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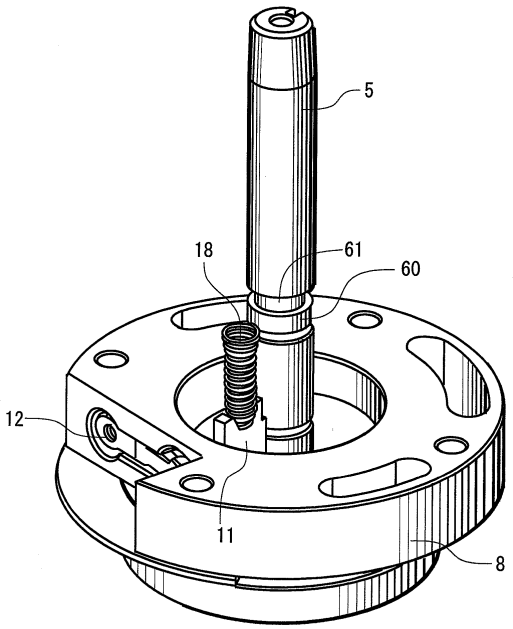
## (54) Compressor

(57) A vane compressor comprising: a compression element comprising a cylinder in which a compression space is constituted; a suction port and a discharge port which communicate with the compression space in the cylinder; a support member which closes an opening of the cylinder; a rotary shaft which is rotatably supported by a main bearing as a bearing formed on the support member; a compression member whose one surface crossing an axial direction of the rotary shaft is inclined continuously between a top dead center and a bottom dead center and which is disposed in the cylinder to be rotated by the rotary shaft and which compresses a fluid sucked from the suction port to discharge the fluid via the discharge port; a vane which is disposed between the suction port and the discharge port to abut on one surface of the compression member and which partitions the compression space in the cylinder into a low pressure chamber and a high pressure chamber; and a shaft seal which is disposed on an end portion of the bearing (main bearing) on a side opposite to the compression member and which abuts on the rotary shaft.

FIG. 20

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# EUROPEAN SEARCH REPORT

Application Number
EP 05 10 8214

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| X | US 5 980 225 A (SOMMER MANFRED [DE])<br>9 November 1999 (1999-11-09)<br>* column 9, line 60 - column 10, line 23; figures 1,3 *<br>----- | 1-3,5,6,8 | INV.<br>F04C18/356<br>F04C23/00<br>F04C27/00 |
| X | DE 40 34 280 A1 (SCLADAN GEORG [DE])<br>30 April 1992 (1992-04-30)<br>* abstract; figure 1 *<br>----- | 1-3,5,6,8 | |
| X | JP 57 059091 A (TAMADA OKIMOTO)<br>9 April 1982 (1982-04-09)<br>* abstract; figure 10 *<br>----- | 1-3,5-8 | |
| X | JP 51 009925 B (.)<br>31 March 1976 (1976-03-31)<br>* abstract; figure 1 *<br>----- | 1-3,5-8 | |
| X | EP 0 412 634 A2 (MITSUBISHI ELECTRIC CORP [JP]) 13 February 1991 (1991-02-13)<br>* abstract; figures 1,2,4,5,6 *<br>----- | 5-8 | |
| X | GB 2 394 007 A (COMPAIR UK LTD [GB])<br>14 April 2004 (2004-04-14)<br>* abstract; figure 3a *<br>----- | 5,6,8,9 | TECHNICAL FIELDS SEARCHED (IPC)<br>F04C |

~~The present search report has been drawn up for all claims~~

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Munich | 23 September 2011 | Alquezar Getan, M |

CATEGORY OF CITED DOCUMENTS

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

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
.....
& : member of the same patent family, corresponding document

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Application Number
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## CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due 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 those claims for which no payment was due.

## 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:

"see additional sheet(s)"

☐ The present supplementary 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 (Rule 164 (1) EPC).

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## LACK OF UNITY OF INVENTION
## SHEET B

Application Number
EP 05 10 8214

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: 1-3, 5-9

   Relating to a rotary compressor provided with a sealing element in the support member. The techical effect can be considered to prevent leakage from the compression chamber in a rotary compressor.

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2. claims: 4, 10-12

   Relating to a swash plate type compressor provided with a selected pressure on the other surface side. The technical effect can be considered to reduce a force by which the compression member is pushed.

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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 10 8214

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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23-09-2011

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| US 5980225 A | 09-11-1999 | DE 19728498 A1 | 08-01-1998 |
| | | FR 2750744 A1 | 09-01-1998 |
| | | GB 2315099 A | 21-01-1998 |
| | | IT TO970588 A1 | 05-01-1998 |
| | | JP 10082396 A | 31-03-1998 |
| | | US 5980225 A | 09-11-1999 |
| DE 4034280 A1 | 30-04-1992 | NONE | |
| JP 57059091 A | 09-04-1982 | NONE | |
| JP 51009925 B | 31-03-1976 | NONE | |
| EP 0412634 A2 | 13-02-1991 | DE 69005230 D1 | 27-01-1994 |
| | | DE 69005230 T2 | 07-07-1994 |
| | | EP 0412634 A2 | 13-02-1991 |
| | | JP 2060993 C | 10-06-1996 |
| | | JP 3070891 A | 26-03-1991 |
| | | JP 7026624 B | 29-03-1995 |
| | | US 5022836 A | 11-06-1991 |
| GB 2394007 A | 14-04-2004 | AU 2003269237 A1 | 04-05-2004 |
| | | GB 2394007 A | 14-04-2004 |
| | | WO 2004033915 A1 | 22-04-2004 |

EPO FORM P0459

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