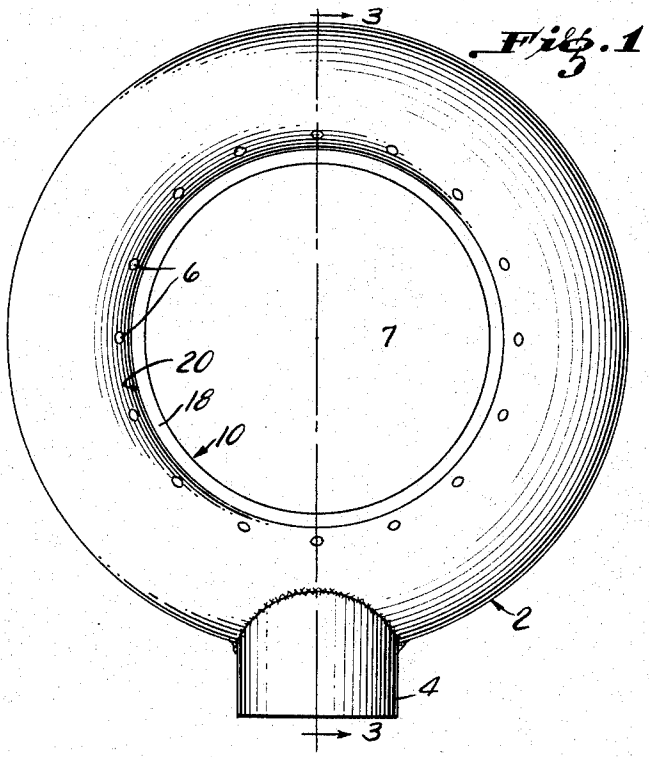
Aug. 25, 1959 J. D. HOLDEN 2,901,033

FLAME RETENTION PILOTING DEVICE FOR GAS BURNER

Filed June 20, 1956

Fig. 1



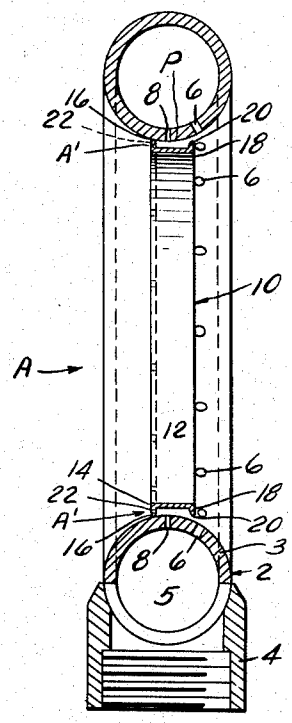
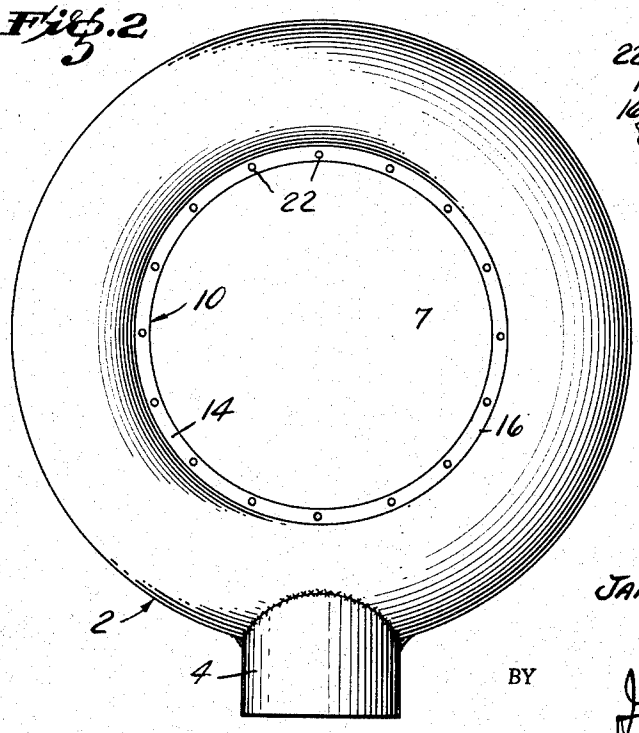


Fig. 3

Fig. 2



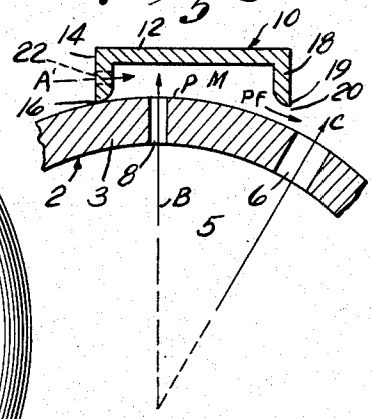


Fig. 4

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FLAME RETENTION PILOTING DEVICE FOR GAS BURNER

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5 Claims. (Cl. 158—116)

This invention relates to gas burners and, more particularly, to a flame retaining shield for maintaining a stable flame.

In order to obtain large burning capacity from a relatively small burner, air is fed at a high velocity past the burner so as to supply sufficient oxygen for combustion with the gas issuing from the burner openings. In response to the air blast passing the burner, the flame tends to flutter and bounce and becomes unstable, apparently because of temporary extinction of the flame near the burner openings. Rapid bouncing sets up vibrations which may injure the boiler or other object being fired, and creates a dangerous condition. The object of the invention is to provide a device not only for protecting and stabilizing a pilot flame adjacent the main burner openings, but also for insuring that the pilot flame will be maintained at the proper location adjacent the main burner openings, and that the main burner flame will receive the proper amount of blast-free air adjacent the main burner openings. Thus it is intended to prevent bouncing and instability of the main burner flame adjacent the burner openings while still permitting the desired large quantities of air at high velocity to maintain combustion of the gas issuing from the burner openings.

These and other objects will be apparent from the following specification and drawing, in which:

Fig. 1 is a front view of a ring burner embodying the invention;

Fig. 2 is a back view of the burner shown in Fig. 1;

Fig. 3 is a cross-section along the line 3—3 of Fig. 1; and

Fig. 4 is an enlarged fragmentary cross-section showing the structural details of the invention.

Referring now to the drawing, in which like reference numerals denote similar elements, the invention is illustrated in its application to a ring burner 2 comprising an annular conduit 3 having the usual inlet coupling 4 for supplying gas through the hollow interior 5 of the burner to the main burner openings 6. It will be understood that burner 2 is typical of those used for boilers and the like devices, that the burner is usually disposed with its axis horizontal, and that large quantities of air may be supplied at considerably high velocities through the burner to sustain combustion with the gas issuing from the main burner openings 6 in the direction of arrow C, Fig. 4. Main burner openings 6 are disposed in a circular row on the outlet side of annular conduit 3 and are spaced slightly above the inner periphery of the conduit. Heretofore, the high velocity combustion air, which blasts through the central openings 7 of the burner in the direction of arrow A, oftentimes caused the flame to temporarily leave the region adjacent the outlet ends of some of the main burner openings 6, the effect being that the flame appeared to flutter and bounce towards and away from the burner openings, thereby setting up violent vibrations.

Extending around the inner periphery P of annular conduit 3 are a row of pilot openings 8 through which

part of the gas from the hollow interior 5 of annular conduit 3 passes in the direction of arrow B. According to the invention, an annular shield 10 is affixed around the inner periphery P of the burner so as to define an annular premixing chamber M adjacent the lower side of the row of main burner openings 6. Shield 10 is generally U-shaped in cross-section, with the concave side of the U disposed towards the adjacent wall of conduit 3. The bight of the U is formed by cylindrical wall 12, and the leg most remote from main burner openings 6 is constituted by the flange 14 whose free edge is welded at 16 to conduit 3. As shown best in Figs. 3 and 4, the leg of the U nearest main burner openings 6 is formed by a flange 18, generally similar to flange 14 previously described, but having its free edge 12 spaced from conduit 3 so as to provide an outlet opening 19. Small portions A^1 of the main air stream A enter pre-mixing chamber M via openings 22 spaced along flange 14 and a pilot flame PF issues in a generally continuous strip through opening 19.

In operation, shield 10 protects the base of the flame adjacent the outlet ends of main burner openings 6 from the direct blast of air coming up through the open center 7 of the burner, and the pilot flame PF engulfs the gas issuing from the main burner openings 6 in comparatively tranquil, although entirely free, air.

While shield 10 has been described as a continuous ring on the inner periphery of a ring burner, it is apparent that it may be found in sections. The invention may also be applied to the outer periphery of such a burner if it be of the type where the main burner openings are also on the outer periphery, or it may be adapted to burners of non-closed shape. Other substitutions, modifications, and equivalents will suggest themselves to those skilled in the art, the invention being limited only by the scope of the following claims.

I claim:

1. A gas burner for furnaces having means for producing a high velocity stream of combustion air so as to create a pressure drop across the burner, said burner comprising a conduit having a side wall adapted to be disposed in said high velocity stream with one side of said conduit facing upstream of said combustion air and constituting a high pressure side and the opposite side of said conduit facing down stream of said combustion air and constituting a low pressure side, said conduit having a row of main burner ports through the side wall on the low pressure side thereof, an elongate shield having a side wall substantially U-shaped in cross-section mounted on one side of said conduit adjacent said row of main burner ports and between said ports and the high pressure side of the conduit, said shield being in intercepting relationship between said main burner ports and the high velocity stream and shielding said main burner ports from the blast of the stream, the length of said shield extending lengthwise of the conduit along the entire length of the row of main burner ports, the concave side of the shield side wall facing the side wall of the conduit and defining a mixing chamber on said side of said conduit between the side walls of the shield and conduit, said shield side wall having one leg of the U thereof disposed adjacent said row of main burner ports, the free end of said one leg being spaced from the side wall of the conduit and defining between said free end and said side wall a slit restricted in cross-section with respect to the cross-section of said mixing chamber and constituting an elongate pilot flame opening extending along the entire length of said row of main burner ports, the main burner ports terminating outside the confines of said shield, said conduit including means for supplying raw gas to said main burner ports and to said mixing chamber, said shield side wall having ports through the other

leg thereof for supplying a portion of said combustion air to said mixing chamber.

2. A gas burner for furnaces having means for producing a high velocity stream of combustion air so as to create a pressure drop across the burner, said burner comprising a conduit having a side wall adapted to be disposed in said high velocity stream with one side of said conduit facing upstream of said combustion air and constituting a high pressure side and the opposite side of said conduit facing down stream of said combustion air and constituting a low pressure side, said conduit having a row of main burner ports through the side wall on the low pressure side thereof, an elongate shield having a side wall substantially U-shaped in cross-section mounted on one side of said conduit adjacent said row of main burner ports and between said ports and the high pressure side of the conduit, said shield being in intercepting relationship between said main burner ports and the high velocity stream and shielding said main burner ports from the blast of the stream, the length of said shield extending lengthwise of the conduit along the entire length of the row of main burner ports, the concave side of the shield side wall facing the side wall of the conduit and defining a mixing chamber on said side of said conduit between the side walls of the shield and conduit, said shield side wall having one leg of the U thereof disposed adjacent said row of main burner ports, the free end of said one leg being spaced from the side wall of the conduit and defining between said free end and said side wall a slit restricted in cross-section with respect to the cross-section of said mixing chamber and constituting an elongate pilot flame opening extending along the entire length of said row of main burner ports and terminating adjacent the outer ends thereof, said conduit constituting a means for supplying raw gas to said main burner ports, the main burner ports terminating outside the confines of said shield, other ports leading from the conduit to said mixing chamber, said other ports terminating within the confines of said shield for supplying raw gas to the mixing chamber, said shield side wall having ports through the other leg thereof for supplying a portion of said combustion air to said mixing chamber for mixing with the raw gas therein whereby to supply a combustible mixture through said pilot flame opening.

3. A gas burner for furnaces having means for producing a high velocity stream of combustion air so as to create a pressure drop across the burner, said burner comprising a conduit in the form of an open ring, said conduit having a side wall adapted to be disposed in said high velocity stream with one side of said conduit facing upstream of said combustion air and constituting a high pressure side and the opposite side of said combustion air facing down stream of said conduit and constituting a low pressure side, said conduit having a row of main burner ports through the side wall on the low pressure side thereof, an elongate shield in the form of a ring, said shield having a side wall substantially U-shaped in cross-section mounted on one side of said conduit adjacent said row of main burner ports and between said ports and the high pressure side of the conduit, said shield being in intercepting relationship between said main burner ports and the high velocity stream and shielding said main burner ports from the blast of the stream, the length of said shield extending lengthwise of the conduit along the entire length of the row of main burner ports, the concave side of the shield side wall facing the side wall of the conduit and defining a mixing chamber on said side of said conduit between the side walls of the shield and conduit, said shield side wall having one leg of the U thereof disposed adjacent said row of main burner ports, the free end of said one leg being spaced from the side wall of the conduit and defining between said free end and said side wall a slit restricted in cross-section with respect to the cross-section of said mixing chamber and constituting an elongate pilot flame opening extending along the entire length of said row of main burner ports and terminating adjacent the outer ends thereof, the main burner ports terminating outside the confines of said shield said conduit constituting means for supplying raw gas to said main burner ports, other ports through the side wall of the conduit connecting the same to said mixing chamber for supplying raw gas to the latter, said other ports terminating within the confines of said shield, said shield side wall having a row of ports through the other leg thereof for supplying a portion of said combustion air to said mixing chamber.

4. A gas burner comprising a conduit having a side wall, said conduit having a row of main burner ports through the side wall thereof, an elongate shield having a side wall substantially U-shaped in cross-section mounted on one side of said conduit adjacent said row of main burner ports, the length of said shield extending lengthwise of the conduit along the entire length of the row of main burner ports, the concave side of the shield side wall facing the side wall of the conduit and defining a mixing chamber on said side of said conduit between the side walls of the shield and conduit, said shield side wall having one leg of the U thereof disposed adjacent said row of main burner ports, the free end of said one leg being spaced from the side wall of the conduit and defining between said free end and said side wall a slit restricted in cross-section with respect to the cross-section of said mixing chamber and constituting an elongate pilot flame opening extending along the entire length of said row of main burner ports, said main burner ports terminating outside the confines of said shield, said conduit including means for supplying raw gas to said main burner ports and to said mixing chamber, and other ports through the shield side wall for supplying air to said mixing chamber.

5. A gas burner comprising an annular ring-like conduit having a side wall, said conduit having a row of main burner ports through the side wall thereof, an elongate ring-like shield having a side wall substantially U-shaped in cross-section mounted on one side of said conduit adjacent said row of main burner ports, the length of said shield extending lengthwise of the conduit along the entire length of the row of main burner ports, the concave side of the shield side wall facing the side wall of the conduit and defining a mixing chamber on said side of said conduit between the side walls of the shield and conduit, said shield side wall having one leg of the U thereof disposed adjacent said row of main burner ports, the free end of said one leg being spaced from the side wall of the conduit and defining between said free end and said side wall a slit restricted in cross-section with respect to the cross-section of said mixing chamber and constituting an elongate pilot flame opening extending along the entire length of said row of main burner ports, said main burner ports terminating outside the confines of said shield, said conduit including means for supplying raw gas to said main burner ports and to said mixing chamber, and other ports through the other leg of the shield side wall for supplying air to said mixing chamber.

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