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V. S. BECK

1,922,348

BURNER

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Fig. 1.

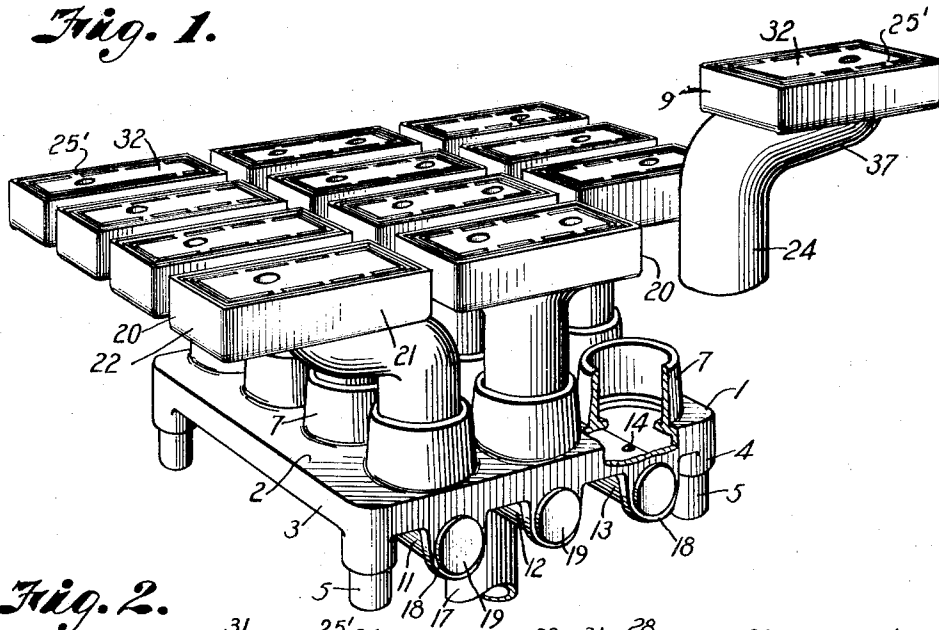


Fig. 2.

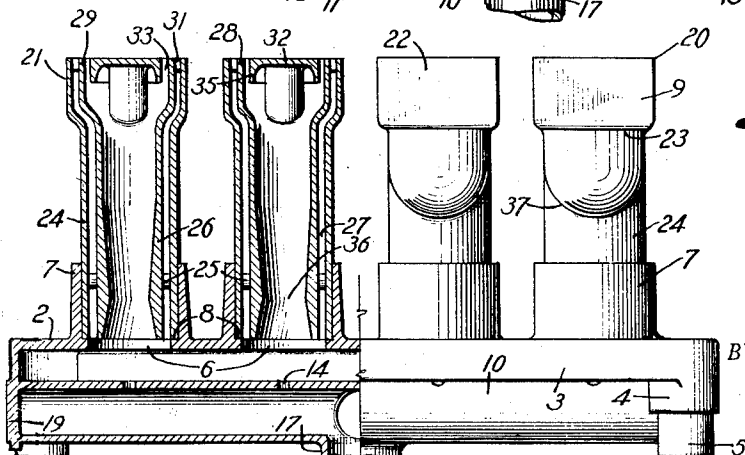
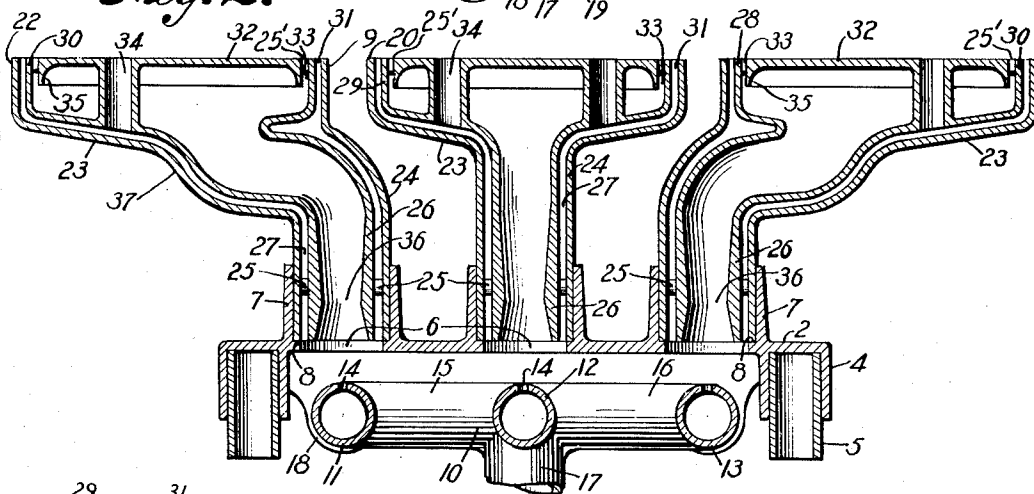


Fig. 3.

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5 Claims. (Cl. 158—106)

This invention relates to gas burners and more particularly to those of that character for distributing an air and gas mixture to the combustion zone of a furnace and has for its principal object to provide a simplified burner structure for effecting more economical use of fuel gas.

Another important object of the invention is to provide a primary air and gas mixture in conjunction with a secondary air supply that is discharged peripherally about the outlet of the primary mixture. Another object of the invention is to provide a burner structure which may be installed through the usual furnace doors without dismantling the furnace.

It is also an object of the invention to provide a burner whereby a unit frame may be equipped with various shaped burner heads so that the burner assembly may conform to and cover substantially the entire area of a fire box.

In accomplishing these and other objects of the invention, I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawing, wherein:

Fig. 1 is a perspective view of a burner constructed in accordance with my invention.

Fig. 2 is a vertical sectional view through the burner illustrating shape of the burner heads.

Fig. 3 is a side elevational view of the burner, a part of which is shown in section to better illustrate the manifold construction which distributes gas to the burner heads.

Referring more in detail to the drawing:

1 designates a preferably rectangular shaped frame of suitable dimensions to enable its installation through one of the doors opening into the fire box of a furnace. The frame 1 comprises a horizontal plate 2 having a depending peripheral flange 3 connecting depending tubular sockets 4 located at the corners of the plate.

Supported in the sockets 4 are nipples or pipe sections 5 forming legs for supporting the plate at a suitable height above the floor of a fire box to permit passage of air thereunder and to accommodate a gas manifold later described. The upper face of the plate 2 is provided with a plurality of spaced rows of openings 6 surrounded by collars 7 forming sockets having internal shoulders 8 positioned in the upper plane of the plate to provide ledges for supporting burner heads 9 later described.

The manifold 10 preferably comprises a plurality of parallel pipes 11, 12 and 13 extending longitudinally of the rows of openings 6 and having gas orifices 14 aligning axially with each of said openings.

The pipes 11, 12 and 13 are connected intermediate their ends by lateral conduits 15 and 16 and with a central supply pipe 17 through which the gas is supplied to the manifold. The manifold thus described may be a separate unit and supported by the frame 1 or it may be formed integrally therewith as illustrated in the drawing with the ends of the pipes integral with ears 18 depending from the end flanges 3, as best illustrated in Figs. 1 and 3, the ends of the pipes being closed by integral diaphragms 19.

The burner heads 9 are here illustrated as comprising rectangular shaped box-like members 20 having parallel side and end walls 21 and 22 and having bottoms 23 connected with tubular leg portions 24 sleeved in the collars 7 with their lower ends supported on the ledges 8 as illustrated in Fig. 2.

The leg portions 24 preferably snugly engage the inner walls of the collars so that the frictional contact will prevent their rotation therein. However, suitable keys may be provided or the legs and collars may be polygonal in shape.

Supported within the legs 24 by suitable spacing lugs 25 which may be formed integral therewith, are tubular conduits 26 having smaller diameter than the inner diameter of the legs to form an annular passageway 27 therebetween for passage of secondary air as later described.

Formed integrally with the upper ends of the conduits 26 are complementary rectangular shaped box-like portions 28 having side and end walls 29 and 30 spaced from the walls 21 and 22 and which cooperate therewith to form an annular air outlet channel 31 extending along the periphery of the burner heads.

Supported within the inner box-like portions 28 of each burner head is a rectangular shaped plate 32 extending horizontally in the plane of the upper edges of the walls and which has its peripheral edges spaced inwardly from the inner walls 29 and 30 to provide a peripheral gas outlet 33. One or more tubular conduits may be formed in each of the burner heads having their lower ends communicating with the secondary air passageway 27 and their upper ends opening through the plate 32 to discharge secondary air within the boundary of the gas outlet 33 so that the gas flame burning above the gas outlet will not be pinched inwardly by the secondary air discharged through the outlet 31.

Spacing lugs 25' may also be used at sufficient intervals to connect the plates 32 with the walls of the head as shown in Fig. 2.

The plates 32 are provided with depending baffles 35 to deflect the gas downwardly from the outlet opening, thereby producing a turbulent or whirling effect of the gas to assure complete mixture and uniform discharge about the periphery of the plates.

The conduits 26 are provided at their inlet ends with venturis 36 so that the gas discharged from the orifices 14 draws primary air into the burner head for mixture therewith and to provide a combustible mixture before it is discharged through the outlet 33.

In order that the burner heads may be positioned to cover the entire area of the fire box, the side rows of burner heads are preferably provided with offset leg portions as at 37 so that the heads thereof may be extended outwardly and laterally of the side edges of the supporting frame toward the sides of the fire box, the lateral offsets of the legs being of sufficient length and shaped to position the burner heads in correct relation with the walls of a fire box.

It is obvious that the burner heads may be of various shapes and may extend at various angles from a manifold so that when they are assembled, they will conform to the cross sectional area of the fire box, thereby adapting the burner to either round or square fire boxes.

In installing a burner constructed and assembled as described, the frame 1 having a desired number of collars or sockets 7 is inserted through a fire door of a furnace and supported in level position from the floor of the fire box by the pipe sections 5 which may be cut in suitable lengths to position the frame at the desired height and to level the frame. The fire box may then be closed or bricked in about the frame as in usual installations, to divide it into a lower air intake chamber and an upper combustion chamber. The burner heads may then be inserted through the fire box opening and installed in each of the collars. In the ordinary rectangular shaped fire box a center row of burner heads will be of substantially T-shape as shown, and the outer side rows will have the specially formed leg portions to position the burner heads so that they will substantially cover the width of the box.

The supply pipe 17 is connected to a suitable gas supply which may be controlled by valves (not shown) so that the gas delivered to the manifold and through the orifices 14 is discharged in proper amounts to each of the burner heads.

The gas streams flowing from the orifices 14 will pass across the space between the manifold and the plates 2 into the venturis, and primary air will be entrained with said streams for mixture in the burner heads. The gas discharging from the venturis 36 mixes with the air and a combustible mixture is formed for discharge through the peripheral gas outlets 33. At the same time, the secondary air is drawn through the annular passageway 27 and discharged through the peripheral outlet 31, and also through the conduits 34 to contact opposite sides of the gas flame to aid in the efficient combustion of the gas.

Attention is also directed to the fact that the burner heads are spaced apart to separate the flames and to provide air passageways therebe-

tween to prevent undue heating of the burner heads and also in some installations the secondary air ports may be dispensed with and the secondary air supplied through the passageways between the burners.

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

1. A burner head including an outer rectangular shaped head member, an inner complementary shaped head member spaced from the outer head member to form a peripheral air discharge outlet and having a gas and primary air inlet, and a plate member associated with the inner member to effect mixture of the gas and primary air and to form an outlet for said mixture within the boundary of said air discharge outlet.

2. A burner head including an outer rectangular shaped head member, an inner complementary shaped head member spaced from the outer head member to form a peripheral air discharge outlet and having a gas and primary air inlet, a plate member associated with the inner member to form a gas outlet within said air discharge outlet and having a depending peripheral lip, an air supply conduit communicating with the outer head member, an inner gas supply conduit communicating with the inner head member, and means for supplying gas to the inner conduit together with primary air for retardation by said lip to effect mixing of said gas and primary air before passage from said gas outlet.

3. A gas burner including a frame, burner head supporting means on the frame, burner heads supported in said means comprising head portions having substantially enclosed mixing chambers therein and provided with peripheral gas outlets, means for admitting a gas mixture to the mixing chambers, and means for discharging secondary combustion supporting air about said gas outlets.

4. A gas burner including a frame having a burner head supporting socket, a burner head having a tubular stem communicating with the socket and terminating in an enlarged head portion, an outer tubular conduit corresponding substantially in shape to said burner head and spaced peripherally therefrom to provide a secondary air passage, a closure plate for the burner head having outlet ports adjacent said air passage, and means for securing the plate in the head including a tubular member communicating with said air passage and opening through the plate.

5. A gas burner including a frame having a socket provided with an inlet opening, an outer tubular conduit supported in said socket and having an enlarged head portion, a burner head corresponding substantially in shape to said tubular conduit and spaced peripherally therefrom to provide a secondary air passage communicating with said inlet opening, spacing lugs connecting the burner head with the tubular conduit, a throat on said burner head communicating with said inlet opening for passage of primary air and gas into said head, and means for delivering gas through said opening into the throat for mixture with the primary air before passage from the head and subsequent mixture with the secondary air.

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