FIREPLACE WITH MOVABLE REFLECTOR

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FIREPLACE WITH MOVABLE REFLECTOR

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The present invention relates to domestic heating installations such as fireplaces and stoves embodying a grate for solid fuel. The invention is applicable to such heating installations whether or not they include domestic boilers and/or cooking ovens.

The term "domestic heating installations" is used herein to mean heating installations for houses, public waiting rooms and the like where open fireplaces or closed stoves are customarily used with or without a boiler and/or an oven or cooking range.

One object of the invention is to provide a domestic heating installation such as a fireplace or stove which will not only be relatively efficient as a heater but which will at the same time provide the cheer which is afforded by an open fire grate.

A further object of the invention is to achieve a relatively high degree of radiant heat emission from an open fire grate.

A still further object of the invention is to provide a domestic heating installation which can burn coke in an open fire grate.

According to the present invention a domestic heating installation such as a fireplace or stove embodying a grate or combustion chamber for solid fuel is provided with a radiant heat reflector extending upwardly and forwardly from above the back of the grate so as to reflect radiant heat outwardly from above the fire and its provisions with a main flue and an auxiliary flue rising from the grate from levels one below the other so as respectively to induce a draught through the fire and to draw products of combustion from the surface of the fire.

According to another aspect of the invention a domestic heating installation such as a fireplace or stove embodies a grate and combustion chamber for solid fuel which is closed at the front and is provided with a main flue extending upwardly from a level below the normal level of the fuel in the grate to cause a downdraught through the fire, and with an auxiliary flue extending upwardly from approximately the normal level of or from a little above the normal level of the fuel in the grate, adapted to carry away products of combustion from the surface of the fire, a radiant heat reflector being arranged above the grate extending upwardly and forwardly from the back of the grate from a level at or above said auxiliary flue so as to reflect radiant heat outwardly from above the fire.

As a rule it will be preferable for said flues to rise from the back of the grate although in certain cases it may be convenient for one or both of the flues to rise from one side of the grate or alternatively from both sides.

An important feature of the present invention consists in a domestic heating installation such as a fireplace or stove embodying a combustion chamber and grate adapted to contain a mass of solid fuel in which a radiant heat reflector is positioned adjacent said fuel mass so as to reflect heat outwardly therefrom, and in which a flue rising from said combustion chamber or grate is adapted to induce a draught over the face of the reflector and through the fuel mass and is spaced from said reflector by a layer of said fuel mass. A further feature of the invention consists in a damper controlled auxiliary flue adapted to influence the draught induced through the combustion chamber by said flue.

The reflector is preferably upwardly and forwardly curved in vertical cross section and may be flat or curved form in horizontal cross section and it is preferably provided with side cheeks which are parallel or converge slightly in the forward direction and the forward edges of which are adapted approximately to coincide with the margin of the fireplace opening.

The reflector may be pivoted at its upper end to the fireplace or stove so that it can be swung forwardly to induce an up-draught when the ash pit door and another door above the opening in front of the stove are opened, and thus act as an incinerator, and preferably the reflector is also readily detachable from the fireplace or stove so that it can be completely removed.

In a preferred form of construction the space above the reflector is normally isolated from the chimney by means of a door which can be opened or removed to enable the grate to be used as a conventional up-draught grate when the reflector is removed or to be used as an incinerator when the reflector is swung into its forward position to act as a blower.

The upper ends of the flues are preferably controlled by dampers which are adjustable by a common control which causes one damper to open as the other closes, the damper control being adapted to prevent the damper of the auxiliary flue from being fully closed so as to maintain at all times a certain degree of draught through the auxiliary flue for removal of products of combustion from the surface of the fire.

The said flues preferably open into a smoke box in which said dampers are arranged and which has a chimney opening.

It will be appreciated that the arrangement
of the flues in relation to the grate and reflector will induce a draught of air downwardly over the face of the reflector to keep it relatively cool and to prevent it from becoming unduly dirty. So that with moderate cleaning the reflector will remain efficient as a radiant heat reflector for long periods of time.

The invention can be used advantageously in conjunction with a hot water boiler or with a cooking range, or both. In the case of a cooking range one or more side flues may extend from the fireplace or stove to lead the products of combustion to the cooking range. Such flue or flues may be alternative to, but are preferably additional to, said main and auxiliary flues already referred to.

An ordinary hot water boiler of rectangular section may be arranged behind the fireplace and the said main flue may pass beneath the boiler. Preferably, however, a relatively deep boiler is provided behind the fireplace or stove and said main flue and preferably also said auxiliary flue pass through the boiler. Such boiler may be of fabricated steel construction and may be used in conjunction with a calorifier.

In connection with the present invention it may be advisable to employ a grate of which some or all of the fire bars are water tubes connected with the boiler.

The grate or stove of the present invention may, if desired, be provided with a door, the front of which may be of glass or mica fitted into a suitable hinged frame. Suitable apertures should be provided at the upper end of the door for admission of air which passes downwardly over the reflector. In the case of a stove the door may be mounted upon a displaceable support which is slideable in guides along the side of the stove, which guides are adapted to receive also the door itself when open. Thus, such a door may be first opened and then slid backwardly with its support into the guides formed in the side of the stove.

A valuable application of the invention is to stoves which can be used for heating two adjacent rooms or spaces, the main room being heated by the fire direct and the other room by the back of the stove which may project into the same through a partition wall. Such a stove may be of rectangular form in plan and elevation and may embody a back boiler of height equal to the height of a stove less the depth of the smoke box. The rear face of the boiler may be formed of corrugated metal so as to afford a good dissemination of heat therefrom.

The invention is more particularly described by way of example with reference to the accompanying drawings which show a preferred form of construction as applied to a stove or fireplace unit, and in which:

Figure 1 is a front view,
Figure 2 is a side view taken from the left hand side of Figure 1,
Figure 3 is a vertical sectional view taken through the centre of Figure 1 and
Figure 4 is a diagrammatic plan view taken between the lines IV—IV of Figure 3 to illustrate the position and shape of the reflector and flues.

The fireplace or stove unit shown in the drawings is contained in an open fronted box-like metal casing of height and width approximating those of a conventional fireplace. A horizontal cross wall 2 spaced below the top of the casing 1 defines a smoke box 3, whilst a vertical wall 4 spaced forwardly from the rear wall of the casing defines a fireplace compartment 5 in the lower part of which a grate or combustion chamber 6 is disposed, and a closed watertight rear compartment or water boiler 7.

The grate or combustion chamber 6 is closed at the front by a portion 9 of the casing front and is provided with a lining 8 formed of fireclay or other ceramic material which extends around the front, sides and rear of the grate.

The grate has a set of rocking fire bars 10 which are operated by an external lever 11 through a cross shaft 12 and rocker arm 13. A radiant heat reflector 14 has side cheeks 15 which converge slightly in the forward direction extends upwardly and forwardly from a position slightly above the normal fuel level at the back of the grate towards the front upper margin of the fireplace compartment 5. The forward edges of the side cheeks 16 are flanged outwardly and in.

The reflector is provided at the upper end of each side cheek thereof with a short pivot pin 25 (indicated in dotted lines in Figure 3) each of which rests in a U-shaped lug 26 on a supporting pin 27 shown in the vertical margins of the opening 16 in the face 17 of the casing 1. Thus the reflector can be swung from its normal position shown in cross section in Figure 3 to the position indicated in broken lines in Figure 3 where it can act as a blower to induce an updraught.

A main flue 18 rises upwardly through the boiler from the back of the grate from a level below the normal level of the fuel in the grate, whilst an auxiliary flue 19 similarly rises upwardly from a level slightly above the normal level of the fuel in the grate. Each of these flues is of upwardly increasing cross sectional area and passes through the cross plate 2 to open into the smoke box 3 from which products of combustion can pass through an opening 20 to the chimney.

It will be appreciated that since the front of the grate is closed, the main flue 18 will induce a down draught through the fire as indicated by the arrows 21 and 22 whilst the auxiliary flue 19 will withdraw any products of combustion from the surface of the fire which might otherwise tend to rise and foul the reflector. This flue arrangement will moreover induce a draught to the forward reflector 14 whereby to keep it cool and clean.

Combustion can be controlled by means of a main damper 27 and auxiliary damper 28 governing the main and auxiliary flues respectively. These dampers are provided with pivot lug 29 and 30 having pivot pins which rest in open U-shaped bearings 31, 32 mounted on the cross plate 2, whereby the dampers can be readily lifted from their bearings and withdrawn. Each damper is provided with a tail-piece 33 which engage respectively with a cam 34 and 35 mounted on a cam shaft 36 journalled at the back front of the smoke box 3 and controlled from the front of the smoke box by a hand wheel or knob 37. The cams 34 and 35 are so shaped and so disposed on the cam shaft 36 that the damper 27 is caused to open when the damper 28 is caused to close and vice versa. Thus if the damper 27 is caused to close by either a large or small amount, the damper 28 is caused to open correspondingly. However the cam 35 is so shaped that the auxiliary damper 28 is never allowed to completely close and its maximum degree of closure is as shown in Figure 3. The damper 28 will always be at least a small degree of draught through the auxiliary flue 19 to ensure that any
products of combustion on the surface of the fire are taken away and not allowed to soil the reflector.

The hand wheel or knob 37 engages the cam shaft 36 through a sleeve 40 in which the forward end of the cam shaft is received and which is slotted as at 41 to receive a pin 42 projecting radially outwardly from the cam shaft 36. The forward end of the shaft 36 abuts against a strong spring 43 in the sleeve 40, which spring allows for temperature expansion of the shaft and prevents it from being locked between the back of the boiler and the knob 37.

The cross wall 2 is provided with a door 44 hinged at 45 and secured in its closed position by a dog 46. When the door 44 is in its open position, shown in broken lines in Figure 3, and when the reflector 14 is in its forward position, as shown in broken lines in Figure 3, products of combustion can pass directly upwardly from the fire to the smoke box and chimney, and in this condition the installation can be used as an incinerator. With the door 44 open and the reflector 14 completely removed, the grate can be used as an ordinary updraught grate as for example when the fire is being lit.

An ash pit door 47 is pivoted as at 48 and can be held in any suitable adjusted open position by means of a cam 50 which is operated by a cam lever 51. The ash pit door 47 has a knob or handle 52 at the left hand end thereof as viewed in Figure 1 to enable the ash pit door to be widely opened and to permit withdrawal of an ash bin 54.

A water feed connection 55, a return connection 56, a hot water outlet connection 57, an air vent 58 and a gas connection 59 for lighting the fire are indicated diagrammatically in Figure 2.

The smoke box is provided with an access opening 53 closed by a cover 61.

I declare that what I claim is:

1. In a domestic heating installation of the open-fronted type, such as a fireplace or a stove, means forming a combustion chamber for solid fuel, a radiant heat reflector arranged above the combustion chamber and behind the opening in the front of the installation and extending upwardly and forwardly from a position adjacent the rear top portion of said chamber to the upper margin of said opening, and a main flue and an auxiliary flue leading from the combustion chamber at levels one below the other, the entrance to the main flue being located substantially below the level of the upper surface of said solid fuel under normal grate load conditions so as to induce down draft through a substantial portion of said solid fuel and the entrance to said auxiliary flue being located near the upper surface of said solid fuel.

2. In a domestic heating installation such as a fireplace or stove, of the type in which the front has an opening therein, means forming a combustion chamber below said opening for receiving solid fuel, said opening being approximately the same width as the width of the combustion chamber and of height approximately equal to said width, a radiant heat reflector arranged above the combustion chamber and behind the opening in said front and extending upwardly and forwardly from a position adjacent the rear top portion of said chamber to the upper
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a door normally closing said opening but open-able to enable said grate to be operated as a conventional updraft grate with the door open, the said closure means open and with the reflector removed or swung forwardly.

7. A domestic heating installation comprising an open-fronted box-like metal casing, a cross partition extending across the casing from back to front to define a shallow smoke box in the upper part thereof said cross partition having an opening in the forward part thereof, an upstanding partition of metal extending from side to side of the casing and up to said cross partition to form a deep and watertight water heater compartment in the rear part of the casing beneath the smoke box and a deep fireplace compartment in front of the water heater compartment, a grate for solid fuel in the lower part of said fireplace, a main flue extending from below the normal fuel level in the grate and rising upwardly through the water heater to said smoke box, an auxiliary flue extending from the region of the normal fuel level in the grate and rising through the water heater and opening into said smoke box, a reflector in the fireplace compartment rising upwardly and forwardly from the back of the grate towards the upper front part of said fireplace compartment, separable pivot means supporting said reflector on said metal casing located above said grate so that the reflector may be readily detached or may be swung into a forward position where it acts as a draft inducer or blower by closing said opening, and a door normally closing said opening in said cross partition but adapted to be opened to enable the grate to be operated as a conventional updraft grate when the reflector is removed or as an incinerator when the reflector is swung into its forward position.

8. A domestic heating installation according to claim 7 in which said door closing the opening in said cross partition is hinged to the cross partition so as to open downwardly and rearwardly about an axis adjacent said upstanding partition.

9. A domestic heating installation according to claim 7 and including main and auxiliary dampers pivotally mounted in said smoke box to control said main and auxiliary flues, a cam shaft in said smoke box operable from the exterior thereof, and cams on said cam shaft adapted to control the opening and closing of said dampers.

10. A domestic heating installation according to claim 1, each of said main and auxiliary flues being provided with dampers and a common control for said dampers operable to close one damper as the other damper is opened and embodying means to prevent the damper of the auxiliary flue from being fully closed.

11. A domestic heating installation according to claim 7 including cam operated dampers, one for each of said flues, said dampers located in said smoke box, cams for operating said dampers, a cam shaft in said smoke box for supporting said cams, and control means operable from the exterior of the casing to rotate said cam shaft.

12. A domestic heating installation according to claim 1, each of said main and auxiliary flues being provided with a damper, and a common control for said dampers embodying means to prevent the damper of the auxiliary flue from becoming fully closed.

RICHARD BAINES.

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