

(19)



(11)

EP 3 382 205 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
18.11.2020 Bulletin 2020/47

(51) Int Cl.:
F04C 18/02 ^(2006.01) **F04C 29/04** ^(2006.01)
F04C 29/12 ^(2006.01) **F04C 23/00** ^(2006.01)

(21) Application number: **17760066.5**

(86) International application number:
PCT/JP2017/008085

(22) Date of filing: **01.03.2017**

(87) International publication number:
WO 2017/150602 (08.09.2017 Gazette 2017/36)

(54) **COMPRESSOR**

VERDICHTER

COMPRESSEUR

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

(30) Priority: **04.03.2016 JP 2016042114**

(43) Date of publication of application:
03.10.2018 Bulletin 2018/40

(73) Proprietor: **Mitsubishi Heavy Industries Thermal
Systems, Ltd.**
Tokyo 108-8215 (JP)

(72) Inventors:
• **SATO, Hajime**
Tokyo 108-8215 (JP)

• **KIMATA, Yoshiyuki**
Tokyo 108-8215 (JP)
• **TAKASU, Yogo**
Tokyo 108-8215 (JP)
• **TAKAHASHI, Kazuki**
Tokyo 108-8215 (JP)

(74) Representative: **Cabinet Beau de Loménie**
158, rue de l'Université
75340 Paris Cedex 07 (FR)

(56) References cited:
EP-A1- 1 882 857 EP-A2- 0 747 597
JP-A- H0 364 686 JP-A- H09 158 856
JP-A- S58 187 594 JP-A- 2006 348 933
JP-A- 2009 287 512 JP-A- 2015 098 804
US-B1- 6 299 417

EP 3 382 205 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

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

EP 1 882 857 relates to a rotary compressor, EP 0 747 597 relates to a capacity modulated scroll machine and JP S58 187594 relates to a scroll compressor.

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 is defined by claim 1 or claim 2.

[0010] A 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] The reed valve has a plate-shaped member which blows the refrigerant discharged from the discharge port, in a predetermined blowing direction, and the pipe unit is disposed on a rear side in the blowing direction.

[0013] According to the invention, 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] 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. 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 forms an angle of 90° or smaller.

[0015] 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. According to the invention, 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.

[0016] Optionally, the pipe unit may be installed on a perpendicular bisector of a line segment connecting the two discharge ports.

[0017] Optionally, 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] According to the invention, the compressor includes 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 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.

[0019] In the above-described configuration with two discharge ports, 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 ports to the discharge chamber is blown in a direction closer to the discharge pipe by the reed valves. 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 refrig-

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 | 50 |
| 3: | DISCHARGE COVER | |
| 4: | UPPER COVER | |
| 5: | DISCHARGE CHAMBER | |
| 6: | UPPER BEARING MEMBER | |
| 6A: | JOURNAL BEARING PORTION | 55 |
| 6B: | THRUST BEARING PORTION | |
| 7: | SCROLL COMPRESSION MECHANISM | |
| 8: | STATOR | |

- | | | |
|---------|-----------------------------------|--|
| 8A: | STATOR WINDING | |
| 9: | ROTOR | |
| 10: | ELECTRIC MOTOR | |
| 11: | CRANKSHAFT | |
| 5 12: | CRANK PIN | |
| 13: | LOWER JOURNAL BEARING | |
| 14: | DISPLACEMENT-TYPE OIL SUPPLY PUMP | |
| 15: | LUBRICANT | |
| 16: | SUCTION PIPE | |
| 10 17: | CIRCULATION PASSAGE | |
| 18: | FIXED SCROLL | |
| 18A: | END PLATE | |
| 18B: | SPIRAL WRAP | |
| 19: | ORBITING SCROLL | |
| 15 19A: | END PLATE | |
| 19B: | SPIRAL WRAP | |
| 19C: | BEARING BOSS | |
| 20: | COMPRESSION CHAMBER | |
| 21: | ROTATION PREVENTION MECHANISM | |
| 20 22: | DRIVE BUSH | |
| 24: | DISCHARGE PORT | |
| 25: | TIP SEAL | |
| 26: | TIP SEAL | |
| 27: | SUCTION PIPE | |
| 25 28: | SUCTION PORT | |
| 29: | DISCHARGE PORT | |
| 30: | DISCHARGE PIPE | |
| 40: | REED VALVE | |
| 41: | RETAINER | |
| 30 42: | BOLT | |
| 50: | INJECTION PIPE | |

Claims

1. A compressor comprising:

- | | |
|----|--|
| 35 | a housing (2); |
| | a scroll-type compression mechanism (7) accommodated in the housing (2); |
| 40 | a discharge cover (3) or a fixed scroll (18) of the compression mechanism (7) having a discharge port (24, 29) through which a refrigerant compressed by the compression mechanism (7) passes; |
| 45 | a discharge chamber (5) formed between the housing (2) and the discharge cover (3) or the fixed scroll (18); |
| | a pipe unit disposed so as to internally pass through the discharge chamber (5), and being connected to the compression mechanism (7) to internally circulating the refrigerant; and |
| 50 | a reed valve (40) disposed in the discharge port (24, 29) of the discharge cover (3) or the fixed scroll (18), and having a configuration in which the refrigerant discharged from the discharge port (24, 29) to the discharge chamber (5) is blown in a direction away from the pipe unit, |
| 55 | |

a discharge pipe (30) installed so as to penetrate the housing (2) into the discharge chamber (5), and discharging the refrigerant inside the discharge chamber (5) outward of the discharge chamber (5), and
 a suction pipe (27) installed on the housing (2), and suctioning the refrigerant into the housing (2),
 wherein the reed valve (40) has a plate-shaped member which blows the refrigerant discharged from the discharge port (24, 29), 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 (40) is long in one direction, and has one end side fixed to the discharge cover (3) or the fixed scroll (18), and the other end side capable of opening and closing the discharge port (24, 29), and
 wherein a line connecting one end and the other end of the plate-shaped member and a line connecting the discharge port (24, 29) and the pipe unit projected on a plane containing the plate-shaped member form an angle of 90° or smaller, and wherein the discharge pipe (30) is disposed on the front side in the direction in which the refrigerant is discharged from the discharge port (24, 29), so that the refrigerant discharged from the discharge port (24, 29) to the discharge chamber (5) is blown in a direction toward the discharge pipe (30) by the reed valve (40) .

2. A compressor comprising:

a housing (2);
 a scroll-type compression mechanism (7) accommodated in the housing (2);
 a discharge cover (3) or a fixed scroll (18) of the compression mechanism (7) having two discharge ports (24, 29) through which a refrigerant compressed by the compression mechanism (7) passes;
 a discharge chamber (5) formed between the housing (2) and the discharge cover (3) or the fixed scroll (18);
 a pipe unit disposed so as to internally pass through the discharge chamber (5), and being connected to the compression mechanism (7) to internally circulating the refrigerant; and
 a reed valve (40) disposed in the discharge port (24, 29) of the discharge cover (3) or the fixed scroll (18), and having a configuration in which the refrigerant discharged from the discharge port (24, 29) to the discharge chamber (5) is blown in a direction away from the pipe unit, wherein the reed valve (40) has a plate-shaped member which blows the refrigerant discharged

from the discharge port (24, 29), 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 (40) is long in one direction, and has one end side fixed to the discharge cover (3) or the fixed scroll (18), and the other end side capable of opening and closing the discharge port (24, 29), and
 wherein the discharge ports (24, 29) are respectively disposed at two locations and the reed valves (40) are disposed one by one for each of the discharge ports (24, 29), and the plate-shaped members of the two reed valves (40) are installed so as to interpose the pipe unit therebetween.

3. The compressor according to Claim 2, wherein the pipe unit is installed on a perpendicular bisector of a line segment connecting the two discharge ports (24, 29) .
4. The compressor according to Claim 2 or 3, 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.
5. The compressor according to any one of Claims 2 to 4, further comprising:

a discharge pipe (30) installed so as to penetrate the housing (2), and discharging the refrigerant inside the discharge chamber (5) outward of the discharge chamber (5),
 wherein the discharge pipe (30) is installed so that the refrigerant discharged from the discharge port (24, 29) to the discharge chamber (5) is blown in a direction toward the discharge pipe (30) by the reed valve (40).

6. The compressor according to Claim 5, wherein the discharge pipe (30) is installed on a side opposite to the pipe unit across a line connecting the two discharge ports (24, 29).

50 Patentansprüche

1. Verdichter, der Folgendes umfasst:

ein Gehäuse (2);
 einen Scrollverdichtungsmechanismus (7), der im Gehäuse (2) aufgenommen ist;
 eine Austrittsabdeckung (3) oder eine feste Spirale (18) des Verdichtungsmechanismus (7) mit

einem Austrittsanschluss (24, 29), durch den ein Kältemittel, das vom Verdichtungsmechanismus (7) verdichtet wird, geführt wird;
 eine Austrittskammer (5), die zwischen dem Gehäuse (2) und der Austrittsabdeckung (3) oder der festen Spirale (18) gebildet ist;
 eine Leitungseinheit, die derart angeordnet ist, dass sie intern durch die Austrittskammer (5) geführt wird, und die mit dem Verdichtungsmechanismus (7) verbunden ist, um das Kältemittel intern zu zirkulieren; und
 ein Membranventil (40), das im Austrittsanschluss (24, 29) der Austrittsabdeckung (3) oder der festen Spirale (18) angeordnet ist und eine Auslegung aufweist, bei der das Kältemittel, das aus dem Austrittsanschluss (24, 29) zur Austrittskammer (5) austritt, in eine Richtung von der Leitungseinheit weg geblasen wird, eine Austrittsleitung (30), die derart installiert ist, dass sie das Gehäuse (2) zur Austrittskammer (5) durchdringt und das Kältemittel in der Austrittskammer (5) von der Austrittskammer (5) nach außen ausgibt, und
 eine Saugleitung (27), die am Gehäuse (2) installiert ist und das Kältemittel in das Gehäuse (2) saugt,
 wobei das Membranventil (40) ein plattenförmiges Element aufweist, das das Kältemittel, das aus dem Austrittsanschluss (24, 29) austritt, in eine vorbestimmte Blasrichtung bläst, wobei die Leitungseinheit in der Blasrichtung auf einer Rückseite angeordnet ist, wobei das plattenförmige Element des Membranventils (40) in einer Richtung lang ist und dessen eine Endseite an der Austrittsabdeckung (3) oder an der festen Spirale (18) befestigt ist und die andere Endseite in der Lage ist, den Austrittsanschluss (24, 29) zu öffnen und zu schließen, und
 wobei eine Linie, die ein Ende und das andere Ende des plattenförmigen Elements verbindet, und eine Linie, die den Austrittsanschluss (24, 29) und die Leitungseinheit, die auf einer Ebene vorsteht, die das plattenförmige Element enthält, verbindet, einen Winkel von 90° oder kleiner bilden,
 und wobei die Austrittsleitung (30) in der Richtung, in die das Kältemittel aus dem Austrittsanschluss (24, 29) austritt, auf der Vorderseite angeordnet ist, derart, dass das Kältemittel, das aus dem Austrittsanschluss (24, 29) zur Austrittskammer (5) austritt, vom Membranventil (40) in eine Richtung zur Austrittsleitung (30) geblasen wird.

2. Verdichter, der Folgendes umfasst:

ein Gehäuse (2);

einen Scrollverdichtungsmechanismus (7), der im Gehäuse (2) aufgenommen ist;
 eine Austrittsabdeckung (3) oder eine feste Spirale (18) des Verdichtungsmechanismus (7) mit zwei Austrittsanschlüssen (24, 29), durch die ein Kältemittel, das vom Verdichtungsmechanismus (7) verdichtet wird, geführt wird;
 eine Austrittskammer (5), die zwischen dem Gehäuse (2) und der Austrittsabdeckung (3) oder der festen Spirale (18) gebildet ist;
 eine Leitungseinheit, die derart angeordnet ist, dass sie intern durch die Austrittskammer (5) geführt wird, und die mit dem Verdichtungsmechanismus (7) verbunden ist, um das Kältemittel intern zu zirkulieren; und
 ein Membranventil (40), das im Austrittsanschluss (24, 29) der Austrittsabdeckung (3) oder der festen Spirale (18) angeordnet ist und eine Auslegung aufweist, bei der das Kältemittel, das aus dem Austrittsanschluss (24, 29) zur Austrittskammer (5) austritt, in eine Richtung von der Leitungseinheit weg geblasen wird, wobei das Membranventil (40) ein plattenförmiges Element aufweist, das das Kältemittel, das aus dem Austrittsanschluss (24, 29) austritt, in eine vorbestimmte Blasrichtung bläst, wobei die Leitungseinheit in der Blasrichtung auf einer Rückseite angeordnet ist, wobei das plattenförmige Element des Membranventils (40) in einer Richtung lang ist und dessen eine Endseite an der Austrittsabdeckung (3) oder an der festen Spirale (18) befestigt ist und die andere Endseite in der Lage ist, den Austrittsanschluss (24, 29) zu öffnen und zu schließen, und
 wobei die Austrittsanschlüsse (24, 29) jeweils an zwei Stellen angeordnet sind und die Membranventile (40) für jeden der Austrittsanschlüsse (24, 29) einzeln angeordnet sind und die plattenförmigen Elemente der zwei Membranventile (40) derart installiert sind, dass sie die Leitungseinheit dazwischen einschließen.

3. Verdichter nach Anspruch 2, wobei die Leitungseinheit auf einer Mittelsenkrechten eines Liniensegments, das die zwei Austrittsanschlüsse (24, 29) verbindet, installiert ist.
4. Verdichter nach Anspruch 2 oder 3, wobei ein Winkel, der zwischen einer Linie, die ein Ende und das andere Ende von einem der plattenförmigen Elemente verbindet, und einer Linie, die ein Ende und das andere Ende des anderen der plattenförmigen Elemente verbindet, gebildet ist, 90° oder kleiner ist.
5. Verdichter nach einem der Ansprüche 2 bis 4, der ferner Folgendes umfasst:

eine Austrittsleitung (30), die derart installiert ist, dass sie das Gehäuse (2) durchdringt und das Kältemittel in der Austrittskammer (5) von der Austrittskammer (5) nach außen ausgibt, wobei die Austrittsleitung (30) derart installiert ist, dass das Kältemittel, das aus dem Austrittsanschluss (24, 29) zur Austrittskammer (5) austritt, vom Membranventil (40) in eine Richtung zur Austrittsleitung (30) geblasen wird.

6. Verdichter nach Anspruch 5, wobei die Austrittsleitung (30) auf einer Seite gegenüber der Leitungseinheit über eine Linie, die die zwei Austrittsanschlüsse (24, 29) verbindet, installiert ist.

Revendications

1. Compresseur comprenant :

un boîtier (2) ;
 un mécanisme de compression de type à spirale (7) logé dans le boîtier (2) ;
 un couvercle de refoulement (3) ou une spirale fixe (18) du mécanisme de compression (7) ayant un orifice de refoulement (24, 29) à travers lequel un réfrigérant comprimé par le mécanisme de compression (7) passe ;
 une chambre de refoulement (5) formée entre le boîtier (2) et le couvercle de refoulement (3) ou la spirale fixe (18) ;
 une unité de tuyau disposée afin de passer intérieurement à travers la chambre de refoulement (5), et étant raccordée au mécanisme de compression (7) pour faire circuler intérieurement le réfrigérant ; et
 une soupape à clapet (40) disposée dans l'orifice de refoulement (24, 29) du couvercle de refoulement (3) ou de la spirale fixe (18), et ayant une configuration dans laquelle le réfrigérant refoulé de l'orifice de refoulement (24, 29) à la chambre de refoulement (5) est éjecté dans une direction à distance de l'unité de tuyau,
 un tuyau de refoulement (30) installé afin de pénétrer dans le boîtier (2) dans la chambre de refoulement (5), et de refouler le réfrigérant à l'intérieur de la chambre de refoulement (5) vers l'extérieur de la chambre de refoulement (5), et un tuyau d'aspiration (27) installé sur le boîtier (2), et aspirant le réfrigérant dans le boîtier (2), dans lequel la soupape à clapet (40) a un élément en forme de plaque qui éjecte le réfrigérant refoulé par l'orifice de refoulement (24, 29) dans une direction d'éjection prédéterminée, dans lequel l'unité de tuyau est disposée sur un côté arrière dans la direction d'éjection, dans lequel l'élément en forme de plaque de la soupape à clapet (40) est long dans une direc-

tion et a un côté d'extrémité fixé sur le couvercle de refoulement (3) ou la spirale fixe (18), et l'autre côté d'extrémité capable d'ouvrir et de fermer l'orifice de refoulement (24, 29), et dans lequel une ligne raccordant une extrémité et l'autre extrémité de l'élément en forme de plaque et une ligne raccordant l'orifice de refoulement (24, 29) et l'unité de tuyau en saillie sur un plan contenant l'élément en forme de plaque forment un angle de 90° ou inférieur, et dans lequel le tuyau de refoulement (30) est disposé sur le côté avant dans la direction dans laquelle le réfrigérant est refoulé par l'orifice de refoulement (24, 29), de sorte que le réfrigérant refoulé de l'orifice de refoulement (24, 29) à la chambre de refoulement (5) est éjecté dans une direction vers le tuyau de refoulement (30) par la soupape à clapet (40).

2. Compresseur comprenant :

un boîtier (2) ;
 un mécanisme de compression de type à spirale (7) logé dans le boîtier (2) ;
 un couvercle de refoulement (3) ou une spirale fixe (18) du mécanisme de compression (7) ayant deux orifices de refoulement (24, 29) à travers lesquels un réfrigérant comprimé par le mécanisme de compression (7) passe ;
 une chambre de refoulement (5) formée entre le boîtier (2) et le couvercle de refoulement (3) ou la spirale fixe (18) ;
 une unité de tuyau disposée afin de passer intérieurement à travers la chambre de refoulement (5), et étant raccordée au mécanisme de compression (7) pour faire circuler intérieurement le réfrigérant ; et
 une soupape à clapet (40) disposée dans l'orifice de refoulement (24, 29) du couvercle de refoulement (3) ou de la spirale fixe (18), et ayant une configuration dans laquelle le réfrigérant refoulé de l'orifice de refoulement (24, 29) à la chambre de refoulement (5) est éjecté dans une direction à distance de l'unité de tuyau, dans lequel la soupape à clapet (40) a un élément en forme de plaque qui éjecte le réfrigérant refoulé par l'orifice de refoulement (24, 29), dans une direction d'éjection prédéterminée, dans lequel l'unité de tuyau est disposée sur un côté arrière dans la direction d'éjection, dans lequel l'élément en forme de plaque de la soupape à clapet (40) est long dans une direction, et a un côté d'extrémité fixé au couvercle de refoulement (3) ou à la spirale fixe (18), et l'autre côté d'extrémité capable d'ouvrir et de fermer l'orifice de refoulement (24, 29), et dans lequel les orifices de refoulement (24, 29) sont respectivement disposés à deux emplace-

ments et les soupapes à clapet (40) sont disposées une à une pour chacun des orifices de refoulement (24, 29), et les éléments en forme de plaque des deux soupapes à clapet (40) sont installés afin d'intercaler l'unité de tuyau entre eux. 5

3. Compresseur selon la revendication 2, dans lequel l'unité de tuyau est installée sur une bissectrice perpendiculaire d'un segment de ligne raccordant les deux orifices de refoulement (24, 29). 10

4. Compresseur selon la revendication 2 ou 3, dans lequel un angle formé entre une ligne raccordant une extrémité et l'autre extrémité de l'un des éléments en forme de plaque et une ligne raccordant une extrémité et l'autre extrémité de l'autre parmi les éléments en forme de plaque est de 90° ou inférieur. 15

5. Compresseur selon l'une quelconque des revendications 2 à 4, comprenant en outre : 20

un tuyau de refoulement (30) installé afin de pénétrer dans le boîtier (2) et de refouler le réfrigérant à l'intérieur de la chambre de refoulement (5) vers l'extérieur de la chambre de refoulement (5), 25

dans lequel le tuyau de refoulement (30) est installé de sorte que le réfrigérant refoulé de l'orifice de refoulement (24, 29) à la chambre de refoulement (5) est éjecté dans une direction vers le tuyau de refoulement (30) par la soupape à clapet (40). 30

6. Compresseur selon la revendication 5, dans lequel le tuyau de refoulement (30) est installé sur un côté opposé à l'unité de tuyau de part et d'autre d'une ligne raccordant les deux orifices de refoulement (24, 29). 35

40

45

50

55

FIG. 1

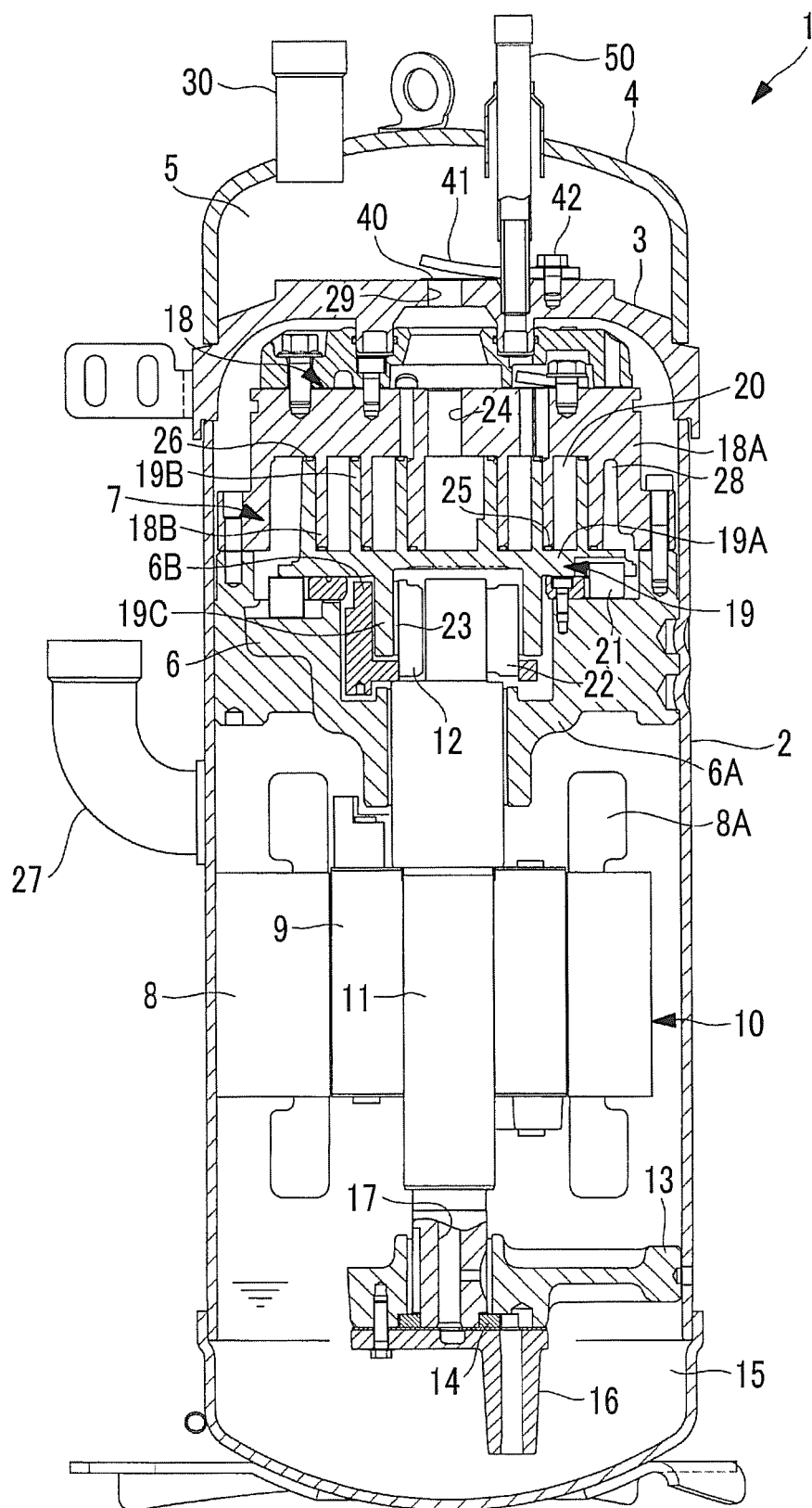


FIG. 2

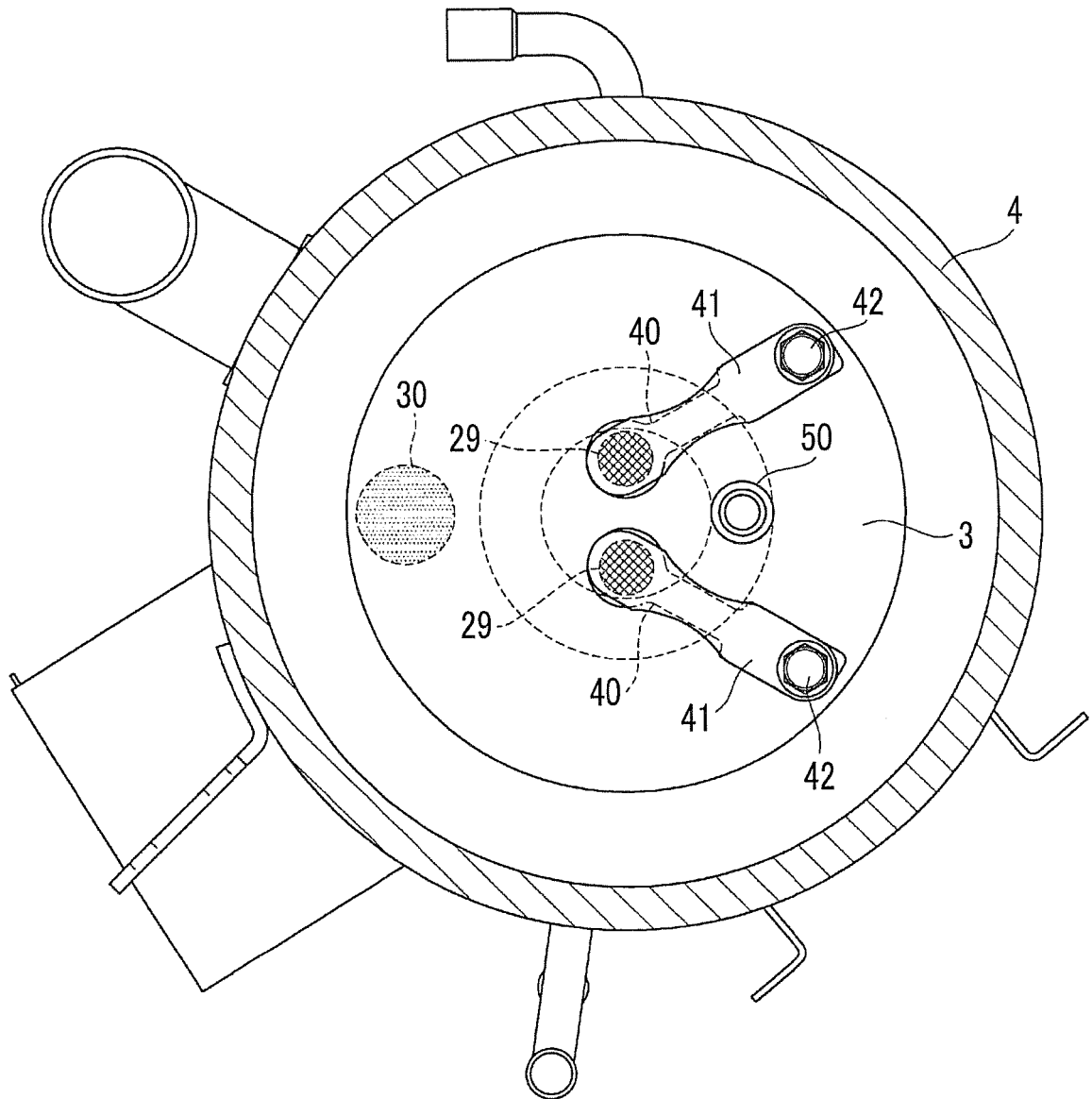


FIG. 3

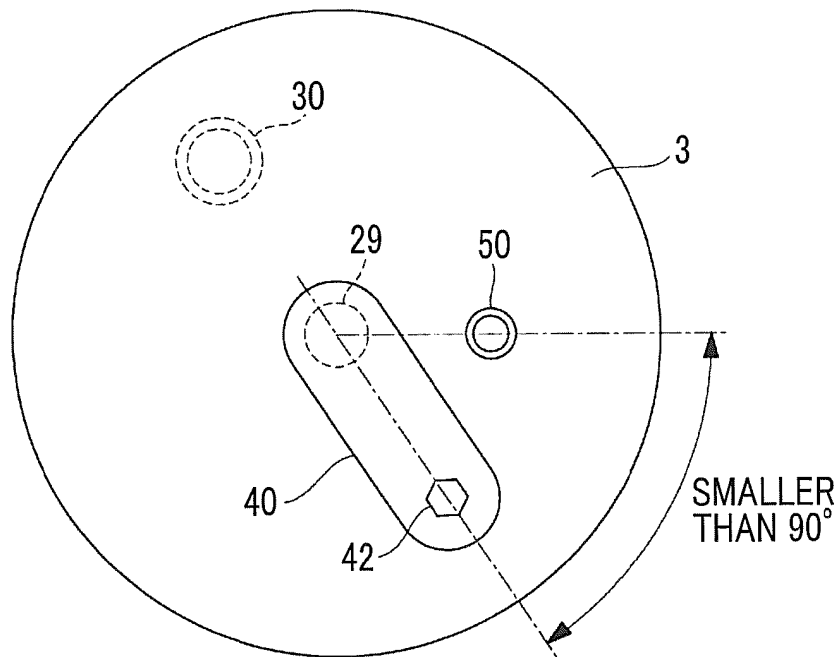


FIG. 4

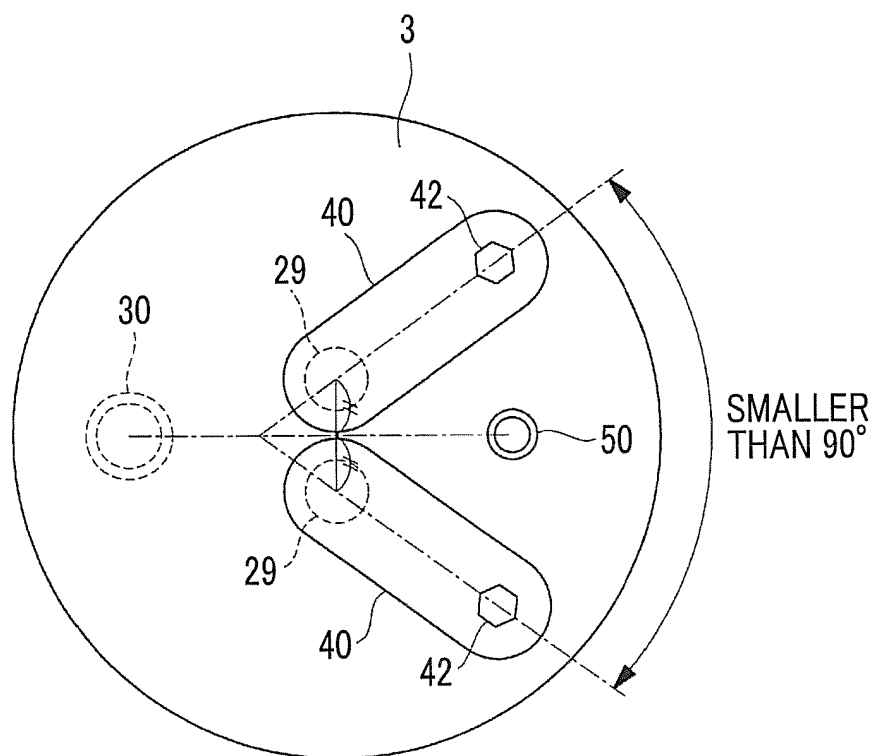


FIG. 5

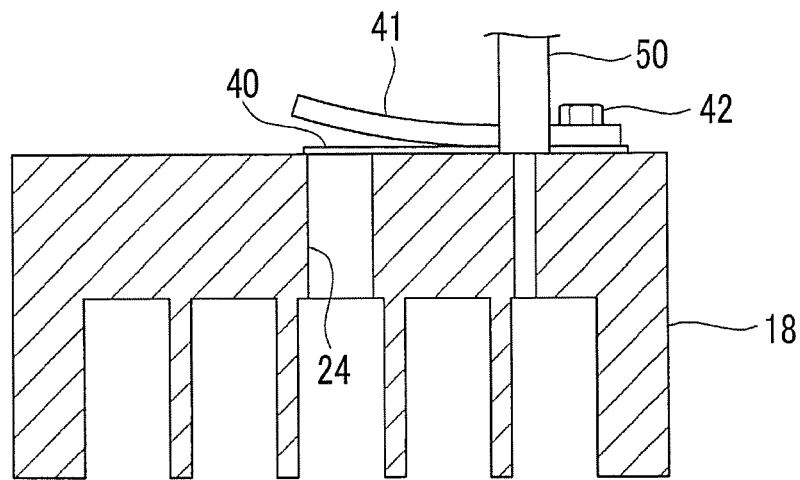


FIG. 6

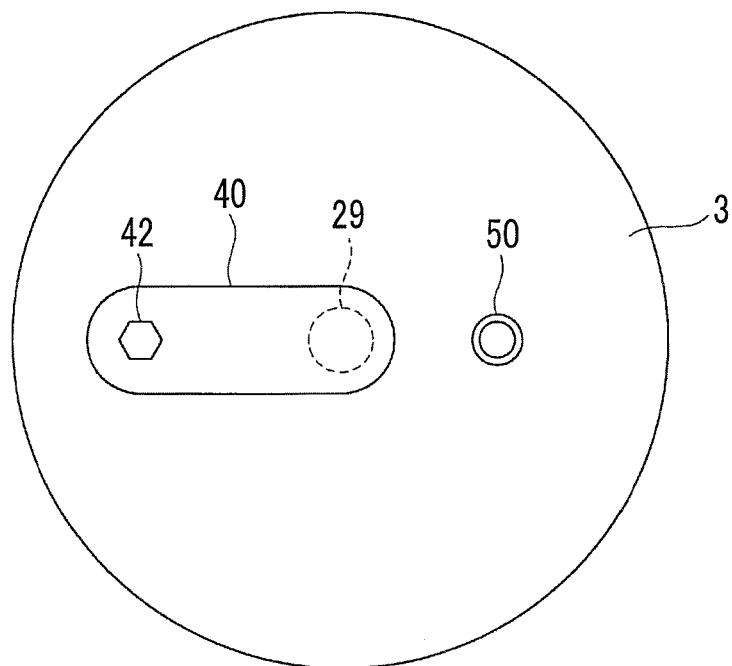


FIG. 7

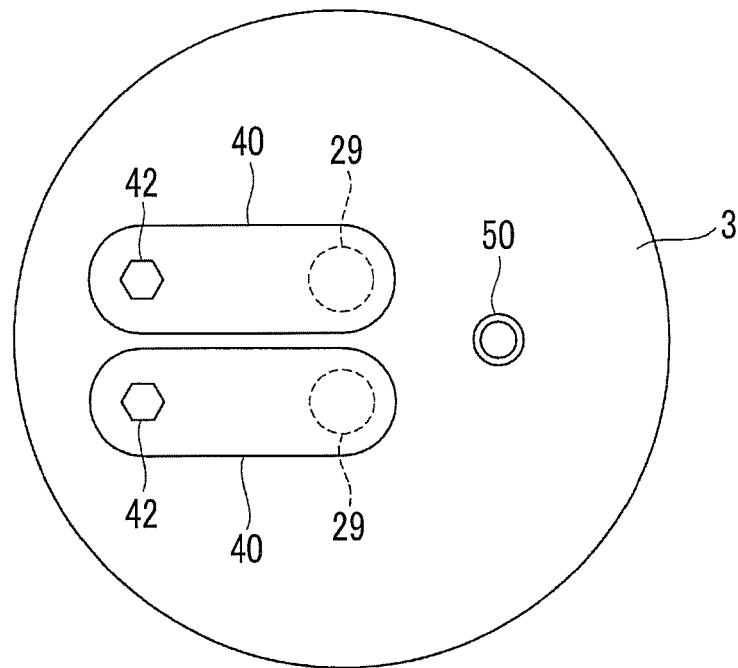


FIG. 8

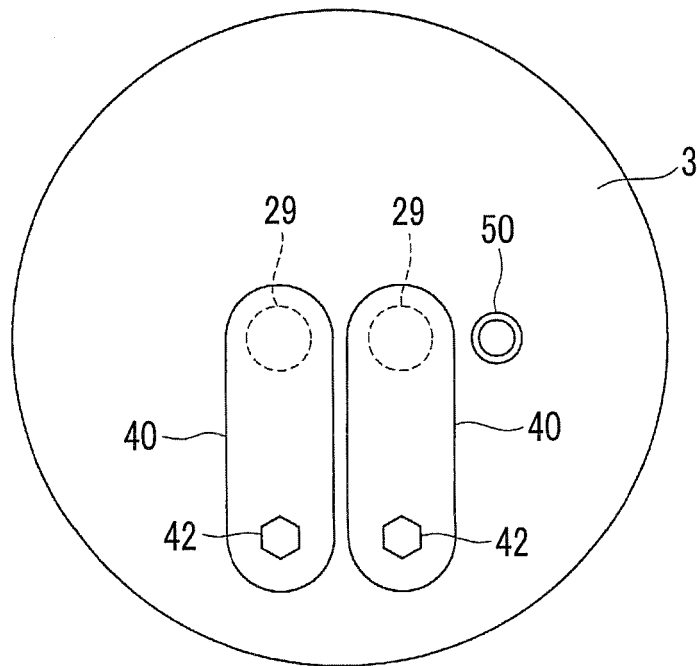
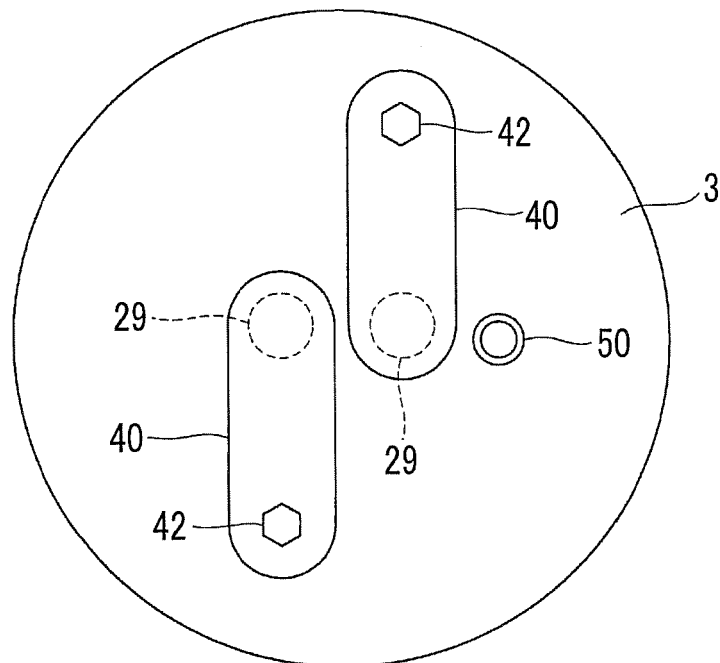


FIG. 9



REFERENCES CITED IN THE DESCRIPTION

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

Patent documents cited in the description

- JP 2009287512 A [0006]
- JP 2015113817 A [0006]
- EP 1882857 A [0006]
- EP 0747597 A [0006]
- JP S58187594 A [0006]