Nov. 24, 1936. W. G. CARTTER 2,061,562

BURNER FOR HYDROCARBON GASES

Filed Nov. 19, 1932

FIG. 1

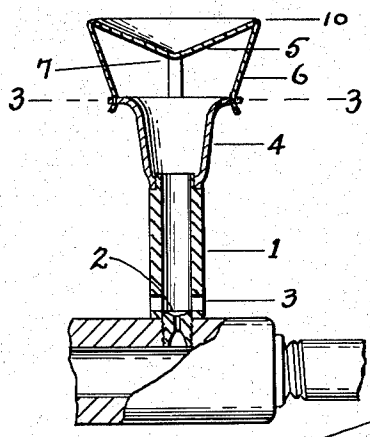


FIG. 3

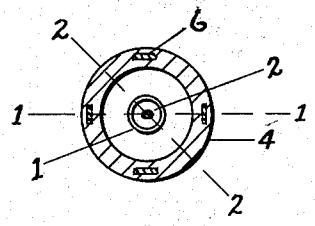


FIG. 2

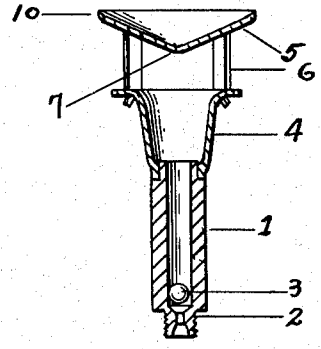


FIG. 5

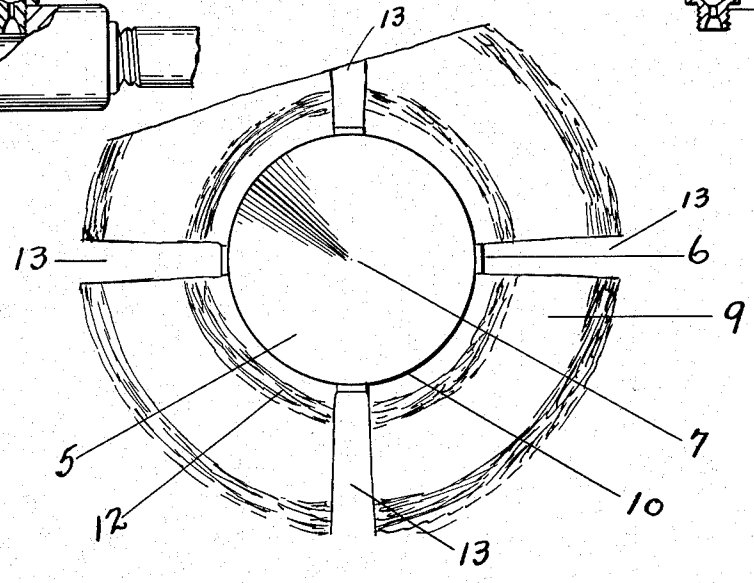
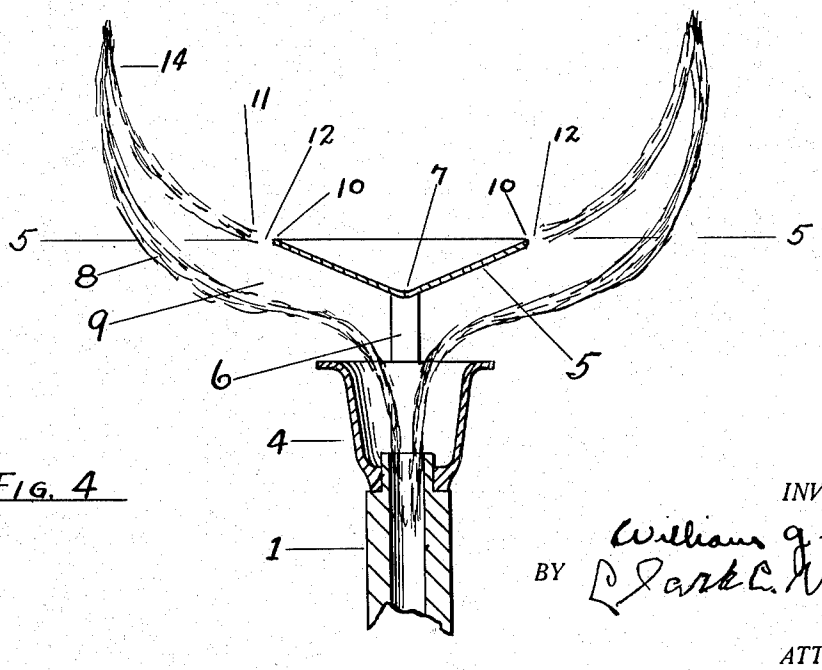


FIG. 4



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BURNER FOR HYDROCARBON GASES

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Application November 19, 1932, Serial No. 643,514

4 Claims. (Cl. 158—113)

My invention relates to burners of the Bunsen type for the burning of hydro-carbon gases, and while it may be used with various types of Bunsen burners, it is more especially intended to be employed with burners of the type set forth in my application No. 437,345, filed March 20, 1930 for gas burners.

Objects of the invention are to increase the supply of secondary air to prevent flashback, and to provide an improved burner that will burn quietly and with a hotter flame.

In the accompanying drawing, Figure 1 is a vertical section of a burner embodying my device, the section being taken on the line 1—1 of Figure 3. Figure 2 is a vertical section taken on the line 2—2 of Figure 3. Figure 3 is a cross-section on the line 3—3 of Figure 1. Figure 4 is a vertical section on an enlarged scale to illustrate the course of the gas currents and the structure of the flame. Figure 5 is a cross-section on the line 5—5 of Figure 4 at the upper edge of the cone 5 to illustrate the effect of the supports 6.

On the burner is a bell 4 extending outwardly and forwardly beyond the exit end thereof at an angle with the axis thereof. The bell is positioned near to but separated from the exit end of the burner so as to permit the formation of inwardly and outwardly flowing currents of air. The effect of the bell is to so control the supply of secondary air to the flame issuing from the burner outlet as to bring the point of combustion back to the outlet of the burner and thus prevent the roaring noise. The velocity of the escaping gas from the burner outlet creates an outflowing current of air which in turn produces an inflowing current of air along the side of the bell next to the burner outlet, which serves to retard the outflowing current of air and also the velocity of the escaping jet of gas and carries an additional supply of secondary air to the outlet of the burner.

In the use of burners of the Bunsen type, as is well-known, the flame takes the form of a long, narrow pencil and if the pressure of gas is too high it becomes extremely noisy and may be blown out entirely, while if too low, or the proportion of air in the gas too great, the rate of combustion becomes greater than the velocity of the gas in the mixing tube and takes fire within the mixing tube, forming which is known as a flashback. The bell 4 already referred to, to a very great degree counteracts the noise and the danger of backflashing and blowing out but does not change the form of the flame. By the spreading member 5, however, it becomes possible to use almost any desired pressure and also produce a short cup-shaped flame of the highest intensity.

The spreading member 5 is in the form of a flattened cone and is mounted a short distance above the top of the bell 4, or of the Bunsen tube if the bell is not used. As is well-known in the operation of Bunsen burners of the ordinary types, the gas escaping from the tube takes fire only on the outside surface, and there is a central core of considerable size of unignited gas in the middle of the escaping jet. The cone 5 is mounted on supports 6, so placed and of such length as to bring the vertex, or point 7, of the cone well within this unignited central core. In this position it does not act as an ordinary baffle, for in these the jet of flame plays directly on the baffle which, therefore, becomes intensly heated. In my device, however, owing to the position of the cone 5, the burning gas never comes in contact with the cone 5, but there is a layer 9 of unignited gas at all times between the flame 8 and the lower surface of the cone 5 as shown in Figure 4.

On passing beyond the edge 10 of the cone 5, the unignited gas 9 comes in contact with the air and takes fire as shown at 11, usually a short distance beyond the edge of the cone as shown at 12, and the outer and inner layers 8 and 11 of the flame burn toward each other until the gas is all consumed, as shown at 14 in Figure 4.

It is evident that the freest possible access of secondary air to the upper side of the cone 5 and to the gases issuing beyond the cone is highly important. If the flame 8 is left entirely uninterrupted it partially prevents this access of air. The supports 6, however, are made of sufficient width to form breaks 13 in the flame as shown in Figure 5. The air passes inward through these breaks and gets free access to the escaping gases. It thus appears that by the use of my device on a burner of the Bunsen type the jet of gas is changed from a pencil to a thin sheet and thus very greatly increases the surface exposed to secondary air and serves at the same time to shorten the flame and increase its size and intensity. It also promotes quiet burning and avoids flashing back, for it will be noted that, owing to the smooth conical shape of the cone 5 it does not materially decrease the velocity of the escaping jet, but merely changes its direction.

It will also be noted that, as already stated, the ignited gases never come in contact with the cone at all, or if they do at low pressure, they will just touch it at the extreme outer edge and the cone is, therefore, cooled by being bathed

continuously in a cool stream of unignited gas and thus its durability is greatly increased.

I claim:

1. The combination in a burner for the consumption of hydrocarbon gases provided with a mixing tube, openings for the admission of gas and air to the mixing tube, and a jetting element for the escape of the mixture from the mixing tube, of a bell having a portion in immediate proximity to said jetting element near the mouth thereof, and a portion extending from said first mentioned portion outwardly beyond the mouth of the jetting element and throughout its full extent diverging therefrom, said bell being cooperatively related to the jetting element whereby to cooperate therewith in causing a steady outwardly flowing current of air next to the flame, and a steady flow of incoming air along the inner side of the bell in opposition to and to retard the outwardly flowing current of air and the jetted mixture, and a member having a bottom face flaring outwardly and upwardly from a relatively low central point to a relatively high marginal edge portion, mounted at such a distance beyond the exit opening of said bell as to be out of contact with the burning gas and with its lower extremity positioned within the unignited portion of the jet of gas issuing from the burner, said member acting to spread the jet of unignited gas.

2. The combination in a burner for the consumption of hydrocarbon gases provided with a mixing tube, openings for the admission of gas and air to the mixing tube, and a jetting element for the escape of the mixture from the mixing tube, of a bell having a portion in immediate proximity to said jetting element near the mouth thereof, and a portion extending from said first mentioned portion outwardly beyond the mouth of the jetting element and throughout its full extent diverging therefrom, said bell being cooperatively related to the jetting element whereby to cooperate therewith in causing a steady outwardly flowing current of air next to the flame, and a steady flow of incoming air along the inner side of the bell in opposition to and to retard the outwardly flowing current of air and the jetted mixture, and a flattened inverted cone mounted at such a distance beyond the exit opening of said bell as to be out of contact with the burning gas and with its lower extremity positioned within the unignited portion of the jet of gas issuing from the burner, said cone acting to spread the jet of unignited gas.

3. The combination in a burner for the consumption of hydrocarbon gases provided with a mixing tube, openings for the admission of gas and air to the mixing tube, and a jetting element for the escape of the mixture from the mixing tube, of a bell having a portion in immediate proximity to said jetting element near the mouth thereof, and a portion extending from said first mentioned portion outwardly beyond the mouth of the jetting element and throughout its full extent diverging therefrom, said bell being cooperatively related to the jetting element whereby to cooperate therewith in causing a steady outwardly flowing current of air next to the flame, and a steady flow of incoming air along the inner side of the bell in opposition to and to retard the outwardly flowing current of air and the jetted mixture, and a member having a bottom face flaring outwardly and upwardly from a relatively low central point to a relatively high marginal edge portion, mounted at such a distance beyond the exit opening of said bell as to be out of contact with the burning gas and with its lower extremity positioned within the unignited portion of the jet of gas issuing from the burner, said member acting to spread the jet of unignited gas, and means for supporting said member in position, said means being adapted to cause breaks in the flame providing for the passage of air inwardly to the escaping gases.

4. The combination in a burner for the consumption of hydrocarbon gases provided with a mixing tube, openings for the admission of gas and air to the mixing tube, and a jetting element for the escape of the mixture from the mixing tube, of a bell having a portion in immediate proximity to said jetting element near the mouth thereof, and a portion extending from said first mentioned portion outwardly beyond the mouth of the jetting element and throughout its full extent diverging therefrom, said bell being cooperatively related to the jetting element whereby to cooperate therewith in causing a steady outwardly flowing current of air next to the flame, and a steady flow of incoming air along the inner side of the bell in opposition to and to retard the outwardly flowing current of air and the jetted mixture, and a member having a bottom face flaring outwardly and upwardly from a relatively low central point to a relatively high marginal edge portion, mounted at such a distance beyond the exit opening of said bell as to be out of contact with the burning gas and with its lower extremity positioned within the unignited portion of the jet of gas issuing from the burner, said member acting to spread the jet of unignited gas, and means for supporting said member in position comprising bars extending upwardly from the outer marginal portion of the bell to the upper marginal portion of said member, said bars being spaced from each other and being of substantial width to form breaks in the flame providing for the passage of air inwardly to the escaping gases.

WILLIAM G. CARTTER.