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(54) Displacement control valve for use in a variable displacement compressor

(57) A valve for controlling a displacement volume of a compressor having a suction chamber, a discharge chamber, and a crank chamber, has a communication passage communicating between the crank chamber and the discharge chamber and a valve member projecting in the communication passage for controlling an opening degree of the communication passage, the valve member directly receiving a gas pressure of the crank chamber at its projecting end. The valve has a first driving member sensing a difference between the gas pressure between the crank chamber and the suction chamber to drive the valve member to opening of the communication passage, and a second driving member sensing a pressure difference between gas pressures of the discharge chamber and the crank chamber to drive the valve member to closing of the communication passage. In order to cancel the crank chamber gas pressure directly applied onto the valve member, the valve has a pressure room communicating with the communication passage for being introduced with the pressure of the crank chamber. The valve member has an opposite end projecting in the pressure room. The second driving member has a sensing rod which has an end subjected to the discharge chamber gas pressure and an opposite end exposed in the pressure room. The sensing rod pushes the valve member by a force corresponding to a pressure difference between the crank chamber and the discharge chamber.

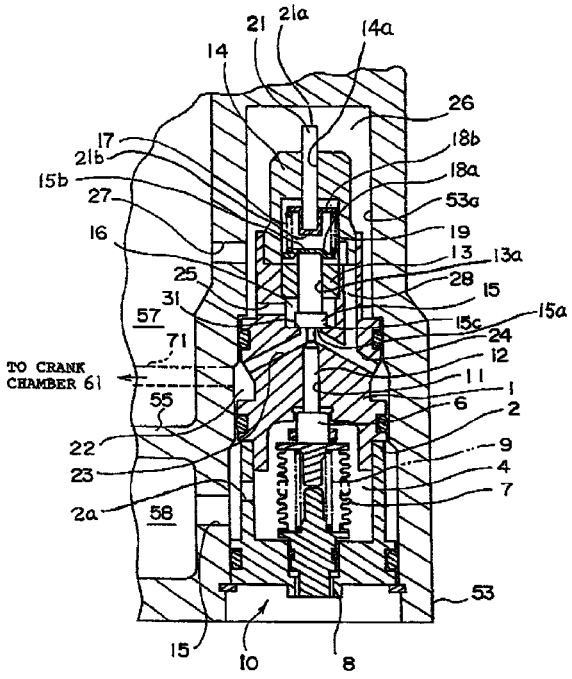

FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 99 11 1736

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.6)
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X	DE 197 16 089 A (TOYODA AUTOMATIC LOOM WORKS) 6 November 1997 (1997-11-06) * column 7, line 54 - line 64; figure 2 *	1	
A	EP 0 498 552 A (SANDEN CORP) 12 August 1992 (1992-08-12) * column 14, line 9 - column 23, line 49; figures 3,4 *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.6) F04B
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~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
THE HAGUE	20 September 1999	Ingelbrecht, P

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
O : non-written disclosure
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D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-9

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-9

   Displacement control valve with a valve member having two surfaces opposite to each other both in contact with crankcase pressure assuring movement of the valve member independant of the crankcase pressure

2. Claim : 10

   Displacement control valve having a first driving member sensing a difference between suction and crank case pressure, and having a second driving member sensing a pressure difference between discharge and crank case pressure; said first driving member driving the valve member to open communication between crankcase and discharge chambers; said second driving member driving the valve member for closing this communication.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 99 11 1736

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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20-09-1999

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82