United States Patent

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[54] **GAS BURNERS**
5 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **431/278,** 239/557, 431/349, 431/351
[51] **Int. Cl.** **F23q 9/00**
[50] **Field of Search** 431/278, 349, 351, 354; 239/557

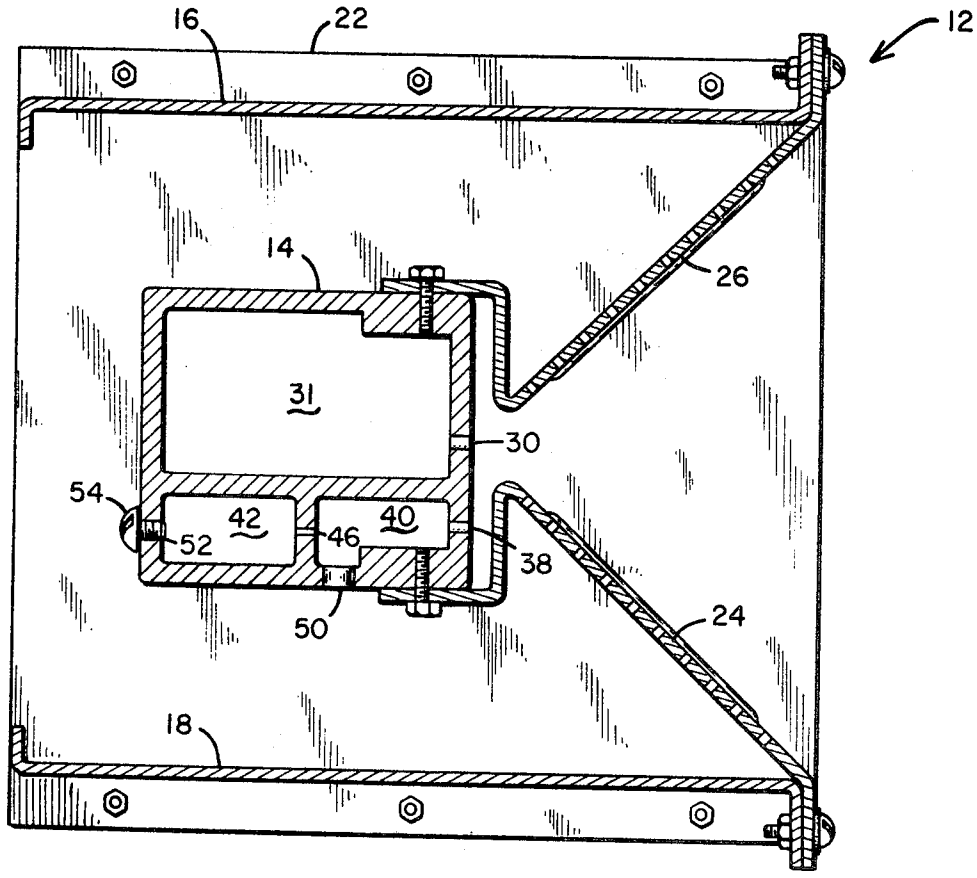
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ABSTRACT: A gas burner formed from an elongated hollow extrusion having three manifolds formed therein. One of the manifolds comprises a high-pressure manifold delivering raw gas through a series of apertures to the main flame while the second manifold delivers a combustible gas and air mixture through a second series of apertures to the pilot or low-heat flame. The third manifold delivers high-pressure gas through a series of transfer apertures to the second manifold periodically along the entire length of the second manifold. A series of air admission apertures along the second manifold allow air to pass into the gas in the second manifold under the influence of aspiration.



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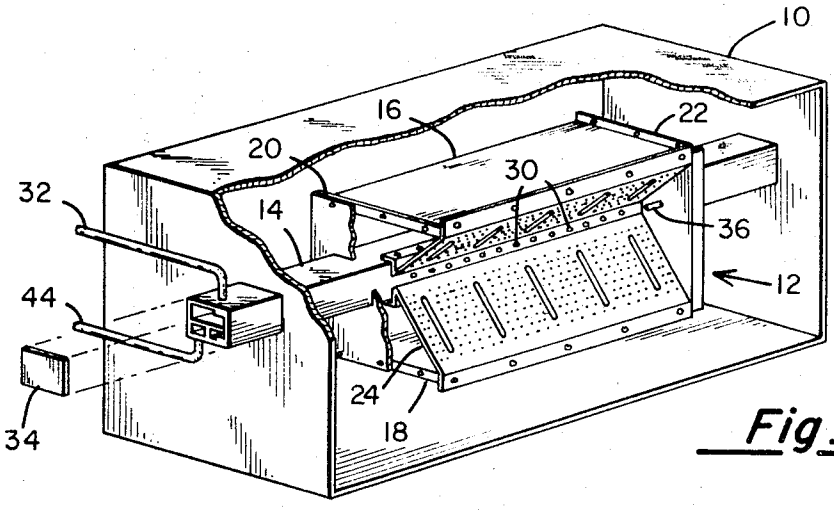
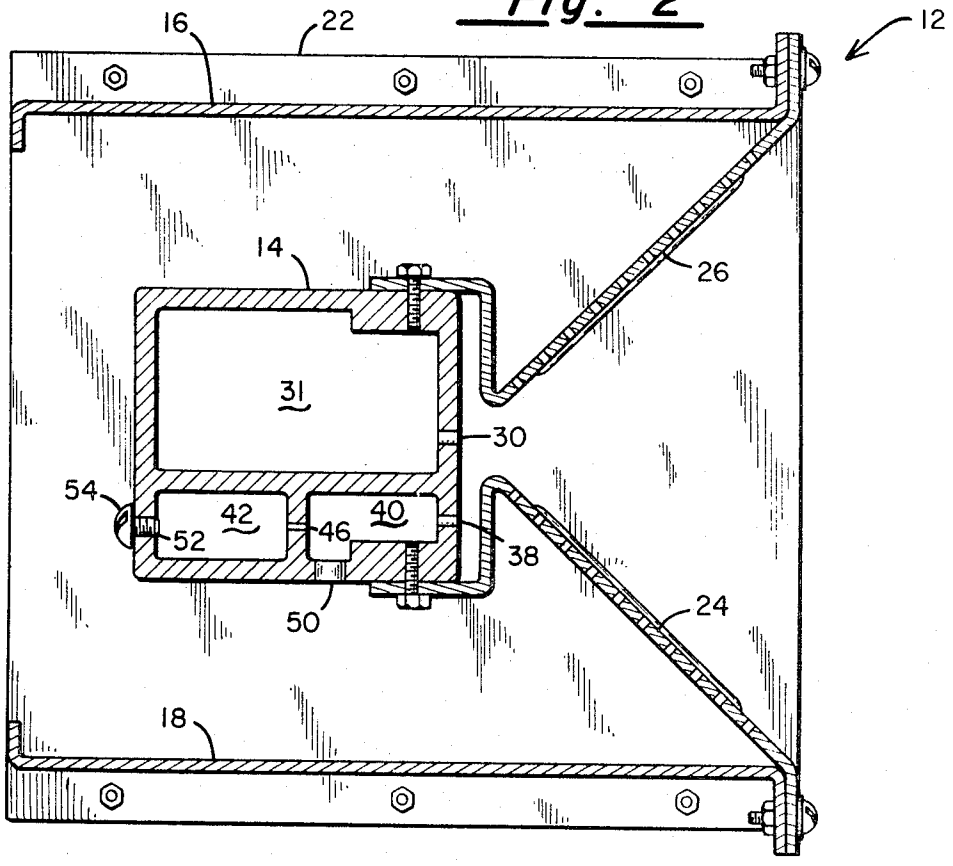


Fig. 1

Fig. 2



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GAS BURNERS

BACKGROUND OF THE INVENTION

Recently, improved gas burners have been designed which employ extruded hollow manifolds to carry the gas and support the flame. Such burners may be formed from aluminum and therefore are lighter and less expensive. Furthermore, the size and capacity of the burner can be controlled simply by cutting the extrusion to the desired length rather than altering expensive castings or using a number of separate castings or burners. This new type of extruded burner is shown and described in copending U.S. Pat. application Ser. No. 779,671 filed Nov. 29, 1968, and invented BY Richard Weatherston.

Briefly, the new extruded gas burners described in the above-referenced copending application are formed with an internal partition dividing them into two elongated parallel manifolds each having a series of spaced apertures therein which apertures face the combustion area. Regulated relatively high- pressure gas is introduced into one of the manifolds which passes out of the apertures and generates a large main flame for the main heating function. The second manifold receives a mixture of gas and air under a relatively low-pressure which serves to generate a small pilot flame for low heating requirements and for igniting the main flame. Experience has pointed up a number of difficulties inherent in this design especially in longer versions of the burner which to date have been made as long as 12 feet. The low-pressure manifold tends to have a more stable flame near the end at which the gas-air mixture is introduced than at the more distant end. Due to the gradual loss of pressure along the length of the pilot manifold and the inconsistent mixing of air and gas afforded by a single mixing device the flame characteristics along the manifold change. This uneven flame along the length of the burner produces uneven heating over the length of the burner with a number of consequent disadvantages. Since the burner depends wholly or partly on the pilot flame for low-level heating the heat output of the burner is uneven over its length. Another difficulty is that the large volume of air and gas mixture necessary to supply a long pilot manifold requires a complicated and expensive air and gas mixing device. The novel design of the present invention avoids the above described problems.

SUMMARY OF THE INVENTION

Briefly, the present invention contemplates using an elongated extrusion with three elongated parallel manifolds formed therein. Two of the manifolds supply the main flame and the pilot flame apertures while the third manifold accepts high-pressure gas which is transferred to the pilot flame manifold through a series of periodic apertures along the length of the pilot manifold. The gas, thus, enters the pilot manifold at the same pressure everywhere along the entire length of the pilot manifold alleviating the uneven flame problem. In addition, another set of air admission apertures are formed in the outside wall of the pilot manifold adjacent the transfer apertures in a one-to-one relationship so that the high-pressure gas passing form the third manifold to the pilot manifold will aspirate air along with it from the air admission apertures automatically so as to eliminate the need for the expensive and complicated prior art air-gas mixing apparatus. Thus, it may be seen that it is an object of the present invention to provide an improved gas burner. It is a further object of the present invention to provide a gas burner in which an even pilot flame is supported over the total length of the burner and in which air is automatically aspirated over the length of the pilot manifold. Further objects and advantages will become apparent upon reference to the following description and drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a partially cutaway perspective view of the main elements of the present inventive gas burner.

FIG. 2 is a cross-sectional view of the burner assembly of FIG. 1 in which the improved extruded manifold is shown in greater detail.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1 a portion of a burner compartment 10 is shown partially cutaway so as to provide a better view of the burner assembly 12 mounted in compartment 10. Burner assembly 12 comprises an extruded hollow member 14, upper and lower plates 16 and 18, end plates 20 and 22 and a pair of diverging foraminous plates 24 and 26. Foraminous plates 24 and 26 define a combustion area between them where air mixes with gas emerging from a series of holes 30 in member 14. Holes 30 connect with the large manifold 31 inside member 14 which manifold receives gas from a regulated source through a pipe 32. End plates such as plate 34 in FIG. 1 serve to close the ends of the manifolds in hollow member 14. As gas enters through pipe 32, manifold 31, and holes 30, air enters burner compartment 10 from the rear in FIG. 1. Some of the air passes into the rear of the burner assembly between plates 16, 18, 20, and 22 and through foraminous diverging plates 24 and 26 into the combustion area. Initially, the mixture is ignited by a spark plug or other suitable igniting device 36. After initial ignition, however, the flame is maintained by a pilot flame from a second series of holes 38 which connect with a second manifold 40. Manifold 40 receives gas from a pipe 44 through a third manifold 42. The unique operation of the pilot flame manifold 40 may be better understood with reference to FIG. 2.

In FIG. 2, burner assembly 12 is shown in section. In order to prevent an inordinate pressure drop along the length of manifold 40, high-pressure gas is introduced into manifold 42 which extends the full length of member 14 generally parallel to manifold 40. Manifold 42 connects with manifold 40 by means of a series of transfer apertures 46. Apertures 46 are relatively small so that the gas metered into manifold 40 at a slow predetermined rate. In the preferred embodiment apertures 46 are formed by a no. 44 drill and spaced at approximately 24 -inch intervals. This has been found to yield a pressure in manifold 40 which, although relatively low, is consistent along the entire length of manifold 40 so that when the gas passes out of manifold 40 through a series of pilot holes 38 the flame characteristics are similar along the entire length of manifold 40. Even, predictable, low-level heating is thus achieved as discussed earlier.

In order to eliminate the need for an expensive, complicated air-gas mixing apparatus to supply the pilot flame as in the past, a series of air admission holes 50 are provided in the bottom of manifold 40. Even predictable, low-level heating is thus achieved as discussed earlier.

In order to eliminate the need for an expensive, complicated air-gas mixing apparatus to supply the pilot flame as in the past, a series of air admission holes 50 are provided in the bottom of manifold 40. One hole 50 is provided adjacent each transfer aperture 46. The high-velocity gas entering through aperture 46 sucks air through hole 50 into manifold 4 by means of aspiration. This flow of air mixes with the gas from aperture 46 and continues on out through pilot apertures 38 assisted by the low-pressure area which exists between foraminous plates 24 and 26 when the flame is burning in the combustion area between plates 24 and 26. Holes 50 have been made approximately one-half inch in diameter in the preferred embodiment which size has been found to provide the proper air-to-gas ratio for proper combustion.

It may be seen that the size of the furnace can be varied simply by varying the length of extrusion 14. Since the gas is supplied equally along the length of the burner and since air is aspirated equally along the length of the burner any length may be chosen for the burner without adjustments to any of the gas or air supply apparatus. Furthermore, an even flame is produced over the length of the chosen burner due to the constant pressure characteristics along the pilot manifold.

Transfer apertures 46 may be drilled through the pilot flame holes 38 if desired but in the preferred embodiment separate access holes 52 are provided in manifold 42 opposite transfer holes 46. Holes 46 may be drilled through access holes 52 and, in addition, transfer holes 46 may be conveniently cleaned by means of access holes 52. In operation, access holes 52 are plugged by means of small sealing screws 54 to prevent escape of the gas.

I claim:

1. A gas burner comprising in combination:

an elongated hollow extrusion having a front side facing the combustion area with two sets of longitudinally spaced outlet apertures therein;

partitions in said extrusion dividing the interior of the extrusion into first, second, and third longitudinally extending manifolds, said first manifold in communication with one of said sets of outlet apertures and said second manifold in communication with the other set of outlet apertures;

means closing the ends of said manifolds;

means for supplying pressurized gas to said first manifold and said third manifold; and

a series of spaced transfer apertures between said third and second manifolds sized and spaced to admit gas to said second manifold at a controlled rate.

2. The apparatus of claim 1 including a series of air admission apertures in said second manifold sized to pass air at a rate dependent on the flow of gas through said transfer apertures.

3. The apparatus of claim 2 in which said air admission apertures comprise a series of holes positioned one each next to the transfer apertures so that the flow of gas through said transfer apertures aspirates air into said second manifold through said air admission apertures.

4. The apparatus of claim 3 in which said extrusion has a generally rectangular cross section with said first and second manifolds positioned along said front side.

5. The apparatus of claim 4 in which said gas-supplying means comprise a pair of inlet pipes connected to said first and third manifolds whereby gas pressure in one of the manifolds may differ from the gas pressure in the other manifold.