

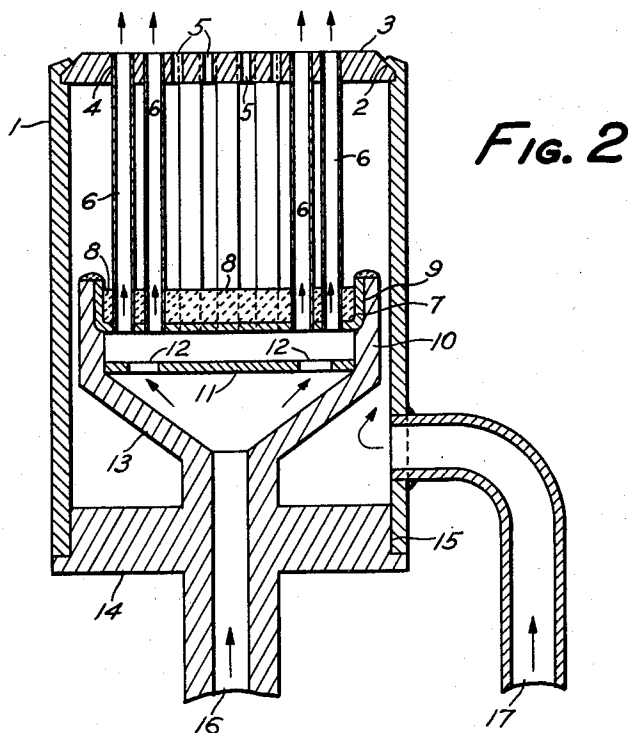
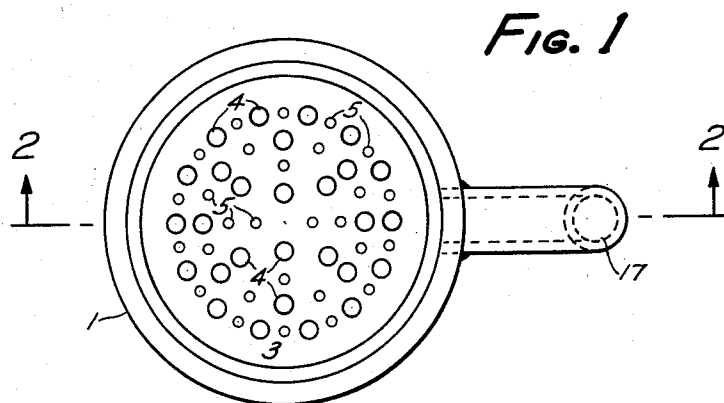
Nov. 3, 1959

C. W. NIEMAN ET AL

2,911,035

POLYMIX GAS BURNER

Filed Dec. 5, 1956



INVENTORS

Chauncy W. Nieman
James B. Lawrence

BY *James T. Seary*

ATTORNEY

1

2,911,035

POLYMIX GAS BURNER

Chauncy W. Nieman, Bethlehem, and James B. Lawrence, Hellertown, Pa., assignors to Bethlehem Apparatus Company, Inc., Hellertown, Pa., a corporation of Pennsylvania

Application December 5, 1956, Serial No. 626,514

2 Claims. (Cl. 158—99)

This invention relates to gaseous fuel burners.

The object of this invention is to provide a gas burner which produces a soft, silent flame of extremely high temperature, which can be adjusted over a wide range of intensities, and which is entirely free from the danger of flash-back.

A burner of this type is useful for glass working, brazing and a wide variety of similar operations. Its construction and operation can best be understood by reference to the accompanying drawings in which:

Fig. 1 is a view of the front face of the burner; and Fig. 2 is a cross section through the burner head.

Referring to the drawings, the tubular outer casing 1 of the burner is annularly recessed as at 2 to hold firmly an edge-beveled front plate 3 perforated by a large number of closely spaced holes in two intimately mixed series, the series of holes 4 indicated by heavy circles being for the discharge of oxygen and the holes 5 indicated by light circles for the discharge of gas. Fitting snugly in the holes 4 are tubes 6 of very small diameter, which tubes terminate at the opposite end in perforated cup 7. This cup 7 is of refractory metal such as copper and serves as a holder for a solidified pool of brazing alloy 8 which firmly unites the cup and the tubes in a gas-tight union. Said cup 7 is a press fit in the annular recess 9 in the tubular portion 10 forming an extension of the conical portion 13 of lower flange member 14 and preferably in addition the joint is brazed. Spaced behind the cup 7 is a baffle plate 11 having a plurality of holes 12. The flange member 14 has a side recess 15 in which the rear end of the casing 1 is firmly attached. Oxygen entering the tubular part 16 of flange member 14 flows forward and strikes the baffle plate 11, which interrupts the direct force of the stream and distributes it evenly through the holes 12. The oxygen then flows through the tubes 6 and discharges into the open at the front face of the plate 3. A tube 17 connected at the side of said casing 1 admits the fuel gas which fills the inside of the casing and is discharged into the open through the holes 5 in the front plate 3, thereupon intimately mixing with the streams of oxygen from tubes 6.

From this construction it follows that the mixture of the oxygen and fuel gas takes place only after these gases have left the burner and flash-back is therefore impossible. Further, the holes are so close together that intimate mixture takes place almost at once and complete burning takes place within a very short distance from the front plate, causing the whole of the flame beyond this zone to be at a uniform and very high temperature.

An important feature of this device is the provision of small circular passages for both oxygen and gas. It is well known that for a given velocity of gas laminar flow can be obtained only up to a certain diameter of tube. If the tube is larger than this, turbulent flow occurs. We have observed that if the gas and oxygen can be handled in such a way as to obtain laminar flow and can be intimately mixed in this condition the resulting flame

2

is almost completely silent, whereas if turbulent flow is permitted a roaring flame results, which has a tendency to be bushy rather than slim and long. Further, if the passageways are truly circular the most regular type of flow is obtained.

Since a certain minimum velocity is necessary to give the desired shape of flame, in this burner circular ducts are provided as shown for both gas and oxygen and these ducts are kept of sufficiently small diameter so that laminar flow is obtained as the gases issue from the front plate.

The tubes for oxygen are brazed at their inner ends to cup 7 so that at this point they are rigidly attached. They are free to move longitudinally, however, in front plate 3, this arrangement allowing for thermal expansion. The tubes are preferably made of a metal of low thermal conductivity such as stainless steel, this metal also being tolerant to high temperatures. They may be very thin walled which permits close spacing, because their ends are protected from excessive heat by the front plate. This plate should preferably be made of a highly conducting metal such as copper to prevent the development of local hot spots and to carry the absorbed heat out to the casing.

It is very important to have the gas and oxygen completely separated inside the torch to avoid back fires. For this reason the type of construction shown has been adopted. Cup 7 holds a depth of brazing alloy which flowing uniformly around the tubes and uniting with them, forms a perfect seal. The cup in turn is pressed into and brazed to the upper tubular portion of flange member 14, again making a seal. With these arrangements interior leakage is virtually impossible.

Instead of the oxygen passing through the tubes and the gas passing simply through the front plate the reverse might be the case. Also instead of oxygen, air might be employed, and the arrangement is suitable for any fuel gas.

The arrangement of holes shown in Fig. 1 can be varied according to any pattern, always taking care that the gas and oxygen outlets are thoroughly intermingled.

Although we have thus described our invention in considerable detail, we do not wish to be limited strictly to the exact and specific details shown and described, but we may also use such substitutions, modifications or equivalents thereof as are embraced within the scope of the invention or pointed out in the appended claims.

We claim:

1. A high temperature gas burner comprising a tubular casing, a rear closure thereon, an air inlet extending therethrough, a conical element connecting to the air inlet, a perforated baffle plate within the conical element, a cylindrical member defining a chamber adjacent the baffle plate, a cup having a plurality of holes and seated on the cylindrical member, a corresponding plurality of small tubes with their terminal outer circumferences affixed in said holes by brazing alloy in said cup, a front plate of conductive metal secured to the casing, said plate having a multiplicity of intimately mixed orifices into certain of which the tubes are snugly fitted, and a gas inlet to the casing whereby the gas flows around the tubes in the casing without premixing and exits through orifices which are not in communication with the tubes.

2. A high temperature gas burner comprising a tubular outer casing having an annular recess inside its forward edge, a front plate secured in said recess, said front plate having a plurality of closely spaced circular holes in two intimately mixed series, a plurality of small-diameter thin-walled tubes slidable in one series of said holes and having their outer ends terminating substantially flush with the outer surface of the front plate, a cup having holes into which the outer ends of said tubes are circumferentially integrally attached, a frusto-coni-

cal chamber behind said cup, a perforated baffle plate within said chamber, first inlet means adapted to admit oxygen to said chamber, a flanged rear closure integral with said chamber and inlet means and securely attached to the casing, and second inlet means adapted to admit gas to the casing.

5

10

References Cited in the file of this patent

UNITED STATES PATENTS

405,528	Brown	June 18, 1889
856,366	Quack	June 11, 1907
904,243	Bennett	Nov. 17, 1908
1,029,691	Kirkwood	June 18, 1912
1,420,182	Cleveland	June 20, 1922
1,710,841	Sala	Apr. 30, 1929
1,729,677	Miller	Oct. 1, 1929