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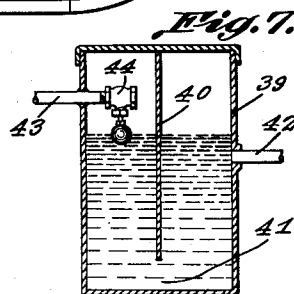
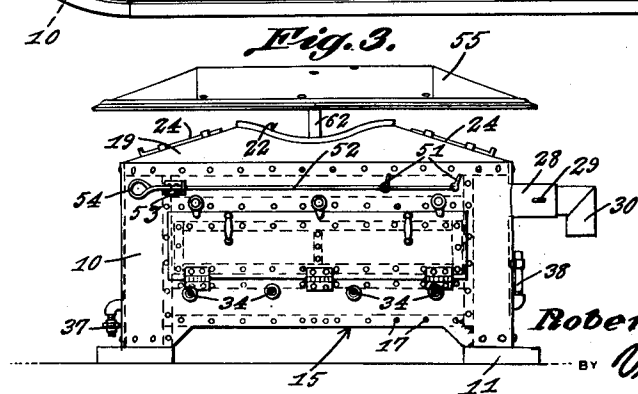
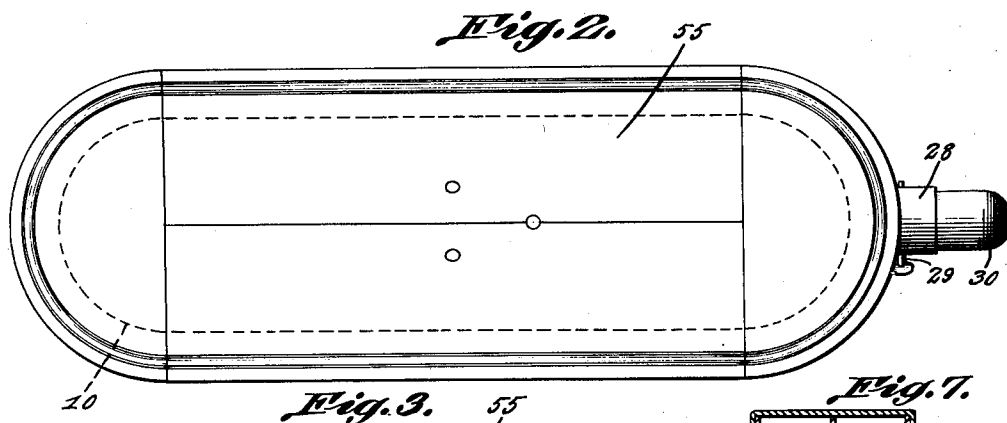
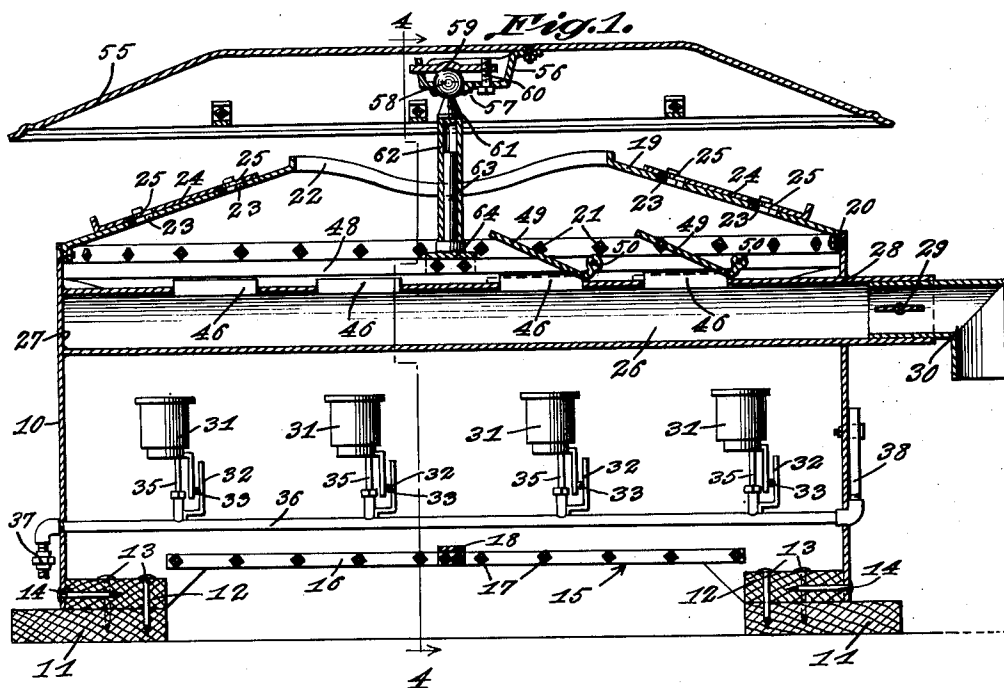
R. L. SPIKES

2,170,735

OIL-BURNING AIR HEATER

Filed Feb. 24, 1938

2 Sheets-Sheet 1



Robert L. Spikes, INVENTOR

BY Victor J. Evans & Co.

ATTORNEYS

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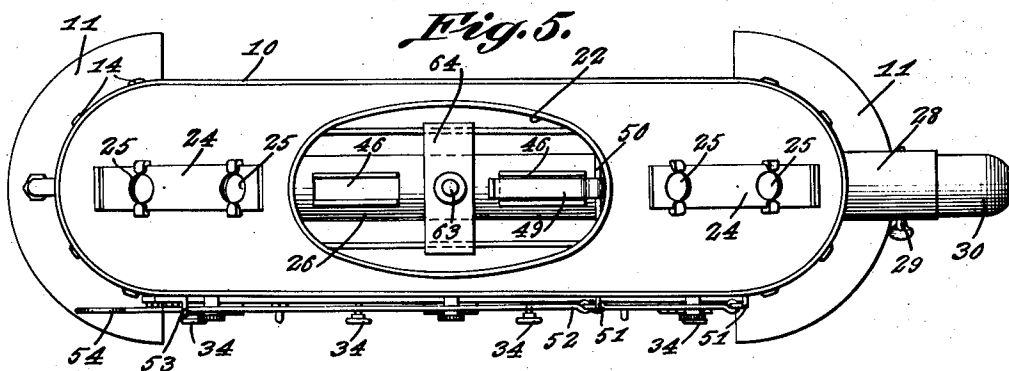
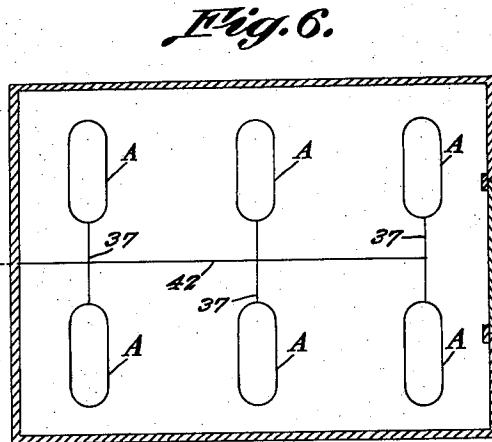
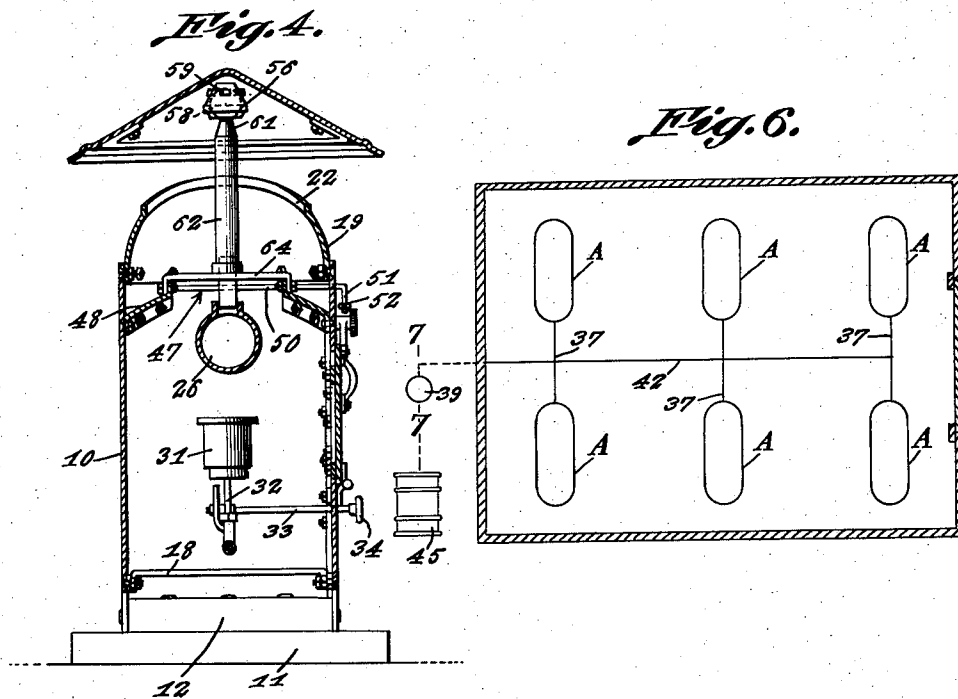
R. L. SPIKES

**2,170,735**

# OIL-BURNING AIR HEATER

Filed Feb. 24, 1938

2 Sheets-Sheet 2



*Robert L. Spikes*, INVENTOR  
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## UNITED STATES PATENT OFFICE

2,170,735

## OIL-BURNING AIR HEATER

Robert L. Spikes, Farmville, N. C., assignor of  
one-third to Frank M. Davis, Jr., and one-third  
to Henry Johnson, both of Farmville, N. C.

Application February 24, 1938, Serial No. 192,403

5 Claims. (Cl. 126—58)

This invention relates to oil burning air heaters and more particularly to an air heating and conditioning unit to be used in a tobacco storage and treating or curing room or compartment, but without absolute limitation thereto.

The principal object of the invention is to provide a heating unit in which conventional oil burners may be utilized to advantage in heating the air taken into the device and to provide not only for the control of the burners in operation but to regulate the flow and distribution of the heated air discharged from the device.

A further object is to provide controlling means of universally adjustable character whereby to direct the flow of the heated air from the unit in any desired direction laterally therefrom, as well as to provide for the control of the volume of the air and the direction of its flow within the unit prior to discharge therefrom.

A still further object is to simplify the structure whereby to facilitate the regulation and control thereof, and to secure economy in manufacture.

With these and other objects in view, the invention consists in the novel structure and combinations and arrangements of parts hereinafter described and set forth with particularity in the appended claims, in connection with the accompanying drawings illustrating a practical embodiment of the invention and in which

Figure 1 is a longitudinal vertical section through the unit;

Figure 2 is a top plan view;

Figure 3 is a front elevation, on a reduced scale, of the unit as illustrated in Figures 1 and 2;

Figure 4 is a section taken on or about the line 4—4 of Figure 1;

Figure 5 is a top plan view of the body portion of the unit with the hood portion removed;

Figure 6 is a diagrammatic view illustrating a practical arrangement of a battery of the heating units within a room or compartment for the conditioning of the air therein and also showing a practical arrangement of the oil supply and pipe connections for the burners of the units; and

Figure 7 is a vertical section of the auxiliary tank used in connection with the main supply tank for controlling the oil supply to the burners.

Referring now to the drawings, the numeral 10 designates a horizontally elongated housing or body casing which is supported in an elevated position from the floor by the provision of base members or blocks 11 at its opposite ends. These blocks may be made of wood, metal or any other suitable material, and as shown they are semi-

circular in top plan, and have a reduced upper portion 12, about the arcuate marginal portion of which the lower part of the correspondingly curved end portions of the housing 10 are fitted and secured in place by any suitable means. As shown, the upper portion 12 is made separately from the base portion 11 and is attached thereto by nails or bolts 13, and the housing is fastened to said portions 12 by the nails 14, as shown in Figure 1.

The intermediate lower portion of the housing 10 is cut away longitudinally on each side, as at 15, and the adjacent marginal portions are preferably reinforced by bars 16 which are bolted thereto, as at 17. It is also preferable to provide a transverse horizontal brace 18 connecting the opposite middle portions of the longitudinal walls of the housing 10.

At the top of the body housing 10 a truncated tapered cover 19 is provided. As shown, this cover is provided with a lower marginal flange 20 which is fitted inside the adjacent upper marginal portion of the housing 10 and secured at intervals throughout the extent thereof by bolts 21, whereby the cover is removable. A relatively large elliptical opening 22 is provided at the center of the cover 19, and in the sloping portions of the cover, between the outer ends thereof and the adjacent ends of the opening 22 as series of smaller openings 23 are provided. As shown, there are two of these openings in each series, and a slide plate 24, provided with a corresponding number of openings 25, is mounted on the outer face of the cover so as to be reciprocated longitudinally whereby to bring the openings 23 and 25 into register with each other and to close said openings, at will.

Extending longitudinally in the upper portion of the housing 10 is a horizontal air tube or duct 26, said tube or duct 26 being closed at one end, as at 27, near one end wall of the housing 10, the opposite end portion 28 of said tube or duct being extended out through an opening in the opposite end wall of the housing, where it is provided with a damper or valve gate 29. Preferably, an elbow extension 30 is provided in said end portion 28 of the tube or duct 26, and the outer leg of the elbow is preferably directed downwardly.

Located in longitudinal alignment under the tube or duct 28 is a plurality of oil burners 31 which may be of any approved type. As shown, said burners comprise upper cylindrical casings housing the flame producing elements (not shown) and provided at their lower portions with

suitable oil supply and flame regulation controls 32. Said controls 32 may be of any suitable form and arrangement, the details of which are not shown, and they are each provided with an operating rod 33 extending horizontally therefrom to the outside of the casing 10 and there provided with a manipulating knob or handle 34, by which arrangement the flame in the respective burners 31 is regulated.

The burners 31 may be supported in any suitable manner, but, as shown, they are supported by the upstanding extensions 35 of a horizontal oil supply pipe 36 extending longitudinally through the casing 10. The pipe 36 may be connected at one end 37 thereof to the oil supply in any suitable manner, but preferably by a pipe connection with a supply tank located so that the oil flows by gravity into the pipe 36, said pipe 36 being provided at its opposite ends with an upstanding extension 38 having a vent opening at its upper end in a plane above the oil level of the supply tank.

Preferably, the tank which delivers the oil to the pipe 36 is auxiliary with relation to a main supply tank and it is provided with means for maintaining a definite quantity of the oil therein. This auxiliary tank is designated by the numeral 39 in Figures 6 and 7, and as shown in section in the latter figure, it is divided by a vertical partition 40 which is spaced at its lower end from the bottom of the tank as at 41. At one side of the tank is an outlet pipe 42, while at the opposite side of the tank and in a horizontal plane above that of the pipe 42, is an oil inlet pipe 43 having a float-controlled valve 44 at its inner end whereby to maintain a liquid level in the tank above the outlet pipe 42. By placing the tank 39 in the oil supply line between the main tank, indicated at 45 in Figure 6, a sediment trap is provided which effectively prevents foreign particles in the oil from entering the pipe 36 which supplies the oil directly to the burners 31.

The air pipe or duct 26 is provided at its upper side with a longitudinal series of openings 46 through which the heated air in the pipe 26 is discharged into the upper portion of the casing 10 through a longitudinal opening 47 provided between a pair of horizontal ledges 48 extending along the inner faces of the side walls of the casing 10, said ledges being inclined transversely and upwardly from the side walls of the casing and being provided at their inner margins with upstanding flanges, by which form and arrangement of said ledges 48 longitudinal troughs are provided in which water or other liquid may be placed for the purpose of humidifying the heated air, if desired.

The openings 46 in the air pipe or tube 26 may each be provided with a valve element whereby said openings may be closed or opened to any desired degree, but, as shown in Figure 1, only two of the openings are so equipped. As shown, the valve elements are in the form of plates 49 mounted at one end on rock shafts 50, the outer end portions of which extend outside of the casing 10 and are provided with crank arms 51 to which a reciprocating operating bar 52 is pivotally attached, said bar being guided in a supporting bracket 53 and provided with a loop or handle 54 whereby it may be conveniently manipulated.

The valve members 49 being hinged at their ends which are disposed towards the adjacent end of the casing 10, they are obviously inclined

upwardly from their hinged ends toward the opposite end of the casing 10 in their opened position. Consequently, the air discharged from said pipe 26 through the openings where the air valve members 49 are applied is directed longitudinally of the housing 10 so as to commingle with the air discharged from the other openings 46 before passing out of the central elliptical openings 22 in the truncated tapered cover 19.

An inverted pan-like hood 55 is mounted above the cover 19 of the housing 10 with a universal tilting arrangement whereby the air discharged from the central elliptical opening 22 and the openings 23 of the cover 19 may be directed in different lateral directions from the unit. As shown, the hood 55 is provided on its under side, at the middle thereof, with a bracket element 56 having a plate portion 57 which is provided with a bearing opening in which a ball 58 is seated and frictionally held by a clamping plate 59 and adjusting screw 60. The ball 59 is provided with a shank 61 which is fixedly attached to the upper end of a tubular stem 62 which is sleeved with a comparatively tight fit on an upstanding stud 63 provided on a transverse cross member 64 which is attached at its opposite ends to the flanged portions of said ledge members 48.

Obviously, by the ball and socket mounting of the hood 55 on the upper end of the stem 62 not only is a universally tiltable movement afforded the hood, but the latter is also capable of a rotative adjustment, if desired, and the heated air discharged from the housing 10 beneath the hood may be directed in any desired direction laterally from the unit. This is of material advantage in the heating and conditioning of air in a room or compartment.

In Figure 6 of the drawings, an arrangement of the units is illustrated in diagram, adapted more particularly for the conditioning of a relatively large storage or treating room, in which is arranged a battery of six of the units, each designated generally by the letter A, in which the supply pipes 37 for the oil burners are cross connected to the pipe 42 from the outlet of the tank 39, which latter, as hereinbefore described, is interposed in the pipe supply line from the main tank 45 and controlled by the float valve 44 therein, as indicated in Figure 7.

By the arrangement of the burners 31 in a longitudinal series beneath the air pipe or duct 26 the air is heated in the said tube or duct, and at the same time the volume of the air admitted to the tube or duct is controlled by the valve or damper 29, while the volume of the heated air and its direction of flow is controlled by the valved openings in said tube or duct and also by the regulation of the openings 23 in the cover 19 which are controlled by the apertured slide plates 24. In this connection it is noted that the distribution of the heated air from the unit may be equally in every direction laterally therefrom when the hood element 55 is in the horizontal position shown in the drawings, yet, when desired, said hood element may be tilted to direct the preponderance of the discharged air in one lateral direction.

In the use of the heating device of the present invention, particularly in the process of curing tobacco within a barn, curing room or compartment, the outer end portion 28 of the tube or duct 26, having a downturned elbow extension 30, is usually extended to the exterior of the curing chamber so as to receive air from the outside

atmosphere although, in some cases, the tube or duct extension may be located within the chamber so as to re-circulate the inside air. In any case, the volume of air passing into and through the tube or duct 26 is controlled by the damper 29, said damper being also provided to entirely close said tube or duct, if desired, so that no air whatever is admitted therein through the elbow 30 on the extension 28, in which case only the air which is taken into the lower combustion chamber portion of the casing 10 is circulated with the heated products of combustion which pass upwardly at each side of the tube or duct 26, through the elongated medial passageway 47 and out through the main central opening 22 of the casing cover or also through the controlled auxiliary openings 23, whence it is directed from the region of the casing 10 in a volume, the directed flow of which is controlled by the relative position of the inverted pan-like hood 55.

When the damper or valve 29 is opened and the tube or duct 26 is heated by the operation of the burner elements 31 thereunder, the air is obviously drawn into the tube or duct through the elbow extension 28, 30, and becoming heated in said tube or duct is discharged through the openings 46, the volume and velocity of the air leaving the tube or duct being controlled by the damper or valve 29 and the aggregate area of the openings 46, some of which latter are controlled by the vertically swingable valve plates or dampers 49. In other words, greater velocity is attained if only the two valveless openings 46 are used. The valve plates 49 of the other two openings 46 being closed, the heated air flows out of the casing 10 through the opening 22 with considerable velocity, its direction of flow from the casing 10 being governed by the relative position of the hood 55 with which it collides as hereinbefore described. Obviously, by opening the valve plates or dampers 49 to different degrees the volume of air passing from the tube or duct 26 is accordingly varied, naturally reducing the velocity of the outflow of heated air from the casing 10, and said valve plates or dampers being hinged mounted as they are the air passing from their respective openings 46 is deflected towards the two valveless openings 46 so as to effectively commingle with the heated air passing from the latter before being discharged through the main central outlet opening 22. In this connection, in some cases, the slides 24 may be adjusted to bring their openings 25 into either partial or full registration with the auxiliary outlet openings 23 in the truncated tapered cover 19 of the casing 10, this being to spread the distribution of the heated air from the casing 10 against the under side of the hood 55 longitudinally thereof, thus increasing the general efficiency of the device and adding to the adjustability and flexibility thereof in adapting it to the varying conditions, atmospheric and otherwise, to be met in the curing of tobacco and for which purpose the device of the present invention is primarily produced.

For access to the lower portion of the casing 10, a horizontally elongated opening is provided in the side wall of the casing with a door 65 which is preferably hinged along its lower edge portion, as at 66, and suitable latches 67 are provided for fastening the door in its closed position.

Obviously the structure and arrangement of the device may be modified and altered in many respects within the spirit and scope of the invention as defined in the appended claims. The in-

vention, therefore, is not limited to the specific construction and arrangement shown in the accompanying drawings.

What is claimed is:

1. An air conditioning and circulating heater for curing tobacco and the like, comprising a horizontally elongated casing with a horizontal air duct therein, the air duct having controllable means of outlet into the upper portion of the casing, said casing having a central outlet opening in its top, correlated fuel burners within the casing for heating said air duct, and a universally adjustable hood element located over the top of the casing and covering the outlet opening thereof whereby to control and variably direct the outflow of heated air impacted thereagainst from said outlet opening of the casing.

2. An air conditioning and circulating heater for curing tobacco and the like, comprising a horizontally elongated casing with a horizontal air duct therein, the air duct having controllable means of outlet into the upper portion of the casing, said casing having a longitudinally elongated, normally open, central outlet opening in its top and a series of controllable auxiliary openings adjacent each end of said central opening, correlated fuel burners within the casing for heating said air duct, and a universally adjustable hood element located over the top of the casing and covering the central and auxiliary outlet openings thereof whereby to control and variably direct the outflow of heated air impacted thereagainst from said outlet opening of the casing.

3. An air conditioning and circulating heater for curing tobacco and the like, comprising a horizontally elongated casing, a horizontal air duct extending longitudinally within the upper portion of the casing, said air duct being closed at one end within the casing and having its opposite end extended outside the casing and provided with a valve-controlled inlet, said duct having a longitudinal series of outlet openings in its upper side within the casing, a longitudinal series of fuel burner elements located beneath said air duct and individually and collectively operable to heat the duct, the casing having a truncated tapered top closure provided with a central outlet opening therein, and a universally adjustable hood element located above the casing and covering the central outlet opening thereof whereby to variably direct the outflow of the heated air impacted thereagainst from said outlet opening.

4. In a heater of the character described, a casing having a horizontal air duct therein, fuel burner elements arranged beneath said air duct whereby to heat the same, said air duct having valve-controlled intake provision externally of the casing and controllable outlet provision within the casing for discharging the heated air from the duct in variable volume and directional flow into the upper portion of the casing, said casing having a central outlet opening in its top, and a hood element located above the top of the casing and extending over the outlet opening thereof with provision for adjustment whereby to variably direct the distribution of the heated air laterally from the casing as discharged from the outlet opening thereof.

5. In a heater of the character described, an open bottomed, horizontally elongated, casing supported at its opposite ends in raised position, a horizontal series of fuel burner elements arranged longitudinally and medially within the lower portion of the casing, means for individu-

ally regulating and operating said burner elements, a horizontal air duct extending longitudinally within the casing and above said burner elements whereby to be heated by the latter, said air duct being closed at one end within the casing, its  
5 opposite end extending outside the casing and being provided with a valved inlet, said duct being provided with a longitudinal series of elongated outlet openings in its upper side within  
10 the casing, certain of said outlet openings nearer the inlet end of the duct being provided with tiltable closure members for regulating the volume of output of heated air from the duct and directing the flow of the discharged air through these particular openings towards the other openings not  
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so provided, said casing having a median longitudinal passageway between a pair of ledges extending longitudinally of the casing walls at opposite sides of and in a plane above said air duct, said casing having a truncated tapered  
5 cover provided with a longitudinally elongated central opening and a series of smaller valve-controlled openings adjacent the opposite ends of said central opening, and an adjustable hood  
10 element located above the casing cover and extending over said openings thereof whereby to variably direct the outflow of heated air laterally from said casing.

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