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J. G. CROSBY
INTERNAL GAS BURNER
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2,552,845

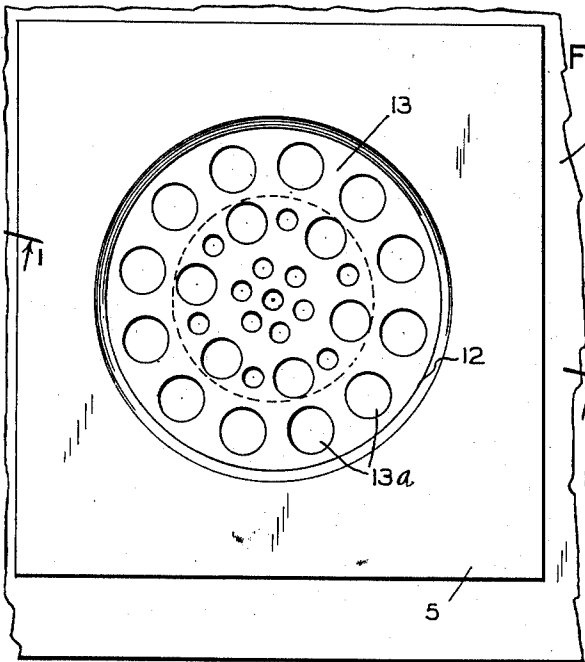


FIG. 1

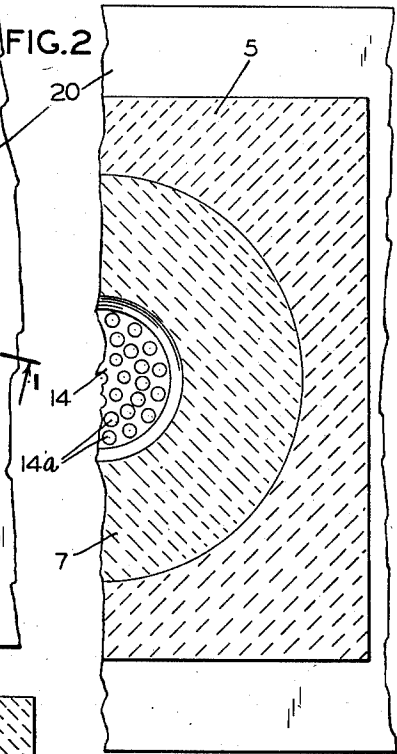
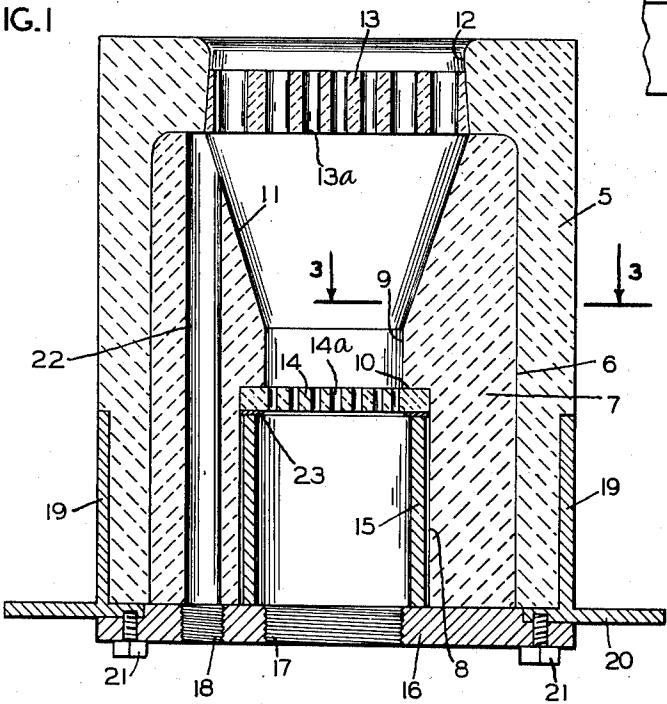


FIG. 2



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INTERNAL GAS BURNER

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2 Claims. (Cl. 158-99)

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This invention relates to gas burners and particularly to a rapid combustion gas burner provided with a combustion chamber completely surrounded by a combustion catalyst.

It has been found that a neutral atmosphere is the most efficient heating atmosphere, and it has been a problem to construct a gas burner which will provide complete combustion within the burner and thus produce a neutral atmosphere immediately above the burner. A reducing atmosphere is inefficient because there are unburned gases which are discharged into the air and thus a maximum heat output cannot be obtained. An oxidizing atmosphere produces uncombined oxygen which forms oxides or scale on the heated metals and is thus undesirable. Maximum heat and efficiency are obtained from a burner when the fuel is completely burned without producing any substantial volume of uncombined oxygen. In other words, a neutral atmosphere adjacent the top of the burner is the most desirable atmosphere because it produces the most efficient heat and does not produce unnecessary oxidation of the metal being heated.

Substantially complete combustion within the combustion chamber is necessary to produce maximum heat adjacent the top of the burner and to prevent combustion from taking place around the work being heated where the work is placed immediately above the burner.

It is an object of my invention to provide a novel and improved gas burner adapted to completely burn the combustible gases within the relatively small combustion chamber thereof by producing extremely high speed combustion within the combustion chamber.

It is another object to provide a gas burner having a combustion chamber completely lined with surface catalytic material capable of incandescence when heated to produce complete and rapid combustion within said burner.

It is a further object to provide a burner having a grid adjacent the discharge end thereof made from material capable of incandescence when heated to provide a surface catalyst to produce substantially complete and very rapid combustion within the combustion chamber of the burner.

These and other objects and advantages of my invention will more fully appear from the following description made in connection with the accompanying drawings wherein like reference characters refer to similar parts throughout the several views and in which:

Fig. 1 is a vertical sectional view of my im-

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proved gas burner taken substantially along the line 1-1 of Fig. 2;

Fig. 2 is a top plan view of my gas burner; and

Fig. 3 is a fragmentary horizontal sectional view taken substantially along the line 3-3 of Fig. 1.

As shown in the accompanying drawings, I provide a gas burner having an outer casing 5 with a substantially cylindrical central recess 6 formed therein. An inner block 7 made from refractory material and having a generally cylindrical shape is adapted to be received in the recess 6 in said outer casing 5. The block 7 is hollow forming a generally cylindrical gas supply passage 8 in the lower portion 9 which forms an annular abutment shoulder 10 at the top of passage 8. The upper hollow portion of block 7 is flared outwardly toward the top, forming an inverted frusto-conical combustion chamber 11.

The upper portion of the casing 5 is bored out to form a frusto-conical aperture 12 diminishing toward the top thereof and adapted to receive a slightly tapered catalytic grid 13 therein. A refractory inlet grid 14 is inserted into the supply passage 8 and abuts the annular shoulder 10 therein. A metal sleeve 15 is fixed to a base plate 16 and is inserted into the supply passage 8. The base plate 16 has an inlet port 17 and a pilot inlet aperture 18 formed therein and is adapted to abut the bottom of the burner when said sleeve 15 is inserted into the said passage 8 and combines therewith to hold the elements of the burner together in assembled position. A heat resistant gasket 23 is interposed between the top of said sleeve 15 and the inlet grid 14 to form a seal and provide an expansion pad therebetween. A reinforcing ring 19 surrounds the lower portion of casing 5 in fixed relation thereto and has an annular horizontal flange 20 around the bottom thereof. The base 16 has an annular recess around the outer periphery thereof to receive the inner portion of flange 20 and a plurality of cap screws 21 securely hold base 16 in retaining position. A cylindrical pilot passage 22 extends vertically upwardly through one side wall of inner block 7 and is adapted to be aligned with pilot aperture 18 in base plate 16. The lower grid 14 has a plurality of defusing apertures 14a formed therethrough to equally spread the mixed gases across the area of the diminished intermediate hollow portion 9. The catalytic grid 13 has a plurality of apertures 13a formed therein and the combined area of these apertures 13a is in the form shown, substantially equal to the area of the diminished portion 9 of the combustion chamber.

Assembly

The upper catalytic grid 13 is initially inserted into the upwardly converging aperture 12 of casing 5, the tapered sides of said grid 13 wedging against the converging sides of the aperture 12. The inner block 7 is then inserted into the cylindrical recess 6 of casing 5 and the lower inlet grid 14 is placed therein with retaining sleeve 15 inserted therebelow in the lower cylindrical portion 8 of the combustion chamber. The base plate 16 is then placed against the bottom of the assembled unit and the cap screws 21 secured in place to hold said base plate in position and retain the parts of the burner in assembled relation. The pilot aperture 18 is internally threaded to receive a supply tube for supplying fuel thereto. The inlet port 17 is concentric relative to the combustion chamber and is also threaded to permit a conduit to be attached thereto to carry gas and air mixture into the combustion chamber.

Operation

The refractory material with which the combustion chamber is lined becomes incandescent upon being heated and serves as a surface catalyst to produce complete combustion within the combustion chamber. The upper catalytic grid 13 is very important in heating and igniting substantially all of the combustible gases before they leave the combustion chamber and becomes incandescent almost immediately upon igniting the burner. By providing this upper grid 13 a large catalytic surface area is provided to ignite any unburned combustible gases before they leave the combustion chamber. This upper grid in addition to providing a large catalytic surface area also slightly retards the discharge of gases from the combustion chamber and increases the pressure therein which is highly desirable for rapid and efficient combustion which is substantially completed within the combustion chamber. By completing the combustion within the combustion chamber, the area surrounding the discharge opening from the combustion chamber will be maintained as a neutral atmosphere rather than a reducing or oxidizing atmosphere. As has been pointed out previously, this is highly desirable so as to permit the placing of the work to be heated immediately above the discharge opening from the burner which is the hottest point of this burner. In the case where extremely large pieces of work are being heated, this is particularly important because it permits the reduction on the size of the furnace in which the work is to be heated as well as increasing the efficiency of the heating operation.

It will be seen that I have provided a novel and improved gas burner adapted to produce a neutral atmosphere adjacent the discharge opening thereof by completely burning all of the combustible gases within the combustion chamber there-

of. My burner incorporates the advantages of surface catalysis into the new and improved combustion chamber design embodied in the burner. The catalytic grid 13 provides a relatively large incandescent area when heated which assures igniting of substantially all of the combustible gases before discharge thereof through said grid.

It should be noted that the parts of the burner may be easily removed for replacement in case of breakage or deterioration of the refractory material.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of my invention.

What I claim is:

1. A power type gas burner comprising a hollow casing having a combustion chamber formed therein, said combustion chamber having a supply inlet at one end and a discharge opening at the other end, said inlet being adapted to be connected to a source of combustible gas mixed with a combustion supporting gas, said chamber flaring outwardly toward the top thereof, a grid of refractory material capable of incandescence when heated covering the discharge opening of said combustion chamber, the total combined cross-sectional area of the apertures in said grid being substantially equal to the area of the combustion chamber at the lower portion thereof.

2. A power type gas burner comprising a hollow casing having a combustion chamber formed therein and flared outwardly toward the top thereof, said combustion chamber having a supply inlet at one end and a discharge opening at the other end, said inlet being adapted to be connected to a source of combustible gas mixed with a combustion supporting gas, a grid extending across said inlet to diffuse the gas supply and evenly distribute the same throughout the combustion chamber, said chamber flaring outwardly at the upper portion thereof, a refractory grid capable of incandescence when heated covering the discharge opening of said chamber, the total combined cross-sectional area of the openings in said upper grid being substantially equal to the area of the combustion chamber directly above the lower grid.

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