April 8, 1930. P. W. McCOY 1,753,613

GAS BURNER

Filed Jan. 10, 1929

Fig. 1.

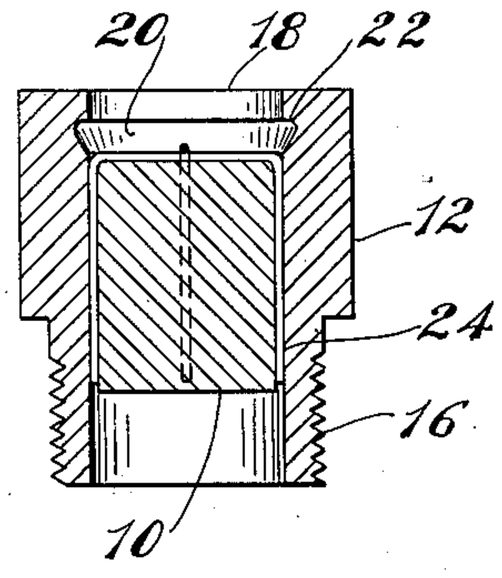


Fig. 2.

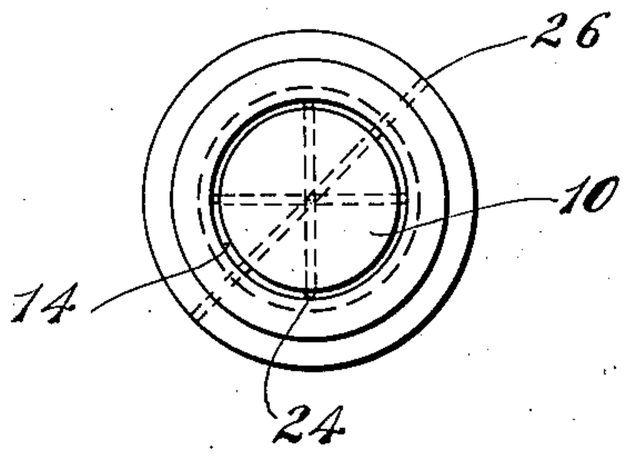
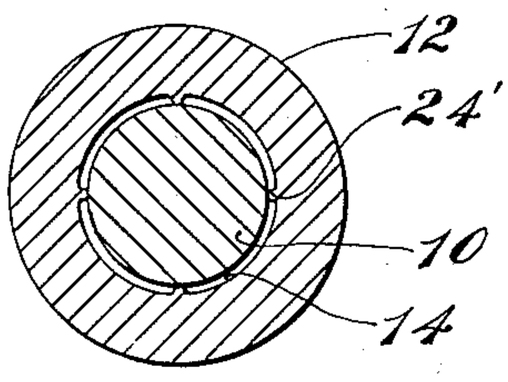


Fig. 3.



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UNITED STATES PATENT OFFICE

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GAS BURNER

Application filed January 10, 1929. Serial No. 331,540.

This invention relates to improvements in gas burners and more particularly to gas burners for burning premixed air and city or artificially made fuel gas.

The invention has for its object to provide a gas burner of the character indicated which shall not back-fire into the mixture supply on a low turn-down and which shall not tend to blow off at the tip when operating at maximum capacity.

Referring to the drawings wherein the preferred form of the invention is shown:

Fig. 1 is a diametral cross section through the burner;

Fig. 2 is a bottom plan of the burner; and

Fig. 3 is a radial cross section of the burner, showing ribs instead of wires for spacing the central plug from the tubular member.

In the drawings, 10 indicates a cylindrical plug over which is telescoped a tubular member 12, the plug and member being maintained in spaced concentric relation in any suitable manner for the purpose of forming a restricted annular feed passage 14 for the gaseous mixture to be burned. The feed passage is made sufficiently small to prevent back flash or flame propagation therethrough under any conditions of operation of the burner. One end of the member or body 12 is exteriorly threaded as at 16 to permit the burner to be screwed into a supply manifold (not shown). The plug 10 terminates short of the outlet end of the member 12 whereby there is formed a relatively shallow pit or well the upper rim of which is indicated at 18. This pit is provided with an annular undercut or groove 20. The form of the undercut is preferably as shown in Fig. 1, the angle at the lower edge 22 of the well rim or throat 18 being preferably not less than a right angle with the side walls of the undercut sloping outwardly.

The plug 10 may be maintained in spaced concentric relation in the bore of the body 12 in any suitable manner as by means of spacer wires 24, disposed in parallelism with the axis of the plug. Four such wires are shown in Fig. 2. For convenience in assembling, the wires are preferably cross-connected at their upper ends by bending the wires to U form and the plug forced into the bore with the wire straddling the plug. A cross pin 26 may be provided for more positively preventing relative axial displacement between the plug and the member 12.

Instead of providing spacing wires, inwardly projecting axially extending ribs 24′ may be provided either as integral parts of the plug 10 or of the member 12 as shown in Fig. 3.

The tubular member 12 and the body 10 are preferably made of a heat-resisting alloy so as to more effectually withstand the high temperatures caused by burning premixed fuel gas and air.

The mode of operation of the burner is as follows: The fuel gas is premixed with air in any suitable manner by apparatus not shown and delivered under pressure to the inlet to the burner below the plug 10, the mixture passing through the annular feed passage 14 into the pit for burning. Where the differential pressure between the atmosphere and the mixture issuing from the feed passage 14 is relatively low, the mixture will burn around the tip of the burner within the outer edge thereof, the annular groove or undercut 22 having very little effect on the manner of the burning of the mixture. Where, however, the differential pressure between the atmosphere and the mixture issuing from the feed passage 14 is relatively great, the undercut 22 interferes with the smooth flow of the mixture in a manner to set up swirling with the result that the pit or well is completely filled with the mixture. The mixture, therefore, burns in much closer proximity to the plug 10 than it otherwise would do. This will be more readily appreciated by considering how the burner would act if the annular undercut or groove 20 were not provided. In such case the mixture would maintain its tubular form for some distance beyond the tip of the burner depending on the velocity of the issuing mixture. In such case, the flame would tend to blow off very readily if indeed the mixture could be ignited.

The mixture of fuel gas and air is such that a substantially perfect mixture is produced. That is to say, the air and gas are so propor-

tioned that there is sufficient air for complete combustion. Such mixtures burn with a very short bluish flame and unless the burner is properly designed, will blow-off at the slightest provocation. The present burner is susceptible of operation over a relatively great range of turn-down and there is not the slightest tendency for the flame to blow off even through the mixture supply should be suddenly increased.

The diameter of the well rim 18 is preferably the same as the diameter of the bore wherein the plug 10 is positioned. Some variations in the relative diameters may, however, be had without materially interfering with the operation of the burner. A relatively sharp edge at the bottom of the rim is preferred, since a more pronounced swirling action is then obtained. As previously stated the burner has been designed for burning premixed air and city gas and finds its special utility with such mixtures.

What is claimed is:

1. A gas burner adapted to burn premixed fuel gas and air, comprising an open-ended body having an annular feed passage terminating short of the discharge end of said body and having its concentric walls close enough to prevent flame propagation therethrough, and an annular recess formed in said body between the discharge end of said feed passage and the adjacent terminal of said body.

2. A gas burner, adapted to burn premixed fuel gas and air, comprising means forming an annular feed passage with its concentric walls close enough to prevent flame propagation therethrough, means forming a relatively short tubular extension from the discharge end of said feed passage, and an annular recess formed within said extension.

3. A gas burner adapted to burn premixed fuel gas and air, comprising a relatively short tubular pit having an annular undercut, and means forming an annular feed passage terminating adjacent said undercut, the rim at the outlet of said pit having substantially the same internal diameter as the outside wall of the feed passage.

4. A gas burner adapted to burn premixed fuel gas and air, comprising a relatively short tubular pit having an annular undercut, and means forming an annular feed passage for entering a tubular sheet of premixed air and fuel gas into the pit at the base thereof, the diameter of said undercut being greater that the diameter of said feed passage, and the walls of said feed passage being close enough to prevent flame propagation therethrough.

5. A gas burner comprising a tubular body having an undercut adjacent one end thereof, and a plug between the walls of which and the walls of the tube is formed a feed passage for the gaseous mixture to be burned, said passage having concentric walls close enough to prevent flame propagation therebetween, said plug terminating adjacent said undercut.

6. A gas burner comprising a cylindrical plug, a tubular member telescoped over said plug, means for maintaining said plug and member in spaced concentric relation to establish an annular feed passage with its concentric walls close enough to prevent flame propagation therebetween, said plug terminating short of the outlet end of said member, and an undercut formed in said member adjacent its outlet end.

7. A gas burner comprising a cylindrical plug, a tubular body within which said plug is supported in concentrically spaced relation to provide a restricted annular feed passage for the gaseous mixture to be burned, said plug terminating short of the outlet end of said body whereby a shallow well is provided, the well being undercut below its top, the rim at the mouth of said well having substantially the same internal diameter as the outer wall of the feed passage.

In testimony whereof I affix my signature.

PHILIP WM. McCOY.