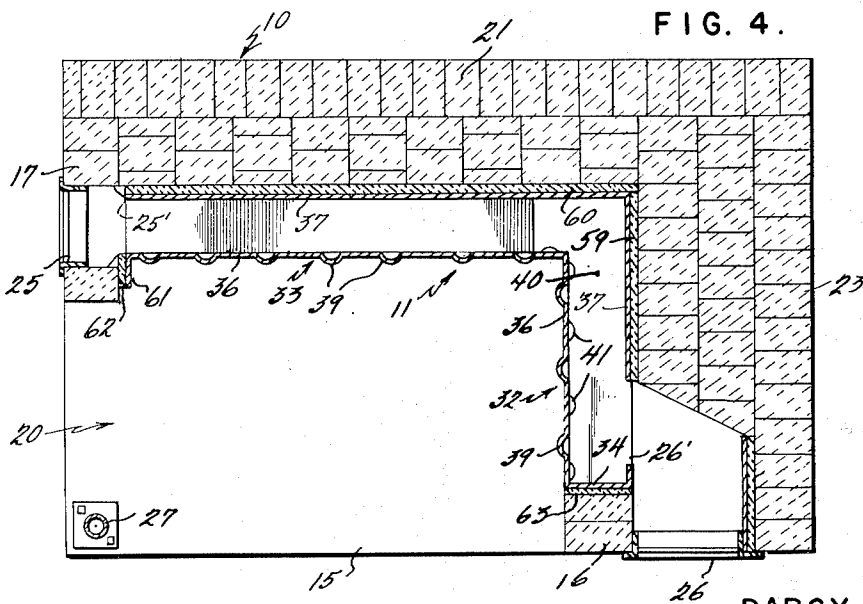


FIG. 4.



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3 Sheets-Sheet 2

FIG. 3.

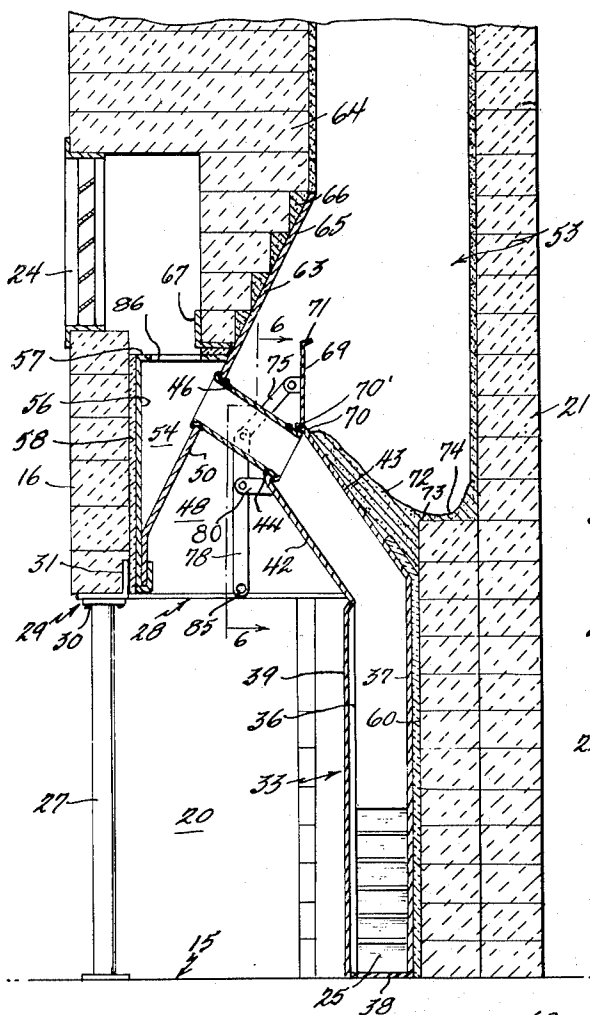


FIG. 2.

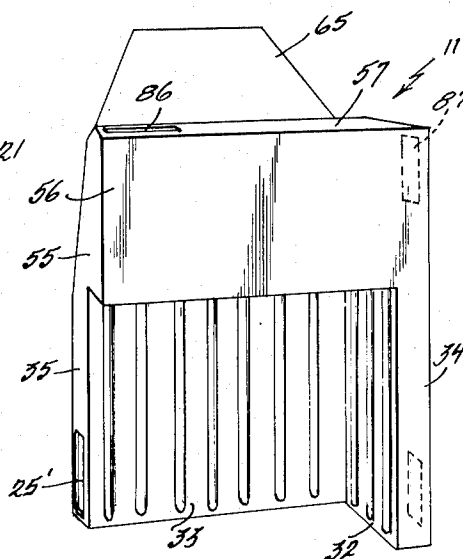


FIG. 7.

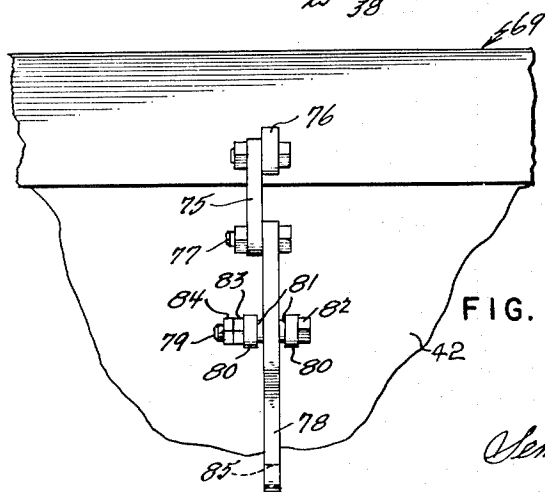
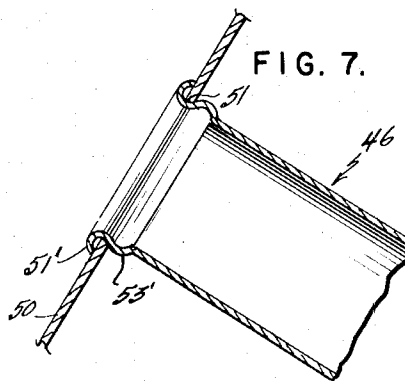


FIG. 6.

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3 Sheets-Sheet 3

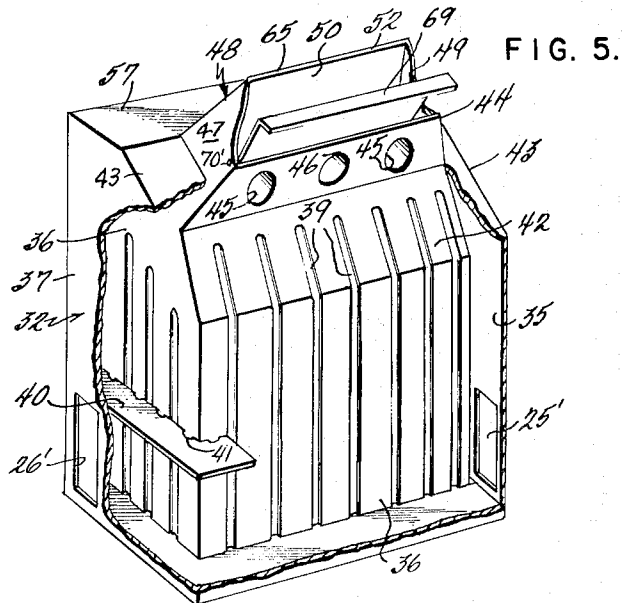
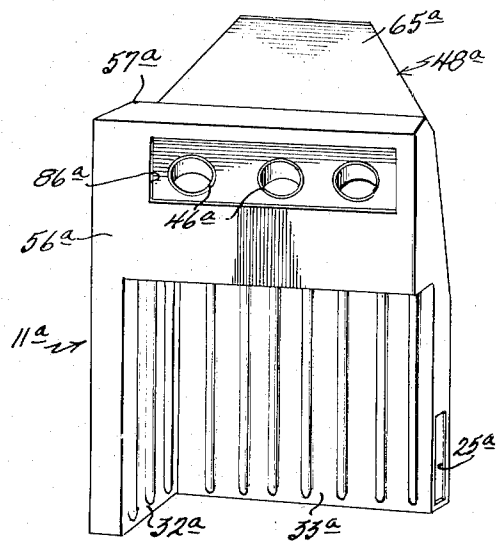


FIG. 8.



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1

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CORNER FIREPLACE CONSTRUCTION

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1 Claim. (Cl. 126—121)

This invention relates to improvements in air heating and circulating fireplace construction, the primary object of the invention being to provide a construction of this kind having a closed back, an open front, a closed side, and an open side, especially but not exclusively, adapted to be installed in a corner of a room at the intersection of two converging walls, so that the fire is made visible from one side as well as from the front of the fireplace, and heat from the fire is reflected, radiated, and conducted from the open side of the fireplace as well as from the front thereof, along the converging walls so as to heat the walls, at the same time that cool air is being withdrawn from at or near floor level, heated, and circulated in the room at a higher level, while smoke from cross drafts is eliminated, as will be explained.

Another important object of the invention is the provision of fireplace construction of the character indicated above having a gravity air heating and circulating unit, enclosed within the masonry of the fireplace and exposed directly to the fire on the hearth, and having hollow walls paralleling the room walls and having cool air intakes substantially at floor level located at their free ends or at the back of the fireplace, open to air intake openings formed in the masonry, and having heated air outlet means opening through the masonry at a level above the opening of the fireplace.

Another important object of the invention is to provide in a fireplace construction of the above indicated character, novel and improved means for relieving the air heating unit of the weight of the masonry and for insulating the masonry from the unit so as to substantially reduce heat losses through the masonry and prevent undue heating of the masonry, while affording both the unit and the masonry increased freedom of expansion and contraction produced by heat transfer so as to substantially reduce damaging strains thereon which would otherwise be present.

A further important object of the invention is to provide a more efficient unitary, all metal air heating and circulating unit for a fireplace construction of the character indicated above which is characterized by novel throat, damper, and dome construction which results in more efficient and enhanced heating of the air, thereby rendering the fireplace more efficient and economical in operation.

Other important objects and advantageous features of the invention will be apparent from the following description and the accompanying drawings, wherein, for purposes of illustration only, preferred embodiments of the invention are set forth in detail.

In the drawings:

Figure 1 is a front perspective view showing an installed corner fireplace in accordance with the present invention;

Figure 2 is a front perspective view of the fireplace;

Figure 3 is an enlarged vertical transverse section taken through Figure 1 on the line 3—3;

2

Figure 4 is an enlarged horizontal section taken through Figure 1 on the line 4—4;

Figure 5 is a rear perspective view of the fireplace with portions broken away to show internal structure;

Figure 6 is an enlarged fragmentary vertical section taken on the line 6—6 of Figure 3;

Figure 7 is an enlarged fragmentary vertical longitudinal section taken through one of the tubes and an associated wall; and

Figure 8 is a front perspective view of a modified form of corner fireplace in accordance with the present invention.

Referring in detail to the drawings, wherein like numerals designate like parts throughout the several views, the illustrated corner fireplace construction comprises the masonry fireplace 10 and the all metal unitary air heating and circulating unit 11 enclosed therein, the fireplace being shown as installed in the intersection between the two converging walls 12 and 13 forming a corner of a room having a floor 14.

The masonry fireplace 10 comprises a hearth 15 of suitable refractory material preferably raised only slightly above the level of the floor 14, a front vertical wall 16, and a left-hand vertical side wall 17, the front and side walls having the rectangular openings 18 and 19, respectively, reaching downwardly to the hearth 15 and being in communication at the intersection of the walls 16 and 17 to expose the fire space 20 on the hearth 15. The fireplace further comprises the vertical back wall 21 paralleling the front wall 16 and the room wall 12, and the right-hand vertical side wall 23 paralleling the left-hand side wall 17 and the room wall 13, and intersecting with the back wall 21 as shown in Figure 4 of the drawings. The front wall 16 is formed above the fire space 20 with one or more grilled or louvered heat air outlet openings 24. The left-hand side wall 17 is formed with a cool air intake opening 25, preferably close to the level of the room floor 14 at a point rearwardly of the fire space opening 19, and the front wall 16 is similarly provided near floor level with another cool air intake opening 26 at a point to the right of the fire space opening 18.

A post 27 mounted in the left front corner of the hearth 15 reaches upwardly to supportably engage angle iron lintel bars 28, 29 which extend horizontally with their horizontal flanges 30 in supporting engagement with the under edges of the tops of the openings 18 and 19 so as to support the portions of the front wall 16 and left-hand side wall which are above these openings, in the manner indicated in Figure 3 of the drawings. The vertical flanges 31 of the lintel bars are located at the rear or inward sides of the wall portions supported by the lintel bars. The lintel bars intersect where they are engaged by the upper end of the post 27 and their opposite ends are suitably supported in the masonry, whereby the portions of the walls 16 and 17 above the fire space 20 are supported independently of the air heating unit 11 and do not bear thereon.

The air heating and circulating unit 11, which is mounted in the fire space 20 upon the hearth 15, comprises, as particularly well shown in Figure 2 of the drawings, a right-hand hollow vertical wall member 32 and a hollow vertical back wall member 33, the rearward end of the right-hand wall member 32 and the right-hand end of the back wall member 33 intersecting and being in communication, the other ends of these wall members being closed by preferably integral plates 34 and 35, respectively, which extend between and are connected to the spaced parallel inner and outer walls 36 and 37, respectively, forming the wall members. The bottoms of the wall members are closed by preferably integral plates 38. The inner walls 36 are formed with laterally

3

spaced vertical elongated indentations 39 which act as expansion ribs which enable the inner walls 36 to expand and contract without damaging distortion. It will be noted that the ribs 39 project on the sides of the walls 36 which face the fire space 20.

A horizontal baffle plate 40, located on a level intermediate the upper and lower ends of the wall members 32 and 33, is secured to and extends between the inner and outer walls thereof. The baffle plate 40 is imperforate except for semi-circular openings 41 spaced along the inner walls 36 and positioned between adjacent ribs 39, through which cool air from the intakes 25 and 26 can rise at a retarded rate into the interior of the wall members 32 and 33 above the baffle plate 40, whereby heat exchange contact of the rising cool air with the wall members is prolonged and the air heated thereby to a higher degree.

As shown particularly well in Figures 3 and 5, the inner wall 36 of the back wall member 33 terminates at its upper end in a plane portion 42 which slopes forwardly at an angle of about 45° to constitute a firewall. It is important that the forward slope of the fire wall 42 not begin below the level of the lintel bars 28, 29 as otherwise the firewall 42 would be visible from the open side of the fireplace and would obstruct heat radiation from the closed side of the fireplace. Experiment has demonstrated conclusively that a fireplace having firewalls, dome structure, and openings constructed and related as illustrated gives remarkable freedom from smoke, when cross drafts, as from open room doors, blow into the fireplace openings. This freedom from smoke caused by cross drafts has been found to come from the fact that the heated air rising from the fire or like source of heat catches the cross draft entering either or both of the openings and carries it along up into and through the dome where it is taken up by currents of air rising in the chimney, whether such currents are caused by heat from below, by partial vacuum in the chimney produced by air currents crossing the chimney top, or down-draft turned back upwardly by the concave down-draft shelf. In any case the cross draft is not turned back into the room, carrying with it smoke complained of in the publication cited, Successful Fireplaces. The outer wall 37 of the back wall member 33 has an upper portion 43 which is parallelly spaced above the firewall 42, and the upper ends of the firewall 42 and outer wall portion 43 are bridged by a rearwardly tilted plate 44, best seen in Figure 5, which is formed with laterally spaced openings 45, in which the tubes 46 are set. It will be noted in Figure 5 of the drawings that a portion 47 of the inner wall 36 of the right-hand wall member 32 follows the angular relationship of the adjacent ends of the firewall 42 and outer wall portion 43 and bridges them, and at the same time extends upwardly to form one end wall of the throat 48 of the unit, the other end of the throat being closed by a wall portion 49, with a rearwardly and upwardly sloping top wall portion forming the front wall of the throat, whose open upper end 52 is approximately of the same side to side dimension as that of the flue 53. The front to rear dimension of the flue 53 is substantially greater than that of the mouth or upper end of the flue, as shown in Figure 3 of the drawings. The front throat wall 50 is formed with openings 51 registered with the openings 45 in the firewall 42.

The tubes slope forwardly and upwardly at an angle of about 40° and, as shown in Figure 7 of the drawings, have beads 53' at their opposite ends which abut the opposed surfaces of the firewall 42 and throat front wall 50, the terminal ends of the tubes being flared over against the opposite sides of the firewall 42 and throat front wall 50, as indicated at 51' and 53', so as to secure the tubes rigidly in place and seal the openings 45 in the firewall and the related openings 51 in the throat front wall. The front throat wall 50 slopes upwardly and rearwardly at an angle of about 60° to the horizontal.

4

A heated air box or chamber 54 is constituted by the throat front wall 50, a left-hand wall portion 55 being a forward extension of the left end plate 35 of the unit, a front wall portion 56 being an extension of the front end plate 34 of the unit, the outer wall 37 of the right-hand wall member 32, and a horizontal flat top wall portion 57 closing the upper end of the space subtended thereby. As shown in Figure 3 of the drawings, suitable insulation 58 is placed between the front wall portion 56 and the fireplace front wall 16 and the vertical flange 31 of the lintel bar 29, and such insulation is continued around the sides and back of the unit, as indicated at 59 and 60 in Figures 3 and 4. A forwardly projecting flange 61 on the left-hand end of the back wall member 33, which abuts a portion of the left-hand fireplace wall 17 is also insulated therefrom, as indicated at 62. The front end plate 34 of the right-hand wall member 32 of the unit is also insulated from the fireplace front wall 16, as indicated at 63.

A dome is constituted by a rearwardly and upwardly sloping lower portion 63 of the front wall 64 of the flue 53 up along which extends the dome plate 65 which is an extension of the front throat wall 50 and extends upwardly and rearwardly at an angle of 60° to the horizontal, so as to overlie and remotely baffle the open upper end of the throat 48, as shown in Figure 3 of the drawings. The dome plate 65 is insulated from its front flue wall, as indicated at 66. A third lintel bar 67 is in supporting engagement with the lower end of the front flue wall 64 and extends beyond both sides of the unit 11 where it bears upon the masonry 10 of the fireplace in order to relieve the unit 11 of the weight of the masonry.

For closing the open upper end 52 of the throat 48 a damper plate 69 is provided which has at its rear longitudinal edge a downwardly and forwardly curved reinforcing flange 70 which is positioned around and welded to a pivot 70' which extends between the end walls of the throat in front and at the upper edge of the wall portion 44 whereby the damper plate is mounted to swing downwardly and forwardly from the open position shown in Figures 3 and 5, into closing relation to the upper end 52 of the throat. The flange 70 runs close to the surface of the wall portion 44 to preclude entrance of loose particles of cement or the like between the flange 70 and the wall surface, which might otherwise keep the damper plate from being fully closed. The forward longitudinal edge of the damper plate 69 is turned up at an angle of about 120° to define a reinforcing flange 71 which rests freely against the lower part 63 of the wall 64 so that the damper plate is prevented from fully entering and becoming locked in the open upper end 52 of the throat 48. Each of these flanges serves to prevent undue warping of the damper 69 by heat, and the forward arrangement of the rear flange 70 prevents locking of the damper plate by loose particles of the cement 72 which is laid behind the wall portion 43 and on top of a shoulder 73 on the rear wall 21 to form a concave down-draft shelf 74. The concave down-draft shelf 74 serves in conjunction with the upstanding open damper plate 69 to divert in an upward and forward direction any down-draft coming down the flue 53, so that such down-draft will be prevented from entering the open upper end 52 of the throat 48, and causing smoke or a poor draft in the fire space 20.

The damper plate 69 is supported and operated by linkage including an upper link 75 pivoted at its upper end to an ear 76 fixed on the forward or lower side of the damper plate, and pivoted at its lower forward end, as indicated at 77, to the upper end of a vertical link lever 78. The lever 78 is pivotally supported near its upper end on a pivot bolt 79 which extends through ears 80 projecting forwardly from the upper part of the firewall 42 at opposite sides of the lever 78. The opposite sides of the lever 78 have washers 81 fixed thereon which frictionally bear against the inward sides of the ears 80.

5

A head 82 on the bolt 79 bears against the outward side of one of the ears 80, while a nut 83 and a lock nut 84 on the bolt bear against the outward side of the other ear 80 and are adapted to be adjusted to produce sufficient frictional engagement between the ears 80 and the washers 81 to hold the damper plate in open or closed or intermediate positions. Operation of the damper is achieved by inserting a poker end in an opening 85 provided in the lower end of the lever 78 which is exposed in the fire space 20.

The end plate 35 of the back wall member 33 of the unit 11 is formed with a cool air intake opening 25' which registers with the intake opening 25 in the left-hand wall 17 of the fireplace 10. The lower forward part of the right-hand wall member 32 of the unit 11 is provided with a cool air intake opening 26' which is arranged to register with the intake opening 26 in the fireplace front wall 16, as shown in Figure 4. The top plate 57 of the unit 11 is formed with a heated air outlet opening 86 which communicates with one of the outlet openings 24 in the fireplace front wall 16 above the fire space 20. The upper part of the right-hand side or end of the hot air box 54 can also be provided with a heated air outlet opening, if desired, as indicated at 87 in Figure 2, which can communicate with one of the outlet openings 24.

In the operation of the above described fireplace, a fire having been kindled on the hearth 15 within the fire space 20, the wall members 32 and 33, the throat 48 including the firewall 42 will be highly heated, as will the hot air box 54 and the front throat wall 50 and the tubes 46. As a result, cool air will be drawn by thermosiphon action into the cool air inlets and will rise therefrom by convection through the wall members, via the openings 41 in the baffle plate 40, and be highly heated in passing across the throat 48 through the tubes 46 and in the hot air box 54 whence the heated air will rise and pass out of the outlet openings 24 into the room in which the fireplace is located. In addition the wall members 32 and 33 will reflect and radiate heat along the room walls 12 and 13, respectively.

It will be understood that the cool air inlets and the heated air outlets can have different positions on the unit 11 and on the fireplace 10 in order that the device may be adapted to heat more than one room or to draw cool air from a place other than the room into which the heated air is discharged.

Some of such different arrangements of the air intake and outlet means are exemplified in the modified form of unit 11a which is disclosed in Figure 8 of the drawings. This form of air heating and circulating unit differs from that disclosed in detail hereinabove only in that the top wall 57a is imperforate and the heated air outlet opening 86a is instead formed in the front wall portion 56a facing the upper ends of the tubes 46a, the unit 11a also having a cool air intake opening 25a corresponding to the opening 25' of the first disclosed embodiment. It will be noted that the closed end of the unit of Figure 8 is at the opposite end of the unit from that of arrangement of the unit 11 of Figures 1 to 7.

It will be understood that while the walls of the fireplace 10 and of the air heating unit 11 have been shown herein as related at right angles to each other to serve in a room whose converging walls form a right angular corner, that the invention is readily adaptable to corners in which the converging walls converge at angles greater or less than a right angle, by conformably angulating the fireplace and air heating unit walls.

I claim:

A fireplace construction, for use preferably with a masonry chimney, comprising a metal form providing two firing openings at right angles to each other, one a front opening and the other a side opening, said form, when in position for use, having first and second vertical

6

planar plates with vertical edges and horizontal bottom edges, said plates joined together at one vertical edge of each plate to form a right-angle fireplace opening therebetween, third and fourth planar plates having vertical edges and horizontal bottom edges, said plates joined at one vertical edge of each plate, said third plate spaced parallel to said first plate and said fourth plate spaced parallel to said second plate to form a right-angular space, an L-shaped planar plate, one leg thereof joined to the horizontal bottom edge of said first plate and the horizontal bottom edge of said third plate, and the other leg thereof joined to the horizontal bottom edge of said second plate and the horizontal bottom edge of said fourth plate, a fifth planar plate joined to the entire upper edge of said first plate to form an obtuse angle therewith sloping towards the front firing opening, a sixth L-shaped planar plate joined to the entire upper edge of said third plate to form an obtuse angle therewith, said sixth plate sloping towards the front firing opening and spaced parallel to said fifth plate, the respective horizontal edges of said fifth plate and that leg of said sixth plate closest to said front firing opening being in alignment with each other and the space between said plates being bridged by a connecting planar seventh plate, a planar inverted L-shaped eighth plate forming the front face of the structure, the vertical leg of said eighth plate bridging the space between said second and fourth plates and connected edge to edge thereto, the other leg of said eighth plate extending in a plane parallel to said first and third plates, the lower edge of said other leg defining the upper limit of the front firing opening and being in the same horizontal plane as the upper edge of said first plate, a rearwardly upwardly sloping ninth planar plate connected to the lower edge of the horizontal leg of said eighth plate and spaced parallel to said seventh plate, a tenth planar rectangular plate lying horizontal and bridging the space between the upper edge of said eighth plate and the side of said ninth plate, said second plate being contoured to register with and be connected edge to edge with respective adjacent ends of said seventh and ninth plates, said fourth plate being contoured to register with and be connected edge to edge with the adjacent edge of said sixth plate, the other leg of said sixth plate extending to and connected with said tenth plate and bridging the space between the upper end of said second and fourth plates, an inverted L-shaped planar eleventh plate connected with respective adjacent ends of said first mentioned L-shaped plate, said first, third, fifth, sixth, seventh, eighth, ninth and tenth plates, opposite to said second and fourth plates and standing parallel thereto, the forward edge of the vertical leg of said L-shaped eleventh plate defining the vertical side of the side firing opening and the lower horizontal edge of the horizontal leg thereof registering with the upper limit of the front firing opening, thereby defining the upward limit of the side firing opening, flue means connecting said seventh and ninth plates, the ensemble of said planar plates making up a lower air-circulating and heating chamber L-shape in horizontal section and an upper heating and circulating chamber rectangular in horizontal section and right-angular triangular in vertical section, one leg of said lower chamber opening directly into said upper chamber and the other leg communicating with said upper chamber by flue means, said lower chamber having cold-air inlet means at the bottom and said upper chamber having heated-air outlet means, a baffle in said lower chamber for directing a minor portion of in-coming air upward along said second plate to said upper chamber and the major portion of said air upward along said first plate towards and through said flue means into said upper chamber, a planar twelfth plate sloping upwardly from and in the same direction as said ninth plate and serving as a support for chimney masonry and as one wall of a chimney dome, and a

damper regulable from the firing openings to open or close the passage way between said seventh and said ninth plates by which the fireplace communicates with the chimney.

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