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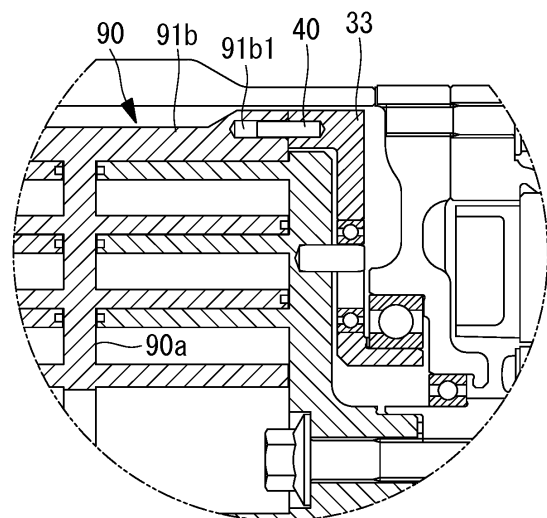
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(54) **TWO-WAY-ROTATING SCROLL COMPRESSOR**

(57) A co-rotating scroll compressor includes a driving-side scroll member that is rotationally driven by a driving unit and includes a spiral driving-side wall disposed on a driving-side end plate, and a driven-side scroll member (90) that includes a driven-side wall corresponding to the driving-side wall. The driven-side wall is disposed on a driven-side end plate (90a) and engages with the driving-side wall to form a compression chamber. A first support member (33) is provided to a front end of a first driven-side wall (91b) in an axis direction. The first support member (33) is connected to the front end by a positioning pin (40) positioning a phase around a rotation axis, and rotates together with the first driven-side wall (91b). The positioning pin (40) is pressed into the first support member (33) and is fitted into the first driven-side wall (91b) in a non-pressed-in state.

FIG. 2



Description

[Technical Field]

[0001] The present disclosure relates to a co-rotating scroll compressor.

[Background Art]

[0002] A co-rotating scroll compressor has been well-known (refer to PTL 1). The co-rotating scroll compressor includes a driving-side scroll and a driven-side scroll that rotates in synchronization with the driving-side scroll, and causes a drive shaft causing the driving-side scroll to rotate and a driven shaft supporting rotation of the driven-side scroll to rotate in the same direction at the same angular velocity while the driven-shaft is offset by a revolving radius from the drive shaft.

[Citation List]

[Patent Literature]

[0003] [PTL 1] the Publication of Japanese Patent No. 5443132

[Summary of Invention]

[Technical Problem]

[0004] The co-rotating scroll compressor adopts a configuration in which a front end of a spiral wall of each of the driving-side scroll and the driven-side scroll is supported by a support member in some cases. In a case where such a configuration is adopted, positioning pins that accurately position phases of the driving-side scroll and the driven-side scroll around a rotation axis are provided in order to ensure engagement of the spiral walls. When the positioning pins are pressed into the spiral walls, however, the walls may be deformed to impair the engagement of the walls, which may deteriorate performance and durability.

[0005] The present disclosure is made in consideration of such circumstances, and an object of the present disclosure is to provide a co-rotating scroll compressor that is not deteriorated in performance and durability when the walls are positioned by the positioning pins.

[Solution to Problem]

[0006] To solve the above-described issues, a co-rotating scroll compressor according to the present disclosure adopts the following solutions.

[0007] A co-rotating scroll compressor according to an aspect of the present disclosure includes: a driving-side scroll member that is rotationally driven by a driving unit and includes a spiral driving-side wall disposed on a driving-side end plate; a driven-side scroll member that in-

cludes a driven-side wall corresponding to the driving-side wall, the driven-side wall being disposed on a driven-side end plate and engaging with the driving-side wall to form a compression chamber; and a synchronous driving mechanism that transmits driving force from the driving-side scroll member to the driven-side scroll member to cause the driving-side scroll member and the driven-side scroll member to perform rotational movement in a same direction at a same angular velocity. A support member is provided to a front end of at least one of the driving-side wall and the driven-side wall in an axis direction. The support member is connected to the front end by a positioning pin positioning a phase around a rotation axis, and rotates together with the connected wall. The positioning pin is pressed into the support member and is fitted into the wall in a non-pressed-in state.

[0008] The driving-side wall disposed on the end plate of the driving-side scroll member and the corresponding driven-side wall of the driven-side scroll member engage with each other. The driving-side scroll member is rotationally driven by the driving unit, and the driving force transmitted to the driving-side scroll member is transmitted to the driven-side scroll member through the synchronous driving mechanism. As a result, the driven-side scroll member rotates as well as performs rotational movement in the same direction at the same angular velocity with respect to the driving-side scroll member. As described above, the co-rotating scroll compressor in which both of the driving-side scroll member and the driven-side scroll member rotate is provided.

[0009] The wall and the support member are connected by the positioning pin. The positioning pin is pressed into the support member while the positioning pin is fitted into the wall in the non-pressed-in state. As a result, the positioning pin can be firmly fixed to the support member, and fitting of the positioning pin does not cause shape deformation of the wall. Since shape deformation does not occur on the wall, there is no possibility of deterioration in performance and durability.

[0010] Note that "fitted in non-pressed-in state" indicates fitting at a degree at which a pin hole is not deformed and enlarged due to fitting of the positioning pin and the member is not deformed. Examples of such fitting include loose fitting.

[0011] Further, in the co-rotating scroll compressor according to the aspect of the present disclosure, the positioning pin is provided at each of at least two positions around the rotation axis.

[0012] Providing the positioning pin at each of the two positions makes it possible to determine the position around the rotation axis.

[0013] Further, in the co-rotating scroll compressor according to the aspect of the present disclosure, the driving-side scroll member includes a first driving-side scroll portion and a second driving-side scroll portion. The first driving-side scroll portion includes a first driving-side end plate and a first driving-side wall and is driven by the driving unit. The second driving-side scroll portion in-

cludes a second driving-side end plate and a second driving-side wall. The driven-side scroll member includes a first driven-side wall and a second driven-side wall. The first driven-side wall is provided on one side surface of the driven-side end plate and engages with the first driving-side wall, and the second driven-side wall is provided on another side surface of the driven-side end plate and engages with the second driving-side wall. The co-rotating scroll compressor includes a first support member and a second support member. The first support member is fixed to a front end side of the first driven-side wall in the axis direction with the first driving-side end plate in between and rotates together with the first driven-side wall. The second support member is fixed to a front end side of the second driven-side wall in the axis direction with the second driving-side end plate in between and rotates together with the second driven-side wall. The positioning pin is provided between the first driven-side wall and the first support member and between the second driven-side wall and the second support member.

[0014] In a case where the driven-side scroll member includes the first driven-side wall and the second driven-side wall, the positioning pin is provided between the first driven-side wall and the connected support member and between the second driven-side wall and the connected support member.

[Advantageous Effects of Invention]

[0015] The positioning pin is pressed into the support member while the positioning pin is fitted into the wall in the non-pressed-in state. Therefore, there is no possibility of deterioration in performance and durability.

[Brief Description of Drawings]

[0016]

[Fig. 1]

Fig. 1 is a vertical cross-sectional view illustrating a co-rotating scroll compressor according to a first embodiment of the present disclosure.

[Fig. 2]

Fig. 2 is a partial vertical cross-sectional view illustrating a vicinity of a positioning pin provided in a first driven-side wall.

[Fig. 3]

Fig. 3 is a partial vertical cross-sectional view illustrating a modification of Fig. 2.

[Fig. 4]

Fig. 4 is a partial vertical cross-sectional view illustrating another modification of Fig. 2.

[Fig. 5]

Fig. 5 is a vertical cross-sectional view illustrating a co-rotating scroll compressor according to a second embodiment.

[Description of Embodiments]

[0017] Some embodiments of the present disclosure are described below.

[First Embodiment]

[0018] Fig. 1 illustrates a co-rotating scroll compressor (scroll compressor) 1 according to a first embodiment. The co-rotating scroll compressor 1 can be used as, for example, a supercharger that compresses combustion air (fluid) to be supplied to an internal combustion engine such as a vehicle engine.

[0019] The co-rotating scroll compressor 1 includes a housing 3, a motor (driving unit) 5 accommodated on one end side in the housing 3, and a driving-side scroll member 70 and a driven-side scroll member 90 that are accommodated on the other end side in the housing 3.

[0020] The housing 3 has a substantially cylindrical shape, and includes a motor accommodation portion 3a that accommodates the motor 5, and a scroll accommodation portion 3b that accommodates the scroll members 70 and 90.

[0021] A cooling fin 3c to cool the motor 5 is provided on an outer periphery of the motor accommodation portion 3a. A discharge opening 3d from which compressed air (working fluid) is discharged is provided at an end part of the scroll accommodation portion 3b. Note that, although not illustrated in Fig. 1, the housing 3 includes an air suction opening from which air (working fluid) is sucked in.

[0022] The motor 5 is driven by being supplied with power from an unillustrated power supply source. Rotation of the motor 5 is controlled by an instruction from an unillustrated control unit. A stator 5a of the motor 5 is fixed to an inner periphery of the housing 3. A rotor 5b of the motor 5 rotates around a driving-side rotation axis CL1. A driving shaft 6 that extends on the driving-side rotation axis CL1 is connected to the rotor 5b. The driving shaft 6 is connected to a first driving-side shaft portion 7c of the driving-side scroll member 70.

[0023] The driving-side scroll member 70 includes the first driving-side scroll portion 71 on the motor 5 side, and the second driving-side scroll portion 72 on the discharge opening 3d side.

[0024] The first driving-side scroll portion 71 includes the first driving-side end plate 71a and the first driving-side walls 71b.

[0025] The first driving-side end plate 71a is connected to the first driving-side shaft portion 7c connected to the driving shaft 6, and extends in a direction orthogonal to the driving-side rotation axis CL1. The first driving-side shaft portion 7c is provided so as to be rotatable with respect to the housing 3 through the first driving-side bearing 11 that is a ball bearing.

[0026] The first driving-side end plate 71a has a substantially disc shape in a planar view. The plurality of first driving-side walls 71b each formed in a spiral shape are

provided on the first driving-side end plate 71a. The first driving-side walls 71b are disposed at equal intervals around the driving-side rotation axis CL1.

[0027] The second driving-side scroll portion 72 includes the second driving-side end plate 72a and the second driving-side walls 72b. The plurality of second driving-side walls 72b each formed in a spiral shape are provided similarly to the above-described first driving-side walls 71b.

[0028] The cylindrical second driving-side shaft portion 72c that extends in the driving-side rotation axis CL1 is connected to the second driving-side end plate 72a. The second driving-side shaft portion 72c is provided so as to be rotatable with respect to the housing 3 through the second driving-side bearing 14 that is a ball bearing. The second driving-side end plate 72a includes the discharge port 72d extending along the driving-side rotation axis CL1.

[0029] Two seal members 16 are provided on a front end side (left side in Fig. 1) of the second driving-side shaft portion 72c relative to the second driving-side bearing 14, between the second driving-side shaft portion 72c and the housing 3. The two seal members 16 and the second driving-side bearing 14 are disposed to include a predetermined interval in the driving side rotation axis CL1. For example, a lubricant that is a grease as a semi-solid lubricant is sealed between the two seal members 16. Note that only one seal member 16 may be provided. In this case, the lubricant is sealed between the seal member 16 and the second driving-side bearing 14.

[0030] The first driving-side scroll portion 71 and the second driving-side scroll portion 72 are fixed while the front ends (free ends) of the walls 71b and 72b corresponding to each other face each other. The first driving-side scroll portion 71 and the second driving-side scroll portion 72 are fixed by the wall fixing bolts (wall fixing parts) 31 that are fastened to the flange portions 73 provided at a plurality of positions in the circumferential direction. The flange portions 73 are provided so as to protrude outward in the radial direction.

[0031] The driven-side scroll member 90 includes the driven-side end plate 90a that is located at a substantially center in the axis direction (horizontal direction in figure). The discharge through hole (through hole) 90h is provided at a center of the driven-side end plate 90a, and causes the compressed air to flow toward the discharge port 72d.

[0032] The first driven-side walls 91b are provided on one side surface of the driven-side end plate 90a, and the second driven-side walls 92b are provided on the other side surface of the driven-side end plate 90a. The first driven-side walls 91b provided on the motor 5 side from the driven-side end plate 90a engage with the first driving-side walls 71b of the first driving-side scroll portion 71. The second driven-side walls 92b provided on the discharge opening 3d side from the driven-side end plate 90a engage with the second driving-side walls 72b of the second driving-side scroll portion 72.

[0033] A first support member 33 and a second support member 35 are provided at respective ends of the driven-side scroll member 90 in the axis direction (horizontal direction in figure). The first support member 33 is disposed on the motor 5 side, and the second support member 35 is disposed on the discharge opening 3d side.

[0034] The first support member 33 is fixed to the front ends (free ends) of the respective first driven-side walls 91b on the outer peripheral side by first support fixing bolts 34, and the second support member 35 is fixed to the front ends (free ends) of the respective second driven-side walls 92b on the outer peripheral side by second support fixing bolts 36.

[0035] Positioning between the first support member 33 and the first driven-side walls 91b around a driven-side rotation axis CL2 is performed by a positioning pin 40 that is provided at an angular position different from an angular position of the first support fixing bolt 34. More specifically, as illustrated in Fig. 2, one end of the positioning pin 40 is inserted into a pin insertion hole 91b1 that is provided at the front end of the corresponding first driven-side wall 91b, and the other end of the positioning pin 40 is pressed into the first support member 33. The positioning pin 40 is fitted into the pin insertion hole 91b1 of the corresponding first driven-side wall 91b in a non-pressed-in state. In other words, the positioning pin 40 is fitted into the pin insertion hole 91b1 at a fitting degree at which the pin insertion hole 91b1 is not deformed and enlarged due to fitting of the positioning pin 40 and the corresponding first driven-side wall 91b is not deformed.

[0036] Two positioning pins 40 are provided around the driven-side rotation axis CL2. Three or more positioning pins 40 may be provided. In this case, it is unnecessary for the third or more positioning pins 40 to perform actual positioning. Therefore, the third or more positioning pins 40 become so-called dummy pins.

[0037] Note that positioning pins are similarly provided between the second support member 35 and the second driven-side walls 92b.

[0038] The shaft portion 33a is provided on the center axis side of the first support member 33, and the shaft portion 33a is fixed to the housing 3 through the first support member bearing 37. The shaft portion 35a is provided on the center axis side of the second support member 35, and the shaft portion 35a is fixed to the housing 3 through the second support member bearing 38. As a result, the driven-side scroll member 90 rotates around the driven-side rotation axis CL2 through the support members 33 and 35.

[0039] The pin-ring mechanism (synchronous driving mechanism) 15 is provided between the first support member 33 and the first driving-side end plate 71a. More specifically, a rolling bearing (ring) is provided on the first driving-side end plate 71a, and the pin member 15b is provided on the first support member 33. The pin-ring mechanism 15 transmits the driving force from the driving-side scroll member 70 to the driven-side scroll member 90, and causes the scroll members 70 and 90 to

perform rotational movement in the same direction at the same angular velocity.

[0040] The co-rotating scroll compressor 1 including the above-described configuration operates in the following manner.

[0041] When the driving shaft 6 rotates around the driving-side rotation axis CL1 by the motor 5, the first driving-side shaft portion 7c connected to the driving shaft 6 also rotates, and the driving-side scroll member 70 accordingly rotates around the driving-side rotation axis CL1. When the driving-side scroll member 70 rotates, the driving force is transmitted from the support members 33 and 35 to the driven-side scroll member 90 through the pin-ring mechanism 15, and the driven-side scroll member 90 rotates around the driven-side rotation axis CL2. At this time, when the pin member 15b of the pin-ring mechanism 15 moves while being in contact with the inner peripheral surface of the circular hole, the both scroll members 70 and 90 perform rotational movement in the same direction at the same angular velocity.

[0042] When the scroll members 70 and 90 perform rotational movement, the air sucked through the air suction opening of the housing 3 is sucked in from outer peripheral side of each of the scroll members 70 and 90, and is taken into the compression chambers formed by the scroll members 70 and 90. Further, compression is separately performed in the compression chambers formed by the first driving-side walls 71b and the first driven-side walls 91b and in the compression chambers formed by the second driving-side walls 72b and the second driven-side walls 92b. A volume of each of the compression chambers is reduced as each of the compression chambers moves toward the center, which compresses the air. The air compressed by the first driving-side walls 71b and the first driven-side walls 91b passes through the discharge through hole 90h provided in the driven-side end plate 90a, and is joined with the air compressed by the second driving-side walls 72b and the second driven-side walls 92b. The resultant air passes through the discharge port 72d and is discharged to outside from the discharge opening 3d of the housing 3. The discharged compressed air is guided to an unillustrated internal combustion engine, and is used as combustion air.

[0043] The present embodiment achieves the following action effects.

[0044] The positioning pins 40 that perform positioning between the driven-side walls 91b and 92b and the support members 33 and 35 are pressed into the support members 33 and 35 while the positioning pins 40 are fitted into the driven-side walls 91b and 92b in the non-pressed-in state. As a result, the positioning pins 40 can be firmly fixed to the support members 33 and 35, and fitting of the positioning pins 40 does not cause shape deformation of the driven-side walls 91b and 92b. Therefore, there is no possibility of deterioration in performance and durability of the co-rotating scroll compressor 1 because shape deformation does not occur on the driven-

side walls 91b and 92b as described above.

[0045] Further, as illustrated in Fig. 3, a columnar collar 33b as a separate body may be provided at a protruded part of the first support member 33, and the corresponding positioning pin 40 may be pressed into the collar 33b. Since the collar 33b is provided as a member separated from the first support member 33, the first support member 33 is easily machined. Further, a facing distance between the both scroll members 70 and 90 can be adjusted through adjustment of a height of the collar 33b. A similar collar may be provided also on the second support member 35.

[0046] Further, as illustrated in Fig. 4, each of the positioning pins 40 may be pressed into the first support member 33 by penetrating through the corresponding collar 33b. In this case, each of the positioning pins 40 may be pressed into or loosely fitted into a through hole of the corresponding collar 33b. A similar collar may be provided also on the second support member 35.

[Second Embodiment]

[0047] In the first embodiment, the so-called double-tooth co-rotating scroll compressor in which the walls are provided on both sides of each of the scroll members in the axis direction has been described. In a second embodiment, a so-called single-tooth co-rotating scroll compressor in which the wall is provided on one side in the axis direction is described.

[0048] Fig. 5 illustrates a single-tooth co-rotating scroll compressor 1A. The co-rotating scroll compressor 1A includes support members 20 and 22 that respectively support a wall 7b of a driving-side scroll member 7 and a wall 9b of a driven-side scroll member 9. Although Fig. 5 does not illustrate the vicinity of the motor 5 illustrated in Fig. 1, the vicinity of the motor 5 has a similar configuration in the present embodiment.

[0049] As illustrated in Fig. 5, the driving-side support member 20 is fixed to a front end (free end) of the driving-side wall 7b of the driving-side scroll member 7 through a positioning pin 41. The positioning pin 41 is fitted into the driving-side wall 7b in a non-pressed-in state while the positioning pin 41 is pressed into the driving-side support member 20.

[0050] The driven-side scroll member 9 is sandwiched between the driving-side support member 20 and the driving-side scroll member 7. Accordingly, a driven-side end plate 9a is disposed to face the driving-side support member 20.

[0051] The driving-side support member 20 includes a shaft portion 20a on center side. The shaft portion 20a is rotatably attached to the housing 3 through a driving-side support member bearing 26 that is a ball bearing. Accordingly, the driving-side support member 20 rotates around the driving-side rotation axis CL1 as with the driving-side scroll member 7.

[0052] A pin-ring mechanism 15' is provided between the driving-side support member 20 and the driven-side

end plate 9a. More specifically, a ring member 15a is provided on the driven-side end plate 9a, and a pin member 15b is provided on the driving-side support member 20.

[0053] The driven-side support member 22 is fixed to a front end (free end) of the driven-side wall 9b of the driven-side scroll member 9 through a positioning pin 41. The positioning pin 41 is fitted into the driven-side wall 9b in a non-pressed-in state while the positioning pin 41 is pressed into the driven-side support member 22.

[0054] The driving-side scroll member 7 is sandwiched between the driven-side support member 22 and the driven-side scroll member 9. Accordingly, a driving-side end plate 7a is disposed to face the driven-side support member 22.

[0055] The driven-side support member 22 includes a shaft portion 22a on center side. The shaft portion 22a is rotatably attached to the housing 3 through a driven-side support member bearing 28 that is a ball bearing. Accordingly, the driven-side support member 22 rotates around the driven-side rotation axis CL2 as with the driven-side scroll member 9.

[0056] The present embodiment achieves the following action effects.

[0057] The positioning pins 41 that perform positioning between the walls 7b and 9b and the support members 20 and 22 are pressed into the support members 20 and 22 while the positioning pins 41 are fitted into the walls 7b and 9b in the non-pressed-in state. As a result, the positioning pins 41 can be firmly fixed to the support members 20 and 22, and fitting of the positioning pins 41 does not cause shape deformation of the walls 7b and 9b. Therefore, there is no possibility of deterioration in performance and durability of the co-rotating scroll compressor 1A because shape deformation does not occur on the walls 7b and 9b as described above.

[0058] Note that, in the above-described embodiments, the co-rotating scroll compressor is used as the supercharger; however, the present disclosure is not limited thereto. The co-rotating scroll compressor is widely used to compress fluid, and for example, can be used as a refrigerant compressor used in air conditioner. In addition, the scroll compressor according to the present disclosure is applicable to an air brake device using air force, as a brake system for a railway vehicle.

[Reference Signs List]

[0059]

1, 1A	Co-rotating scroll compressor
3	Housing
3a	Motor accommodation portion
3b	Scroll accommodation portion (housing)
3c	Cooling fin
3d	Discharge opening
5	Motor (driving unit)
5a	Stator

5b	Rotor
6	Driving shaft
7	Driving-side scroll member
7a	Driving-side end plate
5 7b	Driving-side wall
7c	First driving-side shaft portion
9	Driven-side scroll member
9a	Driven-side end plate
9b	Driven-side wall
10 11	First driving-side bearing
14	Second driving-side bearing
15, 15'	Pin-ring mechanism (synchronous driving mechanism)
15b	Pin member
15 16	Seal member
20	Driving-side support member
20a	Shaft portion
22	driven-side support member
22a	Shaft portion
20 26	Driving-side support member bearing
28	Driven-side support member bearing
31	Wall fixing bolt (wall fixing part)
33	First support member
33a	Shaft portion
25 33b	Collar
34	First support fixing bolt
35	Second support member
35a	Shaft portion
36	Second support fixing bolt
30 37	First support member bearing
38	Second support member bearing
40, 41	Positioning pin
70	Driving-side scroll member
71	First driving-side scroll portion
35 71a	First driving-side end plate
71b	First driving-side wall
72	Second driving-side scroll portion
72a	Second driving-side end plate
72b	Second driving-side wall
40 72c	Second driving-side shaft portion
72d	Discharge port
73	Flange portion
90	Driven-side scroll member
90a	Driven-side end plate
45 90h	Discharge through hole (through hole)
91b	First driven-side wall
91b1	Pin insertion hole
92b	Second driven-side wall
CL1	Driving-side rotation axis
50 CL2	Driven-side rotation axis

Claims

- 55 1. A co-rotating scroll compressor, comprising:
- a driving-side scroll member that is rotationally driven by a driving unit and includes a spiral driv-

ing-side wall disposed on a driving-side end plate;

a driven-side scroll member that includes a driven-side wall corresponding to the driving-side wall, the driven-side wall being disposed on a driven-side end plate and engaging with the driving-side wall to form a compression chamber; and

a synchronous driving mechanism that transmits driving force from the driving-side scroll member to the driven-side scroll member to cause the driving-side scroll member and the driven-side scroll member to perform rotational movement in a same direction at a same angular velocity, wherein

a support member is provided to a front end of at least one of the driving-side wall and the driven-side wall in an axis direction, the support member being connected to the front end by a positioning pin positioning a phase around a rotation axis, and rotating together with the connected wall, and

the positioning pin is pressed into the support member and is fitted into the wall in a non-pressed-in state.

wall, and

the positioning pin is provided between the first driven-side wall and the first support member and between the second driven-side wall and the second support member.

2. The co-rotating scroll compressor according to claim 1, wherein the positioning pin is provided at each of at least two positions around the rotation axis.

3. The co-rotating scroll compressor according to claim 1 or 2, wherein

the driving-side scroll member includes a first driving-side scroll portion and a second driving-side scroll portion, the first driving-side scroll portion including a first driving-side end plate and a first driving-side wall and being driven by the driving unit, and the second driving-side scroll portion including a second driving-side end plate and a second driving-side wall,

the driven-side scroll member includes a first driven-side wall and a second driven-side wall, the first driven-side wall being provided on one side surface of the driven-side end plate and engaging with the first driving-side wall, and the second driven-side wall being provided on another side surface of the driven-side end plate and engaging with the second driving-side wall,

the co-rotating scroll compressor includes a first support member and a second support member, the first support member being fixed to a front end side of the first driven-side wall in the axis direction with the first driving-side end plate in between and rotating together with the first driven-side wall, and the second support member being fixed to a front end side of the second driven-side wall in the axis direction with the second driving-side end plate in between and rotating together with the second driven-side

FIG. 1

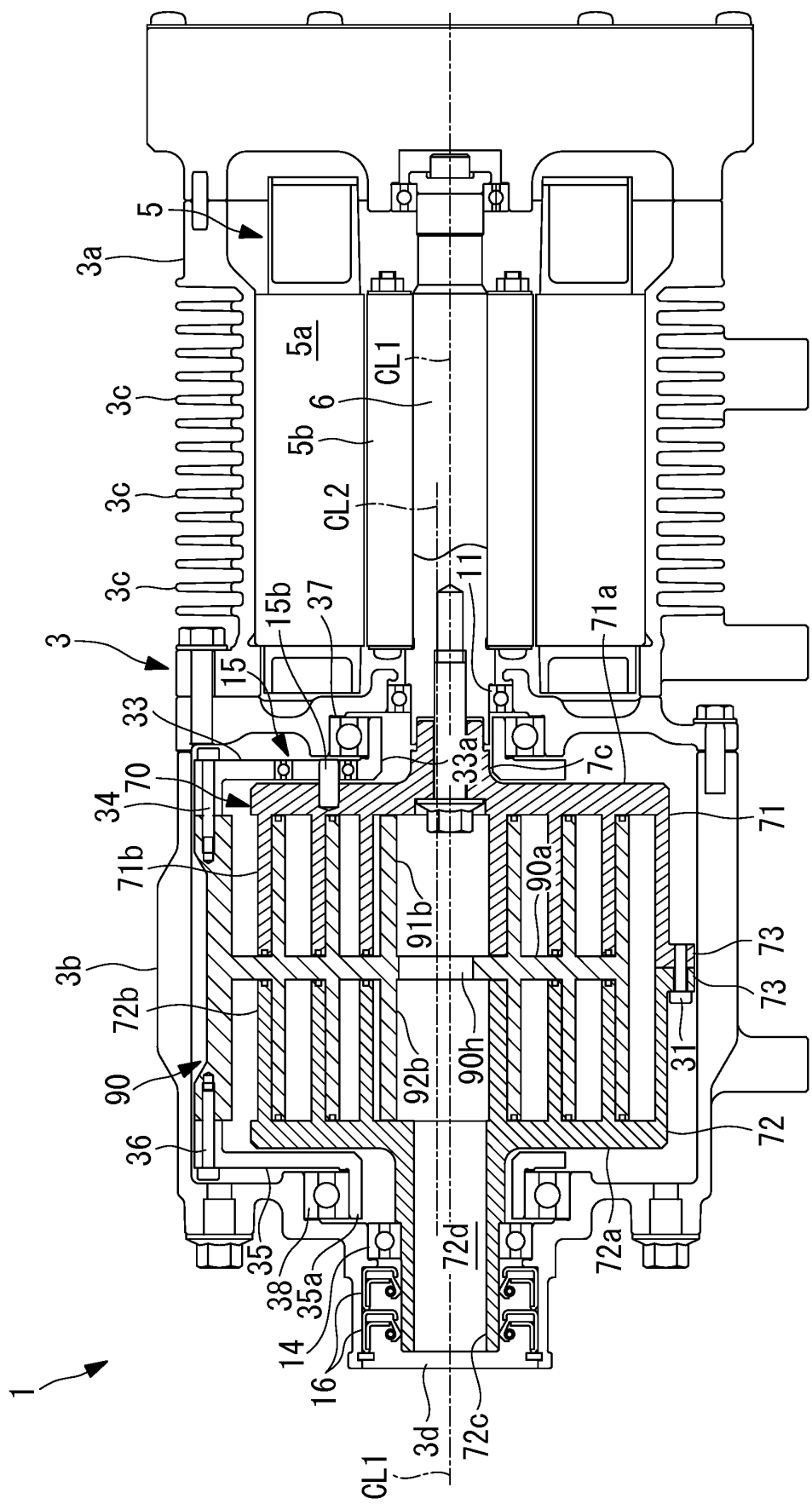


FIG. 2

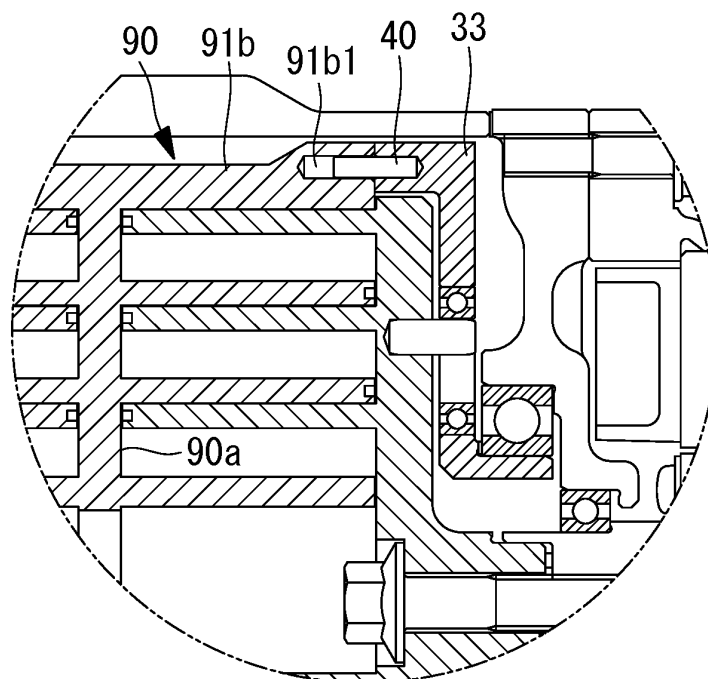


FIG. 3

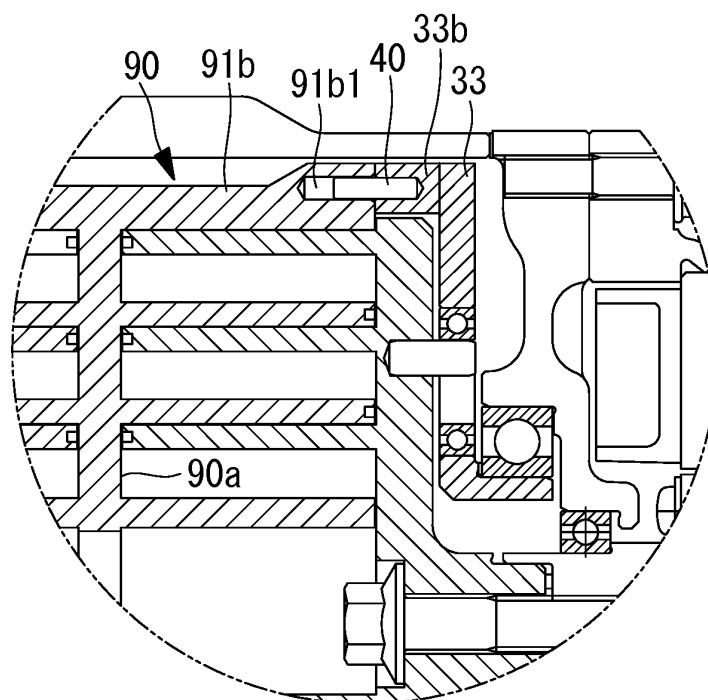


FIG. 4

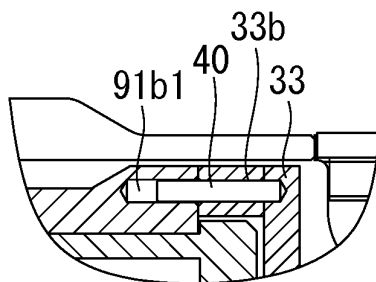
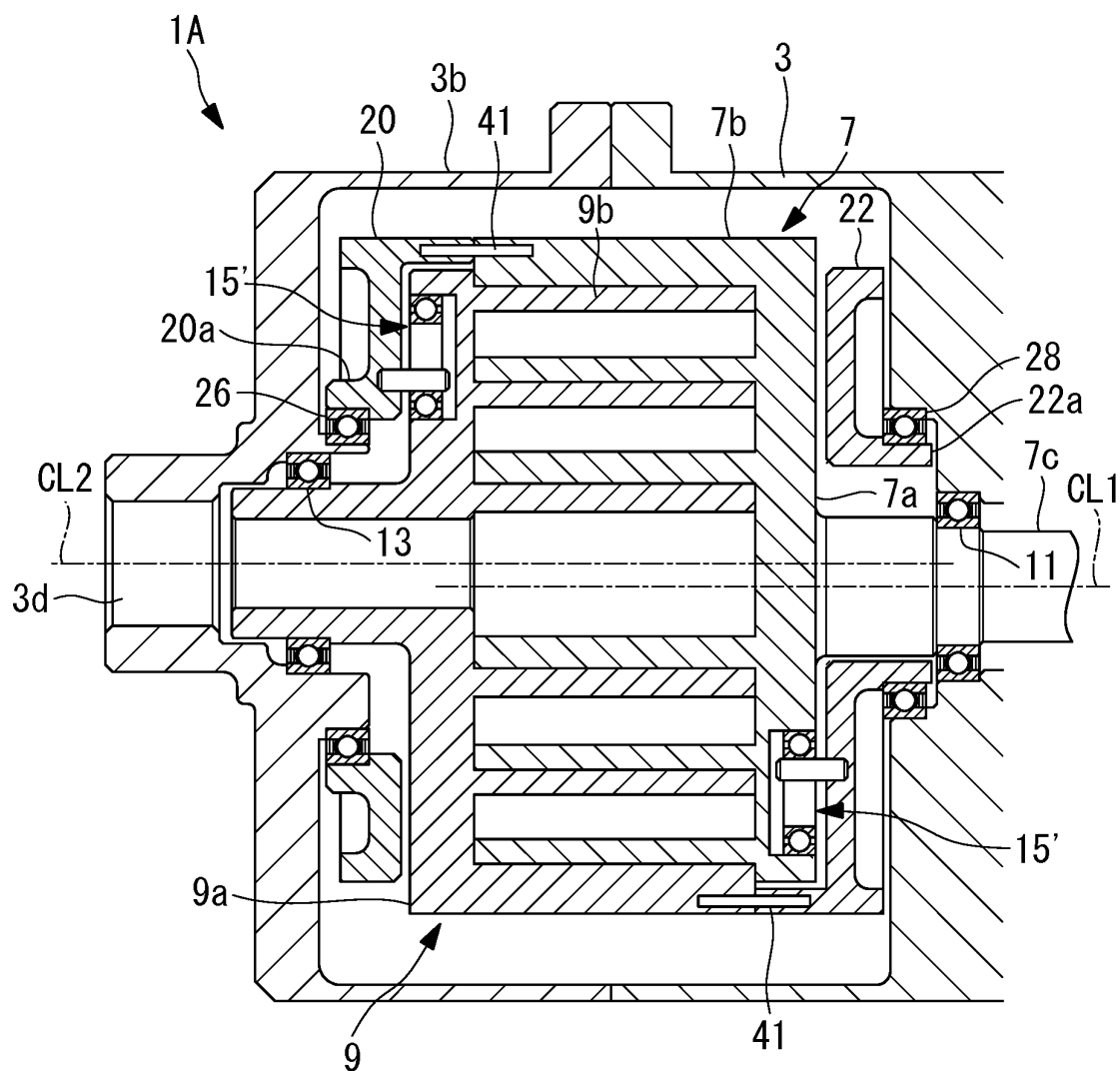


FIG. 5



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2018/004469

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. F04C18/02 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl. F04C18/02

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	1971-2018
Registered utility model specifications of Japan	1996-2018
Published registered utility model applications of Japan	1994-2018

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2010-71226 A (SCROLL GIKEN KK) 02 April 2010, paragraphs [0008]-[0017], fig. 1-7 (Family: none)	1-3
A	JP 2013-227905 A (ANEST IWATA CORPORATION) 07 November 2013, paragraphs [0020]-[0031], fig. 1, 2 & US 2013/0302199 A1, paragraphs [0023]-[0034], fig. 1, 2 & CN 103375174 A	1-3
A	JP 5443132 B2 (SCROLL GIKEN KK) 19 March 2014, paragraphs [0017]-[0019], fig. 3 (Family: none)	1-3

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

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 58-59391A (HITACHI, LTD.) 08 April 1983, page 1, lower right column, line 13 to page 2, upper left column, line 12, fig. 1-3 (Family: none)	1-3
A	JP 55-101789 A (HITACHI, LTD.) 04 August 1980, page 2, upper left column, line 4 to upper right column, line 2, fig. 3-6 (Family: none)	1-3

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Patent documents cited in the description

- JP 5443132 B [0003]