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GAS BURNING HEATER WITH BACKDRAFT DIVERTER

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2 Sheets-Sheet 1

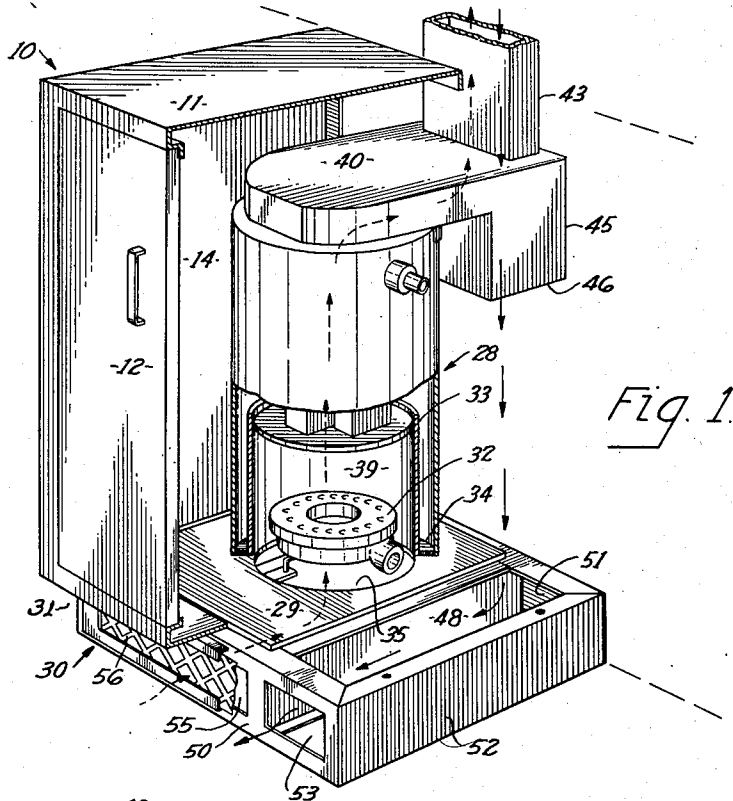


Fig. 1.

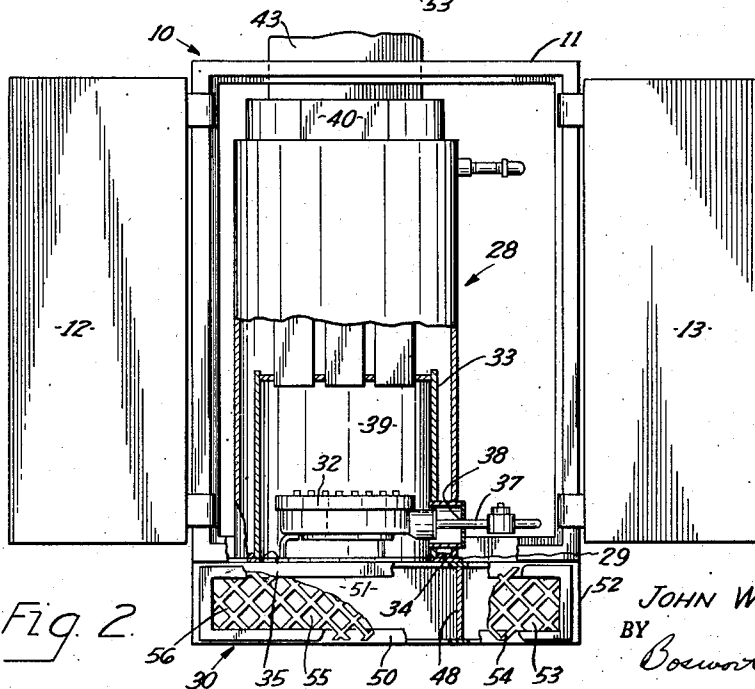


Fig. 2.

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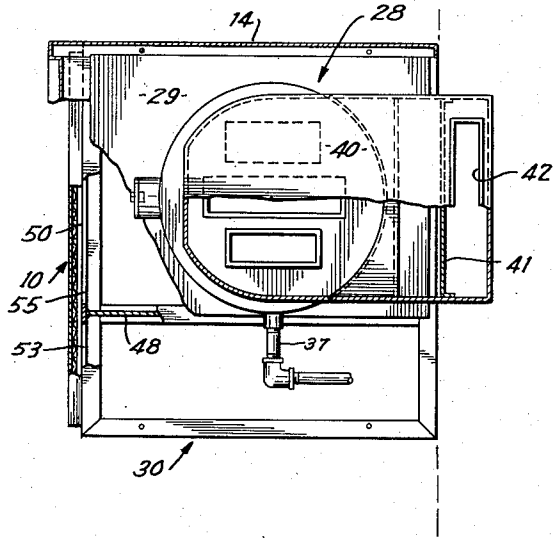


Fig. 3.

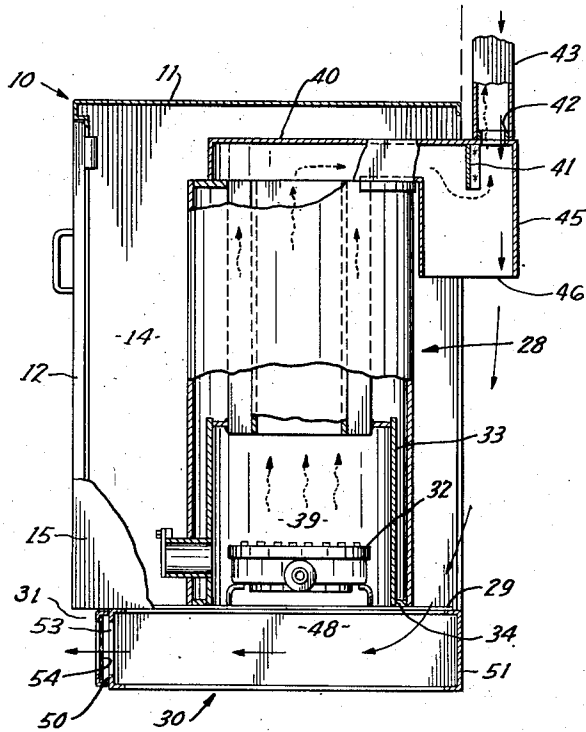


Fig. 4.

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# UNITED STATES PATENT OFFICE

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## GAS BURNING HEATER WITH BACKDRAFT DIVERTER

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5 Claims. (Cl. 126-85)

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This invention relates to a draft hood and cabinet construction for domestic heaters and more particularly to domestic heaters of a compact type adapted especially for installation in kitchens, utility rooms and the like.

In recent years extremely compact heaters such as shown, for example, in my copending application Serial No. 740,597, filed April 10, 1947, which application is now abandoned, have been developed. In heaters of this type, the heat transfer unit and fuel burner are contained within a sheet metal cabinet which is arranged to be installed with its back against a wall or partition of a building, provision being made to conduct the products of combustion from the burner to a ceramic flue built into the wall or partition. Combustion air is admitted to the interior of the cabinet through a suitable screened opening and drawn from the interior of the cabinet to the burner.

Heaters of this type, especially those which are gas fired, require devices to prevent downdrafts that may occur in the flue from reaching the burner. The downdraft preventing devices are necessary in gas fired furnaces to prevent sudden gusts from blowing out the gas burners or pilots and are needed with all types of fuels to prevent the discharge of products of incomplete combustion from the combustion chamber into the building in which the heater is located. A conventional installation of this type consists of a flue pipe which leads from the heater to a T-connection. The flue pipe constitutes the leg of the T and from this a connection leads upwardly to the chimney or flue while a short pipe leads downwardly, terminating in an open end so that in the case of downdrafts in the chimney the gases present in the chimney are discharged through the open end instead of being blown back through the furnace.

This type of installation has a serious defect where the open end of the pipe is in communication with the interior of the cabinet housing the heater. One reason for this is that in case of a downdraft, the cabinet becomes partially filled with chimney gases. These gases do not contain an adequate percentage of oxygen to support complete combustion of the fuel in the burner, yet in the ordinary installation, the air required for the burner is drawn from within the cabinet. The result is that during a downdraft, incomplete combustion of the fuel takes place and carbon monoxide is produced in the flue gases. A dangerous situation thus can develop, particularly if the downdraft continues for any

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substantial period of time and the gases within the cabinet are discharged into the room in which the heater is installed. In this connection, it is to be noted that heaters of this type are frequently installed in kitchens, and where kitchen exhaust fans are used, continuous downdrafts may occur whenever the exhaust fan is operated.

A general object of the present invention, therefore, is to provide a heater construction in which the above noted difficulties are prevented and in which even in the case of persistent downdrafts the recirculation of flue gases through the burner is substantially eliminated and the formation of carbon monoxide is prevented. Another object is the provision of a compact heater in which the draft hood and associated elements are enclosed within a counter-height cabinet containing the heat transfer unit, fuel burner and auxiliary equipment so that the entire top of the cabinet is unobstructed and can be used as a work surface. Another object is the provision of a heater and cabinet construction which does not require louvers or other openings in the doors or front closure of the cabinet.

Further objects and advantages of the invention will become apparent from the following description of a preferred form thereof, reference being made to the accompanying drawings wherein Figure 1 is a perspective view of a gas-fired heating unit embodying the invention, parts of the cabinet and heater being broken away; Figure 2 is a front elevation of the unit shown in Figure 1 with the cabinet doors open and parts broken away; Figure 3 is a plan view of the unit shown in Figure 1 with the top of the cabinet removed and parts broken away; and Figure 4 is an elevational view, partially in section, looking into the cabinet from the right-hand side.

Briefly, the present construction eliminates the difficulties with prior units of the same general type by the provision of a separate passageway for conducting combustion air to the burner from the exterior of the cabinet, and sealing this passageway from the interior of the cabinet. An opening is provided for discharges of flue gases into the interior of the cabinet when downdrafts occur, thus eliminating the possibility of downdrafts blowing out the flame, but the combustion air supply passage does not communicate with the interior of the cabinet, hence the flue gases discharged into the cabinet cannot circulate through the burner. A separate passageway leading to the exterior of the cabinet is provided for the

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discharge of flue gases. Inasmuch as the flue gases do not contain carbon monoxide so long as the combustion is correct, this discharge is harmless and it is possible for downdrafts to continue for indefinite periods of time without danger or loss of efficiency of the heater. The entire draft hood is below the top of the cabinet so that the top of the cabinet, which is preferably at counter height, presents an unobstructed work surface.

Referring to the drawings, a preferred form of my invention may comprise a sheet metal cabinet or housing indicated in general at 10 and having a top 11 which may be at standard counter height and constitute a work surface in a kitchen or utility room. The front wall of the cabinet is constituted by doors 12 and 13; side panels 14 and 15 are also provided. The back of the cabinet is open as shown and is intended to be closed by placing the cabinet against a wall structure, the plane of the interior surface of the wall being indicated by broken lines in Figures 1, 3 and 4.

The heating unit indicated in general at 28 is supported within the cabinet upon a base plate 29 carried above the floor level by a hollow, rectangular base frame 30 which also supports the cabinet. Preferably the sides, doors and base plate 29 project forwardly beyond the base 30 as shown particularly in Figures 1 and 4 to provide a recessed toe space 31 of the sort frequently found in kitchen cabinets and the like. Suitable connections are made from the unit 28 to the heating system (not shown) and the cabinet may also contain auxiliary equipment such as a circulating pump, valves and controls. The heating unit 28 may be constructed in accordance with the disclosure of my aforesaid application Serial No. 740,597 or may be of any other suitable compact construction. The unit embodies a burner shown as a gas burner 32 and a cylindrical heat exchanger member 33 mounted upon the base plate 29, the annular portion 34 of the heating unit making a tight connection with the base plate 29 and surrounding the opening 35 in the base plate through which combustion air for the burner is supplied. The burner may be supplied with fuel through a conduit 37, the conduit being sealed as at 38 where it passes through the annular portion 34. Thus air can reach the combustion chamber 39 only from beneath the base plate 29.

The products of combustion in the burner are collected in the hood 40 and flow through the hood horizontally, then downwardly around the transverse baffle 41 (see Figure 4); thence upwardly through the short connection portion 42 into the ceramic flue 43 which may be disposed between the studding of the wall or otherwise built into the wall. At the rear of the hood there is a downwardly extending portion 45 which terminates in an open lower end 46. The rear half of the member 45 lies within the wall construction when the unit is installed and the downwardly extending portion 45 is of such length that in the absence of a downdraft, the flue gases follow the path shown by the dotted arrows in the drawings, around the baffle 41 as shown in Figure 4, without being discharged into the interior of the cabinet.

In the event of a downdraft, the combustion gases from the chimney and also from the draft hood 40 may be discharged into the cabinet through the open end 46 as indicated by the solid arrows. These gases contain a much lower per-

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centage of oxygen than air contains; if these gases were recirculated through the burner, the result would be incomplete combustion of the fuel and the production of carbon monoxide.

In order to prevent the recirculation of such gases through the burner, the base frame 30 is provided with a vertically extending partition 48 which extends upwardly from the floor and makes a tight connection with the base plate 29 which terminates adjacent the upper edge of the partition 48. The partition extends from the front wall 50 of the base to the rear wall 51 thereof and thus divides the base portion of the cabinet into two separate compartments or passageways. One compartment or passageway, through which air for the burner is supplied, is directly under the base plate 29. The other is defined by the partition 48 and the side wall 52; this passageway is in open communication with the interior of the cabinet and communicates with the interior of the building through the opening 53 in the front wall 50 of the base. Opening 53 leads to the recessed toe space 31 and may be covered by a screen 54 of expanded metal or the like as shown in Figure 2. Thus any gases discharged through the opening 46 into the cabinet can be discharged harmlessly into the room through the opening 53 and are prevented from reaching the burner 32 by the plate 29, the vertical partition 48 and the annular portion 34 of the heater which surrounds the burner.

In order to provide air for the burner, the front base member 50 has an opening 55 which also opens into the recessed toe space and which may be screened by expanded metal or the like 56. Opening 55 communicates with the space beneath the base plate 29; this space is sealed from the interior of the cabinet and thus all of the air supplied to the burner must be taken from the room through the opening 55.

From the foregoing description of a preferred form of my invention, it will be evident that I have provided a simple and effective draft hood construction and downdraft preventer for compact furnaces enclosed in cabinets wherein there is no possibility of combustion gases being supplied directly to the fuel burner, downdrafts are dissipated harmlessly into the room in which the unit is installed, and the efficiency of the burner is not impaired. The construction is simple and economical and particularly adapted to compact heating units for installations where space is at a premium. The draft hood is within the cabinet and the wall, so that the top of the cabinet provides an unobstructed work surface. The provision of the air intake and discharge openings in the recessed toe space provided by the overhanging cabinet makes it unnecessary to employ louvers or the like in the cabinet doors; thus the cabinet can be made to match the other equipment in a kitchen or utility room.

Those skilled in the art will appreciate that various changes and modifications may be made in the preferred form of the invention described herein without departing from the spirit and scope thereof. Therefore it is to be understood that the detailed description given in the foregoing specification and the showing in the drawings are by way of example and not by way of limitation. The scope of the invention is defined in the appended claims.

I claim:

1. In a furnace, boiler or the like, a cabinet adapted to be installed within a building, said cabinet having a hollow base portion, side, top

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and front walls and an open back, a heat transfer unit and a burner within the cabinet, said cabinet having a passageway within the base portion thereof to provide primary and secondary air for said burner, said passageway extending through an opening in the front of said cabinet and being adapted to communicate with the interior of the building, a hood at least partially within said cabinet, said hood being connected to said heat transfer unit and having a passageway extending through the rear of said cabinet and adapted to conduct flue gases from said heat transfer unit to chimney flue at the rear of said cabinet and having means for connection to a chimney flue, said hood having an opening communicating with the interior of said cabinet and disposed exteriorly of said heat transfer unit to permit the discharge of downdrafts in said chimney within said cabinet, said cabinet having a second passageway in said hollow base portion separate from said passageway for air, said second passageway communicating with an opening in the front of said cabinet adapted to lead to the interior of said building at the front of said cabinet to permit the discharge of downdrafts, said opening for the discharge of downdrafts being separate from the opening of said passageway for primary and secondary air.

2. A heating unit comprising a hollow base adapted to be supported upon a floor, a base plate carried by said hollow base portion, a partition in said base portion dividing said base portion into two compartments, the top of one of said compartments being closed by said base plate, the top of the other compartment being open, said compartments communicating separately with the exterior of said base, a cabinet having top, side and front walls mounted on said base portion, a heat transfer unit within said cabinet, said heat transfer unit embodying a burner and being mounted on said base plate, said base plate having an opening therein for supplying air to said burner from the compartment beneath said base plate, said heat transfer unit preventing access of air to said burner except through said opening in said base plate, a draft hood for conducting flue gases from said heat transfer unit to a chimney flue, said draft hood having a horizontal portion, a downwardly extending portion at the end of the horizontal portion having an open-end communicating with the interior of said cabinet, a transverse baffle in the horizontal portion above the opening in the end of the downwardly extending portion and an opening beyond the baffle in the direction away from the heat transfer unit adapted to be connected to a flue whereby under normal conditions flue gases flow through said horizontal portion, then downwardly and around said baffle and into said flue and downdrafts in said flue are discharged through said downwardly extending open-ended portion into said cabinet, and thence through said open-topped compartment and to the exterior of the cabinet.

3. A heating unit comprising a hollow base adapted to be supported upon a floor, a base plate carried by said hollow base, a partition in said base dividing said base into two compartments, the top of one of said compartments being closed by said base plate, the top of the other compartment being open, said compartments communicating separately with the exterior of said hollow base at the front thereof, a cabinet having top, side and front walls mounted on said base, the back of said cabinet being open and being adapted

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ed to be closed by a wall of the building in which the unit is installed, a heat transfer unit within said cabinet, said heat transfer unit embodying a burner and being mounted on said base plate, said base plate having an opening therein for supplying air to said burner from the compartment beneath said base plate, said heat transfer unit preventing access of air to said burner except through said opening in said base plate, a draft hood for conducting flue gases from said heat transfer unit to a flue, said draft hood having a horizontal, rearwardly extending portion, a downwardly extending portion at the end of the rearwardly extending portion having an open end communicating with the interior of said cabinet, a transverse baffle in the horizontal portion above the opening in the end of the downwardly extending portion and an opening to the rear of the baffle adapted to be connected to a flue whereby under normal conditions flue gases flow through said horizontal portion, then downwardly and around said baffle and into said flue and downdrafts in said flue are discharged through said downwardly extending open-ended portion into said cabinet and thence through said open-topped compartment and to the exterior of the cabinet.

4. A heating unit comprising a hollow base adapted to be supported upon a floor, a base plate carried by said hollow base, a partition in said base dividing said base into two compartments, the top of one of said compartments being closed by said base plate, the top of the other compartment being open, said compartments communicating separately with the exterior of said hollow base at the front thereof, a cabinet having substantially imperforate top, side and front walls mounted on said base, the back of said cabinet being open and being adapted to be closed by a wall of the building in which the unit is installed, said base plate and said cabinet overhanging said hollow base at the front thereof to provide a recessed toe space with which said compartments communicate, a heat transfer unit within said cabinet, said heat transfer unit embodying a burner and being mounted on said base plate, said base plate having an opening therein for supplying air to said burner from the compartment beneath said base plate, said heat transfer unit preventing access of air to said burner except through said opening in said base plate, a draft hood for conducting flue gases from said heat transfer unit to a flue, said draft hood having a horizontal, rearwardly extending portion, a downwardly extending open-ended portion at the end of the rearwardly extending portion communicating with the interior of said cabinet, a transverse baffle in the horizontal portion above the opening in the end of the downwardly extending portion and an opening to the rear of the baffle adapted to be connected to a flue whereby under normal conditions flue gases flow through said horizontal portion, then downwardly and around said baffle and into said flue and downdrafts in said flue are discharged through said downwardly extending open-ended portion into said cabinet and thence through said open-topped compartment and to the exterior of the cabinet.

5. A heating unit comprising a hollow base adapted to be supported upon a floor, a base plate carried by said hollow base, a partition in said base dividing said base portion into two compartments, the top of one of said compartments being closed by said base plate, the top of the

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other compartment being open, said compartments communicating separately with the exterior of said base, a cabinet having top, side and front walls mounted on said base, a heat transfer unit within said cabinet, said heat transfer unit embodying a burner and being mounted on said base plate, said base plate having an opening therein for supplying air to said burner from the compartment beneath said base plate, said heat transfer unit preventing access of air to said burner except through said opening in said base plate, a draft hood for conducting flue gases from said heat transfer unit to a flue, said draft hood having a conduit adapted to be connected to a flue and an opening communicating with the interior of said cabinet to permit the dis-

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charge of downdrafts from said flue into said cabinet and thence through said open-topped compartment and to the exterior of the cabinet.  
JOHN W. BROWN, JR.

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