

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 1 300 593 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

09.04.2003 Bulletin 2003/15

(51) Int Cl.7: **F04C 18/344**, F04C 29/00,
F01C 21/08, F04C 29/02,
F01C 21/10

(21) Application number: **02256837.2**

(22) Date of filing: **01.10.2002**

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
IE IT LI LU MC NL PT SE SK TR**

Designated Extension States:

AL LT LV MK RO SI

(72) Inventors:

- **Toyama, Tatshuhiro, c/o Seiko Instruments Inc.
Chiba-shi, Chiba (JP)**
- **Sato, Hideyuki, c/o Seiko Instruments Inc.
Chiba-shi, Chiba (JP)**

(30) Priority: **03.10.2001 JP 2001307281**

(74) Representative: **Sturt, Clifford Mark et al
Miller Sturt Kenyon
9 John Street
London WC1N 2ES (GB)**

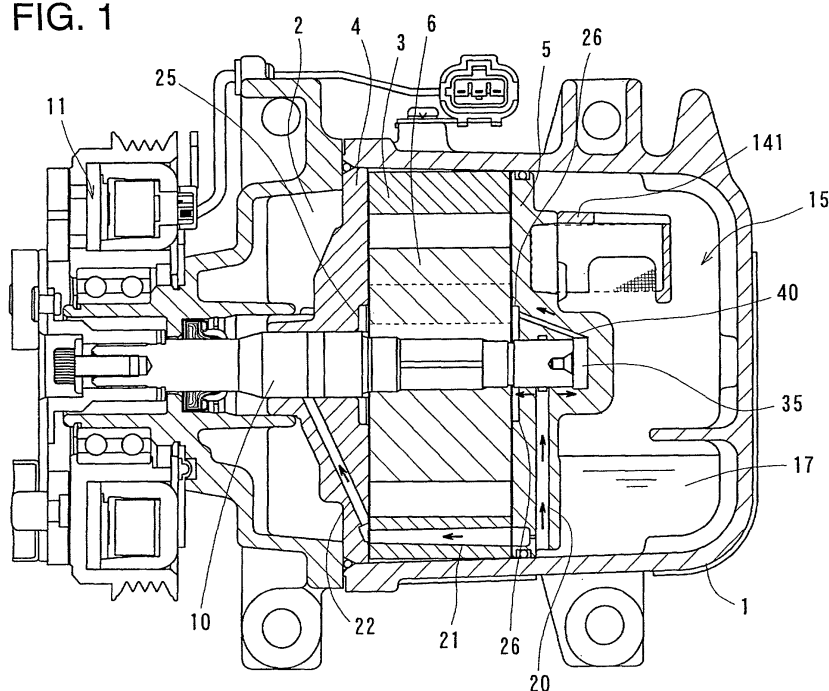
(71) Applicant: **Seiko Instruments Inc.
Chiba-shi, Chiba (JP)**

(54) **Vane compressor**

(57) To abolish the O-ring for sealing the space on the rotor shaft rear end surface side. There are provided at the ends of a tubular cylinder (3) a front side block (4) and a rear side block (5), and a rotor rotatable by a rotor shaft is arranged in a cylinder, there being formed in the rotor (6) vane grooves in which vanes are accommodated there being further provided a high pressure chamber (15) and an oil sump portion (17), a lubricant oil space (35) being provided in the rear side block and on the rear end surface side of the rotor shaft, there being pro-

vided an oil supply passage for supplying oil to the lubricant oil space from the oil sump portion, there being provided in the rear side block or in the rotor shaft a vane back pressure chamber oil passage (40) whose one end communicates with the oil accommodating space (35) and whose other end communicates with the vane back chambers. The space on the rotor shaft rear end surface side can be formed solely by the rear side block, and the O-ring for sealing the high pressure chamber is abolished.

FIG. 1



EP 1 300 593 A2

Description

[0001] The present invention relates to a gas compressor used in a vehicle or the like as a part of an air conditioner.

[0002] A vane type gas compressor for use in an air conditioner, a refrigerator or the like is known. The gas compressor will be described with reference to Fig. 4.

[0003] In one side portion of a casing 1, there is formed a suction chamber 2, and, adjacent to the suction chamber 2, there is provided a gas compressing portion. In the gas compressing portion, there is provided a tubular cylinder 3 having an inner peripheral surface which is substantially elliptical in longitudinal section perpendicular to the axial direction, and a front side block 4 and a rear side block 5 fastened to the axial end surfaces thereof so as to be parallel to each other.

[0004] As shown in Fig. 5, inside the cylinder 3, there is arranged a rotatable rotor 6 supported by a rotor shaft 10. In this rotor 6, there are radially formed a plurality of (five in the example shown) vane grooves 7, and a vane 8 is slidably fitted into each vane groove 7 and retained therein. Further, at the inner peripheral-side end portions of the vane grooves 7, vane back pressure chambers 9 are formed so as to communicate with the grooves, and oil is supplied to the vane back pressure chamber 9 to aid the advancing and retreating motions of the vanes 8.

[0005] Further, as shown in Fig. 4, attached to the rear end of the rear side block 5 is a cyclone block 14 for separating oil component from compressed refrigerant gas, and a high pressure chamber 15 is formed on the rear side of the rear side block 5 and the cyclone block 14. The casing 1 has a discharge port (not shown) formed so as to communicate with the high pressure chamber 15, and at the bottom of the high pressure chamber 15, there is provided an oil sump portion 17. The refrigerant gas compressed in the cylinder 3 is discharged into the high pressure chamber 15 through the rear side block 5 and the cyclone block 14, and the high pressure refrigerant gas discharged into the high pressure chamber 15 is supplied to the exterior through the discharge port. Further, the oil obtained by separation through the cyclone block 14 falls onto the oil sump portion 17.

[0006] The oil in the oil sump portion 17 is under the action of the discharge pressure of the high pressure refrigerant gas discharged into the high pressure chamber 15, and lubricant oil is supplied from the oil sump portion 17 through oil supply passages 20, 21, and 22 respectively formed in the cylinder 3, the front side block 4, and the rear side block 5 to the plain bearing portion of the rotor shaft 10 to lubricate the plain bearing portion. Further, a portion of the oil supplied to the plain bearing portions at the front and rear ends of the rotor shaft 10 is supplied to a small space 30 formed by the rear end surface of the rotor shaft 10 and the cyclone block 14 to prevent seizure of the rear end surface of the rotor shaft.

The oil supplied to this small space 30 passes through the gap between the rear end surface of the rear side block 5 and the front end surface of the cyclone block 14, and, further, passes through an oil passage 23 formed in the rear side block 5 to be supplied to one flat groove 26 to supply the vane back pressure chamber 9 with oil.

[0007] As described above, the small space 30 of the rear end surface portion of the rotor shaft is formed by the rear side block 6 and the cyclone block 14, so that to cut off the small space 30 from the discharge pressure space outside the cyclone block 14, an o-ring 31 is arranged for sealing between the rear side block 6 and the cyclone block 14 so as to surround the small space 30.

[0008] However, the space of the rear end surface portion of the rotor shaft is filled with oil having a high temperature, and there exists gas or oil at high temperature and high pressure in the discharge pressure space outside the cyclone block, so that the O-ring is subject to deterioration due to heat, making it disadvantageously impossible to maintain an appropriate vane back pressure.

[0009] The present invention has been made in view of the above problem. It is an object of the present invention to provide a compressor in which the need for installation of an O-ring around the small space is eliminated, thereby eliminating the problem due to the deterioration in the O-ring.

[0010] In order to solve the above-mentioned problem according to the present invention, a gas compressor comprising a tubular cylinder, a front side block and a rear side block situated at the axial ends of the cylinder, a rotor rotatably arranged in the cylinder, a vane groove provided in the rotor, a vane back pressure chamber provided so as to communicate with an inner peripheral-side end portion of the vane groove, a vane accommodated in the vane groove so as to be capable of advancing and retreating, a rotor shaft for rotating the rotor, a high pressure chamber into which compressed gas is discharged from the interior of the cylinder, and an oil sump portion in which oil is stored and to which the pressure of the high pressure chamber is applied, and is characterized in that there is provided a lubricant oil space inside the rear side block and on the side of the rear end surface of the rotor shaft, there being provided an oil supply passage for supplying oil from the oil sump portion to the lubricant oil space, and that there is formed in the rear side block or in the rotor shaft a vane back pressure chamber oil passage whose one end communicates with the oil accommodating space, the other end of the oil passage communicating with the vane back pressure chamber.

[0011] According to the present invention, the gas compressor is characterized in that there is formed in the front end surface of the rear side block a flat groove communicating with the vane back pressure chamber, and that the flat groove is connected to the oil passage to establish communication between the oil passage

and the vane back pressure chamber.

[0012] According to the present invention, the gas compressor is characterized in that the vane back pressure chamber is formed in the rotor shaft along the axial direction, and that the oil passage is radially deflected on the cylinder side to communicate with the vane back pressure chamber, there being arranged in the oil passage a throttle valve for limiting the opening area of the oil passage by a force sucking oil toward the vane back-pressure chamber generated in the oil passage.

[0013] That is, according to the present invention, a small space is formed between the rear end portion of the rotor shaft and the rear side block, and the oil supplied to the small space is supplied to a vane back pressure chamber through an oil passage formed in the rear side block or the rotor shaft, so that it is possible to cut off the small space from the high pressure chamber without using any O-ring, making it possible to abolish the O-ring and supply oil to the vane back pressure chamber under an appropriate pressure.

[0014] The above oil passage may be formed in the rear side block and connected as it is to the flat groove, etc. It is also possible to provide the oil passage so as to communicate with the small space and extend along the axial direction inside the rotor shaft, causing it to be once deflected toward the interior of the rear side block to be connected to the flat groove, etc.

[0015] In the construction in which the vane back pressure oil passage is formed in the rotor shaft to extend along the axial direction and in which the oil passage is radially deflected on the cylinder side to communicate with the vane back pressure chamber, the centrifugal force acting in the oil passage portion extending along the radial direction increases as the RPM of the rotor shaft increases, and the force causing the oil in the oil passage move to the outer peripheral side, that is, the force sucking the oil toward the vane back pressure chamber is strongly applied to the oil in the rotor shaft, so that there is the danger of an excessive amount of oil being extracted from the lubricant oil space on the rotor shaft rear end portion side. In view of this, as claimed in Claim 3, it is possible to arrange in the oil passage a throttle valve for limiting the opening area of the oil passage by the force for sucking oil toward the cylinder side generated in the oil passage, whereby it is possible to prevent an excessive sucking force from being applied to the lubricant oil space to make it impossible to secure an appropriate amount of lubricant oil.

[0016] Embodiments of the present invention will now be described by way of further example only and with reference to the accompanying drawings, in which:-

Fig. 1 is a general front sectional view of a gas compressor according to first embodiment of the present invention.

Fig. 2 is a general front sectional view of a gas compressor according to second embodiment.

Fig. 3 is an enlarged sectional view of a portion

around a vane back pressure chamber passage according to third embodiment.

Fig. 4 is a general front sectional view of a conventional gas compressor.

Fig. 5 is a side sectional view of the same, showing the cylinder and the interior thereof.

(First Embodiment)

[0017] First embodiment of the present invention will now be described with reference to the accompanying drawings. The components which are the same as those of the prior-art example are indicated by the same reference numerals, and a description of such components will be omitted or abridged as needed.

[0018] Fig. 1 shows the general construction of a gas compressor. The gas compressor includes a casing 1 having at one end a suction port (not shown) and a discharge port (not shown). Connected to the suction port is a suction pipe (not shown) for sucking from outside the refrigerant gas to be compressed, and connected to the discharge port is a discharge pipe (not shown) for supplying the compressed refrigerant to a condenser or the like (not shown).

[0019] In the interior of one side portion (suction port side) of the casing 1, there is provided a suction chamber 2, which communicates with the suction port. Further, in the central portion of the interior of the casing 1, there are arranged a tubular cylinder 3 having a substantially elliptical inner peripheral surface in longitudinal section perpendicular to the axial direction, a front side block 4 (suction port side) fastened to the axial end surfaces of the cylinder 3 so as to be parallel to each other, and a rear side block 5 (discharge port side).

[0020] Then, as shown in Fig. 5, inside the cylinder 3, there is arranged a rotatable rotor 6 supported by a rotor shaft 10, and this rotor 6 has a plurality of vane grooves 7 radially formed, a vane 8 being slidably fitted into each of them and retained therein. Further, a vane back pressure chamber 9 is formed so as to communicate with the inner peripheral-side end portion of each vane groove 7.

[0021] The rotor shaft 10 is connected to an electromagnetic clutch 11, and the drive force of a vehicle engine is transmitted to the rotor shaft 10 through the electromagnetic clutch 11 to rotate the rotor 6, whereby the vanes 8 advance and retreat in the vane grooves 7 by their centrifugal force and the hydraulic pressure of the lubricant oil due to the back pressure chambers 9, rotating while being held in close contact with the inner peripheral wall of the cylinder 3. Due to the rotation of the rotor 6, the interior of the cylinder 3 is partitioned by the rotor 6 and the vanes 8 to form a compression chamber 3a.

[0022] In the cylinder 3, an opening (not shown) is provided on the front side block 4 side so as to communicate with the compression chamber 3a, and a discharge hole (not shown) is formed on the rear side block 5 side;

the gas taken in the compression chamber 3a through the opening is compressed, and the compressed gas compressed in the compression chamber 3a is discharged into the high pressure chamber 15 through the discharge hole and a passage (not shown) formed in the rear side block 5. A cyclone block 141 is mounted to the rear end side of the rear side block 5, and, in this cyclone block 141, the oil ingredient is separated from the compressed gas. In the casing 1 at the rear of the rear side block 5 and the cyclone block 141, the high pressure chamber 15 is formed, and a discharge port is formed in the casing 1 so as to communicate with the high pressure chamber 15. Further, at the bottom of the high pressure chamber 15, the oil sump portion 17 is provided.

[0023] In the rear side block 5, an oil supply passage 20 for moving oil from the oil sump portion 17 is formed so as to be directed toward the shaft center at the rear end of the rotor shaft 10, so that oil can be supplied to the plain bearing portion at the rear end of the rotor shaft 10. Further, at some midpoint, the oil supply passage 20 communicates with an oil supply passage 21 formed in the cylinder 3 along the axial direction, and the oil supply passage 21 communicates with an oil supply passage 22 formed in the front side block 4. The oil supply passage 22 extends toward the front end of the rotor shaft 10, making it possible to supply oil to the plain bearing portion at the front end of the rotor shaft 10. Further, flat grooves 25 and 26 are respectively formed in the rear end surface of the front side block 4 held in contact with the rotor shaft 10 and the front end surface of the rear side block 5; in the flat grooves 25 and 26, the oil supplied to the plain bearing portions of the rotor shaft 10 flows in, and oil is supplied to the vane back pressure chambers 9. Further, in the rear side block 5, a boss configuration is imparted to the rear end surface side of the rotor shaft 10 so that a small space 35 for lubricant oil may be formed, and a recess is provided in the inner surface thereof. That is, the small space 35 is formed inside the rear side block 5. In the rear side block 5, a vane back pressure chamber oil passage 40 whose one end communicates with the small space 35 for lubricant oil is formed so as to extend obliquely and substantially along the axial direction; the other end of the vane back pressure passage 40 is connected to the flat groove 26 and communicates with the vane back pressure chambers 9.

[0024] Next, the operation of the above gas compressor will be described.

[0025] When the rotor 6 is rotated by rotating the rotor shaft 10 by means of the electromagnetic clutch 11, an extruding force toward the outer periphery is applied, with the rotation, to the vanes 8 due to the centrifugal force and the supply of lubricant oil to the vane back pressure chambers 9 (described in detail below). The vanes 8 to which the extruding force is applied rotate while being held in close contact with the inner peripheral wall of the cylinder 3 and the side walls of the front side block 4 and the rear side block 5. As a result of this

rotation, a sucking force toward the interior of the cylinder 3 is generated, and sucks refrigerant gas into the casing 1 from outside through the suction port. The refrigerant gas is sucked into the suction chamber 2, and sucked into the cylinder 3 through an opening (not shown). In the cylinder 3, the refrigerant gas is successively compressed by the compression chamber 3a formed by the rotor 6 and the vanes 8 continuing to rotate.

[0026] The compressed refrigerant gas is discharged from a discharge opening (not shown) formed in the cylinder 3 into a compressed gas passage (not shown) formed in the rear side block 5. The compressed gas discharged moves successively through the compressed gas passage, and oil is separated therefrom in the cyclone block 141 before it is discharged into the high pressure chamber 15. The compressed gas discharged into the high pressure chamber 15 is successively discharged from the high pressure chamber 15 to an external condenser or the like through the discharge port of casing 1. On the other hand, the separated oil drips into the oil sump portion 17. In the oil sump portion 17, due to the difference in pressure between the high pressure chamber 15 and the suction chamber 2, lubricant oil is supplied to the oil supply passage 20, and is supplied to the plain bearing portion at the rear end of the rotor shaft 10 to lubricate the plain bearing portion. Further, a part of the oil in the oil supply passage 20 diverts to the oil passage 21 of the cylinder 3, and is supplied to the plain bearing portion at the forward end of the rotor shaft 10 by way of the oil passage 22 of the front side block 4 to lubricate that plain bearing, too. Then, the oil supplied to the plain bearing portions at the front and rear ends of the rotor shaft 10 is throttled when passing the plain bearing portions to undergo a reduction in pressure, and is then supplied to the vane back pressure chambers 9 through the pair of flat grooves 25 and 26 provided in the rotor side end surfaces of the front side block 4 and the rear side block 5 to aid the advancement and retreating of the vanes 8.

[0027] Further, the oil supplied to the plain bearing portion at the rear end of the rotor shaft partly moves forwards to be supplied to the flat groove 26 as described above, and partly moves backwards to be supplied to the small space 35 formed by the rear end surface of the rotor shaft 10 and the cyclone block 14 to prevent seizure of the rear end surface of the rotor shaft. The oil supplied to this small space 35 passes through the vane back pressure chamber oil passage 40 and is supplied to the flat groove 26 to supply oil to the vane back pressure chambers 9.

[0028] A part of the oil sent to the vane back pressure chamber 9 through the plain bearing portion and the oil passage 40 leaks out of the vane back pressure chambers 9 and is conveyed to the gap between the rotor 6 and the front side block 4 or the rear side block 5, the gap between the vanes 8 and the inner peripheral surface of the cylinder 3, and the gap between the vanes

8 and the front side block 4 or the rear side block 5 to thereby prevent wear and effect sealing with oil film.

[0029] In the above embodiment, the small space 35 for accommodating oil in the rotor shaft rear end surface is cut off from the high pressure chamber 15 due to the boss configuration of the rear side block 5, so that there is no need to effect cutting-off by an O-ring as in the prior art. Thus, no problem due to a deterioration of the O-ring is involved.

(Second Embodiment)

[0030] Next, second embodiment will be described with reference to Fig. 2.

[0031] In this embodiment, a vane back pressure chamber oil passage allowing communication between the small space on the rotor shaft rear end surface side and the flat groove is formed in the rotor shaft. The components which are the same as those of first embodiment and the conventional example are indicated by the same reference numerals, and a description of such components will be omitted or abridged.

[0032] As in the first embodiment, in this embodiment, a boss configuration is imparted to the rear side block 5 at a position at the rear of the rear end surface of the rotor shaft 10, and a small space 36 is formed between the rear end surface of the rotor shaft 10 and the inner surface of the rear side block 5. Further, on the rear end side of the rotor shaft 10, there is formed at the axial center a vane back pressure oil passage 41 extending along the axial direction, its one end being formed in the small space 36. On the other end side of the oil passage 41, the oil passage 41 is radially deflected immediately before the side end surface of the rotor 6, and extends to the outer periphery to be connected to the flat groove 26.

[0033] As in the first embodiment, in this second embodiment, gas is compressed, and compressed gas is discharged from the discharge port. Further, the oil in the oil sump portion 17 is supplied to the plain bearing portion of the rotor shaft 10 as in Embodiment 1 to lubricate the plain bearing portion. Then, a portion of the oil is supplied to the small space 36 on the rotor shaft rear end surface side to prevent seizure of the rear end surface of the rotor shaft 10. The oil supplied to the small space 36 moves within the rotor shaft 10 through the oil passage 41, and is radially deflected on the rotor 6 side to be supplied to the flat groove 26 to thereby supply oil to the vane back pressure chambers. In this embodiment also, the small space 36 on the rotor shaft rear end surface is cut off from the high pressure chamber 15 by the boss portion of the rear side block, so that there is no need to provide an O-ring, which means it is possible to prevent a problem due to a deterioration in the O-ring. Further, in this embodiment, the oil passage 41 is provided inside the rotor shaft 10, so that there is no need to secure a thick-walled portion for forming the passage on the rear side block 5 side, and the wall thickness,

size, etc. of the boss portion are reduced, whereby the volume of the rear side block is reduced. As a result, it is possible to increase the volume of the high pressure chamber.

[0034] In the front side block 4 and the rear side block 5 of this gas compressor, a plain bearing is used in the bearing portion for the rotor shaft 10. A hole forming the plain bearing requires a finish-machining of higher accuracy than in the case of a bearing hole for a ball bearing or a needle bearing. Here, the term accuracy refers, for example, to the out-of-roundness and cylindricity of the hole, the surface roughness of the inner surface thereof, etc. For high-accuracy finishing of the hole, the disposal of the chips and shavings generated at the time of machining is an important issue.

[0035] In the rear side block 5 of the conventional gas compressor shown in Fig. 4, the bearing hole is a through-hole. The chips and shavings generated when finish-machining this through-hole can be easily discharged to the exterior of the hole. Thus, the chips and shavings have practically no influence on the finishing accuracy of the hole.

[0036] In contrast, in the rear side block 5 of the gas compressor of the present invention shown in Figs. 1 and 2, this bearing hole is a blind hole. In the case of a blind hole, the chips and shavings generated at the time of finish-machining are not easily discharged from the hole, and it is impossible to achieve a high accuracy finishing by the same machining method as that for a through-hole. In view of this, it is the general practice to alternately repeat the machining and the removal of chips and shavings, thus spending a lot of time to finish the hole with high accuracy without involving any influence of the chips and shavings.

[0037] To prevent an increase in the requisite time for the finish-machining, in the case of the rear side block 5 of Embodiment 1, the hole of the oil passage 40 is formed by machining beforehand so that the chips and shavings generated when finish-machining the bearing hole can be discharged through the hole of the oil passage 40.

[0038] In the case of the rear side block 5 of Embodiment 2, holes are provided in the cutting tool and the grinding tool for finish-machining the bearing hole, and the chips and shavings are discharged through these holes.

(Third Embodiment)

[0039] In third embodiment, the second embodiment, in which the oil passage is formed inside the rotor shaft, is improved.

[0040] That is, as in the second embodiment, the vane back pressure chamber oil passage 42 is formed at the axial center inside the rotor shaft 10 so as to extend along the axial direction, and is radially deflected toward the outer periphery on the rotor 6 side. That is, the oil passage is composed of an axial portion 42a and a ra-

dial portion 42b.

[0041] Further, the axial portion 42a is reduced stepwise in diameter as it extends toward the rotor side at the connection portion where it is connected to the radial portion 42b; at the connection portion, there is arranged in the radial portion 42b a coil spring 45 so as to extend backwards along the axial direction, and a spherical valve body 46 is fixed to the rear end portion thereof. When the coil spring 45 is under no load, this valve body 46 is situated in the large diameter portion of the axial portion 42a to secure a large opening area in the axial portion 42a. On the other hand, in the state in which the coil spring 45 is contracted, the valve body moves to the small diameter side of the axial portion 42a to diminish the opening of the axial portion 42a. Apart from this, the construction of this embodiment is the same as that of the second embodiment, and a description thereof will be omitted.

[0042] In this third embodiment, when the compressor operates, gas is compressed, and lubricant oil moves within the compressor; as in the above embodiment, oil moves along the oil passage 42 and supplies oil to vane back pressure chambers (not shown) from the axial portion 42a through the radial portion 42b. In this oil passage 42, a centrifugal force is applied to the oil moving through this passage at the radial portion 42b with the rotation of the rotor shaft 10, and the oil moving through the axial portion 42a is sucked toward the rotor side. When the RPM of the rotor shaft 10 increases, the centrifugal force and the sucking force applied to the oil moving through the axial portion 42a increase; due to this sucking force, the valve body 46 moves toward the rotor side while contracting the coil spring 45, and the opening at the axial portion 42a is narrowed to restrain the movement of the oil in the axial portion 42a, whereby it is possible to prevent oil from moving excessively from the space on the rotor shaft rear end side to the vane back pressure chambers as a result of an increase in the RPM of the rotor shaft 10, thus securing an appropriate amount of oil on the rotor shaft rear end surface side.

[0043] As described above, the present invention provides a gas compressor comprising, a tubular cylinder, a front side block and a rear side block situated at the axial ends of the cylinder, a rotor rotatably arranged in the cylinder; a vane groove provided in the rotor, a vane back pressure chamber provided so as to communicate with an inner peripheral-side end portion of the vane groove, a vane accommodated in the vane groove so as to be capable of advancing and retreating, a rotor shaft for rotating the rotor, a high pressure chamber into which compressed gas is discharged from the interior of the cylinder; and an oil sump portion in which oil is stored and to which the pressure of the high pressure chamber is applied, wherein there is provided a lubricant oil space inside the rear side block and on the side of the rear end surface of the rotor shaft, there being provided an oil supply passage for supplying oil from the oil

sump portion to the lubricant oil space, and that there is formed in the rear side block or in the rotor shaft a vane back pressure chamber oil passage whose one end communicates with the oil accommodating space, the other end of the oil passage communicating with the vane back pressure chamber, whereby it is possible to form the space on the rotor shaft rear end surface side solely with the rear side block and abolish the O-ring for sealing the high pressure chamber to thereby achieve an improvement in reliability. Further, due to the abolishment of the O-ring, it is possible to achieve a reduction in cost and assembly man-hours.

15 Claims

1. A gas compressor comprising:

a cylinder;
a front side block and a rear side block situated at the axial ends of the cylinder;
a rotor rotatably arranged in the cylinder;
a vane groove provided in the rotor;
a vane back pressure chamber provided to an inner peripheral-side of the vane groove;
a vane accommodated in the vane groove so as to be capable of advancing and retreating;
a rotor shaft for rotating the rotor;
a high pressure chamber into which compressed gas is discharged from the cylinder;
an oil sump portion in which oil is stored and to which the pressure of the high pressure chamber is applied;
a lubricant oil space arranged inside the rear side block and on the side of the rear end surface of the rotor shaft;
an oil supply passage for supplying oil from the oil sump portion to the lubricant oil space; and
an oil passage formed in the rear side block or in the rotor shaft, one end of the oil passage communicating with the lubricant oil space and the other end communicating with the vane back pressure chamber.

2. A gas compressor according to Claim 1, wherein there is formed in the front end surface of the rear side block a flat groove communicating with the vane back pressure chamber, and that the flat groove is connected to the oil passage to establish communication between the oil passage and the vane back pressure chamber.

3. A gas compressor according to Claim 1, wherein the vane back pressure chamber is formed in the rotor shaft along the axial direction, and that the oil passage is radially deflected on the cylinder side to communicate with the vane back pressure chamber, there being arranged in the oil passage a throt-

the valve for limiting the opening area of the oil passage by a force sucking oil toward the vane back pressure chamber generated in the oil passage.

5

10

15

20

25

30

35

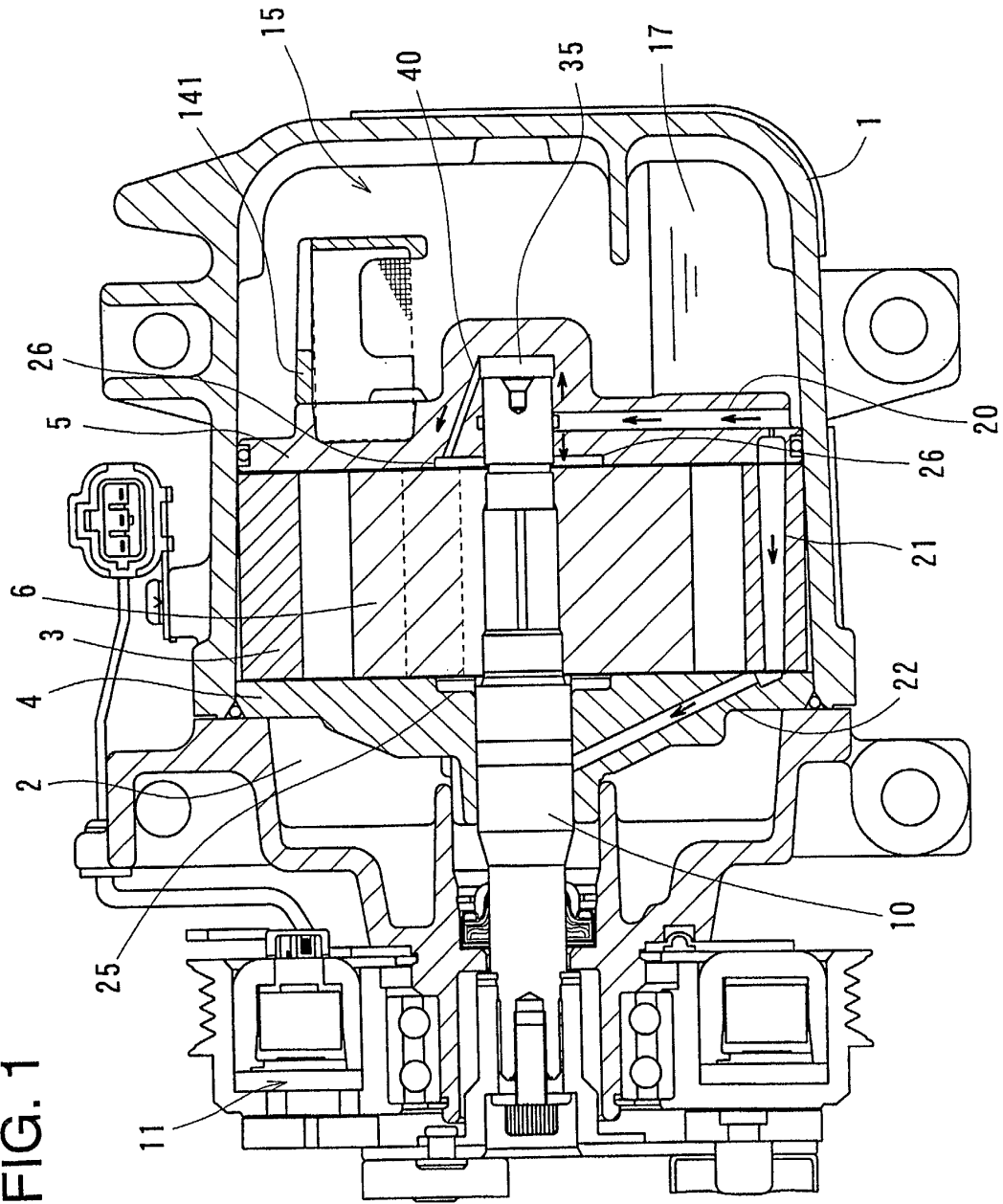
40

45

50

55

FIG. 1



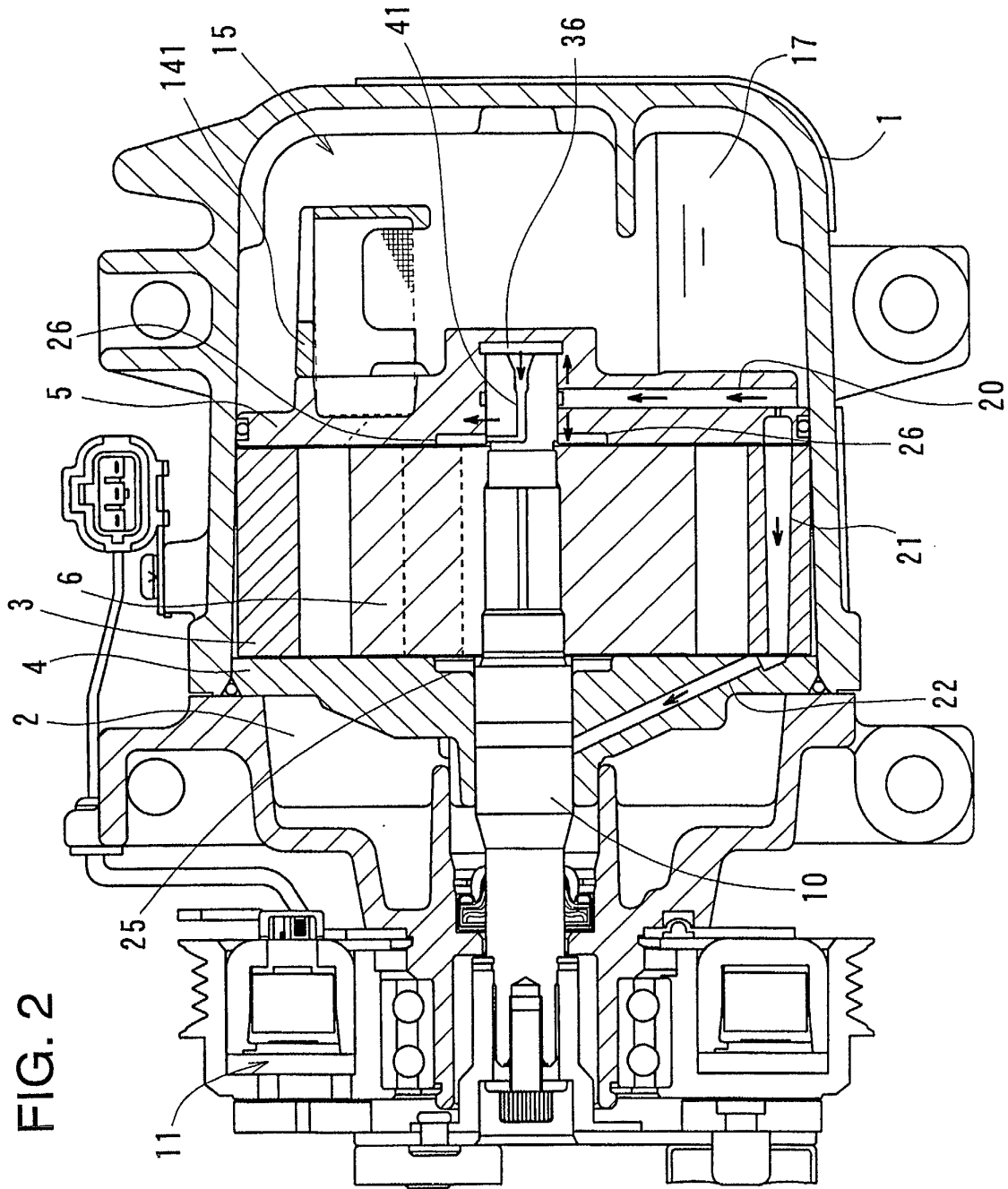


FIG. 3

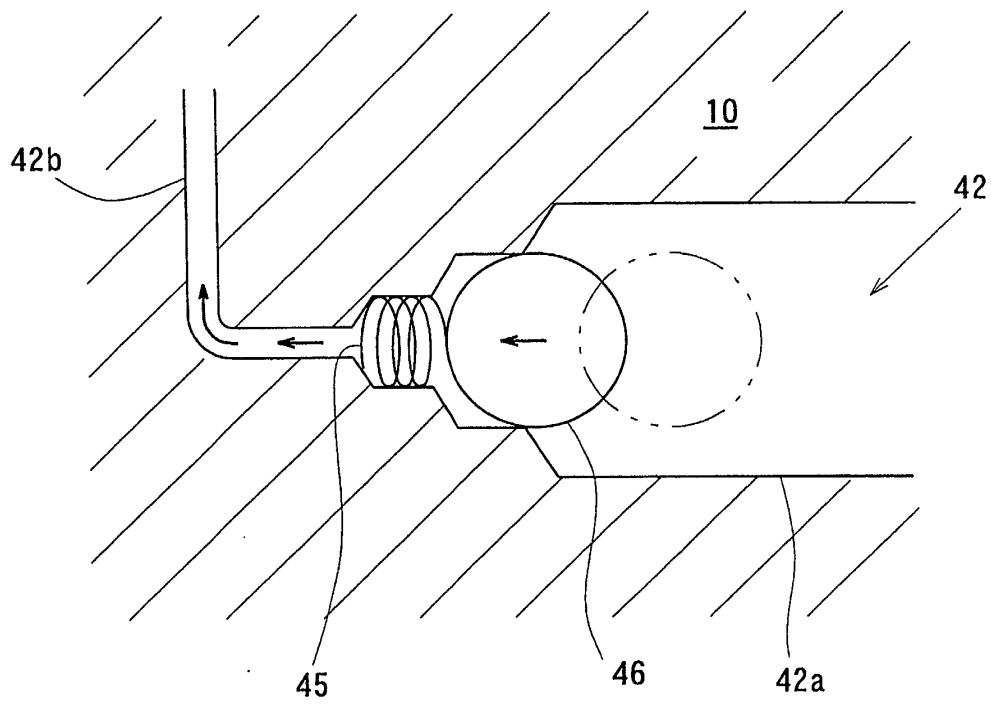


FIG. 4 PRIOR ART

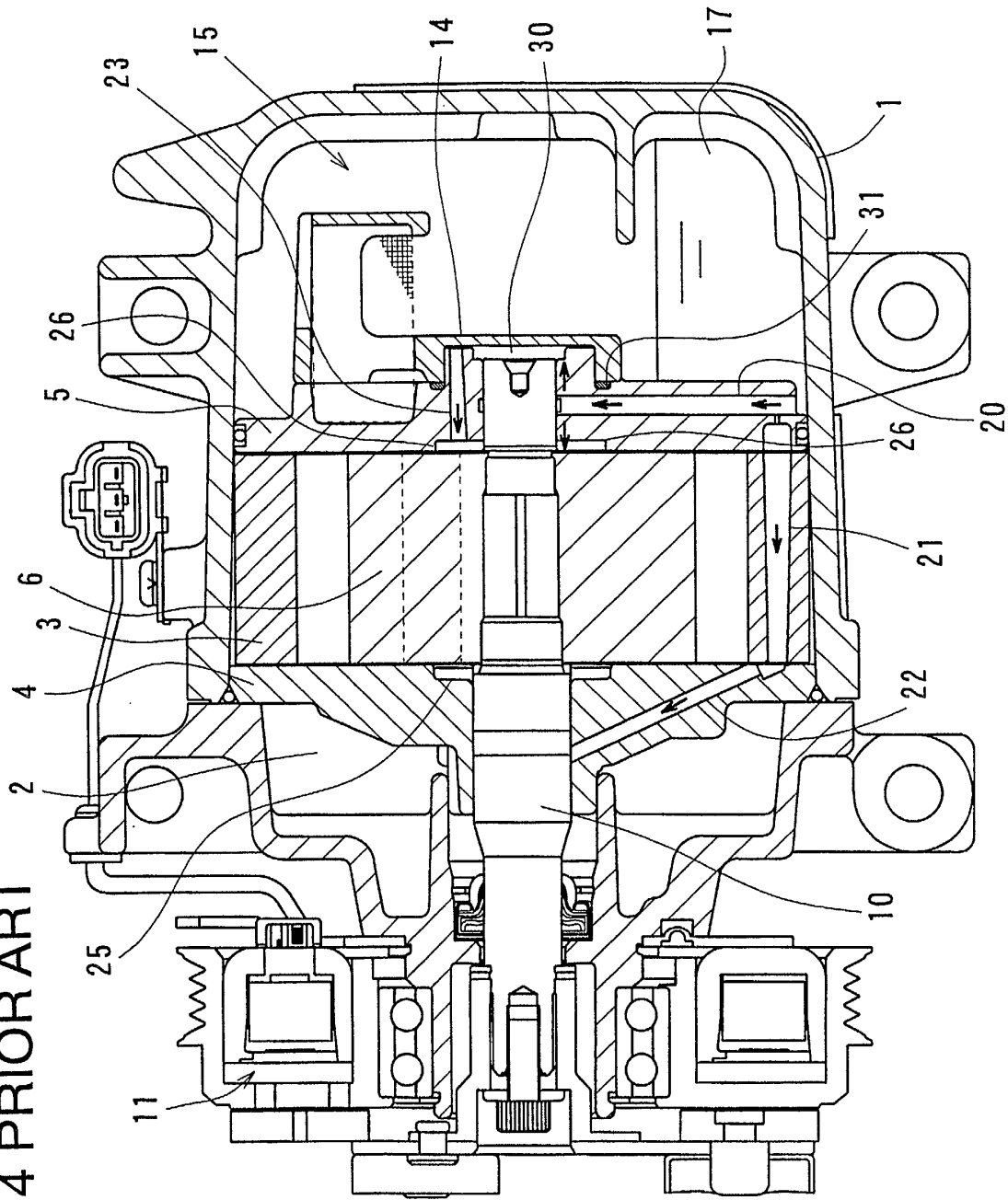


FIG. 5 PRIOR ART

