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(54) **COMPRESSOR AS WELL AS COOLING-HEATING REFRIGERATION DEVICE AND COOLING-ONLY REFRIGERATION DEVICE HAVING SAME**

(57) A compressor (100), a cooling and heating type refrigerating device (1000) and a single cooling type refrigerating device (2000) having the same are provided. The compressor (100) includes a housing (1), a first cylinder (2) and a second cylinder (3). The housing (1) is provided with an exhaust pipe (10), a first suction pipe (11) and a second suction pipe (12). The first cylinder (2) defines a first exhaust passage (20) and a first suction passage (21) communicated with the first suction pipe (11), a suction volume of the first cylinder (2) is denoted by V1, and a minimum flow area of the first suction passage (21) is denoted by S1. The second cylinder (3) defines a second exhaust passage (30) and a second suction passage (31) communicated with the second suction pipe (12), a suction volume of the second cylinder (3) is denoted by V2, and a minimum flow area of the second suction passage (31) is denoted by S2; a suction pressure of the second cylinder (3) is greater than a suction pressure of the first cylinder (2), and the first cylinder (2) and the second cylinder (3) satisfy: $1.2 \cdot V2/V1 \leq S2/S1$.

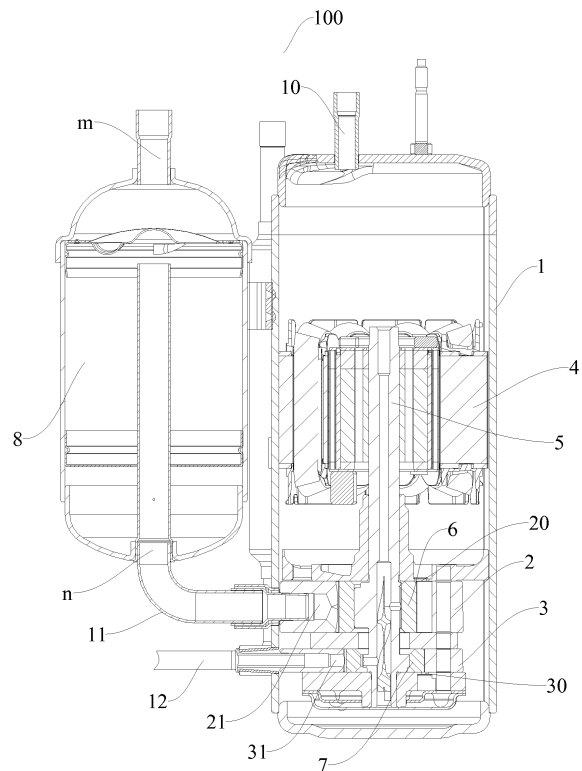


Fig. 1

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Description

FIELD

[0001] The present disclosure relates to refrigerating field, more particularly to a compressor, a cooling and heating type refrigerating device and a single cooling type refrigerating device having the same.

BACKGROUND

[0002] In the terms of heating technology, heating capacity of the existing conditioner, particularly in a low ambient temperature will significantly attenuate, and cannot meet the user's demand for heat requirement. Additionally, with the implementation of the APF energy efficiency for the air conditioner, insufficiency of the heating capacity of the air conditioner at low temperature becomes prominent increasingly, and solutions to this problem are desired to be sought.

[0003] In order to address this problem, in recent years, the application of the gaseous refrigerant injection method to the compressor and the refrigeration device has attracted much attention, and in particular, research on the use of twin-cylinder rotary compressor has progressed.

SUMMARY

[0004] The present disclosure seeks to solve at least one of the problems existing in the related art to at least some extent.

[0005] To this end, the present disclosure proposes a compressor, which has a high indicated efficiency of gas compression for a second cylinder.

[0006] The present disclosure also proposes a cooling and heating type refrigerating device having the above-described compressor.

[0007] The present disclosure yet proposes a single cooling type refrigerating device having the above-described compressor.

[0008] The compressor according to embodiments of the present disclosure includes: a housing provided with an exhaust pipe, a first suction pipe and a second suction pipe; a first cylinder disposed in the housing, the first cylinder defining a first exhaust passage and a first suction passage communicated with the first suction pipe, a suction volume of the first cylinder being denoted by V_1 , and a minimum flow area of the first suction passage being denoted by S_1 ; and a second cylinder disposed in the housing, the second cylinder defining a second exhaust passage and a second suction passage communicated with the second suction pipe, a suction volume of the second cylinder being denoted by V_2 , and a minimum flow area of the second suction passage being denoted by S_2 ; a suction pressure of the second cylinder being greater than a suction pressure of the first cylinder, and the first cylinder and the second cylinder satisfying:

$$1.2 \cdot V_2 / V_1 \leq S_2 / S_1.$$

[0009] In the compressor according to embodiments of the present disclosure, by satisfying $1.2 \cdot V_2 / V_1 \leq S_2 / S_1$, the loss of the suction pressure of the second cylinder can be reduced, the high indicated efficiency of the gas compression for the second cylinder can be ensured, such that the compressor has better energy efficiency, is easy to manufacture and is safe and reliable.

[0010] In some embodiments of the present disclosure, the first cylinder and the second cylinder further satisfy: $1.4 \cdot V_2 / V_1 \leq A_2 / A_1$, in which A_1 refers to a minimum flow area of the first exhaust passage, and A_2 refers to a minimum flow area of the second exhaust passage.

[0011] Further, the first cylinder and the second cylinder further satisfy: $A_2 / A_1 \leq 4 \cdot V_2 / V_1$.

[0012] Further, the first cylinder and the second cylinder further satisfy: $S_2 / S_1 \leq 5 \cdot V_2 / V_1$.

[0013] In some embodiments of the present disclosure, the second suction passage is internally provided with a filter screen.

[0014] The cooling and heating type refrigerating device according to embodiments of the present disclosure includes: a compressor according to the above-described embodiments of the present disclosure; a reversing assembly including a first valve port, a second valve port, a third valve port and a fourth valve port, the first valve port being communicated with one of the second valve port and the third valve port, the fourth valve port being communicated with the other of the second valve port and the third valve port, the first valve port being connected to the exhaust pipe, and the fourth valve port being connected to the first suction pipe; an indoor heat exchanger and an outdoor heat exchanger, the indoor heat exchanger having a first end connected to the second valve port, and the outdoor heat exchanger having a first end connected to the third valve port; and a flash evaporator provided with a first interface, a second interface and a third interface, a first throttling element being connected in series between the first interface and a second end of the indoor heat exchanger, a second throttling element being connected in series between the second interface and a second end of the outdoor heat exchanger, and the third interface being connected to the second suction pipe.

[0015] In the cooling and heating type refrigerating device according to embodiments of the present disclosure, by providing the compressor according to the above-described embodiments of the present disclosure, the loss of the suction pressure of the second cylinder can be reduced, the high indicated efficiency of the gas compression for the second cylinder can be ensured, such that the compressor has better energy efficiency.

[0016] Further, the compressor also includes a reservoir, the reservoir is provided with an inlet and an outlet, the inlet is connected to the fourth valve port, and the outlet is connected to the first suction pipe.

[0017] Preferably, the reversing assembly is a four-

way valve.

[0018] Optionally, the first throttling element is a capillary, an electronic expansion valve or a thermal expansion valve, and the second throttling element is a capillary, an electronic expansion valve or a thermal expansion valve.

[0019] The single cooling type refrigerating device according to embodiments of the present disclosure includes: a compressor according to the above-described embodiments of the present disclosure; an indoor heat exchanger and an outdoor heat exchanger, the indoor heat exchanger having a first end connected to the first suction pipe, and the outdoor heat exchanger having a first end connected to the exhaust pipe; and a flash evaporator provided with a first interface, a second interface and a third interface, a first throttling element being connected in series between the first interface and a second end of the indoor heat exchanger, a second throttling element being connected in series between the second interface and a second end of the outdoor heat exchanger, and the third interface being connected to the second suction pipe.

[0020] In the single cooling type refrigerating device according to embodiments of the present disclosure, by providing the compressor according to the above-described embodiments of the present disclosure, the loss of the suction pressure of the second cylinder can be reduced, the high indicated efficiency of the gas compression for the second cylinder can be ensured, such that the compressor has better energy efficiency.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

Fig. 1 is a schematic view of a compressor according to some embodiments of the present disclosure;
 Fig. 2 is a schematic view of a compressor according to some other embodiments of the present disclosure;
 Fig. 3 is a graph showing relationship between flow area proportions of suction passages of a first cylinder and a second cylinder and an indicated efficiency of gas compression of the second cylinder;
 Fig. 4 is a graph showing relationship between flow area proportions of exhaust passages of a first cylinder and a second cylinder and an indicated efficiency of gas compression of the second cylinder;
 Fig. 5 is a schematic view of a cooling and heating type refrigerating device according to an embodiment of the present disclosure;
 Fig. 6 is a pressure-enthalpy diagram of a system circle of a cooling and heating type refrigerating device; and
 Fig. 7 is a schematic view of a single cooling type refrigerating device according to an embodiment of the present disclosure.

Reference numerals:

[0022]

5 cooling and heating type refrigerating device 1000,
 single cooling type refrigerating device 2000,
 compressor 100, housing 1, exhaust pipe 10, first
 suction pipe 11, second suction pipe 12,
 first cylinder 2, first exhaust passage 20, first suction
 10 passage 21,
 second cylinder 3, second exhaust passage 30, second
 suction passage 31,
 electric motor 4, crankshaft 5, first piston 6, second
 piston 7, filter screen 9,
 15 reservoir 8, inlet m, outlet n,
 reversing assembly 200, first valve port a, second
 valve port b, third valve port c, fourth valve port d,
 indoor heat exchanger 300, outdoor heat exchanger
 400,
 20 flash evaporator 500, first interface e, second inter-
 face f, third interface g,
 first throttling element 600, seventh throttling ele-
 ment 700.

25 DETAILED DESCRIPTION

[0023] Embodiments of the present disclosure will be described in detail below, and examples of the embodiments are shown in accompanying drawings. The embodiments described herein with reference to drawings are explanatory, illustrative, and used to generally understand the present disclosure. The embodiments shall not be construed to limit the present disclosure.

[0024] In the specification, it is to be understood that
 30 terms such as "central," "longitudinal," "lateral," "length,"
 "width," "thickness," "upper," "lower," "front," "rear," "left,"
 "right," "vertical," "horizontal," "top," "bottom," "inner,"
 "outer," "clockwise," "counterclockwise," "axial," "radial"
 and "circumferential" should be construed to refer to the
 40 orientation as then described or as shown in the drawings
 under discussion. These relative terms are for convenience
 of description and do not require that the present
 disclosure be constructed or operated in a particular ori-
 entation.

[0025] In addition, terms such as "first" and "second"
 45 are used herein for purposes of description and are not
 intended to indicate or imply relative importance or sig-
 nificance. Thus, the feature defined with "first" and "sec-
 ond" may comprise one or more of this feature. In the
 50 description of the present disclosure, the term "a plurality
 of" means two or more than two, unless specified other-
 wise.

[0026] In the present disclosure, unless specified or
 limited otherwise, the terms "mounted," "connected,"
 55 "coupled," "fixed" and the like are used broadly, and may
 be, for example, fixed connections, detachable connec-
 tions, or integral connections; may also be mechanical
 or electrical connections; may also be direct connections

or indirect connections via intervening structures; may also be inner communications of two elements. The above terms can be understood by those skilled in the art according to specific situations.

[0027] A compressor 100 according to embodiments of the present disclosure will be described below in detail with reference to Figs. 1 to 4, and a refrigerant used in an interior of the compressor 100 may be any one of HCFC, HFC, HC, HFO, or a mixture of one or more refrigerants.

[0028] As illustrated in Figs. 1 and 2, the compressor 100 according to embodiments of the present disclosure includes a housing 1, a first cylinder 2 and a second cylinder 3. The housing 1 is provided with an exhaust pipe 10, a first suction pipe 11 and a second suction pipe 12. The first cylinder 2 is disposed in the housing 1. The first cylinder 2 defines a first exhaust passage 20 and a first suction passage 21 communicated with the first suction pipe 11, a suction volume of the first cylinder 2 is denoted by V_1 , and a minimum flow area of the first suction passage 21 is denoted by S_1 . That is to say, the first cylinder 2 defines the first exhaust passage 20 and the first suction passage 21, the first suction passage 21 is communicated with the first suction pipe 11, and the first exhaust passage 20 is communicated with the exhaust pipe 10.

[0029] The second cylinder 3 is disposed in the housing 1, the second cylinder 3 defines a second exhaust passage 30 and a second suction passage 31 communicated with the second suction pipe 12. That is to say, the second cylinder 3 defines the second exhaust passage 30 and the second suction passage 31, the second suction passage 31 is communicated with the second suction pipe 12, and the second exhaust passage 30 is communicated with the exhaust pipe 10. A suction volume of the second cylinder 3 is denoted by V_2 , and a minimum flow area of the second suction passage 31 is denoted by S_2 .

[0030] It could be understood that, the compressor 100 further includes an electric motor 4, a crankshaft 5, a first piston 6 and a second piston 7 or other elements. The electric motor 4 is disposed in the housing 1, and a rotor of the electric motor 4 is secured to the crankshaft 5 to drive the crankshaft 5 to rotate. The first piston 6 and the second piston 7 are fitted over the crankshaft 5 separately to be driven to rotate by the crankshaft 5. The first piston 6 is eccentrically and rotatably disposed in a cylinder chamber of the first cylinder 2, and the second piston 7 is eccentrically and rotatably disposed in a cylinder chamber of the second cylinder 3. The first exhaust passage 20 and the second exhaust passage 30 are each provided with an exhaust valve. The compression principle of the compressor 100 for the refrigerant has been the prior art, which will not be described herein in detail.

[0031] A suction pressure of the second cylinder 3 is greater than a suction pressure of the first cylinder 2, and a suction density of the second cylinder 3 is also higher than that of the first cylinder 2. As illustrated in Fig. 2, the first cylinder 2 and the second cylinder 3 satisfy the fol-

lowing relation: $1.2 \cdot V_2/V_1 \leq S_2/S_1$.

[0032] In the compressor 100 according to embodiments of the present disclosure, by satisfying $1.2 \cdot V_2/V_1 \leq S_2/S_1$, the loss of the suction pressure of the second cylinder 3 can be reduced, the high indicated efficiency of the gas compression for the second cylinder 3 can be ensured, such that the compressor 100 has better energy efficiency, is easy to manufacture and is safe and reliable.

[0033] Although the first cylinder 2 and the second cylinder 3 have the same exhaust pressure, opening times for the exhaust valves of the first cylinder 2 and the second cylinder 3 are different due to different suction pressures. Therefore, as illustrated in Fig. 4, in some embodiments of the present disclosure, the first cylinder 2 and the second cylinder 3 further satisfy the following relation: $1.4 \cdot V_2/V_1 \leq A_2/A_1$, in which A_1 refers to a minimum flow area of the first exhaust passage 20, and A_2 refers to a minimum flow area of the second exhaust passage 30. Thus, the high indicated efficiency of the gas compression for the second cylinder 3 can be further ensured, such that the compressor 100 has better energy efficiency.

[0034] If the minimum flow area A_2 of the second exhaust passage 30 of the second cylinder 3 is relatively too large, this will result in a larger clearance volume of the second cylinder 3, and also reduce the indicated efficiency of the compression of the second cylinder 3. Therefore, in further embodiments of the present disclosure, the first cylinder 2 and the second cylinder 3 also satisfy the following relation: $A_2/A_1 \leq 4 \cdot V_2/V_1$. Thus, the high indicated efficiency of the gas compression for the second cylinder 3 can be further ensured, such that the compressor 100 has better energy efficiency.

[0035] If the minimum flow area S_2 of the second suction passage 31 of the second cylinder 3 is relatively too large, this will result in a suction closing delay of the second suction passage 31, and reduce the indicated efficiency of the compression of the second cylinder 3. Therefore, according to some embodiments of the present disclosure, the first cylinder 2 and the second cylinder 3 also satisfy the following relation: $S_2/S_1 \leq 5 \cdot V_2/V_1$. Thus, the high indicated efficiency of the gas compression for the second cylinder 3 can be further ensured, such that the compressor 100 has better energy efficiency.

[0036] As illustrated in Fig. 2, in some embodiments of the present disclosure, the second suction passage 31 is internally provided with a filter screen 9. Thus, the impurities can be prevented from directly entering the second cylinder 3, so as to improve reliability of the compressor 100. Specifically, the filter screen 9 may be secured to the second suction pipe 12 or to an inner peripheral wall of the second suction passage 31.

[0037] A cooling and heating type refrigerating device 1000 according to embodiments of the present disclosure will be elaborated in the following with reference to Figs. 1 to 6, and the cooling and heating type refrigerating de-

vice 1000 has a cooling mode and a heating mode.

[0038] As illustrated in Fig. 5, the cooling and heating type refrigerating device 1000 according to embodiments of the present disclosure includes the compressor 100 according to the above-described embodiments of the present disclosure, a reversing assembly 200, an indoor heat exchanger 300, an outdoor heat exchanger 400 and a flash evaporator 500. The reversing assembly 200 includes a first valve port a, a second valve port b, a third valve port c and a fourth valve port d. The first valve port a is communicated with one of the second valve port b and the third valve port c, the fourth valve port d is communicated with the other of the second valve port b and the third valve port c, the first valve port a is connected to the exhaust pipe 10, and the fourth valve port d is connected to the first suction pipe 11. The indoor heat exchanger 300 has a first end connected to the second valve port b, and the outdoor heat exchanger 400 has a first end connected to the third valve port c. When the cooling and heating type refrigerating device 1000 is cooling, the first valve port a is communicated with the third valve port c and the second valve port b is communicated with the fourth valve port d. When the cooling and heating type refrigerating device 1000 is heating, the first valve port a is communicated with the second valve port b and the third valve port c is communicated with the fourth valve port d.

[0039] Preferably, the reversing assembly 200 is a four-way valve. Certainly, it could be understood that, the reversing assembly 200 may also be formed as other structures, as long as the first valve port a through the fourth valve port d are included and the reversing can be realized.

[0040] The flash evaporator 500 is provided with a first interface e, a second interface f and a third interface g, and the flash evaporator 500 has an effect of gas-liquid separation. The first interface e and a second end of the indoor heat exchanger 300 is provided with a first throttling element 600 connected in series therebetween, the second interface f and a second end of the outdoor heat exchanger 400 is provided with a second throttling element 700 connected in series therebetween, and the third interface g is connected to the second suction pipe 12. Both of the first throttling element 600 and the second throttling element 700 have effects of throttling and pressure reduction. Optionally, the first throttling element 600 is a capillary, an electronic expansion valve or a thermal expansion valve, and the second throttling element 700 is a capillary, an electronic expansion valve or a thermal expansion valve.

[0041] When the cooling and heating type refrigerating device 1000 is cooling, the refrigerant discharged from the first cylinder 2 and the second cylinder 3 flows to the outdoor heat exchanger 400 through the exhaust pipe 10 of the compressor 100 and the reversing assembly 200 for condensation and heat dissipation. The refrigerant discharged from the outdoor heat exchanger 400 is throttled and reduced in pressure by the second throttling

element 700 and discharged into the flash evaporator 500 through the second interface f for gas-liquid separation. The separated liquid refrigerant flows to the first throttling element 600 through the first interface e for throttling and pressure reduction. The refrigerant discharged from the first throttling element 600 is discharged to the indoor heat exchanger 300 for evaporation and heat absorption. The refrigerant discharged from the indoor heat exchanger 300 flows to the first cylinder 2 through the reversing assembly 200 and the first suction pipe 11 for compression. The separated gaseous refrigerant is discharged to the second cylinder 3 through the third interface g and the second suction pipe 12 for compression. Consequently, the suction pressure of the first suction pipe 11 is lower than the suction pressure of the second suction pipe 12. When cooling, the outdoor heat exchanger 400 is a condenser, and the indoor heat exchanger 300 is an evaporator.

[0042] When the cooling and heating type refrigerating device 1000 is heating, the refrigerant discharged from the first cylinder 2 and the second cylinder 3 flows to the indoor heat exchanger 300 through the exhaust pipe 10 of the compressor 100 and the reversing assembly 200 for condensation and heat dissipation. The refrigerant discharged from the indoor heat exchanger 300 is throttled and reduced in pressure by the first throttling element 600 and discharged into the flash evaporator 500 through the first interface e for gas-liquid separation. The separated liquid refrigerant flows to the second throttling element 700 through the second interface f for throttling and pressure reduction. The refrigerant discharged from the second throttling element 700 is discharged to the outdoor heat exchanger 400 for evaporation and heat absorption. The refrigerant discharged from the outdoor heat exchanger 400 flows to the first cylinder 2 through the reversing assembly 200 and the first suction pipe 11 for compression. The separated gaseous refrigerant is discharged to the second cylinder 3 through the third interface g and the second suction pipe 12 for compression. Consequently, the suction pressure of the first suction pipe 11 is lower than the suction pressure of the second suction pipe 12. When heating, the indoor heat exchanger 300 is a condenser, and the outdoor heat exchanger 400 is an evaporator.

[0043] With reference to Fig. 6, the first cylinder 2 isentropically compresses the gaseous working medium from a suction state point 1 to an exhaust state point 2. The second cylinder 3 isentropically compresses a saturated vapor state point 3 to an exhaust state point 3'. High-temperature gases of the point 2 and the point 3' are mixed within the housing 1 and then enter the condenser, and are condensed to a state point 5 after heat exchange through the condenser. The refrigerant of the state point 5 is supercooled to some extent to a state point 6. The refrigerant of the state point 6 is throttled to a gas-liquid mixed state point 7 by the throttling element. The refrigerant of the gas-liquid mixed state point 7 passes through the flash evaporator 500 for gas-liquid separation, and

the separated saturated vapor state point 3 enters the second cylinder 3. A saturated liquid state point 8 separated by the flash evaporator 500 is throttled to an evaporation pressure state point 9 by the throttling element. A two-phase state point 9 forms a low-temperature low-pressure superheated gas state point 1 after passing through the evaporator, and then enters the first cylinder 2.

[0044] In the cooling and heating type refrigerating device 1000 according to embodiments of the present disclosure, by providing the compressor 100 according to the above-described embodiments of the present disclosure, the loss of the suction pressure of the second cylinder 3 can be reduced, the high indicated efficiency of the gas compression for the second cylinder 3 can be ensured, such that the compressor 100 has better energy efficiency.

[0045] In some embodiments of the present disclosure, as illustrated in Figs. 1, 2 and 5, the compressor 100 further includes a reservoir 8. The reservoir 8 defines an inlet m and an outlet n, the inlet m is connected to the fourth valve port d, and the outlet n is connected to the first suction pipe 11. The reservoir 8 can have a function of gas-liquid separation, and the refrigerant discharged from the fourth valve port d is discharged into the reservoir 8 for gas-liquid separation. The separated gaseous refrigerant is sucked through the first suction pipe 11 into the first cylinder 2 for compression, such that occurrence of a liquid impact phenomenon at the first cylinder 2 can be avoided, and impurities can also be prevented from entering the first cylinder 2, thereby improving the reliability of the compressor 100.

[0046] A single cooling type refrigerating device 2000 according to embodiments of the present disclosure will be elaborated in the following with reference to Figs. 1-4 and 7.

[0047] As illustrated in Fig. 7, the single cooling type refrigerating device 2000 according to embodiments of the present disclosure includes the compressor 100 according to the above-described embodiments of the present disclosure, the indoor heat exchanger 300, the outdoor heat exchanger 400 and the flash evaporator 500. The indoor heat exchanger 300 has a first end connected to the first suction pipe 11, and the outdoor heat exchanger 400 has a first end connected to the exhaust pipe 10.

[0048] The flash evaporator 500 is provided with a first interface e, a second interface f and a third interface g, and the flash evaporator 500 has an effect of gas-liquid separation. The first interface e and a second end of the indoor heat exchanger 300 is provided with a first throttling element 600 connected in series therebetween, the second interface f and a second end of the outdoor heat exchanger 400 is provided with a second throttling element 700 connected in series therebetween, and the third interface g is connected to the second suction pipe 12. Both of the first throttling element 600 and the second throttling element 700 have effects of throttling and pres-

sure reduction. Optionally, the first throttling element 600 is a capillary, an electronic expansion valve or a thermal expansion valve, and the second throttling element 700 is a capillary, an electronic expansion valve or a thermal expansion valve.

[0049] When the single cooling type refrigerating device 2000 is cooling, the refrigerant discharged from the first cylinder 2 and the second cylinder 3 flows to the outdoor heat exchanger 400 through the exhaust pipe 10 of the compressor 100 for condensation and heat dissipation. The refrigerant discharged from the outdoor heat exchanger 400 is throttled and reduced in pressure by the second throttling element 700 and discharged into the flash evaporator 500 through the second interface f for gas-liquid separation. The separated liquid refrigerant flows to the first throttling element 600 through the first interface e for throttling and pressure reduction. The refrigerant discharged from the first throttling element 600 is discharged to the indoor heat exchanger 300 for evaporation and heat absorption. The refrigerant discharged from the indoor heat exchanger 300 flows to the first cylinder 2 through the first suction pipe 11 for compression. The separated gaseous refrigerant is discharged to the second cylinder 3 through the second suction pipe 12 for compression. Consequently, the suction pressure of the first suction pipe 11 is lower than the suction pressure of the second suction pipe 12.

[0050] In the single cooling type refrigerating device 2000 according to embodiments of the present disclosure, by providing the compressor 100 according to the above-described embodiments of the present disclosure, the loss of the suction pressure of the second cylinder 3 can be reduced, the high indicated efficiency of the gas compression for the second cylinder 3 can be ensured, such that the compressor 100 has better energy efficiency.

[0051] In the present disclosure, unless specified or limited otherwise, a structure in which a first feature is "on" or "below" a second feature may include an embodiment in which the first feature is in direct contact with the second feature, and may also include an embodiment in which the first feature and the second feature are not in direct contact with each other, but are contacted via an additional feature formed therebetween. Furthermore, a first feature "on," "above," or "on top of" a second feature may include an embodiment in which the first feature is right or obliquely "on," "above," or "on top of" the second feature, or just means that the first feature is at a height higher than that of the second feature. While a first feature "below," "under," or "on bottom of" a second feature may include an embodiment in which the first feature is right or obliquely "below," "under," or "on bottom of" the second feature, or just means that the first feature is at a height lower than that of the second feature.

[0052] Reference throughout this specification to "an embodiment," "some embodiments," "an example," "a specific example," or "some examples," means that a particular feature, structure, material, or characteristic

described in connection with the embodiment or example is included in at least one embodiment or example of the present disclosure. Thus, the appearances of the phrases in various places throughout this specification are not necessarily referring to the same embodiment or example of the present disclosure. Furthermore, the particular features, structures, materials, or characteristics may be combined in any suitable manner in one or more embodiments or examples. In addition, without conflicting, various embodiments or examples or features of various embodiments or examples described in the present specification may be combined by those skilled in the art.

[0053] Although embodiments of the present disclosure have been shown and described, it would be appreciated by those skilled in the art that the above embodiments are exemplary and cannot be construed to limit the present disclosure, and changes, variations, alternatives, and modifications can be made in the embodiments within the scope of the present disclosure.

Claims

1. A compressor, comprising:
 - a housing provided with an exhaust pipe, a first suction pipe and a second suction pipe;
 - a first cylinder disposed in the housing, the first cylinder defining a first exhaust passage and a first suction passage communicated with the first suction pipe, a suction volume of the first cylinder being denoted by V_1 , and a minimum flow area of the first suction passage being denoted by S_1 ; and
 - a second cylinder disposed in the housing, the second cylinder defining a second exhaust passage and a second suction passage communicated with the second suction pipe, a suction volume of the second cylinder being denoted by V_2 , and a minimum flow area of the second suction passage being denoted by S_2 ; a suction pressure of the second cylinder being greater than a suction pressure of the first cylinder, and the first cylinder and the second cylinder satisfying: $1.2 \cdot V_2 / V_1 \leq S_2 / S_1$.
2. The compressor according to claim 1, wherein the first cylinder and the second cylinder further satisfy: $1.4 \cdot V_2 / V_1 \leq A_2 / A_1$, in which A_1 refers to a minimum flow area of the first exhaust passage, and A_2 refers to a minimum flow area of the second exhaust passage.
3. The compressor according to claim 2, wherein the first cylinder and the second cylinder further satisfy: $A_2 / A_1 \leq 4 \cdot V_2 / V_1$.
4. The compressor according to any one of claims 1 to 3, wherein the first cylinder and the second cylinder further satisfy: $S_2 / S_1 \leq 5 \cdot V_2 / V_1$.
5. The compressor according to any one of claims 1 to 4, wherein the second suction passage is internally provided with a filter screen.
6. A cooling and heating type refrigerating device, comprising:
 - a compressor according to any one of claims 1 to 5;
 - a reversing assembly comprising a first valve port, a second valve port, a third valve port and a fourth valve port, the first valve port being communicated with one of the second valve port and the third valve port, the fourth valve port being communicated with the other of the second valve port and the third valve port, the first valve port being connected to the exhaust pipe, and the fourth valve port being connected to the first suction pipe;
 - an indoor heat exchanger and an outdoor heat exchanger, the indoor heat exchanger having a first end connected to the second valve port, and the outdoor heat exchanger having a first end connected to the third valve port; and
 - a flash evaporator provided with a first interface, a second interface and a third interface, a first throttling element being connected in series between the first interface and a second end of the indoor heat exchanger, a second throttling element being connected in series between the second interface and a second end of the outdoor heat exchanger, and the third interface being connected to the second suction pipe.
7. The cooling and heating type refrigerating device according to claim 6, wherein the compressor further comprises a reservoir, the reservoir is provided with an inlet and an outlet, the inlet is connected to the fourth valve port, and the outlet is connected to the first suction pipe.
8. The cooling and heating type refrigerating device according to claim 6 or 7, wherein the reversing assembly is a four-way valve.
9. The cooling and heating type refrigerating device according to any one of claims 6 to 8, wherein the first throttling element is a capillary, an electronic expansion valve or a thermal expansion valve, and the second throttling element is a capillary, an electronic expansion valve or a thermal expansion valve.
10. A single cooling type refrigerating device, comprising:

a compressor according to any one of claims 1 to 5;

an indoor heat exchanger and an outdoor heat exchanger, the indoor heat exchanger having a first end connected to the first suction pipe, and the outdoor heat exchanger having a first end connected to the exhaust pipe; and

a flash evaporator provided with a first interface, a second interface and a third interface, a first throttling element being connected in series between the first interface and a second end of the indoor heat exchanger, a second throttling element being connected in series between the second interface and a second end of the outdoor heat exchanger, and the third interface being connected to the second suction pipe.

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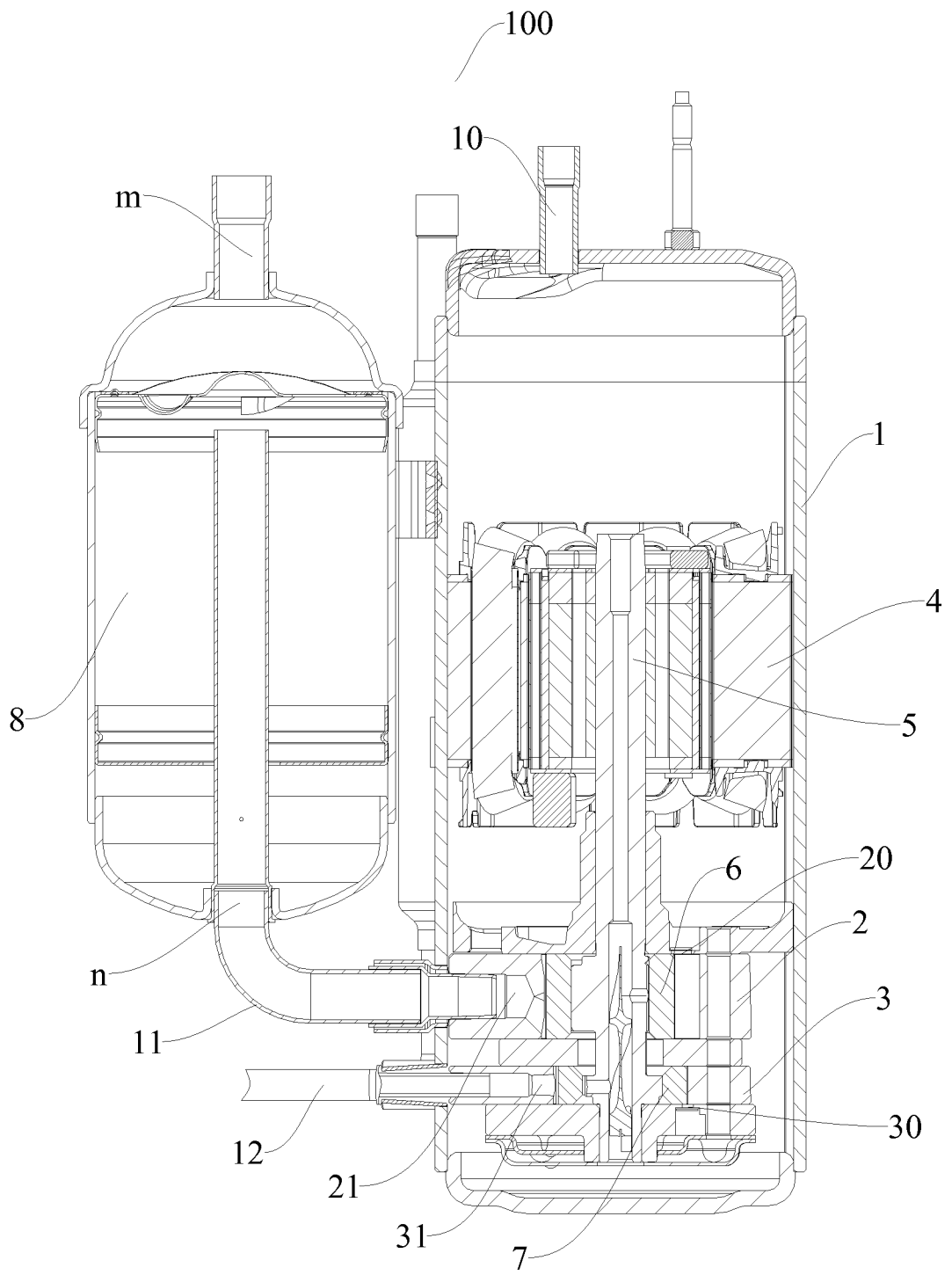


Fig. 1

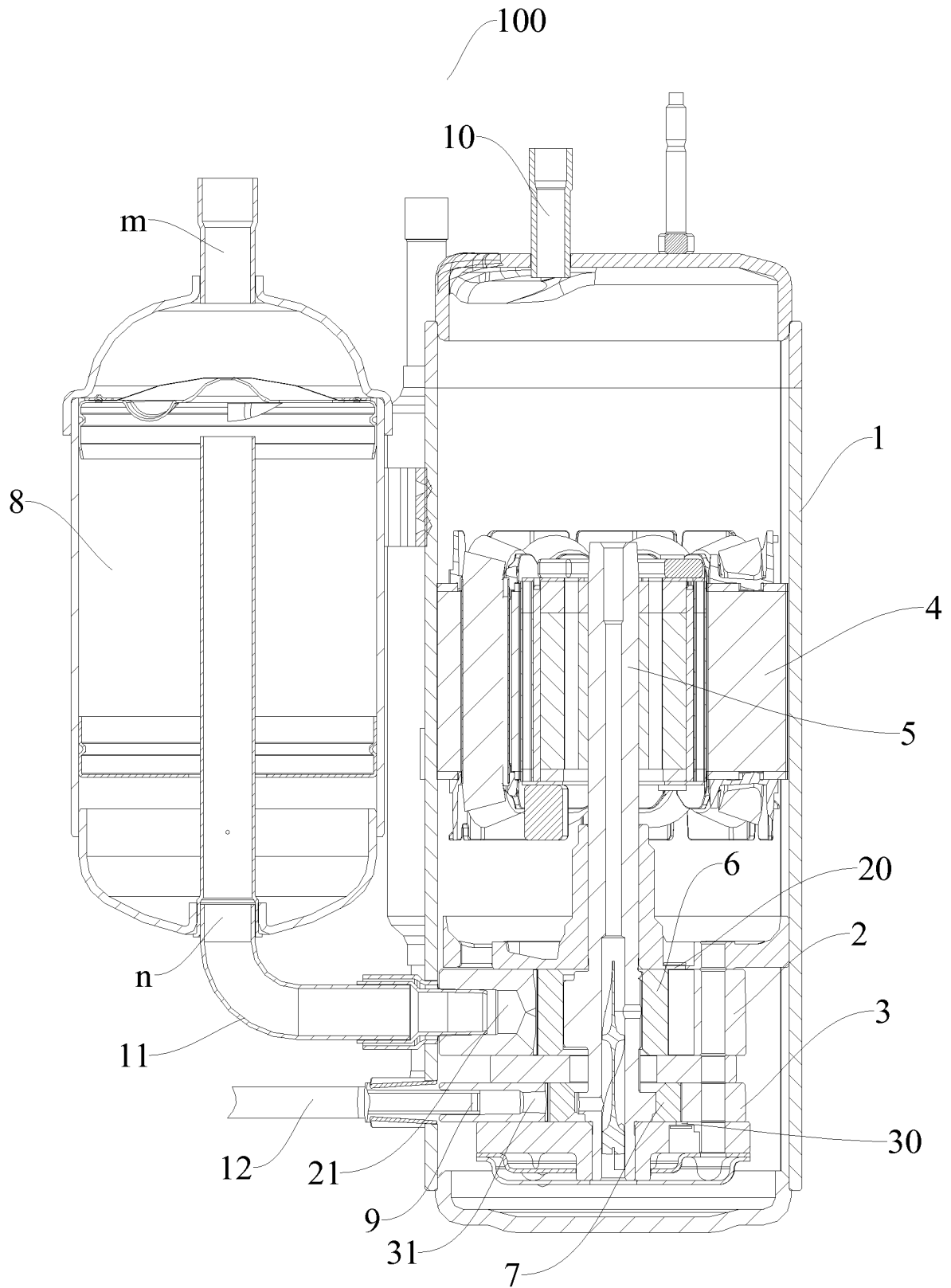


Fig. 2

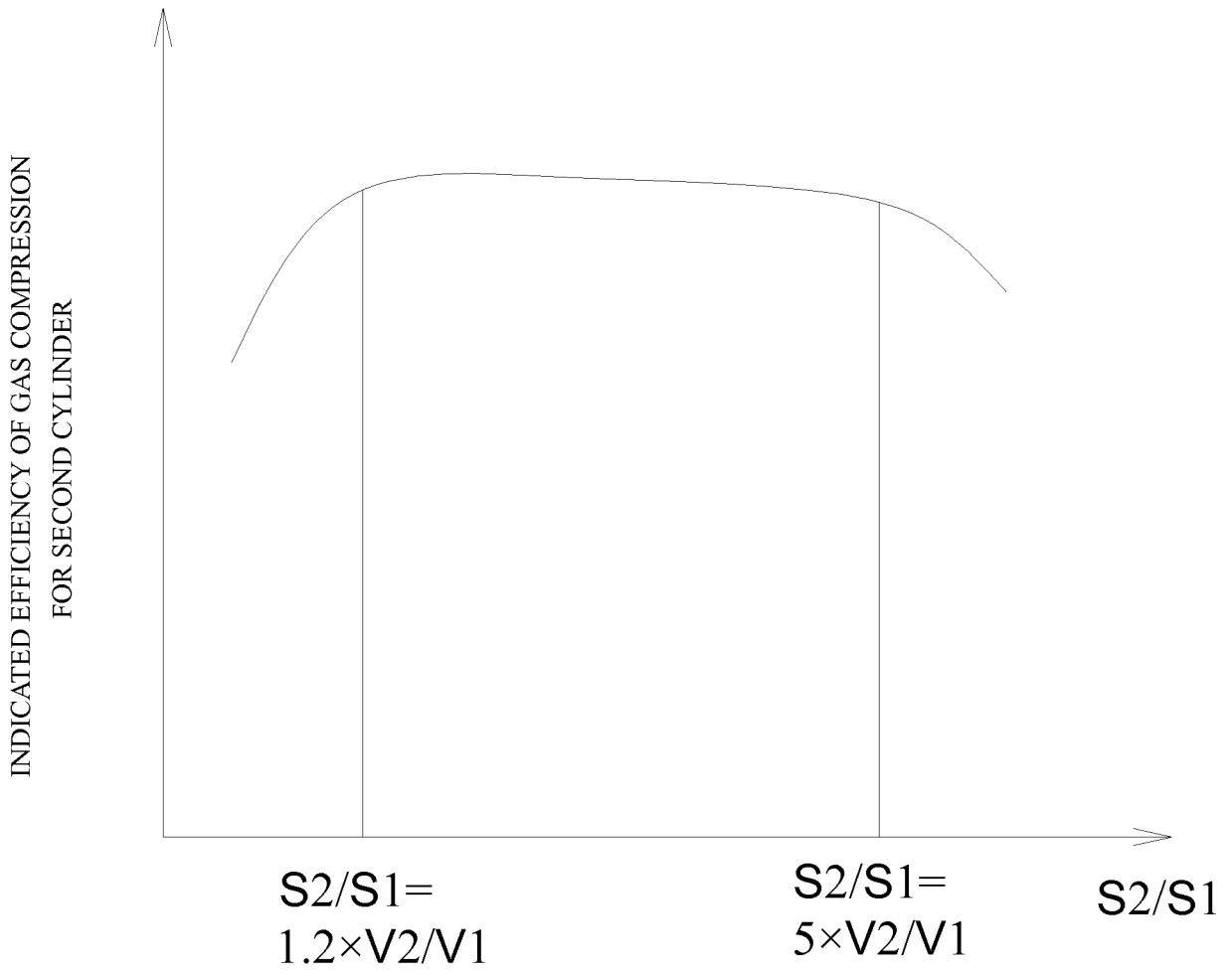


Fig. 3

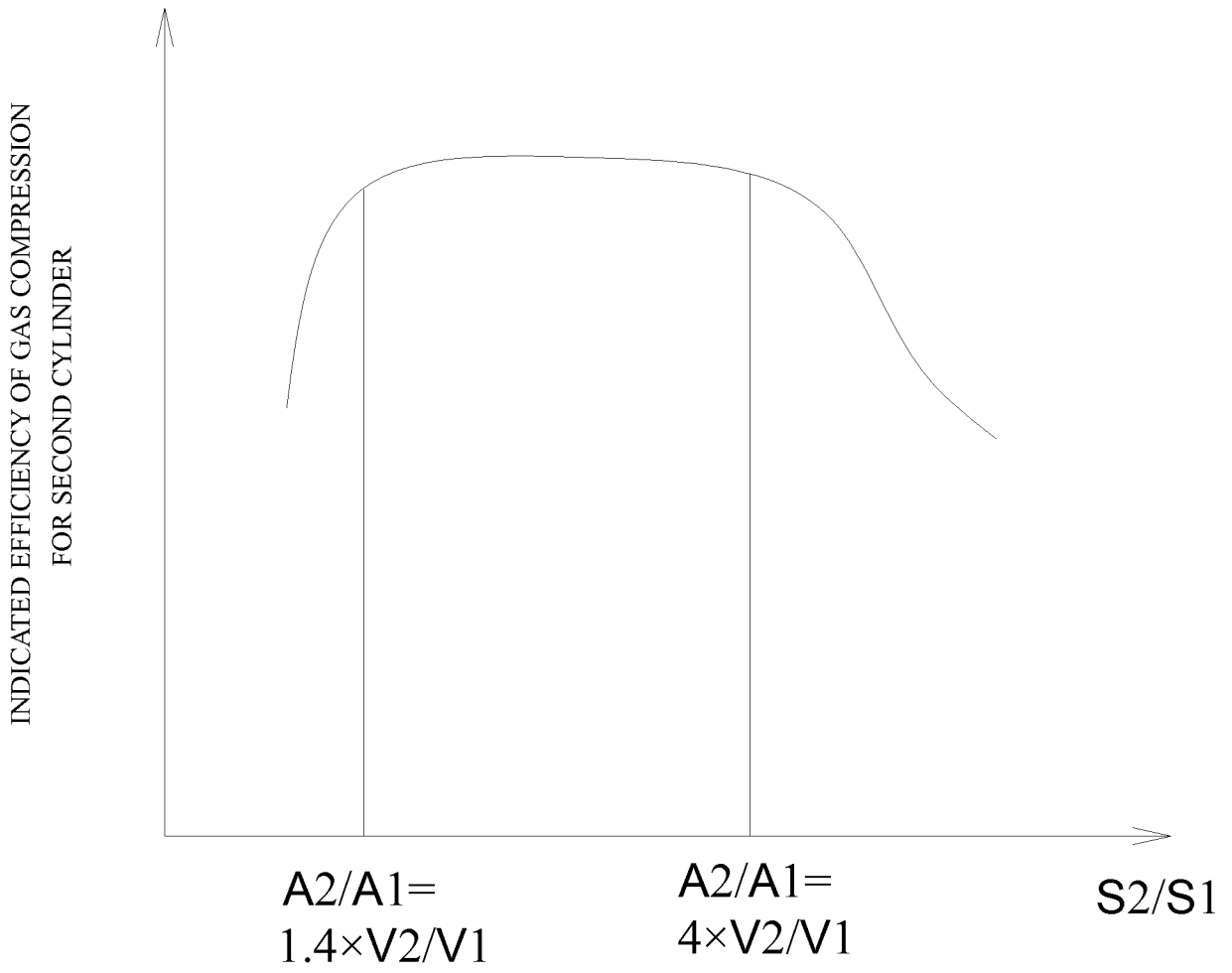


Fig. 4

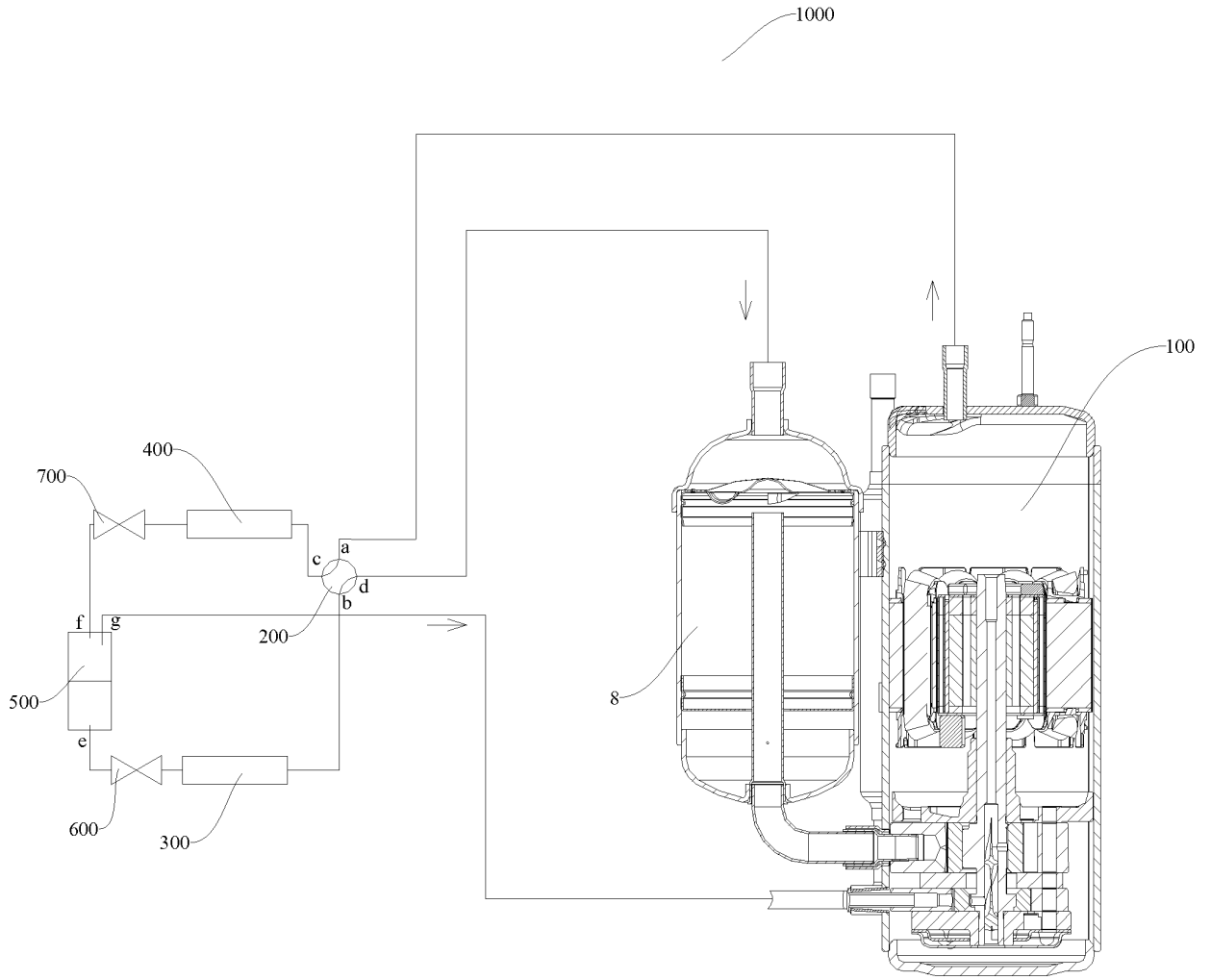


Fig. 5

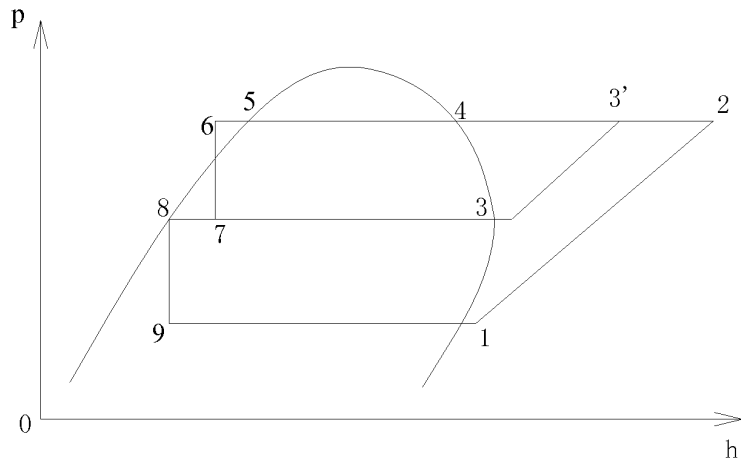


Fig. 6

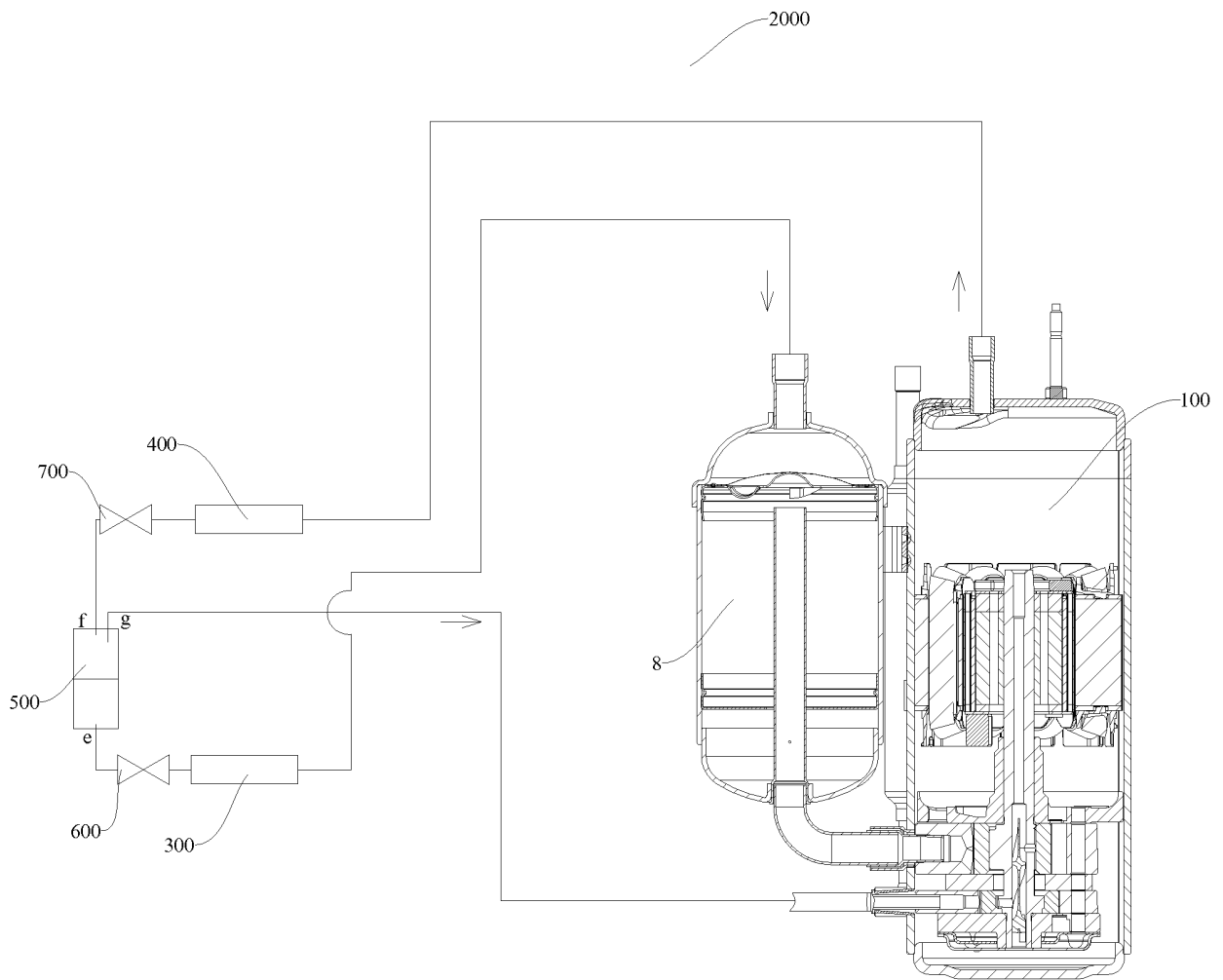


Fig. 7

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2016/092117

A. CLASSIFICATION OF SUBJECT MATTER		
F04C 23/00 (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)		
F04C F25B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
CNABS, CNTXT, CNKI, DWPI, SIPOABS: compressor inject+ cylinder volume area		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	CN 106089712 A (GUANGDONG MEIZHI COMPRESSOR CO., LTD.), 09 November 2016 (09.11.2016), description, paragraphs [0039]-[0069], and figures 1-7	1-10
E	CN 205858680 U (GUANGDONG MEIZHI COMPRESSOR CO., LTD.), 04 January 2017 (04.01.2017), description, paragraphs [0039]-[0069], and figures 1-7	1-10
A	CN 104110377 A (GREE GREEN REFRIGERATION TECHNOLOGY CENTER CO., LTD. OF ZHUHAI), 22 October 2014 (22.10.2014), description, paragraphs [0019]-[0030], and figures 1-4	1-10
A	CN 103742410 A (GUANGDONG MEIZHI COMPRESSOR CO., LTD.), 23 April 2014 (23.04.2014), the whole document	1-10
A	CN 101624985 A (GUANGDONG MEIZHI COMPRESSOR CO., LTD.), 13 January 2010 (13.01.2010), the whole document	1-10
A	JP 3979407 B2 (DAIKIN KOGYO KK), 19 September 2007 (19.09.2007), the whole document	1-10
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family	
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search	Date of mailing of the international search report	
01 April 2017 (01.04.2017)	09 May 2017 (09.05.2017)	
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer ZHOU, Yanhong Telephone No.: (86-10) 62084150	

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2016/092117

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Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 106089712 A	09 November 2016	None	
CN 205858680 U	04 January 2017	None	
CN 104110377 A	22 October 2014	CN 104110377 B	20 April 2016
CN 103742410 A	23 April 2014	CN 103742410 B	18 November 2015
CN 101624985 A	13 January 2010	None	
JP 3979407 B2	19 September 2007	JP 2004324652 A	18 November 2004

Form PCT/ISA/210 (patent family annex) (July 2009)

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