March 20, 1951 M. E. McGOWAN ET AL 2,546,009

GAS BURNER HAVING PORT-CONNECTING PILOT SLOT

Filed Oct. 27, 1945

Fig. 1.

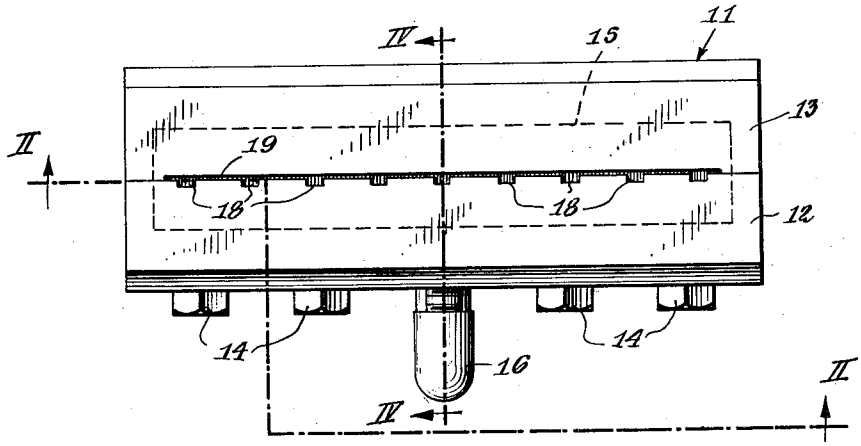


Fig. 2.

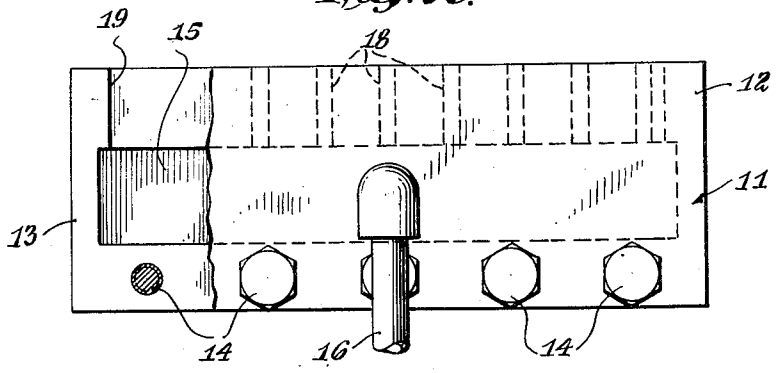


Fig. 3.

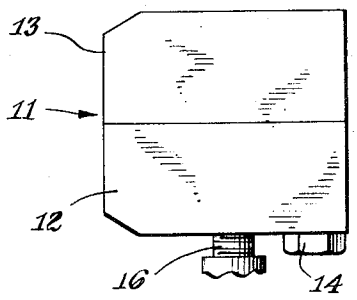
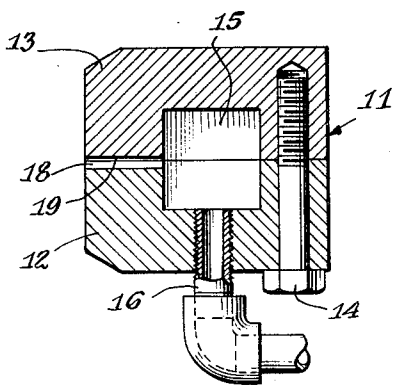


Fig. 4.



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GAS BURNER HAVING PORT-CONNECTING PILOT SLOT

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6 Claims. (Cl. 158—116)

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This invention relates to gas burners and, more particularly, such for burning hydrogen or mixtures of oxygen with hydrogen, or other combustible gas.

The principal object of our invention generally considered is to produce an improved burner in which the sensitivity at different adjustments thereof is minimized, thereby avoiding popping out or back-firing when the burner is turned low.

Another object of our invention is to provide a gas burner in which the ratio between the port area and pilot area is kept within desired limits, in order to reduce the sensitivity thereof and improve its operation, especially when turned low.

Other objects and advantages of the invention will become apparent as the description proceeds.

Referring to the drawing:

Fig. 1 is a plan of a preferred form of burner embodying our invention, the scale thereof being enlarged.

Fig. 2 is an elevational view, partly in vertical section, on the line II—II of Figure 1, in the direction of the arrows.

Fig. 3 is an end view looking from the right of Fig. 1.

Fig. 4 is a transverse sectional view on the line IV—IV of Fig. 1, in the direction of the arrows.

In the past, it has been the practice to make small apertures, either by drilling holes or milling slots of the required area, in forming the outlet apertures of gas burners. In the case of drilling, solid metal was left in the spaces between the apertures, and in milling slots the burner was usually made in two sections, one section having slots in the required number and area. After forming the sections, the abutting areas were lapped to seal the joints between the slots, thus obtaining a condition between the openings comparable of that obtained by the drilling method. We have found that burners made in accordance with the above are very sensitive to adjustment of gas pressures and volume of gas burned.

In accordance with our invention, we propose an improved burner in which the sensitivity and adjustment has been minimized. This is accomplished by using a slot-milling method on one section and on the opposite section relieving the surface to a predetermined extent for a length to span the slots. The joints around the perimeter are then lapped, except between the slots. The clearance thus provided acts as a pilot light, or has an effect allowing various

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conditions of adjustment of the gases to burn uniformly without popping out or back-firing, as experienced in burners previously constructed.

Now referring to the drawing in detail, like parts being designated by like reference characters, there is illustrated a burner chamber 11 formed in two parts 12 and 13. The parts may be connected by bolts 14 and together define a gas holding cavity 15. Combustible gas or mixtures, such as hydrogen and oxygen, illuminating gas and oxygen, or hydrogen, may be admitted from supply pipe 16, after passing from a mixer and/or safety check valve (not shown).

One of the walls of the burner chamber 11 is defined by a flange of the part 12 and one of the part 13. One of said flanges, in this instance that from the part 12, is milled with a series of notches 18, which may be .01" x .01" each in plan, and spaced ⅛" between centers, comprising the "port area," and the other is relieved to provide a long slot 19, which may be .0025" wide, connecting said notches 18 and forming what we call the "pilot area." The "pilot area" is thus about .0025 sq. in. and the aggregate "port area" about .0009, a ratio of about 2.8 to 1. The notches, although here shown rectangular, may be semicircular, triangular, or other shape, if desired, and may extend from one or both sides of the "pilot" slot. Such a burner will operate satisfactorily for consuming from ¾ to 5 cu. ft. of natural gas, mixed with twice the volume of oxygen, per hr., or manufactured gas of double the volumn with equal volume of oxygen. The thickness of the wall in which the slots 18 and relief 19 are formed should be not less than ¼ inch, although it may be up to ⅜ inch or more in thickness.

In accordance with our experience the clearance forming the slot 19 acts as a pilot or ties together all the burner flames from the ports 18, which open in a common plane, to prevent extinguishment or back-firing. It will also be understood that although we have shown a flat burner, yet a ring burner or one of other shape may be similarly formed. As an alternative, the relief area 19 may be provided in one of the parts and the slots 18 milled or inset into the same part, rather than the opposite or cooperating flange, thereby providing a construction which looks like that of Fig. 1 except that the notches 18 extend in the opposite direction from those illustrated.

We have found from experience that the ratio between the "pilot area" and the "port area,"

that is, between the area of the slot 19 and the aggregate area of the notches 18, is about three to one, or between about 2½ and 3½ to one. The actual measurement of a satisfactory burner, is where the "pilot area" is .01767 inch and the "port area" .005 inch, a ratio of about 3½ to one, with the length of the port, or the thickness of the wall in which the slots are formed, between ¼ and ⅜ inch. Such a burner will operate satisfactorily for consuming from 1 to 4 cu. ft. of natural gas, mixed with twice the volume of oxygen, per hr., or manufactured gas of double the volume mixed with equal volume of oxygen.

Although a preferred embodiment of our invention has been disclosed, it will be understood that modifications may be made within the spirit and scope of the appended claims.

We claim:

1. A gas burner, comprising a chamber, means for supplying gaseous fuel thereto, one wall of said chamber being at least ¼ inch thick and having a series of holes of about .01 inch transverse dimensions, with centers spaced about ⅛ inch, and passages about .0025 inch wide connecting said holes, whereby its sensitivity to adjustment of fuel gas pressures and volumes is decreased, and popping or backfiring avoided even when burning at a low rate of fuel consumption.

2. A gas burner, comprising a chamber, means for supplying gaseous fuel thereto, one wall of said chamber being at least ¼ inch thick and having a burner aperture comprising a series of ports connected by a pilot slot also extending through said wall, the pilot area being from about 2½ to 3½ times the aggregate port area, whereby its sensitivity to adjustment of fuel gas pressures and volumes is decreased, and popping or backfiring avoided even when burning at a low rate of fuel consumption.

3. A gas burner comprising a chamber, means for supplying gaseous fuel thereto, one wall of said chamber being at least ¼ inch thick and having a burner aperture comprising a series of ports connected by a pilot slot, the aggregate area of the ports being about .0009 sq. inch and that of the pilot slot about .0025 sq. inch, whereby its sensitivity to adjustment of fuel gas pressures and volumes is decreased, and popping or backfiring avoided even when burning at a low rate of fuel consumption.

4. A gas burner comprising a chamber, means for supplying gaseous fuel thereto, one wall of said chamber being at least ¼ inch thick and having a burner aperture comprising a series of ports connected by a pilot slot, the aggregate area of the ports being about .005 sq. inch and that of the pilot slot about .01767 sq. inch whereby its sensitivity to adjustment of fuel gas pressures and volumes is decreased, and popping or backfiring avoided even when burning at a low rate of fuel consumption.

5. A gas burner of low sensitivity at different burning adjustments comprising a chamber, means for supplying gaseous fuel thereto, one wall of said chamber having in a common plane a series of outlet holes with a narrow open passage through said wall and connecting said holes to provide a burner outlet, the spacing between hole centers being about twelve times the dimension of each hole along the length of said narrow passage.

6. A gas burner of low sensitivity at different burning adjustments comprising a chamber, means for supplying gaseous fuel thereto, one wall of said chamber being at least ¼ inch thick and having a series of outlet holes forming a port area, and a narrow passage forming a pilot area, also extending through said wall, connecting said holes, the pilot area being from about 2½ to 3½ times the aggregate port area, and all of said holes and passage opening in a common plane to provide a burner outlet, the dimension of each hole along the line of holes being about the same as that transverse thereto, whereby its sensitivity to adjustment of fuel gas pressure and volume is decreased, and popping out or backfiring avoided even when burning at a low rate of fuel consumption.

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PAUL E. C. MOES.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
557,506	Nyberg et al.	Mar. 31, 1896
1,424,739	Reeves	Aug. 1, 1922
1,923,393	Pickup	Aug. 22, 1933
1,942,397	Cuyler	Jan. 9, 1934
2,074,531	Becvar	Mar. 23, 1937
2,150,415	Branche	Mar. 14, 1939
2,355,216	Guelson	Aug. 8, 1944

FOREIGN PATENTS

Number	Country	Date
703,339	Germany	Mar. 6, 1941
781,408	France	Feb. 5, 1934