



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
30.11.2022 Bulletin 2022/48

(21) Application number: **20914982.2**

(22) Date of filing: **23.09.2020**

(51) International Patent Classification (IPC):
F04C 18/02 ^(2006.01)

(52) Cooperative Patent Classification (CPC):
F04C 18/02

(86) International application number:
PCT/JP2020/035764

(87) International publication number:
WO 2021/149303 (29.07.2021 Gazette 2021/30)

(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:
KH MA MD TN

(30) Priority: **24.01.2020 JP 2020010166**

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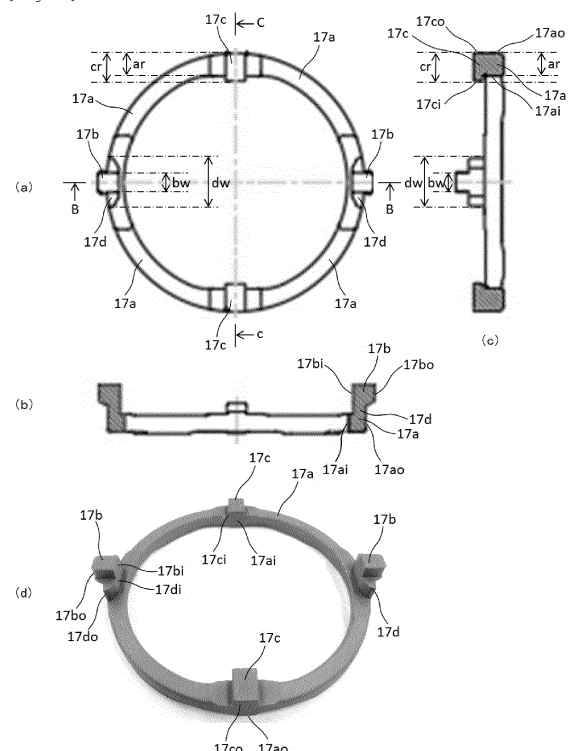
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(54) **SCROLL COMPRESSOR**

(57) According to a scroll compressor of the present invention, a pair of fixed-side keys 17b are formed on one of ring surfaces of a ring portion 17a through a pedestal 17d, a pair of turning-side keys 17c are formed on the one of the ring surfaces of the ring portion 17a, a circumferential width dw of the pedestal 17d is larger than a circumferential width bw of the fixed-side key 17b, a radial width cr of the turning-side key 17c is larger than a radial width ar of the ring portion 17a, and a radial inner end surface 17ci of the turning-side key 17c projects an inner circumferential surface 17ai of the ring portion 17a. According to this, it is possible to provide a scroll compressor having high rigidity of a key peripheral portion in a rotation restraint member 17.

[Fig. 4]



Description

[TECHNICAL FIELD]

[0001] The present invention relates to a scroll compressor used in a cooling device of an air conditioner or a refrigerator, and a freezing device of a heat pump type hot water supply system.

[BACKGROUND TECHNIQUE]

[0002] A scroll compressor is used in a freezing device and an air conditioner. In the scroll compressor, gas refrigerant which evaporated in an evaporator is sucked, the gas refrigerant is compressed to pressure required to condense the gas refrigerant by a condenser, and high temperature and high pressure gas refrigerant is sent into a refrigerant circuit.

[0003] According to a scroll compressor described in patent document 1, an Oldham mechanism includes a ring portion, a fixed-side key portion which projects from one of surfaces of the ring portion and which is slidably engaged, in a reciprocating manner, with an Oldham guide groove which is formed in a swinging scroll, and a swinging-side key portion which projects from one of the surfaces of the ring portion and which is slidably engaged, in a reciprocating manner, with the Oldham guide groove which is formed in a swinging scroll. The fixed-side key portion is shifted toward a radially outer side from the ring portion. An escape which avoids interference with the fixed-side key portion is provided on an inner peripheral surface of a guide frame at a position opposed to the fixed-side key portion.

[PRIOR ART DOCUMENT]

[PATENT DOCUMENT]

[0004] [Patent Document 1] Japanese Patent Application Laid-open No.2015-101985

[SUMMARY OF THE INVENTION]

[PROBLEM TO BE SOLVED BY THE INVENTION]

[0005] However, a large scroll compressor has a problem that rigidity of a key peripheral portion in a rotation restraint member is insufficient.

[0006] Hence, it is an object of the present invention to provide a scroll compressor having high rigidity of the key peripheral portion in the rotation restraint member.

[MEANS FOR SOLVING THE PROBLEM]

[0007] A scroll compressor of the present invention described in claim 1 including a hermetical container 1, in which the hermetical container 1 is provided therein with a compressing mechanism portion 10 for compressing

refrigerant and an electric mechanical portion 20 for driving the compressing mechanism portion 10, the compressing mechanism portion 10 includes a fixed scroll 11, an orbiting scroll 12 and a rotation shaft 13 for turning and driving the orbiting scroll 12, the fixed scroll 11 includes a disk-shaped fixed scroll end plate 11a, and a fixed scroll lap 11b standing on the fixed scroll end plate 11a, the orbiting scroll 12 includes a disk-shaped turning scroll end plate 12a, an orbiting scroll lap 12b standing on a lap-side end surface of the orbiting scroll end plate 12a, and a boss portion 12c formed on a side opposite from the lap-side end surface of the orbiting scroll end plate 12a, an eccentric shaft 13a which is inserted into the boss portion 12c is formed on an upper end of the rotation shaft 13, the fixed scroll lap 11b and the orbiting scroll lap 12b are meshed with each other, a plurality of compression chambers 15 are formed between the fixed scroll lap 11b and the orbiting scroll lap 12b, a main bearing 30 for supporting the fixed scroll 11 and the orbiting scroll 12 is provided below the fixed scroll 11 and the orbiting scroll 12, a rotation restraint member 17 for restraining the orbiting scroll 12 from rotating is provided between the fixed scroll 11 and the main bearing 30, a bearing portion 31 for pivotally supporting the rotation shaft 13, a boss-accommodating portion 32 for accommodating the boss portion 12c therein, and a rotation restraint member ring recess 34 where the rotation restraint member 17 is placed are formed on the main bearing 30, the rotation restraint member 17 includes an annular ring portion 17a, a pair of fixed-side keys 17b which are slidably engaged with a pair of fixed-side guide grooves 11d formed in the fixed scroll 11, and a pair of turning-side keys 17c which are slidably engaged with a pair of turning-side guide grooves 12d formed in the orbiting scroll 12, the boss-accommodating portion 32 is a high pressure region A, an outer circumferential portion of the orbiting scroll 12 where the rotation restraint member 17 is placed is an intermediate pressure region B, and the orbiting scroll 12 is pushed against the fixed scroll 11 by pressures of the high pressure region A and the intermediate pressure region B, wherein the pair of fixed-side keys 17b are formed on one of ring surfaces of the ring portion 17a through a pedestal 17d, the pair of turning-side keys 17c are formed on the one of the ring surfaces of the ring portion 17a, a circumferential width dw of the pedestal 17d is larger than a circumferential width bw of the fixed-side key 17b, a radial width cr of the turning-side key 17c is larger than a radial width ar of the ring portion 17a, and a radial inner end surface 17ci of the turning-side key 17c projects more than an inner circumferential surface 17ai of the ring portion 17a.

[0008] The scroll compressor of the invention described in claim 2 according to claim 1, wherein a radial outer end surface 17do of the pedestal 17d is located on a same plane as an outer circumferential surface 17ao of the ring portion 17a, and a radial outer end surface 17bo of the fixed-side key 17b projects more than the outer circumferential surface 17ao of the ring portion 17a.

[0009] The scroll compressor of the invention described in claim 3 according to claim 1, wherein a radial outer end surface 17do of the pedestal 17d and a radial outer end surface 17bo of the fixed-side key 17b are on a same plane as an outer circumferential surface 17ao of the ring portion 17a, a pair of escaping portions 34x are formed on an outer circumferential surface 34o of the rotation restraint member ring recess 34, and the pair of escaping portions 34x are located at positions corresponding to the fixed-side keys 17b.

[EFFECT OF THE INVENTION]

[0010] According to the present invention, it is possible to enhance rigidity of fixed-side keys and turning-side keys in a rotation restraint member.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[0011]

Fig. 1 is a vertical sectional view of a scroll compressor according to an embodiment of the present invention;

Fig. 2 is an enlarged sectional view of an essential portion of a compressing mechanism portion in Fig. 1;

Figs. 3 are plan views of a fixed scroll and an orbiting scroll shown in Figs. 1 and 2;

Figs. 4 are diagrams showing a rotation restraint member of the embodiment;

Figs. 5 are diagrams showing a main bearing and the rotation restraint member of the embodiment;

Figs. 6 are diagrams showing a rotation restraint member of another embodiment;

Figs. 7 are diagrams showing a main bearing and the rotation restraint member of the embodiment.

[MODE FOR CARRYING OUT THE INVENTION]

[0012] According to a scroll compressor of a first embodiment of the present invention, a rotation restraint member includes an annular ring portion, a pair of fixed-side keys which are slidably engaged with a pair of fixed-side guide grooves formed in a fixed scroll, and a pair of turning-side keys which are slidably engaged with a pair of turning-side guide grooves formed in an orbiting scroll. The pair of fixed-side keys are formed on one of ring surfaces of the ring portion through a pedestal, the pair of turning-side keys are formed on one of the ring surfaces of the ring portion, a circumferential width of the pedestal is made larger than a circumferential width of the fixed-side key, a radial width of the turning-side key is made larger than a radial width of the ring portion, and a radial inner end surface of the turning-side key projects more than an inner circumferential surface of the ring portion. According to the embodiment, it is possible to enhance rigidity of the fixed-side keys and the turning-

side keys.

[0013] According to a second embodiment of the invention, in the scroll compressor of the first embodiment, a radial outer end surface of the pedestal is located on a same plane as an outer circumferential surface of the ring portion, and a radial outer end surface of the fixed-side key projects more than the outer circumferential surface of the ring portion. According to the second embodiment, it is possible to further enhance the rigidity of the fixed-side keys.

[0014] According to a third embodiment of the invention, in the scroll compressor of the first embodiment, the radial outer end surface of the pedestal and the radial outer end surface of the fixed-side key are located on a same plane as the outer circumferential surface of the ring portion, a pair of escaping portions are formed on an outer circumferential surface of a ring-shaped rotation restraint member ring recess, and the pair of escaping portions are located at positions corresponding to the fixed-side keys. According to the third embodiment, it is possible to further enhance the rigidity of the fixed-side keys.

[Embodiments]

[0015] A scroll compressor according to an embodiment of the present invention will be described below. The invention is not limited to the following embodiments.

[0016] Fig. 1 is a vertical sectional view of the scroll compressor according to the embodiment.

[0017] A compressing mechanism portion 10 for compressing refrigerant and an electric mechanical portion 20 for driving the compressing mechanism portion 10 are placed in a hermetical container 1.

[0018] The hermetical container 1 is composed of a cylindrically formed body portion 1a extending along a vertical direction, an upper lid 1c for closing an upper opening of the body portion 1a, and a lower lid 1b for closing a lower opening of the body portion 1a.

[0019] The hermetical container 1 includes a refrigerant sucking pipe 2 for introducing refrigerant into the compressing mechanism portion 10, and a refrigerant discharging pipe 3 for discharging refrigerant compressed by the compressing mechanism portion 10 to outside of the hermetical container 1.

[0020] The compressing mechanism portion 10 includes a fixed scroll 11, an orbiting scroll 12, and a rotation shaft 13 for turning and driving the orbiting scroll 12.

[0021] The electric mechanical portion 20 includes a stator 21 fixed to the hermetical container 1, and a rotor 22 placed on the inner side of the stator 21. The rotation shaft 13 is fixed to the rotor 22. An eccentric shaft 13a which is eccentric with respect to the rotation shaft 13 is formed on an upper end of the rotation shaft 13.

[0022] A main bearing 30 for supporting the fixed scroll 11 and the orbiting scroll 12 is provided below the fixed scroll 11 and the orbiting scroll 12.

[0023] A bearing portion 31 for pivotally supporting the

rotation shaft 13, a boss-accommodating portion 32, a seal ring recess 33, and a rotation restraint member ring recess 34 are formed on the main bearing 30. The main bearing 30 is fixed to the hermetical container 1 by welding or shrinkage fitting.

[0024] The fixed scroll 11 includes a disk-shaped fixed scroll end plate 11a, a fixed scroll lap 11b standing on the fixed scroll end plate 11a, and an outer circumferential wall 11c standing and surrounding a circumference of the fixed scroll lap 11b. A discharging port 14 is formed in a substantially center portion of the fixed scroll end plate 11a.

[0025] The orbiting scroll 12 includes a disk-shaped turning scroll end plate 12a, an orbiting scroll lap 12b standing on a lap-side end surface of the orbiting scroll end plate 12a, and a cylindrical boss portion 12c formed on a side opposite from the lap-side end surface of the orbiting scroll end plate 12a.

[0026] The fixed scroll lap 11b of the fixed scroll 11 and the orbiting scroll lap 12b of the orbiting scroll 12 are meshed with each other. A plurality of compression chambers 15 are formed between the fixed scroll lap 11b and the orbiting scroll lap 12b.

[0027] The boss portion 12c is formed on a substantially central portion of the orbiting scroll end plate 12a. The eccentric shaft 13a is inserted into the boss portion 12c, and the boss portion 12c is accommodated in the boss-accommodating portion 32.

[0028] The fixed scroll 11 is fixed to the main bearing 30 by the outer circumferential wall 11c using a plurality of bolts 16. The orbiting scroll 12 is supported by the fixed scroll 11 through a rotation restraint member 17 such as an Oldham ring. The rotation restraint member 17 which restrains rotation of the orbiting scroll 12 is placed in the rotation restraint member ring recess 34, and is provided between the fixed scroll 11 and the main bearing 30. According to this, the orbiting scroll 12 turns with respect to the fixed scroll 11 without rotating.

[0029] A lower end 13b of the rotation shaft 13 is pivotally supported by an auxiliary bearing 18 which is placed on a lower portion of the hermetical container 1.

[0030] An oil reservoir 4 for storing lubricant oil therein is formed in a bottom of the hermetical container 1.

[0031] A lower end of the rotation shaft 13 is provided with a displacement oil pump 5. The oil pump 5 is placed such that its suction port exists in the oil reservoir 4. The oil pump 5 is driven by the rotation shaft 13. Irrespective of a pressure condition or operation speed, the oil pump 5 can reliably suck lubricant oil existing in the oil reservoir 4 provided in the bottom of the hermetical container 1. Therefore, anxiety of running out of oil is dissolved.

[0032] A rotation shaft oil supply hole 13c is formed in the rotation shaft 13. The rotation shaft oil supply hole 13c extends from the lower end 13b of the rotation shaft 13 to the eccentric shaft 13a.

[0033] Lubricant oil sucked by the oil pump 5 is supplied into a bearing of the auxiliary bearing 18, the bearing portion 31 and the boss portion 12c through the rotation

shaft oil supply hole 13c which is formed in the rotation shaft 13.

[0034] The refrigerant sucked from the refrigerant sucking pipe 2 is introduced into the compression chambers 15 from a suction port 15a. The compression chambers 15 move from the outer circumferential side toward the central portion while reducing volumes thereof, and refrigerant which reaches predetermined pressure in the compression chambers 15 is discharged into a discharging chamber 6 from the discharging port 14 provided in the central portion of the fixed scroll 11. The discharging port 14 is provided with a discharging reed valve (not shown). The refrigerant which reaches the predetermined pressure in the compression chambers 15 pushes and opens the discharging reed valve, and is discharged into the discharging chamber 6. The refrigerant discharged into the discharging chamber 6 is derived into an upper portion in the hermetical container 1, the refrigerant passes through a refrigerant passage (not shown) formed in the compressing mechanism portion 10, reaches a circumference of the electric mechanical portion 20, and the refrigerant is discharged out from the refrigerant discharging pipe 3.

[0035] Fig. 2 is an enlarged sectional view of an essential portion of the compressing mechanism portion in Fig. 1.

[0036] According to the scroll compressor of the embodiment, the boss-accommodating portion 32 is a high pressure region A, and an outer circumferential portion of the orbiting scroll 12 where the rotation restraint member 17 is placed is an intermediate pressure region B. The orbiting scroll 12 is pushed against the fixed scroll 11 by pressures of the high pressure region A and the intermediate pressure region B.

[0037] The eccentric shaft 13a is turnably inserted into the boss portion 12c through the turning bearing 13d. An oil groove 13e is formed in the outer circumferential surface of the eccentric shaft 13a.

[0038] The seal ring recess 33 is formed in a thrust surface of the main bearing 30 which receives thrust force of the orbiting scroll end plate 12a. The rotation restraint member ring recess 34 is formed in an outer circumference of the thrust surface of the main bearing 30. The seal ring recess 33 is provided with a ring-shaped seal member 33a. The seal member 33a is placed on the outer circumference of the boss-accommodating portion 32.

[0039] The hermetical container 1 is filled with high pressure refrigerant, and the high pressure is the same as that of refrigerant discharged into the discharging chamber 6. The rotation shaft oil supply hole 13c opens into an upper end of the eccentric shaft 13a. Therefore, pressure in the boss portion 12c is the high pressure region A having the same pressure as that of the discharged refrigerant.

[0040] Lubricant oil introduced into the boss portion 12c through the rotation shaft oil supply hole 13c is supplied to the turning bearing 13d and the boss-accommodating portion 32 by the oil groove 13e formed in the outer

circumferential surface of the eccentric shaft 13a. Since the outer circumference of the boss-accommodating portion 32 is provided with the seal member 33a, the boss-accommodating portion 32 is the high pressure region A.

[0041] The fixed scroll end plate 11a includes an intermediate pressure taking-out hole 41 for taking out the intermediate pressure of the compression chambers 15, and an end plate-side intermediate pressure communication passage 42a which is in communication with the intermediate pressure taking-out hole 41.

[0042] The outer circumferential wall 11c of the fixed scroll 11 is provided with a circumferential wall-side intermediate pressure communication passage 42b which brings the end plate-side intermediate pressure communication passage 42a and the intermediate pressure region B into communication with each other.

[0043] The end plate-side intermediate pressure communication passage 42a and the circumferential wall-side intermediate pressure communication passage 42b form an intermediate pressure communication passage 42. The intermediate pressure communication passage 42 is formed in the fixed scroll 11. The intermediate pressure communication passage 42 brings the intermediate pressure taking-out hole 41 and the intermediate pressure region B into communication with each other.

[0044] As described above, the intermediate pressure communication passage 42 which brings the intermediate pressure taking-out hole 41 and the intermediate pressure region B into communication with each other is formed in the fixed scroll 11, and intermediate pressure of the compression chambers 15 is introduced into the intermediate pressure region B. According to this, especially under a low pressure compression rate condition, it is possible to prevent the orbiting scroll 12 from separating from the fixed scroll 11, and airtightness of the compression chambers 15 can be enhanced.

[0045] The orbiting scroll end plate 12a is provided with a first oil introducing hole 51 formed in the boss portion 12c, a first oil deriving hole 52 formed in an outer circumference of the lap-side end surface, and a first end plate oil communication passage 53 which brings the first oil introducing hole 51 and the first oil deriving hole 52 into communication with each other.

[0046] The orbiting scroll end plate 12a is provided with a second oil introducing hole 61 which opens into the intermediate pressure region B, a second oil deriving hole 62 which opens into a low pressure space of the compression chambers 15, and a second end plate oil communication passage 63 which brings the second oil introducing hole 61 and the second oil deriving hole 62 into communication with each other. The second oil introducing hole 61 is formed in a side surface of the orbiting scroll end plate 12a.

[0047] Figs. 3 are plan views of the fixed scroll and the orbiting scroll shown in Figs. 1 and 2.

[0048] Fig. 3(a) is a plane view of the fixed scroll according to the embodiment as viewed from the fixed scroll lap, and Fig. 3(b) is a plane view of the orbiting scroll of

the embodiment as viewed from the orbiting scroll lap.

[0049] In Fig. 3(a), a gray zone represents the intermediate pressure region B. As shown in the drawing, the intermediate pressure region B is formed around the outer circumference of the fixed scroll lap 11b.

[0050] As shown in Fig. 3(a), the pair of fixed-side guide grooves 11d are formed in the fixed scroll 11.

[0051] The fixed scroll 11 is provided with a fixed scroll sliding surface 11e which slides on the orbiting scroll end plate 12a shown in Fig. 3(b). The orbiting scroll end plate 12a is located on a more outer circumference side than the orbiting scroll lap 12b. The intermediate pressure region B is formed more on a more outer circumference side than the fixed scroll sliding surface 11e.

[0052] The fixed scroll sliding surface 11e is provided with a sliding surface groove 54 which is in communication with the intermediate pressure region B.

[0053] As shown in Fig. 3(b), the first oil deriving hole 52 and the second oil deriving hole 62 open into an outer circumference of the lap-side end surface of the orbiting scroll end plate 12a, and a pair of turning-side guide grooves 12d are formed in the orbiting scroll 12.

[0054] According to the scroll compressor of the embodiment, by forming the high pressure region A and the intermediate pressure region B, the orbiting scroll 12 is pushed against the fixed scroll 11. Therefore, the lap-side end surface of the orbiting scroll end plate 12a and the fixed scroll sliding surface 11e can maintain a tightly adhered state without separating away from each other. Therefore, an amount of oil can be adjusted by the first oil deriving hole 52 and the sliding surface groove 54, and it is easy to adjust the amount of oil.

[0055] According to the scroll compressor of the embodiment, at a rotation position where a center of an eccentric shaft center of the eccentric shaft 13a come closest to the sliding surface groove 54, maximum centrifugal force is applied to lubricant oil existing in the boss portion 12c. Hence, when the maximum centrifugal force is applied to the lubricant oil existing in the boss portion 12c, the first oil deriving hole 52 and the sliding surface groove 54 are brought into communication with each other. According to this, it is possible to reliably introduced lubricant oil into the sliding surface groove 54.

[0056] Figs. 4 are diagrams showing the rotation restraint member of the embodiment, wherein Fig. 4(a) is a plan view of the rotation restraint member, Fig. 4(b) is sectional view taken along a line B-B in Fig. 4(a), Fig. 4(c) is a sectional view taken along a line C-C in Fig. 4(a), and Fig. 4(d) is a perspective view of the rotation restraint member.

[0057] The rotation restraint member 17 includes an annular ring portion 17a, a pair of fixed-side keys 17b which are slidably engaged with the pair of fixed-side guide grooves 11d formed in the fixed scroll 11, and a pair of turning-side keys 17c which are slidably engaged with the pair of turning-side guide grooves 12d formed in the orbiting scroll 12.

[0058] The pair of fixed-side keys 17b are formed on

one of ring surfaces of the ring portion 17a through a pedestal 17d.

[0059] The pair of turning-side keys 17c are formed on one of the ring surfaces of the ring portion 17a.

[0060] A circumferential width dw of the pedestal 17d is larger than a circumferential width bw of the fixed-side key 17b. A radial width cr of the turning-side key 17c is larger than a radial width ar of the ring portion 17a. A radial inner end surface 17ci of the turning-side key 17c projects more than an inner circumferential surface 17ai of the ring portion 17a.

[0061] Since the fixed-side key 17b is formed on one of the ring surfaces of the ring portion 17a through the pedestal 17d, and the circumferential width dw of the pedestal 17d is larger than the circumferential width bw of the fixed-side key 17b as described above, it is possible to enhance rigidity of the fixed-side key 17b.

[0062] Further, the radial width cr of the turning-side key 17c is larger than the radial width ar of the ring portion 17a, and the radial inner end surface 17ci of the turning-side key 17c projects more than the inner circumferential surface 17ai of through ring portion 17a. According to this, it is possible to enhance the rigidity of the turning-side key 17c.

[0063] In this embodiment, a radial outer end surface 17do of the pedestal 17d is on the same plane as an outer circumferential surface 17ao of the ring portion 17a, and a radial outer end surface 17bo of the fixed-side key 17b projects more than the outer circumferential surface 17ao of the ring portion 17a.

[0064] As described above, the radial outer end surface 17do of the pedestal 17d is on the same plane as the outer circumferential surface 17ao of the ring portion 17a, and the radial outer end surface 17bo of the fixed-side key 17b projects more than the outer circumferential surface 17ao of the ring portion 17a. Therefore, it is possible to further enhance the rigidity of the fixed-side key 17b.

[0065] The radial inner end surface 17di of the pedestal 17d is on the same plane as the radial inner end surface 17bi of the fixed-side keys 17b, and a radial outer end surface 17co of the turning-side key 17c is on the same plane as an outer circumferential surface 17ao of the ring portion 17a.

[0066] Figs. 5 are diagrams showing the main bearing and the rotation restraint member of the embodiment, wherein Fig. 5(a) is a top view of the main bearing, and Fig. 5(b) is a top view showing a state where the rotation restraint member is placed on the main bearing.

[0067] The rotation restraint member 17 is placed in the rotation restraint member ring recess 34 of the main bearing 30. The outer circumferential surface 17ao of the ring portion 17a and the radial outer end surface 17do of the pedestal 17d have a slight gap therebetween so that they do not abut against an outer circumferential surface 34o of the rotation restraint member ring recess 34. However, the radial outer end surface 17bo of the fixed-side keys 17b does not abut against the outer circumferential

surface 34o of the rotation restraint member ring recess 34. That is, the ring portion 17a and the pedestal 17d are placed at positions lower than a thrust surface of the main bearing 30, and the fixed-side keys 17b are placed at positions higher than the thrust surface of the main bearing 30.

[0068] Figs. 6 are diagrams showing a rotation restraint member of another embodiment, and Figs. 7 are diagrams showing a main bearing and the rotation restraint member of the embodiment. Fig. 6(a) is a plan view of the rotation restraint member, Fig. 6(b) is a sectional view taken along a line B-B in Fig. 6(a), Fig. 6(c) is a sectional view taken along a line C-C in Fig. 6(a), Fig. 6(d) is a perspective view of the rotation restraint member, Fig. 7(a) is a top view of the main bearing, and Fig. 7(b) is a top view showing a state where the rotation restraint member is placed on the main bearing.

[0069] The rotation restraint member 17 includes the annular ring portion 17a, the pair of fixed-side keys 17b which are slidably engaged with the pair of fixed-side guide grooves 11d formed in the fixed scroll 11, and the pair of turning-side keys 17c which are slidably engaged with the pair of turning-side guide grooves 12d formed in the orbiting scroll 12.

[0070] The pair of fixed-side keys 17b are formed on one of the ring surfaces of the ring portion 17a through the pedestal 17d.

[0071] The pair of turning-side keys 17c are formed on one of the ring surfaces of the ring portion 17a.

[0072] The circumferential width dw of the pedestal 17d is larger than the circumferential width bw of the fixed-side keys 17b. The radial width cr of the turning-side keys 17c is larger than the radial width ar of the ring portion 17a. The radial inner end surface 17ci of the turning-side keys 17c projects more than the inner circumferential surface 17ai of the ring portion 17a.

[0073] Since the fixed-side keys 17b is formed on one of the ring surfaces of the ring portion 17a through the pedestal 17d and the circumferential width dw of the pedestal 17d is larger than the circumferential width bw of the fixed-side keys 17b as described above, it is possible to enhance rigidity of the fixed-side keys 17b.

[0074] Further, the radial width cr of the turning-side keys 17c is larger than the radial width ar of the ring portion 17a, and the radial inner end surface 17ci of the turning-side keys 17c projects more than the inner circumferential surface 17ai of the ring portion 17a. According to this, it is possible to enhance rigidity of the turning-side keys 17c.

[0075] The rotation restraint member 17 is placed in the rotation restraint member ring recess 34 of the main bearing 30.

[0076] In the embodiment, the radial outer end surface 17do of the pedestal 17d and the radial outer end surface 17bo of the fixed-side keys 17b are on the same plane as the outer circumferential surface 17ao of the ring portion 17a, and a pair of escaping portions 34x are formed on the outer circumferential surface 34o of the rotation

restraint member ring recess 34. The pair of escaping portions 34x are located at positions corresponding to the fixed-side keys 17b. The ring portion 17a and the pedestal 17d are located at positions lower than the thrust surface of the main bearing 30, and the fixed-side keys 17b is located at a position higher than the thrust surface of the main bearing 30. Therefore, the outer circumferential surface 17ao of the ring portion 17a and the radial outer end surface 17do of the pedestal 17d are located on the escaping portions 34x of the rotation restraint member ring recess 34.

[0077] As described above, the radial outer end surface 17do of the pedestal 17d and the radial outer end surface 17bo of the fixed-side keys 17b are on the same plane as the outer circumferential surface 17ao of the ring portion 17a, and the pair of escaping portions 34x are located at the positions corresponding to the fixed-side keys 17b. According to this, it is possible to further enhance rigidity of the fixed-side keys 17b.

[0078] The radial inner end surface 17di of the pedestal 17d is on the same plane as the radial inner end surface 17bi of the fixed-side keys 17b, and the radial outer end surface 17co of the turning-side keys 17c is on the same plane as the outer circumferential surface 17ao of the ring portion 17a.

[INDUSTRIAL APPLICABILITY]

[0079] The scroll compressor of the present invention is useful in a refrigeration cycle of a hydronic heater, an air conditioner, a hot water supply device and a freezer.

[EXPLANATION OF SYMBOLS]

[0080]

1	hermetical container
1a	body portion
1b	lower lid
1c	upper lid
2	refrigerant sucking pipe
3	refrigerant discharging pipe
4	oil reservoir
5	oil pump
6	discharging chamber
10	compressing mechanism portion
11	fixed scroll
11a	fixed scroll end plate
11b	fixed scroll lap
11c	outer circumferential wall
11d	fixed-side guide groove
11e	fixed scroll sliding surface
12	orbiting scroll
12a	orbiting scroll end plate
12b	orbiting scroll lap
12c	boss portion
12d	turning-side guide groove
13	rotation shaft

13a	eccentric shaft
13b	lower end
13c	rotation shaft oil supply hole
13d	turning bearing
5 13e	oil groove
14	discharging port
15	compression chambers
15a	suction port
16	bolt
10 17	rotation restraint member
17a	ring portion
17ai	inner circumferential surface
17ao	outer circumferential surface
17b	fixed-side key
15 17bi	radial inner end surface
17bo	radial outer end surface
17c	turning-side key
17ci	radial inner end surface
17co	radial outer end surface
20 17d	pedestal
18	auxiliary bearing
20	electric mechanical portion
21	stator
22	rotor
25 30	main bearing
31	bearing
32	boss-accommodating portion
33	seal ring recess
33a	seal member
30 34	rotation restraint member ring recess
34o	outer circumferential surface
34x	escaping portion
41	intermediate pressure taking-out hole
42	intermediate pressure communication passage
35 42a	end plate-side intermediate pressure communication passage
42b	circumferential wall-side intermediate pressure communication passage
51	first oil introducing hole
40 52	first oil deriving hole
53	first end plate oil communication passage
54	sliding surface groove
61	second oil introducing hole
62	second oil deriving hole
45 63	second end plate oil communication passage
A	high pressure region
B	intermediate pressure region
ar	radial width
bw	circumferential width
50 cr	radial width
dw	circumferential width

Claims

55

1. A scroll compressor comprising a hermetical container, in which the hermetical container is provided therein with a compressing mechanism portion for

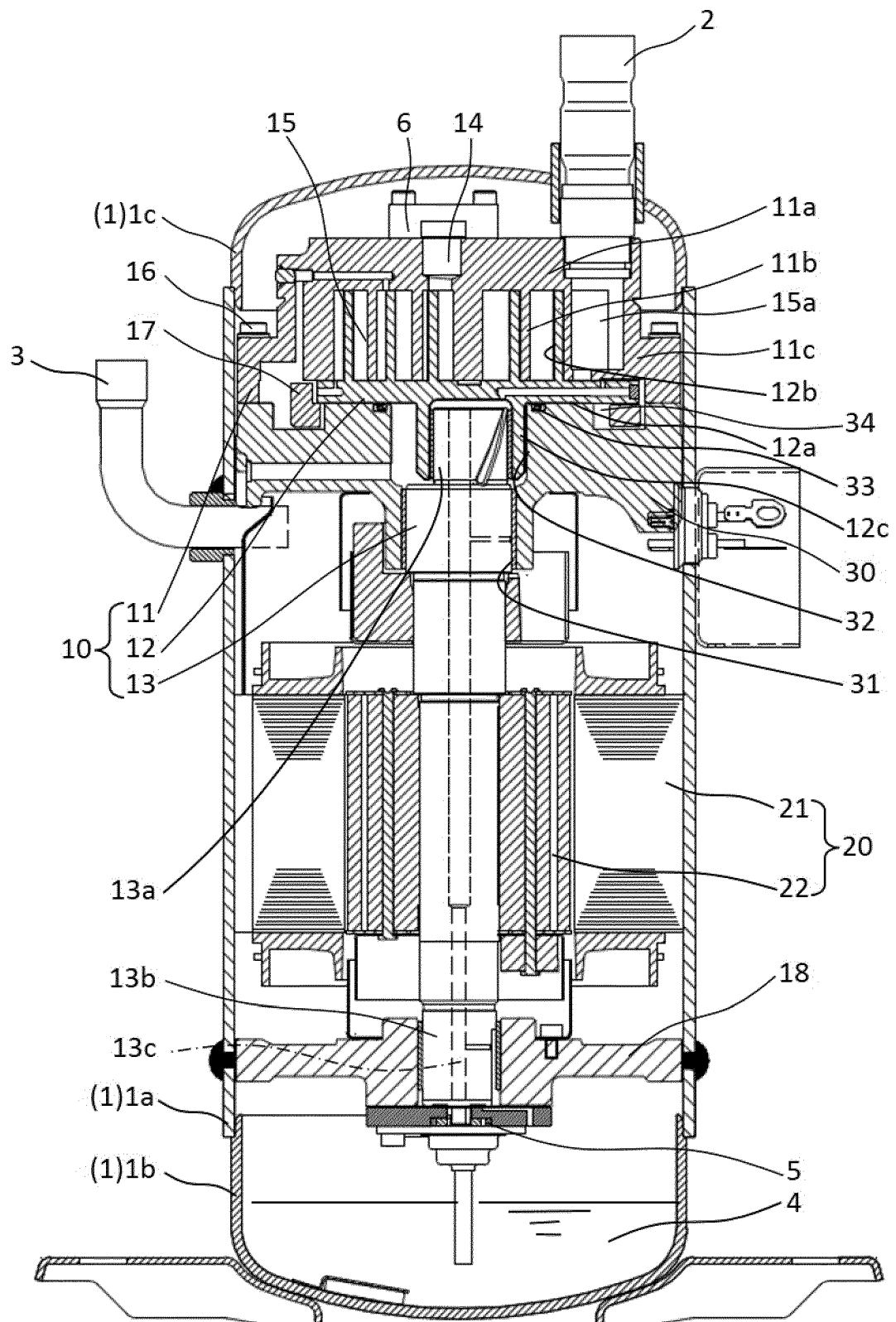
compressing refrigerant and an electric mechanical portion for driving the compressing mechanism portion,

the compressing mechanism portion includes a 5
fixed scroll, an orbiting scroll and a rotation shaft for turning and driving the orbiting scroll,
the fixed scroll includes a disk-shaped fixed scroll end plate, and a fixed scroll lap standing 10
on the fixed scroll end plate,
the orbiting scroll includes a disk-shaped turning scroll end plate, an orbiting scroll lap standing 15
on a lap-side end surface of the orbiting scroll end plate, and a boss portion formed on a side opposite from the lap-side end surface of the orbiting scroll end plate,
an eccentric shaft which is inserted into the boss portion is formed on an upper end of the rotation shaft,
the fixed scroll lap and the orbiting scroll lap are 20
meshed with each other, a plurality of compression chambers are formed between the fixed scroll lap and the orbiting scroll lap,
a main bearing for supporting the fixed scroll and the orbiting scroll is provided below the fixed 25
scroll and the orbiting scroll,
a rotation restraint member for restraining the orbiting scroll from rotating is provided between the fixed scroll and the main bearing,
a bearing portion for pivotally supporting the rotation shaft, a boss-accommodating portion for 30
accommodating the boss portion therein, and a rotation restraint member ring recess where the rotation restraint member is placed are formed on the main bearing, 35
the rotation restraint member includes an annular ring portion, a pair of fixed-side keys which are slidably engaged with a pair of fixed-side guide grooves formed in the fixed scroll, and a 40
pair of turning-side keys which are slidably engaged with a pair of turning-side guide grooves formed in the orbiting scroll,
the boss-accommodating portion is a high pressure region, an outer circumferential portion of the orbiting scroll where the rotation restraint 45
member is placed is an intermediate pressure region, and
the orbiting scroll is pushed against the fixed scroll by pressures of the high pressure region and the intermediate pressure region, wherein 50
the pair of fixed-side keys are formed on one of ring surfaces of the ring portion through a pedestal,
the pair of turning-side keys are formed on the one of the ring surfaces of the ring portion, 55
a circumferential width of the pedestal is larger than a circumferential width of the fixed-side key,
a radial width of the turning-side key is larger

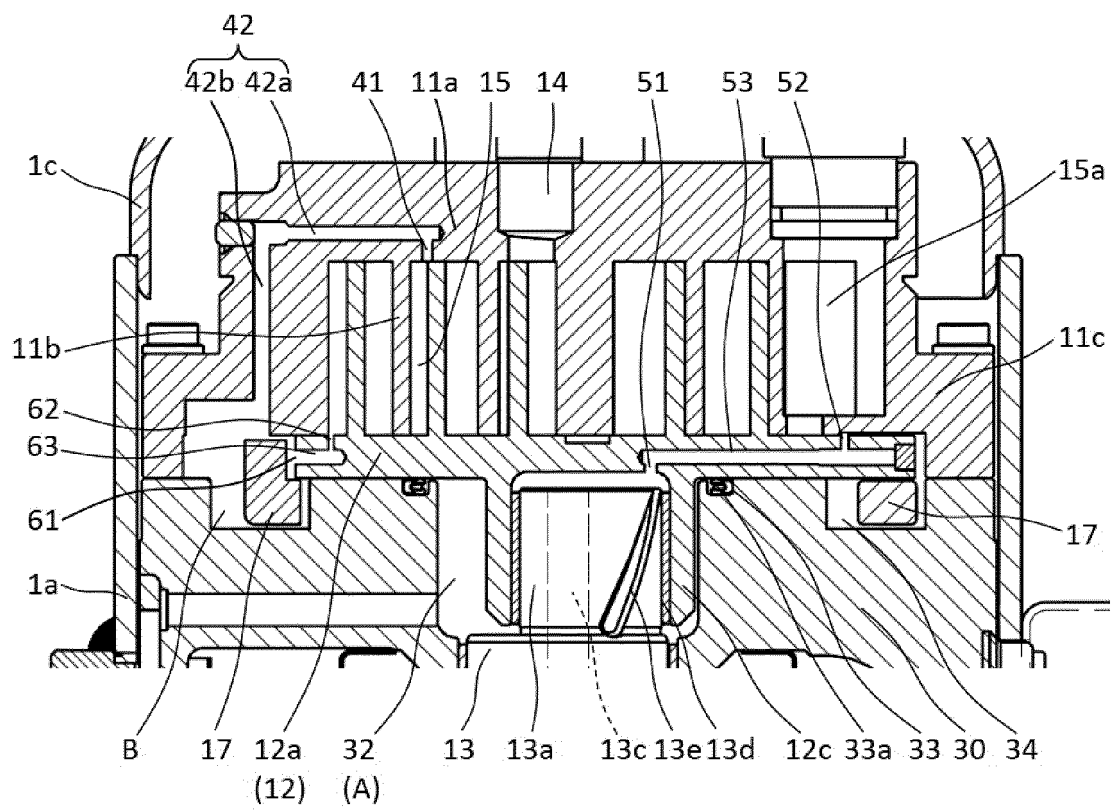
than a radial width of the ring portion, and
a radial inner end surface of the turning-side key projects more than an inner circumferential surface of the ring portion.

2. The scroll compressor according to claim 1, wherein a radial outer end surface of the pedestal is located on a same plane as an outer circumferential surface of the ring portion, and
a radial outer end surface of the fixed-side key projects more than the outer circumferential surface of the ring portion.
3. The scroll compressor according to claim 1, wherein a radial outer end surface of the pedestal and a radial outer end surface of the fixed-side key are located on a same plane as an outer circumferential surface of the ring portion,
a pair of escaping portions are formed on an outer circumferential surface of the rotation restraint member ring recess, and
the pair of escaping portions are located at positions corresponding to the fixed-side keys.

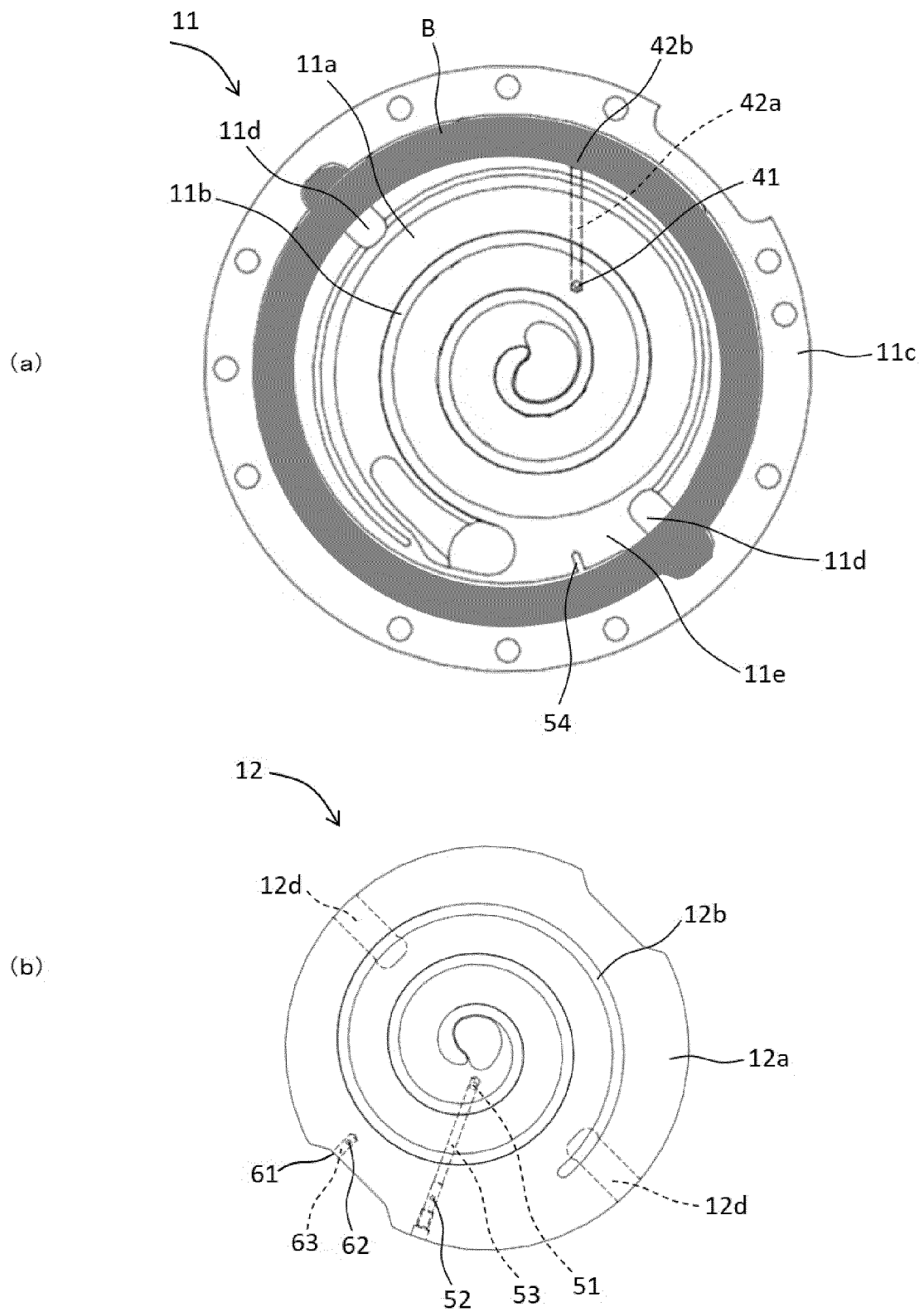
[Fig. 1]



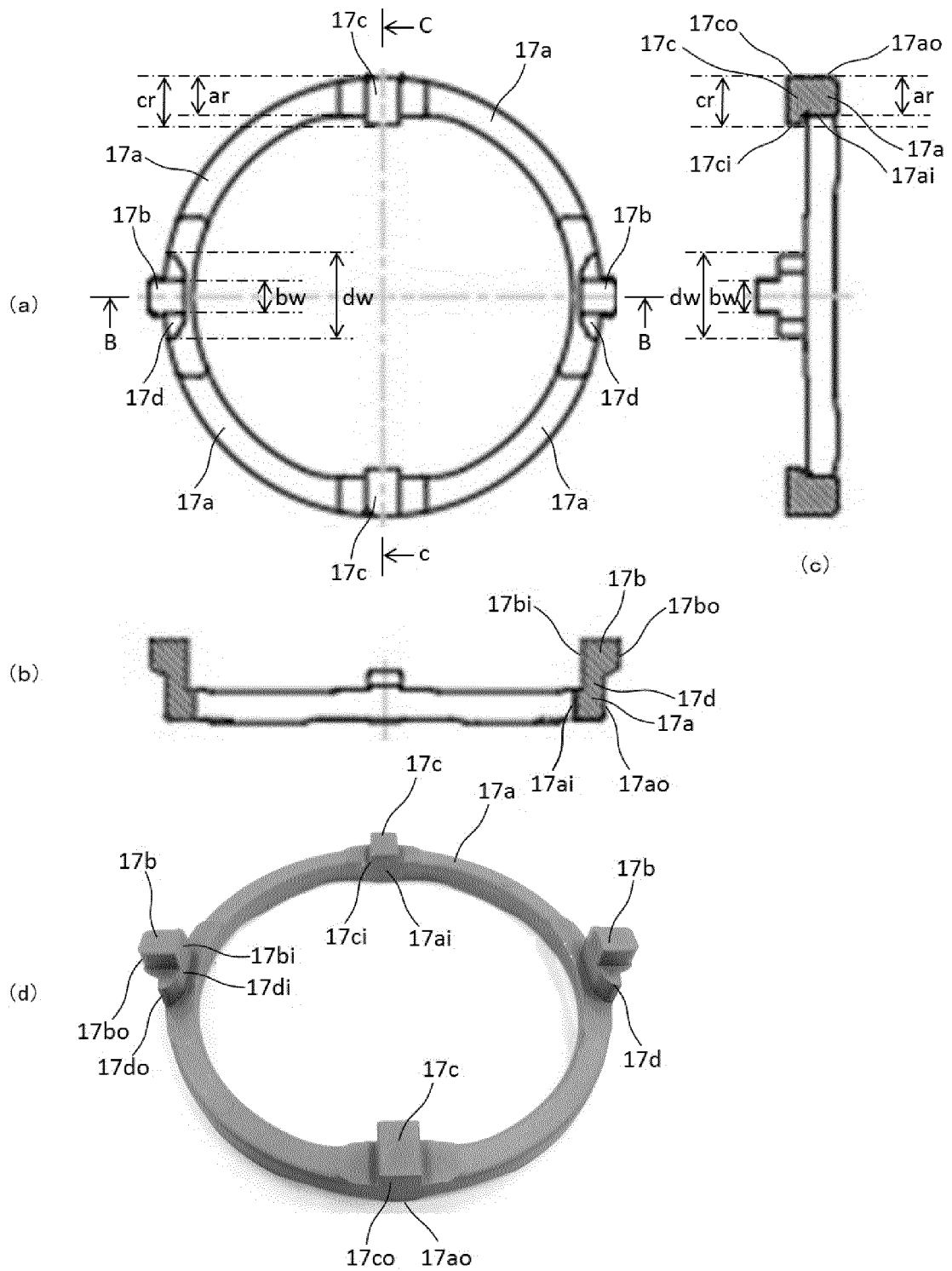
[Fig. 2]



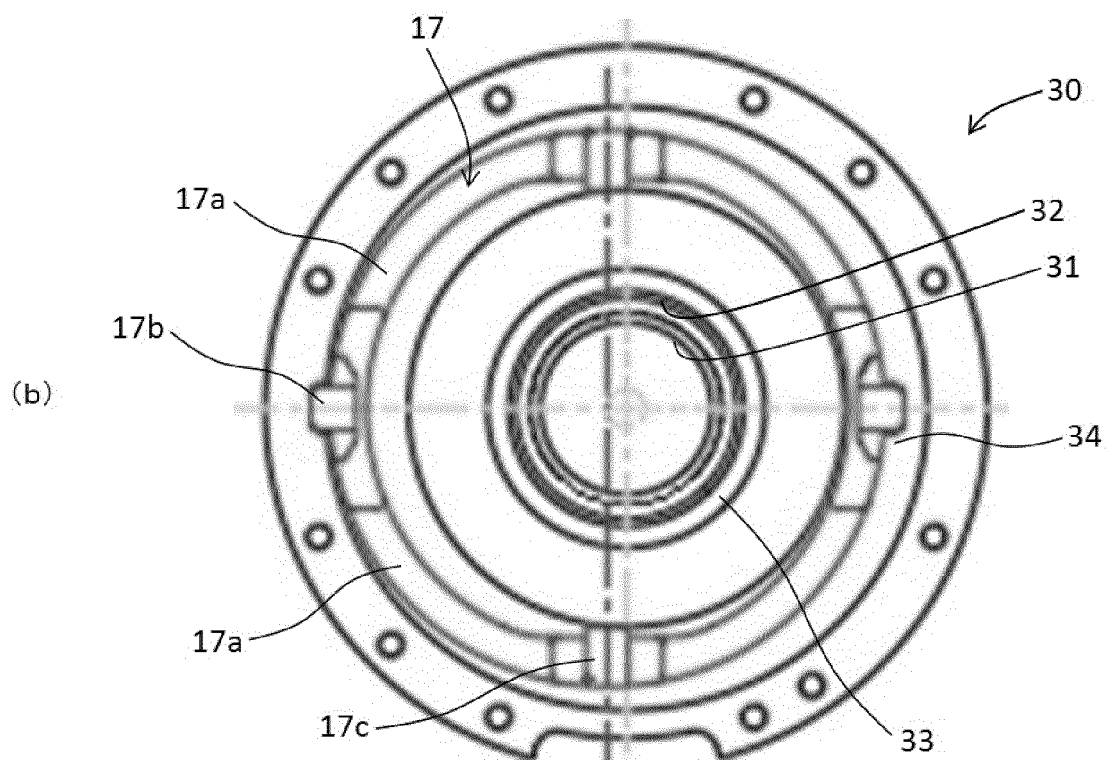
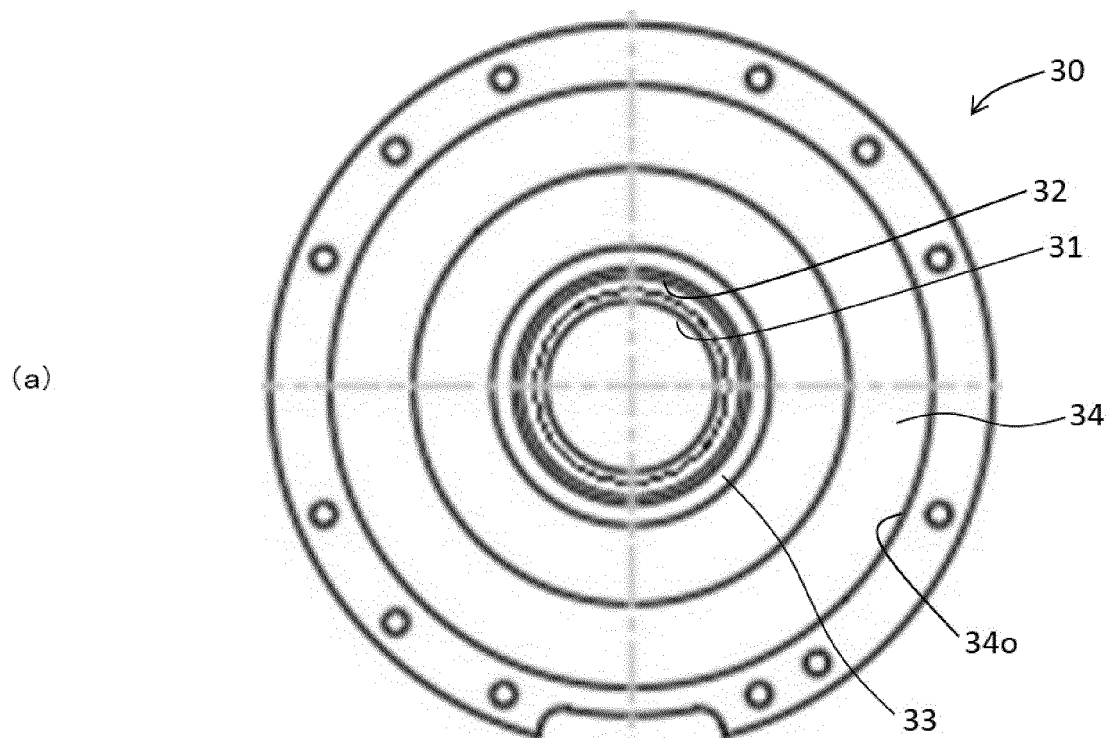
[Fig. 3]



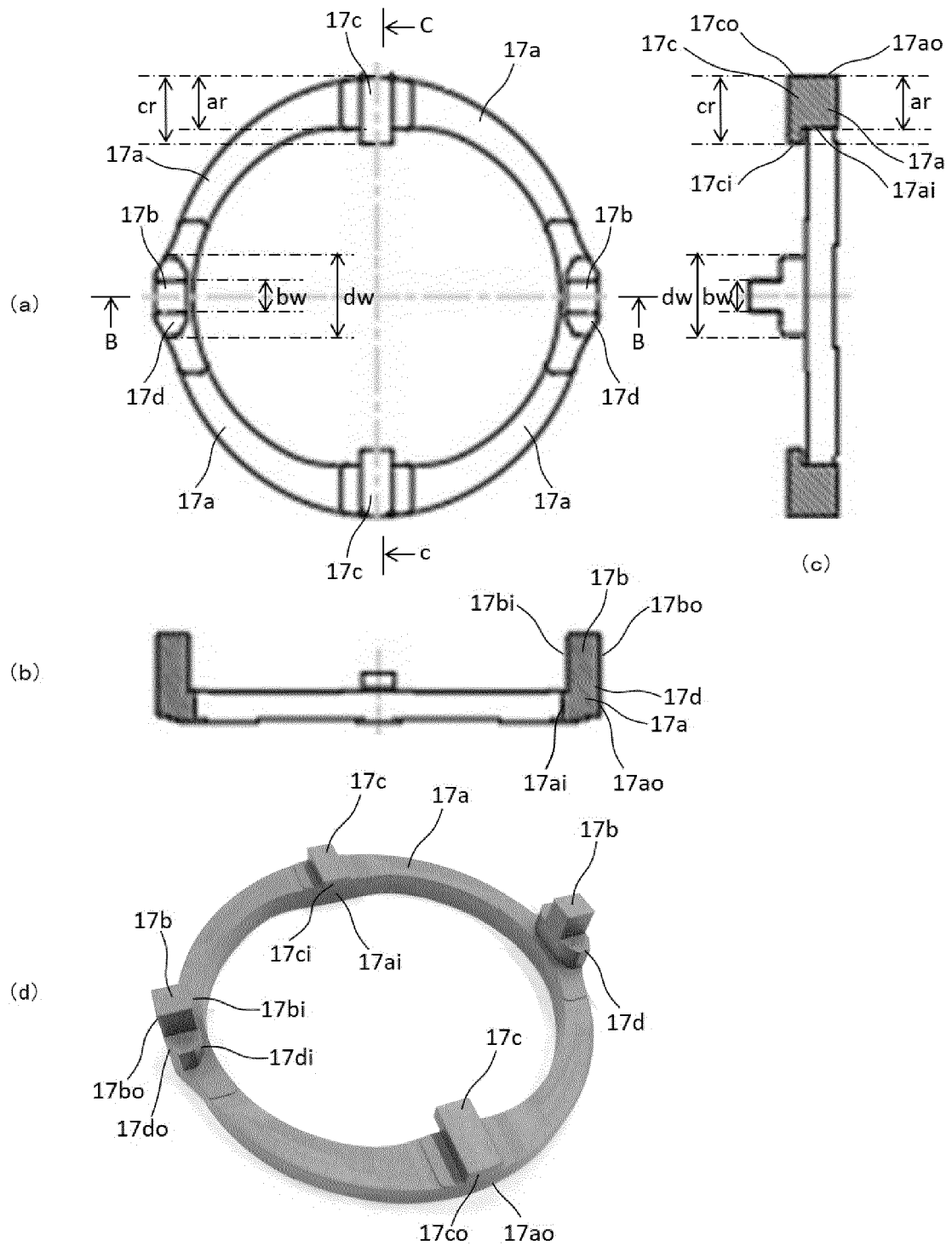
[Fig. 4]



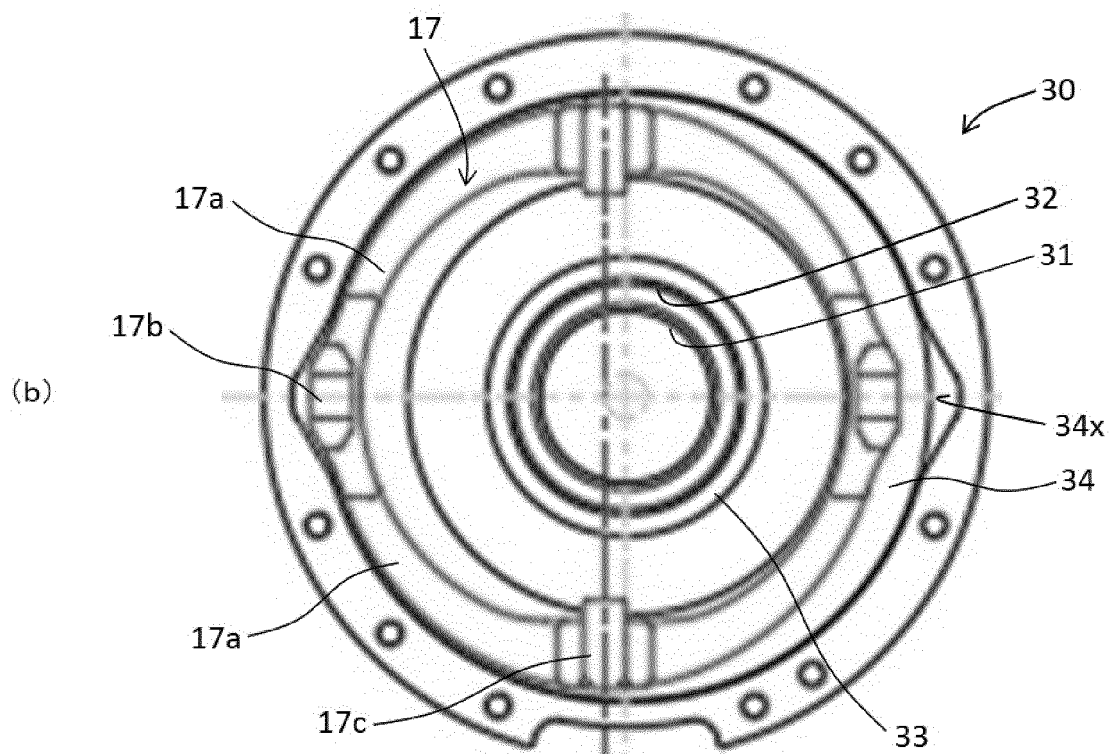
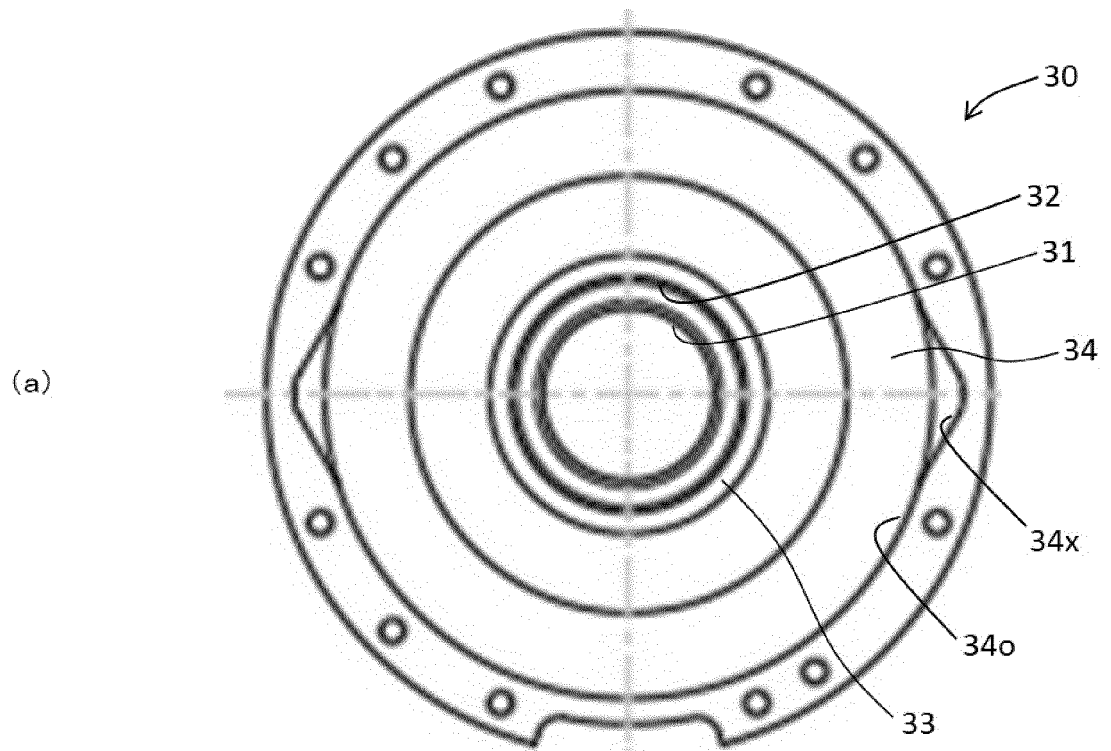
[Fig. 5]



[Fig. 6]



[Fig. 7]



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2020/035764

A. CLASSIFICATION OF SUBJECT MATTER

F04C 18/02 (2006.01) i

FI: F04C18/02 311F

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

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 1971-2020

Registered utility model specifications of Japan 1996-2020

Published registered utility model applications of Japan 1994-2020

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	JP 2010-190164 A (SANYO ELECTRIC CO., LTD.) 02	1-2
Y	September 2010 (2010-09-02) paragraphs [0011]-[0030], fig. 1-5	3
Y	JP 2018-141444 A (SANDEN ENVIRONMENTAL PRODUCTS CORPORATION) 13 September 2018 (2018-09-13) paragraphs [0018]-[0037], fig. 1-10	3
A	JP 2003-35282 A (MITSUBISHI HEAVY INDUSTRIES, LTD.) 07 February 2003 (2003-02-07) paragraphs [0019]-[0031], fig. 1-4	1-3
A	WO 2008/035690 A1 (DAIKIN INDUSTRIES, LTD.) 27 March 2008 (2008-03-27) fig. 12-13	1-3
A	JP 2758193 132 (TOSHIBA CORP.) 28 May 1998 (1998-05-28) fig. 1	1-3
A	US 2013/0078130 A1 (KIM, Hak-Young) 28 March 2013 (2013-03-28) fig. 2	1-3



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Date of the actual completion of the international search
13 November 2020 (13.11.2020)Date of mailing of the international search report
01 December 2020 (01.12.2020)Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

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Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2020/035764

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 203627233 U (ZHUHAI GREE REFRIGERATION TECHNOLOGY CENTER OF ENERGY SAVING AND ENVIRONMENTAL PROTECTION CO., LTD.) 04 June 2014 (2014-06-04) fig. 3	1-3

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INTERNATIONAL SEARCH REPORT
 Information on patent family members

International application No.

PCT/JP2020/035764

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
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JP 2018-141444 A	13 Sep. 2018	(Family: none)	
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WO 2008/035690 A1	27 Mar. 2008	US 2010/0050122 A1 fig. 12-13 JP 2008-101599 A CN 101517237 A US 5080566 A fig. 20-21	
JP 2758193 B2	28 May 1998		
US 2013/0078130 A1	28 Mar. 2013	KR 10-2013-0034538 A (Family: none)	
CN 203627233 U	04 Jun. 2014		

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