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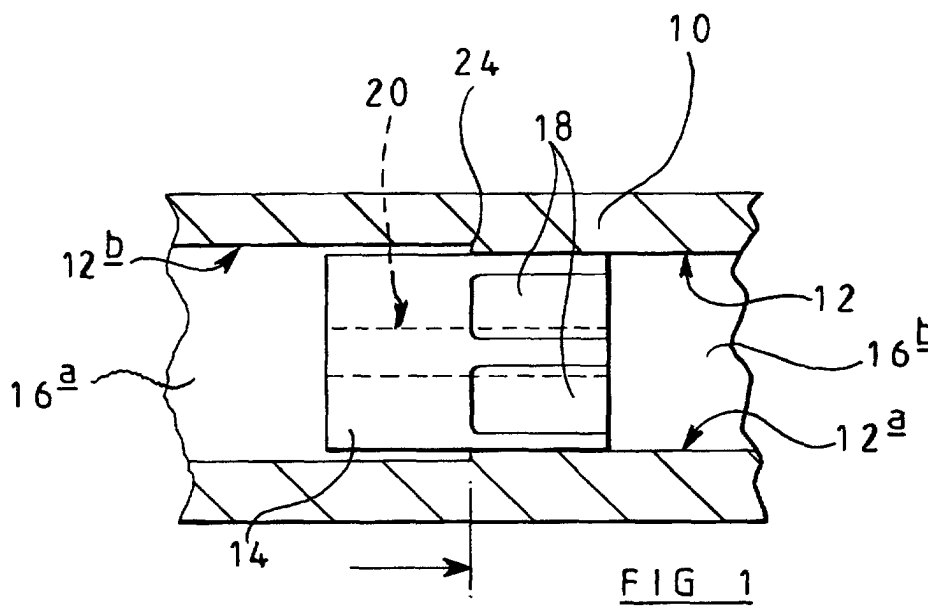
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(54) **Spring seat**

(57) The present invention provides a workpiece (10) having a blind bore (12) of stepped form defining a chamber (16a, 16b) within which a seating member (14) is arranged. A region of the seating member (14) is shaped to form an interference fit within a first part (12a) of the bore (12), the shaped region of the seating member (14) being provided with one or more relieved sec-

tions (18) to ease insertion of the seating member (14) into the bore (12) during assembly of the workpiece (10). Cooperation between the seating member (14) and the first part (12a) of the bore (12) serves to retain the seating member (14) in position within the bore (12).

The invention is particularly suited to being a nozzle holder body for a nozzle body of a fuel injector.





European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 00 31 1690

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.7)
X	US 5 301 874 A (VOGT DIETER ET AL) 12 April 1994 (1994-04-12) * the whole document *	1-3,5-11	F02M61/20 F02M45/08
	---		
X	US 5 165 656 A (ETZEL DIETER ET AL) 24 November 1992 (1992-11-24) * the whole document *	1-3,5-11	
	---		
A,D	EP 0 653 561 A (LUCAS IND PLC) 17 May 1995 (1995-05-17) * the whole document *	1-11	
	---		
A	DE 196 38 339 A (BOSCH GMBH ROBERT) 26 March 1998 (1998-03-26) * the whole document *	1-11	
	---		
A	EP 0 568 845 A (BOSCH GMBH ROBERT) 10 November 1993 (1993-11-10) * the whole document *	1-11	
	-----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			F02M
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 25 August 2003	Examiner Wagner, A
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 31 1690

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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25-08-2003

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5301874	A	12-04-1994	DE 4108665 A1	28-11-1991
			ES 2083306 A1	01-04-1996
			JP 4231672 A	20-08-1992
-----				
US 5165656	A	24-11-1992	DE 4109868 A1	01-10-1992
			GB 2254108 A ,B	30-09-1992
			JP 5087264 A	06-04-1993
-----				
EP 0653561	A	17-05-1995	DE 69412427 D1	17-09-1998
			DE 69412427 T2	18-02-1999
			EP 0653561 A1	17-05-1995
			ES 2119971 T3	16-10-1998
-----				
DE 19638339	A	26-03-1998	DE 19638339 A1	26-03-1998
			GB 2317419 A ,B	25-03-1998
			JP 10089197 A	07-04-1998
-----				
EP 0568845	A	10-11-1993	DE 9205975 U1	09-09-1993
			EP 0568845 A1	10-11-1993
			JP 6026417 A	01-02-1994
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