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RECIRCULATION INSULATED SPACE HEATER

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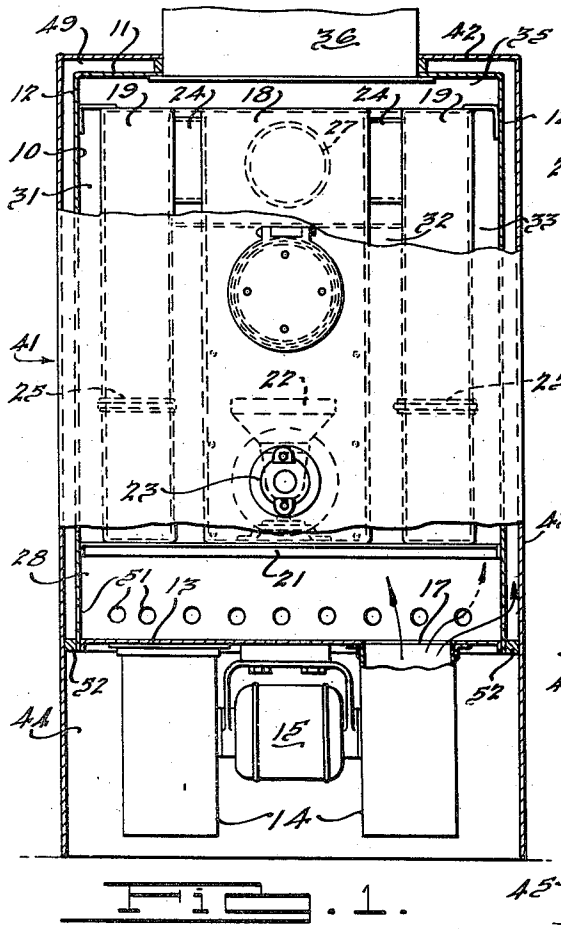


Fig. 1.

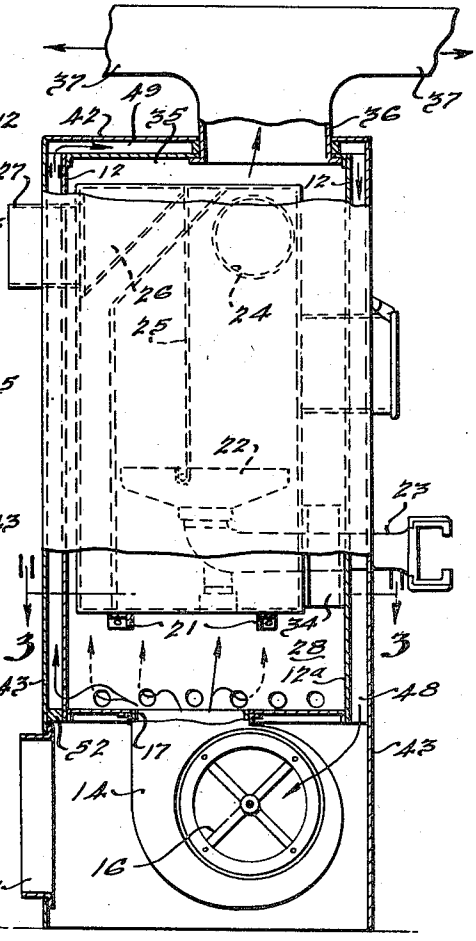


Fig. 2.

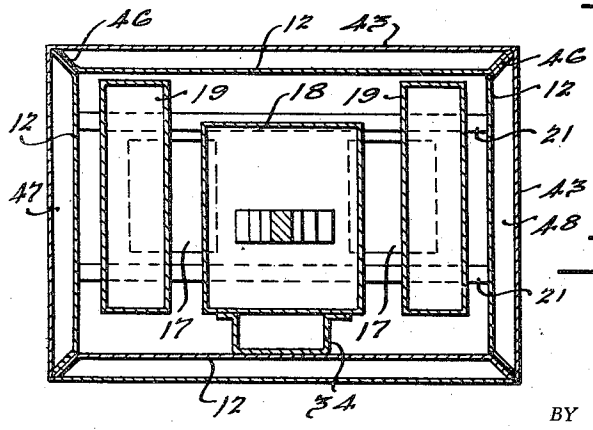


Fig. 3.

INVENTOR
Allen P. Livar.
BY Harness, Dickey, Pierce & Harris.
ATTORNEYS.

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RECIRCULATION INSULATED SPACE HEATER

Allen P. Livar, Dayton, Ohio, assignor to Chrysler Corporation, Highland Park, Mich., a corporation of Delaware

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4 Claims. (Cl. 126—11)

This invention relates to space heaters, and it has particular reference to the provision of an insulating medium for such a heater consisting essentially of the air which is heated. In one of my prior patents, No. 2,196,703 of April 9, 1940, I have disclosed a warm air furnace or space heater, wherein provision was made for an effective transfer of the heat generated by a burner to the air. Units of the type described in my patent are applicable to various installations, including the heating of small homes, or the heating of limited portions of larger dwellings. Some of these installations, however, give rise to an insulating problem, and the present invention is concerned with an effective solution thereof.

As illustrative of the problem, it may be observed that space heaters of the class described are frequently installed in what are called utility closets, where there is very little space between the exterior wall of the heater and the building or closet wall itself. Excessive heat losses through the furnace casing thereby add to a potential fire hazard, particularly when housewives use the closet for the storage of cloths saturated with furniture oil. Again, these units find application in basements converted into what are known as recreation or rumpus rooms. Here, there is no serious fire hazard due to close confinement, but people are prone to bump into the outer walls and burn themselves, and a high exterior temperature also precludes decorative finishes which are desirable for installations of this nature. An obvious expedient is, of course, to insulate the heater wall, either interiorly or exteriorly, with the customary forms of sheet insulation material. However, this is not a satisfactory solution of the problem due, among other things, to the resultant increase in weight and expense and there is nevertheless a residual heat loss.

According to the present invention, the known form of space heater is jacketed by means of an exterior casing and the cold air which is to be heated is made to circulate between the jacket and the casing for the heater proper. I have discovered that it is not necessary to make all of the cold air flow around the casing, on the contrary, the diversion of about 5 to 10% of the total volume of free air will suffice, in a well designed unit, to maintain an exterior surface temperature which will safeguard against property or personal fire damage.

A typical embodiment of the present invention is illustrated in the accompanying drawing wherein:

Fig. 1 is a frontal view, with parts of the casings broken away, illustrating my invention as applied to a heater of the type shown in my stated patent.

Fig. 2 is a side elevational view of the same unit with parts of the casings broken away; and

Fig. 3 is a section taken substantially along the line 3—3 of Fig. 2.

In common with the disclosure of my Patent No. 2,196,703, there is shown in the drawing a heater having an inner casing wall 10 composed of a top 11, and four side walls 12 which are joined at their bottoms by a deck 13. Suspended from the deck 13 is a blower unit consisting of a pair of casings 14 and containing rotors driven by a motor 15 in order to aspirate air through an inlet 16 for delivery to the casing, above the deck, through outlets 17 communicating with apertures formed in the deck itself. The casing 10 moreover contains a fire box 18 and a pair of heat interchangers 19 which are mounted on crossbars 21 below the top 11 and above the deck 13.

As more fully described in the prior patent, the fire box 18 contains a burner 22 adapted to receive a mixture of combustible fuel and air through an inlet coupling 23 which extends exteriorly of the casing and through one of the walls thereof. The hot products of combustion flow upwardly within the box 18, and pass through flues 24 into the heat interchangers 19. The heat interchangers 19 include baffle plates 25 causing the hot gases to circulate therethrough, and eventually to flow into a manifold 26 communicating with a stack coupling 27.

The space between the deck 13 and the rails 21 constitutes a plenum chamber 28, wherein the blower discharge is initially received, for circulation through the various passage ways 31, 32, 33, 34, etc. for circulation around the fire box and the heat interchangers. The cold air in the chamber 28 is accordingly heated, and rises to the overhead space 35 for delivery to a discharge line 36 and thence into feeders 37 which take the warm air to wherever it may be wanted.

According to the present invention, the casing 10 and its contents are enclosed within an exterior jacket 41 having a top wall 42 and side walls 43 which are disposed parallel to and spaced from the comparable walls of the casing. It will be noted that the jacket 41 extends below the deck 13 to form a blower compartment 44 housing the blower 14, and provided with a cold air inlet 45. This inlet may be connected to any suitable point for the induction of the air which is to be heated for discharge through the lines 37.

Referring particularly to Fig. 3, it will be seen that the casing walls 12 are formed of sheet metal plates, whose edges are flared outwardly at about a 45° angle to provide corner portions 46 which abut each other and extend to the corners between the side walls 43 of the jacket 41. The plates 12 may be welded to each other along the edges 46, and the parts may be so dimensioned that the projecting corners of the casing fit snugly within the jacket 43, thereby facilitating the assembling and mounting of the casing within the jacket. Any additional desired means of mounting the casing within the jacket may, of course, be employed. This construction accordingly divides the free space between the jacket and the casing into a plurality of vertically disposed compartments 47, 48, etc. All of these compartments freely communicate with the overhead clear space between the tops 11 and 42, which forms an additional compartment 49.

Certain of the casing walls 12, adjacent the plenum chamber 28, are formed with a number of apertures 51, which permit air passing through the blowers to be diverted in part to the compartments formed between the jacket and casing walls. Each such compartment is sealed from the blower chamber 44 by a sealing strip 52 which extends transversely of the unit and between the walls 12 and 43. In practice, the size and number of the apertures should be so chosen that not all of the air will freely enter these compartments, about 5 or 10% being adequate for the present purposes. As best shown in Fig. 2, the compartment 48 is not provided with a sealing strip 52, and it is therefore, in free communication with the inlet 16 of the blower 14. The casing wall 12a defining the inner portion of the compartment 48 is not formed with any apertures 51, and accordingly none of the discharged air can enter this particular compartment in the manner just described.

When the blower 14 is operated and the burner 22 ignited, the cold air enters the opening 45 and is delivered by the blower into the plenum chamber 28. The substantial portion of this air then flows through the passageways 31, 32, etc., in the manner heretofore described, for delivery to the space to be heated. A minor portion of the delivered cold air flows however, through the openings 51 into the several compartments 47. This cold air absorbs whatever heat may be transferred through the walls 12 of the casing 10, and it then flows upwardly into the upper compartment 49, and thence downwardly through the compartment 48, and so back into the blower 14. It will be seen that this fraction of the total air volume is, therefore, re-circulated around the casing 10 of the heater, and its volume is sufficient to prevent the outer walls 42 and 43 of the jacket 41 from reaching a temperature resulting in any fire hazard, or causing discoloration and deterioration of any decorative finish placed thereon. The heat content of the re-circulated air is, of course, returned to the main heating circuit by admixture with sufficient cold air entering through the opening 45. Accordingly, the heat exchange properties of the entire unit are enhanced, its safety factor is increased, and the unit is more readily applicable to various installations than the heater described in my prior patent.

While I have described my invention with reference to one specific embodiment thereof, and have referred to a known type of space heater in order to illustrate its principles, it will be apparent to those skilled in the art that the foregoing description is intended to be exemplary, and that various modifications may be made without departure from the scope of the invention, as encompassed by the following claims.

I claim:

1. A space heater comprising an outer jacket, a sheet metal inner casing formed of plates joined together, the corners of said casing being bent outwardly and engaging the inner wall of the jacket to space the casing from the jacket and to form a plurality of compartments therebetween, said casing being spaced from the top of the jacket and terminating above the bottom thereof, a deck at the bottom of the casing, a blower mounted within the jacket under said deck, the discharge opening of the blower communicating with the casing, apertures formed in certain of said plates adjacent the deck for admitting a minor portion of the air delivered by the blower to some of the compartments defined by said plates and corners, means sealing the lower ends of such compartments from said under-deck portion of the jacket and thereby the inlet of the blower, all of said compartments communicating at the top of the casing, at least one of said compartments freely communicating with the lower portion of the jacket and said blower inlet, said last named compartment being sealed from the interior of the casing, and means in said casing for heating the major portion of the air delivered by the blower and the air recirculated through said compartments.

2. A space heater comprising a top, side walls, and a lower deck, a blower mounted below the deck and having its outlet discharging into the casing, a heater in the casing, passageways formed in the casing for passing the air delivered by the blower in heat exchange relation to the heater, a warm air outlet formed in the top of the casing, a jacket having a top and side walls disposed over the casing and extending below the deck to house the blower, a cold air inlet in the lower portion of the jacket communicating with the inlet of the blower, said jacket and casing being spaced from each other at said top and side walls, spacer plates extending from the side walls of the casing to the side walls of the jacket to divide the space therebetween into a plurality of vertical compartments communicating with the space between the tops, apertures formed in certain of the casing side walls, adjacent the deck to admit a portion of the air passing the blower to certain of said compartments, sealing bars at the bottom of some of said vertical compartments to isolate the same from the blower inlet, at least one of said vertical compartments being free from such apertures and freely communicating at its bottom with the blower inlet, said warm air outlet extending through the top of the jacket, whereby a portion of the cold air delivered by the blower is recirculated around the casing and through the compartments to insulate the outer jacket from heat losses.

3. A space heater comprising a casing having side and top walls and containing a fire box, an exterior jacket surrounding the casing having side and top walls spaced from the side and top walls respectively of the casing, means dividing the space between the casing and jacket side walls into a plurality of vertical compartments each communicating with the space between the casing and jacket top walls, a blower compartment below said fire box, a blower in the latter compartment operable to deliver air to said casing, said casing

having apertures in the side wall thereof between said fire box and said blower compartment communicating with at least one of said plurality of compartments for diverting thereto a portion of the air delivered to said casing by said blower, another of said plurality of compartments being sealed with respect to the interior of the casing and communicating with the space between the casing and jacket top walls and with said blower compartment for returning to the latter that portion of the air so diverted as aforesaid.

4. A space heater comprising an inner casing having top and side walls, a burner in the inner casing, duct means in said casing for conveying waste gases to a flue, a bottom deck for said casing formed with an air vent, a blower having its outlet connected to the vent to supply air to be heated around said duct means, said inner casing being formed with a warm air opening adjacent the top thereof, an exterior jacket around the inner casing have top and side walls spaced from the top and side walls respectively of the casing, partitions dividing the space between the casing and jacket side walls into a plurality of vertical compartments each communicating with the space between the casing and jacket top walls, said casing being formed adjacent said vent with apertures admitting air delivered by the blower to certain of said vertical compartments, another of said vertical compartments being in open communication with the inlet of the blower for returning air circulated through said compartments to said blower.

ALLEN P. LIVAR.