

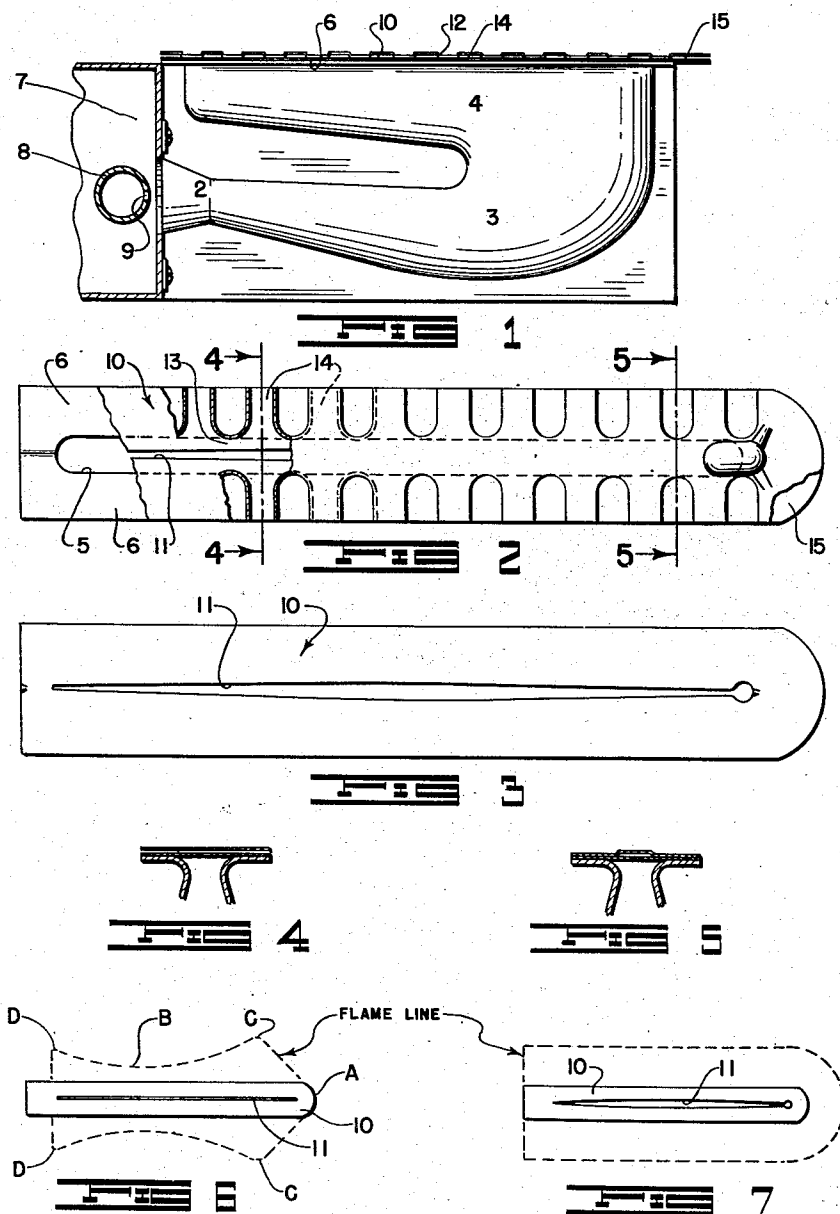
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SHEET METAL GAS BURNER WITH INTERNAL FUEL DISTRIBUTOR

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SHEET METAL GAS BURNER WITH
INTERNAL FUEL DISTRIBUTOR

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Our invention relates to gas burners and included in the objects of our invention are:

First, to provide a gas burner of the multiple jet type which incorporates a novel means whereby equal distribution or any preselected distribution of gas to the jets may be effected so that the length of the jet flames may be uniform or produce any preselected pattern.

Second, to provide a gas burner which lends itself to production from simple stamping 3 adapted to be welded together and is therefore particularly economical of manufacture.

Third, to provide a gas burner which by reason of its novel gas distribution means is relatively independent of the shape and arrangement of the mixing chamber, thereby providing a gas burner which may be designed to fit within a predetermined space even though the available space does not permit the use of the ideal mixing chamber configuration.

With the foregoing and other objects in view, reference is directed to the accompanying drawings in which:

Figure 1 is a side elevational view of our gas burner with the supply duct and mounting frame indicated in section.

Figure 2 is an enlarged top or plan view of our gas burner with a portion of the burner plate broken away to expose the distributor plate.

Figure 3 is a plan view of the distributor plate.

Figure 4 is a fragmentary transverse sectional view through 4—4 of Figure 2.

Figure 5 is another transverse sectional view through 5—5 of Figure 2.

Figures 6 and 7 are diagrammatical views showing the effect on the flame pattern of the change in shape of the slot or opening in the distributor plate.

Our burner includes a pair of mixing chamber plates 1 which have complementary recesses so arranged that when the plates are welded or otherwise sealed together around the peripheries of the recesses there is defined a Venturi throat 2 which communicates with one edge of the combined chamber plates. The throat 2 enlarges to form an expansion chamber 3 which, in turn, merges into a distributor chamber or mixing chamber 4, one end of which is folded over the expansion portion 2. The distributor chamber terminates in a relatively wide slot 5 extending approximately the length of one of the longer edges of the combined chamber plates. The chamber plates are provided with coplanar flanges 6 bordering the slot 5.

The chamber plates are adapted to be carried

by a suitable frame structure or support 7 and a supply tube or duct 8 may extend along several of the burners and be provided with ports 9 directed into the throats 2. By this arrangement, several of the burners may be arranged in parallel relation from a common support.

The flanges 6 support a distributor plate 10 having a slot 11 extending the length of the slot 5 and registering therewith. The slot 11 is narrower than the slot 5 and its width varies for reasons which will be brought out hereinafter.

A burner port plate 12 is mounted on the distributor plate 10. The burner port plate 12 is provided along its side confronting the plate 10 with a longitudinally extending channel 13 overlying the slot 11. Lateral burner port channels 14 communicate with the central channel 13. The areas between the burner port channels 14 are welded to the distributor plate 10 and the distributor plate 10 is, in turn, welded to the flanges 6 in such a manner as to restrict the gas mixture to flow through the burner port channels 14.

It is desirable in many cases that there be, in effect, a flame connection between the burner ports along one side of the burner and the ports on the other side thereof. In the present instance this is effected by an end slit 15 or end burner port which extends around the extended end of the plates 10 and 12, this end being made semi-circular.

It is essential for efficient operation of a multiple jet or multiple port gas burner that the length of flame issuing from each jet or burner port be equal in length to the flames issuing from the other ports. One of the reasons for this is the fact that there exists an optimum rate of flow of the gas mixture. If this flow is reduced until the velocity is below the rate of flame propagation under the conditions existing in the burner port, then the flame will "flash back." If the rate of flow is excessive, the flame will blow out. Between these two extremes the flame may be caused to burn steadily due to the fact that the rate of flame propagation in that portion burning in the air beyond the burner port is greater than the rate of flame propagation of that portion burning within the boundaries of the burner port, due principally to the relatively cooler walls of the burner port.

It therefore follows that the widest range of adjustment of the burner flame may be obtained if the flame from each burner port is equal in length to the others. This can be seen by a

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comparison of Figures 6 and 7. If the flame pattern is as represented in Figure 6, it will be seen that at the regions A and B the flame would flash back before the flame in regions C or D. Conversely, the flame in the regions C or D will tend to blow out before the flame in regions A or B.

This desired uniform condition of the flame pattern has been recognized in the past. The solution has been dependent upon careful design of the Venturi diameter, the Venturi throat expansion chamber and distributor chamber. Various baffles and other means have been introduced to eliminate high pressure regions or low pressure regions along the discharge portion of the distributor chamber. We have found that by the employment of the distributor or orifice plate 10 having a slot of varying width that uneven distribution of pressure along the discharge slot of the mixing chamber can be compensated for. For example, if the flame pattern appears as shown in Figure 6, by the use of a slot 11 of uniform width, then this condition can be readily corrected by widening the slot in those portions supplying regions B and by providing an enlarged opening in the extremity of the slot to supply region A. The variation in width of the slot 11 is exaggerated in the drawings for purposes of illustration.

By so designing the slot 11 that it compensates for uneven pressure distribution, a desired uniform flame pattern may be attained even though space considerations or other factors prevent ideal design of the mixing chamber.

The distributor plate with its regulating or compensating slot enables the mixing chamber plates to be standardized irrespective of the fuel mixture to be employed, that is, whether the fuel mixture is natural or artificial gas for the proper distributor plate and burner plate may be employed to meet the optimum conditions for a given fuel without change in the mixing chamber plates.

Many other embodiments of the invention may be resorted to without departing from the spirit of the invention.

We claim:

1. A gas burner, comprising: a pair of complementary plate members each having a generally U-shaped flange-bordered depression with one side of the depression bordering an edge of said plate member, and a flange directed laterally from said edge, said plate members adapted to be joined by the borders of their depressions to define a Venturi throat expansion chamber and discharge slot, the latter being between said lateral flanges; a distributor plate overlying said flanges and said discharge slot and having a slit registering with said slot and of varying predetermined width tending to compensate for uneven pressure distribution along said discharge slot; and a burner plate overlying said distribu-

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tor plate, and having offset portions defining with said distributor plate laterally directed burner ports, said burner plate, distributor plate, and flanges being secured together by means adjacent said burner ports.

2. A gas burner comprising: a pair of shell members each having a right angle flange at one margin, each of said shells being depressed and said depression extending to said flanged margin, said shells adapted to be joined in confronting relation whereby said depressions define complementarily a mixing chamber and a relatively long narrow discharge slot with said flanges extending laterally and coplanar to form a mounting surface; an orifice plate mounted on said flanges and covering said slot; a burner plate covering said orifice plate; said burner having laterally directed offset portions defining with said orifice plate a plurality of laterally directed burner ports overlying said flanges; means adjacent said ports securing said plates and flanges together; said orifice plate having an orifice slit substantially coextensive with said discharge slot and varying in width to regulate the proportional distribution of fuel mixture from said mixing chamber to said burner ports.

3. A gas burner comprising: a pair of plate members formed from sheet metal and having depressed portions defining complementarily a mixing chamber of generally U-form and a relatively long narrow discharge slot along the side of one leg thereof, said member having laterally directed flanges bordering said slot and forming a mounting surface; means secured to said flanges and defining a series of burner ports communicating with said discharge slot said means including means defining a slit interposed between said discharge slot and burner ports for controlling flow of fuel to said burner ports, said slit varying in width for predetermining the proportional distribution of fuel supply from said mixing chamber to each of said burner ports.

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