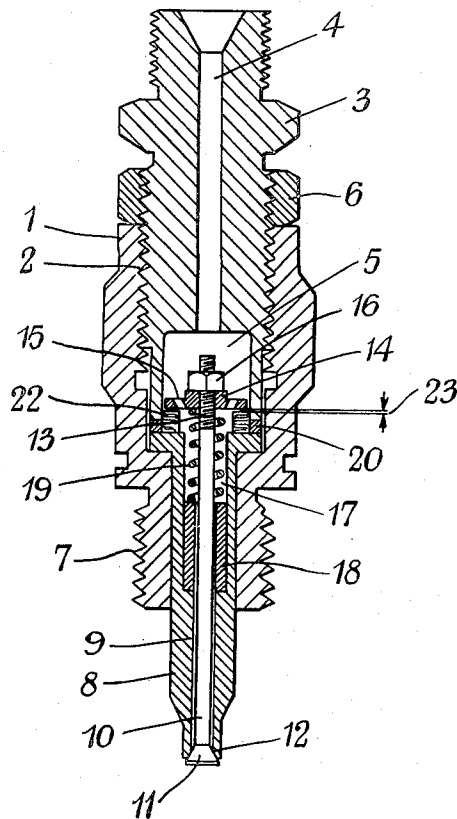


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FUEL INJECTION NOZZLES

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FUEL INJECTION NOZZLES

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This invention relates to fuel injection nozzles and aims at providing a fuel injection nozzle which will provide a satisfactory atomised fuel spray both at low and high fuel deliveries without entailing an excessively high operating pressure at maximum delivery.

The present invention aims at avoiding this drawback and at providing a fuel injection nozzle which operates within acceptable pressure limits both at low and at high delivery rates whilst at all times ensuring highly efficient fuel atomisation.

According to the present invention there is provided an injection nozzle for fluids, wherein a nozzle body has an inlet for the fluid to be injected and an outlet for the fluid, the inlet and outlet being in communication with a chamber in the body, and wherein a valve stem contained within the body carries at one end a valve adapted to seat within said outlet and at the other end an apertured disc contained within said chamber and normally separated from a washer of resilient material contained within said chamber but capable of engaging said washer when said valve is unseated, there being spring means urging said valve into its seated position, the arrangement being such that at low delivery rates of said fluid, the fluid flows into said chamber, through the apertures in said disc and unseats said valve against the action of said spring means so as to be injected, but that at high delivery rates the pressure of the fluid additionally causes said disc to engage the resilient washer whereby further unseating of the valve is governed by said washer and said spring means.

In order to enable the invention to be more readily understood, reference is made to the accompanying drawing which illustrates diagrammatically and by way of example, a longitudinal section through a fuel injection nozzle.

In said drawing, 1 denotes a nozzle body which is internally screw-threaded at 2 to receive an externally screw-threaded connector nipple 3, having an internal bore 4 terminating in a cylindrical chamber 5. The nipple connector 3 is held in position on the nozzle body 1 by a lock nut 6 and is sealed from leakage by a metal ring 20.

The nozzle body 1 is provided with a lower screw-threaded portion 7 adapted to be screwed into the fuel application orifice (not shown).

Located in the chamber 5 is a detachable valve housing 8 provided with an internal bore 9 through which passes a valve stem 10, carrying at its lower end in a valve 11 seating on a corresponding machined surface 12 within the outlet of the valve housing 8.

At its upper end the valve stem 10 is screw-threaded at 13 and passes through an internally screw-threaded metal disc 14 screwed on the valve stem 10 and having angularly drilled apertures 15 permitting fuel to pass into the space beneath the disc 14. The valve stem 10 is maintained in position on the disc 14 by a lock nut 16. The central bore in the valve housing 8 is counter-bored at 17 and is adapted to receive a distance sleeve 18 of

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steel or like non-compressible material and a helical spring 19 bearing at its lower end against the distance sleeve 18 and at its upper end against the underside of the disc 14.

Located in the bottom of the chamber 5 beneath the disc 14 is a ring 22 of synthetic rubber or like resilient material which is normally separated from the underside of the disc 14 by a small free space 23.

When the nozzle is operated at low delivery rates, fuel enters the chamber 5 through the inlet bore 4. The fuel then passes through the apertures 15 in the disc 14, into the counter-bored portion 17 of the valve housing 8 down to the valve seat 11.

The fuel pressure built up by the passage of the fuel to the valve seat 11 ultimately forces the valve 11 away from the valve seat 12 counter to the pressure of the helical spring 19, so that the fuel is injected, the free space 23, however, remaining open.

However, at high delivery rates the valve 11 is forced further away from its seat against the pressure of the helical spring 19, thereby causing the disc 14 to move downwards into engagement with the synthetic rubber or the like ring 22, and thus closing the free space 23. On encountering the rubber ring a change takes place between the upper surface area and the lower surface area of the disc 14, presented to the fuel and the fuel tends to press the disc 14 and with it, the valve 11, counter to the force of the helical spring 19, and the synthetic rubber ring 22, thereby ensuring a satisfactory delivery and atomisation of fuel at high delivery rates.

It will be seen that the properties of the nozzle illustrated are capable of adjustment within wide limits, for example, by altering the position of the lock nut 16 and the disc 14, by altering the characteristics of the spring 19, by replacing the distance sleeve 18 by one of different length by the interposition of shims between the distance sleeve 18 and the helical spring 19, and by altering the characteristics of synthetic rubber ring 22.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. An injection nozzle for fluids, wherein a nozzle body has an inlet for the fluid to be injected and an outlet for the fluid, the inlet and outlet being in communication with a chamber in the body, and wherein a valve stem contained within the body carries at one end a valve adapted to seat within said outlet and at the other end an apertured disc contained within said chamber and normally separated from a washer of resilient material contained within said chamber but capable of engaging said washer when said valve is unseated, there being spring means urging said valve into its seated position, the arrangement being such that at low delivery rates of said fluid, the fluid flows into said chamber, through the apertures in said disc and unseats said valve against the action of said spring means so as to be injected, but that at high delivery rates the pressure of the fluid additionally causes said disc to engage the resilient washer whereby further unseating of the valve is governed by said washer and said spring means.

2. A nozzle as claimed in claim 1, wherein said disc is adjustably mounted on said valve stem.

3. A nozzle as claimed in claim 1, wherein said spring means comprises a helical spring surrounding said valve stem in a recess in said body.

4. A nozzle as claimed in claim 3, wherein said spring rests on a replaceable distance sleeve in said recess.

5. A nozzle as claimed in claim 1, wherein the nozzle body is of multi-part construction.

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