



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.04.2009 Bulletin 2009/14

(51) Int Cl.:
F04C 23/00^(2006.01) F04C 18/356^(2006.01)

(21) Application number: **08164934.5**

(22) Date of filing: **23.09.2008**

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

(72) Inventors:
• **Morozumi, Naoya**
Kawasaki-shi, Kanagawa 213-8502 (JP)
• **Ueda, Kenshi**
Kawasaki-shi, Kanagawa 213-8502 (JP)

(30) Priority: **27.09.2007 JP 2007252255**

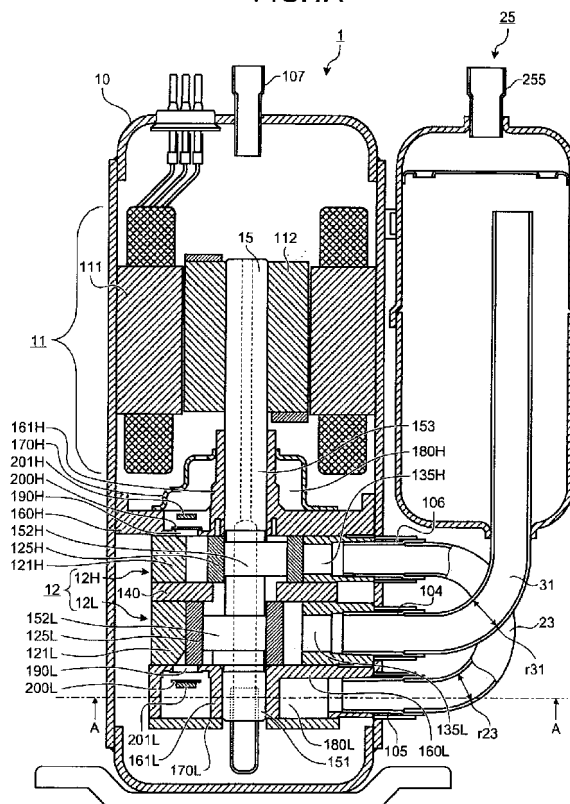
(74) Representative: **Kreutzer, Ulrich et al**
Cabinet Beau de Loménie
Bavariaring 26
80336 München (DE)

(71) Applicant: **Fujitsu General Limited**
Kawasaki-shi,
Kanagawa-ken 213-8502 (JP)

(54) **Two-stage compression rotary compressor**

(57) A two-stage compression rotary (1) compressor includes a low-stage compressing section (12L) and a high-stage compressing section (12H) housed within a cylindrical sealed housing (10) oriented vertically, a low-stage suction pipe (104) connected to a suction side of the low-stage compressing section (12L) and sucking in a low-pressure refrigerant, a low-stage discharge pipe (105) connected to a discharge side of the low-stage compressing section (12L) and discharging the refrigerant from the low-stage to outside of the sealed housing (10), a high-stage suction pipe (106) connected to a suction side of the high-stage compressing section (12H) and sucking in the refrigerant discharged from the low-stage, a low-pressure connecting pipe (31) that connects the low-stage suction pipe and an accumulator (25), and guides the refrigerant inside the accumulator (25) to a suction side of a low-stage compressing section (12L), and an intermediate connecting pipe (23) that connects the low-stage discharge pipe (105) and the high-stage suction pipe (106), wherein an inner diameter of the low-pressure connecting pipe (31) is larger than an inner diameter of the intermediate connecting pipe (23).

FIG.1A



Description

TECHNICAL FIELD

[0001] The present invention relates to a two-stage compression rotary compressor.

BACKGROUND ART

[0002] A two-stage compression rotary compressor generally includes a low-stage compressing section and a high-stage compressing section housed within a sealed housing, a motor that drives the low-stage compressing section and the high-stage compressing section, and an accumulator provided laterally to the compressor main unit.

[0003] The sealed housing has a first through-hole, a second through-hole, and a third through-hole thereon, and includes a low-stage suction pipe connected to the suction side of the low-stage compressing section through the second through-hole to suck in a low-pressure Ps refrigerant gas.

[0004] The sealed housing also includes a low-stage discharge pipe connected to the discharge side of the low-stage compressing section through the first through-hole; and a high-stage suction pipe connected to the suction side of the high-stage compressing section through the third through-hole. The low-stage discharge pipe is to discharge the refrigerant low-stage discharge Pm to outside of the sealed housing. The high-stage suction pipe is to suck in the low-stage discharge refrigerant Pm.

[0005] The low-stage suction pipe and the bottom end of the accumulator are connected by a low-pressure connecting pipe. The low-stage discharge pipe and the high-stage suction pipe are connected by an intermediate connecting pipe.

[0006] The path of flow of the refrigerant gas is thus as follows. The low-pressure Ps refrigerant gas flows sequentially through the accumulator, the low-pressure connecting pipe, and the low-stage suction pipe, is sucked into the low-stage compressing section through a low-stage suction hole, and compressed to an intermediate pressure Pm refrigerant gas. The intermediate pressure Pm refrigerant gas is discharged into the discharge chamber on the low-stage side. The refrigerant gas then flows sequentially through the low-stage discharge pipe, the intermediate connecting pipe, and the high-stage suction pipe, is sucked into the high-stage compressing section through the high-stage suction hole, and compressed to a high pressure Pd. The high-pressure Pd refrigerant gas is then discharged into the chamber of the sealed housing. The high-pressure Pd refrigerant gas then passes through an opening in the motor to be discharged to a refrigeration cycle via a discharge pipe (as disclosed in Japanese Patent Application Laid-open No. 2006-152931).

[0007] However, in the conventional technology, the low-pressure connecting pipe and the intermediate con-

necting pipe have the same the inner diameter. Further, because the suction volume of the low-stage compressing section is greater than that of the high-pressure compressing section, the flow volume in the low-pressure connecting pipe is greater than that of the intermediate connecting pipe. Consequently, there is significant loss of pressure, and decreased efficiency.

DISCLOSURE OF INVENTION

[0008] It is an object of the present invention to at least partially solve the problems in the conventional technology.

[0009] According to an aspect of the present invention, a two-stage compression rotary compressor includes a cylindrical sealed housing oriented vertically; and a low-stage compressing section provided on a low-stage and a high-stage compressing section provided on a high-stage housed within the sealed housing. The two-stage compression rotary compressor also includes a motor that drives the low-stage compressing section and the high-stage compressing section housed within the sealed housing; an accumulator disposed laterally to the sealed housing; a first through-hole, a second through-hole, and a third through-hole provided in a sidewall of the sealed housing; a low-stage suction pipe that is connected to a suction side of the low-stage compressing section via the second through-hole, and sucks in a low-pressure refrigerant; a low-stage discharge pipe that is connected to a discharge side of the low-stage compressing section via the first through-hole, and discharges the refrigerant from the low-stage to outside of the sealed housing; a high-stage suction pipe that is connected to a suction side of the high-stage compressing section via the third through-hole, and sucks in the refrigerant discharged from the low-stage; a low-pressure connecting pipe that is connected to the low-stage suction pipe and the accumulator, and guides the refrigerant within the accumulator to the suction side of the low-stage compressing section; and an intermediate connecting pipe that connects the low-stage discharge pipe and the high-stage suction pipe. A first inner diameter is larger than a second inner diameter, the first inner diameter being an inner diameter of the low-pressure connecting pipe and the second inner diameter being the inner diameter of the intermediate connecting pipe.

[0010] The above and other objects, features, advantages and technical and industrial significance of this invention will be better understood by reading the following detailed description of presently preferred embodiments of the invention, when considered in connection with the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

[0011]

Fig. 1A is a cross-sectional view of a two-stage com-

pression rotary compressor according to a first embodiment of the present invention;

Fig. 1B is a drawing of a principal structure of a low-stage compressing section and a high-stage compressing section of the two-stage compression rotary compressor according to the first embodiment shown in Fig. 1A;

Fig. 1C is a cross-sectional view of a low-stage end plate of the two-stage compression rotary compressor according to the first embodiment taken along line A-A of Fig. 1A;

Fig. 1D is a cross-sectional view for explaining a low-stage discharge valve of the two-stage compression rotary compressor according to the first embodiment shown in Fig. 1A;

Fig. 1E is a cross-sectional view of the low-stage discharge valve of the two-stage compression rotary compressor according to the first embodiment taken along line B-B of Fig. 1D;

Fig. 1F is a schematic diagram for explaining the structure of a sealed housing of the two-stage compression rotary compressor according to the first embodiment shown in Fig. 1A;

Fig. 1G is a side view of the two-stage compression rotary compressor according to the first embodiment; and

Fig. 2 is a cross-sectional view of an injection-enabled two-stage compression rotary compressor according to a second embodiment of the present invention.

BEST MODE(S) FOR CARRYING OUT THE INVENTION

[0012] Exemplary embodiments of a two-stage compression rotary compressor according to the present invention are described below with reference to the accompanying drawing. Although the invention has been described with respect to a specific embodiment for a complete and clear disclosure, the appended claims are not to be thus limited but are to be construed as embodying all modifications and alternative constructions that may occur to one skilled in the art which fairly fall within the basic teaching herein set forth. The constituent elements in the embodiment described can be easily envisioned by those skilled in the art or can be virtually the same as described here.

[0013] Fig. 1A is a cross-sectional view of a two-stage compression rotary compressor 1 according to a first embodiment of the present invention. The two-stage compression rotary compressor 1 includes a cylindrical sealed housing 10 disposed vertically with a compressing section 12 and a motor 11 that drives the compressing section 12 disposed inside the sealed housing 10.

[0014] The motor 11 includes a stator 111 and a rotor 112. The stator 111 is fixed by thermal insert to the inner surface of the sealed housing 10. The rotor 112 is disposed in the mid portion of the stator 111 and is fixed by

thermal insert to a shaft 15 that connects the motor 11 and the compressing section 12.

[0015] The compressing section 12 is composed of a low-stage compressing section 12L and a high-stage compressing section 12H disposed above the low-stage compressing section 12L that are connected in series. Fig. 1B is a drawing of a principal structure of the low-stage compressing section 12L and the high-stage compressing section 12H. The principal component of the low-stage compressing section 12L is a low-stage cylinder 121L, and the principal component of the high-stage compressing section 12H is a high-stage cylinder 121H.

[0016] The low-stage cylinder 121L and the high-stage cylinder 121H, respectively, have a cylinder bore (hole) 123L and a cylinder bore (hole) 123H, which are coaxial with the motor 11. A cylindrical piston 125L and a cylindrical piston 125H, respectively, fit into the cylinder bores 123L and 123H. The outer diameter of the pistons 125L and 125H are smaller than the diameter of the cylinder bores 123L and 123H, thus forming a working clearance between the low-stage cylinder 121L and the piston 125L as well as the high-stage cylinder 121H and the piston 125H, and the refrigerant pervades the working clearance.

[0017] A groove that covers the entire cylinder thickness runs outward from the cylinder bores (holes) 123L and 123H in each of the low-stage cylinder 121L and the high-stage cylinder 121H, with flat vanes 127L and 127H, respectively, housed in the grooves. Springs 129L and 129H, respectively, are disposed between the vanes 127L and 127H and the inner surface of the sealed housing 10. The elastic force of the springs 129L and 129H causes the inner end of the vanes 127L and 127H to push against the outer surfaces of the pistons 125L and 125H, respectively, thus dividing each working clearance into respective sets of a suction chamber 131L and a compression chamber 133L and a suction chamber 131H and a compression chamber 133H.

[0018] Suction ports 135L and 135H are provided, respectively, in the low-stage cylinder 121L and the high-stage cylinder 121H, through which the refrigerant can be sucked into the suction chambers 131L and 131H, respectively.

[0019] An intermediate partition plate 140 disposed between the low-stage cylinder 121L and the high-stage cylinder 121H blocks off the upper portion of the working clearance of the low-stage cylinder 121L and the lower portion of the working clearance of the high-stage cylinder 121H. A low-stage end plate 160L provided below the low-stage cylinder 121L blocks off the lower portion of the working clearance of the low-stage cylinder 121L. A high-stage end plate 160H provided above the high-stage cylinder 121H blocks off the upper portion of the working clearance of the high-stage cylinder 121H.

[0020] A lower shaft bearing 161L located below the low-stage end plate 160L receives a lower shaft 151 of the shaft 15 and an upper shaft bearing 161H located above the high-stage end plate 160H receives the upper

shaft 153 of the shaft 15.

[0021] The shaft 15 has a low-stage crank shaft 152L and a high-stage crank shaft 152H that are eccentric by 180° in different directions. The low-stage crank shaft 152L fits into the piston 125L of the low-stage compressing section 12L, and the high-stage crank shaft 152H fits into the piston 125H of the high-stage compressing section 12H.

[0022] As the shaft 15 rotates causing an orbital motion of the pistons 125L and 125H sliding along the inner wall of the cylinder bores (holes) 123L and 123H, the orbital motion of the pistons 125L and 125H causes the vanes 127L and 127H to intrude and extrude, producing increasing and decreasing volumes of the suction chambers 131L and 131H and the compression chambers 133L and 133H. Suction and compression of the refrigerant are repeated in this manner by the compressing section 12.

[0023] A low-stage muffler cover 170L is provided below the low-stage end plate 160L. A low-stage discharge muffler chamber 180L is formed between the low-stage end plate 160L and the low-stage muffler cover 170L. The low-stage compressing section 12L discharges into the low-stage discharge muffler chamber 180L. In other words, a low-stage discharge hole 190L is provided in the low-stage end plate 160L that connects the working clearance of the low-stage cylinder 121L and the low-stage discharge muffler chamber 180L. The low-stage discharge hole 190L has a low-stage discharge valve 200L that prevents reverse flow.

[0024] Fig. 1C is a cross-sectional view of the two-stage compression rotary compressor 1 shown in Fig. 1A taken along line A-A for explaining the structure of the low-stage end plate 160L of the two-stage compression rotary compressor 1. Figs. 1D and 1E are schematic drawings for explaining the low-stage discharge valve 200L. Fig. 1E is a cross-sectional view taken along line B-B of Fig. 1D. As shown in Figs. 1C and 1D, the low-stage discharge muffler chamber 180L according to the first embodiment is a single chamber and is part of an intermediate connecting passage that connects the discharge side of the low-stage compressing section 12L and the suction side of the high-stage compressing section 12H.

[0025] As shown in Figs. 1D and 1E, a discharge valve press 201L that restricts the movement of the low-stage discharge valve 200L is fixed over the low-stage discharge valve 200L by a rivet 203. A low-stage muffler discharge hole 210L is provided in the outer peripheral wall of the low-stage end plate 160L through which the refrigerant is discharged from the low-stage discharge muffler chamber 180L.

[0026] A high-stage muffler cover 170H is provided above the high-stage end plate 160H. A high-stage discharge muffler chamber 180H is formed between the high-stage end plate 160H and the high-stage muffler cover 170H. A high-stage discharge hole 190H is provided in the high-stage end plate 160H that connects the

working clearance of the high-stage cylinder 121H and the high-stage discharge muffler chamber 180H. The high-stage discharge hole 190H has a high-stage discharge valve 200H that prevents reverse flow. A discharge valve press 201H that restricts the movement of the high-stage discharge valve 200H is fixed over the high-stage discharge valve 200H by a rivet.

[0027] A not shown bolt is used to fix the low-stage cylinder 121L, the low-stage end plate 160L, the low-stage muffler cover 170L, the high-stage cylinder 121H, the high-stage end plate 160H, the high-stage muffler cover 170H, and the intermediate partition plate 140 to form an integrated compressing section 12. From among all the parts of the compressing section 12, the outer peripheral surface of the high-stage end plate 160H is spot-welded to the sealed housing 10, thus fixing the compressing section 12 to the sealed housing 10.

[0028] Fig. 1F is a schematic diagram for explaining the structure of the sealed housing 10 of the two-stage compression rotary compressor 1 according to the first embodiment. The sealed housing 10 has three ports, namely a first through-hole 101, a second through-hole 102, and a third through-hole 103, arranged in a row along its longitudinal direction. The first through-hole 101, the second through-hole 102, and the third through-hole 103 are all located in substantially the same direction from the central axis.

[0029] Fig. 1F is a side view of the two-stage compression rotary compressor 1 according to the first embodiment. An accumulator 25 is attached to the side surface of the main unit of the two-stage compression rotary compressor 1 by an accumulator holder 250 and an accumulator band 253. A system connection pipe 255 that connects the accumulator 25 to the refrigeration cycle is provided in the upper portion of the accumulator 25. A low-pressure connecting pipe 31 is provided in the lower portion of the accumulator 25. One end of the low-pressure connecting pipe 31 extends upwards into the accumulator 25 while the other end is connected to the main unit of the two-stage compression rotary compressor 1.

[0030] The low-pressure connecting pipe 31 that sucks in low-pressure refrigerant of the refrigeration cycle is connected to the suction side, that is, low-stage suction hole 135L, of the low-stage compressing section 12L via the second through-hole 102 and a low-stage suction pipe 104. The low-pressure connecting pipe 31 has L-bends at two points to avoid interference with a substantially U-shaped intermediate connecting pipe 23 connecting the discharge side of the low-stage compressing section 12L and the suction side of the high-stage compressing section 12H.

[0031] The discharge side of the low-stage discharge muffler chamber 180L, that is, the low-stage muffler discharge hole 210L, is connected to one end of a substantially U-shaped intermediate connecting pipe 23 located outside of the sealed housing 10 via the first through-hole 101 and a low-stage discharge pipe 105. The other end of the intermediate connecting pipe 23 is connected

to the suction port 135H of the high-stage compressing section 12H via the third through-hole 103 and a high-stage suction pipe 106. In other words, the intermediate connecting passage that connects the discharge side of the low-stage compressing section 12L and the high-stage compressing section 12H is formed by the low-stage discharge muffler chamber 180L, the low-stage muffler discharge hole 210L, the intermediate connecting pipe 23, and the high-stage suction hole 135H of the high-stage compressing section 12H.

[0032] In the two-stage compression rotary compressor 1 according to the first embodiment, an inner diameter r31 of the low-pressure connecting pipe 31 is kept larger than an inner diameter r23 of the intermediate connecting pipe 23. By keeping the inner diameter r31 of the low-pressure connecting pipe 31 larger than the inner diameter r23 of the intermediate connecting pipe 23, loss of pressure of the refrigerant gas flowing from the accumulator 25 can be reduced in the low-pressure connecting pipe 31, thus enhancing compression efficiency.

[0033] Further, the substantially U-shaped intermediate connecting pipe 23 can be kept narrow by keeping the inner diameter r23 of the intermediate connecting pipe 23 narrower than the inner diameter r31 of the low-pressure connecting pipe 31. Because a narrow pipe can be more easily bent into a substantially U-shape, the narrowness of the intermediate connecting pipe 23 facilitates its easy manufacture.

[0034] The high-stage compressing section 12H discharges into the high-stage discharge muffler chamber 180H and the high-stage discharge muffler chamber 180H discharges into the sealed housing 10. A discharge pipe 107 that discharges the refrigerant within the sealed housing 10 to the refrigeration cycle side is connected to the top of the sealed housing 10.

[0035] A lubricant is sealed in the sealed housing 10 of the two-stage compression rotary compressor 1 up to the height of the high-stage cylinder 121H. A not shown vane pump provided below the shaft 15 circulates the lubricant in the compressing section 12, thus enabling the lubricant to lubricate the sliding member and seal the zone divided into zones of different pressures by a minute opening.

[0036] The path of flow of the refrigerant gas in the two-stage compression rotary compressor 1 is described below. A low-pressure P_s refrigerant gas flows sequentially through the accumulator 25, the low-pressure connecting pipe 31, and the low-stage suction pipe 104, is sucked into the low-stage compressing section 12L through the low-stage suction hole 135L, and compressed to an intermediate pressure P_m . The intermediate-pressure P_m refrigerant gas discharged into the low-stage discharge muffler chamber 180L sequentially flows through the low-stage discharge pipe 105, the intermediate connecting pipe 23, and the high-stage suction pipe 106, is sucked into the high-stage compressing section 12H through the high-stage suction hole 135H, and compressed to a high pressure P_d . The high-pressure P_d

refrigerant gas is discharged into the sealed housing 10, and after flowing through the gaps of the motor 11 is discharged to the refrigeration cycle side by the discharge pipe 107.

[0037] Thus, in the two-stage compression rotary compressor 1 according to the first embodiment, the inner diameter r31 of the low-pressure connecting pipe 31 is kept larger than the inner diameter r23 of the intermediate connecting pipe 23. Consequently, loss of pressure of the refrigerant gas flowing from the accumulator 25 can be reduced in the low-pressure connecting pipe 31, thus enhancing compression efficiency.

[0038] Further, if the thickness of the low-stage cylinder 121L in the axial direction is kept greater than that of the high-stage cylinder 121H, the low-pressure connecting pipe 31, which is connected to the low-stage cylinder 121L from the side, will necessarily have to be broader than the intermediate connecting pipe 23, which is connected to the high-stage cylinder 121H from the side. Consequently, pressure loss can be reduced.

[0039] If the compressing section 12 is driven by the motor 11 that is inverter-controlled to vary the rotational speed, pressure loss increases with the increase in the rotational speed. However, in the first embodiment, by keeping the inner diameter r31 of the low-pressure connecting pipe 31 larger than the inner diameter r23 of the intermediate connecting pipe 23, pressure loss in the low-pressure connecting pipe 31 can be reduced and compression efficiency can be enhanced, and therefore pressure loss can be reduced even at a high rotational speed.

[0040] Easy manufacture of the substantially U-shaped intermediate connecting pipe 23 is facilitated by keeping the intermediate connecting pipe 23 narrow.

[0041] The present invention can be adapted to an injection-enabled two-stage compression rotary compressor equipped with a suction unit that sucks in refrigerant gas of an intermediate pressure between the condensation pressure and evaporation pressure of the refrigeration cycle and that is disposed between the discharge side of the low-stage compressing section and the suction side of the high-stage compressing section. Fig. 2 is a cross-sectional view of an injection-enabled two-stage compression rotary compressor 2 according to a second embodiment of the present invention. In the injection-enabled two-stage rotary compressor 2 according to the second embodiment, an intermediate-pressure suction pipe (injection pipe) 81 that sucks in the refrigerant gas compressed to an intermediate pressure between a condensation pressure and an evaporation pressure of the refrigeration cycle is connected to the intermediate connecting pipe 23 connecting the discharge side of the low-stage compressing section 12L and the suction side of the high-stage compressing section 12H. Apart from the intermediate-pressure suction pipe (injection pipe) 81, the structure of the injection-enabled two-stage compression rotary compressor 2 shown in Fig. 2 is identical to that of the two-stage compression rotary compressor 1 shown in Fig. 1A.

[0042] The inner diameter r31 of the low-pressure connecting pipe 31 is kept larger than the inner diameter r23 of the intermediate connecting pipe 23 in the injection-enabled two-stage compression rotary compressor 2 as well. Consequently, loss of pressure of the refrigerant gas flowing from the accumulator 25 can be reduced in the low-pressure connecting pipe 31, thus enhancing compression efficiency.

[0043] Further, in the injection-enabled two-stage compression rotary compressor 2 as well, if the thickness of the low-stage cylinder 121L in the axial direction is kept greater than that of the high-stage cylinder 121H, the low-pressure connecting pipe 31, which is connected to the low-stage cylinder 121L from the side, will necessarily have to be broader than the intermediate connecting pipe 23, which is connected to the high-stage cylinder 121H from the side. Consequently, pressure loss can be reduced.

[0044] Further, in the injection-enabled two-stage compression rotary compressor 2 as well, if the compressing section 12 is driven by the motor 11 that is inverter-controlled to vary the rotational speed, pressure loss increases with the increase in the rotational speed. However, in the first embodiment, by keeping the inner diameter r31 of the low-pressure connecting pipe 31 larger than the inner diameter r23 of the intermediate connecting pipe 23, pressure loss in the low-pressure connecting pipe 31 can be reduced and compression efficiency can be enhanced, and therefore pressure loss can be reduced even at a high rotational speed.

[0045] In the injection-enabled two-stage compression rotary compressor 2 as well, easy manufacture of the substantially U-shaped intermediate connecting pipe 23 is facilitated by keeping the intermediate connecting pipe 23 narrow.

[0046] There is at least one instance of a conventional compressor in which pipes of differing diameters have been used (see Fig. 1 of Japanese Patent Application Laid-open No. 2006-152931). In the compressor in question, an intermediate connecting pipe is provided inside the compressor, and an injection pipe and a low-pressure side suction pipe of different diameters are used. However, even though this structure reduces the loss of pressure inside the low-pressure connecting pipe, it does not compare well with the effect obtained due to the present invention.

[0047] According to an embodiment of the present invention, an inner diameter of a low-pressure connecting pipe is kept larger than an inner diameter of an intermediate connecting pipe. Consequently, pressure loss in the low-pressure connecting pipe can be reduced, thus enhancing the compression efficiency. An axial direction thickness of a high-stage cylinder is kept thinner than an axial direction thickness of a low-stage cylinder, necessitating use of a low-pressure connecting pipe, which is connected to the low-stage cylinder from the side, that is broader than the intermediate connecting pipe, which is connected to the high-stage cylinder from the side.

Consequently, pressure loss can be reduced.

[0048] Although the invention has been described with respect to a specific embodiment for a complete and clear disclosure, the appended claims are not to be thus limited but are to be construed as embodying all modifications and alternative constructions that may occur to one skilled in the art that fairly fall within the basic teaching herein set forth.

Claims

1. A two-stage compression rotary compressor (1; 2) comprising:

a cylindrical sealed housing (10) oriented vertically;

a low-stage compressing section (12L) provided on a low-stage and a high-stage compressing section (12H) provided on a high-stage housed within the sealed housing (10);

a motor (11) that drives the low-stage compressing section (12L) and the high-stage compressing section (12H) housed within the sealed housing (10);

an accumulator (25) disposed laterally to the sealed housing (10);

a first through-hole (101), a second through-hole (102), and a third through-hole (103) provided in a sidewall of the sealed housing (10);

a low-stage suction pipe (104) that is connected to a suction side of the low-stage compressing section (12L) via the second through-hole (102), and sucks in a low-pressure refrigerant;

a low-stage discharge pipe (105) that is connected to a discharge side of the low-stage compressing section (12L) via the first through-hole (101), and discharges the refrigerant from the low-stage to outside of the sealed housing (10);

a high-stage suction pipe (106) that is connected to a suction side of the high-stage compressing section (12H) via the third through-hole (103), and sucks in the refrigerant discharged from the low-stage;

a low-pressure connecting pipe (31) that is connected to the low-stage suction pipe (104) and the accumulator (25), and guides the refrigerant within the accumulator (25) to the suction side of the low-stage compressing section (12L); and an intermediate connecting pipe (23) that connects the low-stage discharge pipe (105) and the high-stage suction pipe (106),

wherein a first inner diameter is larger than a second inner diameter, the first inner diameter being an inner diameter of the low-pressure connecting pipe (31) and the second inner diameter being the inner diameter of the intermediate connecting pipe (23).

2. The two-stage compression rotary compressor (1; 2) according to claim 1, wherein a first axial direction thickness is greater than a second axial direction thickness, the first axial direction thickness being an axial direction thickness of a low-stage cylinder (121L) that forms a part of the low-stage compressing section (12L) and is connected to the low-pressure connecting pipe (31) via the low-stage suction pipe (104), and the second axial direction thickness being the axial direction thickness of a high-stage cylinder (121H) that forms a part of the high-stage compressing section (12H) and is connected intermediate connecting pipe (23) via the high-stage suction pipe (106). 5 10 15
3. The two-stage compression rotary compressor (1; 2) according to claim 1, equipped with a variable-speed motor system. 20
4. The two-stage compression rotary compressor (1; 2) according to claim 1, wherein a suction unit that sucks in the refrigerant compressed to an intermediate pressure between a condensation pressure and an evaporation pressure of a refrigeration cycle is provided between the discharge side of the low-stage compressing section (12L) and the suction side of the high-stage compressing section (12H). 25 30 35 40 45 50 55

FIG.1A

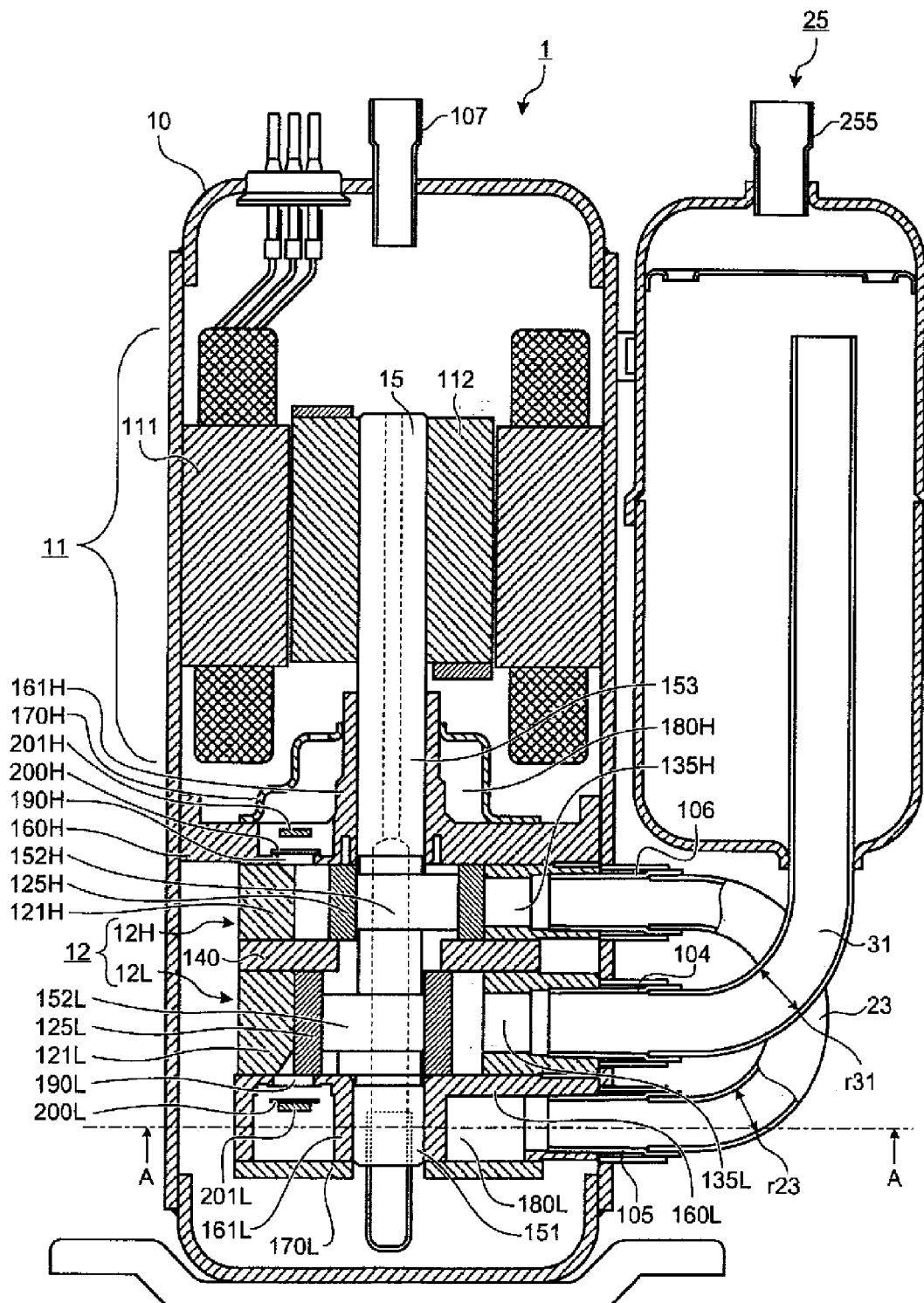


FIG.1B

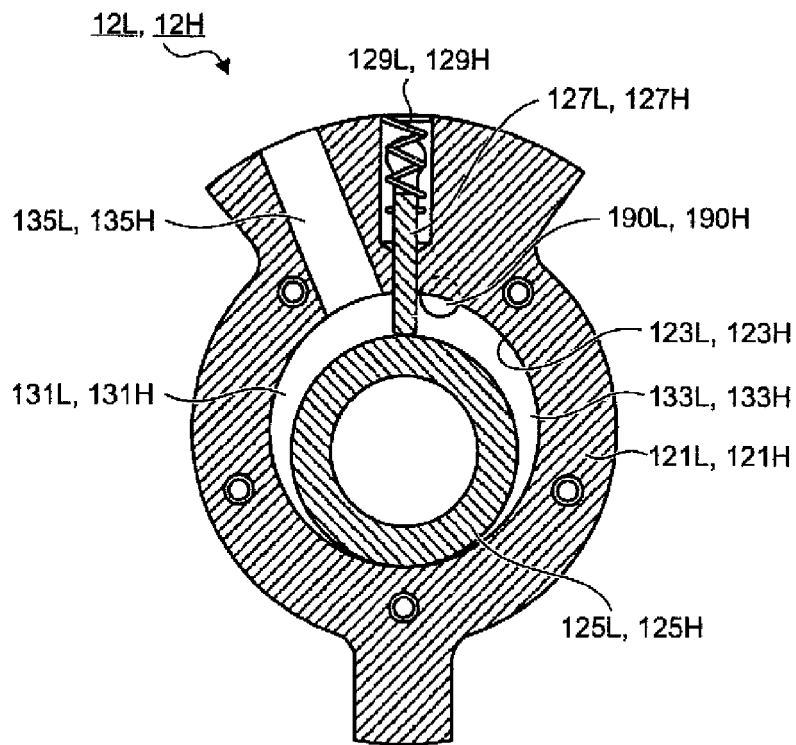


FIG.1C

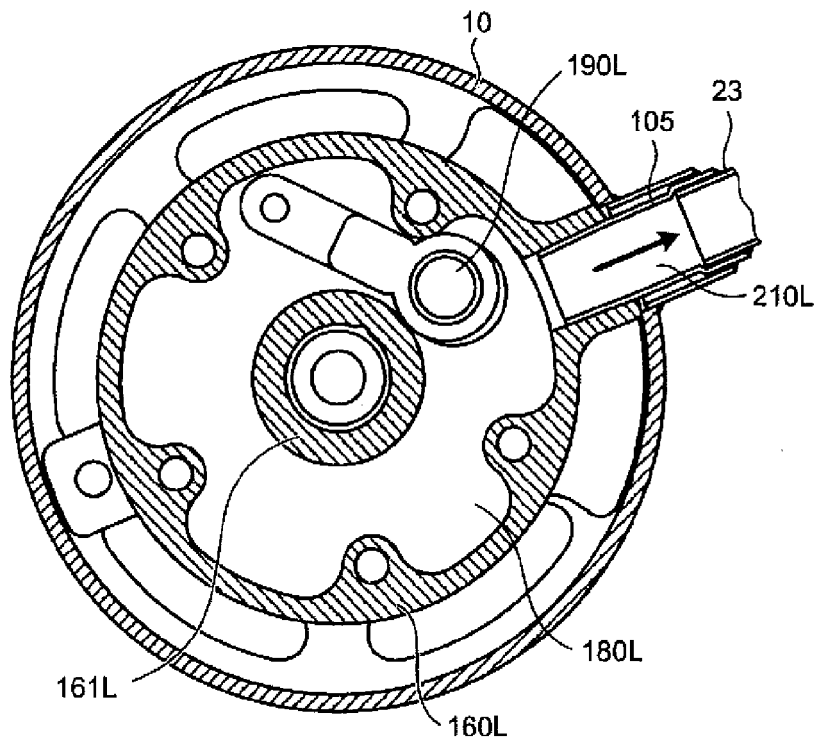


FIG.1D

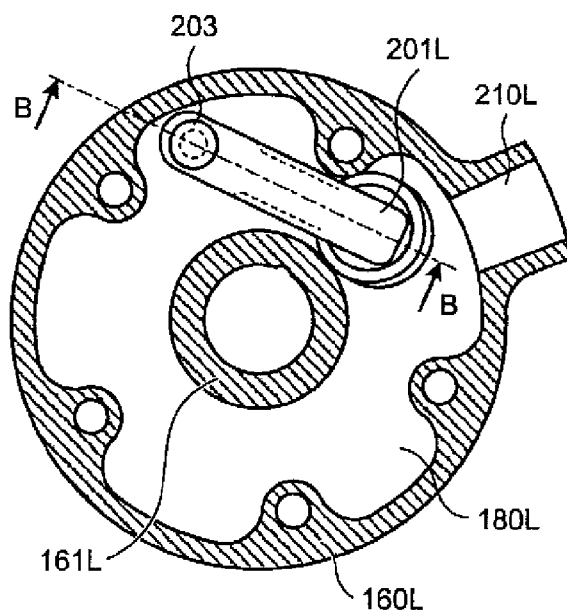


FIG.1E

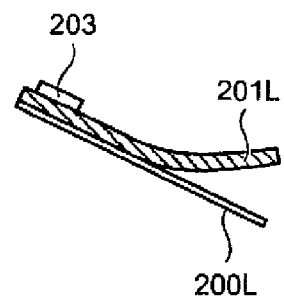


FIG.1F

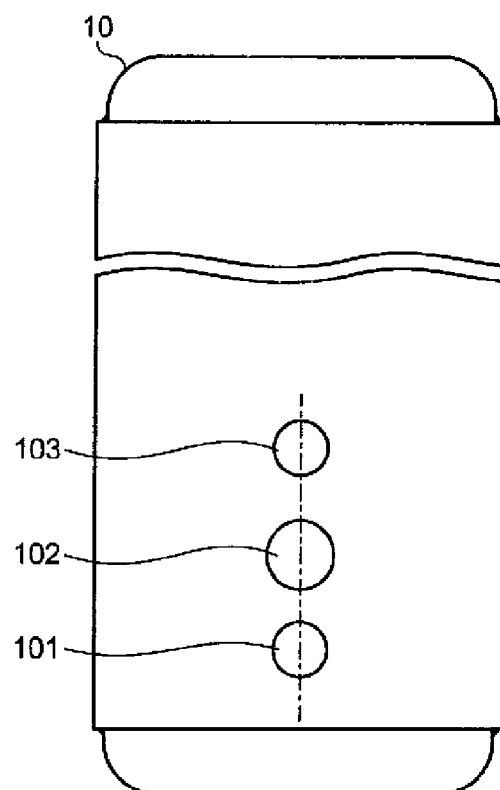


FIG.1G

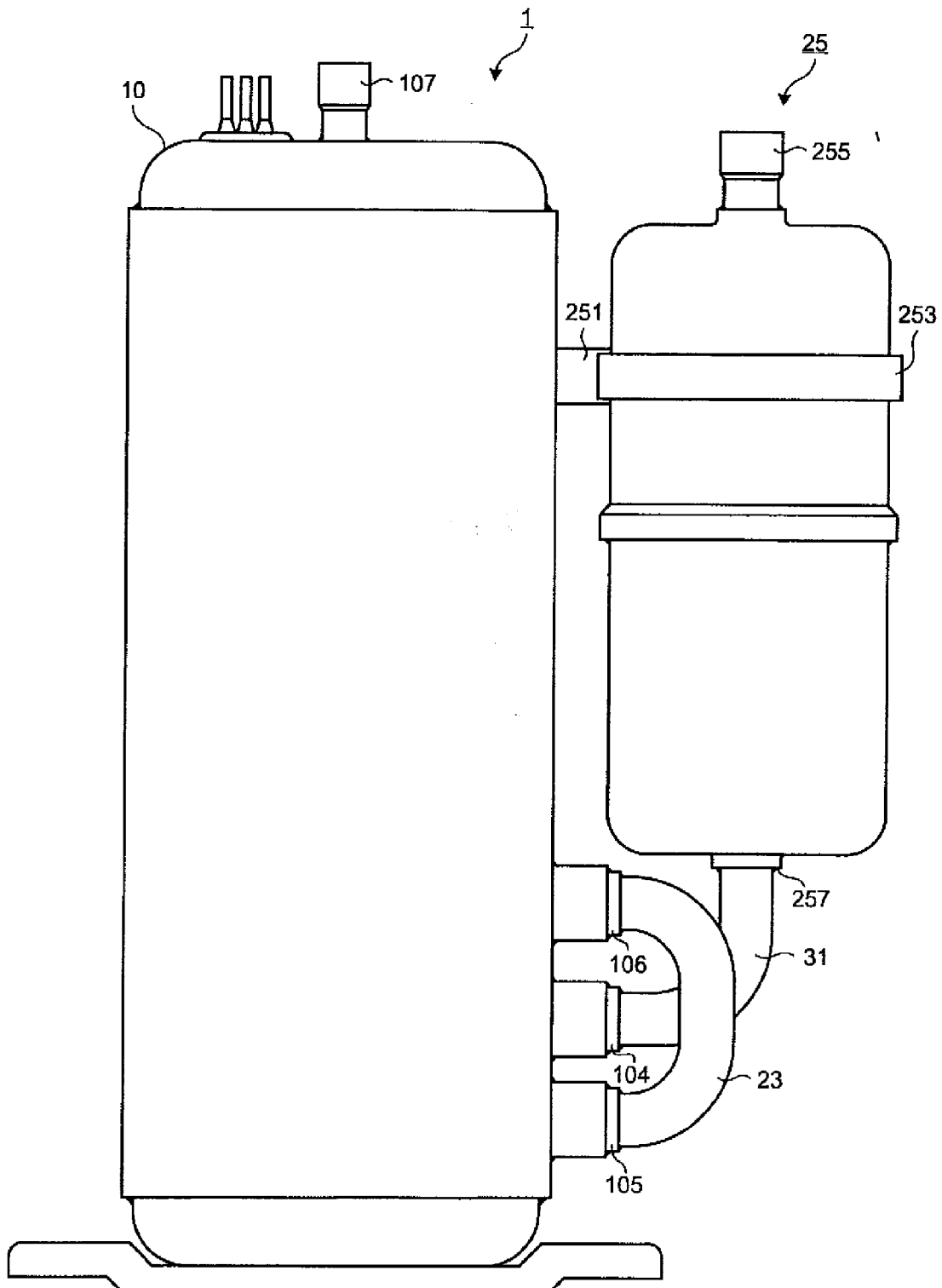
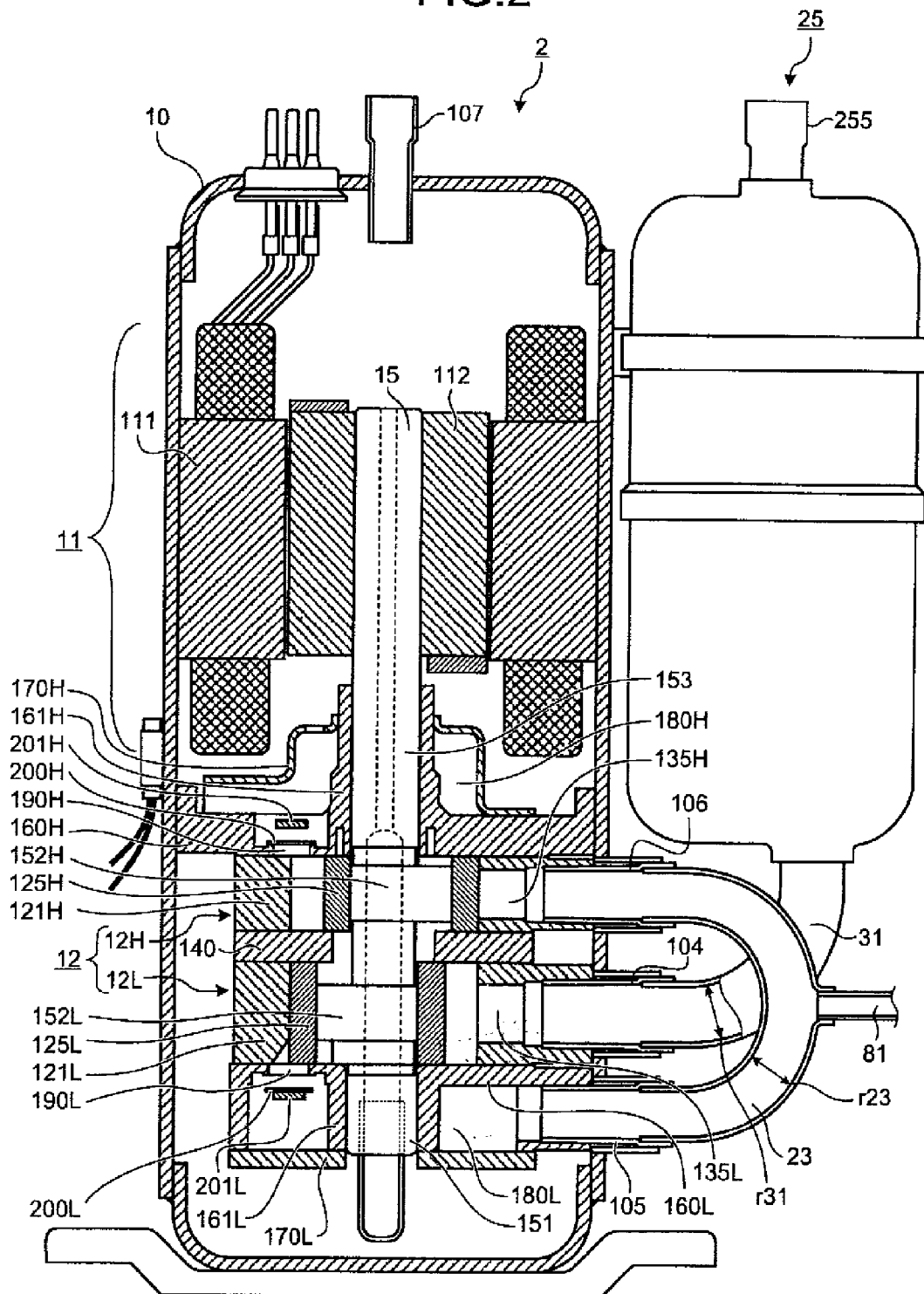


FIG.2



REFERENCES CITED IN THE DESCRIPTION

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

Patent documents cited in the description

- JP 2006152931 A [0006] [0046]