Dec. 6, 1966 A. P. LOEB ETAL 3,289,665

RADIANT GAS BURNER ASSEMBLY

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FIG. 7.

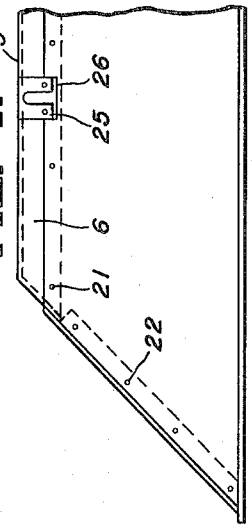


FIG. 8.

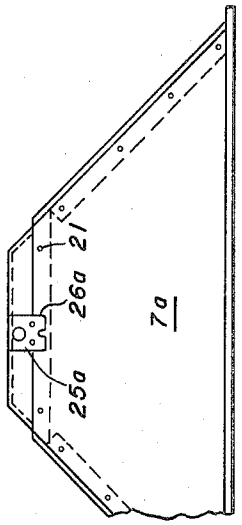


FIG. 3.

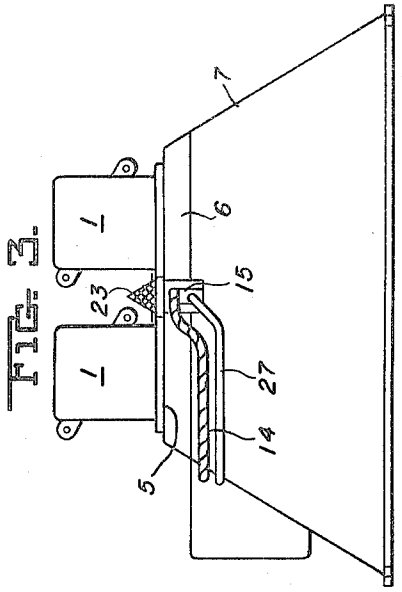


FIG. 2.

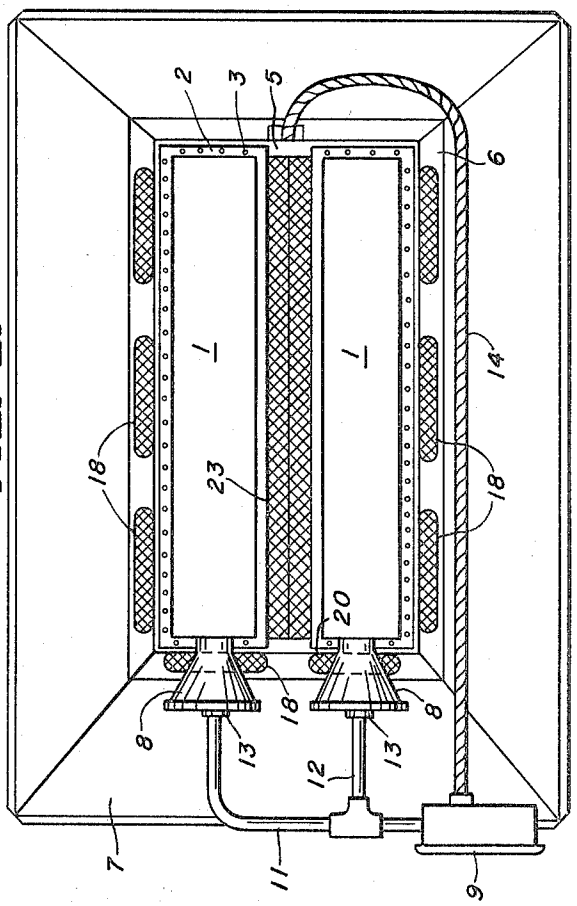
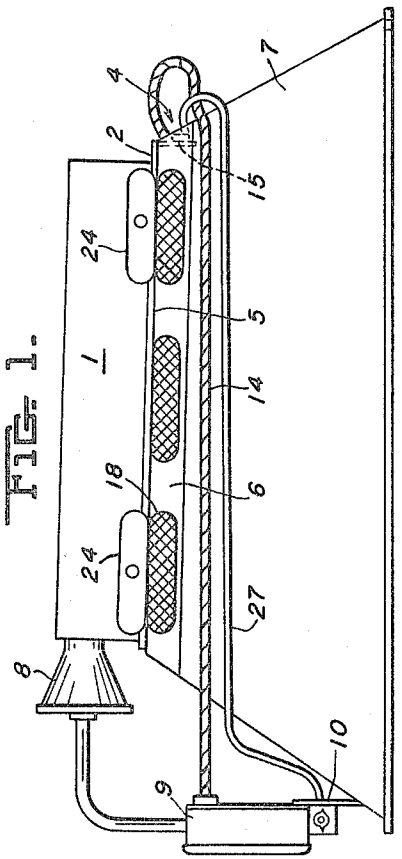


FIG. 1.



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FIG. 5.

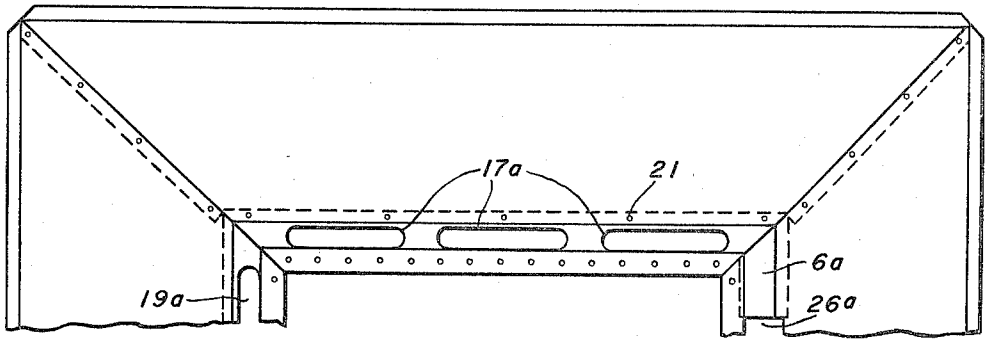


FIG. 4.

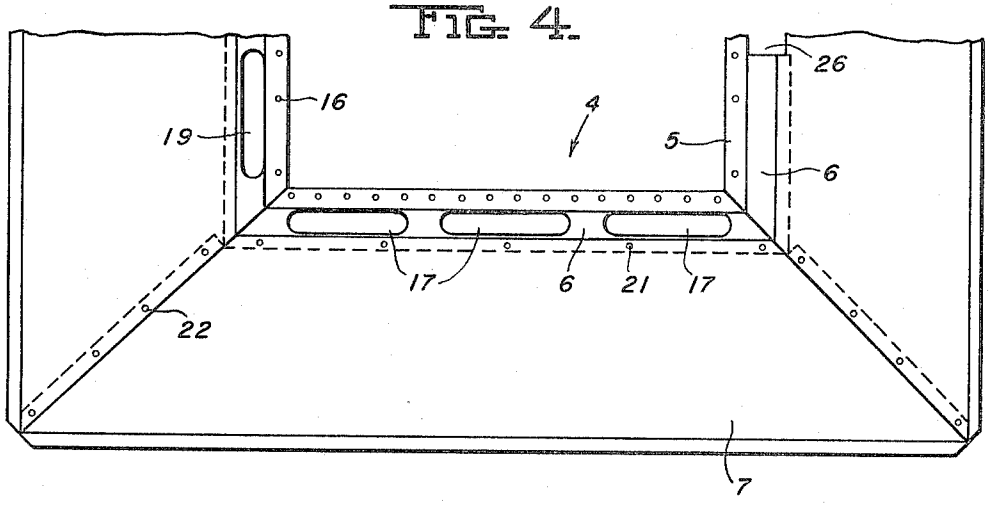
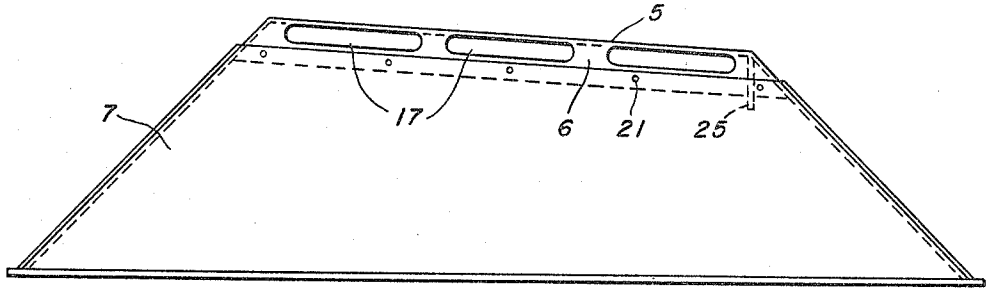


FIG. 6.



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RADIANT GAS BURNER ASSEMBLY

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Filed Nov. 13, 1962, Ser. No. 237,172

2 Claims. (Cl. 126—92)

This is a continuation-in-part of application Serial No. 159,316, now Patent No. 3,185,204 filed December 14, 1961.

The present invention relates to radiant gas fired burners and the assembly thereof with reflectors for controlled directing of the heat from the burners in any desired direction.

Radiant gas fired burners customarily provide some form of manifold wherein a desired combustible air-gas mixture is provided and flows therefrom through an open face of the manifold over which is disposed a suitable grid for burning the combustible mixture upon the outer face of the grid.

Within the manifold is a suitable mixing tube receiving the gas and air in proper amounts to eliminate formation of carbon monoxide during combustion of the gas-air mixture upon the outer face of the grid. This grid must be of suitable design to avoid "flash-back" of the flame into the manifold. When, however, the manifold is mounted upon a desired form of reflector, there is always the possibility of adverse pressure build up within the reflector which can and usually does aggravate the "flash-back" problems. A properly designed reflector mounting for a manifold or a plurality of manifolds has been demonstrated to provide a marked increase in efficiency of the burners to deliver a desired amount of heat upon a selected area from a given volume of gas. Such burners are used as space heaters, as product driers in certain manufacturing operations and other uses.

One object of the present invention is to provide a suitable mounting for the burner or burners upon a desired type of reflector to deliver maximum heat therefrom upon a pre-selected area.

Another object of the invention is to provide a suitable type of mounting for the burner or burners and reflectors to avoid or completely eliminate "flash-back."

Another object of the invention is to provide suitable venting of the burner mounting and reflector to both avoid "flash-back" and formation of carbon monoxide.

These and other objects of the invention will be made apparent from the following description and the drawings forming a part thereof, wherein:

FIG. 1 shows a side elevation of one form of an assembly of dual radiant gas fired burner manifolds, mounting frame and reflector;

FIG. 2 shows a plan view of FIG. 1;

FIG. 3 shows a side elevation of FIG. 1;

FIG. 4 shows a one-half plan view of a mounting frame and reflector, for such dual burner manifolds, which is symmetrical about the center line;

FIG. 5 shows a one-half plan view of a mounting frame and reflector, for a single burner manifold, which is symmetrical about the center line;

FIG. 6 shows a side elevation, typical for both FIGS. 4 and 5;

FIG. 7 shows in end elevation the one-half of a mounting frame and reflector of a dual manifold assembly of FIG. 4; and

FIG. 8 shows in end elevation the one-half of a mounting frame and reflector of a single manifold assembly of FIG. 5.

Referring now in detail to the drawings and particularly FIGS. 1 to 3 thereof, the assembly there shown comprises a pair of suitable burner manifolds 1 which are provided with peripheral flanges 2 having openings 3 therein to receive fastener members connecting the manifolds to a mounting frame 4 underlying the manifolds. The frame 4 may be of any suitable shape and size to accommodate the particular burner manifold or manifolds with which it is used. In the present case, the frame 4 is rectangular in shape having an inwardly turned peripheral upper flange 5 defining an opening through which the heat from the burner or burners is projected. The outer periphery of the flange 5 is defined by a continuous downwardly and outwardly extending skirt portion 6, to the lower portion of which is attached a reflector 7. At one side of the reflector 7 and adjacent the inlet openings of the mixing tubes 8 of the burner manifolds 1 is a conventional type burner control system 9 mounted upon the reflector by any suitable means such as the plate 10. The burner control 9 by a means (not shown) receives gas from a suitable source and this gas is conveyed therefrom by the conduits 11 and 12 to the valves 13 injecting the gas into a venturi type mixing tube 8. The specific burner manifold and associated parts are shown in our copending application Serial No. 159,316, filed December 14, 1961 and reference may be made thereto for specific details of construction. It will suffice to say that the mixing tubes 8 are of the injector venturi type whereby the entering gas also draws into the tube the necessary combustion air. Extending from the burner control 9 is a suitable conduit 14 which supplies gas to a conventional gas pilot 15 which is secured to the mounting frame 4 in a manner hereinafter discussed.

Referring now in detail to FIGS. 4, 6 and 7 of the drawing illustrating the mounting frame and associated reflector, the mounting frame 4 is comprised of a top flange 5 having a skirt portion 6 depending outwardly and downwardly therefrom. The open area defined by the flange 5 is of a size to receive the two burner manifolds 1 in spaced relation about each side of the center line indicated. Within the flange 5 are suitable openings 16 aligned with the openings 3 of the manifold flange 2 for receiving suitable fasteners connecting the two flanges together. Within the skirt portion 6 of the mounting frame at the opposite longitudinal sides thereof are a plurality of slotted openings 17 adapted to receive the open mesh screens 18 (FIG. 1). At one of the transverse sides of the mounting frame 4 the skirt portion 6 has therein a plurality of suitable openings 19 closed by the vent screens 20 (FIG. 1).

As illustrated in FIG. 6 of the drawing the mounting frame flange 5 is inclined upwardly from the horizontal and preferably in a direction towards the gas inlet opening of the manifold mixing tube 8. Adjacent the lower edge of the skirt portion 6 are suitable openings 21 to receive fastener members attaching the reflector 7 to the mounting frame. The mounting frame may be of any suitable metal and preferably aluminum.

The reflector 7 as shown in FIGS. 4, 6 and 7 has an exterior contour similar to that of the mounting frame 4 which is received therein. For practical assembled purposes this reflector 7 may be made into four separate portions which overlap at the corners thereof and secured together by suitable fastener members such as 22. Preferably the reflector 7 may also be made of aluminum or any other suitable material and at least the inner surface of the reflector should be polished for better reflection of the heat.

Referring again to FIG. 1 of the drawings showing the burner manifolds 1 disposed in transverse spaced relation, the opening between the flanges 2 of the manifolds at the center line of the assembly is preferably closed by a suitable open mesh screen 23 which is triangular shape in cross-section with the base of the triangle disposed adja-

cent the flanges 2 of the manifold. This screen 23 may be secured in place in any suitable manner as by being provided with end flanges (not shown) which may extend beneath the mounting frame flanges 5, or overlap them and be secured thereto. As best shown in FIG. 1 the burner mounting frame 4 and reflector 7 assembly may be provided with any suitable means, such as the lugs 24 at opposite sides thereof for suspending the assembly from any suitable support. As a means for mounting the gas pilot 15 upon the mounting frame, a suitable flange such as 25 (FIG. 6) may be provided. The skirt 6 adjacent the flange 25 is provided with a suitable opening 26 to permit mounting of the gas pilot.

Referring now to FIGS. 5 and 8 of the drawing: FIG. 5 is a half plan veiw of a mounting frame for a single manifold and like in FIG. 4, the work frame *4a* has a peripheral flange *5a* adapted for a single manifold. Depending downwardly and outwardly from the flange *5a* is a skirt portion *6a* having suitable openings 21 therein to receive fasteners attaching the reflector to the frame. At one longitudinal edge of the flange *5a* and within the skirt *6a* is a single opening *19a* adapted to receive a screen 20 and at opposite longitudinal sides of the flanges *5a* the skirt *6a* is provided with a plurality of openings *17a* adapted to receive the open mesh screens 18. At one end of the peripheral flange *5a*, the skirt portion *6a* is cut at *26a* to provide an opening for reception of a pilot burner to be attached to the depending flange *25a*, the deflector *7a* is received over the skirt portion *6a* as in FIG. 7. The reflector *7a* may be suitably made of a plurality of sections overlapping at the corners and secured together by suitable fastener members as in FIG. 6. As also shown in FIG. 6 of the drawing, which is common to both types of mounting frame and reflector, the mounting frame is inclined upwardly towards the inlet end of the mixing tube 8 of the manifold.

Referring now to FIG. 8 of the drawings showing a one-half end view of the work frame and reflector of FIG. 5, the member *25a* is clearly visible through the opening *26a*. This end view FIG. 8 is similar, except for size of the burner manifold opening, to the end view of FIG. 7. The slope of the sides of the reflector *7a* are preferably the same as that of reflector 7, however, the transverse width of the reflector, for this single manifold mounting frame, is less than the transverse width of the mounting frame and reflector employing a double manifold. Except for the employment of dual burner manifolds, the assembly of a single manifold mounting frame, reflector and gas control means is identical with that shown in FIGS. 1 and 2 of the drawings. Since the side elevation of FIG. 1 is identical for both the plural and single manifold arrangements, the single manifold arrangement would have the same gas controls and mounting lugs 24.

Referring now to the operation of the manifold, mounting frame and reflector assembly of both forms of the invention, it will be observed that the manifold is supported by the mounting frame so that the manifold slopes downwardly from the inlet end thereof for the gas and towards the closed end of the manifold, where the flow of the gas-air mixture is reversed in direction and flows rearwardly towards the gas inlet end of the manifold. This reversal of flow of the air-gas mixture is customary with manifolds employing a mixing tube extending longitudinally of a substantial portion of the manifold, but the customary manner of mounting the manifold and mixing tube is to place both ends of the manifold in a single horizontal plane.

One of the advantages of tilting the manifold is that the reversed flow of combustible mixture more readily fills the manifold and tends to provide more uniform pressure over the entire area of the outlet screen closing the open bottom face of the manifold.

Another advantage of the mounting frame is that it provides venting outlets 17, 19, *17a*, *19a* and 23 for removal of combustion gas from within the reflector and from the face of the burner screen preventing formation of carbon monoxide. The screens 18 covering said outlets are constructed of a gauge and thickness to cool the combustion gases and the flow thereof through the screens. Additionally, the vent opening screens prevent the flame from flashing through the vent openings when the burner is ignited from a cold starting condition or after a long period of burner operation when the burner and vent openings are hot.

A still further advantage obtained by the assembly of FIG. 1 is that a mounting frame opening to receive the automatic pilot 15 may be provided at either end of the manifold to ignite and to maintain burner operation. Location of the pilot as shown in FIG. 1 has provided the most successful operation.

It will be understood that the surface shape of the mounting frame will be largely determined by the shape and number of the burner manifolds. Additionally, space will be required to provide the vent openings 17, 19, *17a* and *19a*. The addition of vent openings with screens 23 is advisable where a plurality of manifolds are mounted upon a single frame. Such a mounting frame also provides space for mounting lugs 29 to suspend the assembly in any desired position.

The specific contour of the reflector may be changed to suit use conditions and the construction thereof may be varied as required.

The operation of the assembly of FIGS. 1 to 3, is effected by means of the conventional burner control system, indicated generally at 9, FIG.1. Here control of the flow of gas through conduits 11 and 12 to the gas valves 13 is effected. The control system 9 also ignites and maintains the pilot 15. The rate of flow of gas from inlet 13 into the injection type mixing tube 8 of the manifold in combination with the openings in the manifold grid, not shown, determines the volume of air aspirated into the mixing tube to provide the proper gas-air combustible mixture. The burner is initially ignited by pilot 15 receiving gas through conduit 14 from 9. Pilot 15 is initially electrically lighted and maintained in operation by control conduit 27 from the control system 9.

Our copending application Serial No. 159,316, filed December 14, 1961 may be referred to for any desired details of burner manifold and associated screen construction.

We claim:

1. A radiant gas fired burner and heat reflector assembly, comprising

a reflector member providing a top wall and depending outwardly inclined side and end walls, with said top wall sloping downwardly between opposite end walls,

a pasageway through said reflector member inclined top wall and disposed in spaced relation to the adjacent side and end walls,

a radiant gas fired burner manifold disposed over said passageway in the inclined top wall with the heat emitting face of the manifold overlying said passageway and supported upon the adjacent top wall portion about the periphery of said passageway, and

vent openings in at least two opposite depending reflector member walls and adjacent the inclined reflector top wall thereof for venting the burner combustion gases.

2. The assembly as defined in claim 1, wherein the combustible fuel mixture is introduced into one end of the said manifold for flow therethrough in the direction of the downward slope of said reflector top wall.

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