Sept. 30, 1924. 1,510,183

F. R. MACDONALD ET AL

LIQUID HYDROCARBON BURNER

Filed Dec. 11, 1922 2 Sheets-Sheet 1

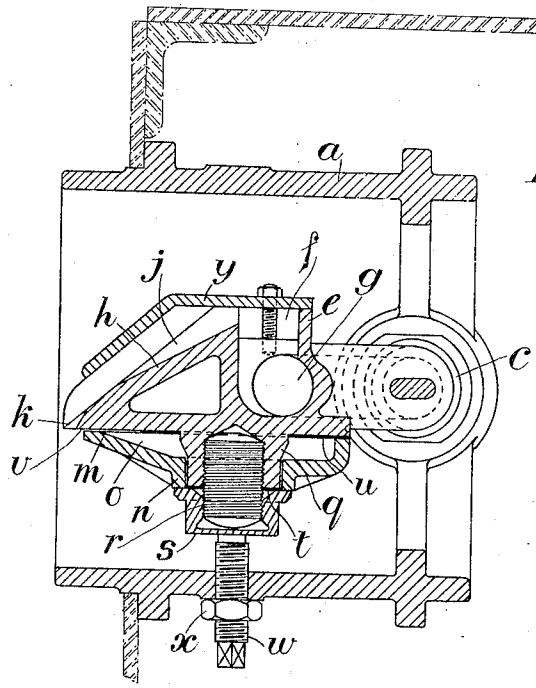


Fig. 1.

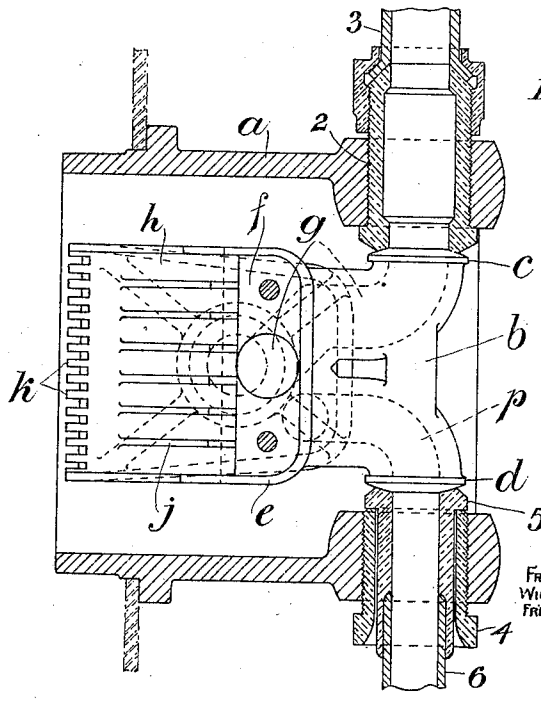


Fig. 3.

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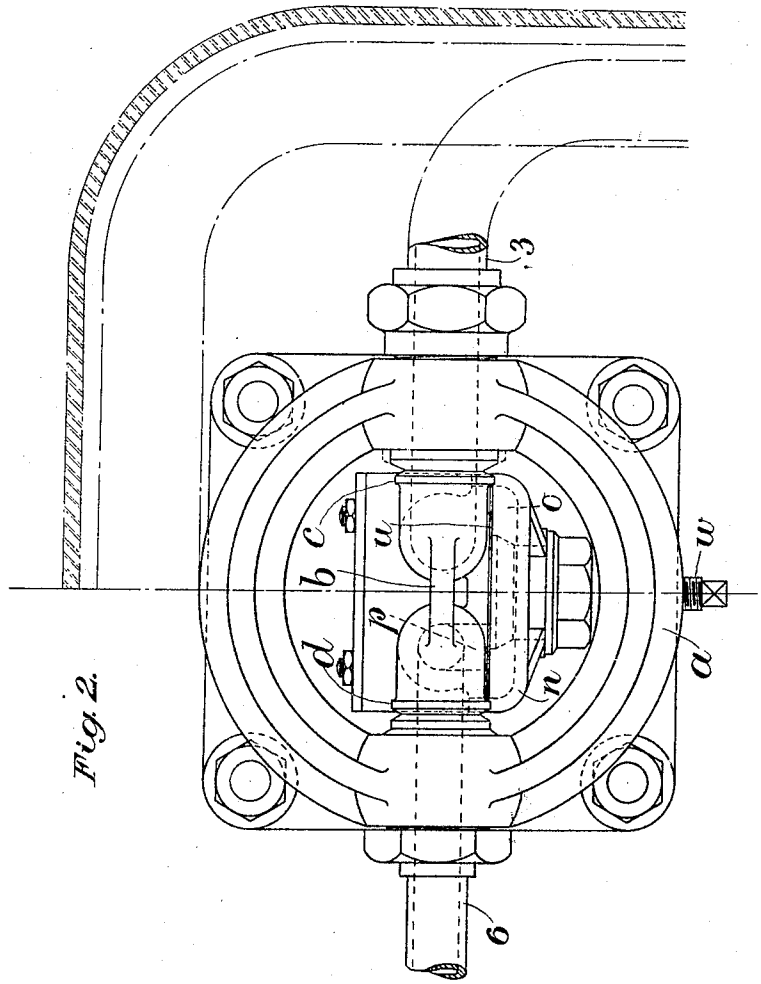


Fig. 2.

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UNITED STATES PATENT OFFICE.

FRANCIS R. MACDONALD, WILLIAM R. A. PICKERSGILL, AND FREDERICK S. LOVICK-JOHNSON, OF LONDON, ENGLAND.

LIQUID-HYDROCARBON BURNER.

Application filed December 11, 1922. Serial No. 606,306.

To all whom it may concern:

Be it known that we, FRANCIS RANDOLPH MACDONALD, of 28 Charles Street, Haymarket, London, S. W. 1, England, WILLIAM ROBERT ALEXANDER PICKERSGILL, of 2 Villa Road, Brixton, London, S. W., England, FREDERICK SAMUEL LOVICK-JOHNSON, of 5 Montana Road, Tooting Bec Common, London, S. W., England, all subjects of the King of Great Britain and Ireland, have invented certain new and useful Improvements in or Relating to Liquid-Hydrocarbon Burners, of which the following is a specification.

This invention relates to liquid hydrocarbon burners of the type in which the atomizing agent, steam or air, is arranged so that angle impact ensues between said agent and the liquid to be atomized.

The object of this invention is to provide an improved burner of this type.

A burner made in accordance with this invention comprises, a casing, a nozzle unit detachably and pivotally mounted within the casing, and having an inclined weir and combed dripping edge down which the liquid hydrocarbon flows with means for adjusting the unit about its pivots to the desired position and may comprise means for enabling the atomizing fluid to attain its maximum velocity before coming in contact with the liquid hydrocarbon, means for suitably distributing the liquid hydrocarbon on to the weir, means for directing the atomizing fluid to a surface below the weir, means for imparting an increasing velocity to the oil film with the object of securing a maximum degree of fineness of the oil film at the point of contact with the atomizing fluid, and means for altering the size of the nozzle.

Referring to the drawings filed herewith:

Fig. 1 is a longitudinal sectional side elevation through the centre of the burner, showing the burner and casing complete;

Fig. 2 is a rear end view showing the manner of the mounting of the burner in its casing and the fuel and atomizing fluid pipe connections;

Fig. 3 is a part sectional plan view of the burner and casing.

In the form shewn in the drawings:—

a is the casing, *b* is the nozzle unit, having bosses *c* and *d* by which it is pivotally mounted in the casing. The nozzle unit comprises a distributing trough *e* and a well *f* having a communicating passage *g* leading to the boss *c*. Oil is admitted through the central well *f* and the passage *g* and flows by gravity from the trough down the inclined weir *h*. The weir *h* is provided with ribs *j*. The lower or dripping edge of the weir is provided with a series of equidistant fins or teeth *k*, and is in effect a comb, the projecting ends of which teeth end at the line of intersection of the inclined surface of the whole tray or weir, and the bottom horizontal surface *m* below the weir.

Secured to the upper member *e* of the nozzle unit is a lower member *n* which forms a steam chamber *o*, with the bottom horizontal surface of the upper member, a passage *p* leads from the steam chamber *o* to the boss *d*. The lower member *n* is secured over a boss *q* on the underside of the upper member *e*, by a nut *s* on a stud *r* fixed in the boss *q*. A packing *u* is placed between the lower member and the upper member so as to leave a nozzle or outlet *v* for the air or steam directly beneath the teeth *k* of the weir *h*.

The thickness of the packing *u* determines the size of the nozzle orifice. An adjustable screw *w* and a lock nut *x* is provided in the underside of the casing, which screw *w* bears against the nut *s* and on which the nozzle unit rests. Adjustment of the bolt raises and lowers the nozzle unit. A cover *v* is provided over the weir *h*.

The casing *a* is provided with a screwed socket 2 to which the oil control valve or supply pipe 3 is adapted to be secured. The inner end of the screwed socket is coned out to receive the coned or spherically shaped end of the boss *c*. Horizontally opposite and coaxially with the socket in the other side of the casing *a* is a screwed sleeve 4, by which the coned end 5 of the air or steam supply tube 6 is adapted to be pressed against the coned or spherically shaped end of the boss *d* of the nozzle unit. The nozzle unit is therefore pivotally mounted in the casing, and is supplied with oil through one pivot and steam or air through the other pivot. The valves not shown are of course fitted on the supply pipes, to control the burner.

The oil enters the nozzle unit through the sleeve 4 and the boss *c* and passes to the trough *e*, through the passage *g* and the well *f*. From the trough *e* the oil flows over by gravity on to the inclined weir, and

according to the quantity of oil supplied will flow down between a few or all of the ribs and will finally fall over and through the teeth *k* on the edge of the weir. The flow of oil down the inclined surface is free from obstruction, and owing to the progressively increasing angle of the inclined surface down which it flows, spreads out into a thin film with progressively increasing velocity of flow, finally falling through the teeth of the comb. Here it meets the steam or air which has entered the nozzle unit through the coned end 5 of the tube 6 and having passed through the passage *p* into the steam chamber *o* is passed out through the nozzle *b*.

The burner just described has very few, simple parts, which are light and compact. The nozzle unit may be readily removed, without disturbing the supply pipes other than to slacken off the screwed sleeve 4. The oil is equally distributed over the whole surface of the weir, when the burner is operating to its full capacity, and owing to the natural rise of the oil flowing up to the trough through the central well *f*, the oil is concentrated over the central portion of the weir when operating at light feeds. The oil film is very thin when delivered for atomizing by reason of its acceleration down the steep inclined surface of the weir.

The actual manufacture of the burner does not involve minutely accurate facing work, and the uniformity of the steam orifice is determined by the packing. The direction of the flame is easily adjusted, while in operation, by elevating or depressing the burner. The atomizing agent and oil film both reach their maximum velocity at their line of contact.

In this form the oil nozzle or weir is integral with the upper part of the nozzle unit, and the steam nozzle is formed between the upper unit and the lower unit secured thereto.

We may however provide a similar design in which the steam nozzle is integral with the main part of the nozzle unit and the oil nozzle or weir is suitably attached thereto.

What we claim and desire to secure by Letters Patent is:—

1. In a burner of the character described, the combination with a casing, a fuel nozzle unit mounted in the casing and provided with an inclined weir and a rigid combed dripping edge and adapted to spread a fuel film flowing over the weir and dripping over the edge, and a supply pipe for the nozzle unit, of a second nozzle arranged adjacent the first and adapted to direct an atomizing agent into angular impact with the spread fuel, and a supply pipe for the second nozzle, said fuel nozzle unit being pivotally, adjustably and detachably mounted about the supply pipes whereby the angle of declination of the weir may be adjusted to alter the velocity and thickness of the fuel film.

2. In a burner of the character described, the combination of elements as claimed in claim 1, in which the inclined surface of said weir lies in adjacent planes of progressively increasing slope whereby the velocity of the fuel film is increased in definite stages of acceleration before dripping over the combed edge.

3. In a burner of the character described, the combination of elements as claimed in claim 1, in which said weir is provided with ridges adapted to be encountered by the flowing fuel film and to split the fuel film into streams up to a point short of the dripping edge.

4. In a burner of the character described, the combination with a casing, a fuel nozzle unit mounted in the casing and provided with an inclined weir and a rigid combed dripping edge and adapted to spread a fuel film flowing over the weir and dripping over the edge, and a supply pipe for the nozzle unit, of a relatively movable under-plate adjacent the nozzle unit and constituting with the underside of the nozzle unit a second nozzle chamber adapted to direct an atomizing agent into angular impact with the spread fuel, yieldable packing means interposed between the under-plate and the nozzle unit, a supply pipe for the second nozzle chamber, said fuel nozzle unit being pivotally, adjustably, and detachably mounted about the supply pipes whereby the angle of declination of the weir may be adjusted to alter the velocity and thickness of the fuel film, and adjustable clamping means for said under-plate whereby the size of the nozzle chamber may be altered.

In testimony whereof we affix our signatures.

F. R. MACDONALD.
W. R. A. PICKERSGILL.
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