(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 806 475 A1

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
11.07.2007 Bulletin 2007/28

(21) Application number: **06008115.5**

(22) Date of filing: **19.04.2006**

(51) Int Cl.:
F01C 21/08 *(2006.01)*
F04C 23/00 *(2006.01)*
F04C 28/06 *(2006.01)*
F04C 18/356 *(2006.01)*
F04C 29/02 *(2006.01)*

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **09.01.2006 KR 20060002276**

(71) Applicant: **Samsung Electronics Co., Ltd.**
Yeongtong-gu
Suwon-city, Gyeonggi-do 442-742 (KR)

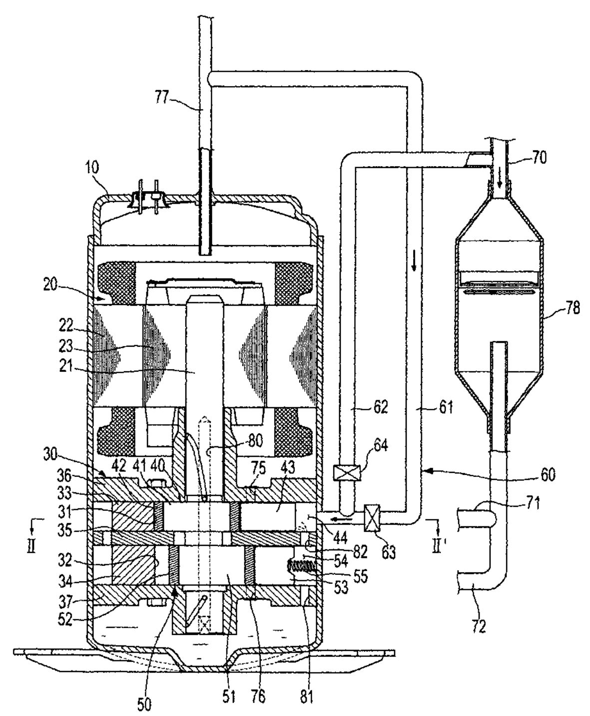
(72) Inventors:
- **Lee, In Ju**
  Jookjeon-1-Dong Yongin-Si, Gyeonggi-Do (KR)
- **Cho, Sung Hea**
  Gooseong-Eub, Yongin-Si, Gyeonggi-Do (KR)
- **Lee, Moon Joo**
  Gwonseon-Gu, Suwon-Si, Gyeonggi-Do (KR)
- **Lee, Jeong Bae**
  Taean-Eub, Hwaseong-Si, Gyeonggi-Do, (KR)
- **Choi, Ji Hoon**
  Yeongtong-Gu, Suwon-Si, Gyeonggi-Do (KR)
- **Han, Kyung Jun**
  Dongchoon-Dong, Yeonsoo-Gu, Incheon-City (KR)
- **Choi, Jin Kyu**
  Yeongton-Gu, Suwon-Si, Gyeonggi-Do (KR)

(74) Representative: **Grünecker, Kinkeldey,**
Stockmair & Schwanhäusser
Anwaltssozietät
Maximilianstrasse 58
80538 München (DE)

(54) Rotary compressor

(57) A rotary compressor for achieving efficient supply of oil into a gap between a vane and a vane groove. The rotary compressor also has a function of closing an oil supply path communicating with the vane groove when the operation of the vane stops for the sake of a variation in compression capacity. The rotary compressor includes at least one compression chamber, a vane to perform forward and rearward movements in a radial direction of the compression chamber, a vane groove to receive the vane and guide the forward and rearward movements of the vane, and an oil supply path communicating with a rear location of the vane groove. The oil supply path is opened when the vane moves forward to the compression chamber, and is closed by the vane when the vane moves rearward.

Fig.1



EP 1 806 475 A1

Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of Korean Patent Application No. 2006-2276, filed on January 9, 2006 in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The present invention relates to a rotary compressor, and, more particularly, to a rotary compressor in which oil can be supplied to a vane groove in which a vane is installed.

2. Description of the Related Art

[0003] As one example of the prior art, Japanese Patent Publication No. 2003-269352 discloses a multi-stage rotary compressor having an oil supply path for supplying oil to a vane groove that is provided to guide forward and rearward movements of a vane. The oil supply path of the disclosed rotary compressor is configured to communicate an outer surface of a cylinder with a portion of an inner surface of the vane groove. When the vane performs forward and rearward movements, oil is supplied into the vane groove through the oil supply path, ensuring efficient lubrication between an outer surface of the vane and the inner surface of the vane groove and achieving air-tightness in gap.

[0004] However, due to the fact that the oil supply path communicates with only a portion of the inner surface of the vane groove, the above described rotary compressor has a difficulty to achieve uniform supply of oil throughout the inner surface of the vane.

[0005] As another example of the prior art, Korean Patent Publication No. 10-2005-0062218 discloses a variable rotary compressor in which a plurality of vanes are installed in a plurality of compression chambers, respectively, such that one of the vanes is selectively restricted to achieve a variation in compression capacity. However, when oil is supplied to the restricted one of the vanes, the oil may be unintentionally introduced to the relevant compression chamber, in which idling rotation is performed, through a gap between the restricted vane and the vane groove. This has a bad effect on operation of the compressor, for example, an increase in drive load. Accordingly, when any vane is restricted, it is necessary to intercept the supply of oil to the restricted vane.

SUMMARY OF THE INVENTION

[0006] Therefore, the present invention has been made in order to solve the above problems, and it is an aspect of the invention to provide a rotary compressor capable of achieving smooth supply of oil through a gap between a vane and a vane groove.

[0007] It is another aspect of the invention to provide a rotary compressor capable of intercepting the supply of oil to a vane groove when a vane stops operation to achieve a variation in compression capacity.

[0008] In accordance with one aspect, the present invention provides a rotary compressor including at least one compression chamber, a vane to perform forward and rearward movements in a radial direction of the compression chamber, and a vane groove to receive the vane and guide the forward and rearward movements of the vane, wherein the rotary compressor further includes an oil supply path communicating with a rear location of the vane groove, and the oil supply path is opened when the vane moves forward to the compression chamber, and is closed by the vane when the vane moves rearward.

[0009] The rotary compressor may further include a vane control device to restrict or release the vane for the control of compression capacity.

[0010] The vane control device may include: a low-pressure pipe to apply suction pressure to the rear location of the vane groove; a high-pressure pipe to apply discharge pressure to the rear location of the vane groove; and a pair of opening/closing valves to selectively open and close the low-pressure and high-pressure pipes, respectively.

[0011] The opening/closing valves may include a low-pressure opening/closing valve to open and close the low-pressure pipe, and a high-pressure opening/closing valve to open and close the high-pressure pipe.

[0012] In accordance with another aspect, the present invention provides a rotary compressor including a hermetic container in which oil is received, and a compression device installed in the hermetic container, the compression device including first and second compression chambers separated from each other, first and second vanes to perform forward and rearward movements in a radial direction of the first and second compression chambers, respectively, and first and second vane grooves to receive the first and second vanes and guide the forward and rearward movements of the first and second vanes, respectively, wherein the rotary compressor further includes: a vane control device to control the forward and rearward movements of the first vane for achieving a variation in compression capacity; and an oil supply path communicating with a rear location of the first vane groove.

[0013] The oil supply path may be opened when the first vane moves forward to the first compression chamber, and is closed by the first vane when the first vane moves rearward.

[0014] The compressor may further include an intermediate plate to separate the first compression chamber from the second compression chamber, and the oil supply path may be formed through the intermediate plate to communicate the rear location of the first vane groove with the second vane groove, and a rear location of the second vane groove communicates with the interior of the hermetic container

[0015] The first compression chamber and the first vane groove may be located above the second compression chamber and the second vane groove, respectively.

[0016] The vane control device may include: a low-pressure pipe to apply suction pressure to the rear location of the first vane groove; a high-pressure pipe to apply discharge pressure to the rear location of the first vane groove; and a pair of opening/closing valves to selectively open and close the low-pressure and high-pressure pipes, respectively.

[0017] The oil supply path may include an oil supply pipe to connect a lower region of the hermetic container to a portion of the high-pressure pipe upstream of the high-pressure opening/closing valve.

[0018] Additional aspects and/or advantages of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] These and/or other aspects and advantages of the invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings, of which:

FIG. 1 is a sectional view showing the configuration of a rotary compressor according to a first embodiment of the present invention, in a state wherein compression operation is performed in a first compression chamber;

FIG. 2 is a cross sectional view taken along the line II-II' of FIG. 1;

FIG. 3 is a sectional view of the rotary compressor according to the first embodiment of the present invention, in a state wherein idling rotation is performed in the first compression chamber;

FIG. 4 is a cross sectional view taken along the line IV-IV' of FIG. 3;

FIG. 5 is a sectional view showing an oil flow path of the rotary compressor according to a second embodiment of the present invention, in a state wherein compression operation is performed in the first compression chamber; and

FIG. 6 is a sectional view showing the oil flow path of the rotary compressor according to the second embodiment of the present invention, in a state wherein idling rotation is performed in the first compression chamber.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0020] Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. The embodiments are described below to explain the present invention by referring to the figures.

[0021] FIGS. 1 to 4 illustrate a rotary compressor in accordance with a first embodiment of the present invention. As shown in FIG. 1, the rotary compressor in accordance with the first embodiment of the present invention comprises an electric motor device 20 mounted in an upper location of a hermetic container 10, and a compression device 30 mounted in a lower location of the hermetic container 10 and connected to the electric motor device 20 via a rotary shaft 21.

[0022] The electric motor device 20 includes a cylindrical stator 22 fixed to an inner surface of the hermetic container 10, and a rotor 23 rotatably inserted in the stator 22 and coupled, through a central portion thereof, to the rotary shaft 21. If electric power is applied to the electric motor device 20, the rotor 23 of the electric motor device 20 is rotated and acts to rotate the rotary shaft 21, bring about operation of the compression device 30.

[0023] The compression device 30 includes a housing having an upper first compression chamber 31 and a lower second compression chamber 32, which are separated from each other. The compression device 30 further includes a pair of first and second compression units 40 and 50 provided in the first and second compression chambers 31 and 32, respectively, and adapted to be operated in accordance with rotation of the rotary shaft 21.

[0024] The housing of the compression device 30 includes an upper first body 33 that internally defines the first compression chamber 31, a lower second body 34 that internally defines the second compression chamber 32, an intermediate plate 35 interposed between the first and second bodies 33 and 34 to separate the first compression chamber 31 from the second compression chamber 32, and first and second flanges 36 and 37 coupled to an upper end of the first body 33 and a lower end of the second body 34, respectively, to close an upper opening of the first compression chamber 31 and a lower opening of the second compression chamber 32. The first and second flanges 36 and 37 also serve to support the rotary shaft 21. The rotary shaft 21 penetrates through the center of the first and second compression chambers 31 and 32, so as to operate the compression units 40 and 50 inside the first and second compression chambers 31 and 32.

[0025] The first compression unit 40 includes a first eccentric portion 41 provided around an outer surface of the rotary shaft 21 in the first compression chamber 31, and a first roller 42 rotatably coupled to an outer circumference of the first eccentric portion 41 to rotate in partial contact with an inner surface of the first compression chamber 31. Similarly, the second compression unit 50 includes a second eccentric portion 51 provided around the outer surface of the rotary shaft 21 in the second compression chamber 32, and a second roller 52 rotatably coupled to an outer circumference of the second eccentric portion 51 to rotate in partial contact with an inner surface of the second compression chamber 32. The first eccentric portion 41 and the second eccentric portion 51, provided around the outer surface of the rotary shaft 21, are adapted to eccentrically rotate in opposite directions from each other, to maintain balance therebewteen.

[0026] The first and second compression units 40 and 50 further include first and second vanes 43 and 53, respectively. The first and second vanes 43 and 53 serve to divide the relevant first and second compression chambers 31 and 32 as they perform forward and rearward movements in a radial direction of the first and second compression chambers 31 and 32, respectively. As shown in FIGS. 1 and 2, the first and second vanes 43 and 53 are received in first and second vane grooves 44 and 54 such that their forward and rearward movements are guided by the first and second vane grooves 44 and 54. The first and second vane grooves 44 and 54 have an elongated shape extending in a radial direction of the first and second compression chambers 31 and 32. Also, a vane spring 55 is installed in the second vane groove 54 to pressure the second vane 53 toward the second roller 52, thereby allowing the second vane 53 to divide the second compression chamber 32.

[0027] The first vane groove 44 is connected to a vane control device 60. The vane control device 60 serves to apply suction pressure into the first vane groove 44 for restricting the first vane 43, or to apply discharge pressure into the first vane groove 44 for allowing forward and rearward movements of the first vane 43. By restricting or releasing the first vane 43 in the above manner, the vane control device 60 brings about compression operation or idling rotation in the first compression chamber 31, in order to achieve a variation in compression capacity. The detailed configuration and operation of the vane control device 60 will be explained hereinafter.

[0028] Meanwhile, the first compression chamber 31 includes a suction hole 73 connected to a suction pipe 71 to introduce gas thereinto, and a discharge hole 75 to discharge the gas, which is compressed in the first compression chamber 31, into the hermetic container 10. Similarly, the second compression chamber 32 includes a suction hole 73 connected to a suction pipe 72 to introduce gas thereinto, and a discharge hole 76 to discharge the gas, which is compressed in the second compression chamber 32, into the hermetic container 10. Accordingly, in operation of the compressor, the interior of the hermetic container 10 is kept in a high pressure state by the compressed gas discharged through the discharge holes 75 and 76. Then, the compressed gas inside the hermetic container 10 is guided to the outside through a discharge pipe 77 that is located on the top of the hermetic container 10. The gas to be sucked is adapted to pass through an accumulator 78, prior to being guided to the suction holes 73 of the compression chambers 31 and 32 through the suction pipes 71 and 72.

[0029] As shown in FIG. 1, the vane control device 60, which serves to control the operation of the first vane 43, includes a high-pressure pipe 61 to connect the discharge pipe 77 to a rear location of the first vane groove 44 for applying discharge pressure to the rear location of the first vane groove 44, a low-pressure pipe 62 to connect a suction pipe 70 to the rear location of the first vane groove 44 for applying suction pressure to the rear location of the first vane groove 44, a high-pressure opening/closing valve 63 to open and close the high-pressure pipe 61, and a low-pressure opening/closing valve 64 to open and close the low-pressure pipe 62. When the high-pressure opening/closing valve 63 is opened and the low-pressure opening/closing valve 64 is closed, the discharge pressure is applied to the rear location of the first vane groove 44. Also, when the high-pressure opening/ closing valve 63 is closed and the low-pressure opening/ closing valve 64 is opened, the suction pressure is applied to the rear location of the first vane groove 44. Accordingly, when the discharge pressure is applied to the rear location of the first vane groove 44, the first vane 43 is pushed to the first compression chamber 31 by the discharge pressure, thereby performing forward and rearward movements in accordance with eccentric rotation of the first roller 42. When the suction pressure is applied to the first vane groove 44, the first vane 43 stops in a rearwardly moved state, thereby causing idling rotation to be performed in the first compression chamber 31.

[0030] As stated above, the vane control device 60 allows compression operation or idling rotation to be selectively performed in the first compression chamber 31 by controlling the forward and rearward movements of the first vane 43, thereby achieving a variation in compression capacity. Specifically, if the compressor is operated in a state wherein the high-pressure opening/closing valve 63 is opened and the low-pressure opening/ closing valve 64 is closed, as shown in FIGS. 1 and 2, the first vane 43 is pushed to the first compression chamber 31 by the discharge pressure that acts on the first vane groove 44, resulting in the forward and rearward movements of the first vane 43. Accordingly, in this case, the compression operation is performed in both the first and second compression chambers 31 and 32, achieving a high compression capacity.

[0031] Conversely, if the compressor is operated in a state wherein the high-pressure opening/closing valve 63 is closed and the low-pressure opening/closing valve 64 is opened, as shown in FIGS. 3 and 4, the first vane 43 moves rearwardly by the suction pressure that acts on the first vane groove 44, and is kept in a stationary state. Accordingly, in this case, the idling rotation is performed in the first compression chamber 31 and the compression operation is performed only in the second compression chamber 32, resulting in a reduction in compression capacity.

[0032] In the rotary compressor in accordance with the present invention, oil is stored in a lower region of the hermetic container 10, to be supplied to frictional portions and gaps requiring air-tightness. If the rotary shaft 21 is rotated, the oil is supplied, through an oil supply path 80 defined in the rotary shaft 21, to frictional portions on the outer surface of the rotary shaft 21 and to the rollers 42 and 52 inside the compression chambers 31 and 32, thereby performing lubrication and air-tightness maintenance functions.

[0033] The second flange 37, which is provided at a lower end of the second vane groove 54, is formed with an oil supply path 81 to introduce the oil to a rear location of the second vane groove 54. Also, the intermediate plate 35 is formed with an oil supply path 82 at a position between the rear location of the first vane groove 44 and the rear location of the second vane groove 54, to allow the oil in the second vane groove 54 to be introduced into the first vane groove 44. When the oil is supplied to the rear locations of the first and second vane grooves 44 and 54 through the oil supply paths 81 and 82, the oil flows in gaps between the forwardly and rearwardly moving first and second vanes 43 and 53 and the first and second vane grooves 44 and 54, so as to achieve lubrication and air-tightness thereat. In particular, supplying the oil through the oil supply paths 81 and 82 located at the rear locations of the first and second vane grooves 44 and 54 has the effect of enabling uniform supply of the oil into the gaps between the vanes 43 and 53 and the vane grooves 44 and 54.

[0034] Preferably, the oil is filled in the hermetic container 10 to the same height as that of the intermediate plate 35. If the height of the oil is higher than the intermediate plate 35, and thus, a great amount of oil is introduced to the rear location of the first vane groove 44, it may have a negative effect on the control of the first vane 43. Also, if the height of the oil is lower than the intermediate plate 35, it may result in inefficient supply of oil into the first vane groove 44.

[0035] Hereinafter, a process for supplying oil into the first vane groove 44 during the operation of the rotary compressor will be explained.

[0036] When compression operation is performed in the first compression chamber 31 (i.e. the high-pressure opening/closing valve 63 is opened and the low-pressure opening/closing valve 64 is closed), as shown in FIG. 1, the first vane 43 performs forward and rearward movements, causing a pressure variation in the rear location of the first vane groove 44. With the pressure variation, the oil is able to be introduced to the rear location of the first vane groove 44 through the oil supply path 82 of the intermediate plate 35. Specifically, the pressure variation generates pumping phenomenon for the introduction of oil. When the first vane 43 performs forward and rearward movements, the second vane 53 also performs forward and rearward movements, and therefore, allows the flow of oil in the rear location of the second vane groove 54. As a result, the oil is able to be introduced into the first vane groove 44.

[0037] When idling rotation is performed in the first compression chamber 31 (i.e. the high-pressure opening/closing valve 63 is closed and the low-pressure opening/closing valve 64 is opened), as shown in FIGS. 3 and 4, the first vane 43 moves rearward, and closes the oil supply path 82 of the intermediate plate 35. Therefore, there is no introduction of oil into the first vane groove 44. In a state wherein the oil supply path 82 of the intermediate plate 35 is closed by the first vane 43, furthermore, the first vane groove 44 is isolated from a high-pressure region. Accordingly, no discharge pressure is applied to the first vane groove 44, allowing the first vane 43 to be kept in the rearwardly moved state (i.e. stationary state).

[0038] FIGS. 5 and 6 illustrate a different oil supply path with respect to the first vane groove 44 of the rotary compressor in accordance with a second embodiment the present invention. In the second embodiment, instead of the oil supply path of the intermediate plate 35, an oil supply pipe 90 is installed to connect the lower region of the hermetic container 10 to a portion of the high-pressure pipe 61 upstream of the high-pressure opening/closing valve 63. The other configuration is identical to the first embodiment.

[0039] In the present embodiment, when the high-pressure opening/closing valve 63 is opened and the low-pressure opening/closing valve 64 is closed (i.e. compression operation is performed in the first compression chamber 31), as shown in FIG. 5, discharge pressure is applied to the first vane groove 44, causing forward and rearward movements of the first vane 43. When the first vane performs the forward and rearward movements of the first vane 43, the rear location of the first vane groove 44 experiences a pressure variation. Therefore, as a result of the pressure variation, the oil in the oil supply pipe 90 is introduced into the first vane groove 44, enabling the supply of oil with respect to the first vane groove 44.

[0040] Conversely, when the high-pressure opening/closing valve 63 is closed and the low-pressure opening/closing valve 64 is opened (i.e. idling rotation is performed in the first compression chamber 31), as shown in FIG. 6, suction pressure is applied to the first vane groove 44, causing the first vane 43 to stop in the rearwardly moved state. In this case, since the high-pressure opening/closing valve 63 is closed, there is no introduction of oil into the first vane groove 44.

[0041] As apparent from the above description, the present invention provides a rotary compressor in which oil is supplied into a vane groove through an oil supply path formed at a rear location of the vane groove, whereby efficient supply of oil throughout a gap between a vane and the vane groove can be accomplished.

[0042] Furthermore, when the operation of the vane stops for achieving a variation in compression capacity, the oil supply path, which communicates with the vane groove, is closed by the vane or a high-pressure opening/closing valve of a vane control device. Therefore, it is possible to prevent the oil from being introduced into the vane groove, and to isolate the vane groove from a high-pressure region. This ensures efficient control of compression capacity.

[0043] Although embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in this embodiment without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.

Claims

1. A rotary compressor including at least one compression chamber, a vane to perform forward and rearward movements in a radial direction of the compression chamber, and a vane groove to receive the vane and guide the forward and rearward movements of the vane,
wherein the rotary compressor further includes an oil supply path communicating with a rear location of the vane groove, and
wherein the oil supply path is opened when the vane moves forward to the compression chamber, and is closed by the vane when the vane moves rearward.

2. The compressor according to claim 1, wherein the rotary compressor further includes a vane control device to restrict or release the vane for the control of compression capacity.

3. The compressor according to claim 2, wherein the vane control device includes:

   a low-pressure pipe to apply suction pressure to the rear location of the vane groove;
   a high-pressure pipe to apply discharge pressure to the rear location of the vane groove; and
   a pair of opening/closing valves to selectively open and close the low-pressure and high-pressure pipes, respectively.

4. The compressor according to claim 3, wherein the opening/closing valves include a low-pressure opening/closing valve to open and close the low-pressure pipe, and a high-pressure opening/closing valve to open and close the high-pressure pipe.

5. A rotary compressor including at least one compression chamber, a vane to perform forward and rearward movements in a radial direction of the compression chamber, and a vane groove to receive the vane and guide the forward and rearward movements of the vane,
wherein the rotary compressor further includes:

   a vane control device to control the forward and rearward movements of the vane for achieving a variation in compression capacity; and
   an oil supply path communicating with a rear location of the vane groove.

6. The compressor according to claim 5, wherein the vane control device includes:

   a low-pressure pipe to apply suction pressure to the rear location of the vane groove;
   a high-pressure pipe to apply discharge pressure to the rear location of the vane groove; and
   a pair of opening/closing valves provided on the low-pressure and high-pressure pipes, respectively, to selectively open and close the low-pressure and high-pressure pipes.

7. The compressor according to claim 6, wherein the oil supply path includes an oil supply pipe connected to a portion of the high-pressure pipe upstream of the opening/closing valve.

8. A rotary compressor including a hermetic container in which oil is received, and a compression device installed in the hermetic container, the compression device including first and second compression chambers separated from each other, first and second vanes to perform forward and rearward movements in a radial direction of the first and second compression chambers, respectively, and first and second vane grooves to receive the first and second vanes and guide the forward and rearward movements of the first and second vanes, respectively,
wherein the rotary compressor further includes:

   a vane control device to control the forward and rearward movements of the first vane for achieving a variation in compression capacity; and
   an oil supply path communicating with a rear location of the first vane groove.

9. The compressor according to claim 8, wherein the oil supply path is opened when the first vane moves forward to the first compression chamber, and is closed by the first vane when the first vane moves rearward.

10. The compressor according to claim 9,
wherein the compressor further includes an intermediate plate to separate the first compression chamber from the second compression chamber, and
wherein the oil supply path is formed through the intermediate plate to communicate the rear location of the first vane groove with the second vane groove, and a rear location of the second vane groove communicates with the interior of the hermetic container.

11. The compressor according to claim 10, wherein the first compression chamber and the first vane groove are located above the second compression chamber and the second vane groove, respectively.

12. The compressor according to claim 8, wherein the vane control device includes:

a low-pressure pipe to apply suction pressure to the rear location of the first vane groove;
a high-pressure pipe to apply discharge pressure to the rear location of the first vane groove; and
a pair of opening/closing valves to selectively open and close the low-pressure and high-pressure pipes, respectively.

13. The compressor according to claim 12, wherein the opening/closing valves include a low-pressure opening/closing valve to open and close the low-pressure pipe, and a high-pressure opening/closing valve to open and close the high-pressure pipe.

14. The compressor according to claim 13, wherein the oil supply path includes an oil supply pipe to connect a lower region of the hermetic container to a portion of the high-pressure pipe upstream of the high-pressure opening/closing valve.

Fig.1

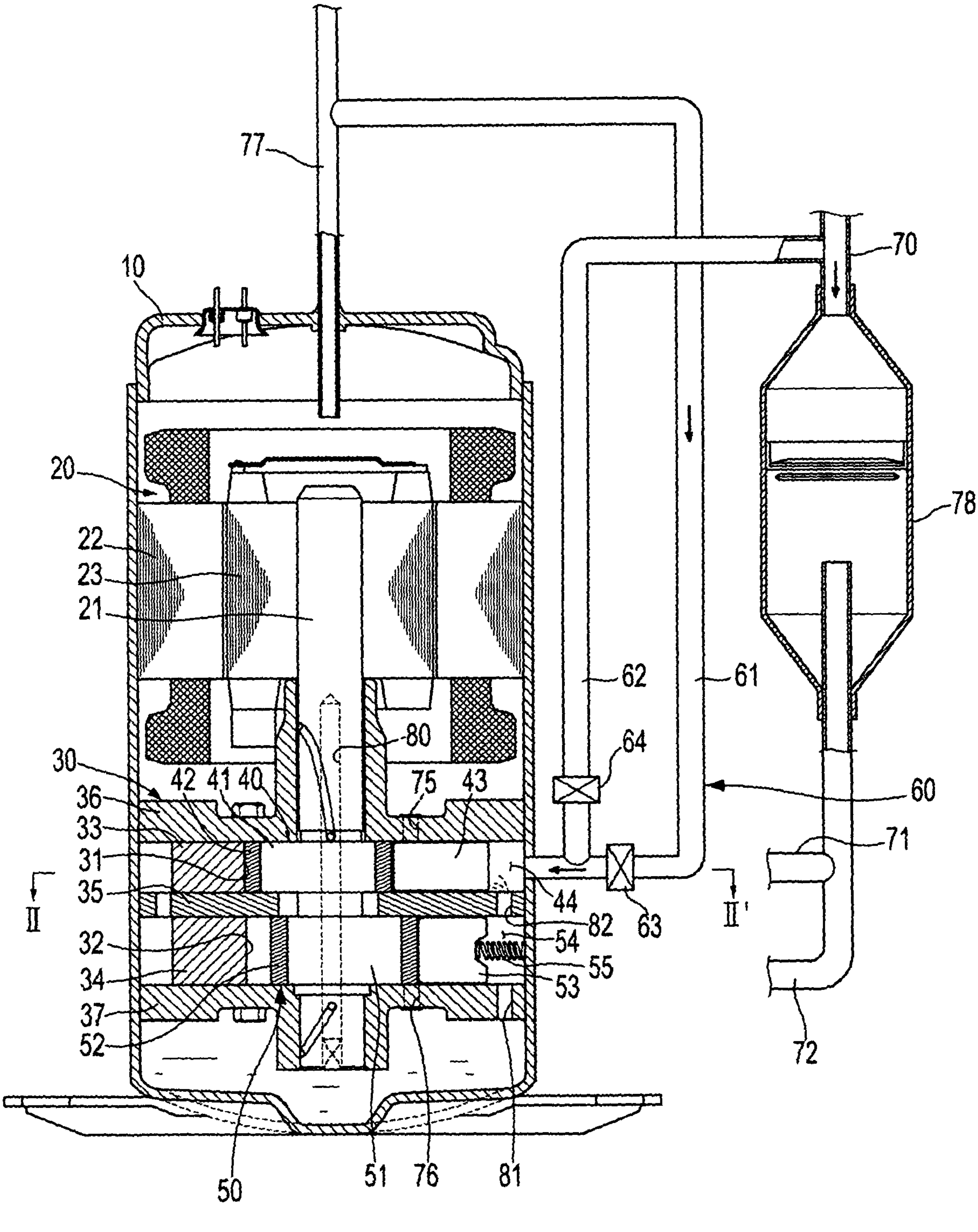

77
70
10
20
78
22
23
21
62
61
80
64
30
42
41
40
75
43
60
36
33
71
31
44
63
II
35
82
II'
54
32
55
34
53
37
72
52
50
51
76
81

Fig.2

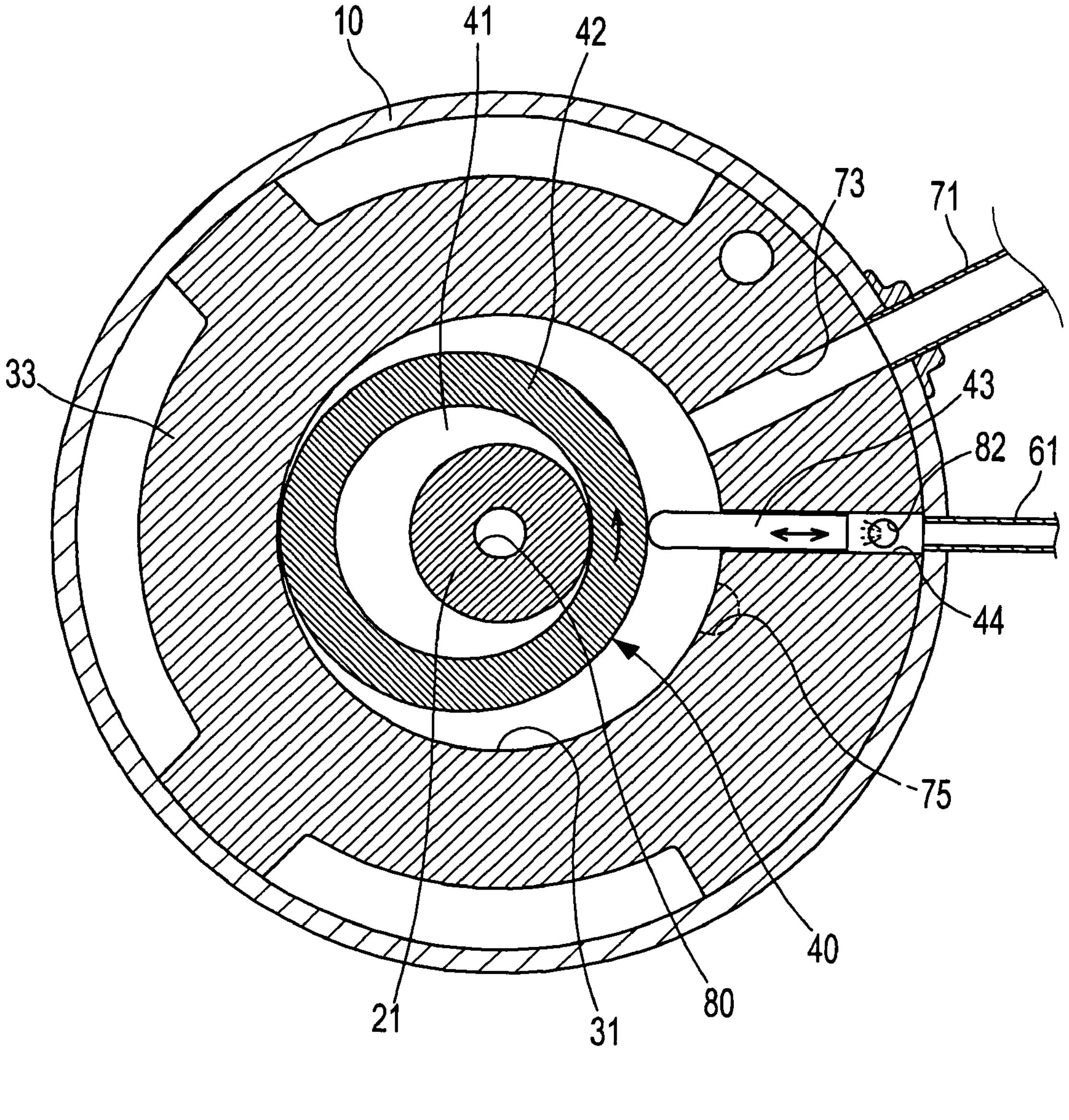


Fig.3

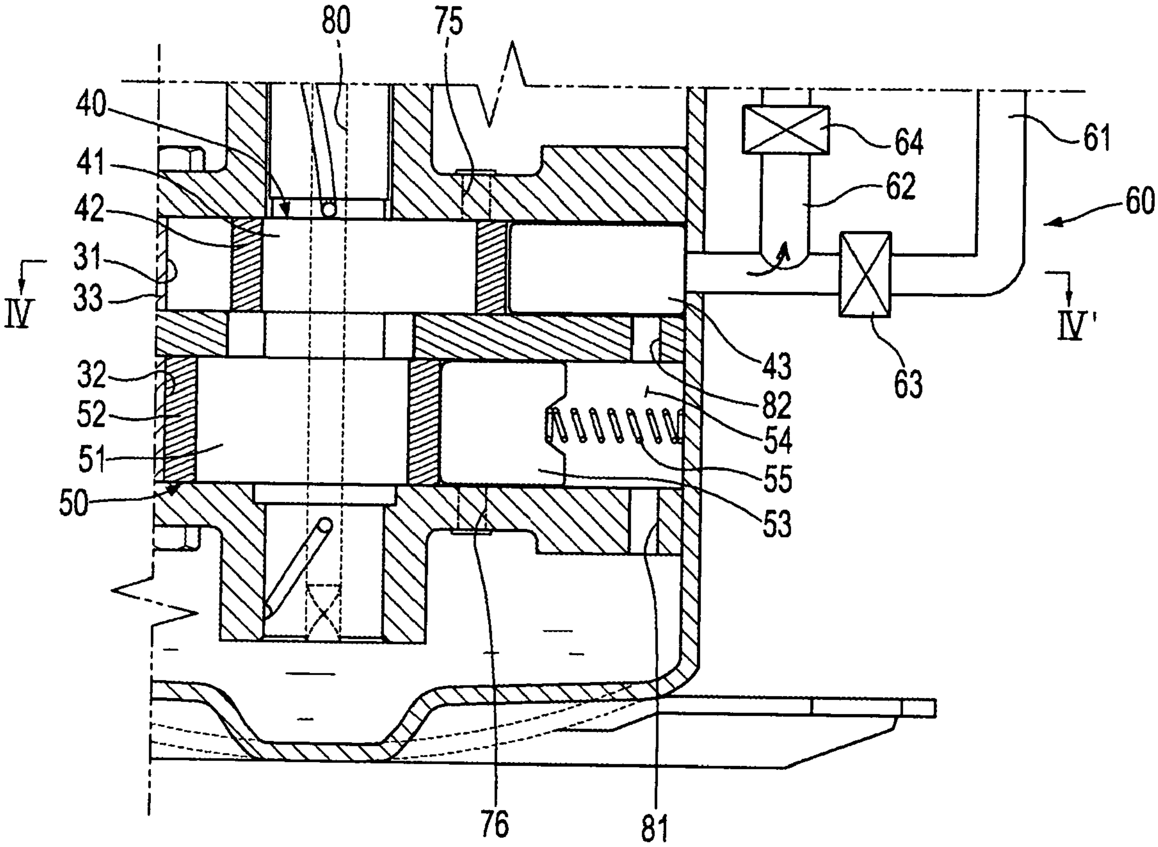


Fig.4

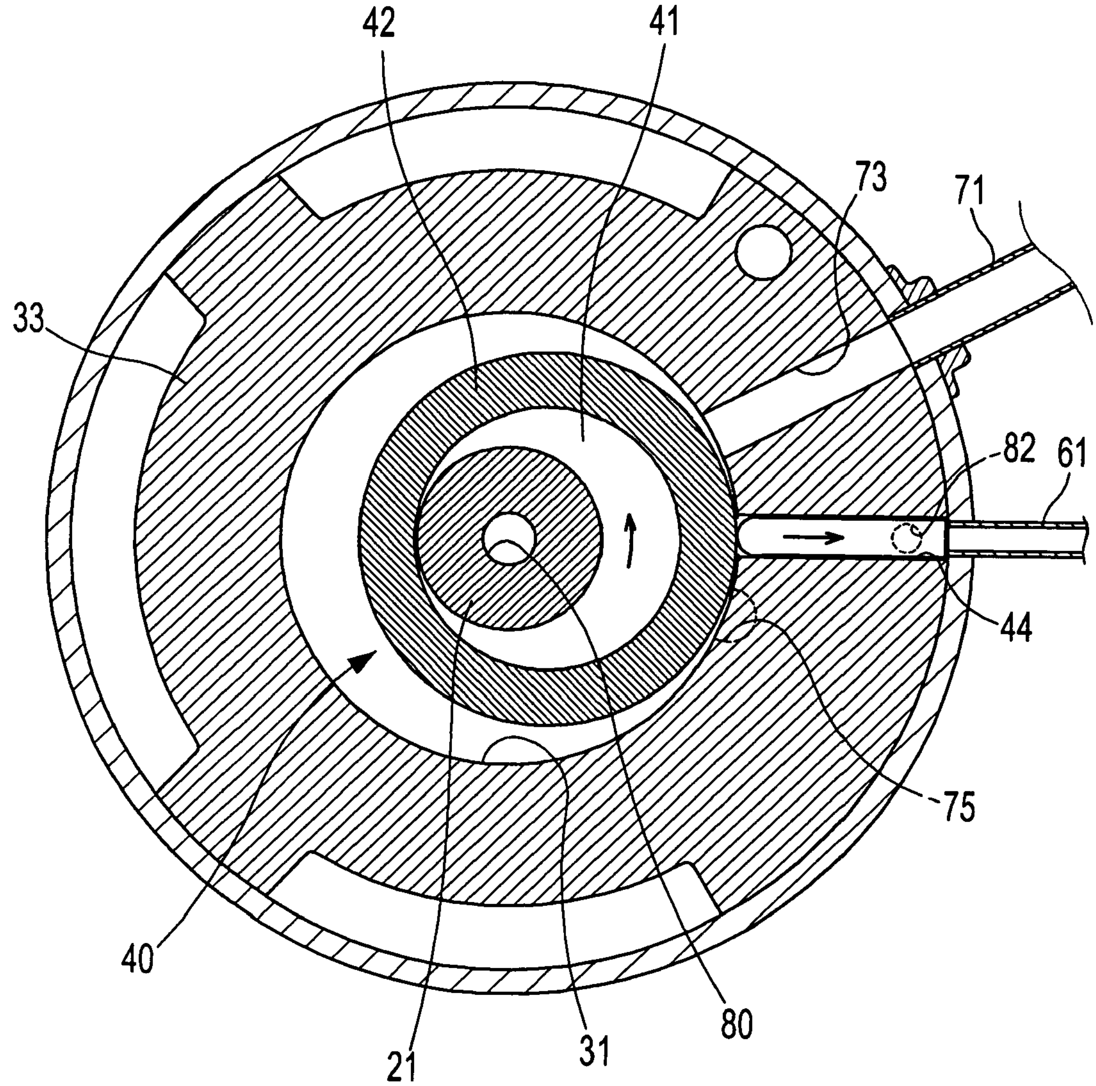


Fig.5

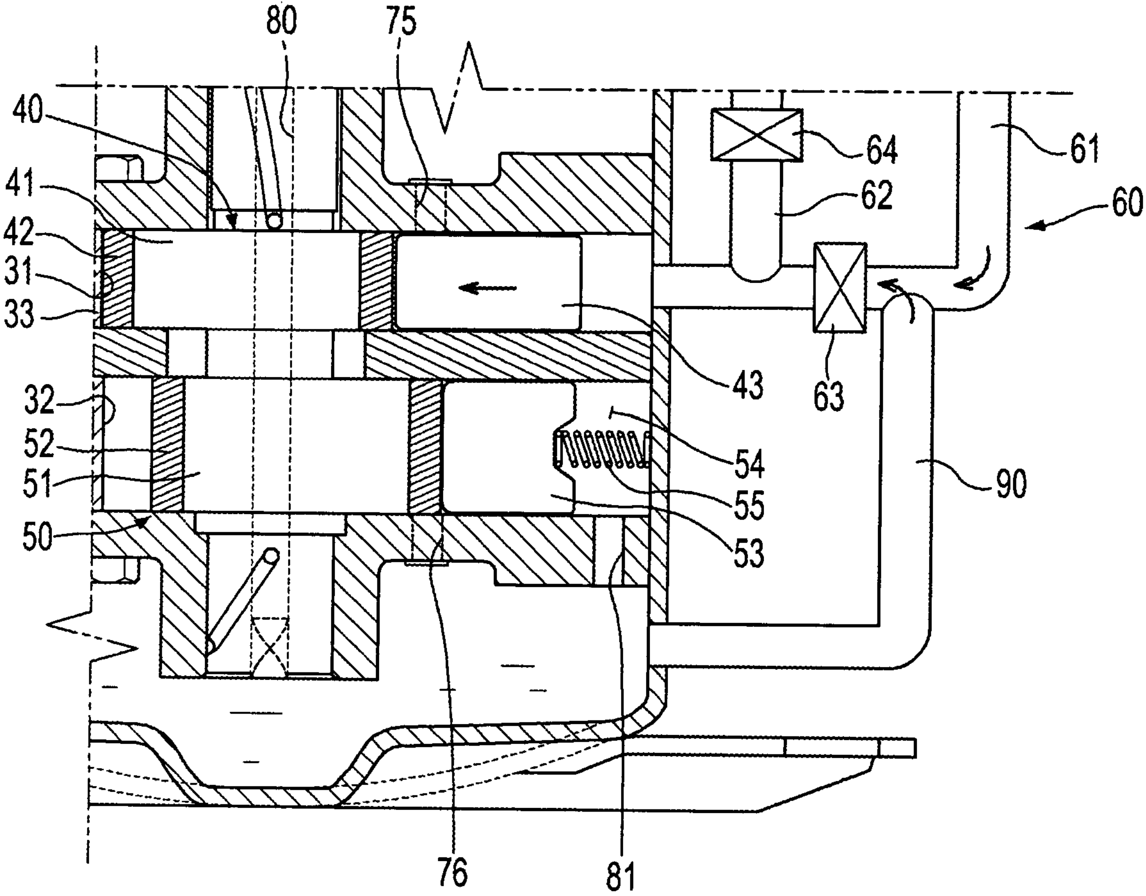
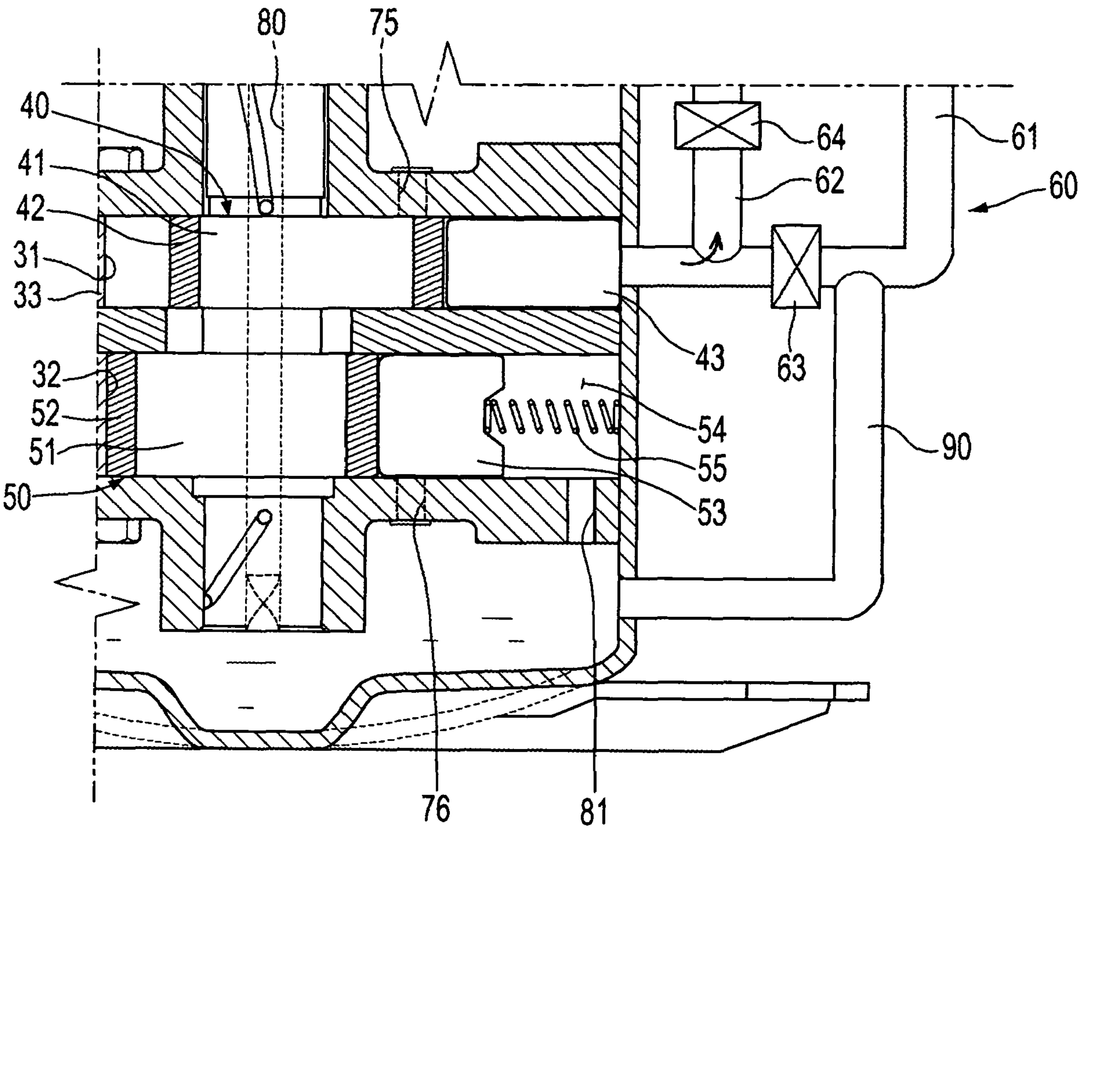


Fig.6



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 00 8115

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
E	WO 2006/090977 A (LG ELECTRONICS INC [KR]; BYUN SANG MYUNG [KR]; CHO SEOUNG YEON [KR]; H) 31 August 2006 (2006-08-31) * figures 1-11 * * page 11, line 20 - line 23 * -----	5,8	INV. F01C21/08 F04C18/356 F04C23/00 F04C29/02 F04C28/06
E	EP 1 672 219 A (SANYO ELECTRIC CO [JP]) 21 June 2006 (2006-06-21) * figure 11 * * column 19, paragraph 89 - column 26, paragraph 125 * -----	5,8	
X Y	JP 06 088584 A (TOKYO SHIBAURA ELECTRIC CO) 29 March 1994 (1994-03-29) * abstract * * figure 2 * -----	1 2,5,8-11	
X A	JP 02 045679 A (MATSUSHITA REFRIGERATION) 15 February 1990 (1990-02-15) * abstract * * figures 1,2 * -----	1 2,5,8, 10,11	TECHNICAL FIELDS SEARCHED (IPC)
X A	US 5 242 280 A (FUJIO KATUHARU [JP]) 7 September 1993 (1993-09-07) * figures 2,3,10 * * the whole document * -----	1 2,5,8-11	F04C F01C
X A	JP 2002 303284 A (MATSUSHITA ELECTRIC IND CO LTD) 18 October 2002 (2002-10-18) * abstract * * figures 1,2 * -----	1 5,8,9	
	-/--		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 April 2007	Lequeux, Frédéric

3

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

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 00 8115

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	EP 1 577 557 A (SANYO ELECTRIC CO [JP]) 21 September 2005 (2005-09-21) * figure 3 * * paragraph [0036] * * paragraph [0050] * -----	5	
Y	US 2004/009083 A1 (KIM HYUN-JOONG [KR] ET AL) 15 January 2004 (2004-01-15) * figures 2-4 * * the whole document * -----	2,5,8-11	

TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

3

Place of search	Date of completion of the search	Examiner
The Hague	20 April 2007	Lequeux, Frédéric

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 06 00 8115

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

20-04-2007

Patent document cited in search report		Publication date	Patent family member(s)			Publication date
WO 2006090977	A	31-08-2006	NONE			
EP 1672219	A	21-06-2006	KR	20060066662	A	16-06-2006
			US	2006140802	A1	29-06-2006
JP 6088584	A	29-03-1994	NONE			
JP 2045679	A	15-02-1990	JP	2604818	B2	30-04-1997
US 5242280	A	07-09-1993	CA	2055907	A1	22-05-1992
			DE	4138344	A1	27-05-1992
			GB	2251656	A	15-07-1992
			JP	2768004	B2	25-06-1998
			JP	4187887	A	06-07-1992
JP 2002303284	A	18-10-2002	NONE			
EP 1577557	A	21-09-2005	CN	1670374	A	21-09-2005
			KR	20060043610	A	15-05-2006
			US	2005214137	A1	29-09-2005
US 2004009083	A1	15-01-2004	CN	1467379	A	14-01-2004
			JP	2004044571	A	12-02-2004
			KR	20040005336	A	16-01-2004

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- KR 20062276 **[0001]**
- JP 2003269352 A **[0003]**
- KR 1020050062218 **[0005]**