



Europäisches Patentamt

European Patent Office

Office européen des brevets

⑪ Publication number:

0 234 006
A3

12 EUROPEAN PATENT APPLICATION

② Application number: 86116392.1

⑤1 Int. Cl.⁴: F04B 1/16, F04B 13/00

22 Date of filing: 26.11.86

③ Priority: 26.12.85 US 813750

(43) Date of publication of application:
02.09.87 Bulletin 87/36

⑧4 Designated Contracting States:
DE ES FR GB IT

⑧ Date of deferred publication of the search report:
07.01.88 Bulletin 88/01

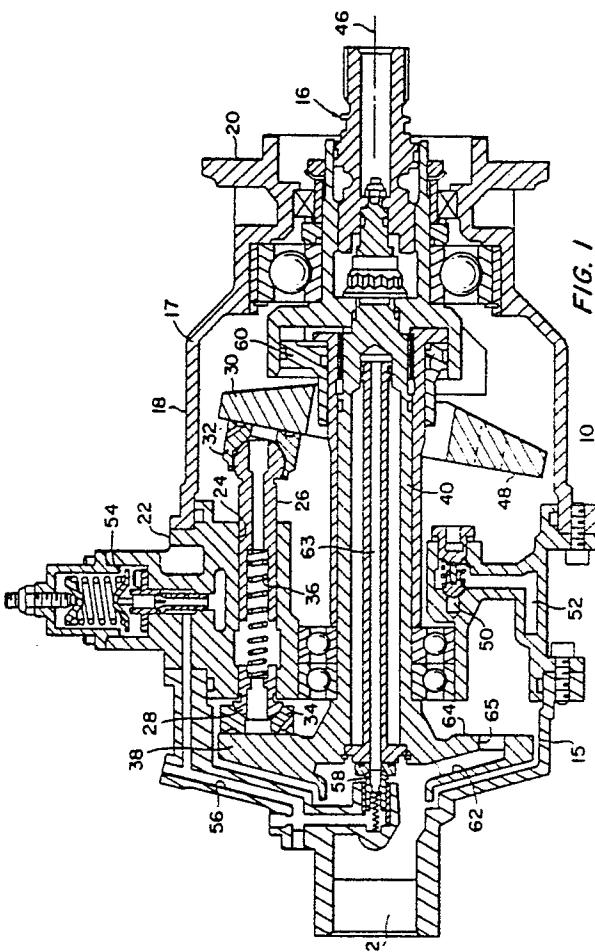
(7) Applicant: **ALLIED CORPORATION**
Columbia Road and Park Avenue P.O. Box
2245R (Law Dept.)
Morristown New Jersey 07960(US)

(72) Inventor: **Woodruff, Frank**
c/o Allied Corporation P.O. Box 2245R
Morrisstown, NJ 07960(US)

74 Representative: Brullé, Jean et al
Service Brevets Bendix 44, rue François 1er
F-75008 Paris(FR)

54 Variable displacement high pressure pump.

57 A variable displacement piston pump (10) including a plurality of axially aligned pumping cylinders (24) with a driven drive shaft (16) extending there between having a tiltable swash plate (30) disposed on one end of the drive shaft (16) for operating the pumping cylinders, and a reaction thrust plate (38) on the other end of the drive shaft (16), for providing reaction force in the drive shaft (16) opposite that provided by the swash plate (30). The pumping cylinders (24) feed a common manifold (52). A check valve (50) is disposed between each cylinder (24) and the common manifold (52) to ensure one way flow. Check valve (50) between cylinders (24) and the common manifold (52) also reduces pressure pulsations during pumping. The thrust plate (38) is formed with a centrifugal impeller opening (62) formed therein through which incoming fluid flows and its pressure is increased. A dummy piston (28) is provided in each cylinder (24) opposite the active pumping piston (26). The active piston (26) and the dummy piston (34) each include an opening there through which is exposed during an intake stroke so that fluid is admitted into both ends of the cylinder (24). After the intake stroke, the openings in both pistons (26, 28) are sealed and pumping action occurs.





DOCUMENTS CONSIDERED TO BE RELEVANT			EP 86116392.1
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	DE - A - 1 703 594 (SHIMADZU)	4,5	F 04 B 1/14
Y	* Totality; especially fig. 1,2,3 *	1,2,6, 7,11, 13	F 04 B 1/28
A	---	1-17	F 04 B 1/16 F 04 B 13/00
Y	DE - B - 1 095 668 (FAIREY AVIATION)	1,2,6	
A	* Totality; especially fig. 1; pos. no. 11 *	6,7,8, 9,11	

Y	DE - A - 2 114 841 (DELAVAN)	7,11, 13	
	* Totality *		
A	---	1-3,8- 10,12, 14-17	
A	US - A - 2 365 309 (TALBOT)	2,6,9	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
	* Totality *		F 01 B 3/00
	---		F 04 B 1/00
D,A	US - A - 4 182 365 (WOODRUFF)	11	F 04 B 13/00
	* Totality *		F 04 B 49/00
	-----		F 16 K 31/00
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
VIENNA	22-10-1987	WERDECKER	
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention	
X : particularly relevant if taken alone		E : earlier patent document, but published on, or after the filing date	
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O : non-written disclosure		& : member of the same patent family, corresponding document	
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