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- **SHIBAHARA, Koryo**
Tokyo 100-8332 (JP)
- **YOSHIHIRO, Shunji**
Tokyo 100-8332 (JP)
- **MITSUMATA, Takashi**
Tokyo 100-8332 (JP)
- **SATO, Kansai**
Tokyo 100-8332 (JP)
- **KITAGUCHI, Keita**
Tokyo 100-8332 (JP)
- **ICHISE, Yuki**
Tokyo 100-8332 (JP)
- **FUJIMOTO, Kei**
Tokyo 100-8332 (JP)

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(71) Applicant: **mitsubishi heavy industries
thermal systems, ltd.**
Tokyo 100-8332 (JP)

(72) Inventors:
• **KUWAHARA, Takayuki**
Tokyo 100-8332 (JP)
• **KAWASAKI, Masaki**
Tokyo 100-8332 (JP)

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

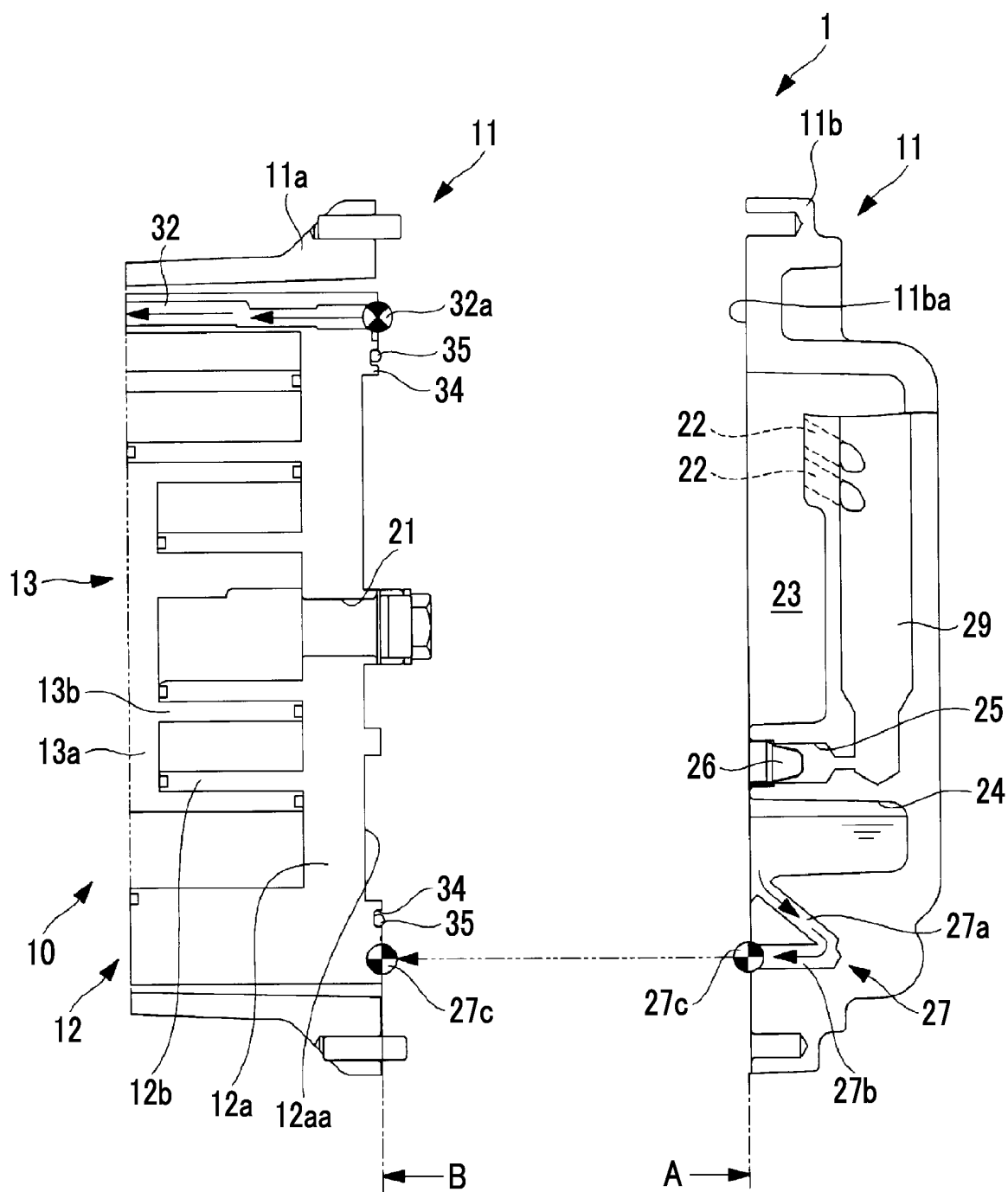
(54) **COMPRESSOR**

(57) The purpose of the present invention is to reduce costs during processing and assembly. This compressor comprises: a housing 11 serving as an outer shell; a scroll compression mechanism 10 which has an orbiting scroll 13 performing an orbiting motion, and a fixed scroll 12 having an end plate 12a and a wall body 12b standing upright on one surface of the end plate 12a, and which is installed inside the housing 11 and compresses a refrigerant containing lubricating oil; a lid section 11b of the

housing 11 which is in surface contact with the other surface 12aa of the end plate 12a; an oil separator 29 which separates lubricating oil from the refrigerant compressed by the scroll compression mechanism 10; and an oil storage chamber 24 which stores the lubricating oil separated by the oil separator 29. A lubricating oil groove through which the lubricating oil discharged from the oil storage chamber 24 circulates is formed in the other surface 12aa of the end plate 12a.

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FIG. 2



Description

Technical Field

[0001] The present disclosure relates to a compressor.

Background Art

[0002] As a compressor provided in an air conditioner or the like, a compressor including an oil separator that separates a refrigerant and lubricating oil contained in the refrigerant is known (for example, PTL 1).

Citation List

Patent Literature

[0003] [PTL 1] Japanese Unexamined Patent Application Publication No. 2005-240676

Summary of Invention

Technical Problem

[0004] Generally, a compressor provided with an oil separator temporarily stores the separated lubricating oil in an oil storage chamber provided in a high-pressure region. In such a compressor, when the lubricating oil stored in the oil storage chamber provided in the high-pressure region is guided to the low-pressure region having a relatively low pressure, the lubricating oil is decompressed by the decompression mechanism. Examples of the decompression mechanism include a thin groove spirally formed in a pin, a thin groove formed in a gasket and the like. Meanwhile, in a case where the spiral groove is formed in the pin, there is a possibility that processing may be difficult and a processing step may be complicated. In addition, in a case where the groove is formed in the gasket, in addition to the difficulty in processing, it is necessary to check the deformation of the gasket at the time of assembling the gasket. Therefore, there is a possibility that an assembly step may also be complicated. For this reason, there is a possibility that the cost may increase during processing or assembly.

[0005] In addition, in a case where a groove as a decompression mechanism is formed on the peripheral surface of the end plate of the fixed scroll as in the compressor described in PTL 1, it is necessary to add a hole or a groove for guiding the oil to the groove in the axial direction. Therefore, there is a possibility that a processing step may be complicated. In addition, in a case where a hole is added in the axial direction, it is necessary to process the groove on the peripheral surface to be deep in order to make the hole and the groove on the peripheral surface communicate with each other. Therefore, there is a possibility that the cost during processing may increase.

[0006] The present disclosure has been made in view

of such circumstances, and an objective thereof is to provide a compressor with which it is possible to reduce a cost at the time of processing or assembly.

5 Solution to Problem

[0007] In order to solve the above problems, the compressor of the present disclosure adopts following means.

10 **[0008]** A compressor according to an aspect of the present disclosure includes a housing that forms an outer shell, a scroll compression mechanism that has an orbiting scroll performing an orbiting motion and a fixed scroll, which has an end plate and a wall body erected on one surface of the end plate and is fixed to the housing, that is provided inside the housing, and that compresses a refrigerant containing lubricating oil, a contact section that is in surface contact with the other surface of the end plate, a separating section that separates the lubricating oil from the refrigerant compressed by the scroll compression mechanism, and a storage section that stores the lubricating oil separated by the separating section, in which an oil groove through which the lubricating oil discharged from the storage section circulates is formed on the other surface of the end plate. Advantageous Effects of Invention

[0009] According to the present disclosure, it is possible to reduce a cost at the time of processing or assembly.

30 Brief Description of Drawings

[0010]

Fig. 1 is a longitudinal sectional view showing a main section of a scroll compressor according to an embodiment of the present disclosure.

Fig. 2 is an exploded view of the scroll compressor shown in Fig. 1.

Fig. 3 is a view as seen along an arrow in an A direction in Fig. 2.

Fig. 4 is a view as seen along an arrow in a B direction in Fig. 2.

Fig. 5 is a sectional view of an oil groove formed in a scroll compressor according to a first embodiment of the present disclosure.

Fig. 6 is a view showing an oil groove according to a modification example of the first embodiment of the present disclosure.

Fig. 7 is a sectional view taken along line VII-VII of Fig. 6.

Fig. 8 is a view showing an oil groove according to a modification example of the first embodiment of the present disclosure.

Fig. 9 is a view when a lid section of a scroll compressor according to a second embodiment of the present disclosure is viewed from a body section side.

Fig. 10 is a view showing an oil groove and a posi-

tioning pin of a scroll compressor according to a second embodiment of the present disclosure.

Description of Embodiments

[0011] Hereinafter, an embodiment of a compressor according to the present disclosure will be described with reference to the drawings.

[First Embodiment]

[0012] Hereinafter, a first embodiment of the present disclosure will be described with reference to Figs. 1 to 8.

[0013] The compressor according to the present embodiment is a scroll compressor, and is applied to, for example, an air conditioner.

[0014] As shown in Figs. 1 and 2, a scroll compressor (compressor) 1 includes a housing 11 that forms an outer shell. The refrigerant containing mist-like lubricating oil fills the housing 11. The housing 11 includes a cylindrical body section 11a and a lid section 11b that closes an opening of the body section 11a on one end side. The body section 11a and the lid section 11b are fixed to each other by a bolt or the like. The lid section 11b has an outer peripheral portion that is in surface contact with an end plate 12a of a fixed scroll 12 to be described later, and a central portion that is recessed from the outer peripheral portion in which a discharge cavity 23 to be described later or the like is formed.

[0015] In the scroll compressor 1 of the present embodiment, a gasket or the like is not provided between the lid section 11b and the fixed scroll 12. That is, the fixed scroll 12 and a surface of the outer peripheral portion of the lid section 11b on the fixed scroll 12 side (hereinafter, referred to as a "contact surface 11ba") are in direct contact with each other. In addition, a gasket (not shown) is provided between the body section 11a and the lid section 11b. That is, the gasket is interposed between the lid section 11b and the body section 11a.

[0016] A scroll compression mechanism 10 having the fixed scroll 12 and an orbiting scroll 13 is provided inside the housing 11. The scroll compression mechanism 10 compresses the refrigerant.

[0017] The fixed scroll 12 is made of, for example, a metallic material. The fixed scroll 12 has a disk-shaped end plate 12a and a scroll-shaped wall body 12b erected on a surface of the end plate 12a on one side. The fixed scroll 12 is interposed and fixed between the body section 11a and the lid section 11b of the housing 11. The orbiting scroll 13 is made of, for example, a metallic material. The orbiting scroll 13 has a disk-shaped end plate 13a and a scroll-shaped wall body 13b erected on a surface of the end plate 13a on one side, as in the fixed scroll 12. The orbiting scroll 13 is provided to be eccentric with a radius of revolution orbiting and to be out of phase by 180° with respect to the fixed scroll 12. In addition, the fixed scroll 12 and the orbiting scroll 13 are disposed such that wall bodies 12b and 13b are engaged with each other. A com-

pression chamber is formed between the wall bodies 12b and 13b.

[0018] The surface of the end plate 12a of the fixed scroll 12 on the other side (hereinafter, referred to as "the other surface 12aa") is in surface contact with the outer peripheral portion of the lid section 11b.

[0019] In addition, the scroll compressor 1 includes a main shaft (not shown) having a crank shaft at an end portion on the orbiting scroll 13 side. The main shaft is rotatably supported in the housing 11 by a plurality of bearings. A motor is connected to one end of the main shaft in a longitudinal direction, and the main shaft is rotated by a driving force of the motor.

[0020] In addition, the orbiting scroll 13 is fixed to the other end of the main shaft in the longitudinal direction. Specifically, a boss portion (not shown) is provided at the center of the other end surface of the end plate 13a of the orbiting scroll 13, and the eccentric portion of the crank shaft is rotatably accommodated in the boss portion via a bearing (not shown) and a drive bush (not shown). Accordingly, the orbiting scroll 13 is configured to perform a revolution orbiting motion by rotating the main shaft. In addition, a balance weight (not shown) is attached to the drive bush.

[0021] A discharge port 21 that discharges a high-pressure refrigerant from the compression chamber is provided at the center of the end plate 12a of the fixed scroll 12. In addition, a discharge cavity 23 is formed between the lid section 11b of the housing 11 and the other surface 12aa of the end plate 12a of the fixed scroll 12. The discharge cavity 23 is partitioned by a recessed portion provided in the lid section 11b and the other surface 12aa of the end plate 12a.

[0022] The scroll compressor 1 causes the orbiting scroll 13 to perform a revolution orbiting motion by rotating a main shaft. Accordingly, the volume of the compression chamber is gradually reduced toward the central portion. Therefore, the refrigerant that has flowed into the compression chamber moves to the central portion, is compressed, and is discharged to the discharge cavity 23 via the discharge port 21.

[0023] As shown in Figs. 1 to 3, the scroll compressor 1 includes an oil separator (separating section) to which a refrigerant is guided from a discharge cavity 23. The oil separator 29 is a long tubular body. The oil separator 29 is accommodated inside the lid section 11b. The refrigerant guided to the inside of the oil separator 29 has an orbiting flow, and the lubricating oil is separated by centrifugal separation. In this way, the oil separator 29 separates the lubricating oil from the refrigerant guided from the discharge cavity 23. The lubricating oil separated by the oil separator 29 is guided to the oil storage chamber (storage section) 24 through the lubricating oil flow path 25 connected to the lower end portion of the oil separator 29. A filter 26 is provided at an intermediate position of the lubricating oil flow path 25. The filter 26 collects impurities such as dust contained in the lubricating oil.

[0024] The oil storage chamber (storage section) 24 that temporarily stores the lubricating oil separated by the oil separator 29 is provided below the discharge cavity 23. The oil storage chamber 24 is partitioned by a recessed portion provided in the lid section 11b and the other surface 12aa of the end plate 12a.

[0025] The lubricating oil stored in the oil storage chamber 24 is guided to a lubricating oil groove (oil groove) 30 (refer to Fig. 4) (to be described later) formed on the other surface 12aa of the end plate 12a via a high-pressure side oil return flow path (inlet flow path) 27 provided in the lid section 11b. The high-pressure side oil return flow path 27 has an inclined section 27a extending obliquely downward and a horizontal section 27b bent from the inclined section 27a and extending substantially horizontally. The high-pressure side oil return flow path 27 is bent such that the angle formed by the inclined section 27a and the horizontal section 27b is an acute angle.

[0026] The lubricating oil that has circulated through the lubricating oil groove 30 is guided to a low-pressure side oil return flow path (outlet flow path) 32 formed inside the wall body 12b of the fixed scroll 12 on the outermost peripheral side. The lubricating oil that has circulated through the low-pressure side oil return flow path 32 is returned to the space on the orbiting scroll 13 side and is used for lubricating a driving mechanism such as various bearings and a drive bush. An O-ring groove 34 is formed on the other surface 12aa of the end plate 12a of the fixed scroll 12. An O-ring 35 is accommodated in the O-ring groove 34. The O-ring 35 seals the refrigerant in the high-pressure region such that the high-pressure refrigerant in the discharge cavity 23 does not move to the low-pressure side oil return flow path 32 side.

[0027] Next, details of the lubricating oil groove 30 formed on the other surface 12aa of the end plate 12a of the fixed scroll 12 will be described with reference to Figs. 4 and 5.

[0028] As shown in Fig. 4, the lubricating oil groove 30 is formed on the other surface 12aa of the end plate 12a of the fixed scroll 12. Specifically, the lubricating oil groove 30 is formed in the outer peripheral portion of the other surface 12aa. The lubricating oil groove 30 extends over the entire circumference along the outer peripheral edge of the end plate 12a. That is, the lubricating oil groove 30 has an annular shape when the other surface 12aa of the end plate 12a is viewed in a plan view. In addition, the lubricating oil groove 30 is provided outside the O-ring groove 34 in the radial direction. The width (length in the radial direction) of the lubricating oil groove 30 is shorter than the width of the O-ring groove 34.

[0029] In addition, the other surface 12aa is in surface contact with the contact surface 11ba of the lid section 11b. For this reason, the upper portion of the lubricating oil groove 30 is closed by the lid section 11b. That is, the lubricating oil groove 30 and the lid section 11b partition a flow path through which the lubricating oil circulates.

[0030] The downstream end 27c of the high-pressure

side oil return flow path 27 is connected to the lower end of the lubricating oil groove 30. In addition, the upstream end 32a of the low-pressure side oil return flow path 32 is connected to the upper end of the lubricating oil groove 30. In a case where the radial positions of the lubricating oil groove 30 and the downstream end 27c of the high-pressure side oil return flow path 27 and/or the upstream end 32a of the low-pressure side oil return flow path 32 do not coincide with each other, a connection portion that connects the lubricating oil groove 30 and the downstream end 27c of the high-pressure side oil return flow path 27 and/or the upstream end 32a of the low-pressure side oil return flow path 32 may be formed. The connection portion may be, for example, a counterbore portion (recessed portion having a circular shape in a plan view) formed on the other surface 12aa of the end plate 12a. By making the connection portion as the counterbore portion in this way, the connection portion (counterbore portion) can also be formed by using a device for forming the reference hole when the reference hole or the like is processed on the other surface 12aa of the end plate 12a. Therefore, the connection portion can be easily formed.

[0031] In the present embodiment, since the downstream end 27c of the high-pressure side oil return flow path 27 and the upstream end 32a of the low-pressure side oil return flow path 32 are positioned outside the lubricating oil groove 30 in the radial direction, the upstream side counterbore portion 30a connecting the lubricating oil groove 30 and the downstream end 27c of the high-pressure side oil return flow path 27 and the downstream side counterbore portion 30b connecting the lubricating oil groove 30 and the upstream end 32a of the low-pressure side oil return flow path 32 are provided. As described above, by providing the counterbore portion (connection portion), it is not necessary to make the radial positions of the lubricating oil groove 30 and the downstream end 27c of the high-pressure side oil return flow path 27 and/or the upstream end 32a of the low-pressure side oil return flow path 32 coincide with each other. Accordingly, the degree of freedom in the layout of the downstream end 27c of the high-pressure side oil return flow path 27 and/or the upstream end 32a of the low-pressure side oil return flow path 32 can be improved.

[0032] As shown in Fig. 5, the lubricating oil groove 30 has a substantially triangular cross section in a longitudinal direction (flow path cross section). Specifically, a triangular vertex portion, which is the bottom surface of the lubricating oil groove 30, is curved. The curved vertex portion has a curvature radius R of 0.4 mm or more.

[0033] The lubricating oil groove 30 is formed by turning processing. In addition, the lubricating oil groove 30 is formed at the same time when the O-ring groove 34 or the like is formed on the other surface 12aa of the end plate 12a by turning processing.

[0034] Next, a part of the flow of the refrigerant and the lubricating oil in the scroll compressor 1 according to the present embodiment will be described.

[0035] In the scroll compressor 1, a high-pressure refrigerant is discharged from a discharge port 21 to a discharge cavity 23 during operation. The refrigerant discharged into the discharge cavity 23 is mixed with mist-like lubricating oil. The refrigerant discharged into the discharge cavity 23 is guided to the oil separator 29 via the refrigerant flow path 22. Since the refrigerant flow path 22 is installed so that the refrigerant has an orbiting flow, the refrigerant introduced into the oil separator 29 orbits inside the oil separator 29. In this manner, the lubricating oil is centrifugally separated from the refrigerant in the oil separator 29. The separated lubricating oil is guided to the oil storage chamber 24 via the lubricating oil flow path 25. At this time, the impurities are removed by the filter 26. The lubricating oil in the oil storage chamber 24 flows into the lubricating oil groove 30 via the high-pressure side oil return flow path 27 because of a differential pressure between the discharge cavity 23 (specifically, oil storage chamber 24) and the low-pressure side oil return flow path 32 side. The lubricating oil that has flowed into the lubricating oil groove 30 circulates inside the lubricating oil groove 30 (refer to arrows in Fig. 4). At this time, the lubricating oil is decompressed. The lubricating oil discharged from the lubricating oil groove 30 flows into the low-pressure side oil return flow path 32. The lubricating oil that has circulated inside the low-pressure side oil return flow path 32 is discharged from the downstream end. The lubricating oil discharged from the low-pressure side oil return flow path 32 falls downward because of gravity, and lubricates a bearing, a drive bush, or the like provided below.

[0036] In Fig. 4, for the sake of illustration, only one direction (counterclockwise direction in Fig. 4) of the circulation direction of the lubricating oil in the lubricating oil groove 30 is shown by an arrow, and the arrow in the other direction (clockwise direction in Fig. 4) is omitted. However, the lubricating oil circulates in both the one direction and the other direction in the lubricating oil groove 30.

[0037] According to the present embodiment, the following operation and effects are obtained.

[0038] In the present embodiment, the lubricating oil groove 30 guiding the lubricating oil from the oil storage chamber 24 is formed on the other surface 12aa of the end plate 12a. The other surface 12aa of the end plate 12a is a flat surface, and has a relatively large area. For this reason, the lubricating oil groove 30 can be easily processed. Therefore, the processing step of the lubricating oil groove 30 can be simplified.

[0039] In addition, since the fixed scroll 12 is made of a material having relatively high rigidity, the fixed scroll 12 is difficult to deform even in a case where the lubricating oil groove 30 is formed. For this reason, it is not necessary to check the deformation of the fixed scroll 12 even when the lubricating oil groove 30 is formed. Accordingly, a step of checking a member in which the lubricating oil groove 30 is formed at the time of the assembly of the scroll compressor 1 can be omitted. There-

fore, the assembly step of the scroll compressor 1 can be simplified.

[0040] As described above, the processing step and the assembly step can be simplified, and thus, the cost at the time of processing or assembly can be reduced.

[0041] In the present embodiment, the lubricating oil groove 30 is formed in an annular shape. Accordingly, the lubricating oil groove 30 can be formed by turning processing. Therefore, the lubricating oil groove 30 can be easily formed. In addition, in a case where a groove (for example, O-ring groove 34) or the like other than the lubricating oil groove 30 is formed on the other surface 12aa of the end plate 12a by turning processing, the lubricating oil groove 30 can also be formed when performing turning processing to form the other groove. Therefore, the lubricating oil groove 30 can be easily formed as compared with a case where the other groove and the lubricating oil groove 30 are processed in separate steps.

[0042] In the present embodiment, the O-ring groove 34 in which the O-ring 35 is provided is formed inside the lubricating oil groove 30 in a radial direction. Accordingly, the leakage of the refrigerant can be suppressed.

[0043] In the present embodiment, the cross section of the lubricating oil groove 30 has a substantially triangular shape. Accordingly, for example, in a case where the lubricating oil groove 30 is formed by turning processing, the lubricating oil groove 30 can be easily formed. Therefore, a cost at the time of processing can be reduced.

[Modification Example 1]

[0044] Next, a modification example of the present embodiment will be described with reference to Figs. 6 and 7. In the present modification example, the positioning pin is provided inside the lubricating oil groove 30, which is different from the first embodiment. Other points are similar to the first embodiment, and thus, similar configurations will be denoted by the same reference numerals with detailed description thereof omitted.

[0045] As shown in Figs. 6 and 7, a positioning pin (flow path cross section reducing portion) 40 is provided inside the lubricating oil groove 30 according to the present modification example. The positioning pin 40 is a pin for positioning the fixed scroll 12 and the housing 11. As shown in Fig. 6, two positioning pins 40 are provided, and the two positioning pins 40 are disposed at an interval of 180 degrees in the circumferential direction.

[0046] As shown in Fig. 7, an end portion of the positioning pin 40 on the lid section 11b side is inserted into a pin hole formed on the contact surface 11ba of the lid section 11b. In addition, an end portion of the positioning pin 40 on the end plate 12a side is inserted into a pin hole formed on the bottom surface of the lubricating oil groove 30. As shown in Fig. 7, the area of the flow path cross section of the lubricating oil groove 30 is reduced in a portion where the positioning pin 40 is provided.

[0047] According to the present modification example,

the following operation and effects are obtained.

[0048] In the present modification example, a positioning pin 40 that reduces the flow path cross section is provided in the lubricating oil groove 30. Accordingly, the area of the flow path cross section of the lubricating oil groove 30 can be adjusted by adjusting the size and the like of the positioning pin 40. Therefore, the amount of decompression of the lubricating oil circulating through the lubricating oil groove 30 can be adjusted.

[0049] In addition, the positioning pin 40 for positioning the fixed scroll 12 and the housing 11 is used to reduce the area of the flow path cross section. Accordingly, it is not necessary to provide a new component separately in order to reduce the area of the flow path cross section, and thus, the number of components can be reduced. Therefore, the assembly step can be simplified, and the cost can be reduced.

[Modification Example 2]

[0050] Next, a modification example of the present embodiment will be described with reference to Fig. 8. In the present modification example, the lubricating oil groove includes a plurality of annular grooves and connection portions, which is different from the first embodiment. Other points are similar to the first embodiment, and thus, similar configurations will be denoted by the same reference numerals with detailed description thereof omitted.

[0051] As shown in Fig. 8, the lubricating oil groove 60 according to the present modification example includes a first annular groove 61 that is connected to the downstream end 27c of the high-pressure side oil return flow path 27 that guides the lubricating oil to the lubricating oil groove 60, a second annular groove 62 that is provided concentrically with the first annular groove 61 and that is connected to the upstream end 32a of the low-pressure side oil return flow path 32 from which the lubricating oil is discharged from the lubricating oil groove 60, and a counterbore portion (connection portion) 63 that connects the first annular groove 61 and the second annular groove 62. The second annular groove 62 is provided outside the first annular groove 61 in the radial direction.

[0052] In the present modification example, as indicated by arrows in Fig. 8, the lubricating oil that has flowed into the first annular groove 61 from the downstream end 27c of the high-pressure side oil return flow path 27 flows into the second annular groove 62 via the counterbore portion 63. The lubricating oil that has flowed into the second annular groove 62 flows into the low-pressure side oil return flow path 32 from the upstream end 32a of the low-pressure side oil return flow path 32.

[0053] In Fig. 8, for the sake of illustration, only one direction (counterclockwise direction in Fig. 8) of the circulation direction of the lubricating oil in the lubricating oil groove 60 is shown by an arrow, and the arrow in the other direction (clockwise direction in Fig. 8) is omitted. However, the lubricating oil circulates in both the one

direction and the other direction in the lubricating oil groove 60.

[0054] According to the present modification example, the following operation and effects are obtained.

[0055] In the present modification example, even in a case where the radial positions of the downstream end 27c of the high-pressure side oil return flow path 27 and the upstream end 32a of the low-pressure side oil return flow path 32 are different from each other, the lubricating oil can be guided from the high-pressure side oil return flow path 27 to the low-pressure side oil return flow path 32 via the lubricating oil groove 60. Accordingly, it is not necessary to make the radial positions of the downstream end 27c of the high-pressure side oil return flow path 27 and the upstream end 32a of the low-pressure side oil return flow path 32 coincide with each other. Accordingly, the degree of freedom in the layout of the downstream end 27c of the high-pressure side oil return flow path 27 and the upstream end 32a of the low-pressure side oil return flow path 32 can be improved.

[0056] In addition, since both the first annular groove 61 and the second annular groove 62 have an annular shape, the first annular groove 61 and the second annular groove 62 can be formed by turning processing. Therefore, processing can be facilitated.

[0057] In addition, by making the connection portion connecting the first annular groove 61 and the second annular groove 62 as the counterbore portion as in the present modification example, the connection portion (counterbore portion 63) can also be formed by using a device for forming the reference hole when the reference hole or the like is processed on the other surface 12aa of the end plate 12a. Therefore, the connection portion (counterbore portion 63) can be easily formed.

[0058] In the present modification example, the example in which two annular grooves are provided has been described. However, three or more annular grooves may be provided. In this case, a counterbore portion connecting all the annular grooves may be provided, or a plurality of counterbore portions connecting only the annular grooves adjacent to each other in the radial direction (for example, in a case where there are three annular grooves, two counterbore portions: a counterbore portion connecting the outermost peripheral annular groove and the central annular groove and a counterbore portion connecting the innermost peripheral annular groove and the central annular groove) may be provided.

[Second Embodiment]

[0059] Next, a second embodiment of the present disclosure will be described with reference to Figs. 9 to 10.

[0060] In the scroll compressor 1 of the present embodiment, the gasket 9 is provided between the end plate 12a of the fixed scroll 12 and the lid section 11b of the housing 11, which is different from the first embodiment. Other points are similar to the first embodiment, and thus, similar configurations will be denoted by the same refer-

ence numerals with detailed description thereof omitted.

[0061] In the scroll compressor 1 according to the present embodiment, the gasket 9 is provided between the body section 11a and the lid section 11b and between the lid section 11b and the fixed scroll 12. That is, the gasket 9 is interposed between the lid section 11b, the body section 11a, and the fixed scroll 12.

[0062] As shown in Fig. 9, the gasket 9 is formed in a substantially annular shape in a plan view. In addition, the gasket 9 has a plurality of protrusion portions 9a that protrude to the outside in the radial direction from the outer peripheral edge. The gasket 9 is in surface contact with the contact surface 11ba of the lid section 11b.

[0063] In addition, the other surface 12aa of the end plate 12a of the fixed scroll 12 is in surface contact with the gasket 9. In addition, the gasket 9 is interposed between the other surface 12aa and the outer peripheral portion of the lid section 11b.

[0064] As described above, the other surface 12aa of the end plate 12a is in surface contact with the gasket 9. For this reason, the upper portion of the lubricating oil groove 30 is closed by the gasket 9. That is, the lubricating oil groove 30 and the gasket 9 partition a flow path through which the lubricating oil circulates.

[Modification Example 3]

[0065] Next, a modification example of the present embodiment will be described with reference to Fig. 10. In the present modification example, the positioning pin is provided inside the lubricating oil groove 30, which is different from the second embodiment. Other points are similar to the second embodiment, and thus, similar configurations will be denoted by the same reference numerals with detailed description thereof omitted.

[0066] As in the modification example 1 of the first embodiment, in the scroll compressor 1 according to the present embodiment, the positioning pin 40 may be provided inside the lubricating oil groove 30. In the present embodiment, the positioning pin 40 penetrates the gasket 9. In addition, a tip of the positioning pin 40 is inserted into a pin hole formed on the bottom surface of the lubricating oil groove 30. As shown in Fig. 10, the area of the flow path cross section of the lubricating oil groove 30 is reduced in a portion where the positioning pin 40 is provided.

[0067] Also in the present modification example, the same effects as those of the modification example 1 of the first embodiment are exhibited.

[0068] The present disclosure is not limited to each of the embodiments described above, and can be appropriately modified within a scope which does not depart from the gist of the present disclosure.

[0069] The compressor described in the embodiment described above is understood as follows, for example.

[0070] A compressor according to an aspect of the present disclosure includes a housing (11) that forms an outer shell, a scroll compression mechanism (10) that

has an orbiting scroll (13) performing an orbiting motion and a fixed scroll (12), which has an end plate (12a) and a wall body (12b) erected on one surface of the end plate and is fixed to the housing, that is provided inside the housing, and that compresses a refrigerant containing lubricating oil, a contact section (9, 11b) that is in surface contact with the other surface (12aa) of the end plate, a separating section (29) that separates the lubricating oil from the refrigerant compressed by the scroll compression mechanism, and a storage section (24) that stores the lubricating oil separated by the separating section, in which an oil groove (30) through which the lubricating oil discharged from the storage section circulates is formed on the other surface of the end plate.

[0071] In the above configuration, the oil groove for guiding the lubricating oil from the storage section is formed on the other surface of the end plate. The other surface of the end plate is a flat surface, and has a relatively large area. For this reason, the oil groove can be easily processed. Therefore, the processing step of the oil groove can be simplified.

[0072] In addition, since the fixed scroll is made of a material having relatively high rigidity, the fixed scroll is difficult to deform even in a case where the oil groove is formed. For this reason, it is not necessary to check the deformation of the fixed scroll even when the oil groove is formed. Accordingly, a step of checking a member in which the oil groove is formed at the time of the assembly of the compressor can be omitted. Therefore, the assembly step of the compressor can be simplified.

[0073] As described above, the processing step and the assembly step can be simplified, and thus, the cost at the time of processing or assembly can be reduced.

[0074] In addition, in the compressor according to the aspect of the present disclosure, the oil groove extends along an outer peripheral edge of the end plate, and has an annular shape when the other surface of the end plate is viewed in a plan view.

[0075] In the above configuration, the oil groove is formed in an annular shape. Accordingly, the oil groove can be formed by turning processing. Therefore, the oil groove can be easily formed. In addition, in a case where a groove (for example, O-ring groove) or the like other than the oil groove is formed on the other surface of the end plate by turning processing, the oil groove can also be formed when performing turning processing to form the other groove. Therefore, the oil groove can be easily formed as compared with a case where the other groove and the oil groove are processed in separate steps.

[0076] In addition, in the compressor according to the aspect of the present disclosure, an O-ring groove (34) in which an O-ring (35) is provided is formed inside the oil groove in a radial direction.

[0077] In the above configuration, the O-ring groove in which the O-ring is provided is formed inside the oil groove in a radial direction. Accordingly, the leakage of the refrigerant can be suppressed.

[0078] In addition, in the compressor according to the

aspect of the present disclosure, the oil groove includes a first annular groove (61) that is connected to an inlet flow path (27) that guides the lubricating oil to the oil groove, a second annular groove (62) that is provided concentrically with the first annular groove and that is connected to an outlet flow path (32) from which the lubricating oil is discharged from the oil groove, and a connection portion (63) that connects the first annular groove and the second annular groove.

[0079] In the above configuration, even when the radial positions of the downstream end of the inlet flow path and the upstream end of the outlet flow path are different from each other, the lubricating oil can be guided from the inlet flow path to the outlet flow path via the oil groove. Accordingly, it is not necessary to make the radial positions of the downstream end of the inlet flow path and the upstream end of the outlet flow path coincide with each other. Therefore, the degree of freedom in the layout of the downstream end of the inlet flow path and the upstream end of the outlet flow path can be improved.

[0080] In addition, since both the first annular groove and the second annular groove have an annular shape, the first annular groove and the second annular groove can be formed by turning processing. Therefore, processing can be facilitated.

[0081] In addition, in the compressor according to the aspect of the present disclosure, a flow path cross section reducing portion (40) that reduces a flow path cross section is provided inside the oil groove.

[0082] In the above configuration, the flow path cross section reducing portion that reduces the flow path cross section is provided inside the oil groove. Accordingly, the area of the flow path cross section of the oil groove can be adjusted by adjusting the size and the like of the flow path cross section reducing portion. Therefore, the amount of decompression of the lubricating oil circulating through the oil groove can be adjusted.

[0083] Examples of the flow path cross section reducing portion include a positioning pin and a gasket.

[0084] In addition, in the compressor according to the aspect of the present disclosure, the oil groove has a triangular cross section when cut in a plane intersecting an extending direction.

[0085] In the above configuration, the cross section of the oil groove has a triangular shape. Accordingly, for example, in a case where the oil groove is formed by turning processing, the oil groove can be easily formed. Therefore, a cost at the time of processing can be reduced.

Reference Signs List

[0086]

- 1: scroll compressor
- 9: gasket
- 9a: protrusion portion
- 10: scroll compression mechanism

- 11: housing
- 11a: body section
- 11b: lid section
- 11ba: contact surface
- 12: fixed scroll
- 12a: end plate
- 12aa: the other surface
- 12b: wall body
- 13: orbiting scroll
- 13a: end plate
- 13b: wall body
- 21: discharge port
- 22: refrigerant flow path
- 23: discharge cavity
- 24: oil storage chamber (storage section)
- 25: lubricating oil flow path
- 26: filter
- 27: high-pressure side oil return flow path (inlet flow path)
- 27a: inclined section
- 27b: horizontal section
- 27c: downstream end
- 29: oil separator
- 30: lubricating oil groove (oil groove)
- 30a: upstream side counterbore portion
- 30b: downstream side counterbore portion
- 32: low-pressure side oil return flow path (outlet flow path)
- 32a: upstream end
- 34: O-ring groove
- 35: O-ring
- 40: positioning pin (flow path cross section reducing portion)
- 60: lubricating oil groove
- 61: first annular groove
- 62: second annular groove
- 63: counterbore portion (connection portion)

Claims

1. A compressor comprising:

- a housing that forms an outer shell;
- a scroll compression mechanism that has an orbiting scroll performing an orbiting motion and a fixed scroll, which has an end plate and a wall body erected on one surface of the end plate and is fixed to the housing, that is provided inside the housing, and that compresses a refrigerant containing lubricating oil;
- a contact section that is in surface contact with the other surface of the end plate;
- a separating section that separates the lubricating oil from the refrigerant compressed by the scroll compression mechanism; and
- a storage section that stores the lubricating oil separated by the separating section,

wherein an oil groove through which the lubricating oil discharged from the storage section circulates is formed on the other surface of the end plate.

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2. The compressor according to Claim 1, wherein the oil groove extends along an outer peripheral edge of the end plate, and has an annular shape when the other surface of the end plate is viewed in a plan view.

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3. The compressor according to Claim 2, wherein an O-ring groove in which an O-ring is provided is formed inside the oil groove in a radial direction.

4. The compressor according to any one of Claims 1 to 3, wherein the oil groove includes a first annular groove that is connected to an inlet flow path that guides the lubricating oil to the oil groove, a second annular groove that is provided concentrically with the first annular groove and that is connected to an outlet flow path from which the lubricating oil is discharged from the oil groove, and a connection portion that connects the first annular groove and the second annular groove.

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5. The compressor according to any one of Claims 1 to 4, wherein a flow path cross section reducing portion that reduces a flow path cross section is provided inside the oil groove.

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6. The compressor according to any one of Claims 1 to 5, wherein the oil groove has a triangular cross section when cut in a plane intersecting an extending direction.

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FIG. 1

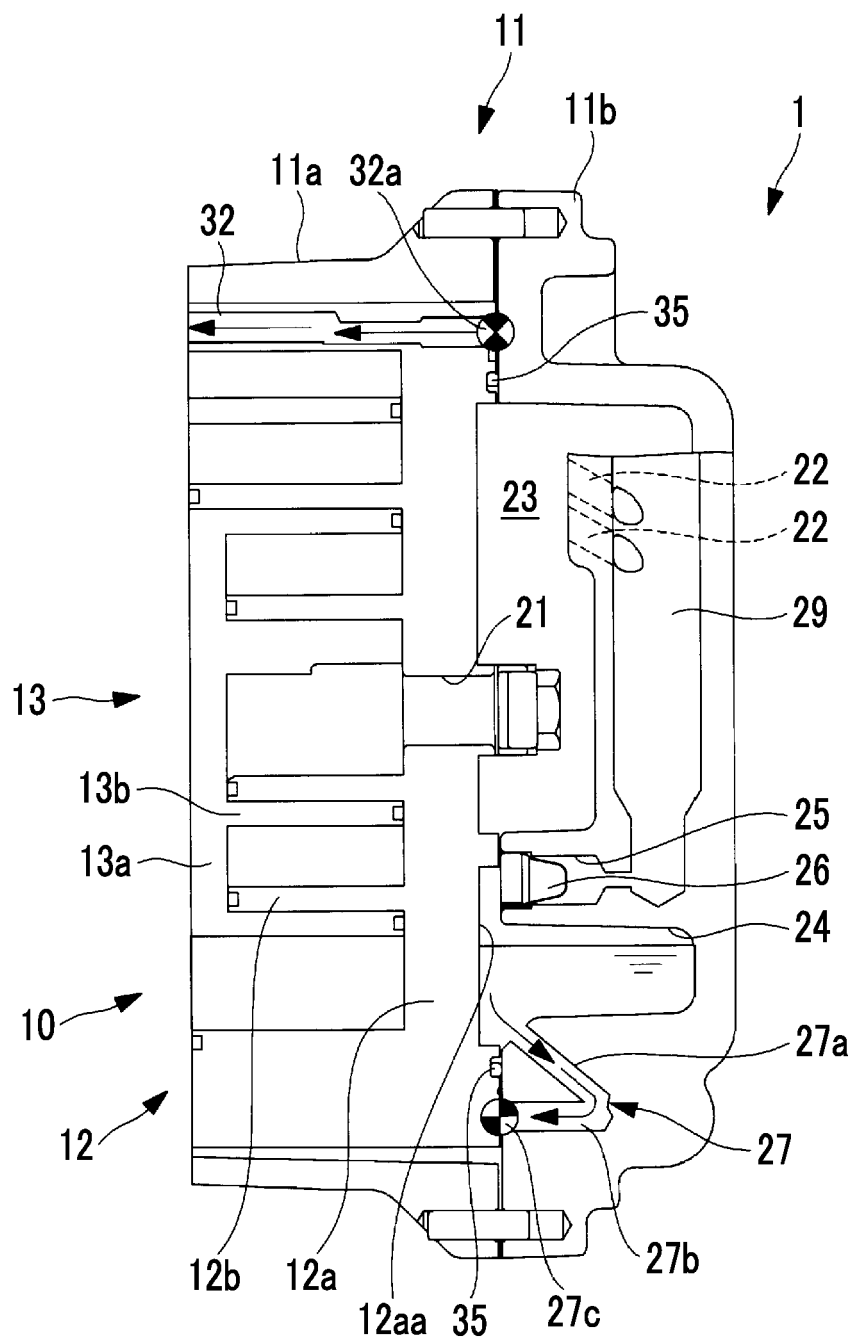


FIG. 2

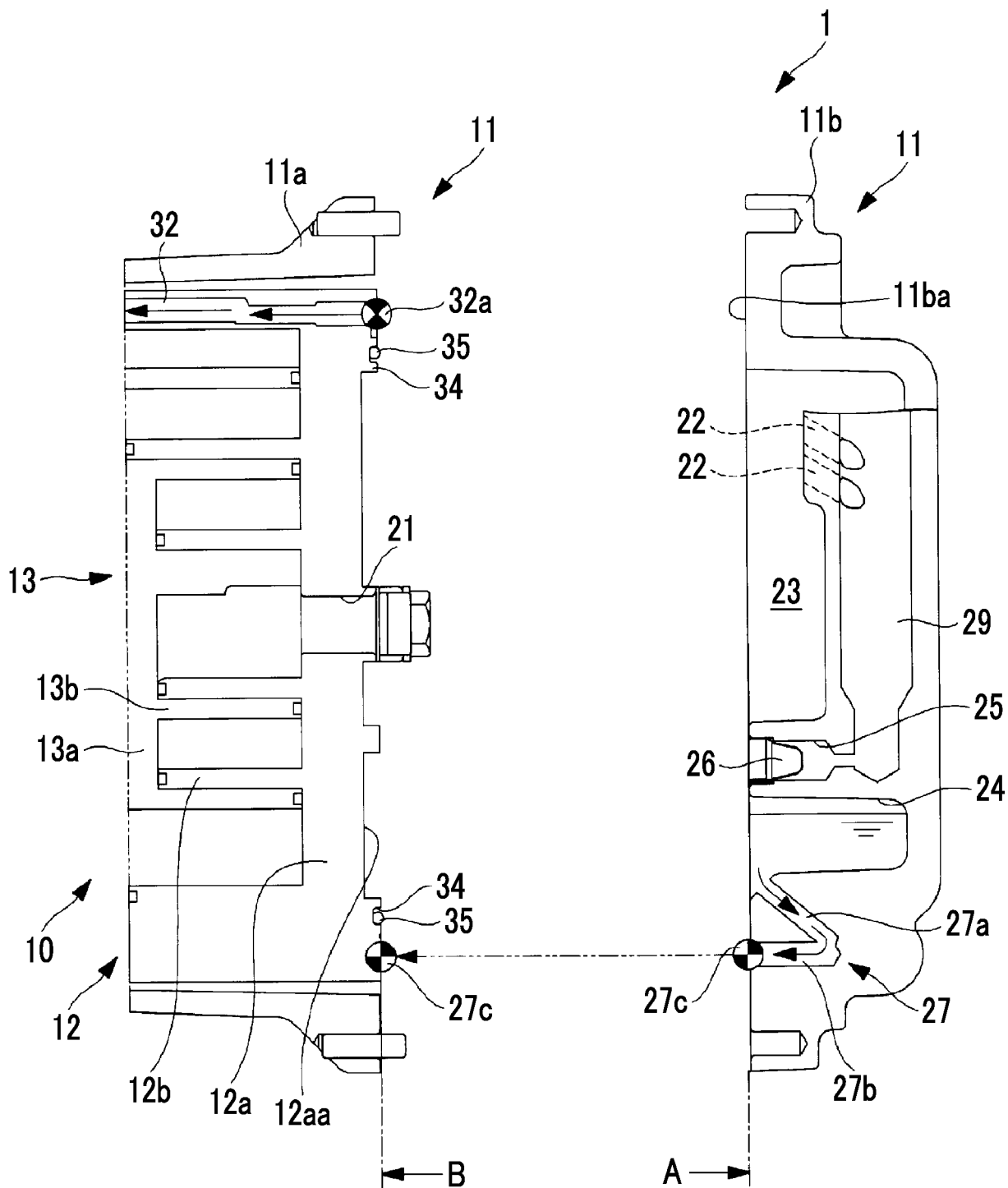


FIG. 3

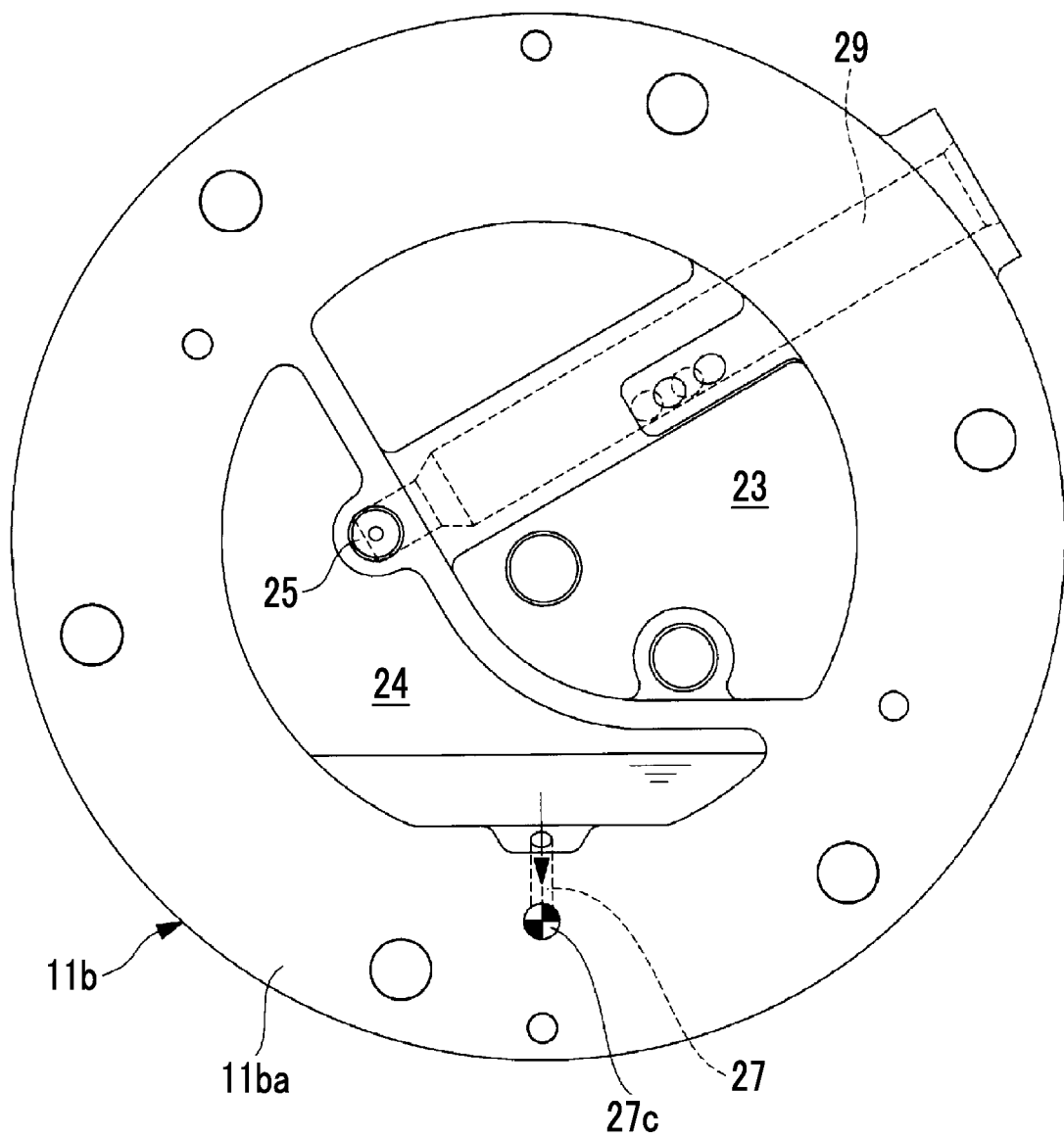


FIG. 4

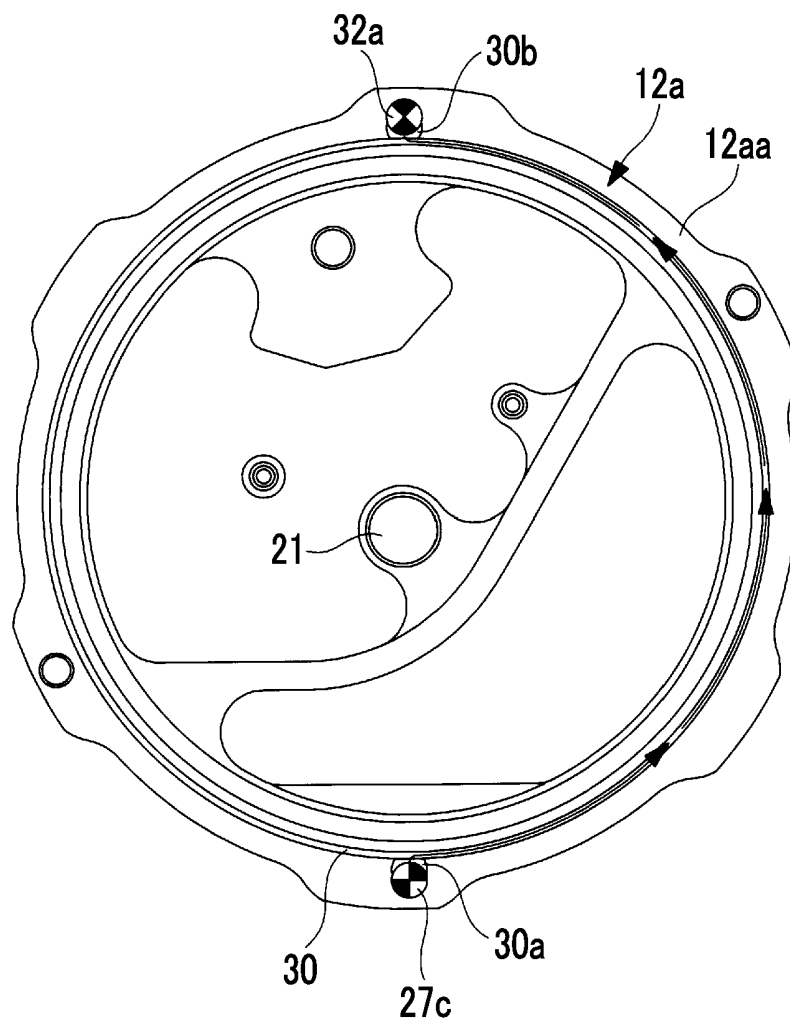


FIG. 5

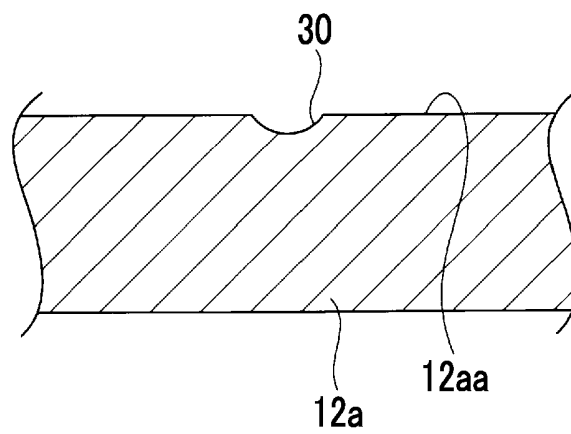


FIG. 6

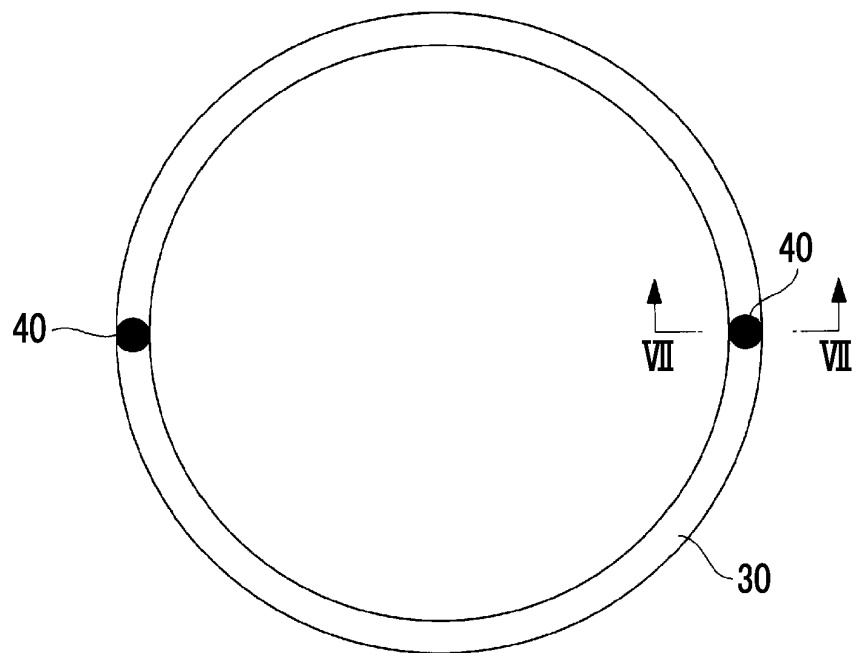


FIG. 7

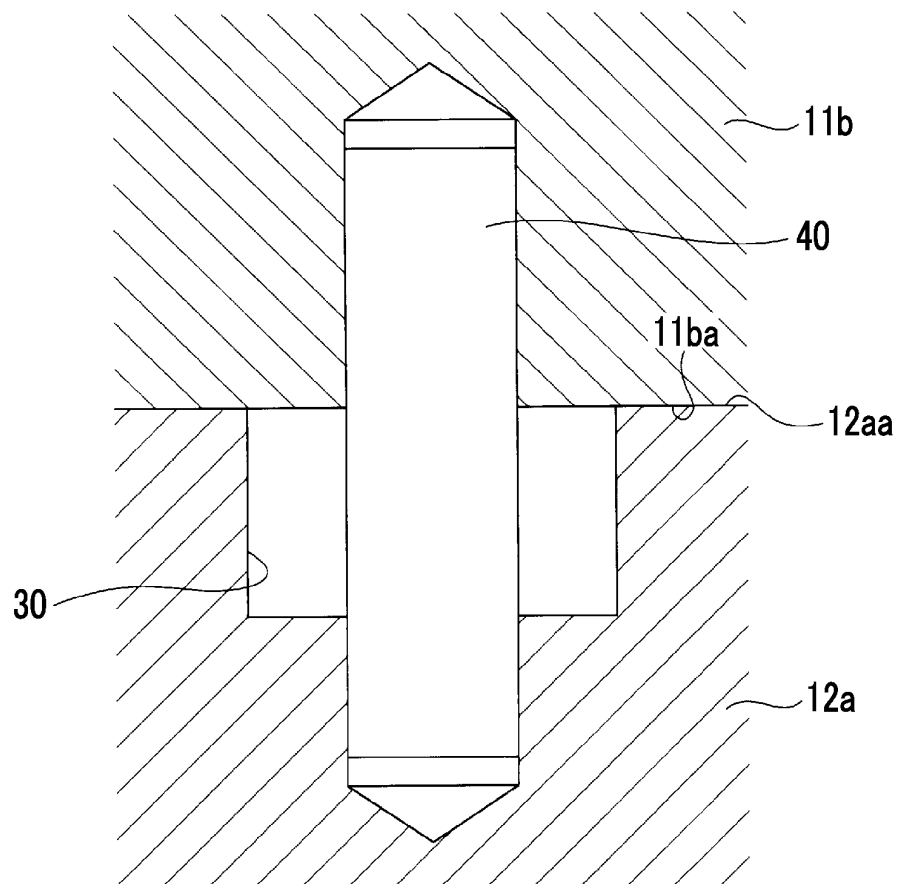


FIG. 8

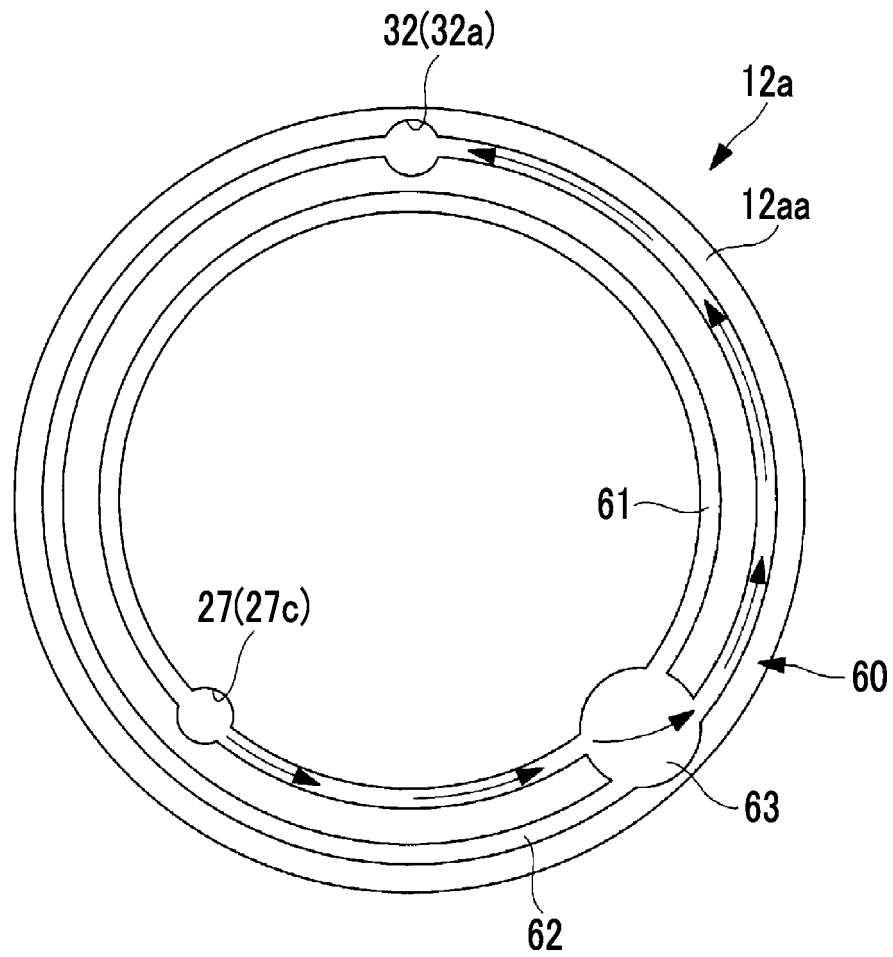


FIG. 9

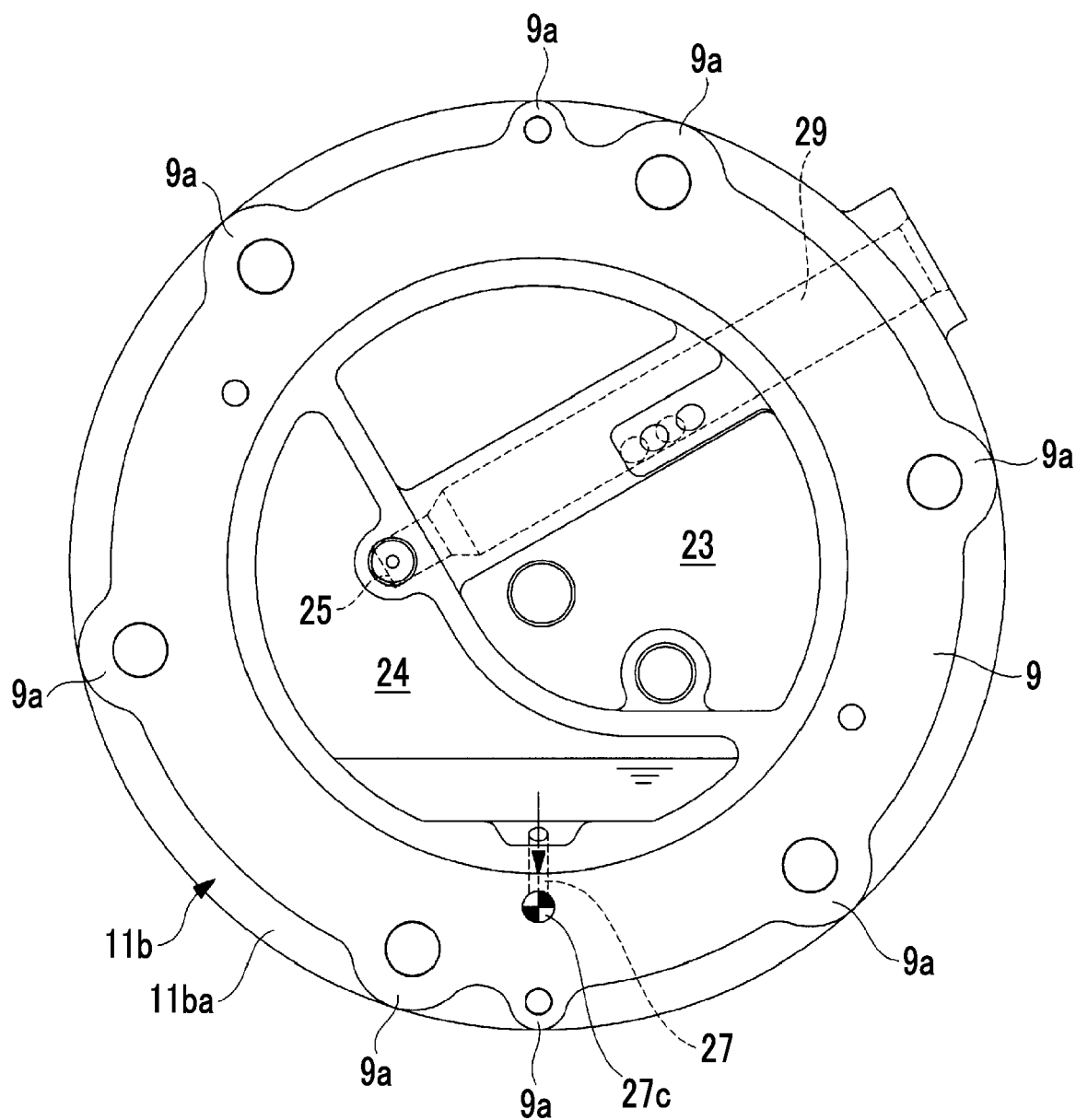
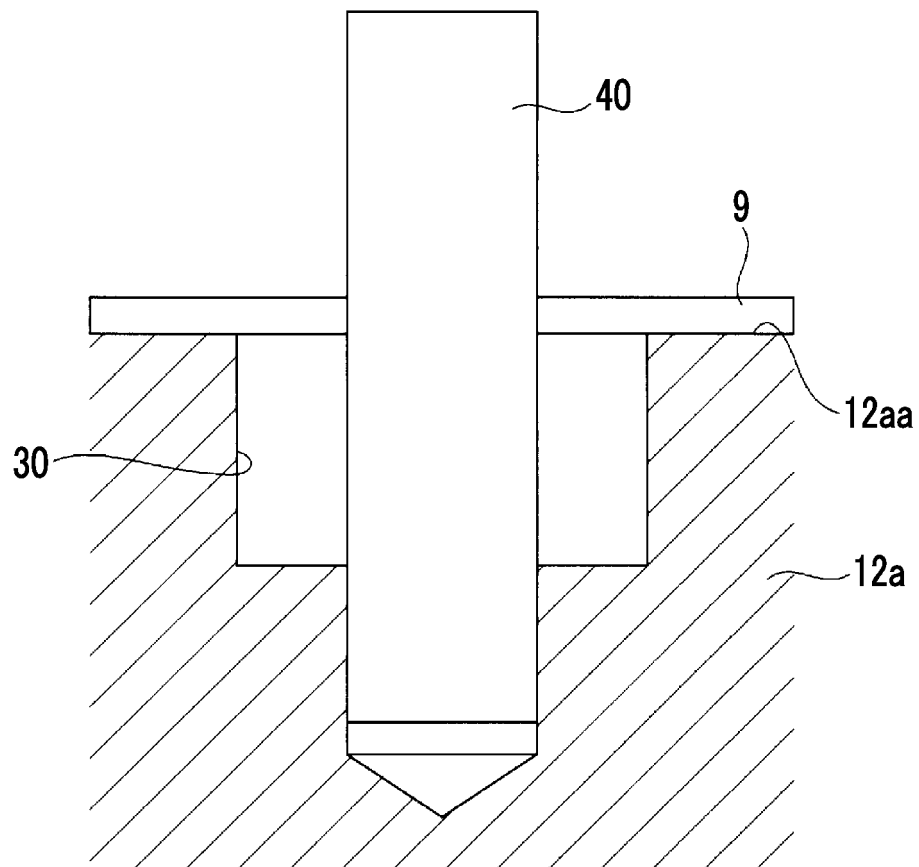


FIG. 10



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2022/048230

A. CLASSIFICATION OF SUBJECT MATTER F04C 18/02(2006.01)i; F04B 39/02(2006.01)i; F04C 29/02(2006.01)i FI: F04C18/02 311W; F04B39/02 G; F04C29/02 351C 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; F04B39/02; F04C29/02 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Published examined utility model applications of Japan 1922-1996 Published unexamined utility model applications of Japan 1971-2023 Registered utility model specifications of Japan 1996-2023 Published registered utility model applications of Japan 1994-2023 Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)												
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>JP 2005-240676 A (MITSUBISHI HEAVY IND., LTD.) 08 September 2005 (2005-09-08) entire text, all drawings</td> <td>1-6</td> </tr> <tr> <td>A</td> <td>JP 2003-232285 A (SANDEN CORP.) 22 August 2003 (2003-08-22) entire text, all drawings</td> <td>1-6</td> </tr> <tr> <td>A</td> <td>JP 2007-186999 A (SANDEN CORP.) 26 July 2007 (2007-07-26) entire text, all drawings</td> <td>1-6</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	A	JP 2005-240676 A (MITSUBISHI HEAVY IND., LTD.) 08 September 2005 (2005-09-08) entire text, all drawings	1-6	A	JP 2003-232285 A (SANDEN CORP.) 22 August 2003 (2003-08-22) entire text, all drawings	1-6	A	JP 2007-186999 A (SANDEN CORP.) 26 July 2007 (2007-07-26) entire text, all drawings	1-6
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A	JP 2007-186999 A (SANDEN CORP.) 26 July 2007 (2007-07-26) entire text, all drawings	1-6										
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Date of the actual completion of the international search 25 January 2023	Date of mailing of the international search report 07 February 2023											
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/JP2022/048230

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP	2005-240676	A	08 September 2005	(Family: none)	
JP	2003-232285	A	22 August 2003	US	6755632 B1
					entire text, all drawings
JP	2007-186999	A	26 July 2007	(Family: none)	

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