Jan. 29, 1946. A. P. ROBINSON 2,393,812

FIREPLACE CONSTRUCTION

Filed July 7, 1942 2 Sheets-Sheet 1

Fig. 1

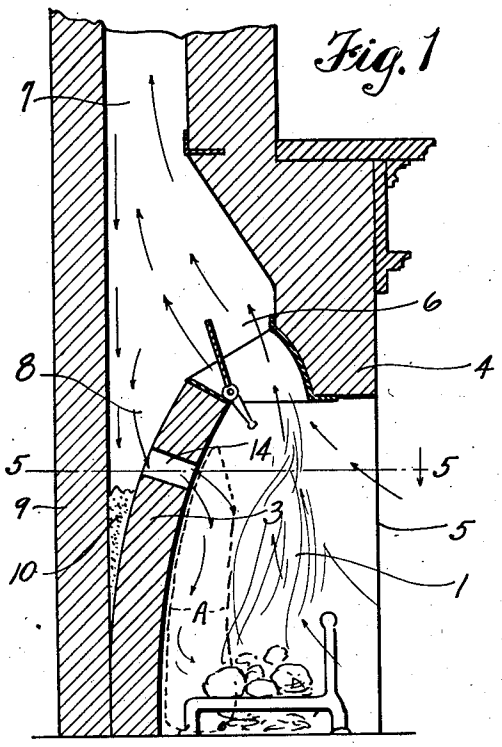


Fig. 3

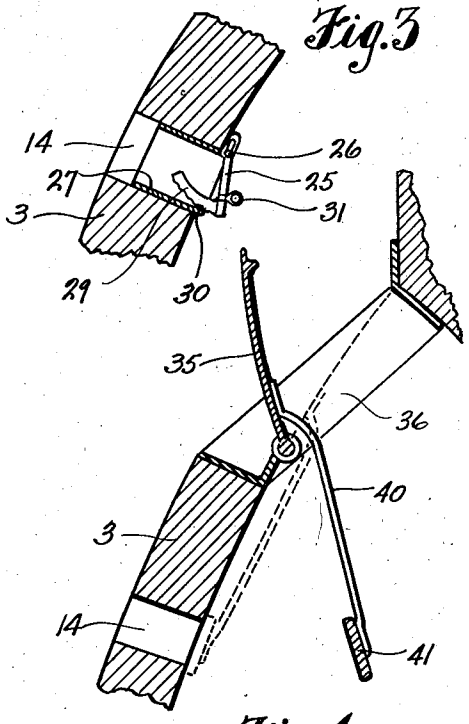
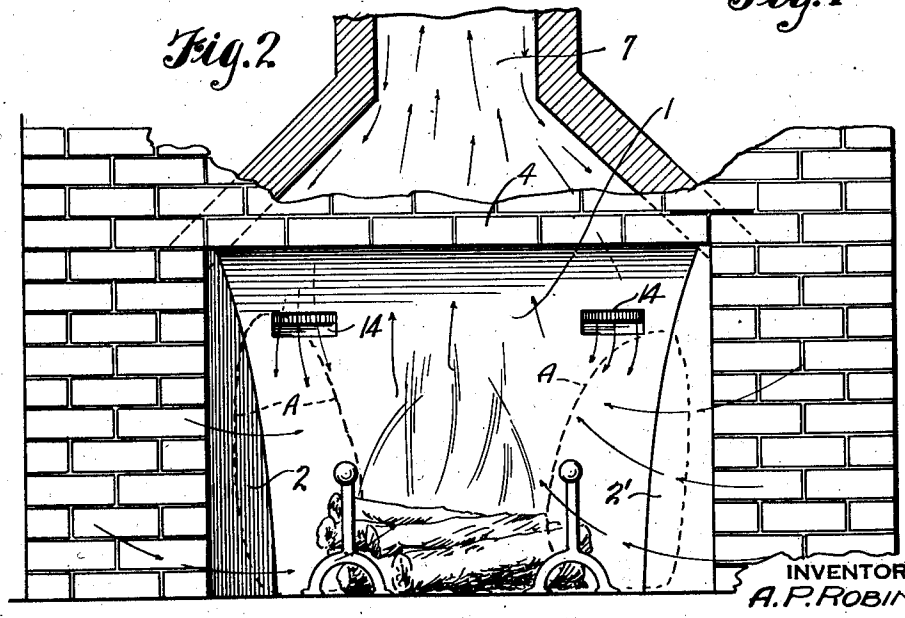


Fig. 4

Fig. 2



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Fig. 5

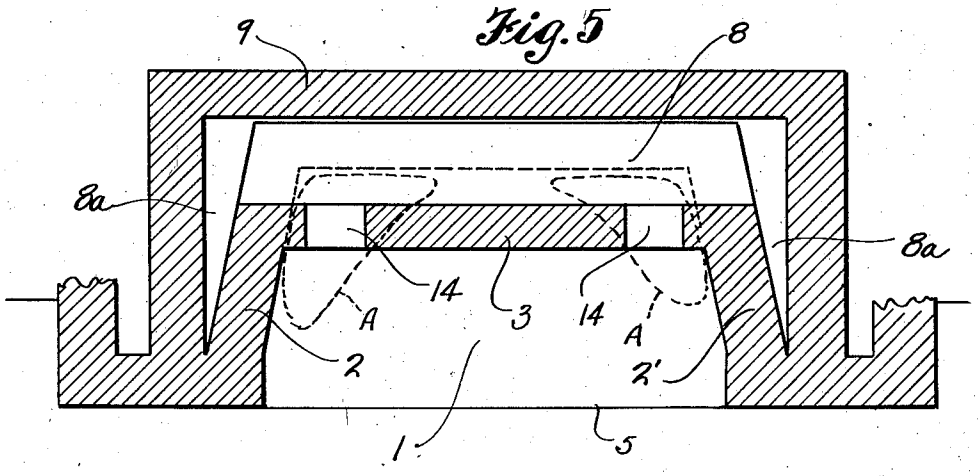
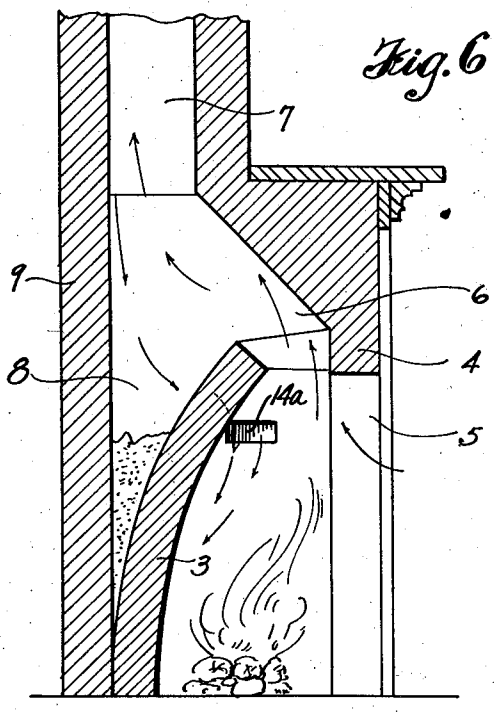


Fig. 6



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Patented Jan. 29, 1946 2,393,812

UNITED STATES PATENT OFFICE

2,393,812

FIREPLACE CONSTRUCTION

Albert P. Robinson, Seattle, Wash.

Application July 7, 1942, Serial No. 449,981

2 Claims. (Cl. 126—120)

This invention relates to fireplaces, and has reference more particularly to novel structural improvements in the ordinary types of residence fireplaces, designed to overcome and to prevent undesirable smoking in the room containing the fireplace, that is due to back draft, down draft or down flow of air currents in the fireplace flue resultant to any one or more of various conditions or causes.

In order to give a better understanding of the objects of the present invention, it will here be explained that many fireplaces have a tendency to smoke. That is, smoke will either slowly flow, or occasionally puff into the room, at the top of the front opening of the combustion chamber. Such smoking may be due to various conditions of wind or weather, or it might be due to structural design either of the fireplace or flue. Furthermore, it might be the result of inadequate ventilation of the room into which the fireplace opens. For example, should there be a very strong updraft in the fireplace flue resulting from rapidly rising hot air currents, or due to any condition of weather, wind or rate of combustion of fuel in the fireplace, and assuming that the room is closed and no provision made for admission of an adequate inflow of air into the room to replace that which passes therefrom and out through the fireplace flue, there will, as a natural consequence, be reverse currents of air created in the flue, usually along the corner portions, and these reverse down flowing currents of air will be apparent in strong gusts of air that will puff into the fireplace chamber through the throat passage and will spill over into the room, carrying more or less smoke with it.

In my copending application, filed on January 16, 1940, under Serial No. 314,062, now Patent No. 2,312,000, issued February 23, 1943, I have quite exhaustively discussed various reasons for fireplace smoking, and have described and illustrated certain features of damper and fireplace throat construction whereby smoking that is due to downdraft, or backflow of air currents in the flue, may be overcome. However, in that application, the claimed invention for overcoming this objectionable smoking is, for the most part, embodied in or in some way related to the fireplace throat and damper therein, whereas in this application I have dealt more particularly with details, or features of construction, which apply to the fireplace in a more general way and are not necessarily confined to throat construction, or dependent upon dampers located in the throat portion of the fireplace for their utility.

In view of the objectionable fireplace smoking previously referred to, it has been the principal object of this invention to provide novel structural features, or details of construction in combination with the flue and combustion chamber of a fireplace, for the effective dissipation of those down flowing currents of air which ordinarily would gush through the throat passage into the combustion chamber, or firebox from the flue, and spill into the room, and by reason of this novel manner of dissipation, eliminate the carrying or forcing of smoke out of the fireplace and into the room.

More particularly, one object of the invention is to provide a fireplace having passages removed from the throat and communicating with the flue and opening into the firebox, or combustion chamber, which will permit those downflowing currents of air which ordinarily drive smoke from the firebox into the room, to be dissipated into certain low pressure areas created in the firebox by the combustion therein, and to pass from these low pressure areas into the upflowing air currents and not caused to spill into the room or to cause smoke to be crowded into the room from the firebox.

Another object of the present invention is to provide means for controlling the flow of down draft or back draft air currents through the relief passages provided; said means of control being in the nature of dampers adapted for use either in conjunction with a throat damper or independently thereof.

In accomplishing the above mentioned, and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Fig. 1 is a vertical, cross sectional view of a fireplace with its back wall equipped with relief passages for back draft or down draft currents, in accordance with the objects of the present invention.

Fig. 2 is a front view of the fireplace of Fig. 1, showing the location of the downdraft relief passages; part of the fireplace being broken away to better illustrate the flue connection with the combustion chamber and indicating with direction arrows possible action of return and downdraft air currents.

Fig. 3 is an enlarged, sectional detail, showing one of the air relief passages as equipped with a closure means.

Fig. 4 is a sectional detail, showing the throat passage of a fireplace as equipped with an ad-

justable damper with which closure plates for the relief passages in the back wall of the fireplace are associated.

Fig. 5 is a horizontal section on the line 5—5 in Fig. 1, in which the location of the areas of low pressure in the combustion chamber, or firebox are indicated.

Fig. 6 is a vertical section of a fireplace showing the relief passages as located in the side walls of the firebox.

Referring more in detail to the drawings:

First, with reference to the showing of the present improvement as applied in Figs. 1 and 2: The illustrated fireplace structure is typical of those used in residences, and it embodies the combustion chamber or firebox 1, defined by the opposite side walls 2 and 2', a back wall 3, and the top or lintel portion 4, that forms the arch across the top of the opening 5 from the room into the combustion chamber. At the top of the combustion chamber is a throat structure providing, back of the lintel and above the top edge of the back wall, an upwardly and rearwardly directed passage 6 leading into the chimney flue 7.

As observed best in Fig. 1, the back wall 3 of the firebox, from the floor upwardly, is slightly forwardly curved, providing a downwardly tapering pocket 8 between it and the outside wall 9 of the chimney that usually continues downwardly at least to the floor line. This pocket, as shown in Fig. 1, is generally filled to a certain depth by suitable filling, usually mortar, as indicated at 10.

Also, it is to be observed by reference to Fig. 5, that the opposite side walls 2 and 2' of the combustion chamber converge from the opposite vertical edges of the fireplace opening 5 toward each other as they approach the back wall 3, thus, back of them, pockets 8a are provided and for the purpose of obtaining the results desired by the construction illustrated in Fig. 6.

It will be understood that the pocket 8 back of wall 3, and the pockets 8a back of the side walls 2 and 2', are in open communication at their upper ends with the lower end of the flue 7. Also, it is shown in Fig. 2 that the flue is symmetrically located with reference to the opposite sides of the combustion chamber and is flared at its lower end to the width of the chamber; the main channel of the flue being somewhat back of the throat passage as noted in Fig. 1.

To further explain the objects of the present invention, it will here be stated that when a fire is kindled in a fireplace in the usual manner, air will be drawn from the room into the combustion chamber to support combustion, and thus currents of air will be caused to converge from the room into the combustion chamber at front, top and sides of the fireplace opening, directly toward the fire. These air currents have been indicated by direction arrows in Figs. 1 and 2.

It is the natural tendency of the upflowing air and hot gases of combustion to rise from the fire in a conical taper to the central part of the throat passage, and thence pass into the flue 7 to flow up the center or axis of the latter after passing from the throat passage 6. As a result of the rapid convergence of air currents toward and into the throat and flue, areas of relatively low air pressure will be created back of the fire in the corner portion of the combustion chamber. These areas, which I have, for explanatory purposes, designated as low pressure areas, have been enclosed by the dash lines in Fig. 1 and in Fig. 5, and are designated by reference character A. Also, it is to be understood that in the flue 7, the strongest current of upflowing gases will tend to follow the center line of the flue, and in most instances the reverse or downdraft currents will flow down the flue along the corner areas. These downdraft air currents ordinarily, without the present invention being embodied in the fireplace, will form whirls and eddies in the pocket 8 and will intermittently or continuously spill therefrom into the top of the combustion chamber, through the opposite end portions of the throat passage, thus causing some of the rising smoke and gases to be forced out from the chamber into the room.

In the mentioned copending application, I illustrate the provision of relief passages for the disposal of the downdraft currents; these passages and cooperating parts involving use of a special form of throat damper. In the present instance, the invention contemplates the provision of relief passages that may be disposed at various locations in the firebox, and it is not necessarily required that dampers be used in the passages, although dampers are desirable in order to provide for closing the passages when the fireplace is not in use, or when it is desirable to more or less control the fireplace draft.

The gist of the present invention therefore resides in the provision of relief passages from the flue pockets 8 or 8a, or from both, into the combustion chamber for the dissipation of the detrimental down draft or back draft air currents into the areas of low pressure in the combustion chamber, as will presently be explained.

In Fig. 1, I have provided the back wall 3 near the top thereof and adjacent the opposite side walls, with the relief openings 14. These passages open directly into the combustion chamber through the back wall and into the pocket 8 which communicates with the lower part of the flue 7, substantially below the level of the throat passage.

Referring to the direction arrows in Fig. 1, it will be understood that the hot upflowing gases directly from the fire will pass upwardly through the throat passage 6 into the flue 7. Down flowing currents from the flue, and back draft currents from the throat, will enter the pocket 8 below the top edge and back side of the wall 3. Ordinarily, and without the present relief openings 14, these air currents would fill up the pocket and spill over into the top of the fireplace at the ends of the throat passage and crowd smoke into the room. However, it has been found that by the provision of the passages 14 from the pocket 8 into the firebox, so located as to release these downdraft currents, or back draft currents, into those indicated areas A of low pressure back of the fire, they will then be dissipated into the combustion chamber and merge with the upflowing gases and will not cause any outflow or spilling into the room with the incident undesirable smoking. The flow of these downdraft air currents into the low pressure areas of the combustion chamber, has been indicated by arrows in Figs. 1 and 2.

It is to be understood that the passages 14 might be in various number and located in the back wall at the places shown or at various elevations higher or lower than indicated in Fig. 1. It is desirable, however, to have these openings as high as practical because the heat in pocket 8 emanating from the back wall 3 will to some extent retard downflow of air currents in the pocket 8. However, such passages, when used in a fireplace that is equipped with an outside or exterior chimney, can be disposed at the floor

line and would be effective at that location since the heat of the back walls will be more readily dissipated to the relatively cold outside walls of the fireplace chimney.

The provision of downdraft relief openings 14a on the side walls of the firebox is illustrated in Fig. 6, and while these are therein located near the top, it is also to be understood that they also might be at various elevations, and by reason of their opening into the pockets 8a, will be effective for the relief of the downdraft currents.

While it is not necessary, insofar as the principles of this invention are concerned, that the passages 14 or 14a be provided with dampers, or closure means, it has been found desirable that dampers or closure plates be provided therefor and used in cooperation with suitable throat dampers. In Fig. 3, I have illustrated a suitable type of closure or damper for the openings 14 as provided in Figs. 1 and 2. This particular closure comprises a plate 25 that is pivotally hinged, by trunnions 26 at its upper corners, in a metal frame 27 that is fitted in the opening 14. The plate is adapted to swing between positions closed against and from the frame, thus to close or uncover the passage. On the plate 25 is an arcuate arm 29 extended into the frame to ride on a lug 30 thus to hold the plate in a closed position, or at different positions of open adjustment. The plate, at the front, is formed with an eyelet 31 adapted to receive the end of a hook to pull the plate to open positions.

In the detail of Fig. 4, I have shown the throat passage as being equipped with a damper plate 35 that is hingedly mounted in a metal frame 36 that is set in the throat opening. The plate 35 swings on a horizontal hinge axis at its lower edge, from closed to open positions. Affixed to the plate 35 are downwardly directed arms 40 with plates 41 at their lower ends adapted to close over the openings 14 with the closing of the damper. When the damper 35 is adjusted to any of its open positions, these closure plates 41 are moved accordingly, from their openings 14. Similar dampers, either individually adjustable or operating in conjunction with the throat damper, could likewise be provided to cover or uncover the openings 14a.

Assuming that a fireplace is thus provided with relief passages for the back draft or down draft air currents, it is quite evident that these currents will be delivered or directed into those areas in the firebox which I have designated as "low pressure areas" and which are back of the fire, from which they will be dissipated into the upflowing hot air currents, and back into the flue in such manner that they will not tend to cause the fireplace to smoke. The particular location of these openings 14 or 14a is material only to the extent that they be so located that they will provide effective outlets or relief passages for the back draft and down draft air currents into those areas in the fire box where they will not crowd smoke or gases of combustion into the room, and these low pressure areas may be at various locations as determined by structural features of the fireplace. The damper control of the outlets is optional, the same as is the dampered control of the fireplace throat, but is desirable for the same reasons that it is desirable to provide the throat damper.

Having thus described my invention, what I claim as new therein and desired to secure by Letters Patent is:

1. A fireplace structure including a flue and an open front combustion chamber of substantial width and depth and having an outlet at the top and centrally of its transverse dimension leading into the flue for the outflow of gases of combustion; said structure defining a pocket therein separate from the combustion chamber, below the level of the said outlet therefrom and in direct communication with the flue to gather down draft and back draft air currents, and there being a passage from the said pocket opening into the combustion chamber for ready dissipation from the pocket of back draft and down draft currents of air into the combustion chamber at one side and out of the normal path of upflowing gases.

2. In a fireplace structure, a flue, an open front combustion chamber having a throat structure forming a passage leading from the top of the chamber into said flue for the outflow of gases of combustion; said structure defining a pocket below the level of the throat passage, open at the top to the flue and throat passage for the reception of back draft and down draft air currents, and there being a relief passage from the said pocket into the combustion chamber for the dissipation of said back draft and down draft air currents into a low pressure area within the chamber for flow to the throat passage, a damper hingedly mounted in the throat passage to swing between open and closed positions, an arm fixed to the said damper, a plate fixed to said arm for movement therewith to cover the relief passage from the said pocket coincident with the closing of the throat damper and to uncover the said passage coincident with the opening of the throat damper.

ALBERT P. ROBINSON.