INTERNAL GEAR COMPRESSOR

A compressor comprises: a hermetic container (10) in which oil is contained; a driving motor (20) mounted in the hermetic container (10); a cylinder (30) mounted in the hermetic container (10); an outer gear (40) inserted into the cylinder (30) and having gear teeth (41) at an inner circumferential surface thereof; an inner gear (50) having gear teeth (51) at an outer circumferential surface thereof, rotatably inserted into the outer gear (40), and forming a plurality of compression spaces with the outer gear teeth (41); an upper bearing (60) and a lower bearing (70) respectively coupled to both lateral surfaces of the cylinder (30), for closing the compression spaces; a rotational shaft (80) for transmitting a rotational force of the driving motor (20) to the inner gear (50); and an oil supplying means for circulation-supplying the oil between the cylinder (30) and the outer gear (40) as the rotational shaft (80) is rotated. In the compressor, compressed gas is discharged many times as a driving motor (20) is rotated one time and thereby two gears (40, 50) are rotated with being engaged to each other, and an abrasion of two gears (40, 50) and components that perform a relative motion with the gears is minimized.
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.
Description
INTERNAL GEAR COMPRESSOR

Technical Field

[1] The present invention relates to a compressor, and more particularly, to a compressor capable of discharging compressed gas many times as a driving motor is rotated one time and thereby two gears are rotated with being engaged to each other and capable of minimizing an abrasion of two gears and components that perform a relative motion with the gears.

Background Art

[2] Generally, a compressor converts an electric energy into a kinetic energy, and compresses a refrigerant by the kinetic energy. The compressor is a core factor constituting a refrigerating cycle system, and is divided into a rotary compressor, a scroll compressor, a reciprocating compressor, and etc. according to a compression mechanism for compressing a refrigerant. The compressor is used at a refrigerator, an air conditioner, a showcase, etc.

[3] In the rotary compressor, a rotational force of a driving motor is transmitted to a rotational shaft, and thereby the rotational shaft is rotated. According to this, an eccentric portion provided at one side of the rotational shaft is rotated in a compression space of a cylinder block. According to this, a volume of the compression space of the cylinder block is changed with the vane provided at the cylinder block, thereby sucking, compressing, and discharging refrigerant gas. In the rotary compressor, as the driving motor is rotated one time, compression gas is discharged one time.

[4] In the scroll compressor, a rotational force of a driving motor is transmitted to a rotational shaft, and thereby the rotational shaft is rotated. According to this, an orbit scroll coupled to the rotational shaft is orbitingly-moved by being engaged to a fixed scroll, thereby sucking, compressing, and discharging refrigerant gas. In the scroll compressor, as the driving motor is rotated one time, compression gas is consecutively discharged two times.

[5] In the reciprocating compressor, a rotational force of a driving motor is transmitted to a crank shaft, and thereby the crank shaft is rotated. According to this, a piston coupled to the crank shaft is linearly-reciprocated in a compression space of a cylinder block, thereby sucking, compressing, and discharging refrigerant gas. In the reciprocating compressor, as the driving motor is rotated one time, compression gas is discharged one time.
As another compressor, there is a compressor composed of: a first gear having a plurality of gears at an inner circumferential surface thereof; and a second gear having a plurality of gears less than the first gear at an outer circumferential surface thereof and rotated with being engaged with the first gear. In said compressor mechanism, as the first gear and the second gear rotate one time with being engaged to each other, compressed gas is consecutively discharged many times. According to this, a compression efficiency and a stability are more excellent in the compression mechanism than in other compressors. Also, since a rotational shaft for transmitting a rotational force of a driving motor to the gears is symmetrical on the basis of the shaft center, an eccentric rotation is more restrained than in other compressors thereby to relatively reduce vibration or noise.

However, in the compression mechanism, since the gears are respectively rotated with being engaged to each other, a relative motion not only between the gears but also between components for supporting the gears is increased thereby to generate an abrasion between components much. According to this, it is an important task to minimize the abrasion between the gears and the components that perform a relative motion to the gears.

Therefore, an object of the present invention is to provide a compressor capable of discharging compressed gas many times as a driving motor is rotated one time and thereby two gears are rotated with being engaged to each other and capable of minimizing an abrasion of two gears and components that perform a relative motion to the gears.

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described herein, there is provided a compressor comprising: a hermetic container in which oil is contained; a driving motor mounted in the hermetic container; a cylinder mounted in the hermetic container with a certain interval from the driving motor; an outer gear rotatably inserted into the cylinder and having gear teeth at an inner circumferential surface thereof; an inner gear having gear teeth at an outer circumferential surface thereof, rotatably inserted into the outer gear, and forming a plurality of compression spaces with the outer gear teeth; an upper bearing and a lower bearing respectively coupled to both lateral surfaces of the cylinder, for closing the compression spaces; a rotational shaft for transmitting a rotational force of the driving motor to the inner gear; an oil supplying means for circulation-supplying the oil between the cylinder and the outer gear as the rotational shaft is rotated; and a suction means and a discharge means provided at the upper
bearing and the lower bearing, for sucking gas into the compression space and discharging the gas.

The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

Description of Drawings

The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

In the drawings:

FIG. 1 is a frontal section view showing one embodiment of a compressor according to the present invention;

FIGS. 2 and 3 are cross-section views showing the compressor;

FIG. 4 is a section view showing a modification example of an oil flow path constituting the compressor according to the present invention;

FIG. 5 is a section view showing a modification example of a third oil flow path constituting the compressor according to the present invention; and

FIG. 6 is a plane view showing an operation state of the compressor according to the present invention.

Best Mode

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

Hereinafter, a compressor according to the present invention will be explained with reference to the attached drawings.

FIG. 1 is a frontal section view showing one embodiment of a compressor according to the present invention, and FIGS. 2 and 3 are cross-section views showing the compressor.

As shown, the compressor comprises: a hermetic container 10 in which oil is contained; a driving motor 20 mounted in the hermetic container 10; a cylinder 30 mounted in the hermetic container 10; an outer gear 40 rotatably inserted into the cylinder 30 and having gear teeth 41 at an inner circumferential surface thereof; an inner gear 50 having gear teeth 51 less than the teeth 41 of the outer gear 40 at an outer circumferential surface thereof, rotatably inserted into the outer gear 40, and forming a plurality of compression spaces with the outer gear teeth 41; an upper bearing 60 and a
lower bearing 70 respectively coupled to both lateral surfaces of the cylinder 30, for closing the compression spaces; a rotational shaft 80 for transmitting a rotational force of the driving motor 20 to the inner gear 50; an oil supplying means for circulation-supplying the oil between the cylinder 30 and the outer gear 40 as the rotational shaft 80 is rotated; and a suction means and a discharge means provided at the upper bearing 60 and the lower bearing 70, for sucking gas into the compression spaces and discharging the gas.

[22] A suction pipe 11 for sucking gas inwardly and a discharge pipe 12 for discharging gas outwardly are connected to the hermetic container 10.

[23] The driving motor 20 includes: a stator 21 fixedly-coupled to the hermetic container 10; and a rotor 22 rotatably inserted into the stator 21. The rotational shaft 80 is forcibly-inserted into the rotor 22.

[24] The cylinder 30 is composed of: a cylindrical body portion 31 having a certain thickness; and a gear insertion hole 32 penetratingly-formed at the cylindrical body portion 31 with a certain inner diameter. The gear insertion hole 32 and the body portion 31 are eccentric to each other. The cylinder 30 is positioned at a lower side of the driving motor 20 with a certain interval.

[25] The outer gear 40 is composed of: a ring-shaped body portion 42 having a thickness corresponding to a thickness of the cylinder 30 and having an outer diameter corresponding to an inner diameter of the gear insertion hole 32; and a plurality of gear teeth 41 formed at an inner circumferential surface of the ring-shaped body portion 42 with the same interval. The outer gear 40 is rotatably inserted into the gear insertion hole 32 of the cylinder 30.

[26] The inner gear is composed of: a disc portion 52 having a thickness corresponding to a thickness of the outer gear 40; a plurality of gear teeth 51 formed at an outer circumferential surface of the disc portion 52; and a shaft coupling hole 53 for inserting the rotational shaft 80. The inner gear 50 is rotatably inserted into the outer gear 40 so that the gear teeth 51 can be in contact with the gear teeth 41. The inner gear 50 is concentric with the cylinder 30 into which the outer gear 40 is inserted.

[27] The number of the teeth 41 of the outer gear 40 is 7, and the number of the teeth 51 of the inner gear 50 is 6. As the teeth 41 of the outer gear 40 and the teeth 51 of the inner gear 50 are in line-contact with each other or in surface-contact with each other by being engaged to each other, a plurality of compression spaces are formed. As the inner gear 50 is rotated with a certain angle, the outer gear 40 is together rotated. According to this, a contact point between the outer gear 40 and the inner gear 50 is
changed and a volume of the compression space is changed.

[28] The number of the teeth 41 of the outer gear 40 and the teeth 51 of the inner gear 50 can be variously implemented. However, the number of the teeth 41 of the outer gear 40 is always larger than the number of the teeth 51 of the inner gear 50.

[29] One side of the rotational shaft 80 is penetratingly-coupled to the shaft coupling hole 53 of the inner gear 50. Another side of the rotational shaft 80 sinks under oil contained at a bottom surface of the hermetic container 10.

[30] The upper bearing 60 is composed of: a supporting plate portion 61 having a certain thickness and area; and a shaft inserting hole 62 formed at the center of the supporting plate portion 61, for inserting one side of the rotational shaft 80. The shaft inserting hole 62 is preferably formed to have a certain depth. The upper bearing 60 is coupled to one surface of the cylinder 30 so as to cover one side of the compression spaces. One side of the rotational shaft 80 is inserted into the shaft inserting hole 62 of the upper bearing.

[31] The lower bearing 70 is composed of: a supporting plate portion 71 having a certain thickness and area; and a shaft inserting hole 72 penetratingly-formed at the supporting plate portion 71, for inserting the rotational shaft 80. The shaft inserting hole 72 is penetratingly-formed at the supporting plate portion 71. The lower bearing 70 is coupled to another surface of the cylinder 30 so as to cover another side of the compression spaces. The rotational shaft 80 is inserted into the shaft inserting hole 72 of the lower bearing.

[32] The cylinder 30, the upper bearing 60, and the lower bearing 70 are coupled to one another by a plurality of bolts (not shown) thereby to form one assembly. The assembly is fixedly-supported by the hermetic container 10 as the cylinder 30 is fixedly-coupled to the hermetic container 10. The assembly can be fixedly-supported by the hermetic container 10 as the upper bearing 60 or the lower bearing 70 is fixedly-coupled to the hermetic container 10.

[33] A high/low pressure separation plate 13 for separating the hermetic container 10 into a high pressure portion and a lower pressure portion is coupled to an upper portion of the upper bearing 60. One side of the high/low pressure separation plate 13 is fixedly-coupled to an inner surface of the hermetic container 10. The suction pipe 11 is positioned at the low pressure side, and the discharge pipe 12 is positioned at the high pressure side.

[34] The suction means is provided at the lower bearing 70, and has a suction opening 73 penetratingly formed at the supporting plate portion 61 of the lower bearing with a
certain shape. The suction opening 73 is formed ranging through compression spaces of which volumes are increased as the rotational shaft 80 is rotated among said compression spaces.

[35] The discharge means is provided at the upper bearing 60. The discharge means includes: a discharge opening 63 penetratingly formed at the supporting plate portion 61 of the upper bearing; and a discharge valve 100 coupled to the supporting plate portion 61, for opening and closing the discharge opening 63. The discharge opening 63 is penetratingly formed at the upper bearing 60 so as to be positioned at a compression space having the minimum volume among said compression spaces.

[36] The oil supplying means includes: a first oil flow path F1 penetratingly formed at the rotational shaft 80; an oil feeder 110 mounted at the first oil flow path, for pumping oil to the first oil flow path F1 by a rotation of the rotational shaft 80; a second oil flow path F2 formed at the upper bearing 60 for guiding oil supplied to the first oil flow path F1 between the cylinder 30 and the outer gear 40; and a third oil flow path F3 formed at the lower bearing 70, for guiding oil that has passed between the cylinder 30 and the outer gear 40 to a bottom surface of the hermetic container 10.

[37] The first oil flow path F1 includes: a first oil hole 81 formed at one side end of the rotational shaft 80 in an axial direction with a certain length; a mounting hole 82 formed at an inlet of the first oil hole 81 with a certain depth, for mounting the oil feeder 110; and a second oil hole 83 connected to the first oil hole 81 at an outer circumferential surface of the rotational shaft 80. An inner diameter of the mounting hole 82 is formed to be larger than an inner diameter of the first oil hole 81. The oil feeder 110 preferably has a propeller form, and sinks under oil contained at the bottom surface of the hermetic container 10.

[38] An oil groove 33 having a certain width and depth is formed at an inner circumferential surface of the gear insertion hole 32 of the cylinder 30 in a circumferential direction. A first oil port 34 for connecting the oil groove 33 and the second oil flow path F2, and a second oil port 35 for connecting the oil groove 33 and the third oil flow path F3 are formed at an edge of the gear insertion hole 32.

[39] As another modification example of the oil flow path formed at the cylinder 30, as shown in FIG. 4, an oil port 36 connected to the second oil flow path F2 and guiding oil between the cylinder 30 and the outer gear 40 is formed at one side of the edge of the gear insertion hole 32 of the cylinder 30 into which the outer gear 40 is inserted. Oil introduced into the oil port 36 can be supplied between the outer gear 40 and the cylinder 30 by a relative motion between the outer gear 40 and the cylinder 30.
[40] The second oil flow path F2 includes: a shaft insertion hole 62 of the upper bearing 60; an oil filling groove 64 formed at an inner circumferential surface of the shaft insertion hole 62 in a circumferential direction as a ring shape having a certain width and depth, for containing oil supplied through the rotational shaft 80; a first oil hole 65 penetrating the oil filling groove 64 and an outer circumferential surface of the upper bearing 60; and a second oil hole 66 for connecting the first oil hole 65 and the first oil port 34.

[41] A hole covering member 130 is coupled to one side of the first oil hole 65 positioned at the outer circumferential surface of the upper bearing 60.

[42] The third oil flow path F3 is constituted as an oil through hole penetratingly formed at the lower bearing 70 so that oil that has passed between the cylinder 30 and the outer gear 40 can be dropped to the bottom surface of the hermetic container 10.

[43] As a modification example, as shown in FIG. 5, the third oil flow path F3 is composed of: a first oil hole 74 formed at the lower bearing 70 with a certain length and connected between the cylinder 30 and the outer gear 40; and a second oil hole 75 connected between the first oil hole 74 and the suction opening 73 formed at the lower bearing 70, for guiding oil to be partially sucked to the compression space with gas sucked through the suction opening 73. The first oil hole 74 is connected to the second oil port 35.

[44] Hereinafter, an operation and an effect of the compressor according to the present invention will be explained.

[45] When a power source is applied to the compressor, the driving motor 20 is operated thereby to generate a rotational force. The rotational force of the driving motor 20 is transmitted to the inner gear 50 through the rotational shaft 80, so that the inner gear 50 is rotated. According to this, the rotational force is transmitted to the outer gear 40 contacting the inner gear 50 at many points, so that the outer gear 40 is together rotated.

[46] Since the number of the teeth of the inner gear 50 is different from the number of the teeth of the outer gear 40, a plurality of contact points are formed between the teeth of the inner gear 50 and the teeth of the outer gear 40 and a plurality of compression spaces are formed. As the inner gear 50 is rotated, the outer gear 40 is together rotated and positions of the contact points between the inner gear 50 and the outer gear 40 are changed. At the same time, volumes of the compression spaces are respectively changed. As the volumes of the compression spaces are changed, gas introduced into the hermetic container 10 through the suction pipe 11 is sucked into the compression
spaces, compressed, and discharged through the discharge pipe 12.

When the number of the teeth 41 of the outer gear 40 is 7 and the number of the teeth 51 of the inner gear 50 is 6, 6 compression spaces are formed between the teeth 41 of the outer gear 40 and the teeth 51 of the inner gear 50 as shown in FIG. 6. If the inner gear 50 is rotated counterclockwise, on the basis of the line X1 of FIG. 6, three compression spaces P1, P2, and P3 become a suction state in which volumes thereof are gradually increased, and then three compression spaces P4, P5, and P6 become a compression state in which volumes thereof are gradually decreased. Since the number of the teeth 51 of the inner gear 50 is 6, the compression spaces formed by the inner gear 50 and the outer gear 40 are repeatedly formed as the same shape whenever the inner gear 50 is rotated by 60°. According to this, gas compressed in one compression space is discharged through the discharge means. Therefore, whenever the inner gear 50 is rotated once time, compressed gas is discharged through the discharge means six times.

In the above process, as the rotational shaft 80 is rotated, the oil feeder 110 coupled to the rotational shaft 80 is rotated thereby to pump oil. The oil pumped by the oil feeder 110 flows along the first oil flow path F1 of the rotational shaft 80 thereby to be introduced into the second oil flow path F2 of the upper bearing 60. Then, the oil introduced to the second oil flow path F2 of the upper bearing 60 is introduced between the outer gear 40 and the cylinder 30 through the second oil flow path F2. The oil introduced between the outer gear 40 and the cylinder 30 is supplied between the outer circumferential surface of the outer gear 40 and the inner circumferential surface of the gear insertion hole 32 of the cylinder 30, thereby serving as lubrication oil when the outer gear 40 and the cylinder 30 perform a relative motion each other.

More specifically, oil introduced into the second oil flow path F2 of the upper bearing 60 is introduced into the oil groove 33 of the cylinder 30 through the first oil port 34 of the cylinder 30. According to this, the oil is supplied between the outer circumferential surface of the outer gear 40 and the inner circumferential surface of the gear insertion hole 32 of the cylinder 30. The oil serves as lubrication oil between the outer circumferential surface of the outer gear 40 and the inner circumferential surface of the gear insertion hole 32 of the cylinder 30 when the outer gear 40 and the cylinder 30 perform a relative motion each other. Then, the oil is introduced into the third oil flow path F3 of the lower bearing 70 through the second oil port 35 of the cylinder 30, and then returns to the bottom surface of the hermetic container 10.

The outer gear 40 is together rotated as the inner gear 50 is rotated, and the outer
circumferential surface of the outer gear 40 performs a relative motion with the inner circumferential surface of the gear insertion hole 32 of the cylinder 30. Since the outer circumferential surface of the outer gear 40 is far from the rotational shaft 80, an amount of the relative motion between the outer circumferential surface of the outer gear 40 and the inner circumferential surface of the gear insertion hole 32 of the cylinder 30 is much. According to this, a frictional force between the outer circumferential surface of the outer gear 40 and the inner circumferential surface of the gear insertion hole 32 of the cylinder is great. Since the oil contained at the bottom surface of the hermetic container 10 is continuously supplied between the outer gear 40 and the cylinder 30 by the above process, a friction between the outer gear 40 and the cylinder 30 is minimized. Also, since the oil contained at the bottom surface of the hermetic container 10 circulates a friction generation part, heat generated by the friction is cooled.

[51] In case that the third oil flow path B3 formed at the lower bearing 70 is composed of the first oil hole 74 and the second oil hole 75, in the process that the oil that has performed a lubrication operation between the outer gear 40 and the cylinder 30 flows to the bottom surface of the hermetic container 10 through the first oil hole 74, the second oil hole 75, and the suction opening 73, oil positioned at the suction opening 73 is partially introduced into the compression space with gas sucked into the suction opening 73. The oil introduced into the compression space is supplied to two components that perform a relative motion each other among the inner gear 50, the outer gear 40, the upper bearing 60, and the lower bearing 70 thus to perform a lubrication operation, thereby reducing a friction between components.

**Industrial Applicability**

[52] As aforementioned, in the compressor according to the present invention, the outer gear 40 and the inner gear 50 are rotated by being engaged each other whenever the driving motor 20 is rotated one time, and thereby compressed gas is consecutively discharged many times. According to this, gas is stably compressed, a compression efficiency is enhanced, and a stability is obtained since rotation components such as the rotational shaft, inner gear, etc. rotated with the rotor of the driving motor are rotated with a balance one another.

[53] Additionally, since oil is smoothly supplied between the outer gear 40 and the cylinder 30 where a frictional force is greatly applied, a friction between the outer gear 40 and the cylinder 30 is decreased thereby to enhance a reliability of the outer gear 40 and the cylinder 30 and to reduce noise due to the friction.
Also, while the oil contained at the bottom surface of the hermetic container 10 is supplied between the outer gear 40 and the cylinder 30 and the supplied oil returns to the bottom surface repeatedly, not only frictional heat generated between the outer gear 40 and the cylinder 30 but also heat generated at other components are cooled. According to this, overheating of components is prevented.

As the present invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its spirit and scope as defined in the appended claims, and therefore all changes and modifications that fall within the metes and bounds of the claims, or equivalence of such metes and bounds are therefore intended to be embraced by the appended claims.
Claims

[1] A compressor comprising:
a hermetic container in which oil is contained;
a driving motor mounted in the hermetic container;
a cylinder mounted in the hermetic container;
an outer gear inserted into the cylinder and having gear teeth at an inner circumferential surface thereof;
an inner gear having gear teeth at an outer circumferential surface thereof, rotatably inserted into the outer gear, and forming a plurality of compression spaces with the outer gear teeth;
an upper bearing and a lower bearing respectively coupled to both lateral surfaces of the cylinder, for closing the compression spaces;
a rotational shaft for transmitting a rotational force of the driving motor to the inner gear;
an oil supplying means for circulation-supplying the oil between the cylinder and the outer gear as the rotational shaft is rotated; and
a suction means and a discharge means provided at the upper bearing and the lower bearing, for sucking gas into the compression space and discharging the gas.

[2] The compressor of claim 1, wherein the driving motor is positioned at a lower side of the cylinder.

[3] The compressor of claim 1, wherein the number of the teeth of the outer gear is 7, and the number of the teeth of the inner gear is 6.

[4] The compressor of claim 1, wherein the oil supplying means includes:
a first oil flow path penetratingly formed at the rotational shaft;
an oil feeder mounted at the first oil flow path, for pumping oil to the first oil flow path by a rotation of the rotational shaft;
a second oil flow path formed at the upper bearing for guiding oil supplied to the first oil flow path between the cylinder and the outer gear; and
a third oil flow path formed at the lower bearing, for guiding oil that has passed between the cylinder and the outer gear to a bottom surface of the hermetic container.

[5] The compressor of claim 4, wherein an oil port connected to the second oil flow path and guiding oil between the cylinder and the outer gear is formed at one
side of an edge of the gear insertion hole of the cylinder into which the outer
gear is inserted.

[6] The compressor of claim 4, wherein an oil groove having a certain width and
depth is formed at an inner circumferential surface of the gear insertion hole of
the cylinder in a circumferential direction, a first oil port for connecting the oil
groove and the second oil flow path is formed at an edge of the gear insertion
hole, and a second oil port for connecting the oil groove and the third oil flow
path is formed at the edge of the gear insertion hole.

[7] The compressor of claim 4, wherein the first oil flow path includes:
a mounting hole formed at one end of the rotational shaft with a certain depth,
for mounting the oil feeder;
a first oil hole connected to the mounting hole and formed at the rotational shaft
in an axial direction with a certain length; and
a second oil hole connected to the first oil hole at an outer circumferential
surface of the rotational shaft.

[8] The compressor of claim 4, wherein the second oil flow path includes:
a shaft insertion hole formed at the upper bearing with a certain depth, for
inserting a part of the rotation shaft;
an oil filling groove formed at an inner circumferential surface of the shaft
insertion hole in a circumferential direction as a ring shape having a certain
width and depth, for containing oil supplied through the rotational shaft;
a first oil hole penetrating the oil filling groove and an outer circumferential
surface of the upper bearing; and
a second oil hole for connecting one side of the first oil hole and between the
cylinder and the outer gear.

[9] The compressor of claim 8, wherein a hole covering member is coupled to one
side of the first oil hole positioned at the outer circumferential surface of the
upper bearing.

[10] The compressor of claim 8, wherein the shaft insertion hole is formed to have a
certain depth.

[11] The compressor of claim 4, wherein the third oil flow path is an oil through hole
for guiding oil that has passed between the cylinder and the outer gear to drop
downwardly.

[12] The compressor of claim 4, wherein the third oil flow path is composed of:
a first oil hole formed at the lower bearing with a certain length and connected
between the cylinder and the outer gear; and
a second oil hole connected between the first oil hole and the suction means
formed at the lower bearing, for guiding a part of oil to be sucked to the
compression space with gas sucked through the suction means.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
   IPC: F04C 18/10, F04C 29/02, F04C 2/10
   According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
   Minimum documentation searched (classification system followed by classification symbols)
   IPC: F04C

   Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
   --

   Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
   EPDOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT
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<td>US 3250459 A (BROWN) 10 May 1966 (10.05.1966) column 2, lines 7-58, figure 2.</td>
<td>1, 3</td>
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<td>A</td>
<td>DE 2134766 A (BORSIG GmbH) 1 February 1973 (01.02.1973) pages 9-12, figures 3, 4.</td>
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   "A" document defining the general state of the art which is not considered to be of particular relevance
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   Date of the actual completion of the international search 19 April 2005 (19.04.2005)
   Date of mailing of the international search report 12 May 2005 (12.05.2005)

   Name and mailing address of the ISA/AT Austrian Patent Office
   Dresdner Straße 87, A-1200 Vienna
   Facsimile No. +43 / 1 / 534 24 / 535

   Authorized officer HÖRZER K.
   Telephone No. +43 / 1 / 534 24 / 359

Form PCT/ISA/210 (second sheet) (January 2004)
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<td>US 5501585 A (OGAWA) 26 March 1996 (26.03.1996) abstract, column 2, line 55 - column 3, line 85, figures 1-4.</td>
<td>1, 4, 5</td>
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<td>PATENT ABSTRACTS OF JAPAN vol. 17, no. 572 (M-1497) 18 October 1993 (18.10.1993) &amp; JP-A-5164080 (NIPPONDENSO CO LTD) 29.06.1993 abstract, figures 1, 2.</td>
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Continuation of first sheet

Continuation No. II

Observations where certain claims were found unsearchable

(Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

Claims Nos.: 10 because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

Said claim No. 10 represents a conceptual formulation only.

____________________________________

Continuation No. IV:

Text of the abstract

(Continuation of item 5 of the first sheet)

A compressor comprises: a hermetic container (10) in which oil is contained; a driving motor (20) mounted in the hermetic container (10); a cylinder (30) mounted in the hermetic container (10); an outer gear (40) inserted into the cylinder (30) and having gear teeth (41) at an inner circumferential surface thereof; an inner gear (50) having gear teeth (51) at an outer circumferential surface thereof, rotatably inserted into the outer gear (40), and forming a plurality of compression spaces with the outer gear teeth (41); an upper bearing (60) and a lower bearing (70) respectively coupled to both lateral surfaces of the cylinder (30), for closing the compression spaces; a rotational shaft (80) for transmitting a rotational force of the driving motor (20) to the inner gear (50); and an oil supplying means for circulation-supplying the oil between the cylinder (30) and the outer gear (40) as the rotational shaft (80) is rotated. In the compressor, compressed gas is discharged many times as a driving motor (20) is rotated one time and thereby two gears (40, 50) are rotated with being engaged to each other, and an abrasion of two gears (40, 50) and components that perform a relative motion with the gears is minimized.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

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<td>DE A1 2134766</td>
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