PORTABLE HEATING APPARATUS

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ABSTRACT

A portable apparatus for connecting to an external heating unit to safely heat an enclosed area such as a house under construction comprises an air transfer assembly for positioning in the house, said assembly having an air intake conduit for connecting to the external heating unit; a flue for carrying exhaust gases to an outside window of the house; and an electric fan for blowing air over the air intake conduit and through a vent in the air transfer assembly. The apparatus may further include a thermostat for shutting off the system at a preset temperature, a plurality of raised legs, a humidifier attachment, and a draft fan for an inlet end of the external heating unit to reduce backflow of exhaust gases when the external heating unit is cycled off and purge ignitable gases before the external heating unit cycles on.
PORTABLE HEATING APPARATUS

FIELD OF THE INVENTION

[0001] The present invention generally relates to heating systems and devices. More particularly, this invention relates to a portable apparatus for connecting to an existing heating unit. The invention enables an enclosed area such as a house under construction to be quickly, conveniently and safely heated for working in same, especially when full utility functions are not available.

BACKGROUND OF THE INVENTION

[0002] Numerous units have been conceived for addressing heat supply to a confined area. Many of such units have self-contained heat energy sources like the indirect fired heater of Mitchler U.S. Pat. No. 4,729,365 or the intake combustion equipment in Nakanishi et al U.S. Pat. No. 6,295,937. In Okura et al U.S. Pat. No. 6,325,060, a stack-equipped infrared space heater variation was shown and described. And Takeuchi U.S. Pat. No. 6,598,599 addresses a space heater capable of exhausting hot air through a wide air outlet system.

[0003] Certain heating units have particular end uses in mind such as the ventilating heater conceived for use by underground utility workers in Beavers et al U.S. Pat. No. 5,052,367. Still other units are designed for the outdoor enthusiast. The portable sportsman furnace of Cox U.S. Pat. No. 5,467,760 is but one example.

[0004] In Adrian U.S. Pat. No. 6,941,677, the objectives behind that portable air heating system are virtually opposite that of the present invention. Therein, a heating unit was positioned atop a propane tank heat source for eventual set up outside a camping tent or other small, confined area. Using a battery-powered motor, that heating system delivered to only an assigned area of the tent heat from a location remote from where exhaust gases of that fuel burner produced heat. Such a system would be grossly undersized for the construction heating needs intended by the present invention.

SUMMARY OF THE INVENTION

[0005] Home construction has been a year-round event for some time regardless of climate zone. After the outer shell (i.e., framing, etc) of a new house has been erected and the unit is technically “under roof”, it is time for the drywallers and plasterers to apply their trade. In many instances, the houses requiring such next-step services have been connected to electrical service, either directly, or perhaps remotely by connection to an adjoining, finished building or by hooking up to a nearby, gasoline-powered generator. But, most often these houses have yet to be fully connected for other utilities, heat supply, gas and/or forced air among them.

[0006] With construction deadlines tightly scheduled, it is not commercially practical to delay a drywalling assignment/project until outside temperatures in a yet unheated house are optimum. In the late fall, throughout the winter, and during much of the early spring, work can continue with the addition of supplemental lighting, but supplemental heating poses its own set of concerns. Positioning one or more, stand-alone kerosene heaters in a house otherwise ready for drywalling can be very dangerous. It is well known that such heaters emit a hydrogen/oxygen vapor detrimental to the proper drying of quality drywall work. In addition, many such units exhaust potentially toxic levels of carbon dioxide which, if not fatal, nevertheless irritate workers’ eyes and throats and cause headaches after some exposure.

[0007] It is a principal objective of the present invention to provide a portable heating apparatus that can supply dry, clean, toxic-free hot air to an interior contractor worksite, such as a new house under construction, during atypical temperature conditions. It is another objective to provide such a unit that is easily adaptable to most of the turbo-style tank heaters already employed in a majority of industrial work environments. It is yet another objective to provide substantially portable, yet safe and powerful means for heating an enclosed space.

[0008] To meet those objectives and advantages, the portable apparatus of the present invention is designed for connecting to an external heating unit and to safely heat an enclosed area such as a house under construction unit. This portable apparatus comprises an air transfer assembly for positioning in the house, such an assembly having: (i) an air intake conduit for connecting to that external heating unit; (ii) a flue for carrying exhaust gases to an outside window of the house; and (iii) an electric fan for blowing air over the aforementioned air intake conduit, then through a vent in the air transfer assembly. Ideally, this same apparatus further includes: a thermostat for periodic shut offs at a preset temperature; along with a plurality of raised legs and an optional humidifier attachment.

[0009] In addition to safely heating larger enclosed areas than a typical camping tent or sportsman’s cabin, the portable air heating apparatus of this invention is relatively lightweight to transport, and can be quickly set up to run safely (i.e., without constant attention) at most any drywalling, construction job. In an emergency, this same apparatus could also be used to provide heat to certain military installations, such as a temporary barracks, or to emergency rescue shelters for the Federal Emergency Management Agency (FEMA), the Red Cross and the like.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] Further features, objectives and advantages of the present invention will become clearer when referring to the following detailed description of preferred embodiments made with reference to the accompanying drawings in which:

[0011] FIG. 1 is a perspective view of one embodiment of the invention connected to an existing external heat supply and is ready for supplying heat to a given enclosed area;

[0012] FIG. 2 is a perspective, partially cutaway view of the assembly for illustrating a representative design for forced-air delivery over the series of ducts and other hardware contained in same;

[0013] FIG. 3 is a schematic representation of the typical components used to connect the assembly unit of this apparatus to its respective neighboring parts, i.e. a window exhaust and external heat supply;

[0014] FIG. 4 is an electrical schematic for the assembly chamber of the present invention; and
FIG. 5 is a sectional view of the interconnecting sleeve adaptor taken along the line 5-5 in FIG. 3.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to the accompanying Figures, there is shown an embodiment of the portable heating apparatus according to the present invention. This unit is not a heating system per se as it does require connecting to an external, stand-alone heating supply, such as a kerosene or propane turbo tank heater common at many indoor and/or outdoor construction sites. The corresponding structures will be provided with reference number designations. It is to be understood, however, that these drawings are diagrammatic and schematic representations of possible embodiments, and are not intended to limit the scope of same nor are they necessarily drawn to scale. Further, a person skilled in the art will appreciate that terms such as top, bottom, upper, and lower as used herein are merely words used to describe the accompanying Figures, and are not meant to limit the scope of the present invention in any way.

Referring now to FIGS. 1 through 3, there is shown a portable apparatus in which the principal component is the air transfer assembly chamber 10. This assembly chamber 10 has a free-standing frame which does not require any additional reinforcement during normal operations. As illustrated, assembly chamber 10 includes a plurality of chamber legs 12. For ease of transport, the latter two legs are provided with wheels 14. Although not completely visible in these Figures, the assembly chamber 10 may further include an attached handle 19 by which the unit is tilted back for transport to the drywaller’s next location and assignment.

While the main component of the present invention, assembly chamber 10 is shown as an extended rectangular box-line structure, it is to be understood that still other assembly chamber shapes can be substituted therefor. As shown, however, this unit measures approximately 22 inches in width, 22 inches in depth and is approximately 5 feet high, with a weight of about 75 lbs.

At one end and on one side to the assembly chamber, there is positioned a lower air intake conduit connector 20. Optimally, the intake connector 20 is positioned at about the same height as the output or heated exhaust to the standard turbo heater 80 mounted in a standard holding cart 84. A sturdy interconnecting sleeve adaptor 86 is used to attachably connect the outlet at the front of the turbo heater 80 to the intake connector 20 after the assembly chamber 10 has been properly positioned, and duly spaced from the walls of the enclosed area to be heated. The outside diameter of the outlet at the front of the turbo heater 80, regardless of the heaters capacity, i.e. 100,000 btu to 200,000 btu units, is typically 8 inches. The interconnecting sleeve adaptor 86 is attached thereto by first sliding over intake connector 20 and then the outlet of the turbo heater 80. The interconnecting sleeve adaptor 86 is secured thereto by tightening a pair of wing nuts 87 passing through the draw-band flange 88 so as to choke the adaptor over the outer diameter of the corresponding attaching structures.

Though it is not essential to be on the same side as the intake connector 20, the assembly chamber 10 further includes an outlet flue 30, near the top end of said chamber. Through a series of standard HVAC elbows 62, straight tubing 60 and/or other flexible ductwork tubing, outlet flue 30 is secured through a window via a window opening cover 64, which are commonly found to adjust in width for accommodating a variety of size window air conditioner units or the like. Should it be practical to assure a more weather-proof seal about the window cover 64 and ductwork tubing passing therethrough, additional insulation (not shown) can be used.

With respect to the inner workings of the assembly chamber 10, there is preferably a significant quantity of surface area of heat transfer coil 24 made from any standard heat conductive pipe, tubing or combination thereof for handling the flow of hot air and fumes exiting the turbo heater 80, passing through the intake connector 20 of assembly chamber 10 and ultimately exiting via the flue 30 completely away from the enclosed area to the outside. This is, once again, the opposite of the goal and heat air flow of the Adrian patented device described above. Some of internal heat transfer coil 24 can be better seen in the partial cutaway view of assembly chamber 10 in FIG. 2. The heat transfer coil 24 has a large surface area, and can even include fins, to facilitate the transfer of heat from the exhaust of the turbo heater 80 to the room air passing therethrough.

More specifically, an electrical chamber fan 50, in this case shown at the base of assembly chamber 10, pulls clean air from the enclosed area beneath the unit (hence, yet another reason for the preferred leg height described above), and over the serpentine internal heat transfer coil 24 before being pushed out of the overall assembly chamber 10 at vented opening 16. One skilled in the art will appreciate that the chamber fan 50 may be disposed in other locations of the assembly chamber 10 while still preserving its functionality. Likewise, the chamber fan 50 may differ in size and configuration from that explicitly described herein. Still further, it will be appreciated that while the air intake conduit connector 20 and flue 30, respectively, are depicted as having substantially cylindrical cross-sections, they could have various other configurations and otherwise perform the same functions as required of the present invention.

The assembly chamber 10 is powered as discussed in detail below through power cord 54 plugged into an electrical power source either within the same enclosed area to be heated, or via extension cords to an external electrical supply or generator. As other items are preferably connected, electrically, to run in conjunction with the assembly chamber 10, it is further wired to accept a plurality of electrical devices via outlet 58.

To better insure safe operation of the portable unit, there is provided an attachable draft fan 82 for the rear of the turbo heater 80. With the attachable draft fan 82 dully connected to the power supply and electrical controls of the assembly chamber 10 through outlet 58, the operator of this unit can be assured that any residual gases that may be “in the system” after the turbo heater 80 cycles off, will be forced through the heat transfer coil 24 of the chamber and, ultimately, exhausted through the window adapter 64 to the outside. In like fashion, any residual kerosene or propane gas that may be “in the system” before the turbo heater 80 cycles on, will be exhausted in like fashion.

While humidity may not be conducive to the typical work of most drywallers, there may be situations (especially for non-drywall, construction applications and/or for
emergency shelter relief needs) where a humidifier should be added to the aforementioned unit. In those circumstances where the addition of warm, moist air is desired, water can be provided and maintained in the trough-like gutter 18 surrounding one or more sides of the vent opening 16 over which the exiting heated room air must pass.

To operate, the portable apparatus of the present invention is first located in the house (or other enclosed area) where heat can be easily blown and/or otherwise radiate throughout the desired working area. Using the wheels and tilt-back handle 19, the assembly chamber 10 is preferably positioned in close proximity to an exterior window, leaving sufficient wall clearance to accommodate the turbo heater 80 near the air intake conduit connector 20 of the apparatus. It is further preferable to locate the apparatus so that there is adequate work space (without bumping into same) while it operates to heat the room in which it has been set to run.

Next, the window adjacent the assembly chamber 10 is opened and the adjustable width/height window opening cover 64 is situated therein. Depending on outside weather temperatures, insulation may be further positioned about the window cover 64. At the top of the assembly chamber 10 of the apparatus, tubing is used to pass from the flue 30 through an outlet hole in the window cover using a series of straight pipe 60 and elbows 62, or some other flexible exhaust-compatible tubing as an alternative.

The portable heating unit, such as the turbo heater 80, is then positioned near the air intake connector 20 of the assembly. Using the suitable interconnecting sleeve 86 which can be straight and/or flexible, the heater 80 and chamber assembly then are interconnected. The attachable draft fan 82 is fitted at the air intake end of turbo heater 80, and the turbo heater 80 is then plugged into the appropriately marked external outlet 58 on the assembly chamber 10. The room thermostat 70 connected to the assembly is turned all the way down. All ductwork connections are checked to make sure they are securely fastened. The assembly is then plugged into its own power source and the thermostat for the unit is raised to its desired operating temperature.

In the typical order of operation, the room thermostat 70 for the present invention will call for the delivery of heat. With reference to the electrical schematic in FIG. 4, the attachable draft fan 82 is started to run for 1 to 3 minutes as part of a pre-operation exhaust purge. The external heating unit, which in this case has been preferably described as the kerosene turbo heater 80, is then turned on to ignite its kerosene source. The 1 to 3 minute delay is caused by delay switch 53. Heated air and exhaust from the turbo heater 80 is forced to pass into the assembly chamber 10 through the air intake conduit connector 20 to heat the heat exchange coils 24. The heated air and exhaust then exits the flue 30, passes through the exhaust tubing 60, 62 and then through the opening in the window cover 64 to the outside. The electric chamber fan 50 in the chamber assembly 10 turns on to blow inside air over the heated coils 24 when the temperature of the heated coils 24 reach a certain minimum coil setpoint temperature, which is preferably anywhere from 130° F. to 140° F. The temperature of the heated coils 24 is measured by a temperature sensor 52, such as a fan limit switch shown in the schematic of FIG. 4.

The assembly chamber fan 50 continues to run while the coil temperature is above the minimum coil setpoint temperature of limit switch 52. When the temperature setting on the room thermostat 70 is met, the turbo heater 80 is shut off. However, the shutting off of the draft fan 82 on the inlet side of the turbo heater 80, as well as the assembly chamber fan 50, is delayed until the temperature of the heated coils 24 falls below the minimum coil setpoint temperature of the switch 52. This way, draft fan 82 continues to run to purge any remaining post-shutoff flames through the assembly chamber 80 and out the window, and the assembly chamber fan 50 continues to run to cool the heated coils 24. The attachable draft fan 82 also serves to partially cool the heater shields on the turbo heater 80. When the room temperature cools below the preset temperature of the thermostat 70, the draft fan 82 kicks back on, with (after the delay) the turbo heater 80, and then the assembly chamber fan 50, to restart the heating cycle once again. As a safety precaution, the electrical power to the turbo heater 80 will be shut off if the chamber temperature exceeds a preset uppermost temperature limit by opening a high limit switch 56. In this case, the preferred uppermost temperature limit is between 180° F. to 200° F.

The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative, not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes that come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:

1. An apparatus suitable for connecting to a portable external heating unit for safely heating an enclosed area, said apparatus comprising:

   (a) a air transfer assembly for positioning in the enclosed area, said assembly having a frame with at least one wheel for portability, an air intake connector for connecting to the external heating unit, a flue for carrying exhaust gases to an area outside the enclosed area, a heat transfer coil between the air intake connector and flue and an electric fan for blowing air over the heat transfer coil and through a vented opening in the assembly transfer assembly; and

   (b) a thermostat for shutting off the apparatus at a preset temperature.

2. The apparatus of claim 2 which further includes an attachable draft fan for an inlet end of the external heating unit to reduce backflow of flames when the external heating unit shuts off.

3. The apparatus of claim 2 which further includes an electrical outlet into which the external heating unit may be plugged.

4. The apparatus of claim 3, wherein the air intake connection comprises an interconnecting sleeve for attachable connection to an outlet end of the external heating unit.

5. The apparatus of claim 3, wherein the exhaust gas flue includes flexible tubing and an adjustable window cover for temporarily installing in an open window of the enclosed area.

6. The apparatus of claim 3 which further includes a humidifier.
7. The apparatus of claim 3, wherein the air transfer assembly frame is raised on a plurality of legs at least two of which include the wheels.

8. An apparatus for connecting to a portable external heating unit for safely heating a house on a temporary basis, said apparatus comprising:

(a) a heat transfer assembly, said assembly having an air intake connector, an interconnecting sleeve adapter for attachable connection to an outlet end of the external heating unit, a flue for carrying exhaust gases to an outside window of the house, a heat transfer coil mounted between the air intake connector and flue, and an electric fan for blowing air over the heat transfer coil and through a vented opening in the air transfer assembly; and

(b) a thermostat for cycling on and off the apparatus at a preset temperature range.

9. The apparatus of claim 8 which further includes an electrical outlet into which the external heating unit may be plugged.

10. The apparatus of claim 9 which further includes an attachable draft fan for an inlet end of the external heating unit to purge ignitable gases before the external heating unit ignites.

11. The apparatus of claim 10 which further includes a humidifier.

12. The apparatus of claim 10 which further includes a plurality of legs at least two of which include wheels for transport.

13. A mobile apparatus suitable for connecting to a portable external heating unit for heating a house under construction, said portable apparatus comprising:

(a) a heat transfer chamber for positioning adjacent an exterior window of the house, said chamber having an air intake connection for connecting to the external heating unit, a flue for connecting to a window adapter and carrying exhaust gases to an area outside the house, a heat transfer coil between the air intake connector and flue, and an electric fan for blowing air over the air intake conduit and through a vented opening in the air transfer chamber; and

(b) a thermostat for shutting off the apparatus at a preset temperature.

14. The mobile apparatus of claim 13 further comprising a draft fan attachment to an inlet end of the external heating unit for reducing backflow of exhaust gases when the external heating unit is cycled off and purging ignitable gases before the external heating unit cycles on.

15. The mobile apparatus of claim 14 wherein the air intake connector is attachably connected by a sleeve adaptor for fitting to an outlet end of the external heating unit.

16. The mobile apparatus of claim 15 wherein the heat transfer chamber further comprises a humidifier attachment.

17. The portable apparatus of claim 15 wherein the air transfer chamber assembly has a frame raised on a plurality of legs at least two of which include wheels for assembly transport.

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