

June 25, 1963

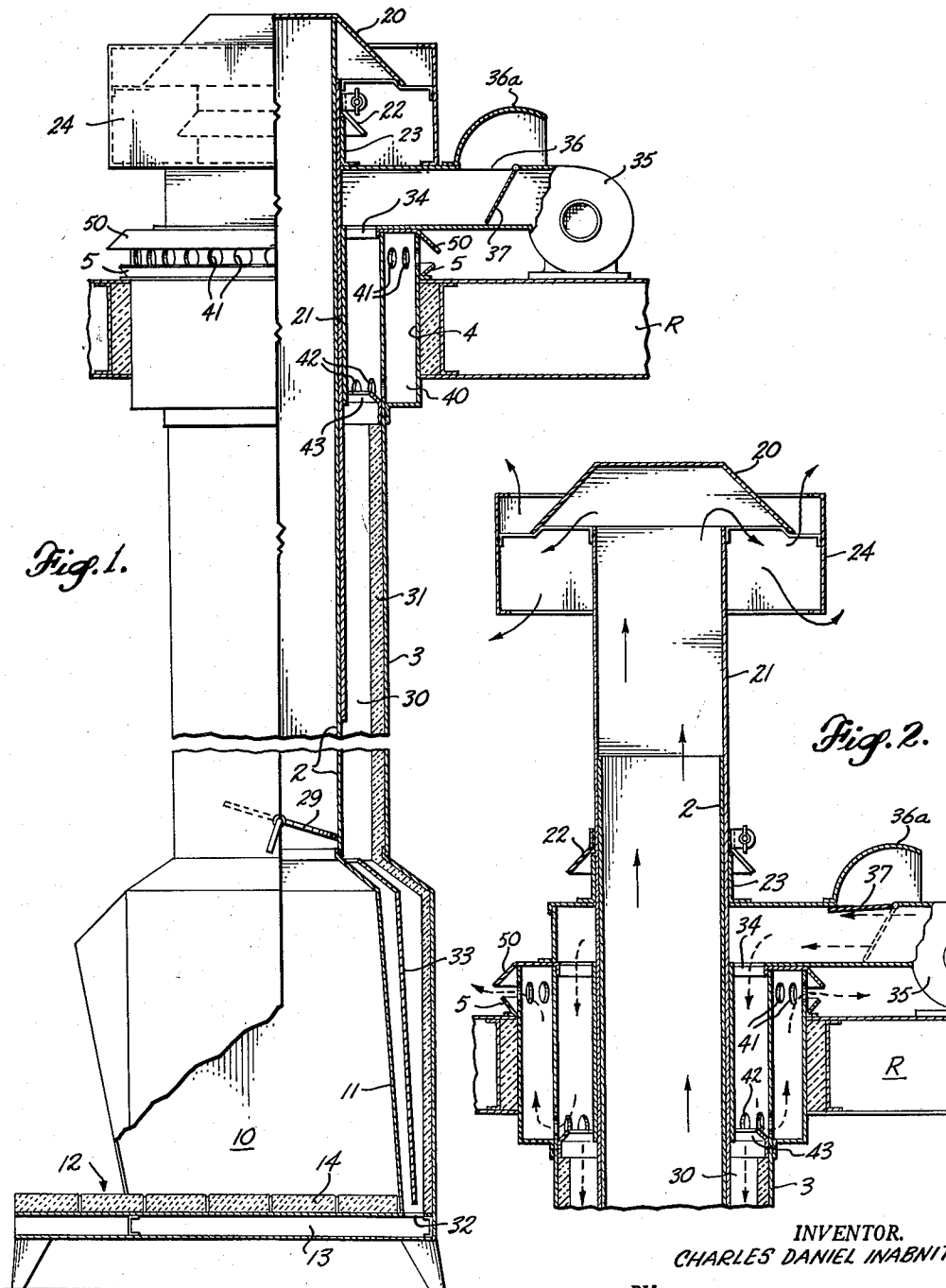
C. D. INABNIT

3,094,980

FIREPLACE INSTALLATION FOR MOBILE HOMES

Filed Jan. 23, 1961

2 Sheets-Sheet 1



INVENTOR.
CHARLES DANIEL INABNIT

BY
Reynolds & Christensen
ATTORNEYS

1

3,094,980

FIREPLACE INSTALLATION FOR MOBILE HOMES

Charles Daniel Inabnit, 13000 S. Empire Way,
Seattle, Wash.

Filed Jan. 23, 1961, Ser. No. 84,193
6 Claims. (Cl. 126—121)

This invention deals with a fireplace installation which is especially suited to mobile homes. It may, however, be used in other circumstances, and especially where conditions similar to those prevailing in mobile homes are to be found. Restriction to the particular use is, therefore, not to be implied, and the use is mentioned for purposes of illustration primarily.

Mobile homes are made of metal for the most part, and are designed to be closed very tightly, for otherwise dust would seep into the interior during travel of the home from one point to another. Being thus tightly closed, it is necessary if a fireplace is to be installed that provision be made for the supply of air from the exterior, not only for support of combustion but also to avoid asphyxiation of the occupants, either by oxygen starvation or by the formation of carbon dioxide or monoxide gas. Such air could be admitted by opening a door or a window, but this may be forgotten and, in any event, would tend to be uncomfortable, for if the weather is such as to make a fire desirable, it would be cold and drafty if a door were to be left ajar. It is an object of the present invention to insure admission of exterior air to the interior of the mobile home and, at the same time, to utilize the heat generated by the fire in the fireplace to warm such air so that it will be comfortable, and not drafty, when it exits into the interior of the mobile home.

It is also an object to provide such a fireplace installation which will especially insulate the parts which project through the roof, to protect the roof from overheating.

It is also an object to provide such an installation which will maintain proper insulation by thermally propelled air after the fire is virtually extinguished and the fan which is part of the installation has ceased to operate.

Since in any given location it may be desirable to have the smoke exit at an appreciable level above the roof, yet during movement of a mobile home it is essential that the overhead clearance be reduced as far as possible, it is a further object to provide a construction wherein the upper discharge end of the smokestack is adjustable in height, from a low height for traveling to a greater height during use.

Other objects, particularly such as relate to the avoidance of splash, the simplicity of construction and of operation, etc., will be more fully understood as this specification progresses.

FIGURE 1 is an illustration, partly in section and partly in side elevation, of such an installation with the parts shown in position for traveling.

FIGURE 2 is a sectional view similar to FIGURE 1 but showing the top of the stack elevated and the fan in operation, as would be the case during normal burning in the fireplace.

FIGURE 3 is in part a section and in part a front elevation, showing the parts of the installation arranged for cooling by means of thermally induced drafts with the fan shut down. In this view the upper end of the smokestack is shown as still elevated in approximately the same position as in FIGURE 2.

Preferably the entire installation is made of sheet metal or metal plates. It involves in particular a firebox located somewhere adjacent the floor level within the interior of the mobile home, a smokestack extending thereabove and through the roof and desirably adjustable in height, and a duct which extends vertically and which surrounds and is spaced from the smokestack, having

2

an exit at its lower end, preferably in the vicinity of the hearth of the firebox. The upper end of this duct has a fan or blower connected to it for discharge of air positively downwardly through the duct, thus picking up heat from the smokestack on the way down, and exiting into the interior as warmed air adequate in amount for humans and for combustion. Damper means are associated with the fan which, when the fan is not in operation, allows exit of air flowing thermally upwardly within the duct to the exterior above the roof. An air chamber or jacket surrounds the duct where the smokestack is installed through the roof. At its lower end the air jacket communicates with the interior of the duct and at its upper end communicates with the exterior, and means are provided for diverting immediately to the exterior some of the fan-propelled air which has picked up heat from the upper portion of the stack, thereby maintaining the roof in particular cooled. Provision is also made for adjustment of the height of the stack.

The firebox 10 is defined by the side and back plates indicated generally by the numeral 11 and has a hearth 12 which is hollow or which has a passage 13 opening to the interior of the mobile home. Fire brick 14 or like material may be used to cover the hearth. At its upper end the hearth leads into a smokestack 2 which extends upwardly through the roof R and is open at its upper end. In order that the height of the smokestack may be adjusted, it is preferred that a sleeve 21 be telescopically engaged with the stack 2. The sleeve 21 may be capped, as indicated at 20, against rain and the like, and the cap may be surrounded by a wind shield 24. Such provisions as the cap and wind shield are conventional and not in themselves a part of this invention. The vertical position of the sleeve 21, and hence the height of the composite stack, may be regulated by a clamping collar 22 such as may be secured anywhere in the height of the sleeve 21, to rest upon a fixed collar 23.

Surrounding the stack thus formed is a duct 3 which is spaced from the stack to leave a passage 30 extending vertically between them. Insulation 31 may be employed so that the duct 3 does not become overheated at its outer surface. The duct, in fact, extends substantially to the hearth, and surrounds not only the stack 2 but the firebox 10 as well, and the passage 30 communicates by apertures 32 to the air discharge hollow space 13 of the hearth. For additional insulation a heat screen 33 may be employed between the walls 11 of the firebox and the exterior of the duct surrounding the firebox. This extends from a level adjacent the apertures 32 to a level at least as high as the firebox itself, and provides dual passages for air of which the outer one will be somewhat less highly heated than the inner one.

The duct 3 extends through the roof R and at its upper end has an aperture 34 for entrance or exit of air, as will be explained later. A fan 35 which can conveniently be mounted upon the roof is connected to discharge air through the aperture 34 and so downwardly through the passage 30 and finally out through the space 13 to the interior. A hooded aperture 36 affords communication between the opening 34 and the exterior above the roof. A damper 37 is arranged to control this aperture 36. The damper 37 may be arranged downstream of the fan so that when the fan is operating the inflowing air will lift the damper 37 to more or less close the aperture 36, and to direct all the fan-propelled air downwardly through the aperture 34. If the fan is not operating, however, the damper 37 can fall by gravity, leaving the aperture 36 open to the exterior, so that air thermally propelled upwardly through the aperture 34 may exit at 36 to the exterior. FIGURE 1 shows the damper in the down position with the aperture 36 open and FIGURE 2 shows the reverse case.

3

Surrounding the duct 3 at its upper end at the roof level, and extending through the roof, is an insulative air jacket 40 defined in part by the vertical walls 4 and closed at its lower or interior end. It is provided with apertures 41, however, at its upper end, which communicate with the exterior above the roof. At the lower end of the jacket 40 there are apertures 42 which afford communication between the upper end of the duct 3 and the jacket 40. It is preferred also that a baffle 43 be provided, projecting into the passage 30 within the duct just below the level of the apertures 42, restricting slightly but not closing the passage 30. The purpose of the apertures 42 and baffle 43 will be explained shortly.

FIGURE 1 illustrates the condition for traveling. The sleeve 21 has been lowered to its lower limit wherein the cap 20 rests on and closes the upper end of the stack 2. The fan is not operating and the damper 37 has dropped to open the aperture 36. While this affords a clear passage to the interior, by way of passages 30, 13, it is unlikely that any appreciable quantity of dust will find its way through this circuitous passage into the interior, and if it were to do so, aperture 36 or its hood 36a could be positively closed and sealed.

When it is desired to operate the fireplace, the sleeve 21 and its cap 20 are elevated to the desired extent and so held by the clamping collar 22. A fire is started upon the hearth 12 and the smoke exits by way of the stack 2 and sleeve 21 in accordance with the full-line arrows in FIGURE 2. The stack becomes heated, and to cool it and to provide adequate air within the interior, the fan 35 is started, the controls being immaterial so far as the present invention is concerned (although automatic controls are contemplated), and the air moving inwardly raises the damper 37 from the dash-line to the full-line position of FIGURE 2, and air begins to flow downwardly through the passage 30 between the duct 3 and the stack 2, in accordance with the dash-line arrows. Most of this air will go all the way through the passage 30, exiting at 32 to the open space 13 and so out at the front of the hearth, where it will support combustion within the firebox 10 and supply air for breathing and warmth by convection to the occupants. Some of it, however, will be intercepted by the baffle 43 and will exit by way of the apertures 42 and 41 to the exterior. In so doing, it will tend to cool the stack in this particular region and will protect the roof R against overheating.

When the fire is substantially burned out, the fan 35 can be stopped by manual or automatic actuation of controls, and we now have the condition shown in FIGURE 3. There being nothing to urge air downwardly through the passage 30, such air as is therein will be warm and will tend to rise in accordance with the dash-line arrows in FIGURE 3. Since the fan has stopped the damper 37 has dropped. Consequently, this thermally-propelled air can exit to the exterior by way of the opening 36. Some of it, passing through the restriction afforded by the inwardly projecting baffle 43, will induce inward movement of air from the exterior by way of the apertures 41 and 42, also as shown in the dash-line arrows in FIGURE 3, and this will commingle with the air from the passage 30 and will be thermally propelled upwardly and outwardly at 36. Again, the roof will be well protected against overheating.

The usual provisions will be made to protect the apertures that open to the exterior against splash and drip. For instance, a splash baffle 5 is provided surrounding the apertures 41, and a drip shield 50 above the same apertures protects them against rain. These provisions are conventional and in themselves form no part of this invention. Similarly a smoke damper 29 may be used in the stack 2. The exterior form of the firebox may be varied to suit architectural tastes or personal requirements, but, again, this is no part of the present invention.

I claim as my invention:

1. In combination with a living enclosure having an aperture in the roof thereof, a fireplace installation com-

4

prising inner casing means defining a firebox in the enclosure and a smokestack extending upwardly from the firebox through the roof aperture, outer casing means extending about the firebox and upwardly therefrom through the roof aperture in spaced relation with the inner casing means to define therewith an annular air passage communicating with the interior and exterior of the enclosure, said outer casing means having ports therein in the portion thereof projecting through the roof aperture, and additional casing means extending through the roof aperture about said outer casing means portion and defining therewith an annular air jacket communicating with the exterior of the enclosure to induce inflow of outside air into and through the outer casing means portion upon draft of air through said annular passage.

2. The combination according to claim 1 further comprising power fan means mounted to force outside air into the upper portion of said annular passage for downward flow therethrough into said enclosure.

3. The combination according to claim 1 further comprising a baffle member projecting into said annular passage below said ports in the outer casing means portion to deflect a portion of the air moving through said passage relative to said outer casing means ports.

4. In combination with a living enclosure having an aperture in the roof thereof, a fireplace installation comprising inner casing means defining a firebox in the enclosure and a smokestack extending upwardly from the firebox through the roof aperture, said firebox having a hearth opening in one side thereof, outer casing means extending about the firebox and upwardly therefrom through the roof aperture in spaced relation with the inner casing means to define therewith an annular air passage terminating in upper and lower openings in the outer casing means adjacent the upper end portion of the smokestack and the hearth opening, respectively, said outer casing means having ports therein in the portion thereof projecting through the roof aperture, additional casing means insulatively engaged in the roof aperture about the outer casing means portion and defining therewith an annular air jacket communicating with the exterior of the enclosure through ports spaced relatively above said ports in the outer casing means portion to induce inflow of outside air into and through the outer casing means portion upon draft of air through said annular passage, and power fan means mounted to force outside air into the upper portion of said annular passage for downward flow therethrough into said enclosure via the lower of said terminal openings.

5. The combination according to claim 4 further comprising a baffle member projecting into said annular passage below said ports in the outer casing means portion to deflect a portion of the air moving through said passage relative to said outer casing means ports.

6. In combination with a living enclosure having an aperture in the roof thereof, a fireplace installation comprising inner casing means defining a firebox in the enclosure and a smokestack extending upwardly from the firebox through the roof aperture, said firebox having a hearth opening in one side thereof, outer casing means extending about the firebox and upwardly therefrom through the roof aperture in spaced relation with the inner casing means to define therewith an annular air passage terminating in upper and lower openings in the outer casing means adjacent the upper end portion of the smokestack and the hearth opening, respectively, said lower terminal opening being disposed on said side of the firebox in a position below the hearth opening, said outer casing means having ports therein in the portion thereof projecting through the roof aperture, additional casing means extending through the roof aperture about said outer casing means portion and defining therewith an annular air jacket communicating with the exterior of the enclosure to induce inflow of outside air into and through the outer casing means portion upon draft of air through

5

said annular passage, power fan means mounted to force outside air into said annular passage adjacent the upper of said terminal openings for downward flow through the passage to the lower of said terminal openings, and gate valve means pivotally mounted to close said upper terminal opening under the forced draft of the fan.

References Cited in the file of this patent

UNITED STATES PATENTS

345,664	Bolte	July 20, 1886	10
382,507	Bending	May 8, 1888	

757,348
1,388,330
1,588,587
1,697,635
2,243,751
2,410,537
2,625,150
2,634,720

6

Ross	Apr. 12, 1904
Gardiner	Aug. 23, 1921
Klaus	June 15, 1926
Cornelius	Jan. 1, 1929
Donley	May 27, 1941
Wait	Nov. 5, 1946
Little	Jan. 13, 1953
Thulman	Apr. 14, 1953

FOREIGN PATENTS

Australia	Nov. 14, 1957
-----------	---------------

219,136