Sept. 18, 1962 H. T. WRIGHT 3,054,394

CONVERTIBLE FIREPLACE STOVE HEATING UNITS

Filed May 23, 1961 3 Sheets-Sheet 1

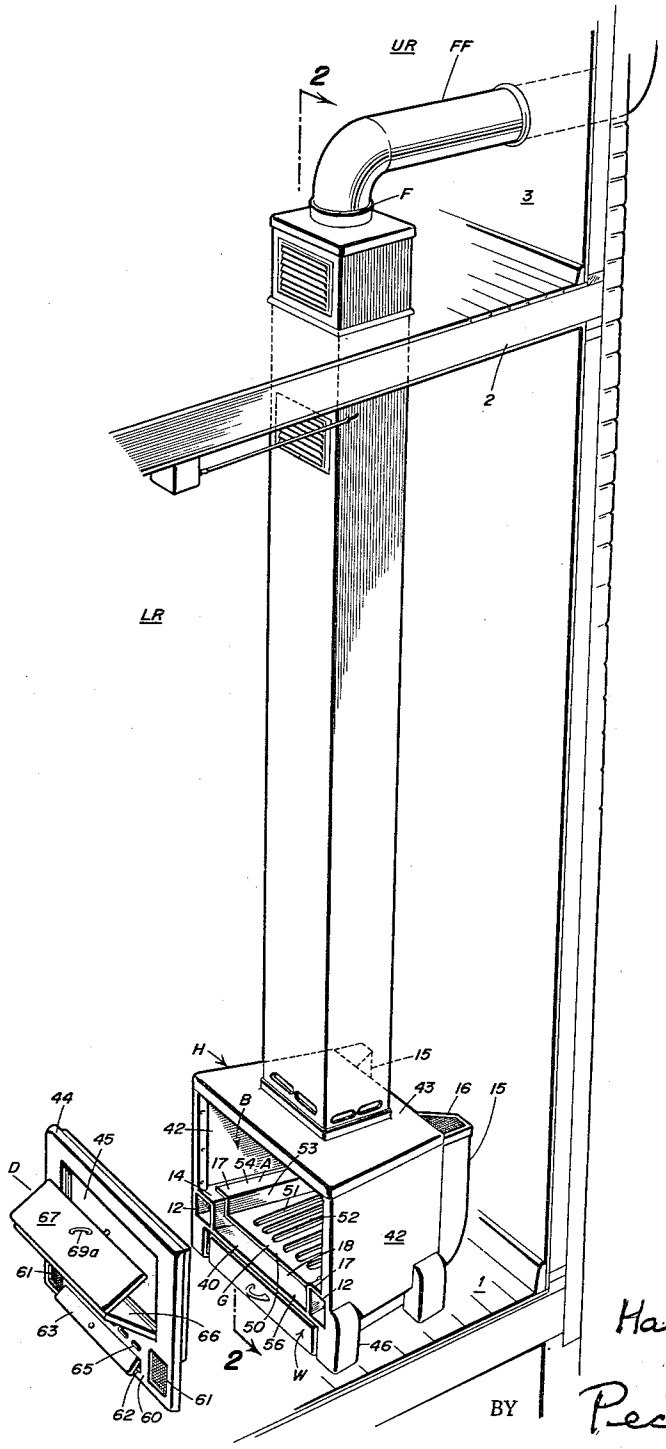


FIG. 1.

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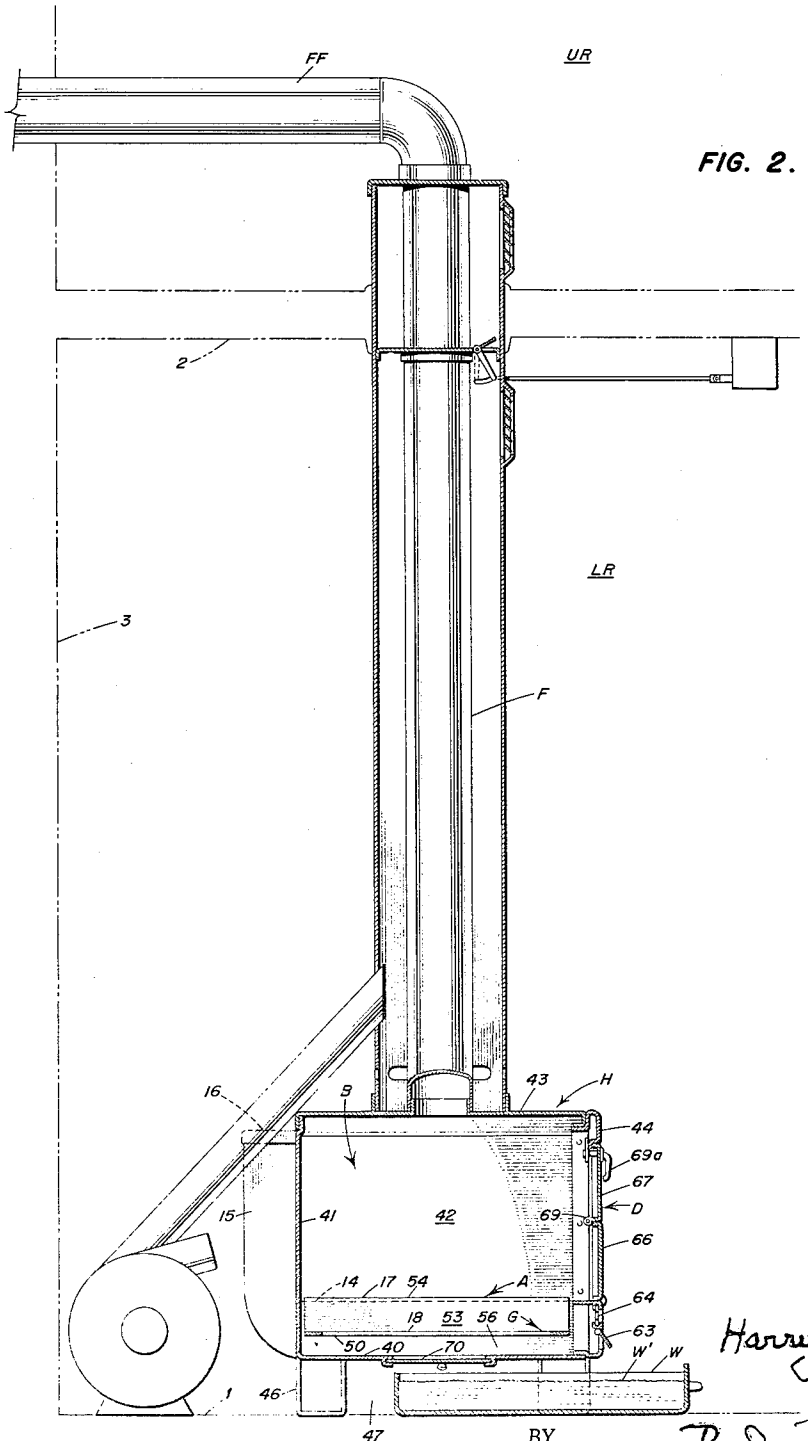
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CONVERTIBLE FIREPLACE STOVE HEATING UNITS

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FIG. 2.



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CONVERTIBLE FIREPLACE STOVE HEATING UNITS

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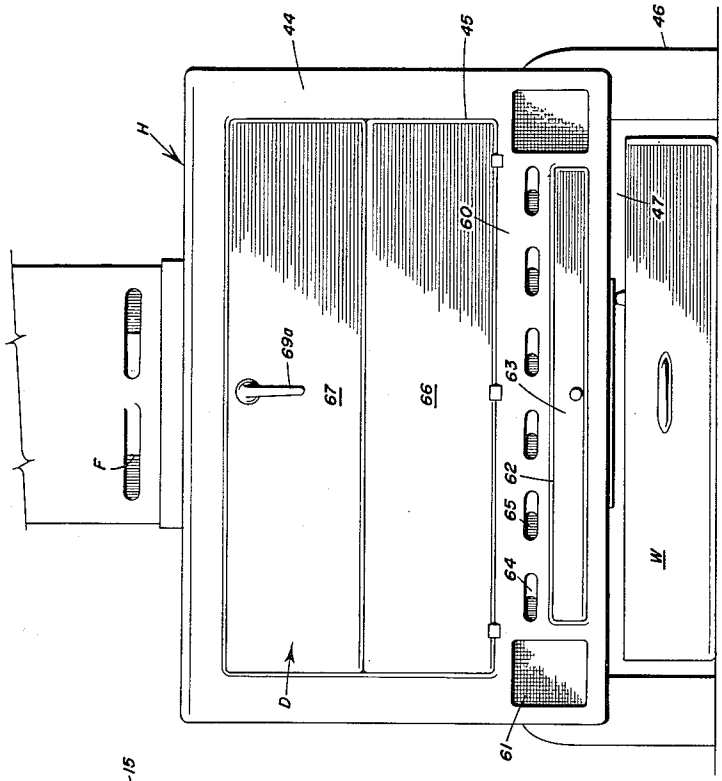


FIG. 4.

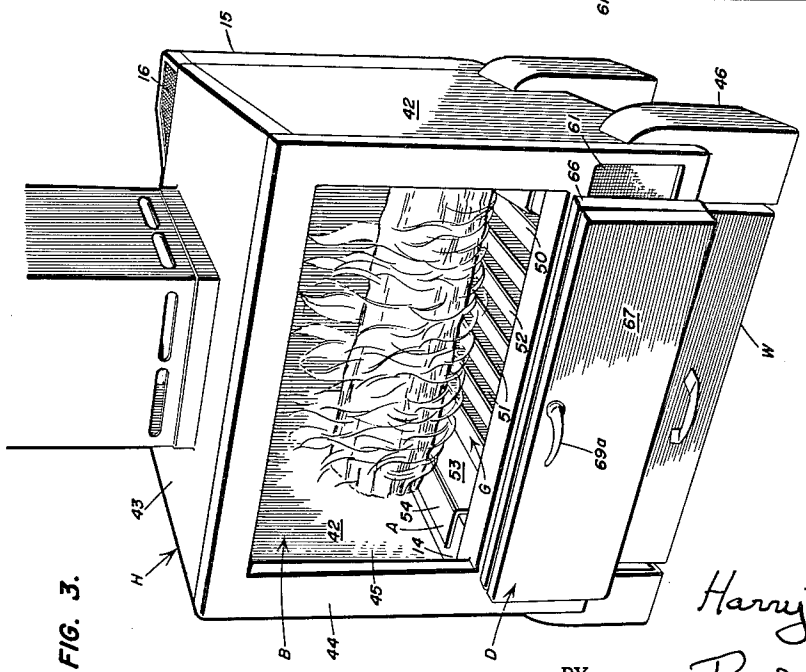


FIG. 3.

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3,054,394
CONVERTIBLE FIREPLACE STOVE HEATING UNITS

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Filed May 23, 1961, Ser. No. 112,057
6 Claims. (Cl. 126—121)

My present invention is directed to the provision of convertible fireplace stove heating units; and the nature and objects of the invention will be readily recognized and understood by those skilled in the arts to which the invention relates in the light of the following explanation and detailed description of the accompanying drawings illustrating what I at present consider to be a preferred embodiment or mechanical and structural expression of a portable fireplace heating system of my invention from among various other embodiments, expressions, designs, constructions and combinations of which the invention is capable within the broad spirit and scope thereof as defined in and by the claims hereto appended.

It is a primary object of my invention to provide a fireplace unit that will not only be portable and which is readily convertible to form an open fireplace or to form an enclosed stove or heating unit, but such a convertible fireplace-stove heating unit that may be manufactured at relatively low cost and economically priced for the market in a standard sized model that will operate to supply sufficient heat to satisfy the heating needs of a wide range of smaller low cost homes, yet which will also provide a desirable convertible fireplace-stove heating unit that may be used in the more expensive and larger type homes.

A particular feature and object of the invention is to provide such a convertible fireplace stove heating unit that is portable in the sense that it may be readily installed and after installation may be easily taken down and moved for installation at some other location, either in the same room or in some other part of the house, and that is of simple construction of a minimum number of components to be disassembled and assembled and of a character that may be transported readily from place to place as any piece or item of household equipment.

A further object is to provide a convertible fireplace-stove or enclosed heating unit that may be readily converted by a user from an open fireplace to an enclosed stove or heating unit and as readily converted back to an open fireplace.

A further object is to provide such a convertible fireplace-stove or enclosed heating component that is readily adapted to burn either a solid fuel, such as coal or wood, or to use a fuel such as a gas.

Another object resides in the particular design and construction of the grate mounting and arrangement in the combustion chamber or fire box of the convertible fireplace-stove unit so that without any change in construction or in parts by either addition of substitution, a user may either operate the unit with coal or a similar solid fuel or may utilize logs or sticks of wood for combustion therein, particularly when it is desired to use the convertible unit as an open fireplace.

It is a further object of the invention to provide a design and construction of a convertible fireplace-stove unit in which air at room temperatures is drawn through the unit in heat exchange relation with the fuel holding grate and with the combustion chamber, but completely separated from such chamber, to prevent overheating and burning out of the grate with this air then being heated and circulated back into the room in which the fireplace-stove unit is located for raising the temperature of the room air.

Another object is to provide conduits in the combustion

chamber of the fireplace-stove unit for flow of air therethrough in heat exchange relation with said chamber and the grate of the unit, with such conduits being so located and designed as to provide not only mounting supports for the grate, but also in effect "andirons" for supporting logs or sticks of wood thereacross when wood is used as the fuel for the unit, and particularly when the unit is converted to an open fireplace for wood burning therein.

A further object is to provide a convertible fireplace-stove unit that is so designed and constructed as to provide for maximum utilization of the heat generated by the burning of the fuel in the fireplace-stove unit to heat air and to efficiently distribute such heated air to the areas which it is desired to heat.

And other objects include the provision of an efficient design and arrangement of water carrier for effective evaporation from the exposed surface thereof to humidify to a desirable degree the heated air supplied by the heating system; the provision of simple yet efficient means for ready removal of ashes from the fire box or combustion chamber of the fire box-stove unit; the provision of mechanically and structurally simple and readily operable damper means for controlling the air supply to the fuel in the combustion chamber in the fireplace-stove unit for maximum combustion efficiency; and the design and construction of the fireplace-stove unit to utilize parts and components of simple form, contours, and shapes to thereby eliminate the necessity of utilizing complicated casting, stampings to form the parts and components for not only low cost but more efficient designs of flow passages, conduits and chambers in the system.

With the foregoing and various other objects, features and results in view which will be readily apparent to and recognized by those skilled in the art from the following explanation and detailed description, my invention consists in certain novel features in design and construction of parts and elements and in combinations thereof, and in the functioning thereof, all as will be more fully and particularly referred to and specified hereinafter.

Referring to the accompanying drawings in which similar reference characters refer to corresponding parts throughout the several figures thereof:

FIG. 1 is a perspective view of a convertible fireplace-stove unit of my invention in installed position in a dwelling structure of which a portion only is shown with the front wall removed, the front wall of the fireplace-stove unit being shown in position removed from mounted position thereon.

FIG. 2 is a vertical longitudinal section through the installed convertible fireplace-stove unit of FIG. 1, taken as on the line 2—2 of FIG. 1.

FIG. 3 is a view in front elevation of the fireplace-stove unit of FIG. 1 converted to a fireplace, portions of wood logs being shown for burning therein.

FIG. 4 is a view in front elevation of the fireplace-stove unit converted to function as a closed stove.

I have selected and illustrated in the accompanying drawings purely by way of example, what may be considered as a preferred form and arrangement of a portable and convertible fireplace-stove heating unit of a standard size and capacity adapted particularly for installation and heating operation in the small or average size homes or dwelling houses. The selected example embodiment is shown as installed in a lower room LR of a two-floor dwelling structure. In the illustrated installation of a convertible fireplace-stove unit of the invention, the lower room LR has the floor 1 and the structure 2 that provides the ceiling for the lower room LR and the floor for the upper room UR. A side wall 3 of the building structure is partially shown while the front wall when

facing the building structure is not shown but has been removed.

The convertible fireplace-stove unit or component H of the selected example of the invention is portable and is shown as removably mounted and supported on the floor 1 of the lower room LR. A combustion flue F is mounted in communication at its lower end with the combustion chamber or firebox of the unit H and extends upwardly through room LR into room UR where it is connected at its upper end to the chimney or flue FF which leads through the wall 3 to the exterior of the building structure.

The convertible fireplace-stove heating unit H, referring now to FIGS. 1 and 2 in particular, includes the bottom wall 40, rear wall 41, opposite side walls 42, top wall 43, and front wall or face frame 44 having therethrough the opening 45 of large area, that is, of a width approaching the width of the face frame and a height approaching the height of the face frame 44. This front wall or face frame 44 is removably mounted in any well-known or other suitable manner on and over the front side of the heating unit H, that is, on and against the forward edges of the wall structure formed of the walls 40, 41, 42 and 43. Thus the assembly of the walls 40, 41, 42, 43 and 44 form the body of the heating unit H and enclose and provide therewithin the combustion chamber or firebox B. The convertible fireplace-stove heating unit H is in this example provided with the support pedestals or legs 46 which are secured in position depending from the corners, respectively, of the heating unit a distance downwardly below the bottom wall 40 thereof. Such pedestals or legs 46 are supported on a suitable base, such as the floor 1 of the room LR of the example installation of FIG. 1, with the heating unit H thus removably positioned spaced a distance above floor 1 to provide a space 47 between such floor and the bottom wall 40 of the heating unit. This space 47 is adapted to removably receive therein a humidifier unit in the form of a flat, open top pan or container W within which a body of water W' is contained for functioning in a manner hereinafter described.

The heating unit H may have the walls 40, 41, 42, 43 and 44 thereof formed of any suitable heat conducting materials of a suitable thickness for transfer of heat therethrough and for radiation of heat therefrom to heat the surrounding air within the room LR or other space within which the heating unit H is installed. The components, such as the walls 40, 41, 42, 43 and 44 of the heating unit H may be formed as castings, stampings or as the products of other forming methods, but with weight kept as low as possible while retaining the requisite structural strength and resistance to warping, cracking and other damage under the action of temperatures to which subjected in operation and use. Accepted and standard stove constructions may be utilized for the fabrication of a heating unit of the invention, with the walls 40, 41, 42 and 43 secured together in assembled relation by the use of bolts, screws, welds and such like known means in manners familiar in this art and adapted to the particular materials and manner of forming the components making-up a stove unit of the invention.

In accordance with a feature of my present invention, air heating conduits 12 are mounted on the upper side of the bottom wall 40 within the combustion chamber B along and against the opposite, vertical side walls 42, respectively. These conduits 12 are identical in this example, and each extends from the forward or front side of the heating unit H at the front wall or frame piece thereof rearwardly to and opens through the rear wall 41 of the heating unit. Each air heating conduit 12 is preferably of rectangular cross section, in this instance of substantially square cross section, and extends laterally inwardly into the combustion chamber B on the bottom wall 40 a small distance relative to the width of the combustion chamber and extends upwardly along a side wall 42 a small distance relative to the height of the combustion chamber. The upper, horizontally disposed side wall of each conduit 12 provides a relatively flat seating and supporting surface 14 for a purpose to be hereinafter described. Each of these air circulating and heating conduits 12 opens at its rear end through and into a vertically disposed conduit 15 located at the exterior of the rear wall 41. The conduits 15 in this specific example extend upwardly along the rear wall to a location just below the top wall 43 and are provided at their upper ends with the heated air discharge openings 16 so that air heated within the conduits 12 in the combustion chamber B flows rearwardly to and upwardly through conduits 15 for discharge and circulation in the room LR to thereby heat the air in such room.

By my invention I provide a low cost yet efficient removable grate unit G of such a design and construction as to make possible the convertibility of the heating unit H to either wood burning or to the burning of solid fuels in lump form, such as coal, coke, fuel briquets and the like. An example form of grate G of my invention is illustrated in the accompanying drawings and is comprised by a plate member 50 of suitable material such as sheet steel, cast iron, or the like which provides the base or bed of the grate and which is provided with a plurality of parallel, longitudinally disposed slots 51 therein extending from adjacent the forward edge of the grate to the rear edge thereof to form, in effect, the grate bars 52 therebetween. At the opposite longitudinal side edges of the plate 50 vertically disposed side walls 53 are provided which in this instance are integral with plate 50. Horizontal, laterally outwardly extending support flanges 54 are provided integral with and extending outwardly from the upper edges of the vertical walls 53, respectively. The width of the plate 50 which forms the bed or base of the grate G is substantially the same as the spacing between the inner, facing side walls of the conduits 12 so that this plate 50 can be received and fitted in position located in the space between the conduits 12. The length or front-to-rear dimension of the grate G and its bed-forming plate 50 is slightly less than the distance between the forward ends of the conduits 12 and the rear wall 41 of the heating unit H. Thus formed and dimensioned, the grate G is removably mounted in operating position in the combustion chamber B of the heating unit H with the support flanges 54 extended radially outwardly over and seated on the upper side seating surfaces 14, respectively, of the air heating and circulating conduits 12. When so mounted, the plate 50 which forms the bed proper of the grate is in horizontally disposed position in a plane at an elevation below the upper sides of the support flanges 54 which are seated on the conduits 12. The vertical dimension or depth of the vertical side walls 53 of the grate G is less than the vertical dimension of the conduits 12 so that the plate 50 of the grate is supported in position spaced over and above the bottom wall 40 of the heating unit H to thereby provide a space 56 between the wall 40 and plate 50 for receiving ashes from the grate through the slots 51.

Thus a grate G of the example embodiment may be formed as a one-piece, relatively lightweight unit that is readily removable from operative position mounted in the combustion chamber B and replaced to its mounted position through the open forward side of the heating unit H when the front wall or frame piece 44 is removed from its mounted and assembled position on the heating unit. If solid fuel in lump or piece form is to be burned in the heating unit H, it is placed on the bed 50 of the grate G and ignited and burned in the usual manner. However, if it is desired to burn logs or sticks of wood in the heating unit for operation thereof either as a closed stove or when it is converted to function as an open fireplace, the logs or pieces of wood are selected of a length to bridge the bed 50 of the grate with their opposite ends supported on the upper sides of the support flanges 54 of the grate so that these upper flanges then function as andirons A of an open fireplace.

The convertibility of a heating unit of my invention, such as the example embodiment of heating unit H, is basically made possible by the removable front wall or face frame **44** with its fireplace opening **45** and the foldable door unit D by which said fireplace opening can be closed to convert the heating unit of a closed stove or by which such opening **45** may be fully opened to expose the forward side of the combustion chamber B and thus make of the heating unit an open fireplace in functioning and in appearance. The front wall or face frame **44** at the lower side thereof provides the wall **60** thereacross having the intake openings **61** therethrough for alignment and communication with the open forward ends of the air circulating conduits **12**, respectively, when the front frame piece **44** is mounted and secured in assembled position on the heating unit H, as clearly shown by FIG. 2 of the drawings. Also in this wall **60** there is provided an elongated opening **62** therethrough having a vertically swingable, narrow, elongated door **63** which may be swung open for access to the ash receiving space **56** of the heating unit when it is desired to remove therefrom ashes that have collected therein. In normal operation of the heating unit H the door **63** may be closed although such door, of course, may also function as a draft controlling damper to the combustion chamber B for admission of air to the underside of the grate G. Preferably, a slide damper **64** is provided between the ash removal opening **62** and the fireplace opening **45** of the frame piece **44**, the wall **60** being provided with a series of openings **65** therethrough for control by the damper **64**.

The door D for the fireplace opening **45** of the front wall or frame piece **44** is of the foldable type comprised of the lower panel **66** and the upper panel **67**. The lower panel **66** is pivotally mounted or hinged for vertical swinging upwardly and downwardly on an axis along its lower edge which is positioned at and along the upper edge of the wall **60** for the width of the fireplace opening **45**. The lower edge of the upper panel **67** is pivoted to and along the upper edge of the lower panel **66** by a suitable hinge or pivot means **69**. Thus, with the door D unfolded and in vertically disposed position, as shown in FIG. 2, the fireplace opening **45** is completely closed and the heating unit H is converted to a closed stove. When it is desired to convert the heating unit H to an open fireplace, the door D is folded outwardly and downwardly by folding the lower panel **66** thereof downwardly and inwardly to a vertically disposed position at the front side of wall **60** of frame piece **44** with the upper panel **67** then folded or swung inwardly against the inner side of the lower panel **66**. In this manner the fireplace opening **45** is completely open and unobstructed and exposes therethrough the combustion chamber or firebox B of the heating unit H. In order to render conversion of the heating unit H to a closed stove or to an open fireplace a quickly and easily performed operation, a handle **69*a*** is provided on the outer side of the upper panel **67** adjacent the upper edge thereof, with this handle of generally curved or hooked form so that it may be readily engaged by the end of a poker or similar standard and readily available implement for folding or unfolding the door.

If desired or found expedient, an ash dump opening may be provided centrally through the bottom wall **40** with a door **70** pivotally mounted in position for vertical swinging to and from position opening or closing said ash dump opening. If such provision is made, then when it is desired to dump ashes from the ash space **56**, the humidifier W may be removed from its position in space **47** and a suitable ash receptacle inserted in such space in position under the door **70** for receiving the ashes from the ash space.

The humidifier W presenting as it does the upper surface of the body of water W′ contained therein exposed to heat from the heating unit H, provides for surface evaporation of the body of water W′ and thus maintains a comfortable and healthy humidification of the heated air in the room LR.

It will also be evident that various changes, modifications, constructions, combinations, substitutions, eliminations and additions may be resorted to without departing from the broad spirit and scope of my invention and hence I do not desire or intend to limit my invention in all respects to the exact and specific examples thereof as herein disclosed, except as may be required by intended specific limitations thereto appearing in any of the claims hereto appended.

What I claim is:

1. A convertible fireplace-stove unit, including, in combination, a casing structure having opposite side walls, a rear wall, a bottom wall, and a top wall with a front side of said casing structure being open; said casing structure providing a combustion chamber therewithin; a door unit mounted for displacement from position closing said front wall opening of said casing structure to form the same into an enclosed stove component and to a position swung clear of said front wall opening to form said structure into an open fireplace; an off-take flue for products of combustion from said combustion chamber; conduits extending rearwardly along said bottom wall within said combustion chamber at said opposite side walls thereof; said conduits extending a distance upwardly and a distance laterally into said combustion chamber and being open at their forward ends for intake of air thereinto and open at their rear ends through said rear wall of said casing structure for discharge of heated air therefrom; said conduits providing along their upper surfaces support seats for receiving thereon the ends of logs of wood for combustion in said combustion chamber; and a grate structure having elevated support flanges at opposite sides thereof removably seated on said upper side seating surfaces of said conduits with said grate structure depending between and across said conduits at an elevation below the plane passing through said upper side seating surfaces of said conduits.

2. A convertible fireplace-stove unit, including in combination, a casing structure having opposite side walls a rear wall, a bottom wall and a top wall providing a combustion chamber therewithin; horizontally disposed, laterally spaced conduits of heat conducting material within said combustion chamber extending rearwardly therethrough at said bottom wall along opposite inner sides of said opposite side walls of said casing structure; said conduits opening through the forward side of said casing structure for intake of air thereinto from the exterior of said unit and open at their rear ends through said rear wall of said casing structure for discharge of heated air to the exterior of said casing structure; the upper sides of said conduits within said combustion chamber providing seating surfaces thereon; and a grate structure of heat conducting material having opposite side, horizontally disposed supporting members extending upwardly therefrom removably seated on said seating surfaces on said conduits in heat transfer relation therewith with said grate structure depending between and across said conduits below said seating surfaces at the upper sides thereof.

3. A convertible fireplace-stove unit including, in combination; a casing structure having closed side walls, back wall, bottom wall and a removable front wall enclosing and providing a combustion chamber within said casing structure; an off-take flue opening through said casing structure for discharge therethrough of the products of combustion from said combustion chamber; horizontally disposed, laterally inwardly extending air heating conduits of heat conducting material within said combustion chamber along said bottom wall at said closed side walls of said casing structure; said conduits being closed throughout their lengths through said combustion chamber and having openings at the forward ends thereof through said casing structure for intake of air thereinto

from the exterior of said casing structure; said air heating conduits at their rear ends having heated air discharge openings therethrough opening through said back wall for discharge of air to the exterior of said casing structure; a fuel holding grate unit of heat conducting material having elevated support flanges at opposite sides thereof; and said grate unit removably mounted in position depending across and between said air heating conduits within said combustion chamber in position spaced a distance below and with said elevated support flanges removably seated on the upper sides of said air heating conduits, respectively, in heat transfer contact therewith.

4. A convertible fireplace-stove unit including, in combination, a casing structure having side walls, a bottom wall, a rear wall, and a removable front wall including a fireplace opening therethrough of substantial area; said casing structure providing a combustion chamber therewithin; a door assembly pivotally mounted on said front wall for swinging displacement thereon between a lowered position removed from and completely opening said fireplace opening to convert said unit to an open fireplace and a raised position over and closing said fireplace opening to convert said unit to an enclosed stove; horizontally disposed air heating conduits of heat conducting material located within and extending laterally a distance into said combustion chamber opening through said front wall to the exterior thereof and extending along the lower side of said combustion chamber to said rear wall of said casing structure along said side walls, respectively of the latter; vertically disposed heated air distributing conduits on the exterior of said rear wall of said casing structure opening at their lower ends into said air heating conduits for receiving heated air therefrom; said air heating conduits within said combustion chamber providing seating surfaces along the upper sides thereof; a fuel holding grate unit of heat conducting material having elevated supporting flanges at opposite ends thereof removably resting and seated on said upper side seating surfaces of said air heating conduits; said grate unit depending downwardly between and across said conduits at an elevation below the plane of the upper side seating surfaces of said conduits; and said upper side seating surfaces also providing supports for receiving the opposite ends of logs of wood to position said logs in said combustion chamber for burning with or without said grate being in mounted position within said combustion chamber.

5. A portable convertible fireplace-stove unit including, in combination, a casing structure having opposite side walls, a back wall, a bottom wall, a top wall, and a removable front wall, together enclosing and providing a combustion chamber within said casing structure; an off-take flue of heat conducting material opening through said casing structure for carrying off products of combustion from said combustion chamber; horizontally disposed air heating conduits of heat conducting material within said combustion chamber along said bottom wall at said opposite side walls, respectively; said conduits extending distances laterally into said combustion chamber and being closed throughout their lengths through said combustion chamber and having openings at the front ends thereof through said front wall of said casing structure for intake of air thereinto from the exterior of said casing structure; said air heating conduits having heated air discharge openings therethrough at their rear ends for discharge of heated air to the exterior of said casing structure; a fuel holding grate unit of heat conducting material having elevated support flanges at opposite ends thereof; said grate unit being removably mounted in position extending across and depending between said air heating conduits within said combustion chamber with said elevated support flanges removably seated and resting on the upper sides of said air heating conduits, respectively, in heat transfer contact therewith and with said grate unit located in proximity to said bottom wall; support legs on said casing structure for supporting the latter in position with said bottom wall elevated; and an open top water container removably mounted between said legs in position exposing the upper surface of water contained therein to heat conducted through said bottom wall of said casing structure from said proximate grate unit and combustion chamber thereabove for evaporation to dehumidify the air heating by said fireplace-stove unit.

6. A portable, convertible, fireplace-stove unit including, in combination; a casing structure having opposite side walls, a back wall, a bottom wall, a top wall, and a removable front wall all enclosing and providing a combustion chamber within said casing structure; an off-take flue of heat conducting material opening through said casing structure and extending upwardly therefrom for carrying off the products of combustion from said combustion chamber; horizontally disposed, laterally spaced air heating conduits of heat conducting material within said combustion chamber extending distances laterally thereinto along said bottom wall at said opposite side walls of said casing structure; said conduits providing on their upper horizontal surfaces thereof supporting seats; said conduits having openings at the forward ends thereof through said casing structure for intake of air thereinto and having heated air discharge openings therethrough at the rear ends thereof for discharge of heated air to the exterior of said casing structure; a fuel holding grate unit of heat conducting material having elevated and horizontally disposed support flanges at opposite ends thereof; said grate unit removably mounted in position depending across and between said air heating conduits within said combustion chamber with said elevated support flanges removably resting and seated on the upper horizontal seating surfaces of said air heating conduits, respectively, with said grate unit depending therefrom in position extending across and between said air heating conduits in a plane below the plane passing through said horizontal seating surfaces thereof; said horizontally disposed upper seating surfaces of said air heating conduits being adapted to support thereon the opposite ends of logs for positioning the latter for burning in said combustion chamber; and said grate unit when said removable front wall is removed from said casing structure being removable and replaceable as a unit through the open forward side of the latter.

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