May 26, 1936. O. W. HAHN 2,041,706

GASEOUS FUEL BURNER

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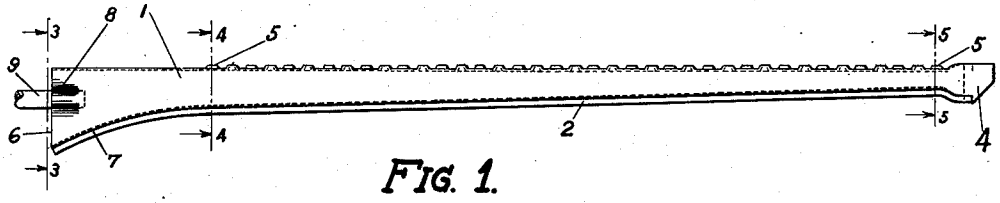


FIG. 1.

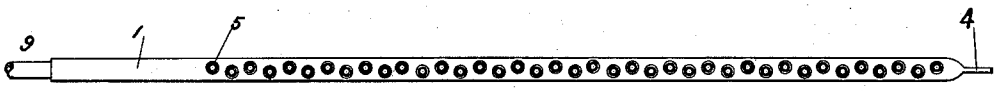


FIG. 2.

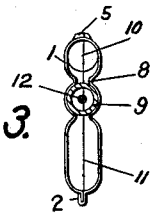


FIG. 3.

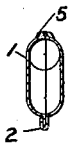


FIG. 4.



FIG. 5.

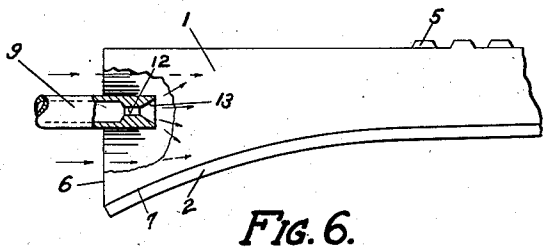


FIG. 6.

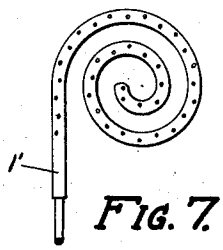


FIG. 7.

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GASEOUS FUEL BURNER

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Application July 25, 1932, Serial No. 624,506

8 Claims. (Cl. 158—99)

This invention relates to burners for gaseous fuels generally, and in particular to burners for use with manufactured or natural gas for domestic and other heating equipment.

The objects of the invention are to provide improvements in such burners whereby a better combustion of the fuel will be obtained and flare-back will be eliminated, also such a burner which will function to best efficiency under widely differing gas pressures and always insure the correct mixture of gas and air. Other features of the burner are simple sheet metal construction, light weight combined with durability and low cost.

In the drawing accompanying this application Fig. 1 is a side elevation of my new burner.

Fig. 2 is a plan view of the burner showing a staggered row of flame nozzles along the upper edge.

Fig. 3 is an enlarged view of the intake end of the burner tube as seen from the line 3—3 of Fig. 1.

Fig. 4 is an enlarged vertical cross section of the burner tube as seen from the line 4—4 of Fig. 1.

Fig. 5 is an enlarged vertical cross section of the burner tube as seen from the line 5—5 of Fig. 1.

Fig. 6 is an enlarged vertical section of the intake portion of the burner tube and gas inlet nozzle.

Fig. 7 is a plan view of a modified form of burner.

In detail, the burner comprises a long, flute-like tubular body 1, preferably of sheet metal, bent to form the cross sections shown respectively in Figs. 3, 4, and 5 and crimped or otherwise joined along a longitudinal seam 2 and flattened and/or otherwise closed and brazed at its extreme outer end 4. The form of the tubular body when viewed in plan as in Fig. 2 is of constant or slightly varying dimensions, while in elevation as shown in Fig. 1 it tapers gradually toward the small end where at the last flame nozzle (line 5—5) it is about half the area as it is at the first flame nozzle (line 4—4). The flame nozzles 5 are extruded outwardly from within so as to form a flame-directing lip around each circular opening and they are about two diameters apart and staggered along the upper edge of the tube. In making the burner tube the flame nozzles are punched and extruded in the sheet metal before bending to closed tubular form. From the first flame nozzle to the intake end 6 of the burner its shape changes inasmuch as the lower edge is downwardly flared in a quickly increasing curve 7, though the top and side walls continue parallel to the end of the burner. The side walls are inwardly crimped at opposite points at 8 (see Fig. 3) to form a round socket at an intermediate point in the height of the intake end of the tube and which socket snugly embraces the gas inlet nozzle 9, thus providing an air inspiration space above as well as below the nozzle, the upper space 10 being substantially round and somewhat less than half the size of the lower space 11 as shown best in Fig. 3. Both spaces have a reduced channel-like form where they come against the gas nozzle 9.

The gas nozzle 9 projects about ⅜ inch into the burner tube, and it has an internal construction as shown in Fig. 6 wherein it will be seen to have a reduced throat 12 flaring outwardly at 13, funnel-shaped, toward the discharge end of the nozzle. The angle of this flaring bore is about 60 degrees as this has been found by experiment to give good results in aspirating the correct amount of air at all pressures of the fuel gas admitted through the nozzle.

The general taper of the burner tube is preferably such as to drop off an amount of area equal to one of the flame openings as each one is reached, so that the volume of gas available to each opening as well as the pressure, remains constant.

By means of the sheet metal construction it is possible to obtain uniformity in flame openings as well as smooth interior body walls so that no interference with the flow of gases can result.

In considering my gas fuel burner as above described, it might at first be thought that it differs but little from ordinary gas burners, but as a matter of behavior it functions in an unusual manner. In the first place it requires no controlled air inlet which has to be shifted whenever the flame is changed, but due to its shape it has been found to automatically draw in the correct amount of air to maintain the same quality of combustion at greatly differing gas pressures, and the flames from the flame jets while longer or higher for high pressure of gas and vice versa, are, for each pressure respectively, of an even height along the burner. However, of most importance is the fact that a burner constructed and proportioned as shown will not flare back or back-fire under any condition found in use, in fact, every effort to make it flare back by sudden change of gas pressures, ignition conditions and air currents, have been unavailing, and as far as

is known it stands absolutely unique in this respect.

A practical size for the burner for quick water heaters, stoves, ovens and domestic purposes, has been found to be just twice that shown in the drawing, Figs. 1 and 2, or of a full size as shown in Figs. 3 to 5, and made of about 3/32 inch sheet brass or other non-rusting metal, but much larger burners have shown similar results.

The same burner tubes coiled up as shown at 1' in Fig. 7 have been made to fit under stove holes, and in other heating equipment.

It is of course understood that any number of the straight burners may be used side by side in groups to cover a large area if desired.

Having thus described my improved gaseous fuel burner, what I claim is:—

1. A gas burner comprising a substantially flat-sided body of elongated flute-like form, said body provided with a gas inlet nozzle and air inlet space at an end, closed at the opposite end and tapered smaller from the discharge end of the inlet nozzle to said opposite end, the inlet end of said burner being outwardly flared and the gas nozzle entering at an intermediate point in the height of the sides at the flared end of the body.

2. A gas burner comprising a substantially flat-sided body of elongated flute-like form, said body provided with a gas inlet nozzle and air inlet space at an end, closed at the opposite end and tapered smaller from the discharge end of the inlet nozzle to said opposite end, the inlet end of said burner being outwardly flared on its lower edge only, and the gas nozzle entering at an intermediate point in the height of the sides at the flared end of the body.

3. A gas burner comprising a substantially flat-sided body of elongated flute-like form, said body provided with a gas inlet nozzle and air inlet space at an end, closed at the opposite end and tapered smaller from the discharge end of the inlet nozzle to said opposite end, the inlet end of said burner being outwardly flared and the gas nozzle entering at an intermediate point in the height of the sides at the flared end of the body into a socket formed by the side walls at said point.

4. A gas burner comprising a substantially flat-sided elongated hollow tubular body of substantially uniform width throughout its length, said body closed at one end and of progressively increasing vertical dimension from said closed end to the opposite end, said opposite end being open and a gas nozzle connected at its sides with the sides of the burner and spaced from the upper and lower edges of the body projecting into the open end thereby providing an air inlet into the body above and below said nozzle.

5. A gas burner comprising an elongated tubular body of sheet metal closed at one end and provided with a gas inlet nozzle and air inlet at its opposite end, said body having a row of flame orifices along one side and being of a form tapering smaller toward the closed end, said body formed of a single sheet of metal crimped together at the closed end and along the side opposite the side having the flame orifices and said orifices being formed with outwardly extruded necks.

6. A gas burner comprisng a tubular body closed at one end and provided with a gas inlet nozzle and an air inlet at its opposite end, said body having a row of flame orifices along its side and being of a form tapering smaller from the discharge end of the inlet nozzle toward the closed end and flaring somewhat abruptly at its nozzle end, said gas inlet nozzle projecting into the tubular body and provided with a restricted neck and a flaring mouth.

7. A gas burner comprising an elongated hollow tubular body closed at one end and provided with a gas inlet nozzle and an air inlet at the opposite end thereof, said body having a longitudinally extending row of open, unobstructed spaced flame orifices along a side of substantially equal cross sectional area and the body being formed to provide an elongated tapering passageway therein tapering smaller from the end provided with the air inlet to the closed end of the body, the degree of taper of said passageway from the orifice of the row nearest the air inlet to the orifice nearest the closed end of the body being such that the cross sectional area of said passageway at the point of each successive orifice toward the closed end is reduced by substantially the cross sectional area of the preceding flame orifice, said passageway being open and unobstructed throughout its length and said gas inlet nozzle projecting a short distance into the tapering passageway at the end of the air inlet.

8. A gas burner comprising an elongated horizontally extending tubular body closed at one end and provided with a gas inlet nozzle at the opposite end, said body having a longitudinally extending row of substantially equally spaced flame orifices along its upper side commencing at a point spaced from the gas inlet nozzle and extending toward the closed end of the body, said flame orifices being substantially equal to each other in cross sectional area, the minimum cross sectional area of that portion of the bore of the tubular body between the gas inlet nozzle and flame orifice of the row nearest thereto being not less than the cross sectional area of the bore at the flame orifice nearest the gas inlet nozzle, said gas inlet nozzle projecting into said portion of the bore at its discharge end and positioned to discharge gas toward the closed end of the body, the remaining bore of the tubular body being uniformly tapered smaller from said flame orifice to the closed end of the body and an air inlet adjacent the gas inlet nozzle adapted to admit air to the bore of the tubular body for mixing with the gas at a point wholly within said bore.

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