Jan. 4, 1949. S. J. HEIMAN 2,457,818

DOWNWARD FORCED FLOW AIR HEATER FOR ROOMS

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FIG. 1

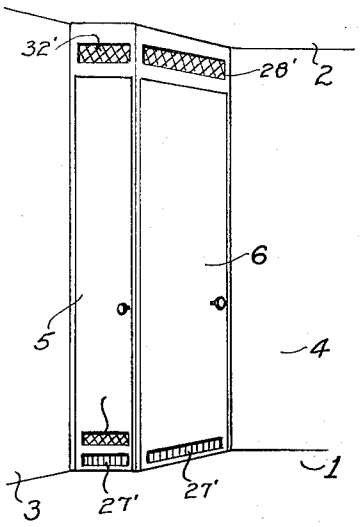
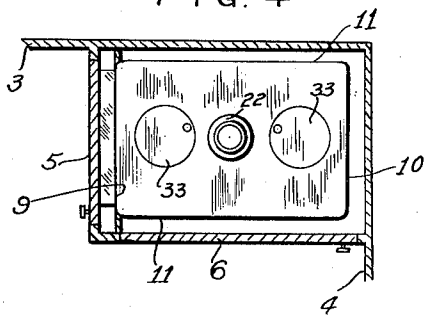


FIG. 4



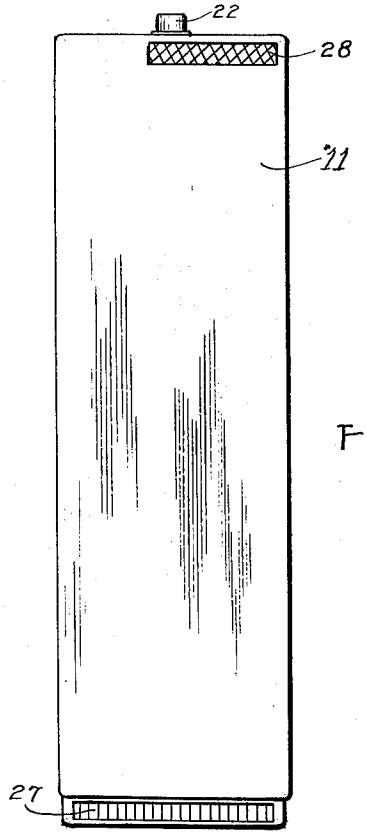
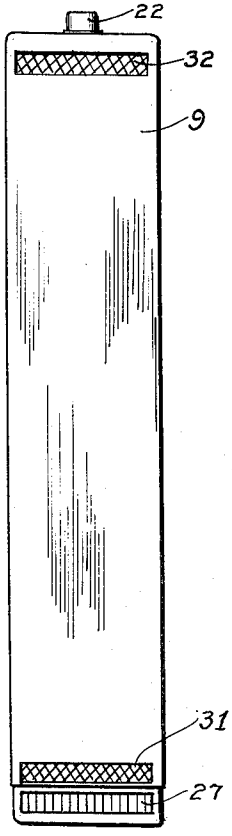


FIG. 3

FIG. 2



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FIG. 6

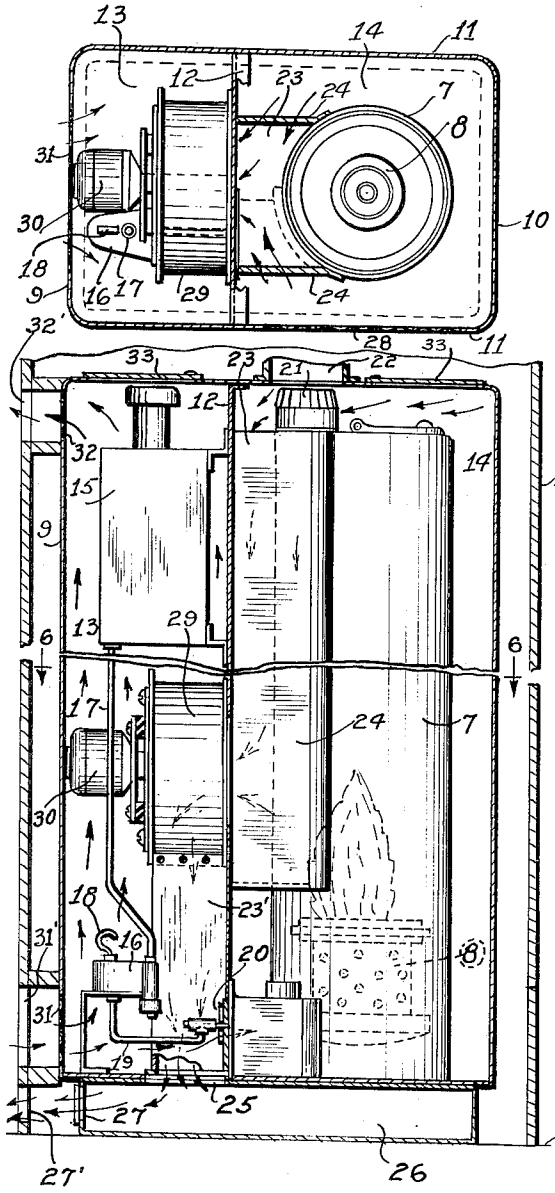
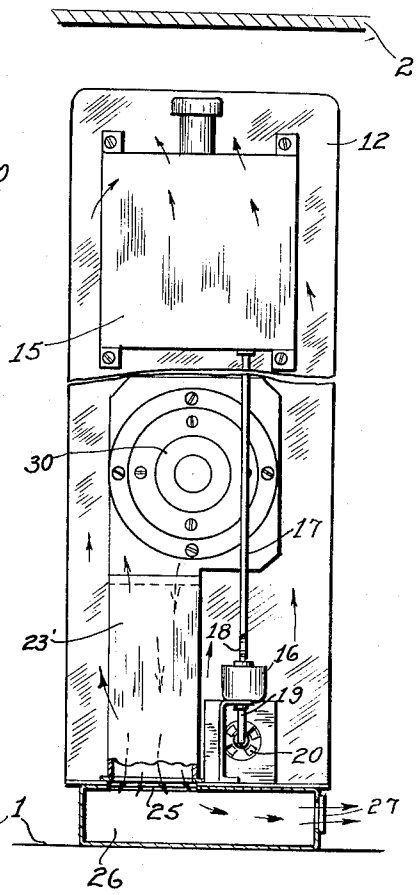


FIG. 5

FIG. 7



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DOWNWARD FORCED FLOW AIR HEATER FOR ROOMS

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4 Claims. (Cl. 126—110)

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This invention relates generally to room or space heaters, and more particularly to such heaters so constructed that they may be placed within the room to be heated, and the air that is adjacent the ceiling of said room will be withdrawn therefrom and passed downwardly through said heater to raise the temperature of said air, whereupon it will be ejected from the heater substantially horizontally and at floor level.

In many space heaters air is passed downwardly through the heater and then projected substantially horizontally from the same at floor level, but in these instances the air so taken into the heater is taken at a much lower level than the height of the room, so that although there is warm air in the room at points above said intake, such air is moved slightly, if at all, and does little or nothing in warming the occupants of the room, because of the fact that said air is above the heads of said occupants.

My invention has as its principal object the use of said high level air, by withdrawing the same from near the ceiling, passing it through the heater to raise its temperature, and thence discharging it horizontally from the heater at approximately floor level.

Another object of this invention is to so construct a heater of the kind described that the air so taken from adjacent the ceiling of the room wherein the heater is placed, is moved downwardly through the heater and confined during this travel, to make contact with substantially the hottest portions of the heater, and to thereby produce the utmost efficiency in heat exchange.

A further object of my invention is to provide means for directing an upwardly traveling relatively cooler body of air through said heater, simultaneously with the hotter downwardly traveling body of air, these two air currents being separate and distinct and sealed off from one another, the hotter current of air being used directly to heat the room while the cooler air is used to cool the means for directing said downward flow of air.

The invention has among its added objects, the production of a device of the kind described, that shall be relatively simple and economical in construction and operation, have comparatively few parts, and which will be otherwise satisfactory and efficient for use wherever deemed applicable.

Many other objects and advantages of the construction herein shown and described, will be obvious to those skilled in the art to which this

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invention appertains, as will be apparent from the disclosures herein given.

To this end, my invention consists in the novel arrangement, construction and combination of parts herein shown and described, and the method and uses mentioned, as will be more clearly pointed out in the following specifications.

In the drawings, wherein like reference characters indicate like or corresponding parts throughout the views,

Figure 1 is a perspective view of a corner of a room in which the heater is installed within a closet;

Figure 2 is a front elevation of the heater ready for such installation;

Figure 3 is a side elevation of the same;

Figure 4 is a top plan view of the same;

Figure 5 is a side elevation of the heater, with parts in section to show the construction more clearly;

Figure 6 is a transverse cross-section, taken substantially along the line 6—6 of Fig. 5; and

Figure 7 is a front view of the heater, with parts in section, and with the casing removed.

Referring more particularly to the drawings, wherein I have illustrated a preferred embodiment of my invention, there is shown a space heater that may be placed at any point within the room to be heated, and may even be placed within a closet or the like so as to be normally concealed, if so desired, the floor and ceiling of the room being represented at 1 and 2 respectively, and the corner walls of the room being indicated at 3 and 4. The closet may have one or more doors 5 and 6 to provide access to the heater, as needed from time to time, and are provided with vents or openings which will be hereinafter described.

Although space or room heaters are old in the art, and even though some of them direct air downwardly through the same to heat it sufficiently, whereupon it is ejected into the room at floor level, yet this intake air is admitted relatively low so that a goodly body or layer of air remains at approximately the height of the ceiling without being drawn into the heater. This air is fairly warm and could perform useful work if it were brought into body contact with the occupants of the room, but inasmuch as it is above their heads it is not felt and is to a great extent wasted.

In the heater device about to be described, I have so constructed the same that the air adjacent the ceiling is entrained directly into the heater, conducted downwardly through the latter

in contact with substantially the hottest portions of the same although out of the path of the products of combustion of the heater, and thence ejected across the floor of the room.

The heater is provided with an upright combustion drum 7 reaching for nearly the full height of the casing, and wherein oil or other fuel may be burned, as indicated by the pot or burner 8 (shown in Fig. 5). A casing or housing, of rectangular cross-sectional shape in the embodiment shown, is arranged to enclose the combustion drum and various other elements making up the heater construction, this casing having the opposed front and back walls 9 and 10 and the pair of opposed side walls 11—11 connecting said front and back walls.

A partition 12 is mounted to extend across the cabinet from one side wall to the other and for the full height of the casing so as to divide the latter into a pair of compartments 13 and 14 and seal off one compartment from the other.

An oil reservoir 15 is mounted in the front compartment 13 at the desired height and preferably affixed to the partition plate 12, somewhat as shown. A control chamber 16 is arranged somewhere near the bottom of the heater in the compartment 13 and oil is fed thereto from the tank 15 by a pipe 17, and an adjustable control valve 18 is mounted on the control chamber 16 so that the amount of fuel fed to the burner through the feed pipe 19 leading to the latter may be adjusted as desired.

Air to the fire-pot may be adjustably regulated by means of any form of valve, as for example the valve 20 shown.

A flue 21 extends from the combustion drum so that the products of combustion may be conducted to the outside atmosphere by means of a chimney or stack (not shown), and a flue extension sleeve 22 may be provided on the top of the casing in registry with the flue portion 21.

It will be noted that the heater just described is considerably higher than those in general use, and this is done for the purpose of entraining air from closely adjacent the ceiling of the room in which the heater is situated, this being done in a manner about to be described.

The flue is preferably eccentrically arranged relative to the median line of the combustion drum, and as seen in Fig. 5 is substantially flush with the portion of the drum periphery that is closest to the partition 12, and naturally, that portion of the drum is hotter than the other portions about the drum periphery.

In order to make use of this uneven heat distribution about the drum periphery, I have arranged an upright passageway 23 between the partition 12 and the said hottest portion of the drum periphery, said passageway having a pair of side wings 24—24 affixed to said partition and drum so as to bridge the gap or space therebetween, and together with said elements from said passageway 23. This passageway is open at its top and, of course, commencing from approximately the top of said drum, and terminating at about the height of the top of the fire pot 8, said passage being preferably closed across its bottom at said height in the compartment 14, inasmuch as that portion of said compartment below said passageway does not attain the temperature reached by the upper portions of the same.

A passageway extension 23' communicates with the main portion of the passageway 23, but may be arranged to extend downwardly in the compartment 13, and has its discharge outlet 25 at

the bottom of said compartment, where it empties into a plenum chamber 26 situated across both compartments but below the same, and having louvres or other forms of discharge vents or openings 27—27 from the latter, these vents thus being close to the level of the floor of the room in which the heater is placed.

An air intake opening 28 is made through the casing and into the compartment 14 at approximately the top of the casing and through which the air from adjacent the room ceiling is entrained through the vertical passage 23, and, in order to move this air forcibly downwardly, a fan or blower 29, driven by a motor 30 or the like, is interposed between the opposed ends of the air passageway elements 23—23', so that when the fan is in operation and the intake and discharge ends of the passage are unimpeded, a flow of air is directed downwardly in the direction indicated by the arrows, as shown.

In order to keep the motor, and any other elements such as the fuel supply, as cool as possible, within the heater, I have provided air intake openings 31 at the bottom of the compartment 13, and outlet openings 32 at points adjacent the top of said compartment, so that the cooling air from the cooler parts of the room may be entrained to travel upwardly in the path indicated by the arrows in the drawings. It will be noted that these two paths of air flow are entirely sealed off from one another, and that they are in action simultaneously, and in opposed directions vertically.

In order to permit the air from the room to flow through the heater openings in the directions heretofore set forth, the closet walls, in the event that the heater is placed within such a closet for concealment, are provided with openings approximately in registry with the those through the heater, as indicated by the openings 27' for the hot air discharge into the room, the opening 28' for the air intake from the room ceiling and which air is eventually discharged into the room at 27', the cool air intake 31' (and from which body of air a portion is fed to the burner for combustion), and the air outlet 32' for the air initially entrained through 31'.

It is to be understood that any number of doors or service openings, such as are indicated at 33—33, may be provided, as desired, to provide access to the interior of the heater.

The heater hereinbefore described is very much taller than the conventional type of space heater, the same being vertically elongated to be of a height at least two-thirds that of the room wherein it is to be placed, and preferably extending substantially the full height of the said room so as to entrain the very hottest of the air within the room, the upward movement of heat being too well known to be mentioned further herein, thus placing this otherwise practically useless air to work to serve a very useful purpose.

The air thus entrained travels downwardly through the very hottest portions of the heater, out of the path of the products of combustion however, and is discharged into the room across the floor at approximately floor level, while at the same time, the parts of the heater that are apt to become damaged through overheating are cooled by upward movement of air sealed off from the body of downwardly travelling air.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence I do not wish to be understood as limiting myself to the exact form,

arrangement, construction and combination of parts herein shown and described, or method employed, or uses mentioned, except as indicated by the claims hereunto appended.

What I claim as new and desire to secure by Letters Patent is:

1. A unit space heater comprising an upright cabinet adapted to be supported on the floor of the room to be heated and having an upper and a lower opening into said room, an upright partition within said cabinet and engaging along the interior of the same to form a first and a second compartment sealed from one another, an upright combustion drum in the first of said compartments and having a flue extending therefrom for carrying off products of combustion, an upright duct within said first compartment and engaging said drum to form an upright heated air passageway with the latter and extending to adjacent the top of said drum, said duct communicating at its upper and lower ends with said upper and lower openings respectively of the cabinet and communicating with the second compartment through said partition, means in the second compartment for forcibly passing air downwardly through said passageway from said upper opening into the room through said lower opening, said cabinet having an air inlet therethrough into said second compartment adjacent its lower end and an air outlet therethrough adjacent the upper end of said compartment for directing an independent supply of air upwardly therethrough and cooling said last-mentioned means.

2. A unit space heater comprising a cabinet structure formed with upright bounding walls adapted to be supported by the floor of the room to be heated and having an air-intake opening adjacent its upper end, an upright partition wall bridging across said cabinet structure to form a pair of separated individual compartments, an upright combustion drum in one of said compartments spaced from said partition wall, an upright duct structure between said partition wall and drum and engaging the latter and having an open upper end communicating with said air-intake opening to provide a heated-air passage, a partition transversely across the lower portion of said cabinet structure to form a plenum chamber therebelow, said transverse partition having an opening therethrough communicating with said plenum chamber and duct to conduct said heated air from the latter into said plenum chamber, said cabinet structure provided with an air-discharge opening therethrough into the room and communicating with said plenum chamber, means for forcibly impelling said heated air downwardly through said duct into the plenum chamber for discharge into the room, and means disposed in the second of said pair of individual compartments for passing cool air upwardly through the second of said pair of individual compartments to cool said last-mentioned air-impelling means.

3. A unit space heater comprising an upright cabinet adapted to be supported on the floor of the room to be heated, an upright partition within said cabinet bridging between the side walls of the latter forming two transversely separated compartments extending approximately the full height of the cabinet, a combustion drum in one of said compartments to constitute the source of heat, an upright duct along said drum and leading from one of said compartments to the other through said partition, the upper portion of said cabinet being provided with an air inlet opening, said opening communicating with the upper portion of said duct, a horizontal partition extending transversely across said cabinet below said drum to define a plenum chamber therebelow, said partition provided with an opening therethrough into said plenum chamber, said last-mentioned opening communicating with the lower portion of said duct, the lower portion of said cabinet having an opening therethrough from said plenum chamber for substantially horizontal discharge of heated air into the room, and air-moving means in said second compartment and communicating with said duct for directing said heated air downwardly through said duct and the plenum chamber for said horizontal discharge into the room, said last-mentioned compartment of the pair of separated compartments having an air-inlet thereinto adjacent its bottom and having an air-outlet therefrom adjacent its top so that such air acts to move upwardly through said compartment to flow over and cool said air-moving means.

4. A unit space heater comprising an upright cabinet adapted to be supported on the floor of a room to be heated, an upright partition extending across said cabinet from top to adjacent the bottom to divide it into a pair of transversely spaced compartments sealed from one another, a combustion drum in one of said compartments furnishing the source of heat and spaced transversely from said partition, upright side wings in said last-mentioned compartment and extending from said partition to said drum to form a heated-air passageway between said drum and partition, the upper portion of said cabinet being provided with an air inlet opening, said opening communicating with the upper portion of said duct, a substantially horizontal partition extending transversely across said cabinet below said drum to define a plenum chamber within said cabinet therebelow, said partition being provided with an opening therethrough into said plenum chamber, said last-mentioned opening communicating with the lower portion of said duct, the lower portion of said cabinet having an opening in its side wall for discharging air from the plenum chamber into the room, and means in said second of said pair of compartments and communicating with said heated-air-passageway and plenum chamber for impelling air downwardly through said passageway and into said plenum chamber, said last-mentioned compartment having upper and lower vents for the flow of air upwardly and outwardly therethrough to cool said air-impelling means.

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