(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 091 232 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
09.11.2016 Bulletin 2016/45

(51) Int Cl.:
F04C 29/12 *(2006.01)* ***F16L 15/00*** *(2006.01)*

(21) Application number: **16155381.3**

(22) Date of filing: **12.02.2016**

(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
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **27.02.2015 JP 2015038287**

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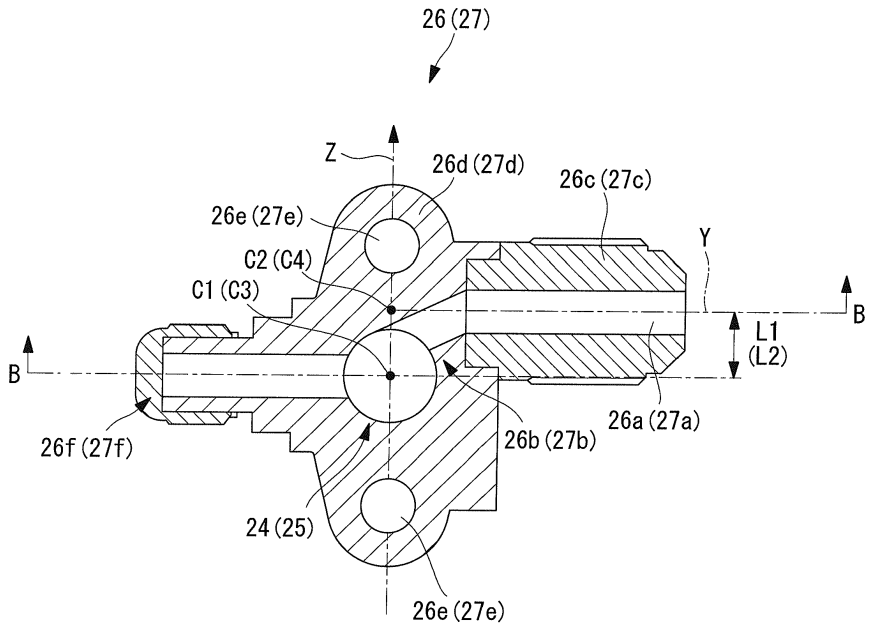
(54) OPEN TYPE COMPRESSOR

(57) There is provided an open type compressor including:
a housing that houses a scroll compression mechanism, and has an outer peripheral surface formed with a suction port 25 and a discharge port 24 thereon; and a discharge side fitting part 26 that is mounted to the discharge port 24, and to which an outflow pipe is to be detachably attached, wherein a first outflow passage 26a for communicating the outflow pipe with the discharge port 24 is formed inside the discharge side fitting part 26, and an axis Y, along which the first outflow passage 26a extends, is disposed at a position offset from a discharge directional axis of the discharge port 24 to which the discharge side fitting part 26 is mounted.

FIG. 4



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Description

{Technical Field}

[0001] The present invention relates to an open type compressor applicable to a compressor, a pump, an expander, and the like.

{Background Art}

[0002] Conventionally, there is known an open type compressor driven by protruding, to the outside of a housing, an end of a drive shaft rotatably supported in a housing through a bearing, and obtaining power from the outside (e.g., refer to PTLs 1 and 2).

[0003] The open type compressor has a suction side fitting part (fitting) connected to an inflow pipe for circulating fluid, and a discharge side fitting part (fitting) connected to an outflow pipe for circulating the fluid. These suction side fitting part and discharge side fitting part are mounted on a mounting seat surface formed in the housing.

{Citation List}

{Patent Literature}

[0004]

{PTL 1} Japanese Unexamined Utility Model Application, Publication No. Sho59-123679
{PTL 2} Japanese Unexamined Utility Model Application, Publication No. Sho60-32581

{Summary of Invention}

{Technical Problem}

[0005] In a case where an existing open type compressor is replaced by a new open type compressor, an inflow pipe and an outflow pipe mounted on the existing open type compressor are mounted on a suction side fitting part and a discharge side fitting part of the new open type compressor, so that it is possible to utilize the existing inflow pipe and outflow pipe as they are.

[0006] However, in a case where the positions of a suction port for fluid and a discharge port for fluid formed in a housing of the new open type compressor are different from the positions of those of the existing open type compressor, the connecting position of the pipe and the connecting position of the fitting part do not coincide, and the new open type compressor cannot be connected to the existing pipe as it is.

[0007] The present invention has been made in view of the above circumstances, and an object of the invention is to provide an open type compressor capable of utilizing an existing pipe as it is even in a case where the position of a suction port for fluid or a discharge port for fluid formed in a housing does not correspond to the connecting position of the existing pipe.

{Solution to Problem}

[0008] In order to solve the above problem, an open type compressor of the present invention employs the following solutions.

[0009] An open type compressor of a first aspect of the present invention includes: a compression mechanism that is driven by a drive shaft, compresses fluid flowing in from a suction port, and discharges the compressed fluid from a discharge port; a housing that houses the compression mechanism, and has an outer peripheral surface formed with the suction port and the discharge port thereon; and a fitting part that is mounted to the suction port or the discharge port, and to which a pipe for circulating fluid is to be detachably attached, characterized in that a passage for communicating the pipe with the suction port or the discharge port is formed inside the fitting part, and an axis, along which the passage extends, is disposed at a position offset from a suction directional axis of the suction port for mounting the fitting part or a discharge directional axis of the discharge port for mounting the fitting part.

[0010] According to the open type compressor of the first aspect of the present invention, the suction port for fluid and the discharge port for fluid are formed on the outer peripheral surface of the housing, and the fitting part is mounted to the suction port or the discharge port. The fitting part is formed with the passage therein.

[0011] Then, the axis, along which the passage extends, is disposed at the position offset from the suction directional axis of the suction port for mounting the fitting part or the discharge directional axis of the discharge port for mounting the fitting part.

[0012] The axis, along which the passage extends, is disposed at the position offset from the suction directional axis of the suction port for mounting the fitting part or the discharge directional axis of the discharge port for mounting the fitting part, and therefore it is possible to utilize the existing pipe disposed at the position offset from the suction port or the discharge port similarly to the passage, to mount the existing pipe on the fitting part.

[0013] Thus, according to the open type compressor of the first aspect of the present invention, it is possible to provide the open type compressor capable of utilizing the existing pipe as it is, even in a case where the position of the suction port for fluid or the discharge port for fluid formed in the housing does not correspond to the connecting position of the existing pipe.

[0014] In the open type compressor of the first aspect of the present invention, the passage may include a first passage coupled to the pipe, and a second passage for communicating the first passage with the suction port or the discharge port.

[0015] Consequently, fluid can be circulated between the pipe and the suction port or the discharge port by

using the first passage coupled to the pipe, and the second passage for communicating the first passage with the suction port or the discharge port.

[0016] In the open type compressor having the above configuration, an axis, along which the passage disposed at the position offset from the suction directional axis of the suction port for mounting the fitting part or the discharge directional axis of the discharge port for mounting the fitting part extends, may be an axis, along which the first passage extends. In this case, the axis, along which the first passage extends, may be a direction along an axis, along which the drive shaft extends.

[0017] Consequently, the axis, along which the first passage coupled to the pipe extends, is offset from the suction directional axis of the suction port or the discharge directional axis of the discharge port, and can be made to correspond to the connecting position of the existing pipe.

[0018] In the open type compressor having the above configuration, a closed space may be formed between an inner peripheral surface of the fitting part, and the outer peripheral surface of the housing, and an axis, along which the passage disposed at the position offset from the suction directional axis of the suction port for mounting the fitting part or the discharge directional axis of the discharge port for mounting the fitting part extends, may be an axis, along which the second passage extends. In this case, the axis, along which the second passage extends, may be disposed in a direction along the suction directional axis of the suction port, or a direction along the discharge directional axis of the discharge port.

[0019] Consequently, the axis, along which the second passage for communicating the first passage and the suction port or the discharge port extends, is offset from the suction directional axis of the suction port, or the discharge directional axis of the discharge port, and can be made to correspond to the connecting position of the existing pipe.

[0020] In the open type compressor having the above configuration, the fitting part may have a first fitting member formed with the first passage therein, and a second fitting member formed with the second passage therein, and the first fitting member and the second fitting member may be joined to each other.

[0021] Consequently, even in a case where the positon of the suction port for fluid or the discharge port for fluid formed in the housing does not correspond to the connecting position of the existing pipe, the second fitting member is joined at a suitable position of the first fitting member, so that it is possible to utilize the existing pipe as it is. Additionally, the first fitting member and the second fitting member are separately formed, and therefore the fitting part can be more easily manufactured compared to a case where the first fitting member and the second fitting member are formed by a single member.

[0022] In the open type compressor of the first aspect of the present invention, the fitting part may have a pair of through holes into which a pair of tightening bolts is inserted, and a pair of tightening holes that is tightened to the pair of tightening bolts may be formed in a mounting seat surface that protrudes from the outer peripheral surface of the housing, and a shape in plan view of the mounting seat surface may be an annular shape a center of which is the suction port or the discharge port.

[0023] Consequently, even in a case where the mounting angle of the fitting part with respect to the center position of the suction port or the discharge port formed in the housing does not correspond to the existing pipe, the pair of tightening holes is newly formed in the mounting seat surface formed in the annular shape, so that it is possible to form a mounting angle corresponding to the existing pipe.

[0024] In the open type compressor of the first aspect of the present invention, the outer peripheral surface, on which the suction port and the discharge port are formed, may extend in a circumferential direction around an axis, along which the drive shaft extends.

[0025] Consequently, the suction port and the discharge port formed on the outer peripheral surface extending in the circumferential direction around the axis, along which the drive shaft extends, can be coupled to the existing pipe.

{Advantageous Effects of Invention}

[0026] According to the present invention, it is possible to provide an open type compressor capable of utilizing an existing pipe as it is, even in a case where a position of a suction port for fluid or a discharge port formed in a housing does not correspond to a connecting position of the existing pipe.

{Brief Description of Drawings}

[0027]

{Fig. 1} Fig. 1 is a longitudinal sectional view illustrating an open type compressor of a first embodiment of the present invention.

{Fig. 2} Fig. 2 is a plan view illustrating a discharge side mounting seat surface and a suction side mounting seat surface of Fig. 1.

{Fig. 3} Fig. 3 is a plan view illustrating a discharge side fitting part and a suction side fitting part of Fig. 1.

{Fig. 4} Fig. 4 is a sectional view taken along the A-A arrow illustrating the discharge side fitting part and the suction side fitting part of Fig. 1.

{Fig. 5} Fig. 5 is a sectional view taken along the B-B arrow illustrating the discharge side fitting part and the suction side fitting part of Fig. 4.

{Fig. 6} Fig. 6 is a longitudinal sectional view illustrating a discharge side fitting part and a suction side fitting part of an open type compressor of a second embodiment of the present invention.

{Fig. 7} Fig. 7 is a plan view illustrating a discharge side mounting seat surface and a suction side

mounting seat surface of an open type compressor of a third embodiment of the present invention.

{Description of Embodiments}

[0028] Hereinafter, embodiments according to the present invention will be described with reference to the drawings. First EMBODIMENT

[0029] Hereinafter, a first embodiment of the present invention will be described with reference to Fig. 1 to Fig. 5.

[0030] An open type scroll compressor (open type compressor) 1 includes a cylindrical housing 2 that extends in a circumferential direction around an axis X, as illustrated in Fig. 1. In this housing 2, a front end side is opened, a rear end side is sealed, a front housing 3 is tightly fixed to an opening on the front end side by a bolt 4, so that a sealed space is formed inside the housing, and a scroll compression mechanism 5 and a drive shaft 6 are housed in the sealed space.

[0031] As illustrated in Fig. 1, a discharge side mounting seat surface 2a is formed on an outer peripheral surface of the housing 2, and a discharge side fitting part 26 is mounted on the discharge side mounting seat surface 2a. Additionally, a suction side mounting seat surface 2b is formed on the outer peripheral surface of the housing 2, and a suction side fitting part 27 is mounted on the suction side mounting seat surface 2b.

[0032] A position in the circumferential direction around the axis X where the suction side mounting seat surface 2b and the suction side fitting part 27 are displaced is different from a position in the circumferential direction around the axis X where the discharge side mounting seat surface 2a and the discharge side fitting part 26 are disposed. Therefore, in Fig. 1, the suction side mounting seat surface 2b and the suction side fitting part 27 are illustrated by broken lines.

[0033] Fig. 2 is a plan view illustrating the discharge side mounting seat surface 2a and the suction side mounting seat surface 2b. In Fig. 2, reference numerals corresponding to the suction side mounting seat surface 2b are put in parentheses.

[0034] As illustrated in Fig. 2, in the discharge side mounting seat surface 2a on which the discharge side fitting part 26 is mounted, a discharge port 24 for discharging fluid from the inside of the housing 2 to the discharge side fitting part 26, and tightening holes 2c in which pairs of tightening bolts 28 are tightened, described later, are formed.

[0035] As illustrated by using parentheses in Fig. 2, in the suction side mounting seat surface 2b on which the suction side fitting part 27 is mounted, a suction port 25 for allowing fluid to flow from the suction side fitting part 27 to the inside of the housing 2, and tightening holes 2d in which pairs of tightening bolts 29 are tightened, described later, are formed.

[0036] As illustrated in Fig. 1, the drive shaft 6 is rotatably supported by the front housing 3 through a main bearing 7 and a sub bearing 8. To a front end of the drive shaft 6 that protrudes from the front housing 3 to the outside through a lip seal 9, a pulley (not illustrated) rotatably installed on an outer peripheral part of the front housing 3 through a bearing (not illustrated) is coupled through an electromagnetic clutch (not illustrated). Thus, external power for driving the pulley through the electromagnetic clutch is transmitted to the drive shaft 6, so that the drive shaft 6 rotates around the axis X illustrated in Fig. 1.

[0037] At a rear end of a drive shaft 6, a crank pin 13 eccentric by a predetermined dimension is integrally provided. Additionally, the rear end of the drive shaft 6 is coupled to a turning scroll 16 of the scroll compression mechanism 5 described later through a publicly known driven crank mechanism 14 including a drive bush which varies the turning radius.

[0038] The scroll compression mechanism 5 is driven by the drive shaft 6, compresses fluid (refrigerant gas) that flows in from the suction port 25 formed in the housing 2, and discharges the compressed fluid from the discharge port 24 formed in the housing 2.

[0039] In the scroll compression mechanism 5, a pair of fixed scrolls 15 and a turning scroll 16 are meshed with each other while shifting in phase by 180 degrees, so that a pair of compression chambers 17 is formed between both the scrolls 15 and 16, and the compression chambers 17 is moved while the capacity is gradually reduced from an outer peripheral position to the center position, thereby compressing the fluid (refrigerant gas).

[0040] The pair of fixed scrolls 15 includes a discharge port 18 for discharging gas compressed at a center part, and is fixedly installed on a bottom wall surface of the housing 2 through a bolt 19. The turning scroll 16 is coupled to the crank pin 13 of the drive shaft 6 through the driven crank mechanism 14, and is supported on a thrust bearing surface of the front housing 3 through a publicly known rotation block mechanism (not illustrated) in such a manner as to freely revolve, turn, and drive.

[0041] At an outer periphery of an end plate 15A of the pair of fixed scrolls 15, an O-ring 21 is provided. The O-ring 21 is brought into close contact with an inner peripheral surface of the housing 2, so that an internal space of the housing 2 is partitioned into a discharge chamber 22 and a suction chamber 23.

[0042] The discharge chamber 22 is communicated with the discharge port 18, and fluid (compressed refrigerant gas) from the pair of compression chambers 17 is discharged. The fluid discharged to the discharge port 18 is discharged from the discharge port 24 formed in the housing 2 to a freezing cycle side through the discharge side fitting part 26.

[0043] The suction chamber 23 is communicated with the suction port 25 formed in the housing 2, the low-pressure fluid that circulates in the freezing cycle is sucked from the suction port 25 through the suction side fitting part 27, and the fluid is sucked in the pair of compression chambers 17 via the suction chamber 23.

[0044] The pair of fixed scrolls 15 and the turning scroll 16 are configured such that scroll laps 15B and 16B are erected on the end plate 15A and 16A, respectively. Between both the scrolls 15 and 16, the pair of compression chambers 17 partitioned by the end plates 15A and 16A and the scroll laps 15B and 16B is formed symmetrically with respect to a scroll center. Additionally, the turning scroll 16 smoothly revolves, turns, and drives around the fixed scrolls 15.

[0045] As illustrated in Fig. 1, in the pair of compression chambers 17, the axial height on the outer peripheral side on the scroll laps 15B and 16B is made to be higher than the height on an inner peripheral side of the scroll laps 15B and 16B. Consequently, the three-dimensional compressible scroll compression mechanism 5 that compresses in both the circumferential direction of the scroll laps 15B and 16B, and the lap height direction, when the compression chambers 17 moves while reducing the capacity from the outer peripheral side to the center side, and compresses the fluid, is configured.

[0046] Now, the discharge side fitting part 26 and the suction side fitting part 27 will be described in detail with reference to Fig. 3 to Fig. 5.

[0047] Fig. 3 to Fig. 5 each illustrate the discharge side fitting part 26 and the suction side fitting part 27. In Fig. 3 to Fig. 5, reference numerals corresponding to the suction side fitting part 27 are put in parentheses.

Discharge Side Fitting Part

[0048] The discharge side fitting part 26 illustrated in Fig. 3 is a member that is mounted on the discharge port 24 (discharge side mounting seat surface 2a) of the housing 2, and to which the outflow pipe 30 for circulating fluid is to be detachably attached. The discharge side fitting part 26 is formed of a metal material (e.g., brass that is alloy of copper and zinc).

[0049] As illustrated in the sectional view of Fig. 4, the discharge side fitting part 26 has a pair of through holes 26e. A pair of the tightening bolts 28 illustrated in Fig. 3 are inserted into the respective pair of through holes 26e, and tightened into the pair of tightening holes 2c of the discharge side mounting seat surface 2a illustrated in Fig. 2.

[0050] Although Fig. 2 illustrates the four tightening holes 2c, the pair of tightening bolts 28 are tightened into the pair of upper and lower tightening holes 2c. The pair of right and left tightening holes 2c are used in a case where the mounting angle of the discharge side fitting part 26 is made different by 90 degrees.

[0051] As illustrated in Fig. 3, an end, on a side close to the discharge side fitting part 26, of the outflow pipe 30 is formed in a flare shape gradually expanding toward a tip. On the other hand, an end, on a side close to the outflow pipe 30, of the discharge side fitting part 26 is formed in a tapered shape gradually reducing toward a tip.

[0052] As illustrated in Fig. 3, a female screw formed in an inner peripheral surface of a coupling nut 30a is tightened to a male screw formed on an outer peripheral surface of the discharge side fitting part 26 in a state where both the ends of the discharge side fitting part 26 and the outflow pipe 30 are brought into contact with each other, so that the discharge side fitting part 26 and the outflow pipe 30 are coupled to each other.

[0053] As illustrated in Fig. 4 and Fig. 5, a first outflow passage 26a (first passage), and a second outflow passage 26b (second passage) are formed inside the discharge side fitting part 26. The first outflow passage 26a is a passage that extends along an axis Y parallel to the axis X, and is coupled to the outflow pipe 30. The second outflow passage 26b is a passage that extends along an axis R (discharge directional axis) orthogonal to the axis X of the housing 2, and guides fluid discharged from the discharge port 24 to the first outflow passage 26a.

[0054] As illustrated in Fig. 3, in a circumferential direction Z around the axis X, a center position C2 of the outflow pipe 30 consistent with the axis Y (second axis) is offset from a center position C1 of the discharge port 24 by a distance L1.

[0055] As illustrated in Fig. 4, the center position C2 of the first outflow passage 26a is offset with respect to the center position C1 of the discharge port 24 in the circumferential direction Z so as to coincide with the center position C2 of the outflow pipe 30 offset from the center position C1 of the discharge port 24 in the circumferential direction Z. Thus, the axis Y along which the first outflow passage 26a extends is disposed at a position offset from the discharge port 24 mounted with the discharge side fitting part 26.

[0056] Therefore, it is possible to couple the existing outflow pipe 30 to the discharge side fitting part 26, and to circulate the fluid discharged from the discharge port 24 to the outflow pipe 30.

[0057] As illustrated in Fig. 4 and Fig. 5, the discharge side fitting part 26 has a first discharge side fitting member 26c (first fitting member) formed with the first outflow passage 26a therein, and a second discharge side fitting member 26d (second fitting member) formed with the second outflow passage 26b therein. The first discharge side fitting member 26c and the second discharge side fitting member 26d are joined by welding and brazing using a brazing material (e.g., silver solder, copper solder, brass solder).

[0058] As illustrated in Fig. 4 and Fig. 5, the discharge side fitting part 26 has a service valve 26f for adding fluid (refrigerant gas) to the second outflow passage 26b.

Suction Side Fitting Part

[0059] The suction side fitting part 27 illustrated in Fig. 3 is a member that is mounted on the suction port 25 (suction side mounting seat surface 2b) of the housing 2, and to which an inflow pipe 31 for circulating fluid is to be detachably attached. The suction side fitting part 27 is formed of a metal material (e.g., brass that is alloy of

copper and zinc).

[0060] As illustrated in the sectional view of Fig. 4, the suction side fitting part 27 has a pair of through holes 27e. A pair of the tightening bolts 29 illustrated in Fig. 3 are inserted into the respective pair of through holes 27e, and tightened into the pair of tightening holes 2d of the suction side mounting seat surface 2b illustrated in Fig. 2.

[0061] Although Fig. 2 illustrates the four tightening holes 2d, the pair of tightening bolts 29 are tightened into the pair of upper and lower tightening holes 2d. The pair of right and left tightening holes 2d are used in a case where the mounting angle of the suction side fitting part 27 is made different by 90 degrees.

[0062] As illustrated in Fig. 3, an end, on a side close to the suction side fitting part 27, of the inflow pipe 31 is formed in a flare shape gradually expanding toward a tip. On the other hand, an end, on a side close to the inflow pipe 31, of the suction side fitting part 27 is formed in a tapered shape gradually reducing toward a tip.

[0063] As illustrated in Fig. 3, a female screw formed in an inner peripheral surface of a coupling nut 31a is tightened into a male screw formed on an outer peripheral surface of the suction side fitting part 27 in a state where both the ends of the suction side fitting part 27 and the inflow pipe 31 are brought into contact with each other, so that the suction side fitting part 27 and the inflow pipe 31 are coupled to each other.

[0064] As illustrated in Fig. 4 and Fig. 5, a first inflow passage 27a (first passage), and a second inflow passage 27b (second passage) are formed inside the suction side fitting part 27. The first inflow passage 27a is a passage that extends along an axis Y parallel to the axis X, and is coupled to the inflow pipe 31. The second inflow passage 27b is a passage that extends along the axis R (suction directional axis) orthogonal to the axis X of the housing 2, and guides fluid flowing in from the first inflow passage 27a to the suction port 25.

[0065] As illustrated in Fig. 3, in a circumferential direction Z around the axis X, a center position C4 of the inflow pipe 31 consistent with the axis Y (second axis) is offset from a center position C3 of the suction port 25 by a distance L2.

[0066] As illustrated in Fig. 4, the center position C4 of the first inflow passage 27a is offset with respect to the center position C3 of the suction port 25 in the circumferential direction Z so as to coincide with the center position C4 of the inflow pipe 31 offset from the center position C3 of the suction port 25 in the circumferential direction Z. Thus, the axis Y, along which the first inflow passage 27a extends, is disposed at a position offset from the suction port 25 for mounting the suction side fitting part 27.

[0067] Therefore, it is possible to couple the existing inflow pipe 31 to the suction side fitting part 27, and to circulate the fluid flowing in from the inflow pipe 31 to the suction port 25.

[0068] As illustrated in Fig. 4 and Fig. 5, the suction side fitting part 27 has a first suction side fitting member 27c (first fitting member) formed with the first inflow passage 27a therein, and a second suction side fitting member 27d (second fitting member) formed with the second inflow passage 27b therein. The first suction side fitting member 27c and the second suction side fitting member 27d are joined by welding and brazing using a brazing material (e.g., silver solder, copper solder, brass solder).

[0069] As illustrated in Fig. 4 and Fig. 5, the suction side fitting part 27 has a service valve 27f for adding fluid (refrigerant gas) to the second inflow passage 27b.

[0070] Action and effects produced by the open type compressor 1 of this embodiment described above will be described.

[0071] According to the open type compressor 1 of this embodiment, the suction port 25 for fluid and the discharge port 24 for fluid are formed on the outer peripheral surface of the housing 2 extending in the circumferential direction around the axis X, and are mounted on the suction side fitting part 27 and the discharge side fitting part 26, respectively. The first inflow passage 27a extending along the axis Y parallel to the axis X is formed inside the suction side fitting part 27, and the first outflow passage 26a extending along the axis Y parallel to the axis X is formed in the discharge side fitting part 26.

[0072] The axis Y is disposed at the position offset from the discharge port 24 to which the discharge side fitting part 26 is mounted, and therefore the existing outflow pipe 30 whose center position in the circumferential direction is offset from the discharge port 24 can be utilized as it is, to be connected to the discharge side fitting part 26, similarly to the first outflow passage 26a.

[0073] Additionally, the axis Y is disposed at the position offset from the suction port 25 to which the suction side fitting part 27 is mounted, and therefore the existing inflow pipe 31 whose center position in the circumferential direction is offset from the suction port 25 can be utilized as it is, to be connected to the suction side fitting part 27, similarly to the first inflow passage 27a.

[0074] Thus, according to the open type compressor 1 of this embodiment, even in a case where the positions in the circumferential direction of the suction port 25 for fluid and the discharge port 24 for fluid formed in the housing 2 do not correspond to the connecting positions of the existing inflow pipe 31 and outflow pipe 30, it is possible to provide the open type compressor 1 capable of utilizing the existing inflow pipe 31 and the outflow pipe 30 as they are.

[0075] According to the open type compressor 1 of this embodiment, the suction side fitting part 27 has the first suction side fitting member 27c formed with the first inflow passage 27a therein, and the second suction side fitting member 27d formed with the second inflow passage 27b therein, and the first suction side fitting member 27c and the second suction side fitting member 27d are joined by welding and brazing.

[0076] Consequently, even in a case where the positon of the suction port 25 for fluid formed in the housing 2 does not correspond to the connecting position of the

existing inflow pipe 31, the second suction side fitting member 27d is joined at a suitable position of the first suction side fitting member 27c, so that it is possible to utilize the existing inflow pipe 31 as it is. Additionally, the first suction side fitting member 27c and the second suction side fitting member 27d are separately formed, and therefore the suction side fitting part 27 can be more easily manufactured compared to a case where the first suction side fitting member 27c and the second suction side fitting member 27d are formed by a single member.

[0077] According to the open type compressor 1 of this embodiment, the discharge side fitting part 26 has the first discharge side fitting member 26c formed with the first outflow passage 26a therein, and the second discharge side fitting member 26d formed with the second outflow passage 26b therein, and the first discharge side fitting member 26c and the second discharge side fitting member 26d are joined by welding and brazing.

[0078] Thus, even in a case where the position of the discharge port 24 for fluid formed in the housing 2 does not correspond to the connecting position of the existing outflow pipe 30, the second discharge side fitting member 26d is joined at a suitable position of the first discharge side fitting member 26c, so that it is possible to utilize the existing outflow pipe 30 as it is. Additionally, the first discharge side fitting member 26c and the second discharge side fitting member 26d are separately formed, and therefore the discharge side fitting part 26 can be more easily manufactured compared to a case where the first discharge side fitting member 26c and the second discharge side fitting member 26d are formed by a single member.

[0079] In this embodiment, the center position C2 of the first outflow passage 26a with respect to the center position C1 of the discharge port 24 in the circumferential direction Z, and the center position C4 of the first inflow passage 27a with respect to the center position C3 of the suction port 25 in the circumferential direction Z are offset. However, other aspects may be employed.

[0080] An aspect, in which any one of the center position C2 of the first outflow passage 26a with respect to the center position C1 of the discharge port 24 in the circumferential direction Z, and the center position C4 of the first inflow passage 27a with respect to the center position C3 of the suction port 25 in the circumferential direction Z is offset, may be employed.

Second Embodiment

[0081] Now, a second embodiment of the present invention will be described with reference to Fig. 6.

[0082] In the open type compressor of the first embodiment, the center position of the second outflow passage 26b is made to coincide with the center position of the discharge port 24 in the direction of the axis Y parallel to the axis X, and the center position of the second inflow passage 27b is made to coincide with the center position of the suction port 25 in the direction of the axis Y, as illustrated in Fig. 5.

[0083] On the other hand, in this embodiment, as illustrated in Fig. 6, a center position C6 of a second outflow passage 26b is offset with respect to a center position C5 of a discharge port 24 in a direction of an axis Y, and a center position C8 of a second inflow passage 27b is offset with respect to a center position C7 of a suction port 25 in the direction of the axis Y.

[0084] Fig. 6 illustrates a discharge side fitting part 26' and a suction side fitting part 27' of this embodiment. In Fig. 6, reference numerals corresponding to the suction side fitting part 27' are put in parentheses.

[0085] Configurations of the discharge side fitting part 26' and the suction side fitting part 27' similar to the configurations of the discharge side fitting part 26 and the suction side fitting part 27 of the first embodiment are denoted by the same reference numerals, and description thereof will be omitted.

Discharge Side Fitting Part

[0086] As illustrated in Fig. 6, a cover member 26f is provided on a bottom of the discharge side fitting part 26'. A cover member 26g is mounted on a protruding part 2e formed on an outer peripheral surface of a housing 2 by a tightening bolt 32. Then, a discharge side closed space S1 is formed between an inner peripheral surface (bottom surface) of the discharge side fitting part 26' and the outer peripheral surface of the housing 2.

[0087] Inside the discharge side fitting part 26', a first outflow passage 26a coupled to an outflow pipe 30, and a second outflow passage 26b that extends in a direction of an axis R (second axis direction; suction directional axis) orthogonal to an axis X, and guides fluid discharged from the discharge port 24 to the discharge side closed space S1, to the first outflow passage 26a are formed.

[0088] As illustrated in Fig. 6, the center position C6 of the second outflow passage 26b is offset with respect to the center position C5 of the discharge port 24 in the direction of the axis Y parallel to the axis X by a distance L3. Thus, the axis R, along which the second outflow passage 26b extends, is disposed at a position offset from the discharge port 24 to which the discharge side fitting part 26' is mounted.

[0089] Therefore, even in a case where a position of an end of the existing outflow pipe 30 in the axis Y direction does not correspond to a position of the discharge port 24, the existing outflow pipe 30 can be coupled to the discharge side fitting part 26', and fluid discharged from the discharge port 24 can be circulated to the outflow pipe 30.

Suction Side Fitting Part

[0090] As illustrated in Fig. 6, a cover member 27g is provided on a bottom of the suction side fitting part 27'. The cover member 27g is mounted on a protruding part 2f formed on the outer peripheral surface of the housing 2 by a tightening bolt 33. Then, a suction side closed

space S2 is formed between an inner peripheral surface (bottom surface) of the suction side fitting part 27' and the outer peripheral surface of the housing 2.

[0091] Inside the suction side fitting part 27', a first inflow passage 27a coupled to an inflow pipe 31, and a second inflow passage 27b that extends in the direction of the axis R orthogonal to the axis X, and guides fluid flowing in from the first inflow passage 27a to the suction side closed space S2 are formed.

[0092] As illustrated in Fig. 6, the center position C8 of the second inflow passage 27b is offset with respect to the center position C7 of the suction port 25 in the direction of the axis Y parallel to the axis X by a distance L4. Thus, the axis R along which the second inflow passage 27b extends is disposed at a position offset from the suction port 25 to which the suction side fitting part 27' is mounted.

[0093] Therefore, even in a case where a position of an end of the existing inflow pipe 31 in the axis Y direction does not correspond to a position of the suction port 25, the existing inflow pipe 31 can be coupled to the suction side fitting part 27', and fluid flowing in from the inflow pipe 31 can be circulated to the suction port 25.

[0094] As described above, according to the open type compressor 1 of this embodiment, the axis R, along which the second outflow passage 26b extends, is disposed at the position offset from the discharge port 24 to which the discharge side fitting part 26 is mounted. Therefore, the existing outflow pipe 30 disposed at the position offset in the direction of the axis X from the discharge port 24 can be utilized as it is, to be connected to the discharge side fitting part 26.

[0095] The axis R, along which the second inflow passage 27b extends, is disposed at the position offset from the suction port 25 to which the suction side fitting part 27 is mounted. Therefore, the existing inflow pipe 31 disposed at the position offset in the direction of the axis X from the suction port 25 can be utilized as it is, to be connected to the suction side fitting part 27.

[0096] Thus, according to the open type compressor of this embodiment, even in a case where the positions in the axis X direction of the suction port 25 for fluid and the discharge port 24 for fluid formed in the housing 2 do not correspond to the connecting positions of the existing inflow pipe 31 and outflow pipe 30, it is possible to provide the open type compressor capable of utilizing the existing inflow pipe 31 and outflow pipe 30 as they are.

[0097] In this embodiment, the center position C6 of the second outflow passage 26b is offset with respect to the center position C5 of the discharge port 24 in the axis Y direction, and the center position C8 of the second inflow passage 27b is offset with respect to the center position C7 of the suction port 25 in the axis Y direction. However, other aspects may be employed.

[0098] An aspect, in which any one of the center position C6 of the second outflow passage 26b with respect to the center position C5 of the discharge port 24 in the axis Y direction, and the center position C8 of the second inflow passage 27b with respect to the center position C7 of the suction port 25 in the axis Y direction is offset, may be employed.

Third Embodiment

[0099] Now, a third embodiment of the present invention will be described with reference to Fig. 7.

[0100] In the open type compressor 1 of the first embodiment, as illustrated in Fig. 2, the shape in plan view of each of the discharge side the mounting seat surface 2a and the suction side mounting seat surface 2b formed in the housing 2 is a substantially cross shape in which four tightening holes are formed.

[0101] On the other hand, in an open type compressor of this embodiment, as illustrated in Fig. 7, the shape in plan view of each of a discharge side mounting seat surface 2a' and a suction side mounting seat surface 2b' formed in a housing 2 is an annular shape in which a discharge port 24 or a suction port 25 is the center.

[0102] As illustrated in Fig. 7, in the discharge side mounting seat surface 2a' formed in the housing 2, a pair of tightening holes 2c' is formed as illustrated by solid lines. Similarly, in the discharge side mounting seat surface 2a' formed in the housing 2, a pair of tightening holes 2c' is formed as illustrated by solid lines.

[0103] In a case where an outflow pipe 30 is disposed at a position illustrated in Fig. 7, when the tightening bolts 28 illustrated in Fig. 3 is tightened into the pair of tightening holes 2c' illustrated by the solid lines in Fig. 7, the mounting angle of a discharge side fitting part 26 with respect to a center position of the discharge port 24 formed in the housing 2 does not correspond to the existing outflow pipe 30.

[0104] On the other hand, when a pair of tightening holes is newly formed at a position illustrated by broken lines in Fig. 7, the mounting angle of the discharge side fitting part 26 with respect to the center position of the discharge port 24 formed in the housing 2 corresponds to the existing outflow pipe 30.

[0105] Thus, according to the open type compressor of this embodiment, even in a case where the mounting angle of the discharge side fitting part 26 with respect to the center position of the discharge port 24 formed in the housing 2 does not correspond to the existing outflow pipe 30, the pair of tightening holes is newly formed in the discharge side mounting seat surface 2a' formed in the annular shape, so that it is possible to form a mounting angle corresponding to the existing outflow pipe 30.

[0106] As illustrated in Fig. 7, in the suction side mounting seat surface 2b' formed in the housing 2, a pair of tightening holes 2c' is formed as illustrated by solid lines. Similarly, in the suction side mounting seat surface 2b' formed in the housing 2, a pair of tightening holes 2d' is formed as illustrated by solid lines.

[0107] In a case where an inflow pipe 31 is disposed at a position illustrated in Fig. 7, when the tightening bolts 29 illustrated in Fig. 3 is tightened into the pair of tight-

ening holes 2d' illustrated by the solid lines in Fig. 7, the mounting angle of a suction side fitting part 27 with respect to a center position of the suction port 25 formed in the housing 2 does not correspond to the existing inflow pipe 31.

[0108] On the other hand, when a pair of tightening holes is newly formed at a position illustrated by broken lines in Fig. 7, the mounting angle of the suction side fitting part 27 with respect to the center position of the suction port 25 formed in the housing 2 corresponds to the existing inflow pipe 31.

[0109] Thus, according to the open type compressor of this embodiment, even in a case where the mounting angle of the suction side fitting part 27 with respect to the center position of the suction port 25 formed in the housing 2 does not correspond to the existing inflow pipe 31, the pair of tightening holes is newly formed in the suction side mounting seat surface 2b' formed in the annular shape, so that it is possible to form a mounting angle corresponding to the existing inflow pipe 31.

[0110] The present invention is not limited to the invention according to the above embodiments, and can be appropriately changed and modified without departing from the scope of the present invention.

Claims

1. An open type compressor (1) comprising:

a compression mechanism (5) that is driven by a drive shaft (6), compresses fluid flowing in from a suction port (25), and discharges the compressed fluid from a discharge port (24);
a housing (2) that houses the compression mechanism (5), and has an outer peripheral surface formed with the suction port (25) and the discharge port (24) thereon; and
a fitting part (26, 27) that is mounted to the suction port (25) or the discharge port (24), and to which a pipe (30, 31) for circulating fluid is detachably attached, **characterized in that**
a passage (26a, 26b, 27a, 27b) for communicating the pipe (30, 31) with the suction port (25) or the discharge port (24) is formed inside the fitting part (26, 27), and
an axis (Y, R), along which the passage (26a, 26b, 27a, 27b) extends, is disposed at a position offset from a suction directional axis of the suction port (25) for mounting the fitting part (26, 27) or a discharge directional axis of the discharge port (24) for mounting the fitting part (26, 27).

2. The open type compressor (1) according to claim 1, wherein
the passage (26a, 26b, 27a, 27b) includes a first passage (26a, 27a) coupled to the pipe (30, 31), and a second passage (26b, 27b) for communicating the first passage (26a, 27a) with the suction port (25) or the discharge port (24).

3. The open type compressor (1) according to claim 2, wherein
an axis, along which the passage disposed at the position offset from the suction directional axis of the suction port (25) for mounting the fitting part (26, 27) or the discharge directional axis of the discharge port (24) for mounting the fitting part (26, 27) extends, is an axis (Y), along which the first passage (26a, 27a) extends.

4. The open type compressor (1) according to claim 2, wherein
a closed space (S1, S2) is formed between an inner peripheral surface of the fitting part (26, 27), and the outer peripheral surface of the housing (2), and
an axis, along which the passage disposed at the position offset from the suction directional axis of the suction port (25) for mounting the fitting part (26, 27) or the discharge directional axis of the discharge port (24) for mounting the fitting part (26, 27) extends, is an axis (R), along which the second passage (26b, 27b) extends.

5. The open type compressor (1) according to any one of claims 2 to 4, wherein
the fitting part (26, 27) has a first fitting member (26c, 27c) formed with the first passage (26a, 27a) therein, and a second fitting member (26d, 27d) formed with the second passage (26b, 27b) therein, and
the first fitting member (26c, 27c) and the second fitting member (26d, 27d) are joined to each other.

6. The open type compressor (1) according to any one of claims 1 to 5, wherein
the fitting part (26, 27) has a pair of through holes (26e, 27e) into which a pair of tightening bolts (28, 29) is inserted, and
a pair of tightening holes (2c, 2d) that is tightened to the pair of tightening bolts (28, 29) is formed in a mounting seat surface (2a, 2b) that protrudes from the outer peripheral surface of the housing (2), and
a shape in plan view of the mounting seat surface (2a, 2b) is an annular shape a center of which is the suction port (25) or the discharge port (24).

7. The open type compressor (1) according to claim 3, wherein
the axis (Y), along which the first passage (26a, 27a) extends, is a direction along an axis, along which the drive shaft (6) extends.

8. The open type compressor (1) according to claim 4, wherein
the axis (R), along which the second passage (26b,

27b) extends, is disposed in a direction along the suction directional axis of the suction port (25) or a direction along the discharge directional axis of the discharge port (24).

9. The open type compressor (1) according to any one of claims 1 to 7, wherein
the outer peripheral surface, on which the suction port (25) and the discharge port (24) are formed, extends in a circumferential direction around an axis, along which the drive shaft (6) extends.

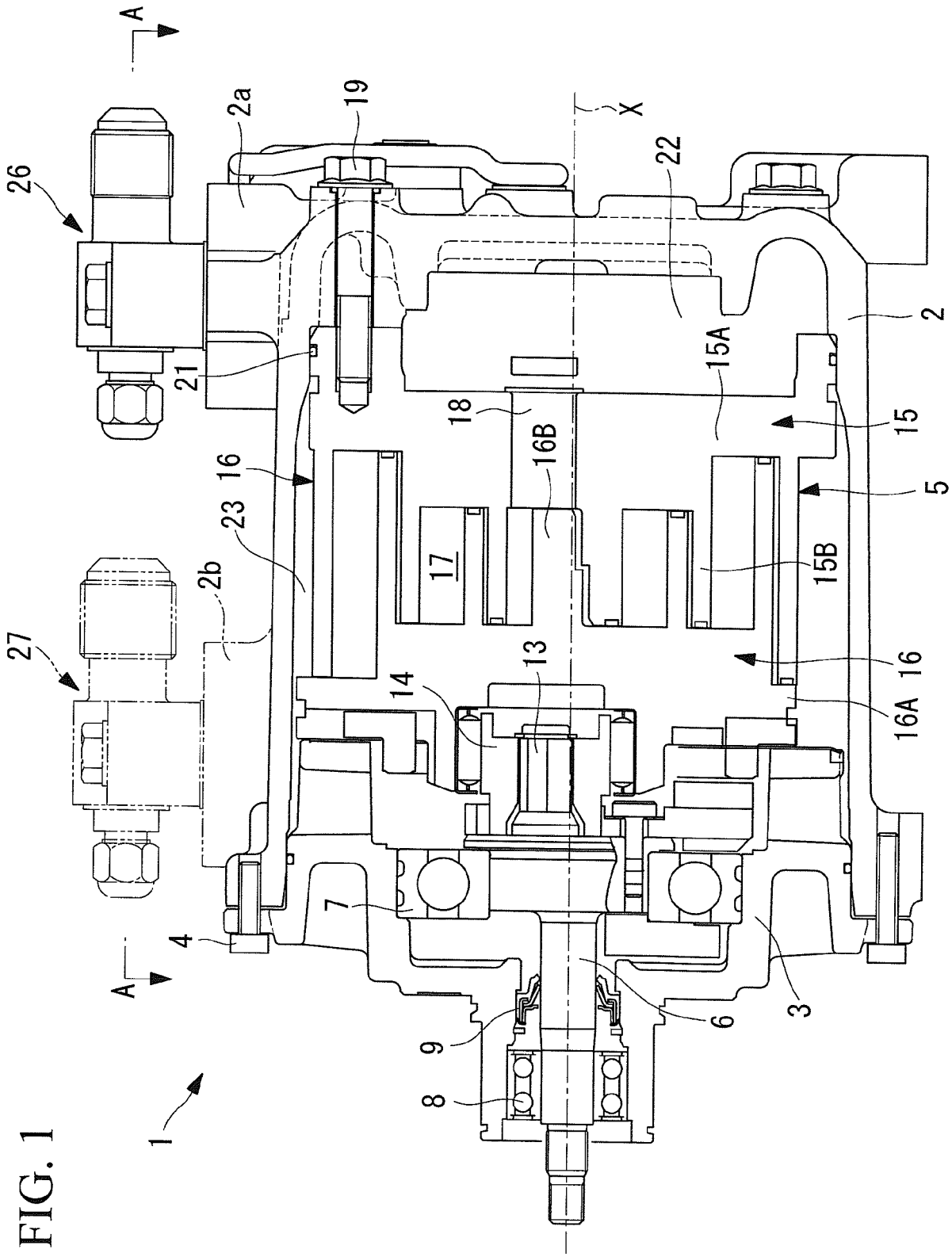

A
A
X
26
2a
19
22
2
21
18
16B
15A
15
16
23
5
17
15B
2b
27
13
14
16
16A
7
4
6
3
9
8
1

FIG. 1

FIG. 2

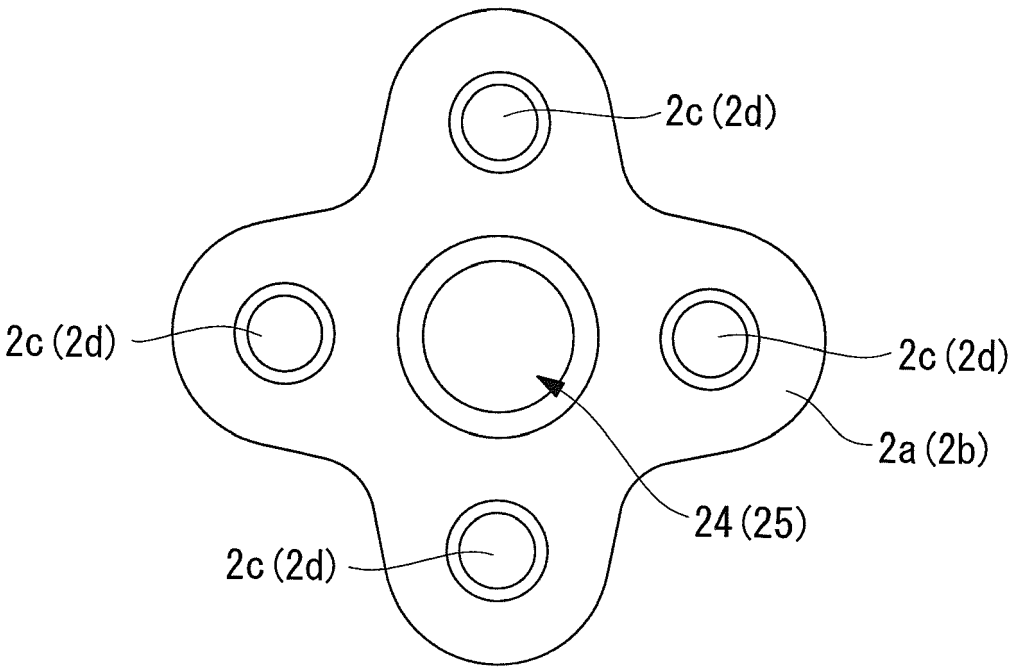


FIG. 3

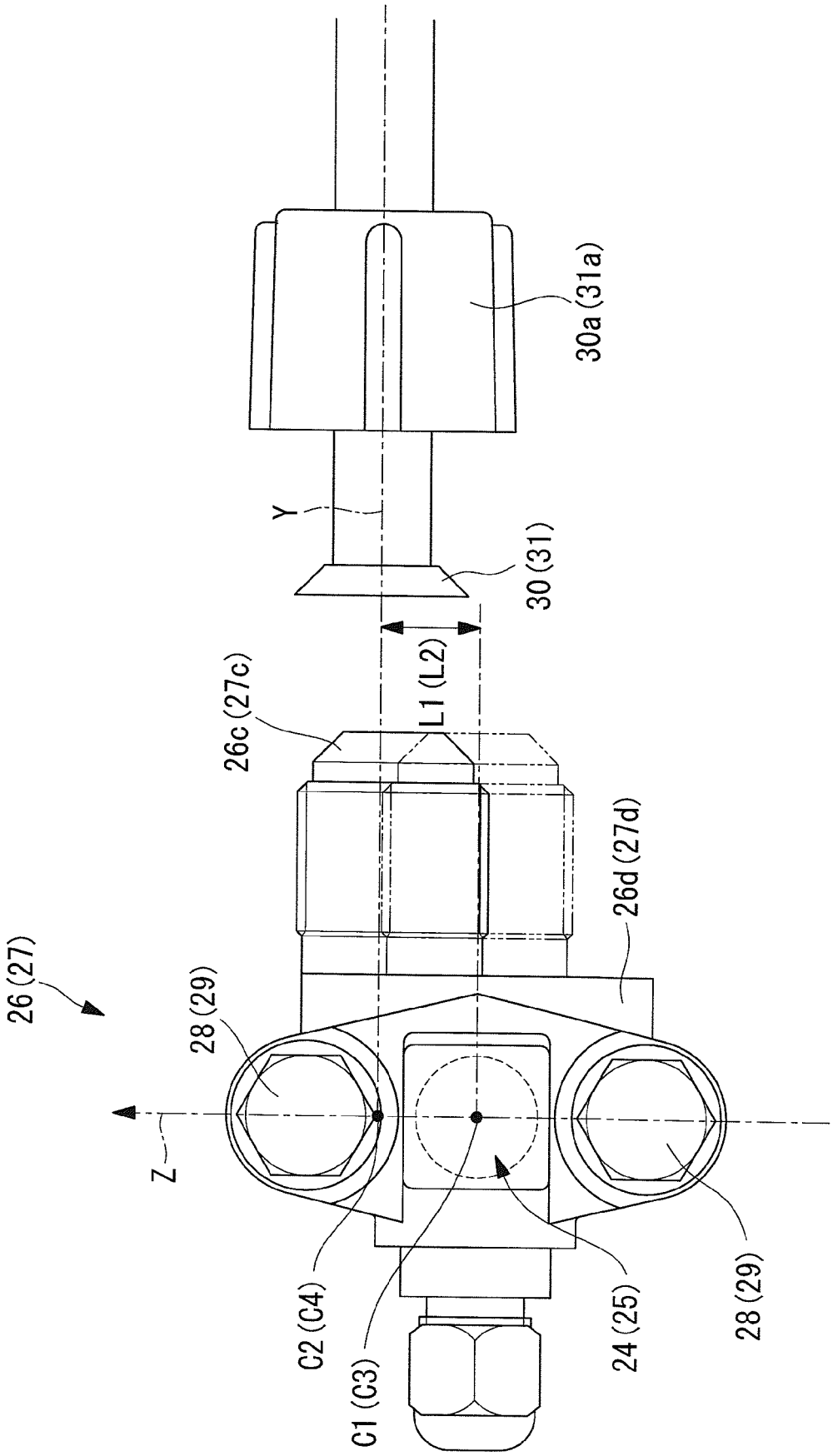

30a (31a)
Y
30 (31)
L1 (L2)
26c (27c)
26d (27d)
26 (27)
28 (29)
Z
C2 (C4)
C1 (C3)
24 (25)
28 (29)

FIG. 4

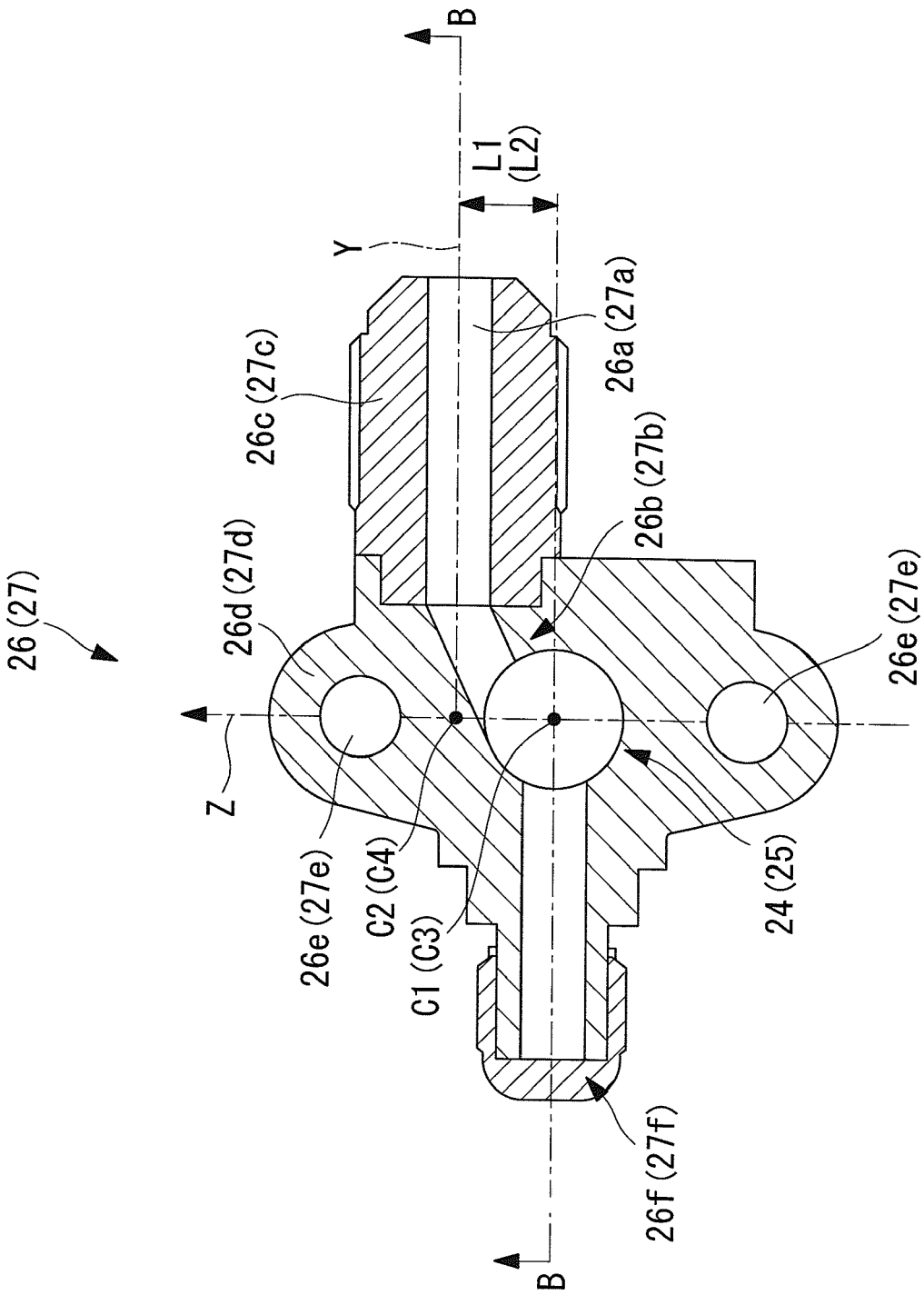

B
L1
(L2)
Y
26a (27a)
26c (27c)
26b (27b)
26d (27d)
26 (27)
26e (27e)
Z
26e (27e)
C2 (C4)
C1 (C3)
24 (25)
26f (27f)
B

FIG. 5

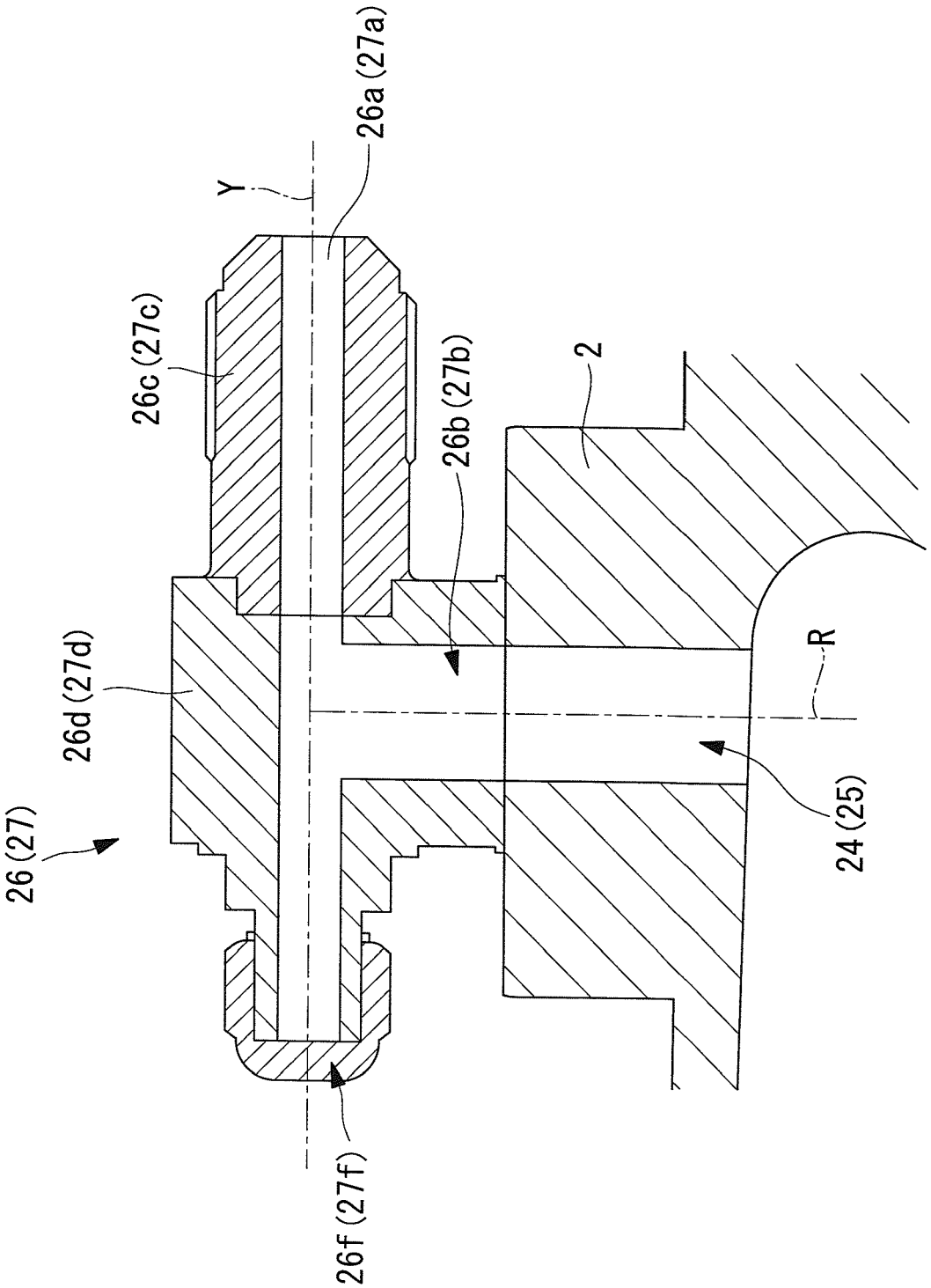


FIG. 6

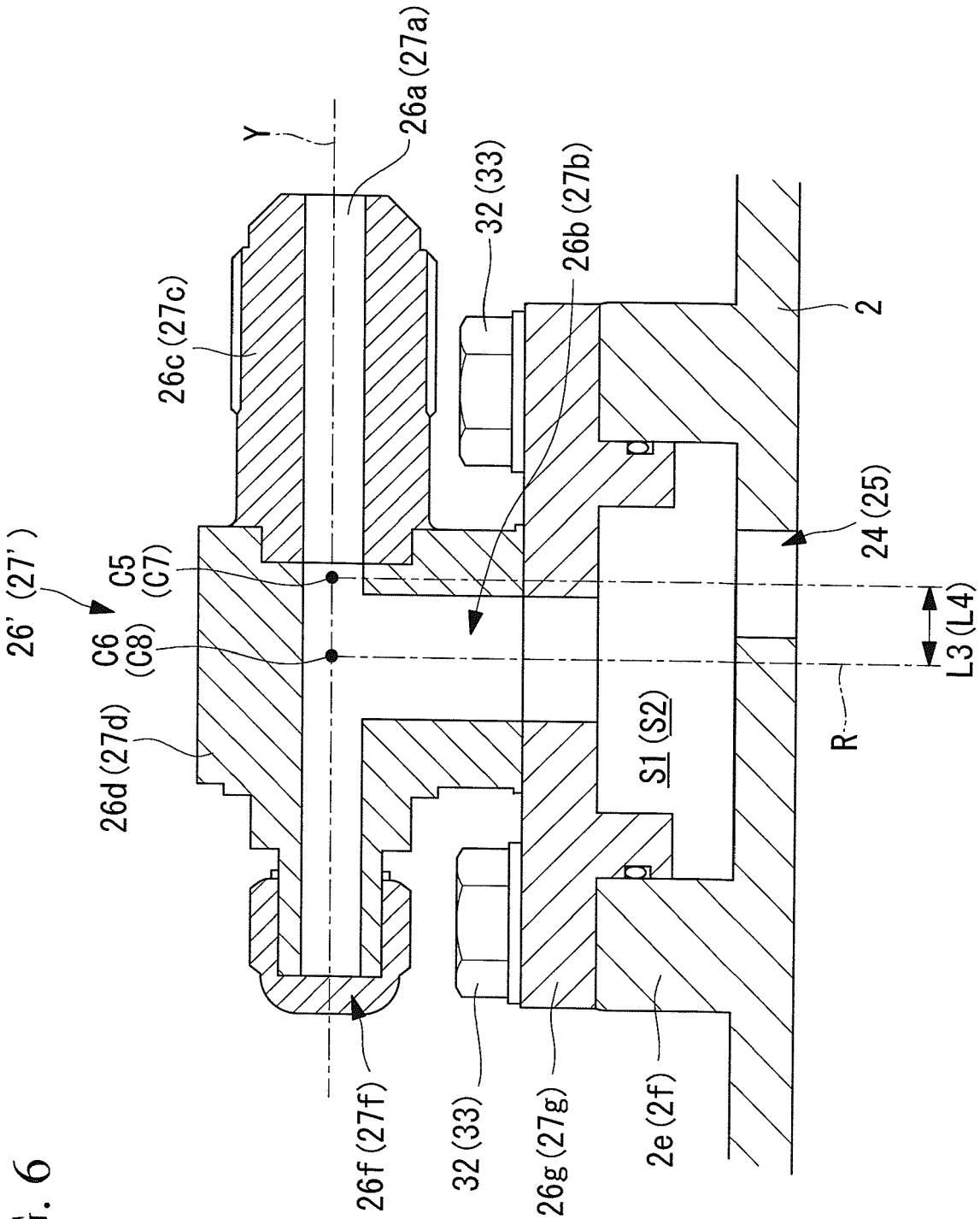
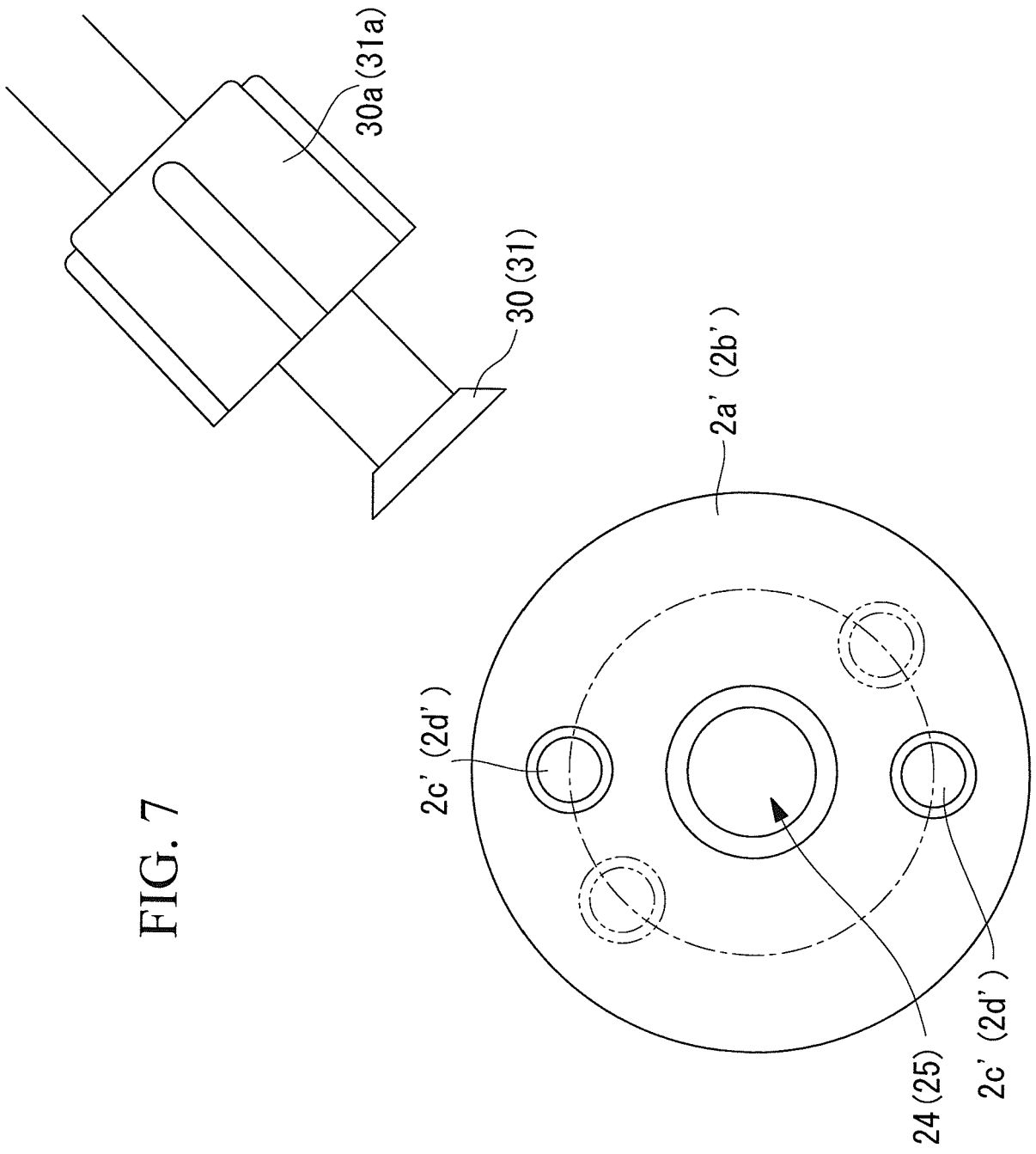

Y
26a (27a)
32 (33)
26b (27b)
26c (27c)
2
24 (25)
26' (27')
C5 (C7)
C6 (C8)
L3 (L4)
R
26d (27d)
S1 (S2)
26f (27f)
32 (33)
26g (27g)
2e (2f)

FIG. 7



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EUROPEAN SEARCH REPORT

Application Number
EP 16 15 5381

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	EP 2 072 822 A2 (TOYOTA JIDOSHOKKI KK [JP]) 24 June 2009 (2009-06-24) * paragraph [0010] - paragraph [0021] * * figures 1,2 * -----	1-5,9 6-8	INV. F04C29/12 F16L15/00
Y,D	JP S60 32581 U (UNKNOWN) 5 March 1985 (1985-03-05) * figures 1-5 * -----	6-8	
A	JP 2002 333087 A (SEKISUI CHEMICAL CO LTD) 22 November 2002 (2002-11-22) * abstract; figure 1 * -----	1	

TECHNICAL FIELDS SEARCHED (IPC)

F04C
F16L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 September 2016	Papastefanou, M

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29-09-2016

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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