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D. H. HAYDEN

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FIREPLACE

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Fig. 1.

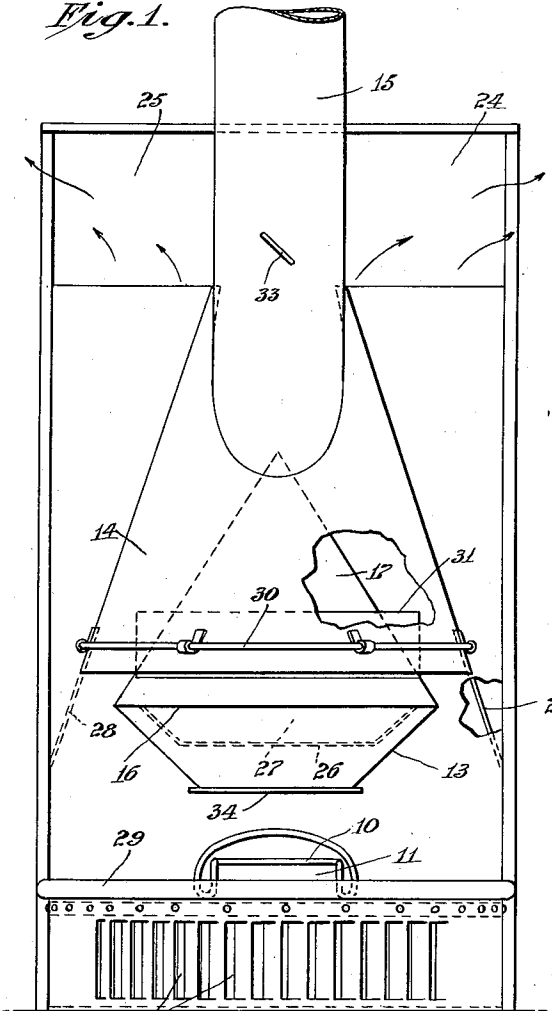


Fig. 2.

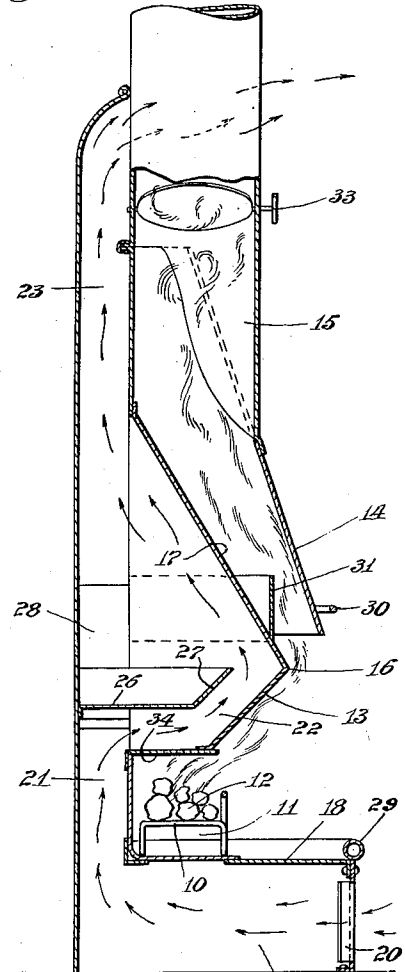


Fig. 3.

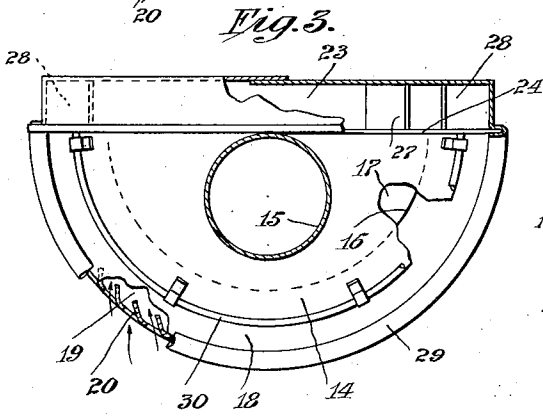
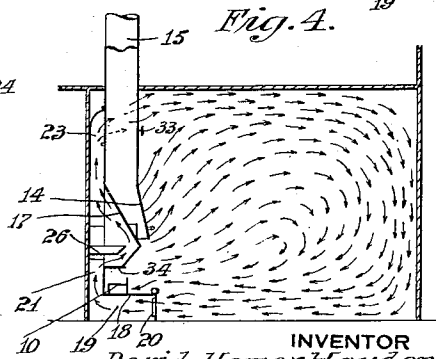


Fig. 4.



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FIREPLACE

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6 Claims. (Cl. 126—121)

This invention relates to fireplaces such as are used for heating houses and the like.

Ordinarily it has been customary to provide a smoke flue of such size and shape that gases rise from the grate in a large enough volume to preclude complete combustion of all the gases and solid particles carried thereby. Proof of this fact is sometimes seen in the presence of a flame above the top of a chimney which does not extend all the way down into the chimney for its full length. Such incomplete combustion is believed due to the volume of gases being sufficient to keep air away from the inner portion of the rising column.

An object of this invention is to eliminate this objection and obtain complete combustion by spreading the gases into so thin a sheet that all particles are brought into contact with the air.

Another object is to provide an efficient fireplace capable of heating a room with little fuel. A further object is to absorb heat from in back of the fireplace and utilize the heat so absorbed for also heating the same or another room.

Still another object is to provide enhanced circulation of air without the aid of a fan or blower whereby all portions of an ordinary room may be heated.

In the drawing—

Fig. 1 is a front elevation of one embodiment of this invention.

Fig. 2 is a longitudinal section through the device of Fig. 1.

Fig. 3 is a top plan view of the device of Figs. 1 and 2 with parts broken away.

Fig. 4 represents the general direction of convection currents induced in a room being heated, though of course the room is for convenience dwarfed in size with respect to the fireplace.

Some ordinary type of grate, andirons, or other suitable support 10 for fuel to be consumed is elevated sufficiently to provide an air space 11 below it as is customary. The fuel 12 may be wood, coal, or almost any well known type of suitable fuel. Above the grate is a bulbous deflector 13, the sides of which slope upwardly and outwardly at both the front and the sides. In the form illustrated this deflector 13 is of the general shape of an inverted cone though it will be understood the same may be polygonal in cross section to accomplish the same general purpose. This hood acts to spread or thin out the rising gases into a sheet sufficiently thin so that practically all portions of the gases may contact with the air and thus be completely consumed. With

a small wood fire it has been noted these rising gases seem to be igneous and glow in rising and being fanned or thinned out by the deflector.

Above the deflector is a hood 14 of the general shape indicated for the purpose of catching the rising gases and directing them up the chimney 15. The deflector 13 should extend outwardly and upwardly far enough so that the volume of gases may be sufficiently thinned out to be completely consumed by the time they reach the portion 16 of maximum outward bulge. Above the portion 16 the hood is of any convenient shape such as the general tapering or conical contour 17 illustrated.

The metal flooring 18 supports the grate or andirons high enough off the floor to provide a hollow space 19 so that air may be drawn through the louvers 20 and caused to circulate through the rising passage 21 in back of the fire and in back of the deflector 13. The rear of the fireplace and the deflector 13 being of metal or other appropriate heat conducting material become hot and the air in the passage 21 becomes heated and rises through the passage 22 in back of the deflector and up the passage 23 behind the chimney and thence out into the upper portion of the room through the discharge vents 24 and 25, which are for convenience arranged on each side of the chimney. The air passing through the passages 21, 22 and 23 is out of contact with the fire and of any products of combustion. This air circulates in the general direction shown by the arrows in Fig. 4 and assists in causing better circulation in the room being heated by the fireplace. The air directly heated by the fireplace rises and moves in the general direction of the innermost arrows of Fig. 4. Whereas in an ordinary room heated air tends to rise making the lower portion of the room cool, it will be seen that the additional heated air absorbed from the rear of the fireplace is discharged into the upper portion of the room and caused to circulate downwardly within the room and across the floor toward the fire.

The air heated and absorbed from the rear of the fireplace and deflector may, if desired, be discharged into another or different room. In this last event the air supply for the passage 21 may be from the other room, or from the same room. However, the preferred embodiment contemplates utilizing the heat absorbed from the rear of the fireplace and deflector in the same room in which the fireplace is located. This invention will be found applicable to a so-called

double fireplace, that is, one which is common to two rooms and in such case the fire should preferably be in at least two parts, one on each side of the air passage 21.

5 To direct the air in passage 21 into intimate contact with the heated deflector 13 it has been found desirable to provide a baffle 26 having a flat bottom portion and the inclined sides 27 as shown in Fig. 2. If desired the air in passage 10 21 may be directed toward the bottom of the deflector although this has not been found necessary. It is desirable, however, to prevent the air in back of the fireplace from rising laterally beyond the hood and for this reason the baffles 15 28 have been provided as shown in Figs. 1 and 2.

A guard rail 29 around the hearth will be found to be ornamental and prevent any ashes from getting onto the floor of the room.

20 The hand rail 30 around the lower part of the hood has been found to be kept cool enough without having it thermally insulated from the hood. The guard rail 29 is also kept cool by the cool air passing above and below it.

25 Within the flue a wall 31 may be provided to obtain the customary jet action for substantially continuous or more uniform flow of flue gases without their being mixed with too large a proportion of air from the room. After passing in contact with the deflector walls and with the 30 inner flue wall determined by the cone 17, the heated air passing through the passages 21, 22 and 23 may be maintained in back of the chimney by additional baffles. A damper 33 being customarily provided in a flue should be elevated 35 in order to be located in a suitable portion of the chimney 15. It will be understood a damper for the air passages 21, 22 and 23 may be provided by means of a shutter on the outside of the louvers 20 or may be located elsewhere in 40 these passages to be accessible from the sides or front. The lower portion 34 of the deflector 13 has been shown to be flat, though of course it may be somewhat inclined though preferably not as much inclined as are the sides 13.

45 A distinctive characteristic of this fireplace is its great efficiency in providing effective heating with an unusually small amount of fuel.

50 For some reason the fire will be found to burn more rapidly in the center of the grate, that is substantially under the center of the deflector. Possibly the reason for this is because the center of the fire is hottest and not cool as the surrounding edges may be, yet combustion seems to be complete. The gentle glow from hot gases 55 around the deflector 13 provides radiant heat downwardly and outwardly into the room as distinguished from the radiant heat from an ordinary fireplace which is directed outwardly in 60 practically only one direction instead of being directed laterally outwardly on both sides as is the case with this fireplace. Another reason for the fire being hottest in the center may be because the crown sheet 34 becomes very hot and thus assists in creating a strong draft in the 65 center. The complete combustion of the gases rising from the grate by means of the deflector 13 is an important feature of this invention since much less heat energy is lost up the chimney. Another important feature of this invention 70 is the supplemental heating by air in back of the grate and deflector 13 whereby the room is heated thoroughly throughout without the use of any fan or blower. Of course this fireplace may be built in a corner.

75 Combustion is so complete that about seven

(7) feet above the fire the flue is not hot enough to be uncomfortable to the bare hand when it is pressed against the metal of the flue and that is so even when a large enough fire is burning 5 outside of the deflector 13.

The air that causes the gases to ignite is preheated since it has to enter the fireplace under the deflected heat from the deflector. If coal or oil is used as fuel, the unit might be placed in 10 the cellar of a house and the heated air piped into the flue as is the case with an ordinary furnace or heating unit. In this last event by placing a shield in front of the hearth and having return air registers, the unit could operate 15 in place of an ordinary furnace but probably on much less fuel as well as less initial cost, since the fuel economy is due to the open complete burning. Ordinary heating units such as 20 furnaces or stoves do not get enough air to effect complete combustion. The danger of fire is negligible because of the combustion being complete. The burning is not substantially different from the blaze from a gas stove. No open fireplace heretofore as far as is known has been 25 adapted to give this effect.

In the appended claims the term "grate" has been used to cover andirons and equivalent purpose devices.

30 From the drawing it may be seen that the maximum width of the deflector 13 is over twice that of the grate illustrated. The bottom 34 of the deflector changes the direction of a large portion of the rising flames and gases and to that extent slows their movement. 35

I claim:

1. An open fireplace including a grate, a generally inverted conical guide spaced from and above said grate by an amount substantially greater 40 than the depth of fuel on the grate, shaped to spread the hot gases laterally and forwardly to insure intimate contact between the air and the hot gases rising from a fire on said grate, a hood above and spaced from said guide on the sides and front, a passageway below said grate and in 45 back of said guide extending above the guide, the guide being of metal and forming at least a portion of one wall of said passageway, said passageway discharging heated air into a room above the lower portion of said hood, the natural circulation of air through said passageway being 50 sufficient to circulate the air of a room at a distance from said fireplace downwardly.

2. A fireplace including a grate of substantial area, a bulbous deflector spaced above the grate 55 and having its walls sloping outwardly, upwardly and laterally from a central portion less inclined than the surrounding portion of the deflector to fan out or thin out flames and gases rising from the grate in contact with the air until such 60 gases are more than twice their lateral extent at the grate, whereby said deflector enables complete combustion to take place, a hood over the widest portion of said deflector for directing the products of combustion up a flue. 65

3. An open fireplace including a grate of substantial area and on which fuel may be burned, a deflector above the grate having a portion for 70 changing the direction of movement of a large part of the rising flames and gases from the grate before they have risen enough to become cooled below the ignition temperature of the unburned particles of gas, said deflector above said first 75 mentioned portion being outwardly and upwardly inclined to insure complete combustion of the

gases rising from said grate by thinning out such gases.

4. An open fireplace having a fuel burning grate from which a column of gases of substantial cross sectional area rises, a deflector above the grate having its wall sloping upwardly and outwardly as well as flaring laterally on both sides beyond the grate, whereby the surface of the deflector is progressively increased upwardly and radiant heat may be transmitted laterally as well as outwardly, the deflector surface extending for a substantial distance both upwardly, laterally and outwardly whereby the flames and gases rising from the grate are spread and thinned out into a sheet of greater periphery and into intimate contact with the air to insure complete combustion of such gases before they become cooled below their ignition temperature, and a flue beginning adjacent the portion of the deflector of maximum width and depth for directing the products of combustion up a chimney.

5. An open fireplace having a fuel burning grate from which a column of gases of substantial cross sectional area arises, a deflector above the grate having its wall sloping upwardly and outwardly as well as flaring laterally on both sides beyond the grate, whereby the surface of the deflector is progressively increased upwardly and radiant heat may be transmitted laterally as well as outwardly, the deflector surface extending for a substantial distance both upwardly, laterally and outwardly whereby the flames and gases rising from the grate are spread and thinned out into a sheet of greater periphery and into inti-

mate contact with the air to insure complete combustion of such gases before they become cooled below their ignition temperature, a flue beginning adjacent the portion of the deflector of maximum width and depth for directing products of combustion up a chimney, and a passage for supplying air underneath the grate, upwardly behind it, contiguous the rear side of the upwardly, outwardly and laterally flaring deflector and thence out into a room above the portion of the deflector of maximum width.

6. An open fireplace having a fuel burning grate from which a column of gases of substantial cross sectional area arises, a deflector above the grate having its wall sloping upwardly and outwardly as well as flaring laterally on both sides beyond the grate, whereby the surface of the deflector is progressively increased upwardly and radiant heat may be transmitted laterally as well as outwardly, the deflector surface extending for a substantial distance both upwardly, laterally and outwardly whereby the flames and gases rising from the grate are spread and thinned out into a sheet of greater periphery and into intimate contact with the air to insure complete combustion of such gases before they become cooled below their ignition temperature, and a flue beginning adjacent the portion of the deflector of maximum width and depth for directing the products of combustion up a chimney, a portion of the deflector immediately above the grate being somewhat flattened below its inclined wall.

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