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J. HARRIS

GASEOUS FUEL BURNER

Filed March 21, 1927

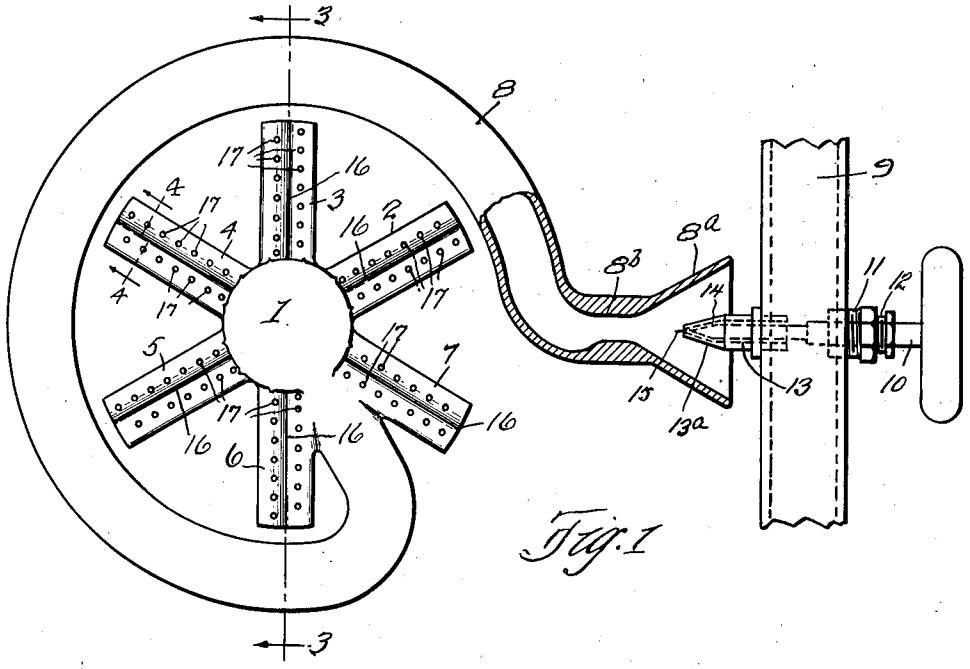


Fig. 1

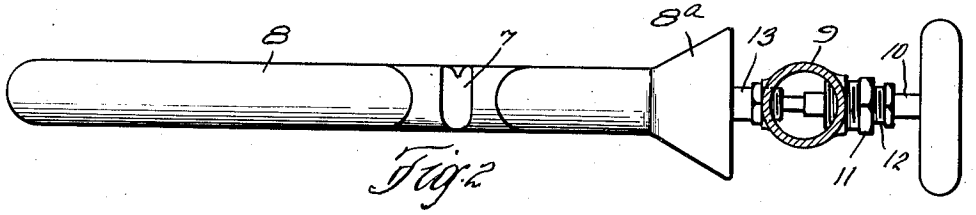


Fig. 2

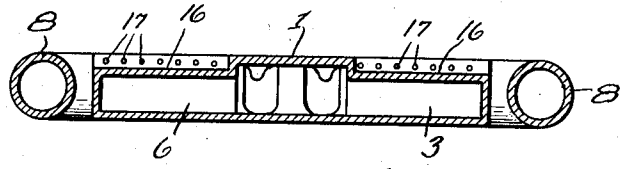


Fig. 3

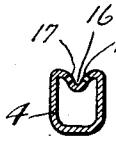


Fig. 4

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UNITED STATES PATENT OFFICE.

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GASEOUS-FUEL BURNER.

Application filed March 21, 1927. Serial No. 176,907.

This invention relates to gaseous fuel burners, and has for its general object to produce a burner which is capable of consuming efficiently gases such as are liquefied by pressure and cold and which are dispensed in a liquid form, in cylinders or containers and supplied to burners from such cylinders or containers. Instances of such gases are the various forms of casing-head gas, which contain one or more of the heavier hydrocarbon gases, such as hexane, butane propane and ethane, or a mixture of such gases.

A further and more limited object of the invention is to enable such gases to be burned completely, and with the production of a blue flame almost immediately upon placing the burner in operation. Further objects and advantages of the invention will appear hereinafter and will be realized by the combinations of elements embodied in the claims hereof.

Referring to the drawings, Fig. 1 represents a plan view of a burner constructed in accordance with my invention, a part of the mixing tube being broken away; Fig. 2 a side elevation of said burner, the supply pipe being shown in section; and Figs. 3 and 4 are details in sections, corresponding respectively to the lines 3—3 and 4—4 of Fig. 1.

The gases to which my burner is particularly adapted are gases containing one or more of the richer or heavier hydrocarbons. These gases, being dispensed in liquid form, must be converted quickly into a gaseous or aeriform condition in order to secure complete combustion thereof. Furthermore, this conversion should be accomplished practically immediately upon the starting of the burner in operation. For the purpose of obtaining these results, I have provided a burner which comprises generally a central distributing chamber 1, from which the burner arms 2—7 radiate. The fuel for the burner is supplied to the chamber 1 by means of a mixing tube 8, which nearly surrounds the burner, communicating with the chamber 1 between the burner arms 6 and 7. The inlet end of this mixing tube is provided with a bell 8^a, and the bore is somewhat contracted at 8^b, just beyond the point where the bell merges with the body of the mixing tube, to insure the proper proportion of air to the fuel delivered into the said tube and to provide for the expansion of such fuel in the part of the mixing tube beyond such contraction.

9 denotes a supply pipe for the gas, said pipe supporting a valve 10 by means of a stuffing box 11, 12, mounted in one side thereof and a nozzle 13 mounted in the opposite side thereof. The valve is threaded into the stuffing box member 12 and is provided with a conical end 14 adapted to engage corresponding conical end 13^a of the nozzle, the valve being provided with a needle point 15 which is adapted to be projected through the jet orifice of the nozzle thereby to clear the same from sediment etc.

It will be noted, by reference to Fig. 4, that each burner arm is provided in the upper surface with a V-shaped groove 16 extending the length thereof and that the burner orifices 17 are formed in opposite walls of said groove, the orifices on one side of the groove being staggered with respect to those on the opposite side, the arrangement being such that the flames proceeding from the orifices in one wall of the groove are arranged to heat in a most effective manner the wall of said groove opposite thereto; the staggering of the orifices prevents the impingement of the flames from one set of orifices upon those from the opposed set of orifices.

In the operation of the burner, the liquefied gas is discharged from the nozzle 13, 13^a into the mixing tube, where it quickly expands, mixing with the air and, after the burner is lighted, the mixture is heated by said burner as it flows through the mixing tube to the chamber 1. In addition, the gaseous mixture within the burner is heated efficiently by reason of the construction of the burner arms and the arrangement of the orifices in the grooves, as pointed out hereinbefore. Because of this arrangement of the mixing tube and the construction of the burner arms, I am enabled to burn gases of the type referred to with a blue flame, almost immediately upon starting the burner in operation. Furthermore, because the V-shaped grooves 16 extend to the outer ends of the burner arms, should any unvaporized or ungasified fuel be discharged through the orifices 17, it can flow from such ends of the grooves into the usual pan provided beneath the burner, thereby preventing the clogging of the orifices.

Having thus described my invention, what I claim is:

1. A burner comprising, in combination, a central receiving chamber, a plurality of radial burner arms extending therefrom, a combined mixing and expansion tube communicating with said chamber between a pair of said arms and extending approximately around the said chamber and arms and in close proximity to said arms, and means for delivering a mixture of fluid fuel and air into the receiving end of said tube, each of the said burner arms being provided with a V-shaped groove in the top thereof and being provided with burner orifices on opposite sides of said groove, the orifices on one side of the groove being arranged to discharge in proximity to the part of the arm opposite thereto and being staggered with respect to the orifices on the opposite side of said groove.

2. A burner comprising, in combination, a hollow burner body, a combined mixing and expansion tube arranged in close proximity to said body, means for delivering a mixture of fluid fuel and air into the receiving end of said tube, the said burner body being provided with a V-shaped groove and being provided with burner orifices on opposite sides of said groove, the orifices on one side of the groove being staggered with respect to the orifices on the opposite side of said groove and the said orifices being arranged to discharge in close proximity to the sides of the burner body opposite thereto.

3. A burner comprising, in combination, a receiving chamber, a plurality of burner arms projecting radially from said chamber, a combined mixing and expansion tube communicating with said chamber between two of said arms and extending approximately about the said burner arms and the said chamber, means for supplying a mixture of fluid fuel and air into the receiving end of the tube, each of the burner arms having in the top thereof a V-shaped groove extending to the outer end thereof and each groove having jet orifices in opposite walls thereof arranged to discharge in proximity to the wall opposed thereto, the orifices in one of the walls of each groove being staggered with respect to the orifices in the opposite wall of said groove.

4. A burner comprising, in combination, a hollow burner body, a combined mixing and expansion tube extending in proximity to said body, and means for supplying a mixture of fluid fuel and air into the receiving end of the mixing tube, the said burner body having in the top thereof a V-shaped groove extending to the outer end thereof and said groove having jet orifices in opposite walls thereof arranged to discharge in proximity to the wall opposed thereto, the orifices in one of the walls of each groove being staggered with respect to the orifices in the opposite wall of said groove.

5. A burner comprising in combination a central receiving chamber with burner arms extending therefrom and communicating therewith, each of said arms having in the top thereof a V-shaped groove having jet orifices in opposite walls thereof arranged to discharge in proximity to the wall opposed thereto, the orifices in one of the walls of each groove being staggered with respect to the orifices in the opposite wall of said groove, a combined mixing and expansion tube extending approximately around the said chamber and the said burner arms and in close proximity to the said arms, the said tube being provided with an outwardly flared receiving end and having its bore restricted inwardly from and adjacent to such receiving end, and means for delivering a mixture of fluid fuel and air into the flared receiving end of said tube.

In testimony whereof, I hereunto affix my signature.

JOHN HARRIS.