

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 404 357 A3

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 90305660.4

(51) Int. Cl.⁵: **F02M 51/08**, F02M 61/08,
F02M 67/12

(22) Date of filing: 24.05.90

(30) Priority: 21.06.89 US 369509

(43) Date of publication of application:
27.12.90 Bulletin 90/52(84) Designated Contracting States:
DE FR GB IT(88) Date of deferred publication of the search report:
13.03.91 Bulletin 91/11(71) Applicant: **GENERAL MOTORS CORPORATION**
General Motors Building 3044 West Grand
Boulevard
Detroit Michigan 48202(US)

(72) Inventor: **De Nagel, Stephen Francis**
29268 Roan Avenue
Warren, Michigan 48093(US)
Inventor: **Pawlak, Andrzej Marian**
4839 Gamber Drive
Troy, Michigan 48098(US)
Inventor: **Klomp, Edward Daniel**
36237 Acton,
Mount Clemens, Michigan 48043(US)

(74) Representative: **Haines, Arthur Donald et al**
Patent Section Vauxhall Motors Limited 1st
Floor Gideon House 26 Chapel Street
Luton, Bedfordshire LU1 2SE(GB)

(54) **Solenoid-actuate valve assembly.**

(57) A solenoid-actuated valve assembly (10) has first and second valve members (18,24), first and second valve seats (26,28), a solenoid coil (40), a first permanent magnet armature (32) effective, when the coil (40) is energized with a positive current, to permit displacement of the first valve member (18) from the first valve seat (28); and a second permanent magnet armature (44) effective, when the coil (40) is energized with a negative current, to displace the second valve member (24) from the second valve seat (26). The first armature (32) is further effective, when the coil (40) is energized with a negative current, to bias the first valve member (18) into engagement with the first valve seat (28), and said second armature (44) is further effective, when the coil (40) is energized with a positive current, to bias the second valve member (24) into engagement with the second valve seat (26).

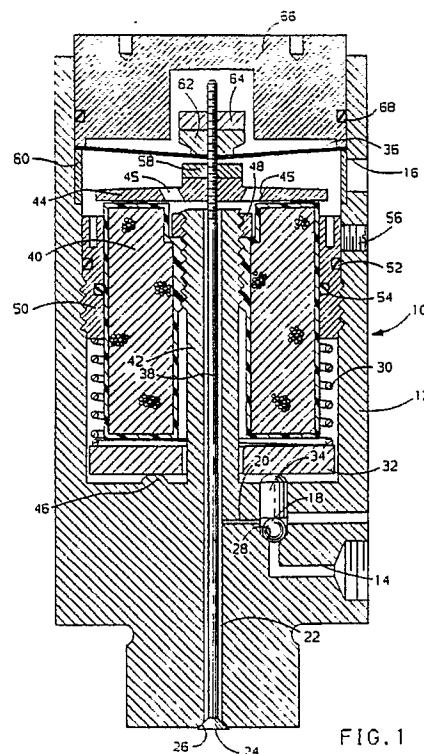


FIG. 1

EP 0 404 357 A3



European
Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 30 5660

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.5)														
X,Y	US-A-4 506 701 (MASAKI ET AL.) * column 2, line 54 - column 4, line 48; figure 1 * - - -	1,2	F 02 M 51/08 F 02 M 61/08 F 02 M 67/12														
Y	US-A-4 020 803 (THUREN ET AL.) * column 3, line 11 - column 4, line 28; figure 2 * - - -	2															
A	WO-A-8 500 854 (ORBITAL ENGINE COMPANY PROPRIETARY LIMITED) * page 6, line 21 - page 7, line 20 ** page 9, lines 29 - 37 @ page 12, line 33 - page 13, line 3; figures 1, 3, 4 * - - -	1,2															
A	US-A-4 387 696 (YOGO ET AL.) * column 2, line 31 - column 3, line 42; figure 2 * - - - - -	1,2															
The present search report has been drawn up for all claims																	
Place of search		Date of completion of search	Examiner														
The Hague		17 December 90	ALCONCHEL Y UNGRIA J														
<table border="0"><tr><td>CATEGORY OF CITED DOCUMENTS</td><td>E: earlier patent document, but published on, or after the filing date</td></tr><tr><td>X: particularly relevant if taken alone</td><td>D: document cited in the application</td></tr><tr><td>Y: particularly relevant if combined with another document of the same category</td><td>L: document cited for other reasons</td></tr><tr><td>A: technological background</td><td></td></tr><tr><td>O: non-written disclosure</td><td></td></tr><tr><td>P: intermediate document</td><td>&: member of the same patent family, corresponding document</td></tr><tr><td>T: theory or principle underlying the invention</td><td></td></tr></table>				CATEGORY OF CITED DOCUMENTS	E: earlier patent document, but published on, or after the filing date	X: particularly relevant if taken alone	D: document cited in the application	Y: particularly relevant if combined with another document of the same category	L: document cited for other reasons	A: technological background		O: non-written disclosure		P: intermediate document	&: member of the same patent family, corresponding document	T: theory or principle underlying the invention	
CATEGORY OF CITED DOCUMENTS	E: earlier patent document, but published on, or after the filing date																
X: particularly relevant if taken alone	D: document cited in the application																
Y: particularly relevant if combined with another document of the same category	L: document cited for other reasons																
A: technological background																	
O: non-written disclosure																	
P: intermediate document	&: member of the same patent family, corresponding document																
T: theory or principle underlying the invention																	