Oct. 25, 1927. 1,646,703

V. MULHOLLAND

LIQUID FUEL BURNER

Filed April 15, 1925

Fig. 1.

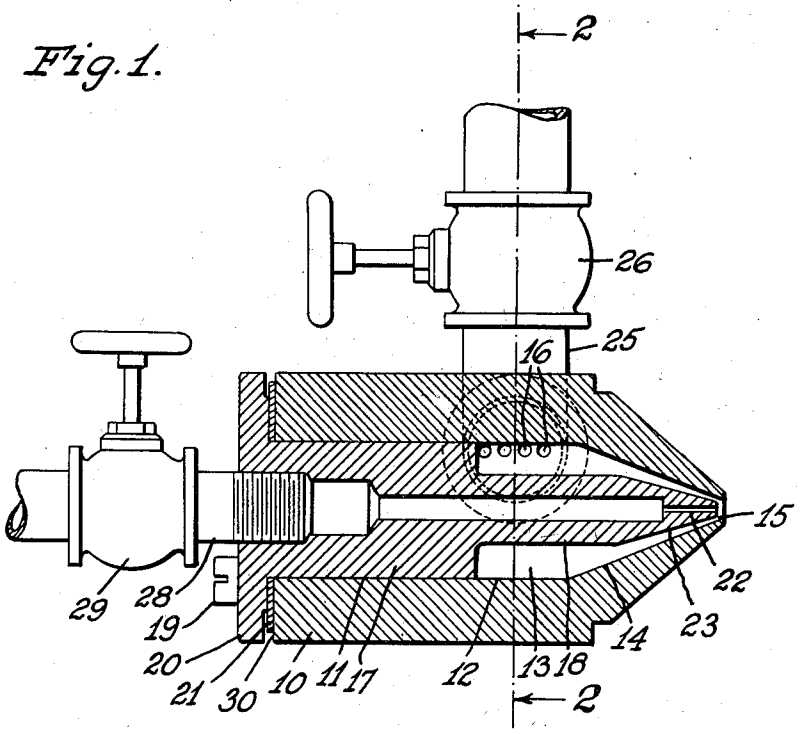
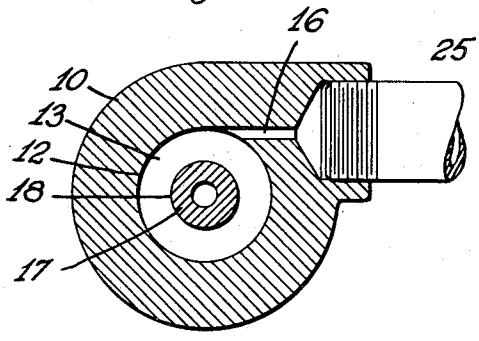


Fig. 2.



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LIQUID-FUEL BURNER.

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My invention relates to liquid-fuel burners, and one of its objects is to provide a burner which may be assembled quickly and accurately; in which the relation between the parts which supply the fuel and the atomizing air shall be adjustable; and in which any selected adjustment of these parts shall be restored definitely whenever the burner is taken apart and reassembled.

Another object of my invention is to provide a burner structure that will cause a whirling current of air to be projected from an annular outlet surrounding the fuel projector orifice of the burner, so as to obtain a thorough commingling of the air and the fuel.

In the accompanying drawing, Figure 1 is a central longitudinal section of a burner constructed in accordance with my invention; and Fig. 2 is a transverse section on the line 2—2, Fig. 1.

The burner shown herein belongs to the class of liquid-fuel burners in which the fuel is supplied through a tube that is enclosed in a hollow casing, the atomizing air being introduced into an annular space between the fuel tube and the casing. In burners of this type it is important that the fuel tube be coaxial with the casing, and the discharge end of the fuel tube should be accurately positioned with relation to the discharge end of the air channel which surrounds the fuel tube. It has heretofore been the practice to assemble the tube and the casing by means of ordinary screw threads, and when the burner is taken apart for cleaning or inspection and is then reassembled, the fuel tube may be screwed into the casing too far or not far enough, thus changing the previously selected relation between the fuel tube and the casing and thereby changing the character of the flame delivered by the burner. Moreover, the comparatively loose fits necessary for threaded parts are not sufficiently accurate for proper centralization.

According to my present invention, I centralize the fuel tube accurately within the casing by providing machined and unthreaded bearing surfaces of considerable length for supporting the fuel tube within the casing, and I insure the proper lengthwise adjustment of the fuel tube by providing the rear ends of the fuel tube and the casing with flat opposed surfaces which are separated by a flat washer of suitable thickness to bring the discharge end of the fuel tube into the desired relation to the discharge end of the casing, which relation can be varied by the use of washers of different thicknesses. The fuel tube and the casing are preferably secured together by means of screws instead of being threaded together in the usual way.

The burner shown on the drawing by way of illustrating my invention includes a body or casing 10 provided with an axial bore 11, a part of which forms an exterior wall 12 of an annular air chamber 13, and which is tapered at one end to form the exterior wall 14 of an annular outlet 15 for a whirling current of air under pressure admitted to the chamber 13 through ports 16 located in tangential relation to the circumference of the wall 12 of the annular chamber 13. The ports 16 are connected to a source of air supply (not shown) by means of a pipe line 25 in which a regulating valve 26 is interposed.

A fuel supply tube 17, a reduced portion 18 of which forms the interior wall of the annular air chamber 13, is secured at one end to the body 10 by screws 19 which maintain the said member in correct axial position within the body 10 by reason of the long bearing surfaces on which the body and the fuel tube engage each other.

The fuel tube 17 is provided at its rear end with a flange 20 which is separated from the adjacent end 30 of the body 10 by a spacing washer 21 of the proper thickness to bring the discharge end of the fuel tube into the desired relation to the discharge end of the air outlet 15. All of the surfaces of the body 10, the tube 17 and the washer 21 which engage one another are carefully machined to their proper size and shape. It is especially important that the meeting surfaces of the flange 20, the washer 21 and the end of the body 10 be accurately flat.

A reduced nozzle 22 is provided at the front end of the tube 17 for the passage of oil therefrom. The exterior 23 of this nozzle is so tapered as to form the inside wall of the annular outlet 15 through which the air is discharged. At its rear end, the tube 17 has a tapped opening 27 that is adapted to receive a pipe 28 in which is a regulating valve 29 for controlling the oil supply.

The burner described above may be readily taken apart by removing the screws 19,

and when the parts are again assembled they return in a definite and positive manner to their proper relative positions. This enables the burner to be cared for by unskilled operators, as the burner cannot be assembled incorrectly so long as the screws 19 are properly screwed down. When it is desired to change the relation between the fuel tube and the body 10, it is only necessary to replace the washer 21 by another washer of different thickness.

The tangential arrangement of the air ports 16 produces, in a simple and effective manner, a whirling current of air which, when discharged through the outlet 15, assists by induction the discharge of fuel from the nozzle 22, thoroughly atomizes the fuel, and mingles with the atomized fuel to form an effective combustion mixture.

Several advantages are obtained by the use of the multiple air ports 16 instead of a single part of larger diameter. Among these advantages are that their small diameter gives high velocity for a given volume of air; that the whole area of each port is near the periphery of the air chamber 13, where it is most effective in producing whirling air currents, and that the row of small ports gives substantially the same effect as a long narrow slot, and may be drilled into the casing more conveniently than such a slotted port.

The arrangement of the air ports 16 at the outer periphery of the air chamber 13 tends, by reason of the whirling motion imparted to the air in the air chamber, to produce a "short fire", that is, a flame in which the combustion is completed a short distance beyond the atomizing outlet. By making the air ports 16 adjustable in area and in direction, the whirling movement of the air in the chamber 13 may be reduced or eliminated entirely, thus producing a longer or shorter flame, as may be desired.

This invention is not limited to the details of construction herein shown, and may be modified within the scope of the appended claims.

I claim:

1. A liquid fuel burner comprising a body member having a cylindrical bore therein terminating in a conical outlet, a fuel tube having a conical extremity disposed within said bore and in spaced relation thereto, and a plurality of relatively small air ports disposed in side-by-side relation tangentially of said bore for projecting air into the space between said body member and said fuel tube, said ports having a total area sufficient to admit the desired volume of air into said space.

2. A burner comprising a hollow body member having a cylindrical bore terminating in a tapered outlet, a fuel tube extending into said body member and having a substantial portion of its outer surface shaped to fit closely in the cylindrical portion of the bore of said body member, said fuel tube also having a portion of reduced diameter forming an annular air chamber, a plurality of longitudinally spaced ports arranged to introduce air tangentially into said air chamber, a flange formed on said fuel tube outside of said body member, a spacing washer disposed between said flange and the adjacent end of said body member, said washer determining the relative longitudinal positions of said body member and said tube, and screws for securing said flange to said body member.

Signed at Hartford, Connecticut, this 13th day of April, 1925.

VERGIL MULHOLLAND.