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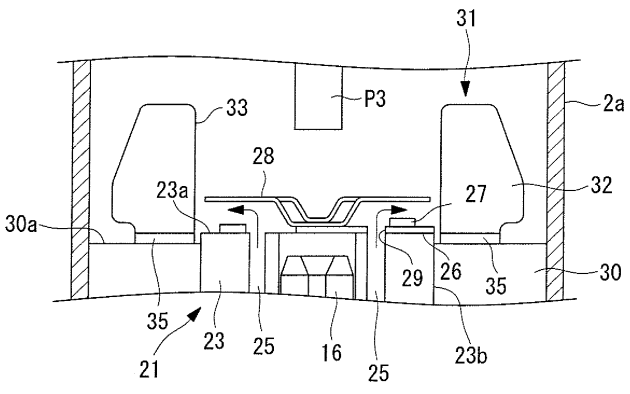
(54) ROTARY COMPRESSOR

(57) A rotary compressor that can improve oil separation efficiency is provided. A rotator (21) is fixed to a crank shaft (16) such that an upper end face (23a) of a rotor core (23) is situated at a position upper than an upper end face (30a) of a stator core (30), and when an open end situated at an entrance side of a communicating channel (35) is seen from an open end situated at an exit side of the relevant communicating channel (35), a covering ratio of the open end, which is situated at the entrance side of the communicating channel (35), by a side face (23b) of the rotor core (23) is 30% to 80%.

FIG. 2



EP 2 169 232 A1

Description

Technical Field

[0001] The present invention relates to a rotary compressor.

Background Art

[0002] A rotary compressor is used for compressing a gas refrigerant in a refrigerant circuit in an air conditioning system such as a room air conditioner or a packaged air conditioner.
As such a rotary compressor, for example, a rotary compressor disclosed in patent document 1 is known.
Patent document 1: Japanese Unexamined Patent Application, Publication No. 2005-337210

Disclosure of Invention

[0003] In the rotary compressor disclosed in the patent document 1, a plurality of communicating channels are formed in a proximal end of a crossover portion of a stator core situated in the upside, each of which extends along a direction perpendicular to a rotation axis of a crank shaft, and communicates between the inside of a concave portion formed by the crossover portion of the stator core situated in the upside, and the inside of a barrel of a housing. Therefore, there has been a problem that a part of a mixture of a lubricant and a refrigerant gas, the mixture being introduced into the concave portion through a plurality of passages extending in a vertical direction along an axial hole of a rotor core, is discharged from the rotary compressor through the communicating channels, consequently the part of the mixture outflows into a refrigerant circuit at a downstream side.
[0004] The invention was made in the light of the above circumstance, and an object of the invention is to provide a rotary compressor that can improve oil separation efficiency.
[0005] The invention employs the following means for solving the problem.
A first aspect of the rotary compressor according to the invention includes a rotary compressor having a housing, a compression mechanism section accommodated in a lower side of the housing, and a drive part accommodated in an upper side of the housing, in which the drive part has a rotator that is fitly fixed around a crank shaft, and rotates with the crank shaft, and a stator that is disposed at an outer circumferential side of the rotator and fixed to the housing, an oil separator plate is attached to an upper end face of a rotor core of the rotator such that the separator plate covers the upper end face, and is situated in a concave portion formed by a crossover portion projecting from an upper end face of a stator core of the stator, and a plurality of communicating channels, which communicates between the inside of the concave portion and the inside of a barrel of the housing, are formed at a proximal end of the crossover portion; wherein the rotator is fixed to the crank shaft such that the upper end face of the rotor core is situated at a position upper than the upper end face of the stator core, and when an open end situated at an entrance side of a communicating channel is seen from an open end situated at an exit side of the relevant communicating channel, a covering ratio of the open end, which is situated at the entrance side of the communicating channel, by a side face of the rotor core is 30% to 80%.
[0006] According to the rotary compressor according to the first aspect, when the open end situated at the entrance side of the communicating channel is seen from the open end situated at the exit side of the same communicating channel, a covering ratio of the open end, which is situated at the entrance side of the communicating channel, by the side face of the rotor core (stator-coil gap shielding ratio) is 30% to 80%, thereby the amount of mixture leaking (escaping) into the barrel of the housing through the communicating channels can be reduced, and the amount of mixture colliding with the crossover portion can be increased, consequently separation efficiency of oil particles can be improved.
Moreover, oil can be prevented from outflowing to the outside of the housing, so that a lubricant can be avoided from being insufficiently supplied to respective components within the housing, consequently life of the rotary compressor can be increased.
[0007] A second aspect of the rotary compressor according to the invention includes a rotary compressor having a housing, a compression mechanism section accommodated in a lower side of the housing, and a drive part accommodated in an upper side of the housing, in which the drive part has a rotator that is fitly fixed around a crank shaft, and rotates with the crank shaft, and a stator that is disposed at an outer circumferential side of the rotator and fixed to the housing, an oil separator plate is attached to an upper end face of a rotor core of the rotator such that the oil separator plate covers the upper end face, and is situated in a concave portion formed by a crossover portion projecting from an upper end face of a stator core of the stator, and a plurality of communicating channels, which communicates between the inside of the concave portion and the inside of a barrel of the housing, are formed at a proximal end of the crossover portion; wherein a closing member is provided over entrance ends and/or exit ends of the communicating channels.
[0008] According to the rotary compressor according to the second aspect, the closing member is simply used to close the open ends situated at the exit sides of the communicating channels, thereby the amount of mixture leaking (escaping) into the barrel of the housing through the communicating channels can be made zero (or extremely reduced), and the amount of the mixture colliding with the crossover portion can be increased, consequently separation efficiency of oil particles can be improved.
Moreover, oil can be prevented from outflowing to the

outside of the housing, so that a lubricant can be avoided from being insufficiently supplied to respective components within the housing, consequently life of the rotary compressor can be increased.

[0009] A third aspect of the rotary compressor according to the invention includes a rotary compressor having a housing, a compression mechanism section accommodated in a lower side of the housing, and a drive part accommodated in an upper side of the housing, in which the drive part has a rotator that is fitly fixed around a crank shaft, and rotates with the crank shaft, and a stator that is disposed at an outer circumferential side of the rotator and fixed to the housing, an oil separator plate is attached to an upper end face of a rotor core of the rotator such that the oil separator covers the upper end face, and is situated in a concave portion formed by a crossover portion projecting from an upper end face of a stator core of the stator, and a plurality of communicating channels, which communicate between the inside of the concave portion and the inside of a barrel of the housing, are formed at a proximal end of the crossover portion; wherein the communicating channels are formed such that the amount of a mixture of oil particles and a refrigerant gas outflowing into the barrel of the housing through the communicating channels is zero or extremely small amount.

[0010] According to the rotary compressor according to the third aspect, the amount of mixture leaking (escaping) into the barrel of the housing through the communicating channels can be zero or extremely reduced (minimized), and the amount of the mixture colliding with the crossover portion can be increased, consequently separation efficiency of oil particles can be improved.
Moreover, oil can be prevented from outflowing to the outside of the housing, so that a lubricant can be avoided from being insufficiently supplied to respective components within the housing, consequently life of the rotary compressor can be increased.

[0011] In an air conditioning system according to a fourth aspect of the invention, since a rotary compressor having improved oil separation efficiency is provided, a refrigerant gas containing oil can be prevented from outflowing into a refrigerant circuit, consequently system COP of the refrigerant circuit as a whole can be extremely improved.

[0012] According to the invention, an advantage that oil separation efficiency can be improved is obtained.

Brief Description of Drawings

[0013]

[Fig. 1] Fig. 1 shows a schematic, vertical section diagram of a rotary compressor according to a first embodiment of the invention.
[Fig. 2] Fig. 2 shows an enlarged vertical section diagram of a relevant part of Fig. 1.
[Fig. 3] Fig. 3 shows a graph showing a relationship between compressor efficiency and a stator-coil gap shielding ratio, and a relationship between system COP and the stator-coil gap shielding ratio in the rotary compressor according to the first embodiment of the invention.
[Fig. 4] Fig. 4 shows a schematic, vertical section diagram of a rotary compressor according to a second embodiment of the invention.

Explanation of Reference:

[0014]

1:	rotary compressor
2:	housing
2a:	barrel
3:	compression mechanism section
4:	drive part
16:	crank shaft
21:	rotator
22:	stator
23:	rotor core
23a:	upper end face
23b:	side face
28:	oil separator plate
30:	stator core
30a:	upper end face
32:	crossover portion
33:	concave portion
35:	communicating channel
40:	rotary compressor
41:	band member (closing member)

Best Mode for Carrying Out the Invention

[0015] Hereinafter, a first embodiment of a rotary compressor according to the invention is described according to Figs. 1 to 3.
Fig. 1 shows a schematic, vertical section diagram of a rotary compressor according to the embodiment, Fig. 2 shows an enlarged vertical section diagram of a relevant part of Fig. 1, and Fig. 3 shows a graph showing a relationship between compressor efficiency and a stator-coil gap shielding ratio, and a relationship between system COP and the stator-coil gap shielding ratio in the rotary compressor according to the embodiment.

[0016] A rotary compressor 1 according to the embodiment is provided on a refrigerant circuit of an air conditioning system such as a room air conditioner or packaged air conditioner, and used for compressing a gas refrigerant circulating through the refrigerant circuit.
As shown in Fig. 1, the rotary compressor 1 has a housing 2 being a closed vessel, and a compression mechanism section 3 for compressing a gas refrigerant supplied from the refrigerant circuit, and a drive part 4 for driving the compression mechanism section 3 are accommodated in the housing 2.

[0017] In the embodiment, the housing 2 is formed as an approximately cylindrical, closed vessel being closed

at both ends, and installed with an approximately vertical axis. The compression mechanism section 3 is disposed in a lower side of the housing 2, and the drive part 4 is disposed above the compression mechanism section 3. A lower side-face of the housing 2 is inserted with refrigerant pipes P1 and P2 of the refrigerant circuit from the outside, and the gas refrigerant is supplied from the refrigerant circuit to the compression mechanism section 3 through the refrigerant pipes P1 and P2.

Here, while not shown, an oil reservoir room is provided in a bottom of the housing 2, and a lubricant used for lubrication of the compression mechanism section 3 and the like is reserved in the oil reservoir room.

[0018] The compression mechanism section 3 compresses the gas refrigerant supplied through the refrigerant pipes P1 and P2 into a high-pressure compressed gas, then sends out the gas into the housing 2.

Here, a top of the housing 2 is inserted with a refrigerant pipe P3 from the outside, and the compressed gas being temporarily reserved in the housing 2 is sent to a downstream side of the refrigerant circuit through the refrigerant pipe P3.

[0019] The compression mechanism section 3 has a plurality of cylinders 11 each having a cylindrical inner-face 12, and the cylinders 11 are adjacently disposed in an axial direction in a manner that respective cylindrical inner-faces 12 are approximately coaxial with each other, and a separator 13 is interposed between the cylinders. A cylindrical rotor 14 having a smaller diameter than that of each cylindrical inner-face 12 is provided within each of the cylinders 11 with its axis being approximately parallel to an axis of each cylindrical inner-face 12.

[0020] A crank shaft 16 is inserted through the cylinders 11, separator 13, and rotors 14. The crank shaft 16 is provided with its axis being approximately parallel to an array direction of the cylinders 11, and inserted into the compression mechanism section 3 at a lower-end side. Here, the crank shaft 16 is supported at an upper-end side by the drive part 4, and rotationally driven about the axis by the drive part 4. In the embodiment, the drive part 4 includes an electromotive motor having a rotor holding the upper-end side of the crank shaft 16, and the rotor is rotated to rotationally drive the crank shaft 16.

[0021] The crank shaft 16 has a region to be inserted into respective cylinders 11, in which approximately cylindrical, eccentric shafts 17 are provided, the shafts being engaged with inner circumferential faces of the rotors 14 respectively, and the crank shaft 16 is rotationally driven about the axis, thereby each rotor 14 is eccentrically rotated in a manner of rolling on the cylindrical inner surface 12 of each cylinder 11.

Here, the eccentric shafts 17 are provided while eccentric directions thereof are shifted approximately 180 degrees from each other about the axis of the crank shaft 16 (that is, phases are shifted about 180 degrees from each other about the axis). Thus, when the crank shaft 16 is rotationally driven, inertia moment produced in one eccentric shaft 17 and inertia moment produced in the other eccentric shaft 17 are cancelled by each other, so that rotation of the crank shaft 16 is stabilized.

Moreover, an array of the cylinders 11 is mounted with end bearings 18 at one end side and at the other end side respectively, and the crank shaft 16 is supported by the end bearings 18 while it can be rotated about the axis.

[0022] The drive part 4 has a rotator 21 being fitly fixed around the crank shaft 16, and a stator 22 arranged at an outer circumferential side of the rotator 21.

The rotator 21 includes a core (hereinafter, called "rotor core") 23 formed by stacking a plurality of thin materials such as silicon steel sheets formed in a certain shape, and the rotor core 23 has a plurality of through-holes (hereinafter, called "passages") 25 extending in a vertical direction along an axial hole 24 of the rotor core. Each of the passages 25 has a lower end being an open end, and a mixture of a lubricant, which is for smoothly driving the compression mechanism section 3 and the drive part 4, and the refrigerant gas flows into the passages 25 through the open ends. It is also acceptable that a cylindrical body is fitted in the axial hole 24 of the rotor core 23, and the crank shaft 16 is pressed into the cylindrical body.

[0023] On the other hand, as shown in Fig. 2, a disk-like oil separator plate 28 is mounted on an upper end face 23a of the rotor core 23 via an attachment stage 26 and fastening members (for example, bolts and nuts) 27 such that the plate 28 covers the upper end face 23a. In the attachment stage 26, a plurality of through-holes 29 are provided, which penetrate the stage 26 in a thickness direction, and are adjusted to open ends provided at upsides of the passages 25 respectively. The mixture of the lubricant and the refrigerant gas flowing into the passages 25 through the open ends provided at the lower side of the passages 25 outflows to the outside of the rotor core 23 (into a space formed between the upper end face 23a of the rotor core 23 and the oil separator plate 28) through the open ends provided at the upsides of the passages 25 and the through-holes 29 as shown in arrows in full line of Fig. 2.

[0024] As shown in Fig. 1, the stator 22 includes a core (hereinafter, called "stator core") 30 formed by stacking a plurality of thin materials such as silicon steel sheets formed in a certain shape, and coil ends (crossover portions) 31 wind on teeth of the stator core 30. In this case, crossover portions 32 of the coil ends 31 project from either of end faces 30a and 30b of the stator core 30, and thus form upper and lower concave portions 33 and 34 in the compression mechanism section 3. In the concave portion 33, the attachment stage 26 and the oil separator plate 28 are accommodated. The stator core 30 is fixed by pressing in a barrel 2a of the housing 2 (shrinkage fit).

[0025] As shown in Fig. 2, at a proximal end of the crossover portion 32 (end situated at a side of the stator core 30), a plurality of communicating channels 35 are formed, each of which extends in a direction perpendicular to the rotation axis of the crank shaft 16, and com-

municates between the inside of the concave portion 33 and the inside of the barrel 2a of the housing 2.

[0026] In the embodiment, the rotator 21 is fixed to the crank shaft 16 such that an upper end face 23a of the rotor core 23 is situated at a position upper than the upper end face 30a situated at an upside of the stator core 30, and when an open end situated at an entrance side (inside in a radial direction) of a communicating channel 35 is seen from an open end situated at an exit side (outside in a radial direction) of the same communicating channel 35, a covering (closing) ratio of the open end, which is situated at the entrance side of the communicating channel 35, by a side face 23b of the rotor core 23 (stator-coil gap shielding ratio) is 30% to 80% (most preferably, about 50%).

[0027] In the rotary compressor 1 configured in this way, the mixture (mixture of the refrigerant gas and the lubricant) rising through the passage 25 outflows into a space formed between the upper end face 23a of the rotor core 23 and the oil separator plate 28. Then, the outflowing mixture is radially scattered (dispersed) to a crossover portion 32 side due to centrifugal force caused by rotation of the oil separator plate 28, and collides with the crossover portion 32. When the mixture collides with the crossover portion in this way, oil in the mixture adheres on a side face of the crossover portion 32, so that the oil is separated from the refrigerant gas. The separated oil is returned to the oil reservoir room provided in the lower side of the housing 2 along the stator 22. On the other hand, the separated refrigerant gas is discharged to the outside of the housing 2 via the refrigerant pipe P3 provided in a top of the housing 2.

[0028] According to the rotary compressor 1 according to the embodiment, the stator-coil gap shielding ratio is designed to be 30% to 80%, thereby the amount of mixture leaking (escaping) into the barrel 2a of the housing 2 through the communicating channel 35 can be reduced, and the amount of mixture colliding with the crossover portion 32 can be increased, consequently separation efficiency of oil particles can be improved. As a result, as shown in Fig. 3, while compression efficiency is somewhat reduced (because the amount of flux is reduced, and a motor current is increased, thereby motor efficiency is reduced, and magnet pull force is increased, and accordingly thrust loss is increased, leading to increase in mechanical loss), the refrigerant gas containing oil can be prevented from outflowing into a refrigerant circuit using the rotary compressor 1, consequently system COP of the refrigerant circuit as a whole can be extremely improved. Moreover, oil can be prevented from outflowing to the outside of the housing 2, so that the lubricant can be avoided from being insufficiently supplied to respective components in the housing 2, consequently life of the rotary compressor 1 can be increased.

[0029] A second embodiment of the rotary compressor according to the invention is described according to Fig. 4. Fig. 4 shows a schematic, vertical section diagram of the rotary compressor according to the embodiment.

A rotary compressor 40 according to the embodiment is different from the rotary compressor of the described first embodiment in that the rotator 21 is fixed to the crank shaft 16 such that the stator-coil gap shielding ratio is 0% (that is, the upper end face 23a of the rotor core 23 and the upper end face 30a situated at the upside of the stator core 30 are situated on the same plane), and the open ends situated at the exit sides of the communicating channels 35 are closed by a band member (closing member) 41.

Since other components are the same as those in the first embodiment, description of them is omitted here. In Fig. 4, the same members as in the first embodiment are marked with the same references respectively.

[0030] The band member 41 is a belt-like (film-like) or wire-like member including a heat-resistant and refrigerant-resistant material (polyester series material), and wind so as to close the open ends situated at the exit sides of the communicating channels 35. The band member 41 prevents the mixture, which has flown into the communicating channels 35 through the open ends situated at the entrance sides of the communicating channels 35, from leaking (escaping) into the barrel 2a of the housing 2 through the open ends situated at the exit sides of the communicating channels 35.

[0031] According to the rotary compressor 40 according to the embodiment, the band member 41 is simply used to close the open ends situated at the exit sides of the communicating channels 35, thereby the amount of mixture leaking (escaping) into the barrel 2a of the housing 2 through the communicating channels 35 can be made zero (or extremely reduced), and the amount of the mixture colliding with the crossover portion 32 can be increased, consequently separation efficiency of oil particles can be improved. As a result, the refrigerant gas containing oil can be prevented from outflowing into a refrigerant circuit using the rotary compressor 40, consequently system COP of the refrigerant circuit as a whole can be improved. Moreover, oil can be prevented from outflowing to the outside of the housing 2, so that the lubricant can be avoided from being insufficiently supplied to respective components in the housing 2, consequently life of the rotary compressor 40 can be increased.

While description was made on a configuration where the band member 41 was used to close the open ends situated at the exit sides of the communicating channels 35 in the embodiment, the invention is not limited to such a configuration, and a configuration where the band member 41 is used to close the open ends situated at the entrance sides of the communicating channels 35 may be used, or a configuration where the band member 41 is used to close the open ends situated at both of the entrance sides and the exit sides of the communicating channels 35 may be used.

[0032] A third embodiment of the rotary compressor according to the invention is described.

A rotary compressor according to the embodiment is different from the rotary compressor of the described em-

bodiments in that the rotator 21 is fixed to the crank shaft 16 such that the stator-coil gap shielding ratio is 0% (that is, the upper end face 23a of the rotor core 23 and the upper end face 30a situated at the upside of the stator core 30 are situated on the same plane), and the crossover portion 32 is formed such that the communicating channels 35 are not formed, or each communicating channel 35 is formed such that inner diameter of the communicating channel 35 is smaller than that in each of the described embodiments.

[0033] According to the rotary compressor according to the embodiment, the amount of the mixture leaking (escaping) into the barrel 2a of the housing 2 through the communicating channels 35 can be zero or extremely reduced (minimized), and the amount of the mixture colliding with the crossover portion 32 can be increased, consequently separation efficiency of oil particles can be improved. As a result, the refrigerant gas containing oil can be prevented from outflowing into a refrigerant circuit using the rotary compressor, consequently system COP of the refrigerant circuit as a whole can be improved. Moreover, oil can be prevented from outflowing to the outside of the housing 2, so that the lubricant can be avoided from being insufficiently supplied to respective components in the housing 2, consequently life of the rotary compressor can be increased.

[0034] The invention is not limited to the above embodiments, and can be carried out with being appropriately modified or altered within a scope without departing from the gist of the invention. For example, the first embodiment and the second embodiment may be carried out in a combined manner, or the first embodiment and the third embodiment may be carried out in a combined manner.

Claims

1. A rotary compressor, comprising a housing, a compression mechanism section accommodated in a lower side of the housing, and a drive part accommodated in an upper side of the housing,
in which the drive part has a rotator that is fitly fixed around a crank shaft, and rotates with the crank shaft, and a stator that is disposed at an outer circumferential side of the rotator and fixed to the housing,
an oil separator plate is attached to an upper end face of a rotor core of the rotator such that the oil separator plate covers the upper end face, and is situated in a concave portion formed by a crossover portion projecting from an upper end face of a stator core of the stator, and
a plurality of communicating channels, which communicates between the inside of the concave portion and the inside of a barrel of the housing, are formed at a proximal end of the crossover portion, the rotary compressor being **characterized in that**:

the rotator is fixed to the crank shaft such that the upper end face of the rotor core is situated at a position upper than the upper end face of the stator core, and
when an open end situated at an entrance side of a communicating channel is seen from an open end situated at an exit side of the relevant communicating channel, a covering ratio of the open end, which is situated at the entrance side of the communicating channel, by a side face of the rotor core is 30% to 80%.

2. A rotary compressor, comprising a housing, a compression mechanism section accommodated in a lower side of the housing, and a drive part accommodated in an upper side of the housing,
in which the drive part has a rotator that is fitly fixed around a crank shaft, and rotates with the crank shaft, and a stator that is disposed at an outer circumferential side of the rotator and fixed to the housing,
an oil separator plate is attached to an upper end face of a rotor core of the rotator such that the oil separator plate covers the upper end face, and is situated in a concave portion formed by a crossover portion projecting from an upper end face of a stator core of the stator, and
a plurality of communicating channels, which communicate between the inside of the concave portion and the inside of a barrel of the housing, are formed at a proximal end of the crossover portion, the rotary compressor being **characterized in that**:

a closing member is provided over entrance ends and/or exit ends of the communicating channels.

3. A rotary compressor, comprising a housing, a compression mechanism section accommodated in a lower side of the housing, and a drive part accommodated in an upper side of the housing,
in which the drive part has a rotator that is fitly fixed around a crank shaft, and rotates with the crank shaft, and a stator that is disposed at an outer circumferential side of the rotator and fixed to the housing,
an oil separator plate is attached to an upper end face of a rotor core of the rotator such that the oil separator plate covers the upper end face, and is situated in a concave portion formed by a crossover portion projecting from an upper end face of a stator core of the stator, and
a plurality of communicating channels, which communicate between the inside of the concave portion and the inside of a barrel of the housing, are formed at a proximal end of the crossover portion, the rotary compressor being **characterized in that**:

the communicating channels are formed such that the amount of a mixture of oil particles and a refrigerant gas outflowing into the barrel of the housing through the communicating channels is zero or extremely small amount.

4. An air conditioning system comprising the rotary compressor according to any one of claims 1 to 3.

FIG. 1

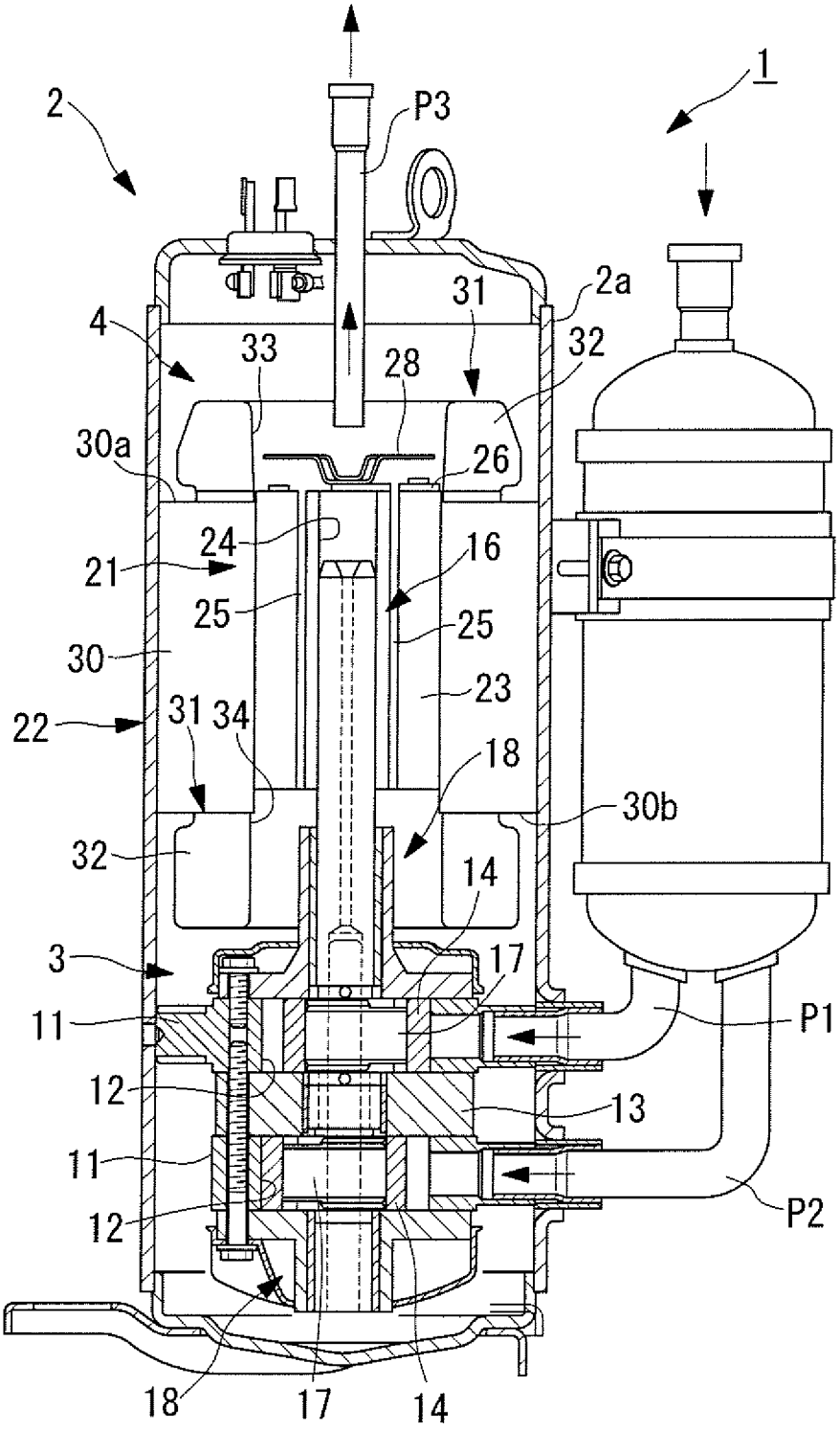

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FIG. 2

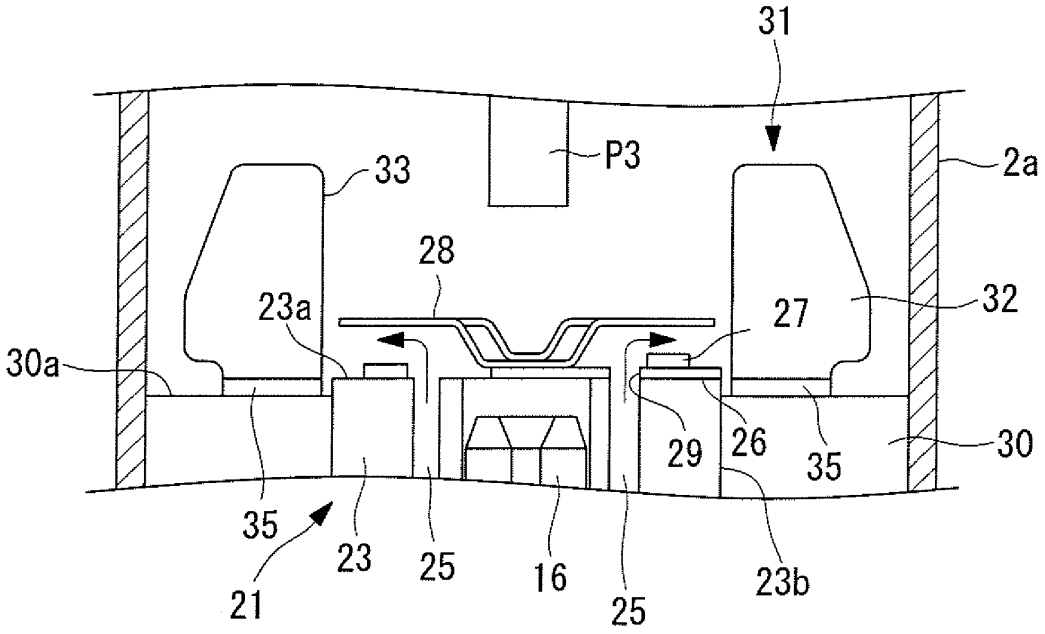
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FIG. 3

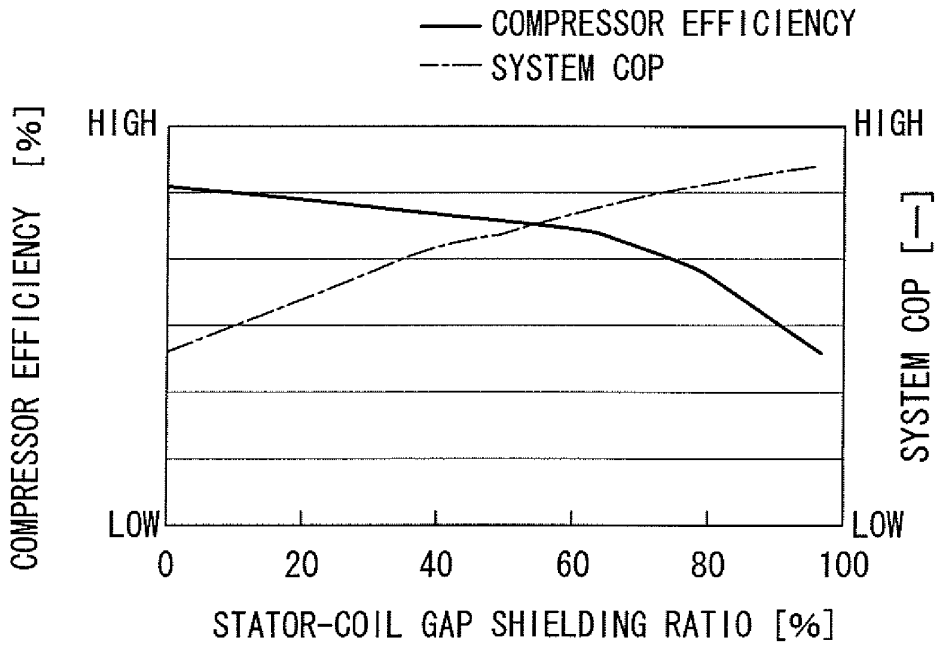
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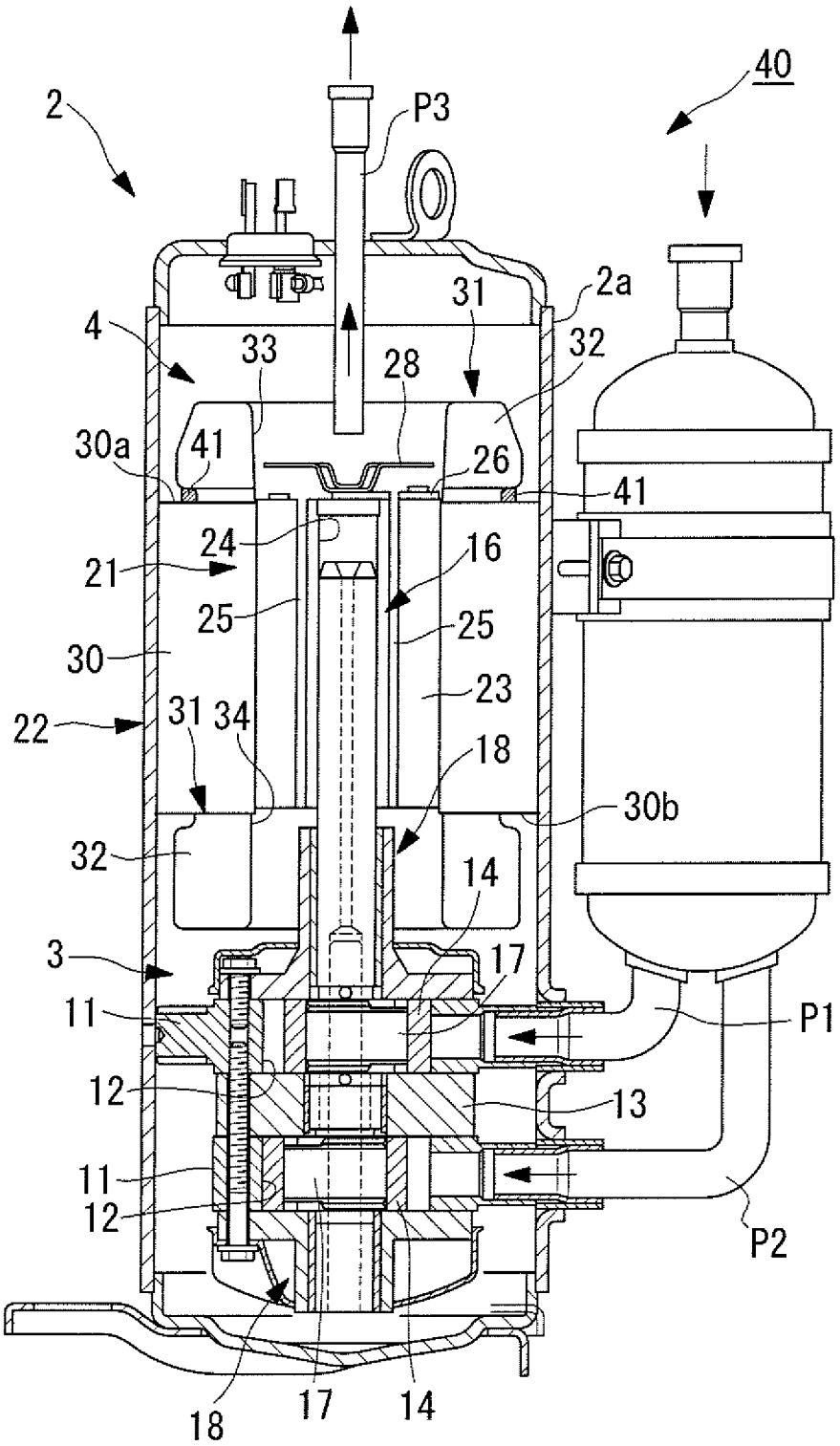
FIG. 4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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2008/050097

A. CLASSIFICATION OF SUBJECT MATTER
F04C29/02(2006.01)i

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)
F04C29/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2008
Kokai Jitsuyo Shinan Koho 1971-2008 Toroku Jitsuyo Shinan Koho 1994-2008

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 75244/1984(Laid-open No. 187377/1985) (Toshiba Corp.), 12 December, 1985 (12.12.85), Description, page 8, lines 2 to 7; Figs. 1 to 4 (Family: none)	2-4 1
Y A	JP 2006-336463 A (Matsushita Electric Industrial Co., Ltd.), 14 December, 2006 (14.12.06), Par. Nos. [0015] to [0016]; Fig. 1 & WO 2005/028869 A1	2-4 1

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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06 February, 2008 (06.02.08)	19 February, 2008 (19.02.08)
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