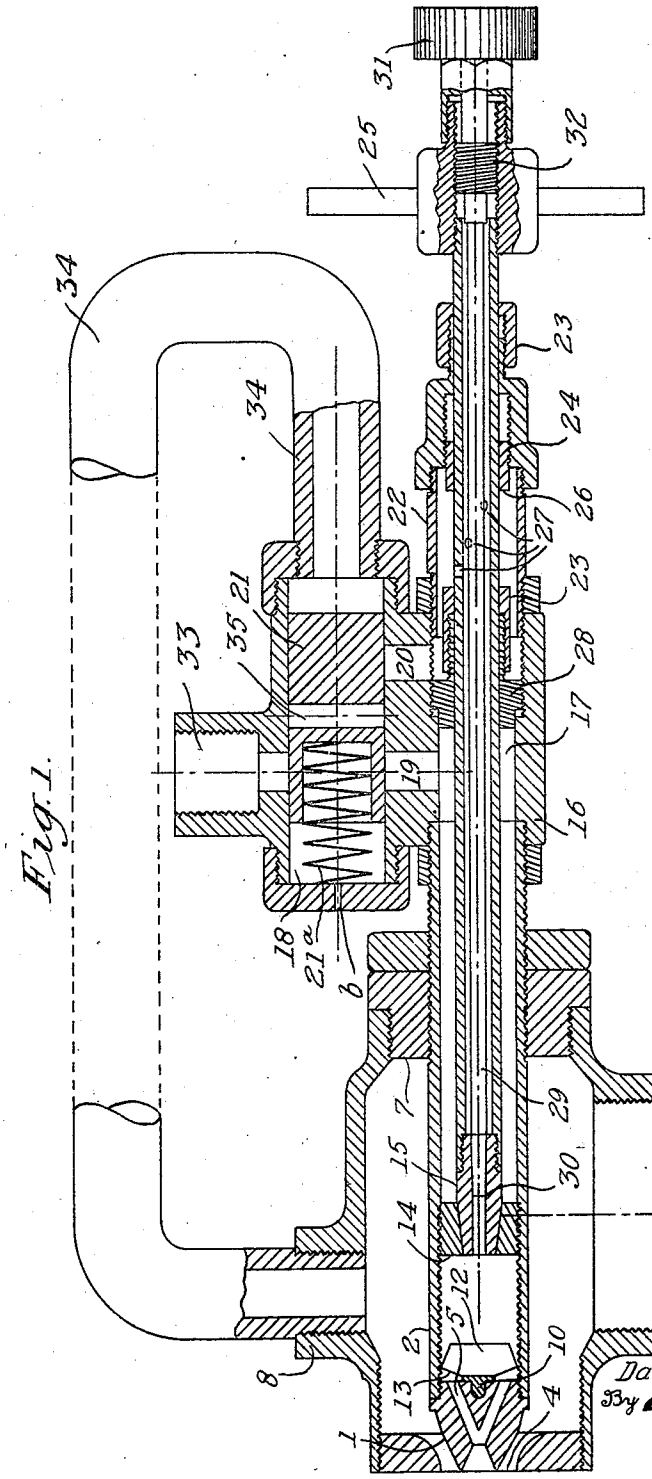
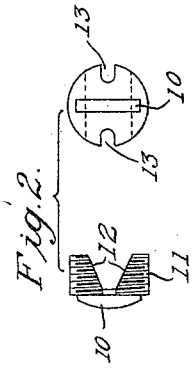
April 6 , 1926. 1,579,278

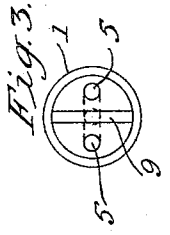
D. R. BRUCE

LIQUID FUEL BURNER OF THE INJECTION TYPE

Filed Dec. 5, 1922







Inventor:-
David Robertson Bruce.
By Cruikshank, Boothe,
Jamieson & Varney
His Attorneys.

Patented Apr. 6, 1926. 1,579,278

UNITED STATES PATENT OFFICE.

DAVID ROBERTSON BRUCE, OF LONDON, ENGLAND.

LIQUID-FUEL BURNER OF THE INJECTION TYPE.

Application filed December 5, 1922. Serial No. 605,124.

To all whom it may concern:

Be it known that I, DAVID ROBERTSON BRUCE, a subject of the King of Great Britain, residing in London, England, have invented certain new and useful Improvements in and Relating to Liquid-Fuel Burners of the Injection Type, of which the following is a specification.

This invention relates to improvements in liquid fuel burners.

According to the present invention liquid fuel is forced through the nozzle of the burner through two or more independent passages arranged at a suitable angle, by means of fluid pressure. There are, however, no independent air or pressure fluid passages through the nozzle, the pressure fluid being admitted to a casing surrounding the nozzle and thus passing with the fuel jets into the furnace or the like.

The fuel supply to the nozzle is controlled by a hand operated needle or like valve and the pressure fluid is controlled by a second similar hand operated valve.

The fuel supply to the apparatus may be controlled by the fluid pressure in a known manner so that when the pressure is cut off, the supply of fuel automatically ceases. This may be effected by causing the fuel from the reservoir to pass through a port in a casing controlled by a reciprocating member under the action of a spring and the fluid pressure, the spring normally tending to close the fuel port and the pressure to open same.

This reciprocating member may also control the pressure supply to the fuel feed to the nozzle.

To enable the invention to be fully understood it will now be described by reference to the accompanying drawing in which:—

Fig. 1 is a sectional elevation of a burner constructed according to the invention, and

Figs. 2 and 3 are views of details of the nozzle construction thereof.

As shewn, the burner comprises a nozzle 1 carried on a burner tube 2 mounted in a pressure casing 3 having a flame opening 4.

The nozzle 1 is provided with two independent passages 5 arranged at an angle so as to discharge substantially at the tip of the nozzle. The fluid pressure is admitted to the casing 3 through opening 6, the burner tube being held in a fluid tight closure 7, a by-pass port 8 being provided in the casing for connection with the fuel regulating device as hereinafter described.

The nozzle is shewn in rear view in Fig. 3 and in order to form a fuel concentrating chamber behind the nozzle, the base may be provided with a transverse slot 9 adapted to receive a projection 10 formed on a screwed block 11 shaped as shewn in Fig. 2. This block provides a conical passage 12 inside the burner tube 2 immediately behind the nozzle, said block having openings 13 coinciding with the passages 5 in the nozzle base, the arrangement being such that the fuel is heaped up or concentrated on the openings 13 owing to the shape of the passage 12 formed in the block 11. In fitting up the burner, the block 11 is first partially screwed into the tube 2 and the nozzle 1 is then placed on the block with its slot 9 engaging the projection 10, the two then being screwed home together. It will be understood that the block and nozzle are in close engagement during working of the burner. With this construction the nozzle and block can be readily removed for cleaning or replaced owing to wear. Fig. 2 shews the block in plan and also a front view.

The burner tube 2 is fitted with a seat 14 for the needle valve 15 controlling the fuel supply to the nozzle and the said tube is fitted into a portion 16 carrying the fuel and pressure admission and controlling devices for the nozzle.

The portion 16 comprises two cylindrical chambers 17, 18, connected by ports 19, 20, controlled by a valve 21 slidably mounted in chamber 18. The burner tube 2 opens into the chamber 17 and the stem of the needle valve 15, which is hollow, extends through the chamber and through an extension 22, through fluid tight stuffing boxes 23, 24, to an operating handle 25. On turning the handle 25 the stem 15 will move longitudinally, the screwed collar 26 secured to the stem moving in the threaded interior of the stuffing box 24. Holes 27 are formed in the stem 15 and the chamber 17 is divided by a fluid tight partition 28. A second needle valve 29 is fitted inside the stem 15 controlling a seat 30 near the end of the stem and having an operating knob 31 and a screwed portion 32 working in the boss of handle 25 and serving also to seal the end of the stem 15 as shewn.

Fuel is admitted to chamber 18 through

a supply opening 33 and fluid pressure through a pipe 34 connected to the port 8 in casing 3. The valve 21 is pressed by a spring 21^a which when the pressure is cut off, forces the valve into the position shewn, in which the ports 19, 20 are closed and the burner is out of operation. An air vent b is provided in the chamber 18.

When pressure is admitted through pipe 34, the valve 21 is moved and its port 35 connects the fuel supply opening 33 with the port 19 allowing fuel to pass into the burner tube 2, filling said tube up to the seat of needle valve 15. Simultaneously, port 20 is opened and fluid pressure passes into chamber 17 and into the extension 22 and through the holes 27 into the stem 15.

Thus at the seat 14, the valve 15 regulates the flow of fuel therethrough, while the pressure passing out of the hollow stem 15 is regulated by the interior needle valve 29 controlling seat 30.

The pressure thus forces the oil into the passage 12 forming the concentrating chamber behind the nozzle, and through the passages 5 in the nozzle.

Pressure fluid is also passing through the casing 3 and mixes with the fuel forced through the nozzle carrying the jet through the flame opening.

When the fluid pressure is cut off, the valve 21 under the action of spring 21^a closes the fuel supply to the chamber 17.

The valves 15 and 29 may be regulated by the operating handles 25, 31 respectively, thus providing an effective control of the fuel passing through the nozzle.

If desired, the control of the fuel supply by fluid pressure may be dispensed with. In this case, a closed chamber may be provided on the outside of the burner tube divided by a partition. The fuel is admitted on one side of the partition and passes through a suitable port into the burner tube, the fluid pressure being admitted on the other side of the partition and passing through a suitable port to the hollow needle valve stem 15.

This chamber may be cylindrical or of other suitable shape. With this arrangement the necessary regulation is obtained by operation of the needle valves.

Having thus described the nature of the said invention and the best means I know of carrying the same into practical effect, I claim:—

1. A liquid fuel burner having a fluid pressure chamber provided with a fluid opening, a conical nozzle arranged in a burner tube in said opening and provided with two independent inclined passages meeting at a common point substantially at the tip of said nozzle, a liquid fuel chamber communicating with the burner tube, a valve seat in said tube, a hollow needle valve stem operable from the outside of the tube seating on said seat, means for admitting pressure fluid to the interior of the valve stem, and a second valve stem inside the first stem and operable from the outside of the burner tube for regulating the flow of pressure fluid.

2. A liquid fuel burner having a fluid pressure chamber provided with a fluid opening, a conical nozzle arranged in a burner tube in said opening and provided with two independent inclined passages meeting at a common point substantially at the tip of said nozzle, a liquid fuel chamber communicating with the burner tube, a valve seat in said tube, a hollow needle valve stem operable from the outside of the tube seating on said seat, means for admitting pressure fluid to the interior of the valve stem, a second valve stem inside the first stem and operable from the outside of the burner tube for regulating the flow of pressure fluid, a spring pressed valve in the fuel chamber, the spring normally causing the valve to cut off the fuel supply to the burner tube and means for admitting fluid pressure to the chamber to overcome the resistance of the spring to open the valve to admit the fuel supply.

3. A liquid fuel burner having a fluid pressure chamber provided with a fluid opening, a conical nozzle arranged in a burner tube in said opening and provided with two independent inclined passages meeting at a common point substantially at the tip of said nozzle, a liquid fuel chamber communicating with the burner tube, a valve seat in said tube, a hollow needle valve stem operable from the outside of the tube seating on said seat, means for admitting pressure fluid to the interior of the valve stem, a second valve stem inside the first stem and operable from the outside of the burner tube for regulating the flow of pressure fluid, a spring pressed valve in the fuel chamber, the spring normally causing the valve to cut off the fuel supply to the burner tube and a by-pass connection between the fluid pressure chamber at the nozzle and the fuel chamber to admit pressure fluid to the fuel chamber.

In testimony whereof I have signed my name to this specification.

DAVID ROBERTSON BRUCE.