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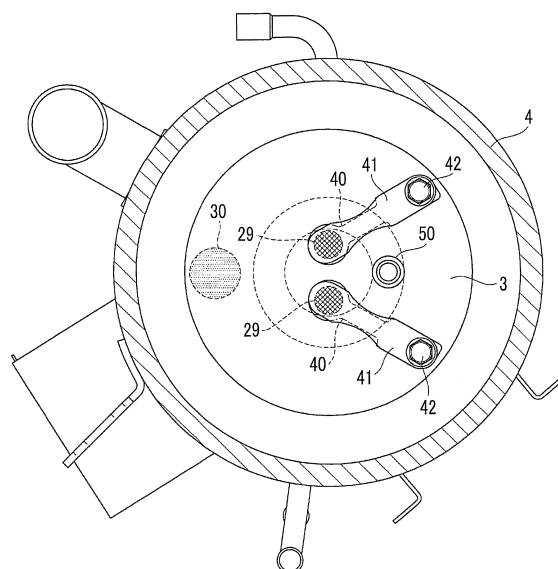
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(54) **COMPRESSOR**

(57) This hermetic scroll compressor includes: a hermetic housing; a scroll compressing mechanism housed in the hermetic housing; a discharge cover (3) provided with a discharge port (29) through which a refrigerant compressed by the scroll compressing mechanism passes; a discharge chamber formed between the hermetic housing and the discharge cover (3); an injection tube (50) provided so as to be passed inside the discharge chamber, and within which the refrigerant flows; and a reed valve (40) that is provided to the discharge port (29) of the discharge cover (3), and that is configured such that the refrigerant discharged from the discharge port (29) to the discharge chamber is ejected in a direction separating from the injection tube (50).

FIG. 2



Description

Technical Field

[0001] The present invention relates to a compressor.

Background Art

[0002] For example, a hermetic scroll compressor is used for a refrigerator or an air conditioner so as to compress and discharge an externally supplied refrigerant.

[0003] In the hermetic scroll compressor, a discharge chamber is formed in an upper portion of a scroll-type compression mechanism in a hermetic housing. The discharge chamber is a space surrounded by the scroll-type compression mechanism and the housing. A refrigerant compressed by the compression mechanism is supplied to the discharge chamber so as to temporarily store the refrigerant. Thereafter, the refrigerant is discharged outward from a discharge pipe.

[0004] PTLs 1 and 2 below disclose a scroll-type compressor which has an injection pipe for introducing an intermediate-pressure refrigerant from the outside into the compression chamber of the compression mechanism. A liquid refrigerant is supplied to the compression chamber via the injection pipe. In this manner, a temperature of the refrigerant is lowered by latent heat generated when the liquid refrigerant evaporates, thereby cooling the inside of the compression chamber.

[0005] In addition, in some cases, the scroll-type compressor may have a capacity control pipe (hereinafter, referred to as a bypass pipe) for externally extracting the intermediate-pressure refrigerant of the compression chamber. The externally extracted intermediate-pressure refrigerant returns to a suction side of the compressor. In this manner, it is possible to perform a capacity control operation of the compressor.

Citation List

Patent Literature

[0006]

[PTL 1] Japanese Unexamined Patent Application Publication No. 2009-287512

[PTL 2] Japanese Unexamined Patent Application Publication No. 2015-113817

Summary of Invention

Technical Problem

[0007] The injection pipe or the bypass pipe disposed in the hermetic scroll compressor penetrates an upper portion of the housing and the discharge chamber, and is connected to the compression mechanism. Therefore, the refrigerant passing through the injection pipe or the

bypass pipe is heated by a high-temperature refrigerant inside the discharge chamber. In particular, as illustrated in Figs. 6 and 7, if the injection pipe or the bypass pipe is installed so that the refrigerant discharged from a discharge port 29 is caused to flow toward an injection pipe 50 or the bypass pipe by a reed valve 40, the refrigerant passing through the injection pipe 50 or the bypass pipe is likely to be heated. If the refrigerant passing through the injection pipe is heated, there is a problem in that the inside of the compression chamber cannot be cooled. If the refrigerant passing through the bypass pipe is heated, there is a problem in that a volume of the refrigerant increases and compression efficiency is lowered. In any case, desired performance of the compressor cannot be obtained.

[0008] The present invention is made in view of these circumstances, and an object thereof is to provide a compressor which is installed inside a discharge chamber, and which is capable of suppressing a temperature rise of a refrigerant passing through a pipe unit such as an injection pipe or a bypass pipe.

Solution to Problem

[0009] In order to solve the above-described problem, a compressor according to the present invention adopts the following means.

[0010] That is, the compressor according to the present invention includes a housing, a scroll-type compression mechanism accommodated in the housing, a discharge cover or a fixed scroll of the compression mechanism having a discharge port through which a refrigerant compressed by the compression mechanism passes, a discharge chamber formed between the housing and the discharge cover or the fixed scroll, a pipe unit disposed so as to internally pass through the discharge chamber, and internally circulating the refrigerant, and a reed valve disposed in the discharge port of the discharge cover or the fixed scroll, and having a configuration in which the refrigerant discharged from the discharge port to the discharge chamber is blown in a direction away from the pipe unit.

[0011] According to this configuration, the refrigerant compressed by the compression mechanism is discharged from the discharge port disposed in the discharge cover or the fixed scroll of the compression mechanism, to the discharge chamber formed between the housing and the discharge cover or between the housing and the fixed scroll of the compression mechanism. In this case, the refrigerant discharged from the discharge port to the discharge chamber is blown in the direction away from the pipe unit by the reed valve disposed in the discharge port. Therefore, the high-temperature refrigerant discharged from the discharge port does not directly flow to the pipe unit at the shortest distance. Accordingly, the refrigerant passing through the pipe unit is less likely to be heated.

[0012] In the above-described aspect, the reed valve

may have a plate-shaped member which blows the refrigerant discharged from the discharge port, in a predetermined blowing direction, and the pipe unit may be disposed on a rear side in the blowing direction.

[0013] According to this configuration, the refrigerant discharged from the discharge port is blown in the predetermined blowing direction by the plate-shaped member of the reed valve. Then, the pipe unit is disposed on the rear side in the predetermined blowing direction of the refrigerant. Therefore, the refrigerant discharged from the discharge port to the discharge chamber does not directly flow to the pipe unit. Accordingly, the refrigerant passing through the pipe unit is less likely to be heated.

[0014] In the above-described aspect, the plate-shaped member of the reed valve may be long in one direction, and may have one end side fixed to the discharge cover or the fixed scroll, and the other end side capable of opening and closing the discharge port. A line connecting one end and the other end of the plate-shaped member and a line connecting the discharge port and the pipe unit may form an angle of 90° or smaller.

[0015] In the above-described aspect, the plate-shaped member of the reed valve may be long in one direction, and may have one end side fixed to the discharge cover or the fixed scroll, and the other end side capable of opening and closing the discharge port. When the discharge ports are respectively disposed at two locations and the reed valves are disposed one by one for each of the discharge ports, the plate-shaped members of the two reed valves may be installed so as to interpose the pipe unit therebetween.

[0016] In the above-described aspect, the pipe unit may be installed on a perpendicular bisector of a line segment connecting the two discharge ports.

[0017] In the above-described aspect, an angle formed between a line connecting one end and the other end of one of the plate-shaped members and a line connecting one end and the other end of the other one of the plate-shaped members may be 90° or smaller.

[0018] In the above-described aspect, the compressor may further include a discharge pipe installed so as to penetrate the housing, and discharging the refrigerant inside the discharge chamber outward of the discharge chamber. The discharge pipe may be installed so that the refrigerant discharged from the discharge port to the discharge chamber is blown in a direction closer to the discharge pipe by the reed valve.

[0019] In the above-described aspect, the compressor may further include a discharge pipe installed so as to penetrate the housing, and discharging the refrigerant inside the discharge chamber outward of the discharge chamber. The discharge pipe may be installed so that the refrigerant discharged from the discharge port to the discharge chamber is blown in a direction closer to the discharge pipe by the reed valve. The discharge pipe may be installed on a side opposite to the pipe unit across the line connecting the two discharge ports.

Advantageous Effects of Invention

[0020] According to the present invention, it is possible to suppress a temperature rise of the refrigerant passing through the pipe unit such as the injection pipe or the bypass pipe installed inside the discharge chamber.

Brief Description of Drawings

[0021]

Fig. 1 is a longitudinal sectional view illustrating a scroll-type compressor according to an embodiment of the present invention.

Fig. 2 is a cross-sectional view illustrating the scroll-type compressor according to the embodiment of the present invention.

Fig. 3 is a schematic cross-sectional view illustrating the scroll-type compressor according to the embodiment of the present invention, and illustrates a case having only one discharge port.

Fig. 4 is a schematic cross-sectional view illustrating the scroll-type compressor according to the embodiment of the present invention, and illustrates a case having two discharge ports.

Fig. 5 is a schematic longitudinal sectional view illustrating a modification example of the scroll-type compressor according to the embodiment of the present invention.

Fig. 6 is a schematic cross-sectional view illustrating a comparative example of the scroll-type compressor, and illustrates a case having only one discharge port.

Fig. 7 is a schematic cross-sectional view illustrating a comparative example of the scroll-type compressor, and illustrates a case having two discharge ports.

Fig. 8 is a schematic cross-sectional view illustrating a comparative example of the scroll-type compressor, and illustrates a case having two discharge ports.

Fig. 9 is a schematic cross-sectional view illustrating a comparative example of the scroll-type compressor, and illustrates a case having two discharge ports.

Description of Embodiments

[0022] Hereinafter, a hermetic scroll compressor according to an embodiment of the present invention will be described with reference to the drawings.

[0023] As illustrated in Fig. 1, a hermetic scroll compressor 1 serving as a scroll fluid machine has a cylindrical hermetic housing 2 whose bottom portion is brought into a hermetic state by a lower cover and which is long in an upward-downward direction. An upper portion of the hermetic housing 2 is brought into a hermetic state by a discharge cover 3 and an upper cover 4. A

discharge chamber 5 to which compressed high-pressure gas is discharged is formed between the discharge cover 3 and the upper cover 4.

[0024] Inside the hermetic housing 2, an upper bearing member (frame member) 6 is fixedly installed in the upper portion. A scroll compression mechanism 7 is incorporated in the hermetic housing 2 via the upper bearing member 6, and an electric motor 10 having a stator 8 and a rotor 9 is installed in the lower portion. The electric motor 10 is incorporated by fixedly installing the stator 8 in the hermetic housing 2, and a crankshaft 11 is fixed to the rotor 9.

[0025] A crank pin 12 whose axis is eccentric by a predetermined dimension is disposed in an upper end of the crankshaft 11. The crank pin 12 is connected to the scroll compression mechanism 7, thereby enabling the scroll compression mechanism 7 to be driven by the electric motor 10. In the crankshaft 11, an upper portion of the crankshaft 11 is rotatably supported by a journal bearing portion 6A of the upper bearing member 6, and a lower end portion is rotatably supported by a lower journal bearing 13 disposed in the lower portion of the hermetic housing 2.

[0026] A displacement-type oil supply pump 14 is disposed between the lower journal bearing 13 and the lower end portion of the crankshaft 11. A configuration is adopted as follows. A lubricant 15 filling a bottom portion of the hermetic housing 2 is suctioned via a suction pipe 16, and is discharged to a circulation passage 17 which is drilled into the crankshaft 11 along an axial direction. The lubricant 15 can be supplied via the circulation passage 17 to portions requiring lubrication, such as the upper bearing member 6, the scroll compression mechanism 7, and the lower journal bearing 13.

[0027] The scroll compression mechanism 7 has the upper bearing member 6 serving as a configuration component, and includes a fixed scroll 18 fixedly installed on the upper bearing member 6, an orbiting scroll 19 that is supported so as to be slidable by a thrust bearing portion 6B of the upper bearing member 6, and that forms a compression chamber 20 by meshing with the fixed scroll 18, a rotation prevention mechanism 21 such as an Oldham ring that is interposed between the upper bearing member 6 and the orbiting scroll 19, and that prevents rotation of the orbiting scroll 19 and allows orbital turning movement, and a drive bush 22 and a turning bearing (needle bearing) 23 which are disposed between the crank pin 12 of the crankshaft 11 and a bearing boss 19C disposed on a rear surface the orbiting scroll 19, and which transmit a rotational force of the crankshaft 11 to the orbiting scroll 19. The scroll compression mechanism 7 is installed on the upper bearing member 6 in a state where a central portion of an end plate of the fixed scroll 18 is connected to the discharge cover 3.

[0028] The fixed scroll 18 includes an end plate 18A and a spiral wrap 18B erected on the end plate 18A, and is configured so that a discharge port 24 is disposed in a central portion of the end plate 18A, and so that a tip

seal 25 is installed on a wrap tooth tip surface of the spiral wrap 18B. In addition, the orbiting scroll 19 includes an end plate 19A and a spiral wrap 19B erected on the end plate 19A. A bearing boss 19C is disposed on a rear surface of the end plate 19A, and a tip seal 26 is installed on a wrap tooth tip surface of the spiral wrap 19B.

[0029] The scroll compression mechanism 7 suctiones refrigerant gas suctioned into the hermetic housing 2 via a suction pipe 27 open at a position facing a stator winding 8A of the electric motor 10, into the compression chamber 20 from a suction port 28 open in the hermetic housing 2, and compresses the refrigerant gas into high-temperature and high-pressure gas. The compressed gas is discharged into the discharge chamber 5 via a discharge port 24 disposed in a central portion of the fixed scroll 18 and a discharge port 29 disposed in the discharge cover 3, and further, the compressed gas is fed outward of the compressor via a discharge pipe 30 connected to the discharge chamber 5.

[0030] In the present embodiment, an injection pipe 50 for introducing intermediate-pressure refrigerant from the outside into the compression chamber 20 of the scroll compression mechanism 7 is provided. The liquid refrigerant is supplied to the compression chamber 20 via the injection pipe 50. In this manner, the temperature of the refrigerant can be lowered by latent heat generated when the liquid refrigerant evaporates, and the inside of the compression chamber 20 can be cooled. The injection pipe penetrates the hermetic housing 2 and the discharge chamber 5, and is connected to the fixed scroll 18.

[0031] The reed valve 40 is a thin plate-shaped member, which is disposed in an outlet portion of the discharge port 29 and opens and closes the discharge port 29. The reed valve 40 regulates the refrigerant so as to flow in only one direction. According to the present embodiment, since the reed valve 40 is provided, the refrigerant flows from the compression chamber 20 to only the discharge chamber 5 side.

[0032] A retainer 41 which limits a movable range (upper limit of an opening degree) of the reed valve 40 is disposed above the reed valve 40. When the reed valve 40 is open, the reed valve 40 comes into contact with a lower surface of the retainer 41, thereby enabling the retainer 41 to regulate the reed valve 40 so as not to be excessively open. The retainer 41 is a very rigid member which is less likely to be deformed.

[0033] The reed valve 40 is a member which is long in one direction, and the end portion has an arc shape, for example. One end side of the reed valve 40 is fixed to the discharge cover 3 by a bolt 42, and the other end side of the reed valve 40 can open and close the discharge port 29. Similar to the reed valve 40, the retainer 41 is a member which is long in one direction, and one end side is fixed to the upper side of the reed valve 40 together with the reed valve 40 by the bolt 42.

[0034] In this manner, the reed valve 40 blows out the refrigerant discharged from the discharge port 29, in a predetermined blowing direction. If it is assumed that a

movable side opposite to a side fixed by the bolt 42 is set as a forward side, the predetermined blowing direction is a forward direction of a circle center of the discharge port 29 having a circular shape. The refrigerant flowing rearward from the center of the discharge port 29 also exists although the flowing amount is less than the amount flowing forward.

[0035] In the present embodiment, the reed valve 40 is attached to the discharge cover 3 so that the refrigerant discharged from the discharge port 29 to the discharge chamber 5 is blown in a direction away from the injection pipe 50. For example, the injection pipe 50 is disposed on the rear side in the blowing direction of the refrigerant discharged from the discharge port 29, and the refrigerant is blown in the direction away from the injection pipe 50.

[0036] In this manner, the refrigerant is blown in the direction away from the injection pipe 50 by the reed valve 40 disposed in the discharge port 29. Therefore, the high-temperature refrigerant discharged from the discharge port 29 does not directly flow to the pipe unit at the shortest distance. Accordingly, the refrigerant passing through the injection pipe 50 is less likely to be heated.

[0037] In a case where only one discharge port 29 is formed in the discharge cover 3, as illustrated in Fig. 3, a line connecting one end and the other end of the reed valve 40 serving as the plate-shaped member and a line connecting and the discharge port 29 and the injection pipe 50 desirably forms an angle smaller than 90°, and preferably 60° or smaller. In this manner, the injection pipe 50 is located on the rear side in the blowing direction of the refrigerant discharged from the discharge port 29, and the refrigerant is reliably blown in the direction away from the injection pipe 50. In Fig. 3, illustration of the retainer 41 is omitted.

[0038] As illustrated in Figs. 2 and 4, when the discharge ports 29 are respectively formed at two locations in the discharge cover 3 and the reed valves 40 are disposed one by one for each of the discharge ports 29, the two reed valves 40 serving as the plate-shaped member are installed so as to interpose the injection pipe 50 therebetween. In this manner, the injection pipe 50 is located on the rear side in the blowing direction of the refrigerant discharged from the two discharge ports 29, and the refrigerant is blown in the direction away from the injection pipe 50. In Fig. 4, illustration of the retainer 41 is omitted.

[0039] That is, as illustrated in Figs. 8 and 9, unlike a case where only one discharge port 29 is formed in the discharge cover 3, the line connecting one end and the other end of the reed valve 40 and the line connecting the discharge port 29 and the injection pipe 50 are less likely to form the angle of 90° or smaller. Even if the line connecting one end and the other end of the reed valve 40 and the line connecting the discharge port 29 and the injection pipe 50 can form the angle of 90°, there is a possibility that the refrigerant blown out from the discharge port 29 may come into contact with the injection pipe 50. Fig. 8 illustrates a case where two reed valves

are fixed to the discharge port 29 on the same side, and Fig. 9 illustrates a case where two reed valves are fixed to the discharge port 29 on different sides.

[0040] As illustrated in Fig. 4, when the two reed valves 40 are installed so as to interpose the injection pipe 50 therebetween, the injection pipe 50 is installed on a perpendicular bisector of the line connecting the two discharge ports 29. According to this arrangement relationship, the two reed valves 40 can be installed so as to interpose the injection pipe 50 therebetween, and the refrigerant can be blown in the direction away from the injection pipe 50.

[0041] As illustrated in Fig. 4, with regard to the two reed valves 40, an angle formed between the line connecting one end and the other end of one of the reed valves 40 and the line connecting one end and the other end of the other one of the reed valves 40 is desirably 90° or smaller. In this manner, the refrigerants blown out from the two discharge ports 29 can be blown in the direction away from the injection pipe 50 without interfering with each other.

[0042] As described above, according to the present embodiment, the refrigerant blown out from the discharge port 29 does not directly come into contact with the injection pipe 50. Accordingly, the refrigerant flowing inside the injection pipe 50 is less likely to be heated. As a result, the inside of the compression chamber 20 is properly cooled by the refrigerant supplied to the compression chamber 20 after passing through the injection pipe 50. Therefore, it is possible to prevent poor performance of the hermetic scroll compressor 1.

[0043] In the above-described embodiment, a relationship between the blowing direction of the refrigerant blown out from the discharge port 29 regulated by the reed valve 40 and the position of the injection pipe 50 has been described. However, the position of the discharge pipe 30 installed in the housing may be further taken into consideration.

[0044] That is, the discharge pipe 30 is installed so that the refrigerant discharged from the discharge port 29 to the discharge chamber 5 is blown in a direction closer to the discharge pipe 30 by the reed valve 40. That is, the discharge pipe 30 is disposed on the front side in the blowing direction of the refrigerant discharged from the discharge port 29. In this manner, the amount of the refrigerant discharged from the discharge port 29 decreases toward the injection pipe 50. Therefore, the refrigerant flowing inside the injection pipe 50 is much less likely to be heated.

[0045] In a case where the discharge ports 29 are respectively formed at two locations in the discharge cover 3 and the reed valves 40 are disposed one by one in each of the discharge ports 29, the discharge pipe 30 is disposed on a side opposite to the injection pipe 50 across the line connecting the two discharge ports 29. Preferably, the discharge pipe 30 is installed on the perpendicular bisector of the line connecting the two discharge ports 29. In this manner, the amount of the refrigerant

erant discharged from the discharge port 29 reliably decreases toward the injection pipe 50. Therefore, the refrigerant flowing inside the injection pipe 50 is much less likely to be heated.

[0046] In addition, in the above-described embodiment, a case has been described where the injection pipe 50 is installed. However, even in a case where a bypass pipe is disposed instead of the injection pipe 50 in the hermetic scroll compressor 1, if the same arrangement relationship is satisfied, the refrigerant blown out from the discharge port 29 can be prevented from directly coming into contact with the bypass pipe. As a result, the refrigerant flowing through the bypass pipe is not heated. Therefore, the refrigerant passes through the bypass pipe, and returns to the inside of the hermetic scroll compressor 1 without increasing the volume of the refrigerant. Even in this case, it is possible to prevent poor performance of the hermetic scroll compressor 1.

[0047] In the above-described embodiment, a case has been described where the reed valve 40 is installed for the discharge port 29 formed in the discharge cover 3. However, the present invention is not limited to this example. That is, in a case having no discharge cover 3, as illustrated in Fig. 5, the reed valve 40 may be installed in the discharge port 24 formed in the fixed scroll 18. Even in this case, the reed valve 40 is installed in the same manner as described above, based on the relationship between the blowing direction of the refrigerant blown out from the discharge port 24 regulated by the reed valve 40 and the position of the injection pipe 50. In addition, the discharge pipe 30 may also be installed in the same manner as described above.

[0048] Even in a case where the reed valve 40 is installed for the discharge port 24 formed in the fixed scroll 18, the refrigerant blown out from the discharge port 24 does not directly come into contact with the injection pipe 50. Accordingly, the refrigerant flowing inside the injection pipe 50 is less likely to be heated. As a result, the inside of the compression chamber 20 is properly cooled by the refrigerant supplied to the compression chamber 20 after passing through the injection pipe 50. Therefore, it is possible to prevent poor performance of the compressor.

Reference Signs List

[0049]

- 1: HERMETIC SCROLL COMPRESSOR
- 2: HERMETIC HOUSING
- 3: DISCHARGE COVER
- 4: UPPER COVER
- 5: DISCHARGE CHAMBER
- 6: UPPER BEARING MEMBER
- 6A: JOURNAL BEARING PORTION
- 6B: THRUST BEARING PORTION
- 7: SCROLL COMPRESSION MECHANISM
- 8: STATOR

- 8A: STATOR WINDING
- 9: ROTOR
- 10: ELECTRIC MOTOR
- 11: CRANKSHAFT
- 12: CRANK PIN
- 13: LOWER JOURNAL BEARING
- 14: DISPLACEMENT-TYPE OIL SUPPLY PUMP
- 15: LUBRICANT
- 16: SUCTION PIPE
- 17: CIRCULATION PASSAGE
- 18: FIXED SCROLL
- 18A: END PLATE
- 18B: SPIRAL WRAP
- 19: ORBITING SCROLL
- 19A: END PLATE
- 19B: SPIRAL WRAP
- 19C: BEARING BOSS
- 20: COMPRESSION CHAMBER
- 21: ROTATION PREVENTION MECHANISM
- 22: DRIVE BUSH
- 24: DISCHARGE PORT
- 25: TIP SEAL
- 26: TIP SEAL
- 27: SUCTION PIPE
- 28: SUCTION PORT
- 29: DISCHARGE PORT
- 30: DISCHARGE PIPE
- 40: REED VALVE
- 41: RETAINER
- 42: BOLT
- 50: INJECTION PIPE

Claims

1. A compressor comprising:

- a housing;
- a scroll-type compression mechanism accommodated in the housing;
- a discharge cover or a fixed scroll of the compression mechanism having a discharge port through which a refrigerant compressed by the compression mechanism passes;
- a discharge chamber formed between the housing and the discharge cover or the fixed scroll;
- a pipe unit disposed so as to internally pass through the discharge chamber, and internally circulating the refrigerant; and
- a reed valve disposed in the discharge port of the discharge cover or the fixed scroll, and having a configuration in which the refrigerant discharged from the discharge port to the discharge chamber is blown in a direction away from the pipe unit.

2. The compressor according to Claim 1, wherein the reed valve has a plate-shaped member

which blows the refrigerant discharged from the discharge port, in a predetermined blowing direction, and
wherein the pipe unit is disposed on a rear side in the blowing direction.

3. The compressor according to Claim 2, wherein the plate-shaped member of the reed valve is long in one direction, and has one end side fixed to the discharge cover or the fixed scroll, and the other end side capable of opening and closing the discharge port, and
wherein a line connecting one end and the other end of the plate-shaped member and a line connecting the discharge port and the pipe unit form an angle of 90° or smaller.

4. The compressor according to Claim 2, wherein the plate-shaped member of the reed valve is long in one direction, and has one end side fixed to the discharge cover or the fixed scroll, and the other end side capable of opening and closing the discharge port, and
wherein when the discharge ports are respectively disposed at two locations and the reed valves are disposed one by one for each of the discharge ports, the plate-shaped members of the two reed valves are installed so as to interpose the pipe unit therebetween.

5. The compressor according to Claim 4, wherein the pipe unit is installed on a perpendicular bisector of a line segment connecting the two discharge ports.

6. The compressor according to Claim 4 or 5, wherein an angle formed between a line connecting one end and the other end of one of the plate-shaped members and a line connecting one end and the other end of the other one of the plate-shaped members is 90° or smaller.

7. The compressor according to any one of Claims 1 to 6, further comprising:

a discharge pipe installed so as to penetrate the housing, and discharging the refrigerant inside the discharge chamber outward of the discharge chamber,
wherein the discharge pipe is installed so that the refrigerant discharged from the discharge port to the discharge chamber is blown in a direction closer to the discharge pipe by the reed valve.

8. The compressor according to any one of Claims 4 to 6, further comprising:

a discharge pipe installed so as to penetrate the housing, and discharging the refrigerant inside the discharge chamber outward of the discharge chamber,

wherein the discharge pipe is installed so that the refrigerant discharged from the discharge port to the discharge chamber is blown in a direction closer to the discharge pipe by the reed valve, and the discharge pipe is installed on a side opposite to the pipe unit across a line connecting the two discharge ports.

Amended claims under Art. 19.1 PCT

1. (Amended) A compressor comprising:

a housing;
a scroll-type compression mechanism accommodated in the housing;
a discharge cover or a fixed scroll of the compression mechanism having a discharge port through which a refrigerant compressed by the compression mechanism passes;
a discharge chamber formed between the housing and the discharge cover or the fixed scroll;
a pipe unit disposed so as to internally pass through the discharge chamber, and internally circulating the refrigerant; and
a reed valve disposed in the discharge port of the discharge cover or the fixed scroll, and having a configuration in which the refrigerant discharged from the discharge port to the discharge chamber is blown in a direction away from the pipe unit,
wherein the reed valve has a plate-shaped member which blows the refrigerant discharged from the discharge port, in a predetermined blowing direction,
wherein the pipe unit is disposed on a rear side in the blowing direction,
wherein the plate-shaped member of the reed valve is long in one direction, and has one end side fixed to the discharge cover or the fixed scroll, and the other end side capable of opening and closing the discharge port, and
wherein a line connecting one end and the other end of the plate-shaped member and a line connecting the discharge port and the pipe unit form an angle of 90° or smaller.

2. (Deleted)

3. (Deleted)

4. (Amended) A compressor comprising:

a housing;

a scroll-type compression mechanism accommodated in the housing;

a discharge cover or a fixed scroll of the compression mechanism having a discharge port through which a refrigerant compressed by the compression mechanism passes;

a discharge chamber formed between the housing and the discharge cover or the fixed scroll; a pipe unit disposed so as to internally pass through the discharge chamber, and internally circulating the refrigerant; and

a reed valve disposed in the discharge port of the discharge cover or the fixed scroll, and having a configuration in which the refrigerant discharged from the discharge port to the discharge chamber is blown in a direction away from the pipe unit,

wherein the reed valve has a plate-shaped member which blows the refrigerant discharged from the discharge port, in a predetermined blowing direction,

wherein the pipe unit is disposed on a rear side in the blowing direction,

wherein the plate-shaped member of the reed valve is long in one direction, and has one end side fixed to the discharge cover or the fixed scroll, and the other end side capable of opening and closing the discharge port, and

wherein when the discharge ports are respectively disposed at two locations and the reed valves are disposed one by one for each of the discharge ports, the plate-shaped members of the two reed valves are installed so as to interpose the pipe unit therebetween.

5. The compressor according to Claim 4, wherein the pipe unit is installed on a perpendicular bisector of a line segment connecting the two discharge ports.

6. The compressor according to Claim 4 or 5, wherein an angle formed between a line connecting one end and the other end of one of the plate-shaped members and a line connecting one end and the other end of the other one of the plate-shaped members is 90° or smaller.

7. (Amended) The compressor according to Claim 1 or any one of Claims 4 to 6, further comprising:

a discharge pipe installed so as to penetrate the housing, and discharging the refrigerant inside the discharge chamber outward of the discharge chamber,

wherein the discharge pipe is installed so that the refrigerant discharged from the discharge port to the discharge chamber is blown in a direction closer to the discharge pipe by the reed

valve.

8. The compressor according to any one of Claims 4 to 6, further comprising:

a discharge pipe installed so as to penetrate the housing, and discharging the refrigerant inside the discharge chamber outward of the discharge chamber,

wherein the discharge pipe is installed so that the refrigerant discharged from the discharge port to the discharge chamber is blown in a direction closer to the discharge pipe by the reed valve, and the discharge pipe is installed on a side opposite to the pipe unit across a line connecting the two discharge ports.

FIG. 1

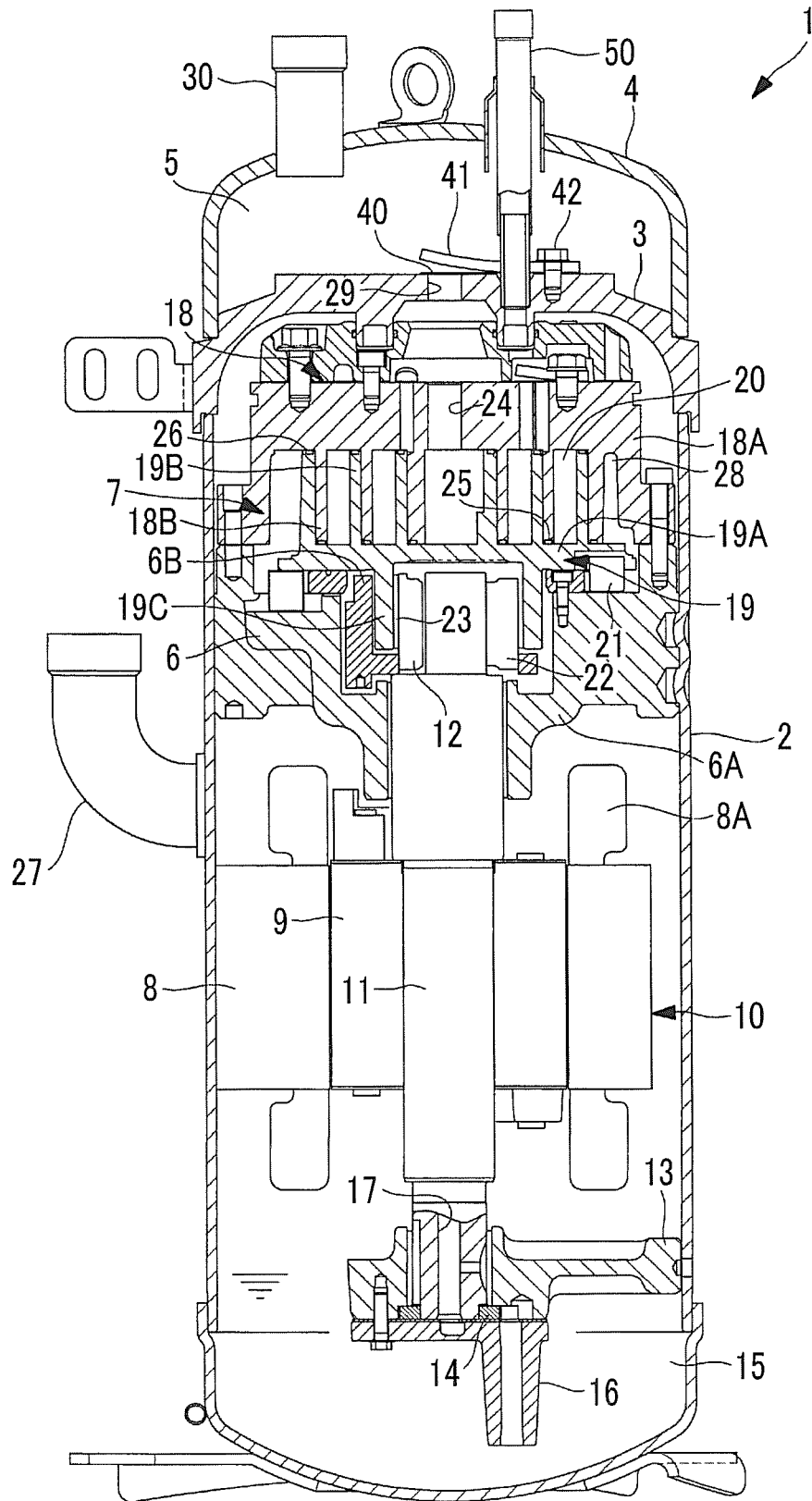


FIG. 2

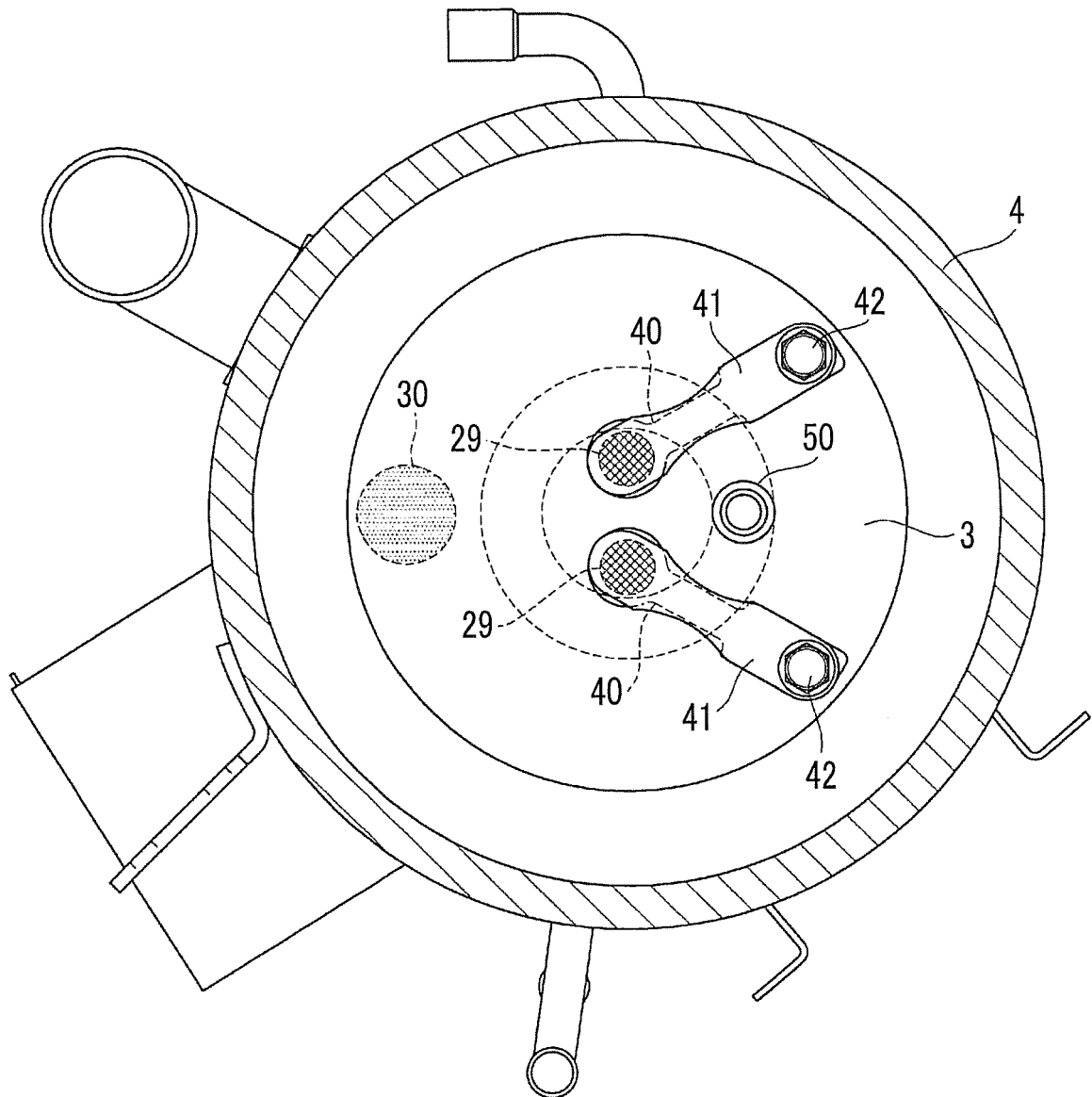


FIG. 3

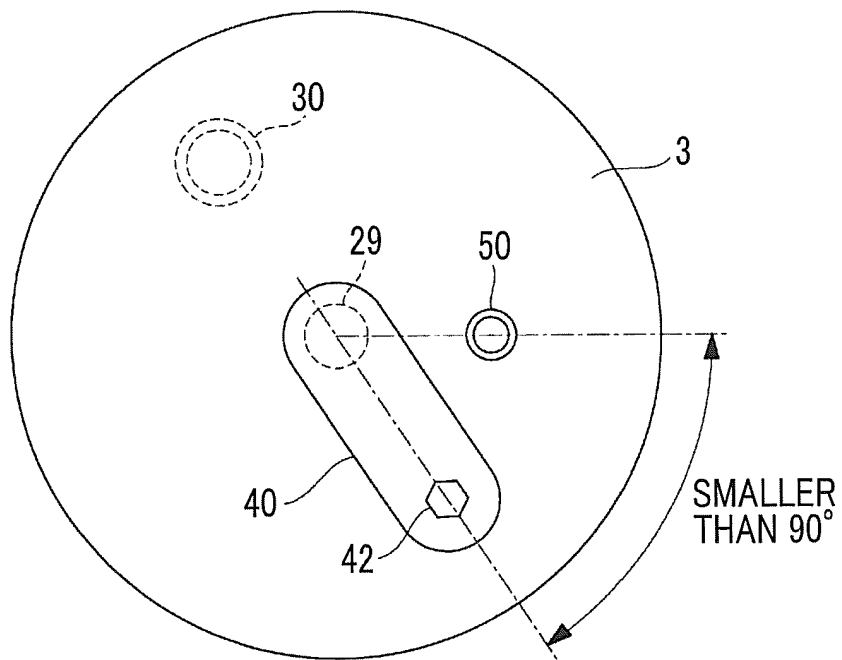


FIG. 4

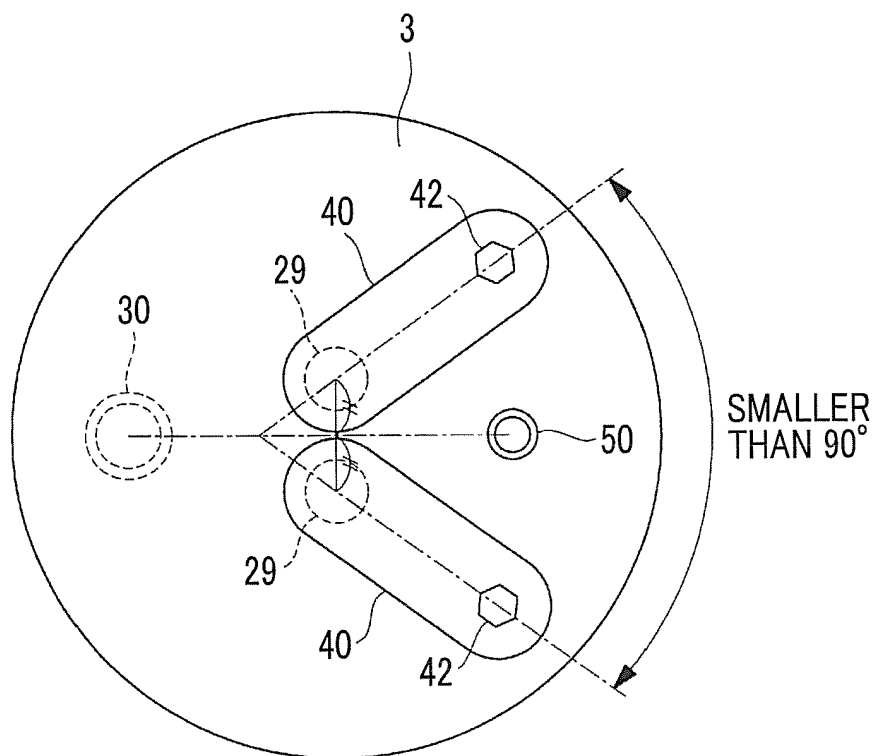


FIG. 5

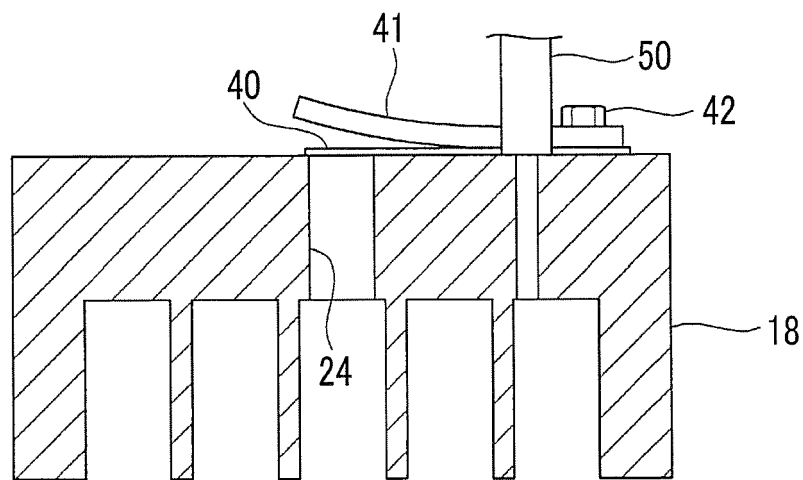


FIG. 6

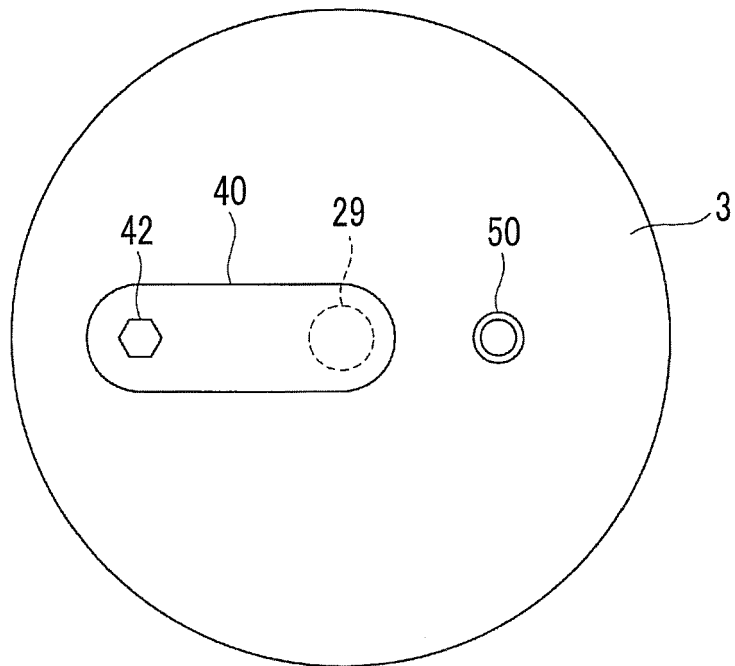


FIG. 7

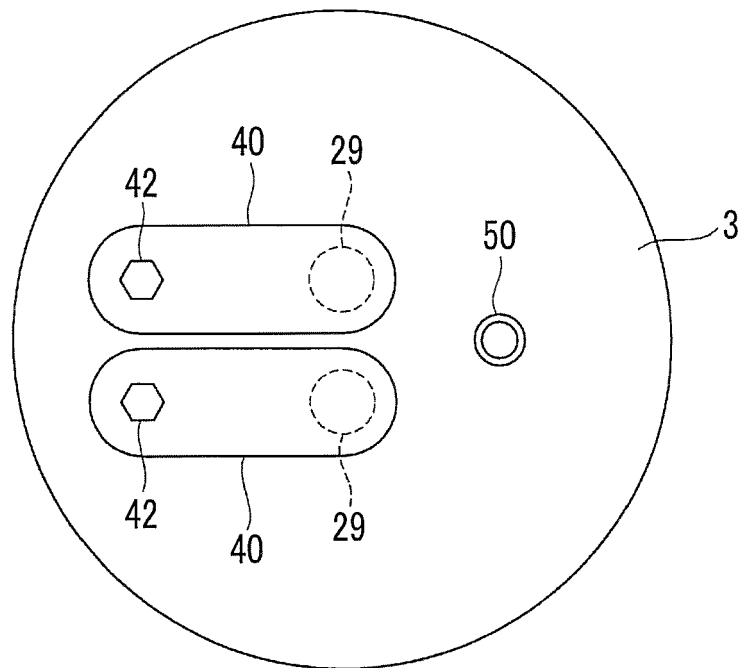


FIG. 8

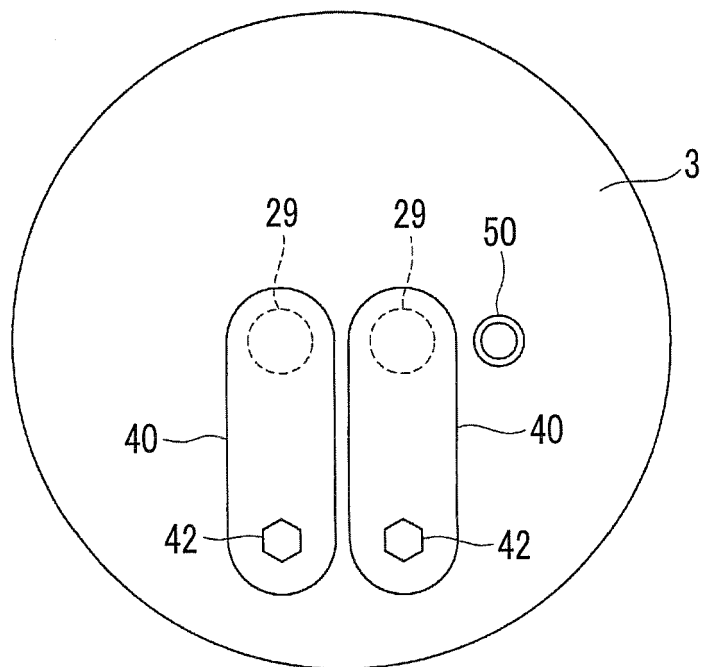
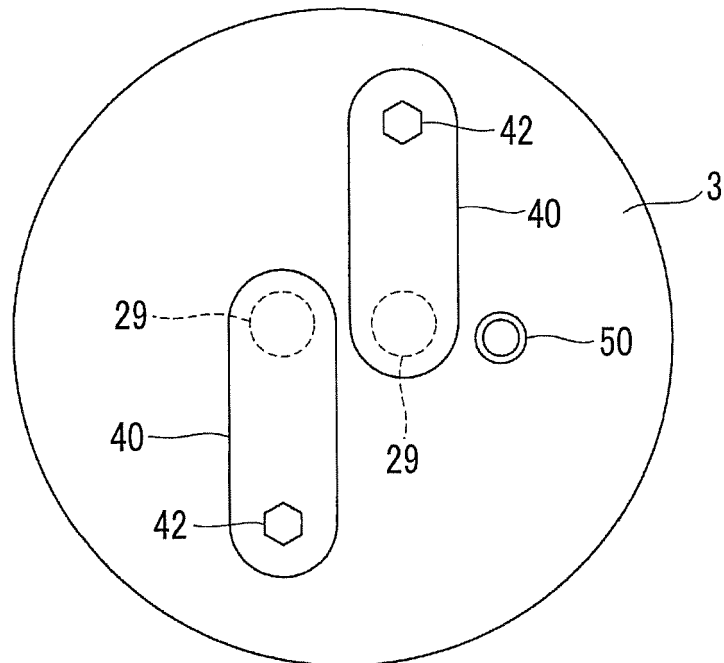


FIG. 9



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2017/008085

A. CLASSIFICATION OF SUBJECT MATTER

F04C18/02(2006.01)i, F04C29/04(2006.01)i, F04C29/12(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)

F04C18/02, F04C29/04, F04C29/12

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 1996-2017

Kokai Jitsuyo Shinan Koho 1971-2017 Toroku Jitsuyo Shinan Koho 1994-2017

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.
X	JP 2006-348933 A (Daikin Industries, Ltd.),	1-6
Y	28 December 2006 (28.12.2006), paragraphs [0077] to [0097]; fig. 7 to 10 & US 2009/0074600 A1 paragraphs [0117] to [0140] & WO 2006/123519 A1 & EP 1882857 A1 & CN 101166903 A	7-8
Y	JP 3-64686 A (Sanden Corp.), 20 March 1991 (20.03.1991), page 3, upper right column, lines 11 to 14; fig. 1 (Family: none)	7-8

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

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"&"

document member of the same patent family

Date of the actual completion of the international search
02 May 2017 (02.05.17)Date of mailing of the international search report
16 May 2017 (16.05.17)Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2017/008085

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2015-98804 A (Toyota Industries Corp.), 28 May 2015 (28.05.2015), entire text; all drawings & US 2015/0139818 A1 & EP 2873865 A1	1-8
A	JP 9-158856 A (Matsushita Electric Industrial Co., Ltd.), 17 June 1997 (17.06.1997), entire text; all drawings & US 5855475 A & KR 10-0210230 B1 & CN 1158944 A	1-8
A	US 6299417 B1 (SHIN, Dong Ku), 09 October 2001 (09.10.2001), entire text; all drawings & KR 10-2001-0035867 A	1-8
A	JP 2009-287512 A (Mitsubishi Heavy Industries, Ltd.), 10 December 2009 (10.12.2009), entire text; all drawings & WO 2009/145297 A1 & EP 2280172 A1	1-8

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REFERENCES CITED IN THE DESCRIPTION

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- JP 2009287512 A [0006]
- JP 2015113817 A [0006]