

Aug. 10, 1965

L. O. MORIN, JR., ETAL

3,199,504

DUAL PURPOSE SPACE HEATER

Filed March 9, 1962

2 Sheets-Sheet 1

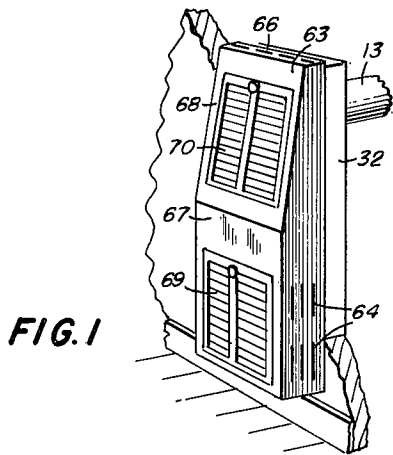


FIG. 1

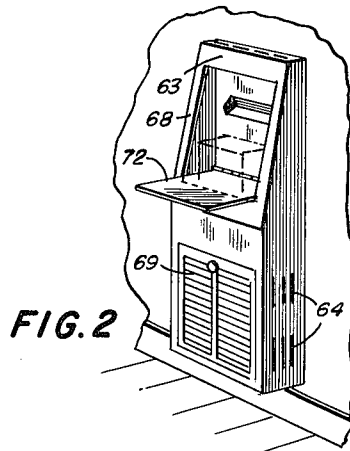


FIG. 2

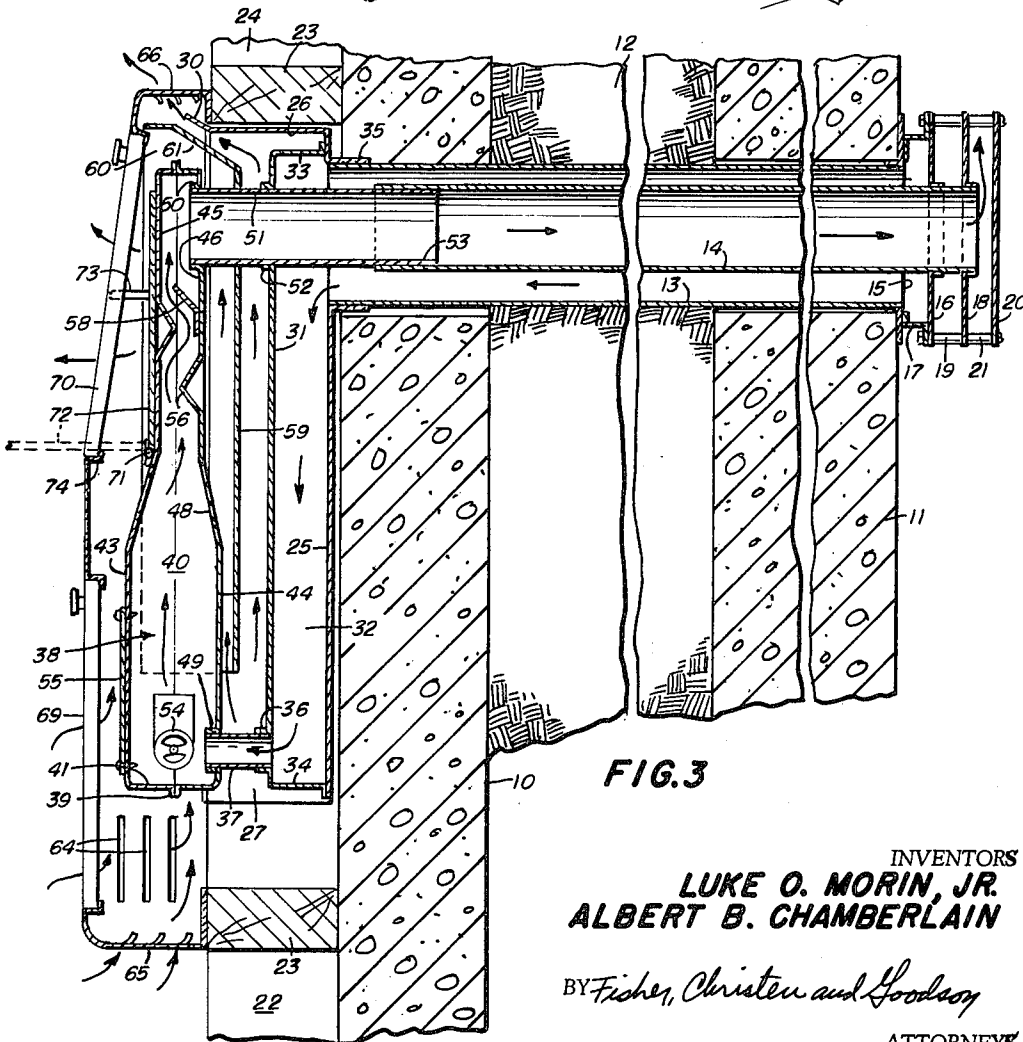


FIG. 3

INVENTORS
LUKE O. MORIN, JR.
ALBERT B. CHAMBERLAIN

BY *Fisher, Christen and Goodson*

ATTORNEYS

1

3,199,504

DUAL PURPOSE SPACE HEATER

Luke O. Morin, Jr., Lookout Mountain, and Albert B. Chamberlain, Chattanooga, Tenn., assignors, by mesne assignments, to Royal Incorporated, Chattanooga, Tenn., a corporation of Tennessee

Filed Mar. 9, 1962, Ser. No. 178,606

2 Claims. (Cl. 126-91)

This invention relates to space heaters, and more particularly to wall-mounted heaters of the gas fired type.

Heaters of this type have particular utility in confined spaces since they can be constructed to lie flat against a wall to occupy only a relatively small amount of the usable space. Such a heater is preferred for use in shelters against blast or dangers of radiation or fall-out resulting from explosions of thermonuclear weapons of war.

In the case of the present invention, the heater has been designed to serve a dual function, not only to provide warmth for the occupants of a confined space such as a shelter, but also to provide a source of heat for the warming of water or the heating of such food as would be available to sustain life.

This invention also relates to an improved form of combustion chamber for wall-mounted space heaters.

In addition, the invention also includes the provision of an improved flue system for wall-mounted heaters used in underground locations.

Other objects and improvements in the present invention will be evident to those skilled in the art after reading the following specification in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of a shelter heater and food warmer in accordance with the present invention, shown as being mounted on a fragmentary portion of a wall;

FIG. 2 is a view similar to that of FIG. 1, but showing the heater in condition to serve as a food or water heater;

FIG. 3 is a cross-sectional elevation on an enlarged scale of the heater shown in FIG. 1, together with an air inlet and flue system which may be used in an above-ground type of shelter;

FIG. 4 is a front elevation of the heater shown in FIG. 3 with a portion of the exterior casing cut away, and

FIG. 5 is a cross-sectional elevation of an air inlet and flue system suitable for use with heaters of this type when installed in an underground shelter.

Turning now to FIG. 3, there is shown a fragmentary portion of one side of an above-ground fall-out shelter, which might comprise a pair of horizontally spaced concrete walls 10 and 11, the space between these walls being filled with earth 12 in accordance with accepted standards for buildings of this type. Extending through suitable openings provided in these walls, is an air inlet and combustion gas venting system comprising an inlet conduit 13 and an outlet conduit, or flue, 14, eccentrically positioned within the inlet conduit.

The outer end of the inlet conduit may terminate adjacent the exterior of the wall 11 and may be provided with a radially outwardly turned peripheral baffle plate 15. The outer end of the flue 14 extends outwardly beyond the end of the inlet conduit and exteriorly of the flue, and there may be provided a second radially outwardly projecting baffle plate or member 16 spaced axially outwardly from the baffle 15, such as by means of the spacers 16. A third radially outwardly projecting baffle plate 18 is provided on the exterior of the flue 14 positioned adjacent the termination of the flue and axially spaced from the second baffle by means of spacers 19. A fourth baffle plate 20 is positioned in a transverse plane and spaced axially outwardly from the end of the flue

2

and from the third baffle 18 by means of spacers 21. The baffles 15 and 17 define an air inlet means for the inlet conduit, while the baffles 18 and 20 define an outlet means for combustion products, the inlet and outlet means being axially separated from each other by a blanket of atmospheric air confined between the baffles 16 and 18. The foregoing arrangement of inlet and outlet conduits and the novel arrangement for separating incoming air from exhausted combustion products is disclosed and claimed in the co-pending application of Albert B. Chamberlain, Serial No. 813,458, filed on May 15, 1959, for "Venting and Air Intake System for Heaters," and forms no part of the present invention.

In the present application, the inner wall 10 is shown as including an interior framework of conventional construction including a series of vertical studs 22 and cross-bracing members 23, which, together, define a shallow rectangular recess within which there may be mounted a shallow rectangular metal pan, indicated generally at 24, which serves as the main supporting base for the principal elements of the heater. This pan comprises a back wall 25, top wall 26, and side walls 27. The pan 24 preferably is not provided with a forwardly projecting lower wall so as not to obstruct the circulation of air as will be apparent later. The side walls 27 may be provided with laterally extending flanges 28 to permit attachment of the pan to the adjacent supports 22 as by means of screws 29, while the upper wall 26 may be provided with an angularly upwardly projecting deflector lip 30 to assist in the distribution of heated air.

A second generally rectangular metal pan 31 of somewhat smaller size than the mounting pan 24 is stamped from sheet metal to provide side walls 32 and top and bottom walls 33 and 34, respectively, of considerably less dimension than the similar walls of the mounting pan. The pan 31 is arranged in facing relationship with the back wall 25 of the mounting pan and is attached thereto such as by welding the abutting margins of the side wall 32 and top wall 33 and bottom wall 34 to the back wall 25 to provide a closed air inlet chamber. An inlet to this chamber is provided at its upper end by the provision of a suitable opening in the back wall 25 having an annular rearwardly projecting collar 35 for suitable connection with the inlet conduit 13. Air which thus enters the chamber passes downwardly and out through a forwardly directed opening 36, which, in turn, is connected with a short conduit 37 which leads to the combustion chamber, indicated generally by the numeral 38.

For convenience, the combustion chamber 38 is preferably fabricated from two generally rectangular shallow stampings of heavy gauge sheet metal which are then joined to each other along their peripheral margins 39 by welding.

The side walls 40 of the combustion chamber extend generally in parallel relationship spaced slightly inwardly from the adjacent walls 27 of the mounting pan. The bottom wall 41 is substantially flat, while the upper wall 42 is preferably formed with an upward taper extending towards the central portion from each side. The lower front and back walls 43 and 44, respectively, are arranged in generally parallel relationship as are also the upper front and back walls, respectively indicated at 45 and 46, but the upper walls are spaced substantially closer together and are joined to the lower walls by the symmetrically outwardly tapering intermediate wall portions 47 and 48. At the bottom of the rear lower wall 44, there is provided a horizontally slotted flanged opening 49, which is secured to the forward extremity of inlet conduit 37, and at the upper end of the upper back wall 46, a flanged outlet opening 50 is provided for connection, as by welding, with a rearwardly extending horizontal outlet pipe 51. This outlet pipe also extends

through a flanged opening 52 provided in the pan 31 and terminates by suitable engagement at 53 with the outlet flue 14. Suitable support for the combustion chamber 38 is provided by attaching the outlet pipe 41 to the opening 52 and the inlet conduit 37 to the opening 36 in a rigid manner such as by welding. Disposed within the combustion chamber is a horizontally extending gas burner 54 of conventional construction which may be supplied with combustible gas through suitable connections and automatic controls, not shown. An inspection opening may also be provided in the lower front wall which would normally be closed by the removable cover plate 55.

Since the efficiency of any combustion products heater of this type is dependent on transmittal of as much generated heat to the surrounding atmosphere as is possible, it is a desirable objective of any apparatus to delay the discharge of combustion products from the combustion chamber for as long a time as is possible. It is to assist in accomplishing this purpose that the upper walls 45 and 46 are spaced closer together than the lower walls so as to restrict the overflow of combustion products. However, in the present invention, additional constricting means has been provided, which, in effect, creates a tortuous passage for the gases as they travel upwardly toward the outlet opening 50. Such a constriction means may include the provision in the rear upper wall 46 of the horizontally extending rib 56 together with a generally similar horizontal inwardly directed rib 57 provided in the upper front wall 45, but spaced slightly above the rear rib 56. Additional restriction of the flow of gases is secured by the inclusion of the forwardly directed horizontal baffle 58, which may be secured to the inside of the upper rear wall 46 as by spot welding prior to assembly of the combustion chamber as a whole. This baffle is spaced above the front rib 57 and serves to direct the gases against the upper front wall with a wiping action to further increase thermal efficiency.

Spaced between the back of the combustion chamber and the front wall 31 of the downflow chamber of the air inlet, there may be positioned a reflector of sheet metal having a vertical wall 59 and side walls 60, each of which extends forwardly spaced from the opposite sides of the combustion chamber. An angularly forwardly directed upper wall 61 extending between the side walls assists in directing heated air forwardly into the space to be heated. An opening 59A is provided in the wall 59 to allow passage of the outlet pipe 51 there-through. This opening should be somewhat larger than the diameter of the pipe so as not to transmit an excessive amount of heat by conduction. The side walls 60 may be provided with outwardly projecting tongues 62 which may be welded to the flanges 28 of the mounting pan to support the reflector in position.

All of the previously mentioned elements are preferably enclosed by a decorative enclosure 63 removably secured in place and projecting outwardly from the wall. It will be understood that although the heater is shown in the present application as being mounted within a recessed enclosure formed by conventional studding, it will be understood that it can be mounted within any suitable recess in any type of wall such as concrete or brick, or, when suitably modified, could be mounted on a flat surface.

In order to allow circulation of air from the space to be heated through the apparatus, the enclosure 63 may be provided with any suitable arrangement of openings such as the lower side louvers 64, bottom louvers 65 and top louvers 66. In addition, the lower front wall 67 of the enclosure and the upper front wall 68 are preferably provided with rectangular openings which may be normally closed by a pair of removable louvered access doors 69 and 70, respectively.

Attached to the exterior of the upper front wall 45 of the combustion chamber by means of a horizontally

extending hinge 71 is a rectangular plate 72 of heavy gauge metal. The hinge is preferably located at the junction of wall 45 with the intermediate wall portion 47 so that when the plate is in a vertical position, it may lie flat against the front wall of the combustion chamber. A rearwardly projecting pin 73 may be attached to the back side of the removable access door 70 to ensure that the plate will not tilt forwardly to obstruct the free flow of air when the access door is in place. The dimensions of the plate 72 are such that when the access door 70 is removed, the plate may be tilted forwardly into a horizontal position extending out beyond the enclosure 63 as shown in FIG. 2. In order to position the plate to support an object for heating (as represented by the dotted lines in FIG. 2) the lower ledge 74 of the access door opening should be located in the same horizontal plane as the hinge 71. It will be realized that when the plate is dropped to its horizontal position, as in FIG. 2, there will be provided a convenient means whereby canned goods, liquids and so forth may be conveniently heated since the plate 72, itself, will derive a certain amount of heat by conduction through its metal connection with the combustion chamber, and, in addition, the direct exposure of the product to be heated to the heat of radiation of the upper front wall of the combustion chamber will be effective.

As is self evident, when the use of the plate 72 is not desired, it may be folded up into the vertical position and the access door 70 may be replaced.

In FIG. 5, there is shown a modified form of air inlet and flue exhaust means suitable for use with combustion heaters placed in underground shelters of the type which are provided with horizontally directed inlet and outlet connections. In this figure, the numeral 75 indicates the ground level, while the numeral 76 indicates a fragmentary portion of the side wall of an underground structure. The wall is provided with a recess 76 suitable for the mounting of a space heater (not shown) of the type previously described and having an interior decorative enclosure indicated by the dotted lines 77. A characteristic of wall-mounted heaters of this type is that they are provided with horizontal air inlet conduits to be supplied by air inlet means such as the horizontally disposed conduit 78 which projects exteriorly horizontally of the wall 76. In addition, such heaters are usually provided with a flue means for the discharge of combustion products extending horizontally within the interior of the air inlet for connection with a flue means such as the exhaust conduit 79. However, due to the influence of convection currents resulting from the heat exchange from the cold air inlet and the heated products of combustion, it is preferable to position the exhaust conduit with its horizontal axis above the horizontal axis of the inlet conduit so as to equalize the heat exchange effect over the entire surface of the exhaust conduit. Furthermore, it will be understood that the length of the respective conduits 78 and 79 may be indefinite since the design considerations of the shelter might require that the inlet and exhaust connections with the atmosphere be located at some distance from the shelter itself.

However, it will be evident that at some point in the system, there must be a vertical run of conduits to establish communication between the atmosphere above ground level 75 and the horizontal conduits. Such a system would include means such as the vertical air inlet conduit 80 which extends downwardly through the ground and is connected with the conduit 70 by means of a 90 degree elbow 81. The upper end of conduit 80 should normally project above the ground level a sufficient amount to prevent the entrance of dirt or mud caused by rainfall and may terminate at its upper end with a reinforcing lip 82.

The vertically extending portion of the flue means may include the tubular conduit 83 connected with the horizontal conduit 79 by means of the 90 degree elbow 84.

5

Since the convection currents created by the dissipation of heat from the conduit 83 travel in a vertical direction, they will be equalized about the entire circumference of the exhaust conduit along the vertical portion of its run, and, therefore, in order to equalize the temperature differential about the circumference of the vertical portion of the inlet conduit 80, the exhaust conduit is preferably arranged coaxially with the inlet conduit, and may be supported in this position by means such as the triangular supporting spider 85.

As in the case of the previous embodiment, the open end 86 of the exhaust conduit should extend axially substantially beyond the open end of the air inlet conduit. Spaced above the lip 82, a sufficient distance to avoid restricting the entry of air, a radially outwardly extending baffle or rain deflector 87 surrounds the entire exterior of the projecting portion of conduit 83. The horizontal width of this baffle should be such that under ordinary conditions of weather, very little, if any rain will be permitted to enter the inlet conduit by virtue of the outward overhang of the baffle. Positioned above the baffle 87 and in axially spaced relation thereto is another radially extending baffle 88, which may be similar in size to baffle 87 and is preferably positioned adjacent the open end 86 of the flue. In order to maintain proper spacing between the baffle, the spacers 89 may be provided. In this connection, it should be noted that the baffles 87 and 88 define between them a zone which includes a blanket of insulating atmospheric air to minimize the likelihood of admixture of exhaust gases with incoming air. Finally, positioned above the baffle 99 is still another radially extending baffle member 90 mounted on spacers 91 a short distance above the open end 86 of the flue conduit. This latter baffle serves to prevent the entry of rain into the exhaust conduit.

Having shown and described the invention in sufficient detail to be understood by those skilled in the art, it should be understood that improvements and modifications may be made in the structures disclosed which would come within the scope of the annexed claims.

We claim:

1. In sealed combustion chambers for wall mounted space heaters of the type wherein a pair of generally rectangular vertically arranged shallow pan-shaped metal

6

stampings are joined to each other along their marginal edges in facing abutment to form a hollow chamber, said chamber having parallel front and back vertical upper walls and parallel front and back vertical lower walls, said lower walls being spaced from each other a substantially greater distance than the distance between the upper walls and being joined to the respective upper walls by tapering symmetrically arranged intermediate walls, said chamber being provided with an air inlet opening at the bottom and a combustion products outlet opening in a vertical wall at the top, said intermediate walls serving to delay the flow of combustion products from the lower portion of the chamber and the upper portion of the chamber being provided with means to restrict the flow of combustion products to said outlet means, said restriction means including a pair of inwardly directed ribs formed in the respective upper front and back walls and vertically offset with respect to each other below the level of the outlet opening and extending horizontally across substantially the entire width of the chamber.

2. The invention as defined in claim 1, wherein the rib formed in the upper rear wall is spaced below the rib formed in the upper front wall, and said restriction means includes a horizontally disposed upwardly and forwardly directed baffle plate secured to the upper rear wall below the outlet opening and above the rib formed in the upper front wall.

References Cited by the Examiner

UNITED STATES PATENTS

1,900,909	3/33	Carnahan	126—91
2,075,433	3/37	Eisentrager	158—1
2,252,968	8/41	Frankland	158—1
2,613,920	10/52	Flint	126—91 X
2,696,369	12/54	Morely et al.	126—91 X
2,754,816	7/56	Ryder	126—307
2,755,794	7/56	Wendell	126—307
2,866,449	12/58	Baeza	126—91
2,919,690	1/60	Horn	126—85
3,056,397	10/62	Little	126—85

JAMES W. WESTHAVER, *Primary Examiner*.

PERCY L. PATRICK, *Examiner*.