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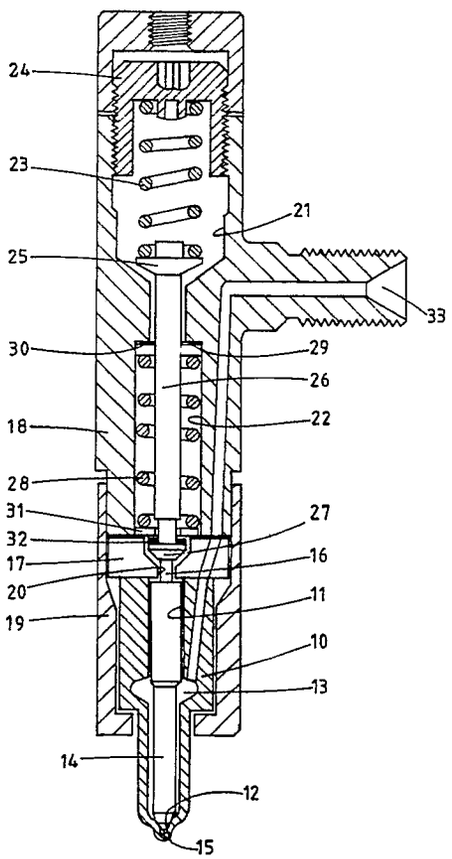
(54) Fuel injection nozzle.

(57) A fuel injection nozzle of the two stage lift type has a valve member 14 slidable in a bore in a body 10 which is secured to a nozzle holder 18 with a distance piece 17 located therebetween. A first spring 23 is located in a chamber in the holder and acts on the valve member through a push rod 26 and a flanged intermediate member 27, the latter being located in an aperture in the distance piece. An abutment plate 31 is biased against the end surface of the distance piece by a second spring 28 and is engaged by the flange of the intermediate member to define the first stage of lift. A shim 32 is located between the intermediate member 27 and the abutment plate 31 to adjust the extent of the first stage of lift.



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FUEL INJECTION NOZZLE

This invention relates to a fuel injection nozzle for supplying fuel to an internal combustion engine, the nozzle being of the kind comprising a nozzle body in which is mounted a fuel pressure actuated valve member which can co-operate with a seating to prevent the flow of fuel through an outlet orifice from a fuel inlet, a nozzle holder to which the nozzle body is secured with a spacer member interposed there-between, first and second spring chambers located in spaced end to end relationship within the nozzle holder, the first spring chamber being the one remote from the nozzle body, a first coiled compression spring in said first spring chamber said first spring acting on said valve member through a push rod extending through said second spring chamber, a second coiled compression spring located in said second spring chamber, means for limiting the initial movement of the valve member away from the seating to allow a restricted flow of fuel through the outlet orifice, the further movement of the valve member away from the seating to allow an increased flow of fuel through the outlet orifice taking place when the fuel pressure at the inlet has risen to a value sufficent to move the valve member against the action of both springs.

The object of the invention is to provide a fuel injection nozzle of the kind specified in a simple and convenient form.

According to the invention a fuel injection nozzle of the kind specified comprises a flanged intermediate member interposed between the valve member and the push rod, an abutment plate engaged by said second spring to urge the abutment plate into contact with the adjacent surface of said spacer member, said abutment plate being positioned in alignment with the flange of said intermediate member and shim means interposed between said flange and the abutment plate to determine said initial movement of the valve member away from the seating.

An example of a fuel injection nozzle in accordance with the invention will now be described with reference to the accompanying drawing which is a sectional side elevation of the nozzle.

Referring to the drawing the nozzle comprises a nozzle body 10 in which is defined a blind bore 11 at the blind end of which is formed a frusto conical seating 12. Intermediate the ends of the bore there is formed an enlargment 13 and slidable within the bore is a valve member 14 which at one end is shaped for co-operation with the seating 12 to prevent flow of fuel through an outlet orifice 15. Intermediate the enlargment 13 and the seating 12 the valve member is of reduced diameter to provide an annular clearance to allow fuel to flow from the enlargement 13 through the outlet orifice when the valve member is lifted from the seating. The valve member has a cylindrical extension 16 of reduced diameter which projects beyond the end of the nozzle body 10 through an aperture 20 formed in a spacer member 17 which is interposed between the nozzle body and a nozzle holder 18. The nozzle body and the spacer member are retained relative to the holder by means of a cap nut 19. The aperture 20 is smaller in diameter than the bore 11.

Formed in the nozzle holder are first and second spring chambers 21, 22. The chambers are disposed in spaced end to end relationship with the second spring chamber 22 being closer to the spacer member 17. Located in the first spring chamber is a first coiled compression spring 23 one end of which is in engagement with an adjustable abutment 24 which is in screw thread engagement with the wall of the chamber 21. The opposite end of the spring 23 engages with a spring abutment 25 which is formed integrally with a push rod 26 which exends through an opening between the spring chambers and through the second spring chamber where it is in engagement with a flanged intermediate member 27 mounted on the extension 16 of the valve member.

Within the second spring chamber is a second coiled compression spring 28 which at its end remote from the nozzle body bears against the base wall of the chamber 22 through the intermediary of a shim or shims 30. At its opposite end the spring 28 is in engagment with an abutment plate 31 which is urged by the spring into engagement with the adjacent surface of the spacer member 17. The abutment plate 31 extends inwardly to overhang the flange of the flanged intermediate member 27 and located intermediate the flange and the abutment plate is a shim or shims 32.

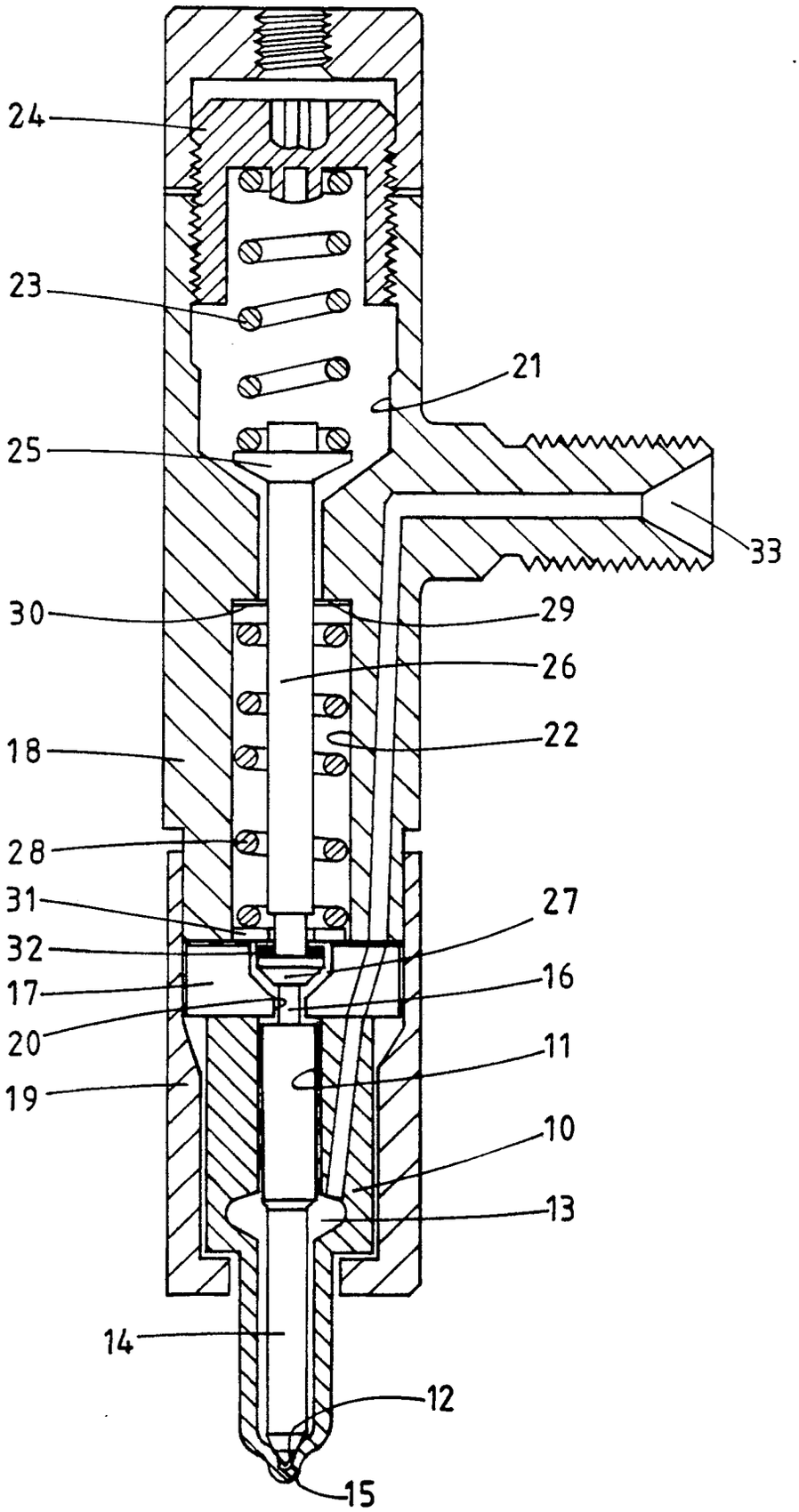
The aforesaid enlargement 13 is connected to a fuel inlet 33 formed in a lateral extension of the holder, by way of passages formed in the holder, the spacer member 17 and the nozzle body and in use the fuel inlet is connected to the outlet of a fuel injection pump. In operation, when fuel under pressure is supplied to the inlet 33 the fuel pressure acts on the valve member to develop a force tending to lift the valve member away from the seating. In the closed position of the valve member a gap exists between the abutment plate 31 and the shims 32 and the initial movement of the valve member against the action of the spring 23 takes up the aforesaid gap so that the shims 32 engage the abutment plate. The valve member is therefore

lifted a predetermined amount away from the seating and a restricted flow of fuel takes place through the outlet orifice 15. As the fuel pressure at the inlet increases, an increasing force is developed on the valve member which eventually moves against the action of both springs 23 and 28 to the fully open position of the valve member which is determined by the engagement of the end of the valve member with the spacer member 17. When the pressure at the fuel inlet falls, the valve member returns under the action of the springs to the closed position.

It is essential to be able to adjust the initial fuel pressure which is required to move the valve member away from the seating and this is effected by adjustment of the abutment member 24 or by the use of shims. The aforesaid gap is adjusted by varying the thickness of the shims 32 and the pressure which is required to effect the second stage of movement of the valve member is determined by adjusting the thickness of the shim 30. These adjustments can be carried out independantly of each other and furthermore, in service when it is required to replace the valve member and the nozzle body it is possible to supply these two components together with the spacer member 17, the intermediate member 27 and the shims 32, for fitment to an existing holder and then it is only necessary to check the pressure required to lift the valve member from the seating against the action of the spring 23. If adjustment of this pressure is required it is a simple matter to adjust the adjustment member 24 within the holder.

Claims

1. A fuel injection nozzle for supplying fuel to an internal combustion engine comprising a nozzle body (10) in which is mounted a fuel pressure actuated valve member (14) which can co-operate with a seating (12) to prevent flow of fuel through an outlet orifice (15) from a fuel inlet (33), a nozzle holder (18) to which the nozzle body (10) is secured with a spacer member (17) interposed therebetween, first and second spring chambers (21, 22) located in spaced end to end relationship within the nozzle holder, the first spring chamber (21) being the one remote from the nozzle body, a first coiled compression spring (23) in said first spring chamber (21) said first spring acting on said valve member (14) through a push rod (26) extending through said second spring chamber (22), a second coiled compression spring (28) located in said second spring chamber (22) and means for limiting the initial movement of the valve member (14) away from the seating (12) to allow a restricted flow of fuel through the outlet orifice (15), the further movement of the valve member away from the seating (12) to allow an increased flow of fuel through the outlet orifice taking place when the fuel pressure at the inlet has risen to a value sufficient to move the valve member against the action of both springs characterised by a flanged intermediate member (27) interposed between the valve member (14) and the push rod (26), an abutment plate (31) engaged by the second spring (28) to urge the abutment plate (31) into contact with the adjacent surface of the spacer member (17), said abutment plate (31) being positioned in alignment with the flange of said intermediate member (27) and shim means (32) interposed between said flange and the abutment plate (31) to determine the initial movement of the valve member away from the seating.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EUROPEAN SEARCH REPORT

Application number

EP 90305613.3

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int Cl.)
A	GB - A - 2 188 367 (R. BOSCH GMBH) * Totality; especially fig. 3 *	1	F 02 M 45/08
A	GB - A - 1 594 174 (R. BOSCH GMBH) * Totality *	1	

TECHNICAL FIELDS SEARCHED (Int Cl.)

F 02 M 45/00
F 02 M 61/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	14-09-1990	PIPPAN

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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