

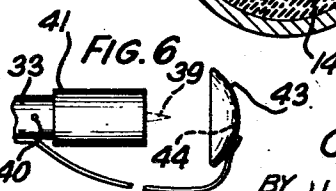
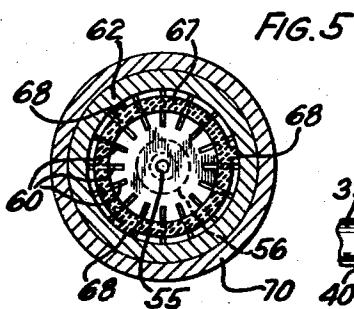
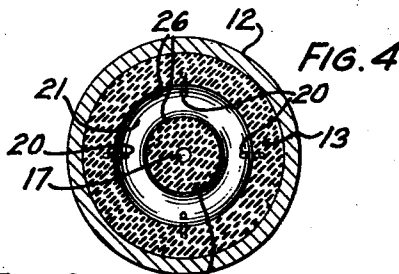
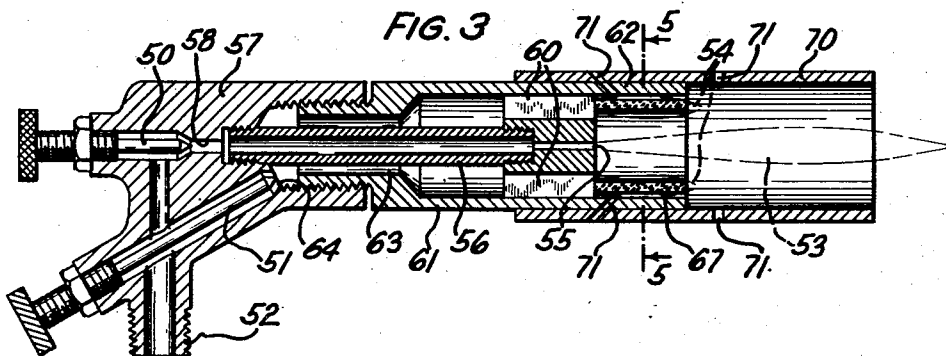
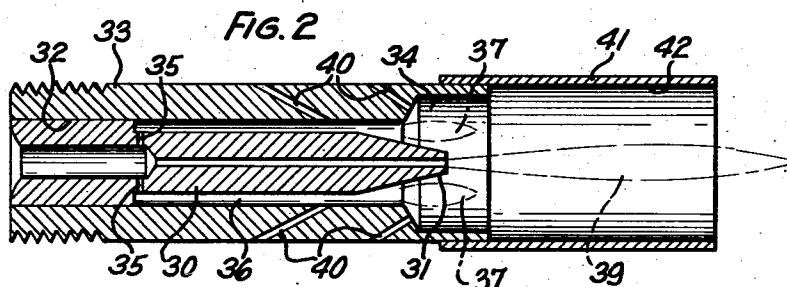
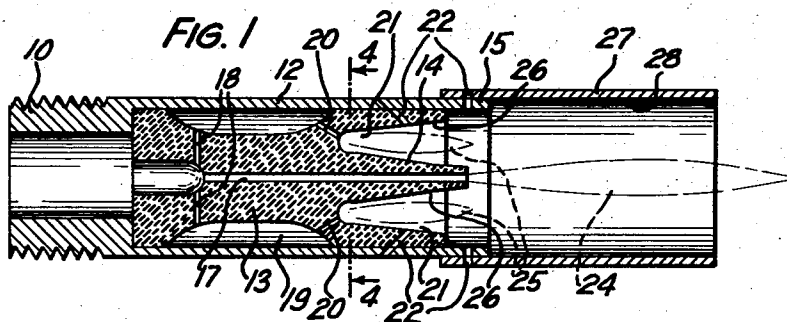
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BURNER

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BURNER

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7 Claims. (Cl. 158—109)

This invention relates to burners, and more particularly to gas burners for using gases having a slow rate of flame propagation.

In glass work, for example, in lamp manufacture where long, sharp, hot, and non-reducing flame jets are necessary, premixed gases such as blue water gas and hydrogen gas have, in some instances, been used heretofore in gas burners. This gas is generally more expensive than the slow flame propagation varieties of gases such as natural gas, butane gas, or propane gas, and in some localities is not as readily obtainable as the latter type of gas. The type of burner heretofore used for burning blue water gas, for example, is not efficient when using the slow burning varieties of gases.

The object of this invention is to provide an inexpensive and efficient gas burner for producing a sharp hot flame.

In accordance with one embodiment of the invention, a gas burner is provided having a main and pilot flame in which a richer mixture is provided for the main flame to compensate for the oxygen taken by the main flame from the atmosphere, and a reflecting surface is provided about the main flame for directing heat radiated from the main flame back to the flame. A catalytic surface is also provided around the main flame to expedite combustion and supplement the reflecting surface in directing heat back to the flame.

The invention will be more fully understood from the following description, taken in connection with the appended drawing, in which

Fig. 1 is a longitudinal sectional view of a gas burner embodying the invention;

Figs. 2 and 3 are views similar to Fig. 1, showing other embodiments of the invention;

Figs. 4 and 5 are vertical sections taken on the lines 4—4 and 5—5 of Figs. 1 and 3, respectively, and

Fig. 6 is a fragmentary view on a reduced scale of a gas burner of this invention, for example, the type shown in Fig. 2 wherein the cylindrical reflector is supplemented by a concave end reflector.

Referring now to the drawing in detail, particularly to Figs. 1 and 4, which represent one embodiment of the gas burner of this invention designed for using slow flame propagation varieties of gases, the reference numeral 10 designates a plug adapted to be screwed at one end into a pipe line for supplying gas to the gas burner, the opposite end of the plug having formed integral therewith a cylindrical sleeve 12 forming the body

of the burner. Within the hollow of the sleeve 12 is a refractory element 13 which abuts at one end a shouldered surface at a point where the plug 10 adjoins the sleeve 12, the opposite end of the element 13, upon which is formed a burner nozzle or tip 14, lying suitably within the corresponding end of the sleeve 12, which end of the sleeve forms a hood 15 surrounding the burner tip. A central aperture 17 in the element 13, extending the entire length thereof, is enlarged at its inner end to register with the central passage in the plug 10. Formed in the element 13 adjacent its inner end are apertures 18 extending laterally from the central aperture 17 for bypassing gas from the latter aperture through a cylindrical chamber 19 formed between the sleeve 12 and the element 13 and thence through apertures 20 in the element 13 to an annular space or pilot flame chamber 21 formed in the element around the burner tip 14. Formed in the hood portion 15 of the sleeve 12 and the element 13 are apertures 22 for supplying air to the pilot flame chamber 21.

In use an elongated sharp pencil flame jet 24 of intense heat burns from the tip 14 and as the flame pierces the atmosphere it takes some oxygen from the atmosphere. For this reason the combustible mixture supplied to the flame jet must be slightly richer than the optimum burning mixture. This mixture, however, is too rich for a pilot flame 25 burning from the apertures 20 and for this reason the apertures 22 are provided to supply additional air to the pilot flame. It will be obvious that the main flame jet 24 inspirates air through the pilot flame 25 and that the pilot flame which is arranged around the tip 14 will cause a heating of the tip to preheat the gas. Since the tip 14 and the surrounding wall of the pilot flame chamber 21 are of refractory material, being a part of the element 13, they will become incandescent in use, thereby setting up a catalytic action which will expedite combustion. To further provide a catalytic action the surfaces of the chamber 21 and the tip 14 are platinum sputtered, as indicated at 26. As an alternative nickel oxide may be painted on the surfaces of the chamber 21 and the tip 14 and heated in a reducing atmosphere to provide a nickel coating catalyst. To further increase the temperature of the main flame jet 24 and to shield the flame from drafts a cylindrical shell or member 27 provided with an inner reflecting surface 28 is secured to the outer end of the sleeve 12 and extends therefrom for a suitable distance to concentrically surround a portion of the jet

24. Since the flame jet 24 is located centrally of the member 27, the reflecting surface 28 there- of serves to focus heat radiations from the flame jet 24 back to the flame jet to increase its intensity.

In Fig. 2 there is shown an embodiment of the gas burner of this invention which operates on substantially the same principle as the burner illustrated in Fig. 1, but differs therefrom mainly in its construction. A central apertured member 30 having its outer end reduced in diameter to form a burner tip 31 is made of Monel metal (nickel copper) which has the proper heat conducting properties to give the correct amount of preheating from the pilot flame to the gas passing through the tip. The opposite end of the member 30 is snugly fitted in a central aperture 32 of an outer shell 33 which is externally threaded at one end for connection to a gas supply line. The burner tip 31 extends along the aperture 32 of the body shell 33 and into an enlargement 34 thereof, the outer end of the tip being suitably spaced from the outer end of the shell 33. Apertures 35 formed in the end of the member 30 at the inner end of the portion thereof which is fitted in the aperture 32 of the shell 33, serve to by-pass gas from the central aperture of the member 30 to an annular pilot flame chamber 36 surrounding the tip 31, the chamber being formed by the inner peripheral walls of the central aperture 32 and the enlargement 34 of the aperture 32. The outer shell 33 is made of German silver or similar nickel zinc composition, which of itself has a catalytic action in the region surrounding the pilot flame 37 burning from the apertures 35 in the chamber 36 the main flame jet being indicated at 39. For the same purpose described heretofore in connection with the apertures 22 of the gas burner illustrated in Fig. 1 apertures 40 are provided in the outer end or hood portion of the shell 33.

A cylindrical member 41 provided with an inner reflecting surface 42 is secured to the outer end of the shell 33 for the same purpose as the member 27 of Fig. 1. The cylindrical reflecting members 27 and 41 of Figs. 1 and 2, respectively, may be supplemented, if desired, by a circular concave member 43 (shown in Fig. 6) secured to the shell 33 and provided with an inner reflecting surface 44, the tip 31 and members 41 and 43 being coaxially disposed.

In Figs. 3 and 5 there is shown a type of gas burner having screw valves indicated at 50 and 51 for regulating the flow of gas, entering through a plug portion 52, which is connected to a gas supply line from which the gas passes to a main flame jet 53, and a pilot flame 54, respectively. A burner tip 55 is provided in the form of a centrally apertured head which is threadedly secured to one end of a tube 56, the opposite end of the tube being threadedly secured to a valve casing 57 and in communication with an aligned aperture 58 in the casing, the volume of gas flowing through the aperture from the supply line being controlled by the screw valve 50. The head of the burner tip 55 is provided with a plurality of radially disposed slots 60 (Fig. 5) extending along its entire length for the passage of gas to the pilot flame 54. Surrounding the burner tip 55 is an outer shell 61 which extends along the entire length of the head of the tip and for a suitable distance beyond its outer end to form a hood 62. The shell 61 is threadedly secured to the valve casing 57 and the inner

diameter of the shell is such that an annular chamber 63 is formed surrounding the tube 56 extending from the casing 57 to the head of the tip 55 and communicates with the slots 60 in the head. An aperture 64 formed in the casing 57 connects the chamber 63 with the supply line, the volume of gas passing through the aperture into the chamber and thence to the pilot flame 54 at the slots 60 of the head of the tip 55 being controlled by the screw valve 51. Fitted within the inner diameter of the shell 61 along the portion thereof forming the hood 62 is a refractory sleeve 67 formed with a plurality of peripheral lugs 68 (Fig. 5) which serve to space the sleeve from the shell 61 and maintain it centered with respect thereto. The sleeve 67 of this embodiment of the invention as well as the member 13 of the embodiment of Fig. 1 may be made of a ceramic material comprising 40% talc, 40% clay and 10% kaolin fired in any well known manner. The pilot flame 54 burning from the slots 60 substantially envelopes the refractory sleeve 67, as clearly shown in Fig. 3. Secured to the outer end of the shell 61 is a cylindrical member 70 which serves in the same capacity as the members 27 and 41 of Figs. 1 and 2, respectively. Apertures 71 are formed in the hood 62 and the member 70 for the same purpose as the apertures 22 and 40 of Figs. 1 and 2.

It will be obvious that the introduction in the vicinity of the pilot and main flames of a catalyst in cooperation with a cylindrical shield with a reflecting surface serves to expedite combustion, shield the main flame from drafts and to focus heat radiations from the main flame back to the main flame to increase its intensity. Also by making the burner nozzle or tip, as particularly shown in Figs. 1 and 2, comparatively long, thin and of a relatively poor heat conductor compared to some metals, for instance, copper or brass, and allowing the pilot flame to play against it a beneficial preheating of the gas is effected. Supplementing the cylindrical shield with a concave shield at its outer end as shown in Fig. 6 is also beneficial in focusing heat radiations back to the main flame jet.

In burning gases of the type hereinbefore referred to, namely, natural gas, butane gas or propane gas, or mixtures of these with each other or with other gases in a burner of the type in which the gas is emitted at high velocity very good piloting must be employed since these gases are of the slow rate of flame propagation varieties of gases. It is, therefore, essential that the pilot flame be large and consequently the amount of gas sufficient, and of a lower velocity than the main flame and it should burn very near the main burner tip. Since a long sharp and hot pencil flame jet is desired for the main flame in glass work, for example in lamp manufacture, it was found that if the air gas ratio was correct for proper burning of the pilot flame, the main flame jet taking up additional air from the atmosphere due to its small cross-section and high velocity became too lean. By supplying a proper mixture for the main flame the excessive richness of the mixture for the pilot flame may be overcome by providing the apertures 22, 40 and 71 of Figs. 1, 2, and 3, respectively, the main flame jet inspirating air through the pilot flame, making it possible to produce a good pilot flame and a rich enough main flame jet at the same time.

While the invention has been described with particular reference to gas burners using gases having a slow rate of flame propagation, it is not limited to such use and it will be understood that the invention is capable of other applications and that modifications can be made without departing from the spirit and scope of the appended claims.

What is claimed is:

1. In a gas burner, a main nozzle for producing a pencil flame, means for supplying a gas mixture at high velocity to the main nozzle of such richness as to form an efficient combustible mixture with the oxygen taken from the air by the pencil flame, means for producing and directing a pilot flame from a plurality of points to surround the main nozzle, means for supplying a similar gas mixture to the pilot flame but at a low velocity, and means for supplying additional air to the pilot flame.

2. In a gas burner, a main flame burner tip for producing a pencil flame, means providing a pilot flame around the tip, an inner member composed of refractory material forming the main flame burner tip and a surrounding wall spaced from the tip to form a pilot flame chamber, and an outer supporting shell for the refractory member, said inner member having a catalytic action when the tip portion and the surrounding wall are heated to incandescence by the pilot flame.

3. In a gas burner, an inner centrally apertured member formed with a main flame burner tip and a pilot flame chamber surrounding the tip, and an outer shell peripherally abutting the inner member along a portion thereof and extending from an end thereof to form a reflector along the greater portion of the length of the main flame, the inner member having apertures for by-passing gas from the central aperture thereof to the pilot flame chamber.

4. In a gas burner, an inner centrally apertured member formed with a main flame burner tip and a pilot flame chamber surrounding the tip, an outer shell peripherally abutting the in-

ner member along a portion thereof and extending from an end thereof to form a hood, the inner member having apertures for by-passing gas from the central aperture thereof to the pilot flame chamber, and a catalyst on the wall of the pilot flame chamber to expedite gas combustion.

5. In a gas burner, an inner centrally apertured refractory member formed in a main flame burner tip and a pilot flame chamber surrounding the tip, an outer shell peripherally abutting the inner member along a portion thereof and extending from an end thereof to form a hood and a reflector along the greater portion of the length of the main flame, the inner member having apertures for by-passing gas from the central aperture thereof to the pilot flame chamber, and a catalyst on the wall of the pilot flame chamber to expedite gas combustion, the outer shell having apertures for admitting air to the pilot flame.

6. In a gas burner, a burner tip having an aperture therethrough for supplying gas to a main pencil flame, a cylindrical hood surrounding said tip and having apertures interconnected with the aperture in said tip to supply gas to a pilot flame at the base of the main flame, said hood having apertures in the wall thereof whereby the main flame will draw air through the pilot flame and direct the pilot flame toward the main flame.

7. In a gas burner, a main nozzle for producing a pencil flame, means for supplying a gas mixture to the main nozzle of such richness as to form an efficient combustible mixture with the oxygen taken from the air by the pencil flame, means for producing a pilot flame around the main nozzle, a cylinder of incandescible refractory material positioned so as to be substantially completely surrounded by said pilot flame, means for supplying a similar gas mixture to the pilot flame, and means for supplying additional air to the pilot flame.

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