Jan. 16, 1968 F. M. EVANS 3,363,844

LIQUID FUEL INJECTION NOZZLE UNITS

Filed Jan. 13, 1966

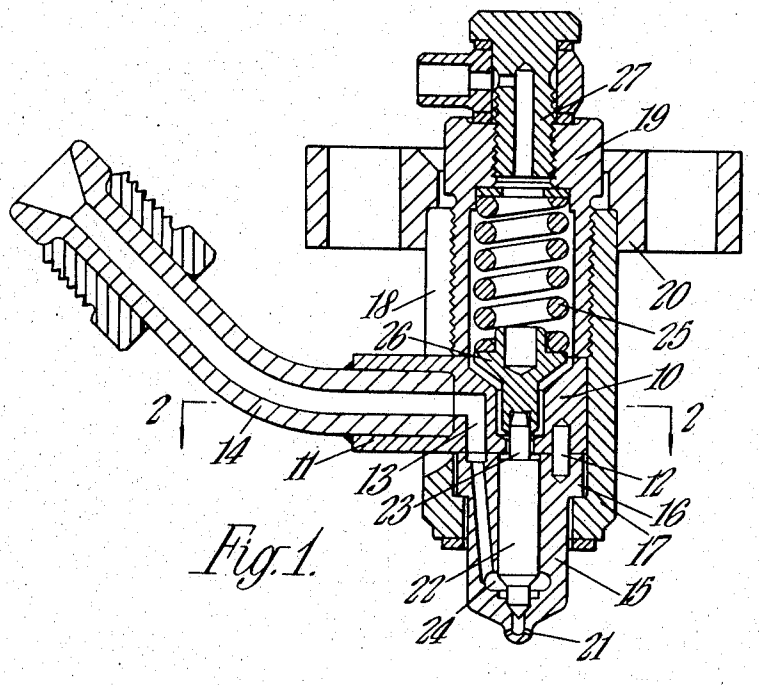


Fig. 1.

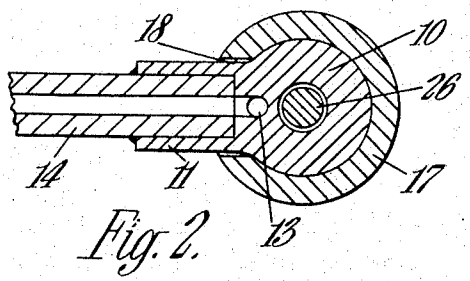


Fig. 2.

United States Patent Office 3,363,844 Patented Jan. 16, 1968

3,363,844

LIQUID FUEL INJECTION NOZZLE UNITS

Fraser Mackie Evans, Ickenham, Uxbridge, England, assignor to C.A.V. Limited, London, England

Filed Jan. 13, 1966, Ser. No. 520,515
4 Claims. (Cl. 239—533)

ABSTRACT OF THE DISCLOSURE

A fuel injection nozzle unit for internal combustion engines and comprising a cylindrical nozzle head having a flange at one end and a nozzle tip at the other end and a member having a laterally extending boss which defines a fuel inlet. The nozzle head and the member being located within a cup-shaped member which is screw-threaded to receive a complementarily screw-threaded cap member, the cup-shaped member having a longitudinal slit to accommodate said boss thereby to enable said member to be assembled within the cup-shaped member.

This invention relates to liquid fuel injection nozzle units for use with internal combustion engines and has for its object to provide such a nozzle unit in a simple and convenient form.

A nozzle unit in accordance with the invention comprises, in combination, a first member having one of its end faces formed to provide a sealing surface, a second member of generally tubular form, and having one end shaped for co-operation with said sealing surface to define a seal therebetween, the other end of said second member incorporating a nozzle tip in which is formed an orifice, a cup shaped member through an aperture in the base of which said second member extends, said second member having a peripheral flange for engagement with the base of said cup shaped member, a cap adapted for engagement with the cup shaped member to close the open end thereof said cap being arranged to bear on said first member so as to retain the members in sealing engagement with each other, passages in the first and second members through which fuel under pressure can be directed towards said orifice and valve means for controlling the flow of fuel through said orifice.

In the accompanying drawings:

FIGURE 1 is a sectional side elevation of one example of a nozzle in accordance with the invention and

FIGURE 2 is a sectional plan view on the line 2—2 of FIGURE 1.

Referring to the drawings there is provided a first member **10** of generally cylindrical form and provided with a boss **11** extending laterally with respect to the axis of the member. One end face of the first member is formed so as to constitute a first sealing surface and extending from this surface is a locating dowel **12** which is offset relative to the axis of the member. Furthermore the member is provided with a stepped bore and in the boss **11** is formed a passage **13** which extends so as to break out on the sealing surface at a position offset from the axis of the bore and diametrically opposite the dowel. Furthermore engaged with the boss is an inlet pipe **14** which in use, is connected to a fuel pump.

There is also provided a second member **15** which is of generally tubular form and which at one end is provided with a peripheral flange **16**. The surface at this end of the second member is formed so as to form a second sealing surface. Said one end of the second member is provided with a recess into which, the dowel **12** extends to locate the members in their correct relative angular position. For securing the two members together there is provided a cup shaped member **17** through an aperture in the base of which the second member extends so that the flange **16** bears against the base thereof. Furthermore the wall of the cup shaped member is formed with a slit **18** through which extends the aforesaid laterally extending boss **11**. The open end of the member **17** is closed by a hollow cap member **19**, this being in screw-thread engagement with the member **17**. When the cap member **19** is fully engaged with the cup member **17**, the rim of the cap member bears against the member **10** and the respective sealing surfaces of the first and second members are urged into contact with each other to form a fluid tight seal. Furthermore, a hoop **20** may be provided adjacent the open end of the cup shaped member to prevent excessive dilation of the cup member when the cap member is engaged therewith. As shown, the hoop **20** is provided with apertured lugs for the reception of screws whereby the nozzle unit may be secured to the cylinder head of an engine.

At the other end of the member **15** is located a nozzle tip in which is formed orifices **21** furthermore, the tip is formed with a valve seating against which is urged a conical valve closure member formed at the reduced end of a rod like needle **22** slideable within a bore in the member **15**.

A clearance is provided between the end of the needle **22** and the member **10** when the closure member is upon the seating and this end of the needle is provided with a cylindrical projection **23** which extends into the bore in the member **10**. Adjacent the end of the member **15** which is adjacent the seating there is defined an annular chamber **24** which is in communication with the passage **13** by way of a further passage formed in the member **15**.

Mounted within the cap member is a coiled compression spring **25** one end of which bears on a spring abutment **26** and the other end of which bears on a shoulder defined within the cap **19**. Moreover, the spring abutment is provided with an extension which extends partly through the bore in the first member and bears upon the projection **23** of the needle. Furthermore the interior of the cap **19** is vented to a low pressure through a pipe not shown which is connected by means of a union **27**.

In use, the unit is mounted so that the second member **15** extends through the cylinder head of the associated engine and the nozzle then extends into a combustion space of the engine. The operation of the device is well known in the art, when fuel under pressure is admitted to the chamber **24** fluid pressure acting on the needle **22** causes it to be moved against the action of the spring **25** and the valve closure member is moved away from the seating thereby allowing fuel to be discharged through the orifices **21** into the combustion space.

By a construction as described the manufacture of a nozzle unit is achieved in an extremely economical manner since the amount of material which has to be machined away is very small in comparison to previously known nozzle units in which the equivalent of the first member and a substantial portion of the second member are made from one piece of material.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A liquid fuel injection nozzle unit comprising in combination, a first member shaped to define a sealing surface, a second member of cylindrical form having one end shaped for co-operation with said sealing surface to define a seal therewith, a nozzle tip positioned at the other end of said second member, an orifice defined in said nozzle tip, passage means within said first and second members through which fuel under pressure can flow to said orifice, an integral boss extending laterally from said first member, a cup-shaped member through an aperture in the base wall of which said second member ex-

tends, a peripheral flange formed on said second member for engagement with said base wall, an axially extending slit formed in the side wall of said cup-shaped member, said slit extending from the free end of the side wall to adjacent said base wall, a cap extending within said cup-shaped member into contact with said first member and screw-thread means interconnecting the cap and the cup-shaped member whereby the first and second members can be urged into sealing engagement with each other.

2. A liquid fuel injection nozzle unit as set forth in claim 1 in which said screw-thread means comprises co-operating screw-threaded portions formed on the internal and external peripheries respectively of the cup-shaped member and the cap.

3. A liquid fuel injection nozzle unit as set forth in claim 2 including a hoop which is located about the cup-shaped member after the first and second members have been located therein, said hoop acting to minimise the

dilation of the cup-shaped member when the cap is engaged therewith.

4. A liquid fuel injection nozzle unit as set forth in claim 3 including apertured lugs formed integrally with said hoop, the apertures in said lugs being provided for the section of screws whereby the units may be secured to an engine.

References Cited

UNITED STATES PATENTS

2,375,492	5/1945	Purdy et al.	239—533
3,128,948	4/1964	De Luca	239—533

FOREIGN PATENTS

475,727	11/1952	Italy.

EVERETT W. KIRBY, *Primary Examiner.*