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(54) **ACCUMULATOR HAVING MULTIPLE PIPES, AND COMPRESSOR**

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Description

Technical Field

[0001] The present invention relates to an accumulator provided with a plurality of pipes, and to a compressor to which the plurality of pipes of the accumulator are connected.

Background Art

[0002] A compressor (twin rotary compressor), which is provided with two rotary-type compression mechanisms and a motor, and which takes a gas refrigerant from an accumulator (gas-liquid separator) into a cylinder of each of the rotary-type compression mechanisms, is used in an air conditioner, a chiller, and the like.

[0003] The accumulator used in the twin rotary compressor is provided with a vessel that separates a refrigerant into gas and liquid phases, and two pipes that introduce the gas refrigerant inside the vessel into the compressor.

[0004] In Patent Document 1, a stay, which fixes the two pipes to an inner wall of the vessel, is installed inside the vessel in an intermediate portion thereof with respect to the vertical direction.

Prior Art Documents

Patent Document

[0005]

Patent Document 1: JP 5531891 B

CN 1734200 discloses an air conditioner cold catalyst pipe support structure.

CN 1690601 discloses a liquid reservoir for air conditioner.

JP H04103972A discloses an accumulator, for combination with a compressor, having single holding portions for pipes in the accumulator vessel, which are separated from the vessel.

JP S61194167U and KR 20060120383 disclose further accumulators, for combination with a compressor, having a plurality of holding portions for pipes in the accumulator vessel, but which are fixed to the inside of the vessel.

None of the above documents discusses the position of vibration nodes relative to the holding portions.

Summary of the Invention

Problem to be Solved by the Invention

[0006] Vibrations are transmitted to an accumulator from a compressor via piping. When the piping is excited by an excitation source, such as torque ripples or a cogging torque of a motor and flow ripples of a refrigerant discharged from a compression mechanism, the piping vibrates inside a vessel of the accumulator. In particular, the vibration amplitude is large in the vicinity of a free end (upper end) of the piping, which is disposed away from a fixed end disposed in a bottom portion of the vessel. When the piping vibrates inside the vessel, the entire accumulator, including the vessel, vibrates at the same time. The accumulator emits noise as a result of the vibrations.

[0007] In order to reduce the noise emitted from the accumulator, the vibrations of the piping excited by the compressor need to be suppressed. In order to achieve that, the piping on the free end side, at which the vibration amplitude is large, may be fixed to the vessel. In Patent Document 1 also, two pipes are fixed, inside the vessel, to an inner wall of the vessel on the free end side thereof by a stay.

[0008] However, when the piping is fixed, inside the vessel, to the inner wall of the vessel, although the piping is being held by a fixing member, such as a stay, the vibrations of the piping are directly input to the vessel via the fixing member. As a result, the vessel is excited, and a sufficient vibration suppression effect cannot be expected for the entire accumulator.

[0009] An object of the present invention is to provide an accumulator capable of sufficiently reducing vibrations of the accumulator excited via piping, and a compressor provided with the accumulator.

Means for Solving the Problem

[0010] An accumulator of the present invention includes: a vessel that separates a fluid into gas and liquid phases in an interior of the vessel; a plurality of pipes that extract the gas phase inside the vessel to the outside of the vessel; and a plurality of holding portions that hold together the plurality of pipes extending in parallel inside the vessel. The holding portions are separated from the vessel, and holds together respective sections of the plurality of pipes inside the vessel.

[0011] The accumulator of the present invention is preferably provided with the holding portions in at least two different locations in the vertical direction.

[0012] In the accumulator of the present invention, when a height from a base end position, which is a position of a reference lower end portion positioned at a highest position among respective lower end portions of the plurality of pipes, to a leading end position, which is a position at which respective upper end portions of the plurality of pipes are arranged side by side, is 1, the holding portions are preferably disposed in a range including a first height of 0.5 and the vicinity thereof, and in a range including a second height of 0.8 and the vicinity thereof.

[0013] In the accumulator of the present invention, the holding portions are disposed at a first height which corresponds to a position of a first node of a tertiary mode of vibrations of the pipes, and at a second height which corresponds to a position of a node of a secondary mode of the vibrations of the pipes and to a position of a second node of the tertiary mode.

[0014] In the accumulator of the present invention, a reference pipe, which is the pipe including the reference lower end portion, is preferably provided with a straight portion passing through a bottom portion of the vessel and extending from the interior of the vessel to the outside of the vessel along the vertical direction, and a curved portion that is curved with respect to the straight portion, and the base end position is preferably an upper end of the curved portion of the reference pipe.

[0015] In the accumulator of the present invention, the holding portion preferably includes a plurality of retaining portions that each respectively retain one of the plurality of pipes, and a connecting portion that connects the plurality of retaining portions with each other.

[0016] In the accumulator of the present invention, the connecting portion preferably includes a spring portion.

[0017] A compressor of the present invention, which includes the above-described accumulator and to which the pipes are connected, is provided with a compression mechanism that compresses a fluid taken in via the pipes; a motor that drives the compression mechanism; and a housing that houses the compression mechanism and the motor and supports the accumulator.

[0018] In the compressor of the present invention, the compression mechanism is preferably a rotary compression mechanism that includes a cylinder and a piston rotor, the piston rotor being rotated, inside the cylinder, eccentrically with respect to an axial center of the cylinder.

[0019] In the compressor of the present invention, it is preferable that two of the compression mechanisms be provided, and each of the two compression mechanisms include the cylinder and the piston rotor.

Effect of Invention

[0020] By the holding portion holding together the plurality of pipes of the accumulator, which vibrate inside the vessel of the accumulator as a result of being excited from the outside, the vibrations of the pipes are dampened due to deformation of the pipes and the holding portion, and also due to friction between the pipes and the holding portion.

[0021] Since the holding portion is separated from the vessel of the accumulator, the vibrations of the pipes disposed inside the vessel are not directly input to the vessel via the holding portion.

[0022] Thus, the vessel is prevented from being excited by the vibrations of the pipes inside the vessel, and the entire accumulator, including the vessel, can be prevented from vibrating.

Brief Description of the Drawings

[0023]

FIG. 1 is a vertical cross-sectional view illustrating a rotary compressor and an accumulator which is not covered by the claimed invention.

FIG. 2A is a diagram schematically illustrating a vibration analysis result of pipes of a known accumulator. FIG. 2B is a diagram illustrating an example in which pipes vibrate in the horizontal direction.

FIGS. 3A to 3C are diagrams each illustrating an example of a configuration of a bracket.

FIGS. 4A and 4B are schematic views describing vibration damping of the pipes held by the bracket inside a vessel of the accumulator.

FIGS. 5A to 5C are diagrams each illustrating an example of a configuration of the bracket.

FIG. 6 is a vertical cross-sectional view illustrating the rotary compressor and an accumulator according to a first embodiment.

FIGS. 7A to 7C are diagrams schematically illustrating a vibration analysis result of the pipes of a conventional accumulator.

FIG. 8A is a diagram illustrating a primary mode of vibrations of the pipes, FIG. 8B is a diagram illustrating a secondary mode of the vibrations of the pipes, and FIG. 8C is a diagram illustrating a tertiary mode of the vibrations of the pipes.

FIG. 9A is a diagram illustrating the primary mode, FIG. 9B is a diagram illustrating the secondary mode, and FIG. 9C is a diagram illustrating the tertiary mode.

FIG. 10 is a vertical cross-sectional view illustrating the rotary compressor and the accumulator according to a modified example which is not covered by the claimed invention.

FIG. 11 is a vertical cross-sectional view illustrating the rotary compressor and the accumulator according to another modified example of the present invention.

Description of the Preferred Embodiments

[0024] Embodiments of the present invention will be described below with reference to the appended drawings. Example not within the scope of the claims A compressor 10 of a first example which is not covered by the claimed invention, which is illustrated in FIG. 1, is provided with a rotary-type compression mechanism 11, a motor 12 that drives the compression mechanism 11, a cylindrical housing 13 that houses the compression mechanism 11 and the motor 12, and an accumulator 20 (gas-liquid separator).

[0025] The compressor 10 takes in a low-pressure gas refrigerant present inside the accumulator 20 via pipes 21 and 22, and compresses the refrigerant using the compression mechanism 11 to which a rotational driving force output from the motor 12 is transmitted via a crank shaft 14.

[0026] The compressor 10 and the accumulator 20 configure an air conditioner, a refrigerator, and the like, and are connected to a refrigerant circuit (not illustrated) in which the refrigerant is circulated.

[0027] First, the compression mechanism 11 will be described.

[0028] The compression mechanism 11, which is a so-called twin rotary-type compression mechanism, is provided with an upper compression mechanism 110, a lower compression mechanism 120, a separator plate 11A, and an upper bearing 11B and a lower bearing 11C that rotatably support the crank shaft 14.

[0029] The upper compression mechanism 110 is provided with an upper crank pin 111 that is offset with respect to an axial center of the crank shaft 14, an upper piston rotor 112, an upper cylinder 113, and an upper muffler 114.

[0030] The upper piston rotor 112 is fitted to an outer circumferential portion of the upper crank pin 111, and revolves inside the upper cylinder 113.

[0031] An intake port 113A, into which the gas refrigerant is taken via the pipe 21 of the accumulator 20, is formed in the upper cylinder 113 so as to penetrate a side wall of the upper cylinder 113 in the radial direction.

[0032] The interior of the upper cylinder 113 and the interior of a lower cylinder 123 are partitioned by the separator plate 11A.

[0033] The refrigerant, which has been taken into the upper cylinder 113 and which has been compressed in a space located further forward, in the rotational direction, than a blade (not illustrated) that is pressed against an outer circumferential portion of the upper piston rotor 112, is discharged into the housing 13 via a discharge port (not illustrated) formed in the upper bearing 11B and an opening (not illustrated) formed in the upper muffler 114.

[0034] The lower compression mechanism 120 is also provided with a lower crank pin 121, a lower piston rotor 122, the lower cylinder 123, and a lower muffler 124.

[0035] An intake port 123A, into which the gas refrigerant is taken via the pipe 22 of the accumulator 20, is formed in the lower cylinder 123 so as to penetrate a side wall of the lower cylinder 123 in the radial direction.

[0036] The lower crank pin 121 is offset with respect to the axial center of the crank shaft 14 in a direction that causes the lower crank pin 121 to have an opposite phase (180 degrees) to that of the upper crank pin 111.

[0037] The refrigerant that has been taken into the lower cylinder 123 is compressed as a result of the rotation of the lower piston rotor 122 and is discharged into the housing 13 via a discharge port (not illustrated) formed in the lower bearing 11C and an opening (not illustrated) formed in the lower muffler 124.

[0038] The refrigerant, which has been discharged into the housing 13 from the upper compression mechanism 110 and the lower compression mechanism 120, is discharged into the refrigerant circuit via a discharge pipe 131 provided in an upper portion of the housing 13.

[0039] Next, the accumulator 20 will be described.

[0040] The accumulator 20 is provided with a vessel 20A that separates the refrigerant into gas and liquid phases in the interior thereof, two pipes 21 and 22 that extract the gas refrigerant of the gas phase inside the vessel 20A to the outside of the vessel 20A and cause the compressor 10 to take in the gas refrigerant, and a bracket 30 (holding portion) that holds together the two pipes 21 and 22 inside the vessel 20A.

[0041] The vessel 20A is formed in a cylindrical shape and supported by a side wall 13A of the housing 13 of the compressor 10. A strap 25 is wound and tightened around an outer circumferential portion of the vessel 20A, and is fixed to an accumulator bracket 26 provided on the side wall 13A. Via the accumulator bracket 26 and the strap 25, the vessel 20A is supported by the side wall 13A of the housing 13 in a cantilevered manner.

[0042] In an upper end portion of the vessel 20A, an intake pipe 20B is provided that takes the low-pressure refrigerant from the refrigerant circuit (not illustrated) into the vessel 20A.

[0043] The pipes 21 and 22 extend in parallel inside the vessel 20A. The pipes 21 and 22 are separated from an inner wall 20W of the vessel 20A.

[0044] The pipe 21 is connected to the upper compression mechanism 110, and the pipe 22 is connected to the lower compression mechanism 120.

[0045] The pipe 21 is provided with a straight portion 21A that extends in the vertical direction (perpendicular direction) downwardly from a position separated by a predetermined distance from the upper end portion of the vessel 20A, and a curved portion 21B that is curved with respect to the straight portion 21A and extends toward the intake port 113A of the upper cylinder 113.

[0046] The straight portion 21A penetrates a bottom portion 23 of the vessel 20A from the interior of the vessel 20A, reaches the outside of the vessel 20A, and is formed contiguously to the curved portion 21B. The straight portion 21A is fixed to the bottom portion 23 of the vessel 20A by causing a circumferential edge of a hole, through which the straight portion 21A passes, to be crimped.

[0047] The curved portion 21B is fixed to the side wall 13A of the housing 13 by a joint 133. A leading end portion of the curved portion 21B penetrates the side wall 13A and is inserted into the intake port 113A.

[0048] The pipes 21 and 22 can be formed of an appropriate copper-based or iron-based metallic material.

[0049] The pipe 22 is also provided with a straight portion 22A that extends along the vertical direction, and a curved portion 21B that is curved with respect to the straight portion 22A and extends toward the intake port 123A of the lower cylinder 123.

[0050] The straight portion 22A extends in parallel with the straight portion 21A of the pipe 21.

[0051] The curved portion 22B is provided below the curved portion 21B of the above-described pipe 21, and extends horizontally and in parallel with the curved portion 21B. A leading end portion of the curved portion 21B penetrates the side wall 13A and is inserted into the intake port 123A.

[0052] A bent section 22C of the pipe 22 is positioned further to the outer circumferential side than a bent section 21C of the pipe 21.

[0053] In an upper part of an internal space of the vessel 20A, an upper end portion 21U of the straight portion 21A of the pipe 21 and an upper end portion 22U of the straight portion 22A of the pipe 22 are arranged side by side at the same height from the bottom portion 23.

[0054] Above the upper end portions of the pipes 21 and 22 in the internal space of the vessel 20A, a partition member 24 is provided that vertically partitions the interior of the vessel 20A. The partition member 24 prevents the refrigerant, which flows into the vessel 20A from the intake pipe 20B, from directly entering into the pipes 21 and 22. The refrigerant, which flows into the vessel 20A, passes through an opening (not illustrated) formed in the partition member 24.

[0055] The refrigerant inside the vessel 20A is separated into the gas refrigerant of the gas phase and a liquid refrigerant of the liquid phase, on the basis of density differences in the refrigerant. The gas refrigerant, which is present in an upper part of the interior of the vessel 20A, flows into the pipes 21 and 22 via the upper end portions 21U and 22U, flows through each of the pipes 21 and 22, and is taken into the compression mechanisms 110 and 120.

[0056] Incidentally, vibrations are transmitted to the accumulator 20 from the compressor 10 via the pipes 21 and 22. The pipes 21 and 22, which are excited by an excitation source, such as torque ripples or a cogging torque of the motor 12 and flow ripples of the refrigerant discharged from the compression mechanism 11, vibrate inside the vessel 20A.

[0057] In the first example, a basic configuration and an operational effect of the present invention, which is configured to reduce the vibrations of the pipes 21 and 22, are described.

[0058] FIG. 2A is a schematic view illustrating an example of a vibration analysis result of pipes 91 and 92 of a known accumulator. FIG. 2A schematically illustrates an outer shape of the housing 13 of a rotary compressor. The pipes 91 and 92, which are connected to the compressor, are each schematically illustrated by one line.

[0059] Here, an axis line of the housing 13 of the compressor while the operation is stopped (when there are no vibrations) is illustrated by a long dashed short dashed line, and the axis line of the housing 13 of the compressor 10 during the operation (when there are vibrations) is illustrated by a solid line.

[0060] Similarly, respective axis lines of the pipes 91 and 92 while the operation is stopped (when there are no vibrations) are illustrated by long dashed short dashed lines, and the respective axis lines of the pipes 91 and 92 during the operation are illustrated by solid lines.

[0061] In FIG. 2A, although the compressor vibrates as a result of a magnetic vibrating force of the motor 12 or the flow ripples of the discharged refrigerant, the pipes 91 and 92, to which vibrations are transmitted from the compressor via the cylinder of the compression mechanism or the housing 13, vibrate even more than the compressor. In particular, in the vicinity of upper end portions 91U and 92U (free ends) of the pipes 91 and 92, which are separated from sections 93 that are crimped to a bottom portion of an accumulator vessel, the vibration amplitude is large.

[0062] In the present example, in order to dampen the vibrations of the pipes 21 and 22 of the accumulator 20, as illustrated in FIG. 1, the bracket 30 is provided that holds together the pipe 21 and the pipe 22 inside the vessel 20A in a state of being separated from the vessel 20A.

[0063] The straight portions 21A and 22A of the pipes 21 and 22 that extend inside the vessel 20A can be held together by one or more of the brackets 30.

[0064] In the present example, the bracket 30 is provided at one location in the length direction (vertical direction) of the straight portions 21A and 22A.

[0065] The bracket 30 is separated from the inner wall 20W of the vessel 20A, is not fixed to the vessel 20A, and holds together the straight portions 21A and 22A that extend inside the vessel 20A.

[0066] As illustrated in FIG. 3A, the bracket 30 is provided with a cylindrical retaining portion 31 that retains an outer circumferential portion of the straight portion 21A that is inserted thereinto, a cylindrical retaining portion 32 that retains an outer circumferential portion of the straight portion 22A that is inserted thereinto in the same manner as the straight portion 21A, and a planar connecting portion 33 that connects the retaining portion 31 and the retaining portion 32.

[0067] The bracket 30 is formed of an appropriate resin-based material or an appropriate metallic material, such that the retaining portion 31, the retaining portion 32, and the connecting portion 33 are integrally formed. The bracket 30 preferably possesses moderate elasticity.

[0068] The retaining portion 31 is fixed to a predetermined section of the straight portion 21A in the vertical direction.

[0069] The retaining portion 32 is also fixed to a predetermined section of the straight portion 22A in the vertical direction.

[0070] When the pipes 21 and 22 are not vibrating, the retaining portions 31 and 32 are positioned at the same height from the bottom portion 23 of the vessel 20A.

[0071] Note that the heights of the retaining portions 31 and 32 are allowed to be slightly different from each other.

[0072] The connecting portion 33 extends between the retaining portion 31 and the retaining portion 32.

[0073] The connecting portion 33 is disposed along the vertical direction, and since the rigidity of the connecting portion 33 is greater in the vertical direction, a vibration damping effect, which is obtained as a result of deformation of the connecting portion 33, is greater when the vibrations are generated in the vertical direction.

[0074] The retaining portion 31 is preferably fixed, in a state of being in close contact with the outer circumferential portion of the straight portion 21A, as a result of the straight portion 21A being press-fitted into the retaining portion 31, for example.

[0075] In this way, friction between the retaining portion 31 and the straight portion 21A increases, and the vibration damping effect by the bracket 30 is improved.

[0076] Instead of causing the retaining portion 31 and the straight portion 21A to be directly in close contact with each other, an elastic member may be interposed between an inner circumferential portion of the retaining portion 31 and the outer circumferential portion of the straight portion 21A, and the inner circumferential portion of the retaining portion 31, the elastic member, and the outer circumferential portion of the straight portion 21A may be caused to be in close contact with each other.

[0077] The above-described configuration is applied to the retaining portion 32 and the straight portion 22A in the same manner.

[0078] The configuration of the bracket 30 illustrated in the present example is merely an example, and as long as the bracket 30 holds together the pipes 21 and 22 inside the vessel 20A in a state of being separated from the vessel 20A, any appropriate configuration of the bracket 30 can be adopted.

[0079] In order to fix the retaining portion 31 to the predetermined section of the straight portion 21A and to fix the retaining portion 32 to the predetermined section of the straight portion 22A, ring members 34, which are illustrated by long dashed double-short dashed lines in FIG. 3A, can be provided on the respective outer circumferential portions of the straight portions 21A and 22A. Since the retaining portions 31 and 32 are supported by the ring members 34, the retaining portions 31 and 32 can be prevented from slipping down.

[0080] When the pipes 21 and 22 vibrate along the length direction as a result of the vibrations being transmitted from the compressor 10, the straight portions 21A and 22A are relatively displaced in the length direction. For example, as illustrated in FIG. 4A, the straight portion 21A of the pipe 21 is displaced downward, and the straight portion 22A of the pipe 22 is displaced upward.

[0081] Since the straight portions 21A and 22A are held together by the bracket 30, as illustrated in FIG. 4B, the straight portions 21A and 22A and the bracket 30 are deformed as a result of the straight portions 21A and 22A respectively sliding inside the retaining portions 31 and 32. As a result of the deformation of the straight portions 21A and 22A and the bracket 30, and then, of the friction between the straight portion 21A and the retaining portion 31 and the friction between the straight portion 22A and the retaining portion 32, the vibrations of the pipes 21 and 22 are dampened.

[0082] Here, since the bracket 30 is separated from the vessel 20A, unlike when the bracket 30 is in contact with the vessel 20A, the vibrations of the pipes 21 and 22 inside the vessel 20A are not directly input to the vessel 20A via the bracket 30. In other words, since the vessel 20A is prevented from being excited by the vibrations of pipes 21 and 22 inside the vessel 20A, the entire accumulator 20, including the vessel 20A, can be prevented from vibrating.

[0083] Thus, according to the present example, since the bracket 30 is provided that holds together the pipes 21 and 22 in a state of being separated from the vessel 20A, the vibrations of the accumulator 20 can be reduced. As a result, a level of an acoustic pressure emitted from the accumulator 20 decreases, and noise emitted from the accumulator 20 can thus be suppressed.

[0084] According to the vibration damping configuration of the present example, which is configured to hold together the pipes 21 and 22 of the accumulator 20, a system that transmits vibrations from the compressor 10, which is an excitation source, to the accumulator 20 is fixed to the pipes 21 and 22 inside the vessel 20A, and the vibrations of the pipes 21 and 22 can be inhibited from being transmitted to the vessel 20A or the outside of the vessel 20A as much as possible.

[0085] In order to reliably dampen the vibrations of the pipes 21 and 22 and to fix the vibration transmission system to the pipes 21 and 22 inside the vessel 20A, respective sections of the pipes 21 and 22, in which a distance of a relative displacement, due to relative vibrations between the pipes 21 and 22, becomes large, are preferably held together by the bracket 30.

[0086] In order to dampen the vibrations of the pipes 21 and 22, an elastic body, such as rubber, may be provided so as to completely cover the outer circumferential portions of the pipes 21 and 22 that extend inside the vessel 20A. However, in this case, the weight of the accumulator 20 increases, and further, a sufficient vibration damping effect may not be necessarily obtained.

[0087] In the present example, by holding together the pipes 21 and 22 inside the vessel 20A using the bracket 30, which is separated from the vessel 20A, the vibration damping can be efficiently achieved.

[0088] In place of the bracket 30 of the present example, a bracket illustrated in FIG. 3B or FIG. 3C can be used.

[0089] A bracket 35 illustrated in FIG. 3B is provided with retaining portions 351 and 352 that are each formed in a C-shape when viewed from the vertical direction, and the connecting portion 33 that connects the retaining portions 351 and 352.

[0090] The bracket 35 is formed by stamping a sheet metal material and bending both ends thereof into point-symmetrical C-shapes. Sections that are bent at both ends of the connecting portion 33 correspond to the retaining portions 351 and 352.

[0091] The retaining portions 351 and 352 are each formed in a C-shape and each provided with a gap Sp in a section thereof adjacent to the connecting portion 33. Thus, when the pipes 21 and 22 held by the retaining portions 351 and 352 vibrate, the retaining portions 351 and 352 can open and close.

[0092] Since the bracket 35 illustrated in FIG. 3B is easily manufactured, and further, since the retaining portions 351 and 352 deform as a result of opening and closing, the vibration damping effect is high.

[0093] A bracket 36 illustrated in FIG. 3C is provided with a connecting portion 361 that is disposed along the horizontal direction, and the retaining portions 31 and 32 that are connected by the connecting portion 361.

[0094] Since the rigidity of the connecting portion 361 is greater in the horizontal direction, the bracket 36 is effective in reducing the vibrations of the pipes 21 and 22 in the horizontal direction, as illustrated in FIG. 2B, for example. Further, as a result of the improved rigidity in the horizontal direction, an eigenfrequency can be adjusted from a view point of avoiding resonance.

[0095] Brackets 37 to 39 illustrated in FIGS. 5A to 5C are respectively the brackets 30, 35, and 36 illustrated in FIGS. 3A to 3C, in each of which a spring member is additionally provided.

[0096] A spring portion 101, which is provided in each of the bracket 37 illustrated in FIG. 5A and the bracket 38 illustrated in FIG. 5B, is formed by performing bending processing on the connecting portion 33 so as to have a bellows-shape.

[0097] As a result of the spring portion 101 elastically deforming, the vibration damping effect by the brackets 37 and 38 is improved.

[0098] A spring portion 102, which is provided in the bracket 39 illustrated in FIG. 5C, is also formed by performing the bending processing on the connecting portion 361 so as to have a bellows-shape. As a result of the spring portion 102 elastically deforming, the vibration damping effect by the bracket 39 is improved.

First Embodiment

[0099] A first embodiment of the present invention will be described with reference to FIGS. 6 to 9.

[0100] In the first embodiment, a configuration is described that can further improve the vibration damping effect by using brackets that hold together the pipes 21 and 22 of an accumulator 40.

[0101] As illustrated in FIG. 6, the accumulator 40 of the first embodiment is provided with brackets 41 and 42 that are disposed at two different locations in the length direction of the straight portions 21A and 22A of the pipes 21 and 22.

[0102] Each of the brackets 41 and 42 can be configured in the same manner as the bracket 30 (FIG. 3A) described in the first example.

[0103] Each of the brackets 41 and 42 may also be configured in the same manner as the brackets 37 to 39 illustrated in FIGS. 3B, 3C, and FIGS. 5A to 5C.

[0104] In the present embodiment, in order to more sufficiently obtain the vibration damping effect, the brackets 41 and 42 are disposed at predetermined heights.

[0105] Here, when a height from a position P1 (base end position) of a reference lower end portion 21L, which is located at the uppermost position of the lower end portion 21L and a lower end portion 22L of the respective pipes 21 and 22, to a position P2 (leading end position), at which the upper end portions 21U and 22U of the respective pipes 21 and 22 are arranged side by side, is "1", the bracket 41 is positioned at a height of approximately 0.5 (first height H1), and the bracket 42 is positioned at a height of approximately 0.8 (second height H2).

[0106] The bracket 41 holds together a first section 211 of the pipe 21 and a first section 221 of the pipe 22. The first section 211 and the first section 221 are positioned at the same height.

[0107] The bracket 42 holds together a second section 212 of the pipe 21 and a second section 222 of the pipe 22. The second section 212 and the second section 222 are positioned at the same height.

[0108] A dimension of each of the brackets 41 and 42 in the vertical direction can be determined to be an appropriate dimension of 1 mm or greater in order to cause a holding force to act on the pipes 21 and 22.

[0109] More specifically, as illustrated by the long dashed short dashed line in FIG. 6, the base end position P1 is an upper end of the curved portion 21B of the pipe 21 (reference pipe), the curved portion 21B having the reference lower end portion 21L that is located in a higher position, of the lower end portions 21L and 22L of the pipes 21 and 22. When the height is calculated from this position, since the pipes 21 and 22 extend over the entire height of "1", this configuration conforms well to a vibration model of a beam (FIG. 8 and FIG. 9), which will be described later.

[0110] When the height from the base end position P1 to the leading end position P2 is "1", the bracket 41 is disposed over a range including the height H1 equivalent to 0.5 and the vicinity of the height H1.

[0111] Similarly, when the height from the base end position P1 to the leading end position P2 is "1", the bracket 42 is disposed over a range including the height H2 equivalent to 0.8 and the vicinity of the height H2.

[0112] More specifically, in terms of dimensions of the brackets 41 and 42, with respect to the bracket 41, a center portion of the bracket 41 in a vertical direction D1, in which the straight portion 21A extends, is preferably positioned at the height H1 of approximately 0.5. With respect to the bracket 42, a center portion of the bracket 42 in the vertical direction D1 is preferably positioned at the height H2 of approximately 0.8.

[0113] A reason why the brackets 41 and 42 are disposed at the predetermined heights will be described below.

[0114] FIGS. 7A to 7C illustrate a vibration analysis result of the pipes 91 and 92 of a conventional accumulator (provided with no bracket for the pipes) connected to the rotary compressor.

[0115] FIG. 7A illustrates a primary vibration mode component, FIG. 7B illustrates a secondary vibration mode component, and FIG. 7C illustrates a tertiary vibration mode component.

[0116] Although there exist quaternary and higher vibration mode components, of all the vibrations of the pipes 91 and 92, there is a particular need to dampen the primary to tertiary vibrations, which cause the noise due to their low frequencies and high acoustic pressure levels.

[0117] In order to improve the vibration damping effect, as described above, the respective sections of the pipes 21 and 22, in which the distance of the relative displacement caused by the relative vibrations between the pipes 21 and 22 becomes large, are preferably held together by the bracket 30.

[0118] This will be described with reference to FIGS. 8A to 8C.

[0119] Each of the pipes 21 and 22 includes a fixed end 201, which is crimped to the bottom portion 23 (FIG. 6) of the vessel 20A, and a free end 202.

[0120] FIGS. 8A to 8C respectively illustrate the primary, secondary, and tertiary vibration mode components.

[0121] In the primary vibration mode illustrated in FIG. 8A, the vibration amplitude gradually increases toward the free end 202, and as the vibration amplitude increases, a relative displacement between a section of the pipe 21 and a section of the pipe 22, which are positioned at the same height from the fixed end 201, increases.

[0122] In the secondary vibration mode illustrated in FIG. 8B, there is an antinode A, at which the vibration amplitude becomes largest, and a node B, at which the vibration amplitude becomes smallest. Here, the relative displacement between the section of the pipe 21 and the section of the pipe 22, which are positioned at the same height from the fixed end 201, becomes largest at a position of the node B, not at a position of the antinode A. The relative displacement between the section of the pipe 21 and the section of the pipe 22, which are positioned at the same height, becomes smallest at the position of the antinode A.

[0123] With respect to the sections of the pipes 21 and 22 that are held together by the bracket (long dashed double-short dashed line), an arrow illustrated in FIG. 8B indicates a direction in which a section of the node B of the pipe 22 is relatively displaced with respect to a section of the node B of the pipe 21.

[0124] As illustrated by the long dashed double-short dashed line in FIG. 8B, when the pipes 21 and 22 are held together by the bracket at locations corresponding to the node B, with respect to the secondary mode, the damping effect on the vibrations becomes highest, the vibrations being caused by the deformation or the friction between the pipes 21 and 22 and the bracket.

[0125] In the tertiary vibration mode illustrated in FIG. 8C, although two nodes B1 and B2 and two antinodes A1 and A2 are present, similarly to the secondary vibration mode, the relative displacement between the section of the pipe 21 and the section of the pipe 22, which are positioned at the same height from the fixed end 201, becomes highest at positions of the nodes B1 and B2.

[0126] With respect to sections of the pipes 21 and 22 that are held together by the brackets (long dashed double-short dashed lines), arrows illustrated in FIG. 8C indicate directions in which respective sections of the pipe 22 corresponding to the nodes B1 and B2 are relatively displaced with respect to respective sections of the pipe 21 corresponding to the nodes B1 and B2.

[0127] As illustrated by the long dashed double-short dashed lines in FIG. 8C, when the pipes 21 and 22 are held together by the brackets at two locations, namely, locations corresponding to the first node B1 and locations corresponding to the second node B2, with respect to the tertiary mode, the damping effect on the vibrations becomes highest, the vibrations being caused by the deformation or the friction between the pipes 21 and 22 and the brackets.

[0128] Even when phases of the vibrations of the pipes 21 and 22 are identical, even when those vibrations have phase differences, or even when only one of the pipes 21 and 22 is resonating, a relationship described below is established. The bracket is inclined to the greatest extent at the position of the node, since the relative displacement of the pipes 21 and 22 is largest at that position, and the bracket is not caused to be inclined at the position of the antinode, since the relative displacement is smallest at that position. Thus, regardless of the phases of the vibrations of the pipes 21 and 22, as illustrated in FIGS. 8B and 8C, the position of the bracket is determined at which the vibration damping effect is highest.

[0129] On the basis of the description above, upon determining the sections of the pipes 21 and 22 to be held, the position of the node B of the secondary vibration mode and the positions of the nodes B1 and B2 of the tertiary vibration mode are calculated on the basis of a basic equation.

[0130] FIGS. 9A to 9C respectively illustrate the primary, secondary, and tertiary vibration mode components.

[0131] FIG. 9B illustrates an example of a value calculated using a vibration formula of a beam having a fixed end and a free end. As illustrated in FIG. 9B, when the length from the fixed end 201 to the free end 202 is "1", the node B of the secondary vibration mode is positioned at "0.774".

[0132] Similarly, FIG. 9C illustrates examples of values calculated using the vibration equation of the beam having the fixed end and the free end. As illustrated in FIG. 9C, when the length from the fixed end 201 to the free end 202 is "1", the node B1 of the tertiary vibration mode is positioned at "0.500" and the node B2 of the tertiary vibration mode is positioned at "0.868".

[0133] As illustrated in FIG. 9A, in the primary vibration mode, the vibration amplitude becomes largest at the free end 202, namely, at the position of "1". Accordingly, it can be considered that the relative displacement of the pipes 21 and 22 becomes largest at this position.

[0134] On the basis of the description above, in order to sufficiently dampen the primary to tertiary vibration modes in a balanced manner, in the present embodiment, as illustrated in FIG. 6, the two locations at the height H1 of 0.5 and at the height H2 of 0.8 are selected as the locations at which the pipes 21 and 22 are held together. By using those heights H1 and H2 as references, the brackets 41 and 42 are preferably disposed at the heights H1 and H2, respectively.

[0135] Since the brackets 41 and 42 have a holding force that reaches positions slightly away from the height H2 of 0.8 (the vicinity of the upper end portions 21U and 22U of the pipes 21 and 22, in which the vibration amplitude of the primary mode is large, and the position of the node B2 of the tertiary mode, for example), the vibrations of the pipes 21 and 22 can be efficiently dampened.

[0136] According to the present embodiment, since the sections of the pipes 21 and 22 are held together by the brackets 41 and 42 at the heights, including the positions of the nodes, at which the relative displacement amount of the pipes 21 and 22 positioned at the same height becomes largest, the vibration damping effect described in the first example can be obtained more sufficiently.

[0137] The accumulator 40 of the present embodiment may be provided with other brackets that hold together the pipes 21 and 22 inside the vessel 20A, in addition to the brackets 41 and 42.

[0138] Besides the above-described embodiment, as long as there is no departure from the scope of the present invention as defined by the claims, configurations described in the above-described embodiment can be selected as desired, or can be changed to other configurations as necessary.

[0139] As illustrated in FIG. 10 representing an embodiment which is not covered by the claimed invention, the pipes 21 and 22 can be held together by one bracket 45 across a range including both the height H1 of 0.5 and the height H2 of 0.8. In this case also, similarly to the first embodiment, the vibrations can be dampened more sufficiently.

[0140] As illustrated in FIG. 11, the pipe 21 and 22 can also be held together inside the vessel 20A by three brackets 46 to 48 that are positioned separately at three locations in the vertical direction so as to be separated from the vessel 20A.

[0141] As described in the above-described example and embodiment, the present invention is suitable for the accumulators 20 and 40 that are provided with the two pipes 21 and 22 corresponding to the two cylinders 113 and 123 of the twin rotary-type compression mechanism 11. However, the present invention is not necessarily limited to this configuration. When the refrigerant is taken into one cylinder from the two pipes 21 and 22 of the accumulators 20 and 40, the present invention can be applied to a rotary compressor provided with one cylinder and one piston rotor.

[0142] Further, the accumulator of the present invention can also be applied to another compressor, such as a scroll compressor, other than the rotary compressor.

[0143] Further, the accumulator of the present invention need not be supported by the housing 13 of the compressor. According to the vibration damping configuration of the accumulator of the present invention, vibrations transmitted from any of the excitation sources to the pipes 21 and 22 inside the vessel 20A can be dampened. As a result, vibrations of the accumulator can be reduced.

[0144] Shapes of the pipes 21 and 22 of the accumulator of the present invention, particularly, shapes and arrangements of the pipes 21 and 22 outside the vessel 20A, can be determined as appropriate. The pipes 21 and 22 need not be provided with the curved portions 21B and 22B.

[0145] In accordance with the shapes, and the like of the pipes 21 and 22, a reference height that determines the respective sections of the pipes to be held can be determined as appropriate.

Reference Numerals

[0146]

- 10 Compressor
- 11 Compression mechanism
- 11A Separator plate
- 11B Upper bearing
- 11C Lower bearing
- 12 Motor
- 13 Housing
- 13A Side wall
- 14 Crank shaft
- 20 Accumulator
- 20A Vessel
- 20B Intake pipe
- 21 Pipe (reference pipe)
- 21A, 22A Straight portion
- 21B, 22B Curved portion
- 21C, 22C Bent section
- 21L Lower end portion (reference lower end portion)
- 22L Lower end portion
- 21U, 22U Upper end portion
- 20W Inner wall
- 22 Pipe
- 23 Bottom portion
- 24 Partition member
- 25 Strap
- 26 Accumulator bracket
- 30, 35 to 39, 41, 42, 45 to 48 Bracket (holding portion)
- 31, 32 Retaining portion
- 33, 361 Connecting portion
- 34 Ring member
- 40 Accumulator
- 91, 92 Pipe
- 91U, 92U Upper end portion
- 101 Spring portion
- 102 Spring portion
- 110 Upper compression mechanism
- 111 Upper crank pin
- 112 Upper piston rotor
- 113 Upper cylinder

113A Intake port
114 Upper muffler
120 Lower compression mechanism
121 Lower crank pin
122 Lower piston rotor
123 Lower cylinder
123A Intake port
124 Lower muffler
131 Discharge pipe
133 Joint
201 Fixed end
202 Free end
211 Section
212 Section
221 Section
222 Section
351, 352 Retaining portion
A, A1, A2 Antinode
B, B1, B2 Node
D1 Vertical direction
H1 First height
H2 Second height
P1 Base end position
P2 Leading end position
Sp Gap

Claims

1. An accumulator comprising:

a vessel (20A) configured to separate a fluid into gas and liquid phases in an interior of the vessel (20A);
a plurality of pipes (21, 22) configured to extract the gas phase inside the vessel (20A) to the outside of the vessel (20A); and
a plurality of holding portions (30) configured to hold together the plurality of pipes (21, 22) extending in parallel inside the vessel (20A), wherein
the holding portions (30) are provided in at least two different locations in a vertical direction, **characterised in that**
the holding portions (30) are separated from the vessel (20A), and hold together respective sections of the plurality of pipes (21, 22) inside the vessel (20A), and
wherein the holding portions are disposed at
a first height (H1), which corresponds to a position of a first node (B1) of a tertiary mode of vibrations of the pipes (21, 22), and
a second height (H2), which corresponds to a position of a node (B) of a secondary mode of the vibrations of the pipes (21, 22) and to a position of a second node (B2) of the tertiary mode.

2. The accumulator according to claim 1, wherein

when a height from a base end position (P1), which is a position of a reference lower end portion (21L) positioned at a highest position among respective lower end portions (21L, 22L) of the plurality of pipes (21, 22), to a leading end position (P2), which is a position at which respective upper end portions (21U, 22U) of the plurality of pipes (21, 22) are arranged side by side, is 1,
the holding portions (41, 42) are disposed at a first height (H1) of 0.5, and at a second height (H2) of 0.8.

3. The accumulator according to claim 1 or 2, wherein

a reference pipe (21), which is the pipe including the reference lower end portion (21L), is provided with
a straight portion (21A) passing through a bottom portion (23) of the vessel (20A) and extending from the interior of the vessel (20A) to the outside of the vessel (20A) along the vertical direction, and
a curved portion (21B) that is curved with respect to the straight portion (21A), wherein
the base end position (P1) is an upper end of the curved portion (21B) of the reference pipe (21).

4. The accumulator according to any one of claims 1 to 3, wherein

the holding portion (30) includes
a plurality of retaining portions (31, 32) that each respectively retain one of the plurality of pipes (21,22), and
a connecting portion (33) that connects the plurality of retaining portions (31, 32) with each other.

5. The accumulator according to claim 4, wherein
the connecting portion (33) includes a spring portion (101).

6. The accumulator according to anyone of claims 1 to 5, wherein
the holding portions are brackets (30).

7. The accumulator according to claim 6, wherein
the plurality of retaining portions (31, 32) and the connecting portion (33) are integrally formed.

8. A compressor, which includes the accumulator (20) according to any one of claims 1 to 7 and to which the pipes (21, 22) are connected, the compressor (10) comprising:

a compression mechanism (11) configured to compress a fluid taken in via the pipes (21, 22); a motor (12) configured to drive the compression mechanism (11); and a housing (13) configured to house the compression mechanism (11) and the motor (12) and to support the accumulator (20).

9. The compressor according to claim 8, wherein

the compression mechanism is a rotary-type compression mechanism (11) that includes a cylinder (113) and a piston rotor (112), the piston rotor (112) being rotated, inside the cylinder (113), eccentrically with respect to an axial center of the cylinder (113).

10. The compressor according to claim 9 comprising:

two compression mechanisms (110, 120), wherein each of the two compression mechanisms includes a cylinder (113, 123) and a piston rotor (112, 122).

Patentansprüche

1. Akkumulator, der Folgendes umfasst:

einen Behälter (20A), der dazu ausgelegt ist, ein Fluid in einem Innenraum des Behälters (20A) in eine Gas- und eine Flüssigphase zu trennen; eine Vielzahl von Rohren (21, 22), die dazu ausgelegt sind, die Gasphase im Behälter (20A) zur Außenseite des Behälters (20A) zu extrahieren; und eine Vielzahl von Halteabschnitten (30), die dazu ausgelegt sind, die Vielzahl von Rohren (21, 22), die sich im Behälter (20A) parallel erstrecken, zusammenzuhalten, wobei die Halteabschnitte (30) an mindestens zwei verschiedenen Stellen in einer vertikalen Richtung bereitgestellt sind, **dadurch gekennzeichnet, dass** die Halteabschnitte (30) vom Behälter (20A) getrennt sind und jeweilige Bereiche der Vielzahl von Rohren (21, 22) im Behälter (20A) zusammenhalten, und wobei die Halteabschnitte angeordnet sind in einer ersten Höhe (H1), die einer Position eines ersten Knotens (B1) eines tertiären Vibrationsmodus der Rohre (21, 22) entspricht, und einer zweiten Höhe (H2), die einer Position eines Knotens (B) eines sekundären Vibrationsmodus der Rohre (21, 22) und einer Position eines zweiten Knotens (B2) des tertiären Modus entspricht.

2. Akkumulator nach Anspruch 1, wobei

wenn eine Höhe von einer Basisendposition (P1), die eine Position eines unteren Referenzendabschnitts (21L) ist, der unter jeweiligen unteren Endabschnitten (21L, 22L) der Vielzahl von Rohren (21, 22) in einer höchsten Position positioniert ist, zu einer Vorderendposition (P2), die eine Position ist, in der jeweilige obere Endabschnitte (21U, 22U) der Vielzahl von Rohren (21, 22) nebeneinander angeordnet sind, 1 ist, die Halteabschnitte (41, 42) sich in einer ersten Höhe (H1) von 0,5 und in einer zweiten Höhe (H2) von 0,8 befinden.

3. Akkumulator nach Anspruch 1 oder 2, wobei

ein Referenzrohr (21), das das Rohr ist, das den unteren Referenzendabschnitt (21L) beinhaltet, versehen ist mit einem geraden Abschnitt (21A), der durch einen Bodenabschnitt (23) des Behälters (20A) verläuft und sich von einem Innenraum des Behälters (20A) entlang der vertikalen Richtung zur Außenseite des Behälters (20A) erstreckt, und einem gekrümmten Abschnitt (21B), der mit Bezug auf den geraden Abschnitt (21A) gekrümmt ist, wobei die Basisendposition (P1) ein oberes Ende des gekrümmten Abschnitts (21B) des Referenzrohres (21) ist.

4. Akkumulator nach einem der Ansprüche 1 bis 3, wobei

der Halteabschnitt (30) Folgendes beinhaltet eine Vielzahl von Festhalteabschnitten (31, 32), die jeweils eines der Vielzahl von Rohren (21, 22) festhalten, und einen Verbindungsabschnitt (33), der die Vielzahl von Festhalteabschnitten (31, 32) miteinander verbindet.

5. Akkumulator nach Anspruch 4, wobei der Verbindungsabschnitt (33) einen Federabschnitt (101) beinhaltet.

6. Akkumulator nach einem der Ansprüche 1 bis 5, wobei die Halteabschnitte Halterungen (30) sind.

7. Akkumulator nach Anspruch 6, wobei die Vielzahl von Festhalteabschnitten (31, 32) und der Verbindungsabschnitt (33) integral gebildet sind.

8. Verdichter, der den Akkumulator (20) nach einem der Ansprüche 1 bis 7 beinhaltet und mit dem die Rohre (21, 22) verbunden sind, wobei der Verdichter

(10) Folgendes umfasst:

einen Verdichtungsmechanismus (11), der dazu ausgelegt ist, ein Fluid, das via die Rohre (21, 22) aufgenommen wird, zu verdichten;
einen Motor (12), der dazu ausgelegt ist, den Verdichtungsmechanismus (11) anzutreiben; und
ein Gehäuse (13), das dazu ausgelegt ist, den Verdichtungsmechanismus (11) und den Motor (12) zu umschließen und den Akkumulator (20) zu stützen.

9. Verdichter nach Anspruch 8, wobei

der Verdichtungsmechanismus Folgendes ist ein Rotationsverdichtungsmechanismus (11), der einen Zylinder (113) und einen Kolbenrotor (112) beinhaltet, wobei der Kolbenrotor (112) im Zylinder (113) mit Bezug auf eine axiale Mitte des Zylinders (113) exzentrisch rotiert wird.

10. Verdichter nach Anspruch 9, der Folgendes umfasst:

zwei Vernichtungsmechanismen (110, 120), wobei
jeder der zwei Verdichtungsmechanismen einen Zylinder (113, 123) und einen Kolbenrotor (112, 122) beinhaltet.

Revendications

1. Accumulateur comprenant :

un récipient (20A) configuré pour séparer un fluide en phases gazeuse et liquide dans un intérieur du récipient (20A) ;
une pluralité de tuyaux (21, 22) configurés pour extraire la phase gazeuse à l'intérieur du récipient (20A) à l'extérieur du récipient (20A) ; et
une pluralité de parties de support (30) configurées pour maintenir ensemble la pluralité de tuyaux (21, 22), s'étendant en parallèle à l'intérieur du récipient (20A), dans laquelle :
les parties de support (30) sont prévues dans au moins deux emplacements différents dans une direction verticale, **caractérisée en ce que** :

les parties de support (30) sont séparées du récipient (20A), et maintiennent ensemble les sections respectives de la pluralité de tuyaux (21, 22) à l'intérieur du récipient (20A), et
dans lequel les parties de support sont disposées à :

une première hauteur (H1) qui correspond à une position d'un premier noeud (B1) d'un mode tertiaire des vibrations des tuyaux (21, 22), et
une seconde hauteur (H2) qui correspond à une position d'un noeud (B) d'un mode secondaire des vibrations des tuyaux (21, 22) et à une position d'un second noeud (B2) du mode tertiaire.

2. Accumulateur selon la revendication 1, dans laquelle :

lorsqu'une hauteur allant d'une position d'extrémité de base (P1), qui est une position d'une partie d'extrémité inférieure de référence (21L) positionnée dans la position la plus haute parmi les parties d'extrémité inférieures (21L, 22L) respectives de la pluralité de tuyaux (21, 22) à une position d'extrémité d'attaque (P2), qui est une position à laquelle les parties d'extrémité supérieures (21U, 22U) respectives de la pluralité de tuyaux (21, 22) sont agencées côte à côte, est 1,
les parties de support (41, 42) sont disposées à une première hauteur (H1) de 0,5, et à une seconde hauteur (H2) de 0,8.

3. Accumulateur selon la revendication 1 ou 2, dans laquelle :
un tuyau de référence (21), qui est le tuyau comprenant la partie d'extrémité inférieure de référence (21L), est prévu avec :

une partie droite (21A) passant à travers une partie inférieure (23) du récipient (20A) et s'étendant à partir de l'intérieur du récipient (20A) à l'extérieur du récipient (20A) le long de la direction verticale, et
une partie courbe (21B) qui est courbe par rapport à la partie droite (21A), dans laquelle :
la position d'extrémité de base (P1) est une extrémité supérieure de la partie courbe (21B) du tuyau de référence (21).

4. Accumulateur selon l'une quelconque des revendications 1 à 3, dans laquelle :

la partie de support (30) comprend :

une pluralité de parties de retenue (31, 32) qui retiennent chacune respectivement l'un de la pluralité de tuyaux (21, 22), et
une partie de raccordement (33) qui raccorde la pluralité de parties de retenue (31, 32) entre elles.

5. Accumulateur selon la revendication 4, dans

laquelle :
la partie de raccordement (33) comprend une partie de ressort (101).

6. Accumulateur selon l'une quelconque des revendications 1 à 5, dans laquelle :
les parties de support sont des consoles (30).

7. Accumulateur selon la revendication 6, dans laquelle :
la pluralité de parties de retenue (31, 32) et la partie de raccordement (33) sont formées de manière solidaire.

8. Compresseur qui comprend l'accumulateur (20) selon l'une quelconque des revendications 1 à 7, et auquel les tuyaux (21, 22) sont raccordés,
le compresseur (10) comprenant :

un mécanisme de compression (11) configuré pour comprimer un fluide prélevé via les tuyaux (21, 22) ;
un moteur (12) configuré pour entraîner le mécanisme de compression (11) ; et
un boîtier (13) configuré pour loger le mécanisme de compression (11) et le moteur (12) et pour supporter l'accumulateur (20).

9. Compresseur selon la revendication 8, dans lequel :
le mécanisme de compression est :
un mécanisme de compression de type rotatif (11) qui comprend un cylindre (113) et un rotor de piston (112), le rotor de piston (112) pouvant tourner, à l'intérieur du cylindre (113), de manière excentrique par rapport à un centre axial du cylindre (113).

10. Compresseur selon la revendication 9, comprenant :
deux mécanismes de compression (110, 120), dans lequel :
chacun des deux mécanismes de compression comprend un cylindre (113, 123) et un rotor de piston (112, 122).

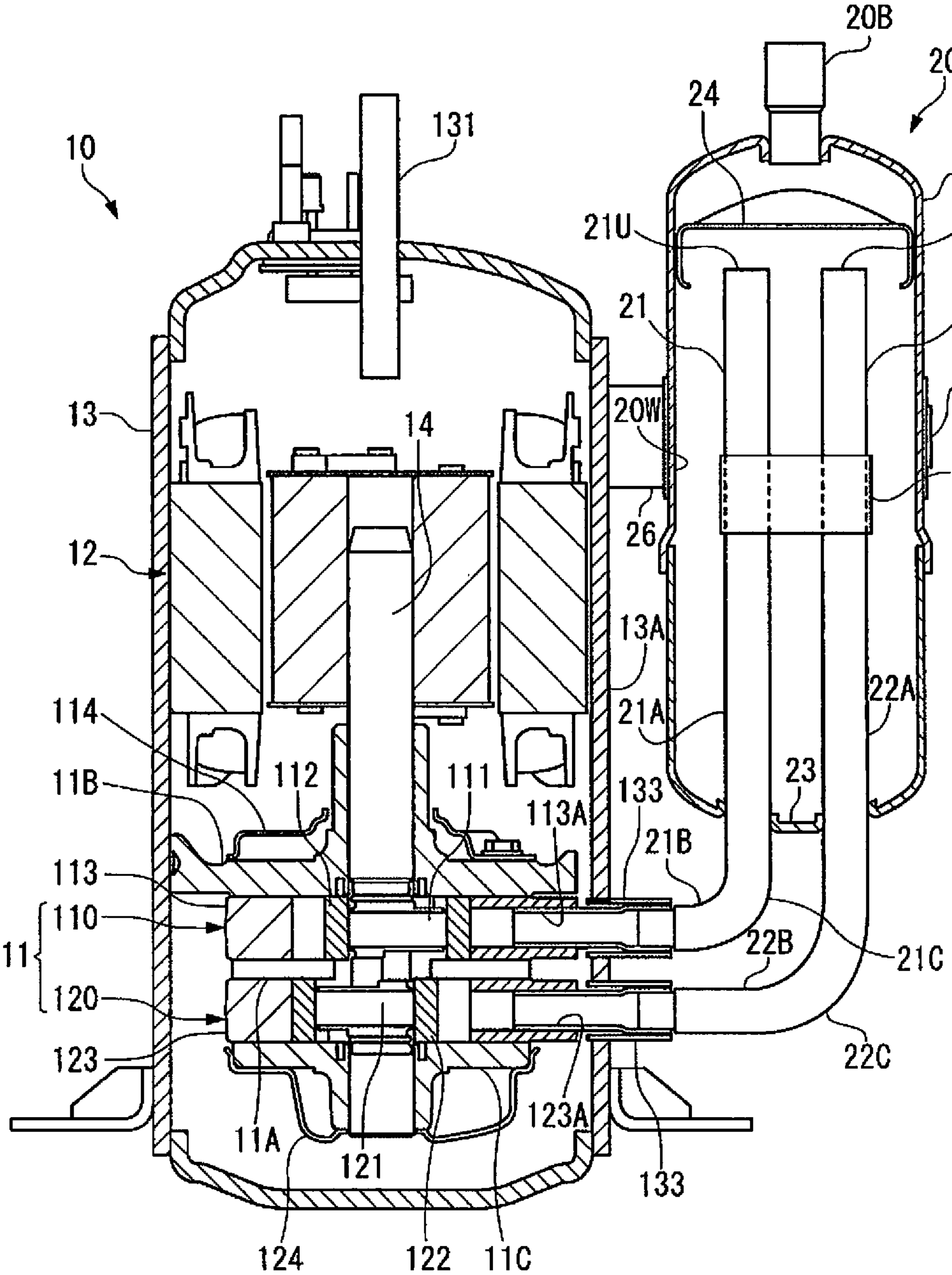

10
131
20B
20
24
20A
21U
22U
21
22
13
14
20W
25
30
12
26
13A
22A
114
21A
11B
112
111
133
23
113A
113
21B
110
11
21C
22B
120
123
22C
11A
121
123A
133
124
122
11C

FIG. 1

FIG. 2A

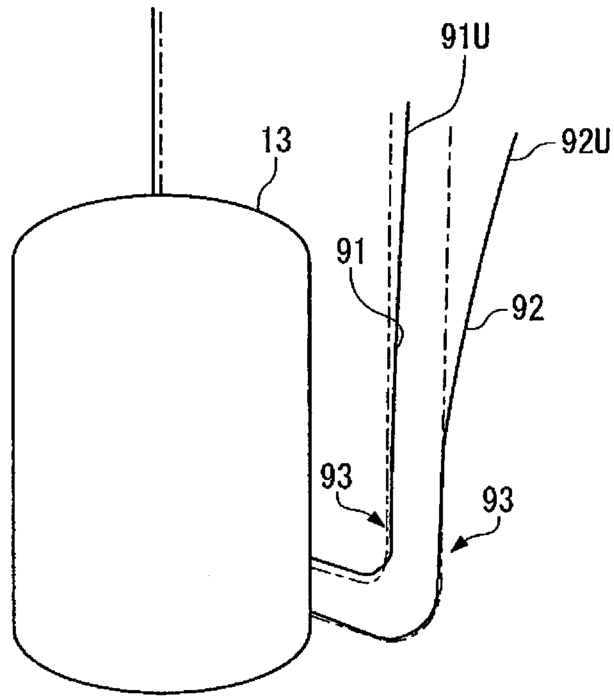


FIG. 2B

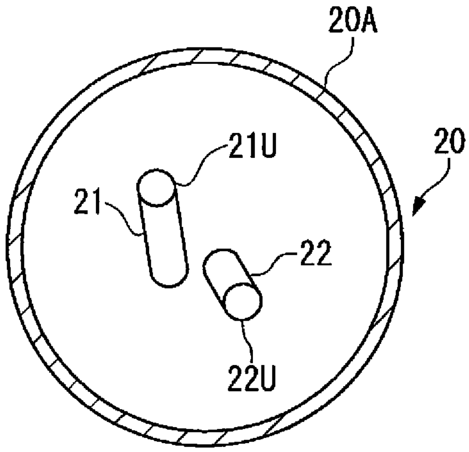


FIG. 3A

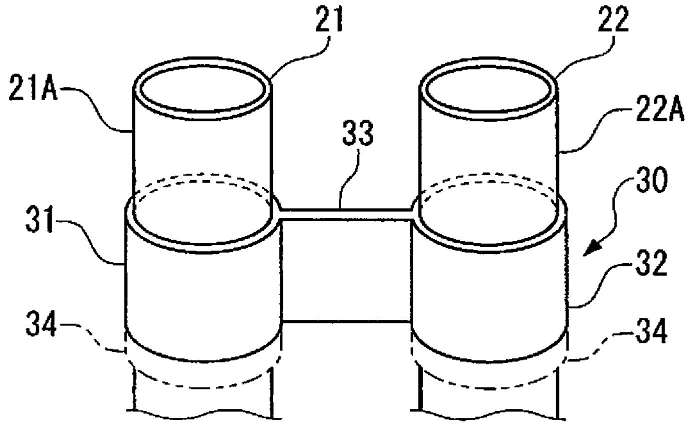


FIG. 3B

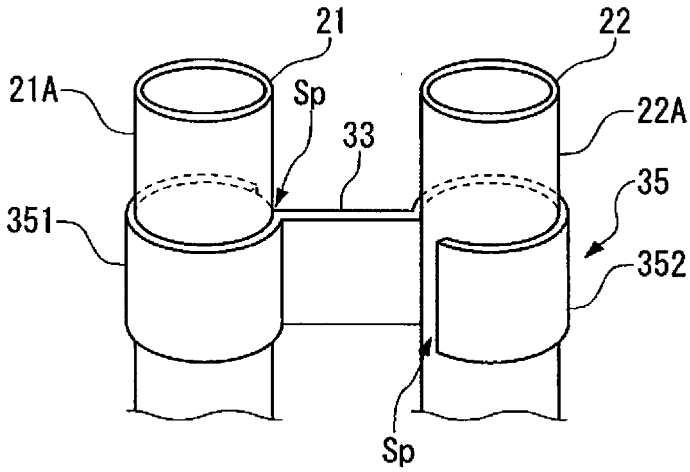


FIG. 3C

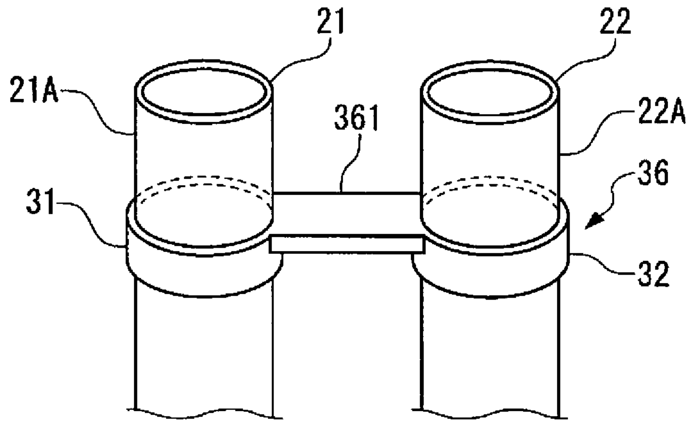


FIG. 4A

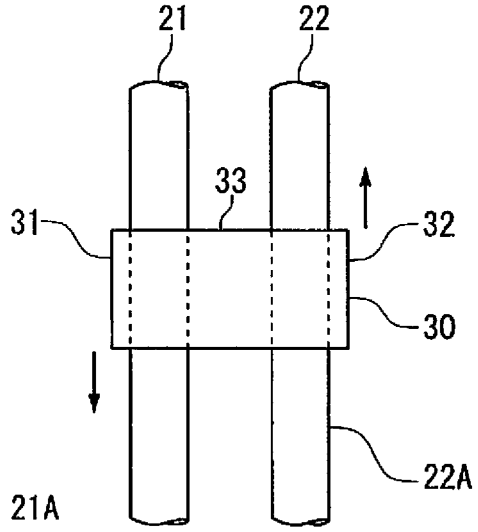


FIG. 4B

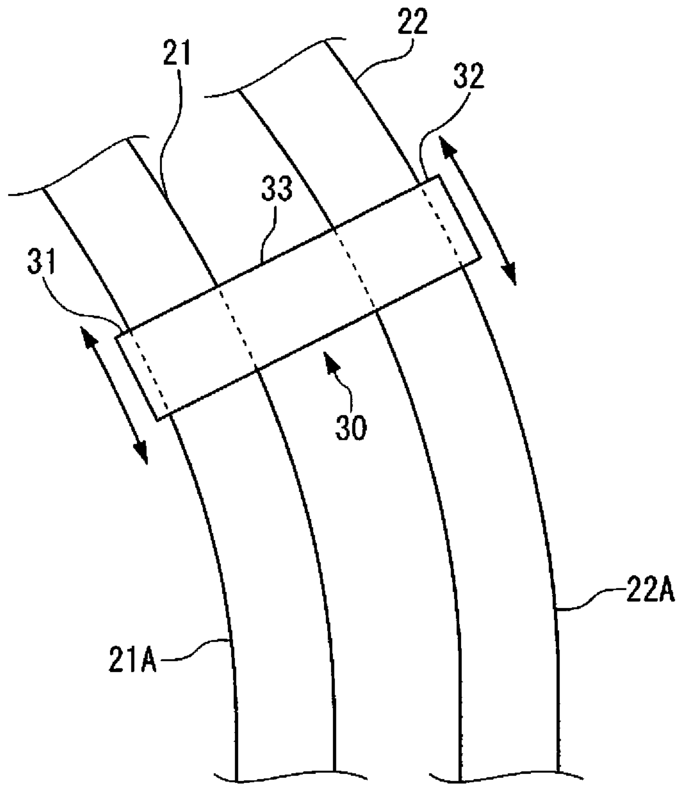


FIG. 5A

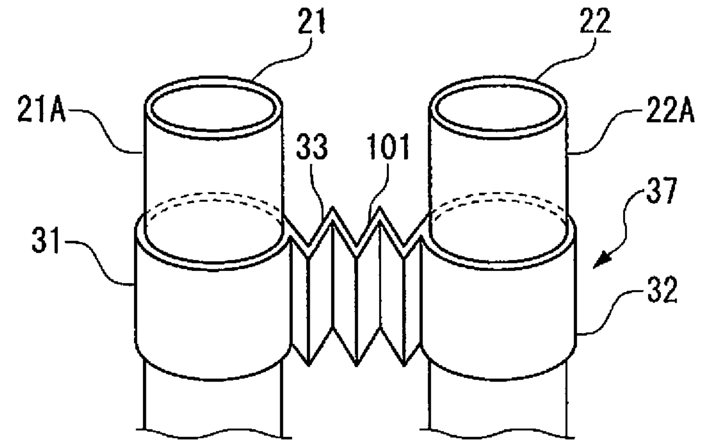


FIG. 5B

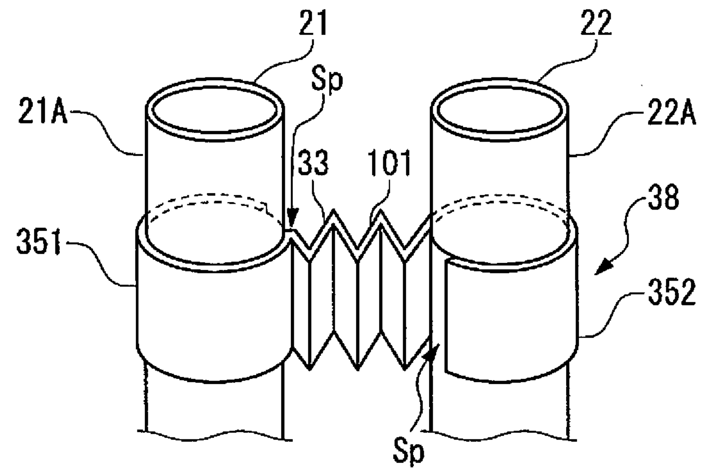
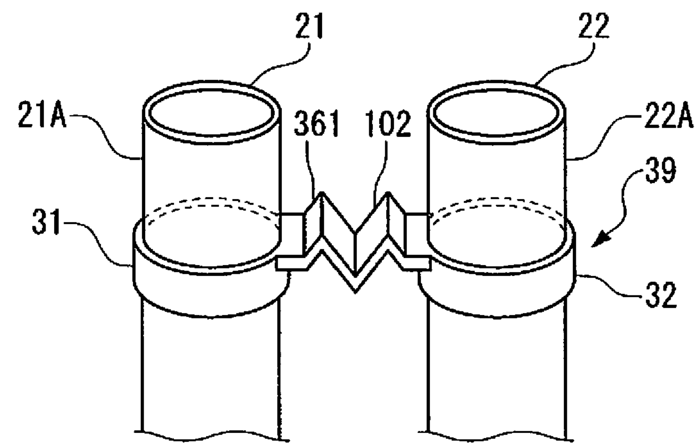
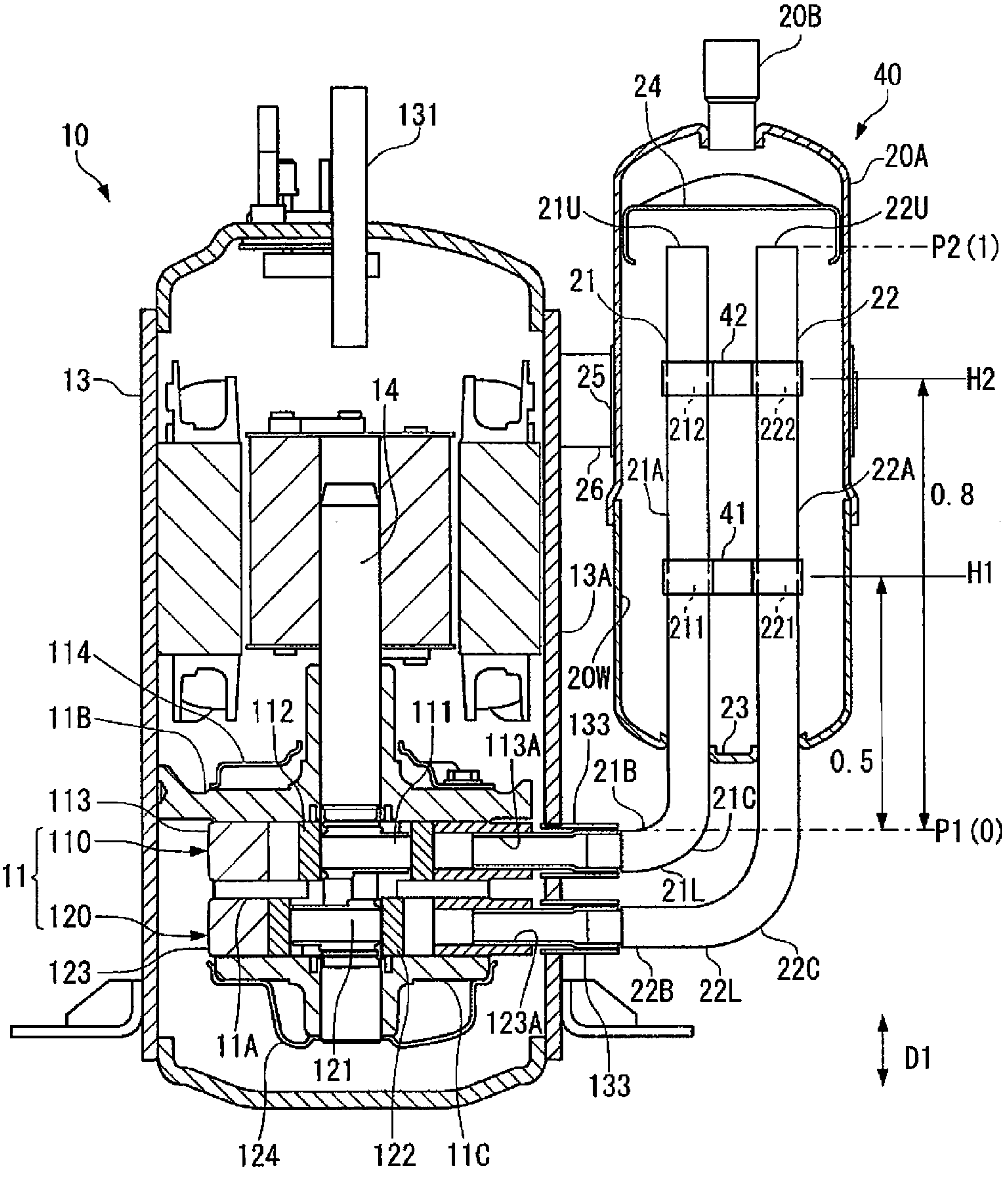


FIG. 5C

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131
20B
24
40
20A
21U
22U
P2 (1)
21
42
22
13
14
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H2
212
222
26
21A
22A
0. 8
41
13A
H1
211
221
114
20W
11B
112
111
133
23
113A
0. 5
113
21B
21C
P1 (0)
110
11
21L
120
123
22B
22L
22C
11A
121
123A
D1
133
124
122
11C

FIG. 6

FIG. 7A

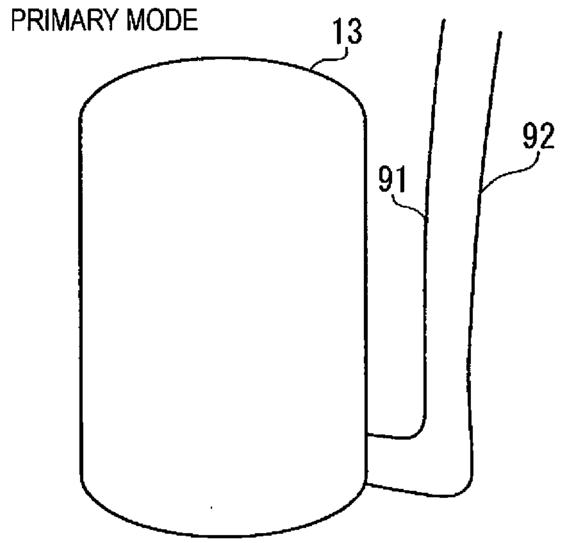


FIG. 7B

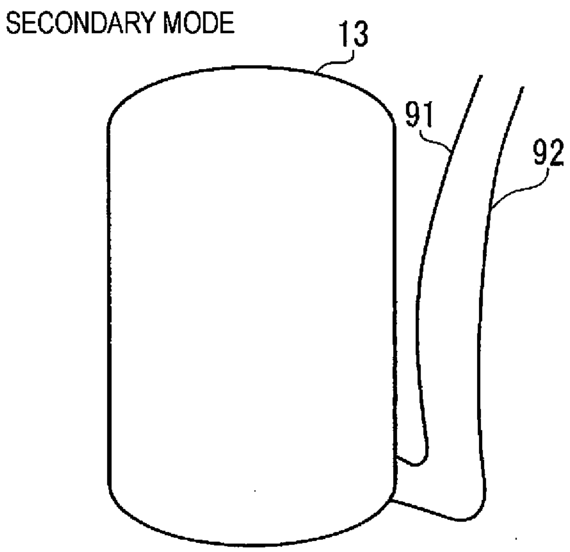


FIG. 7C

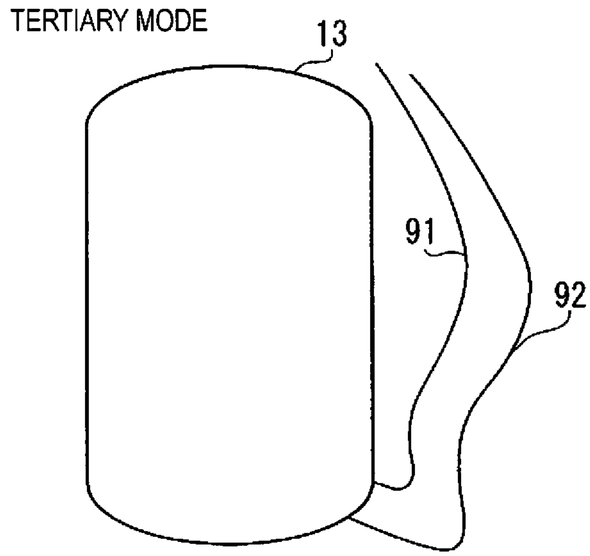
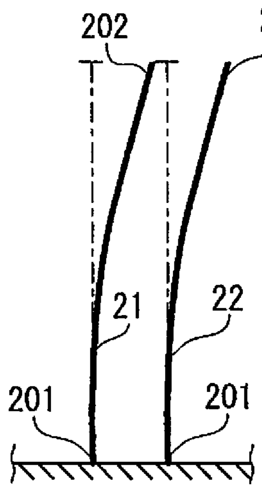
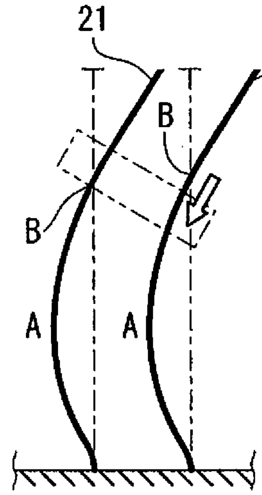


FIG. 8A



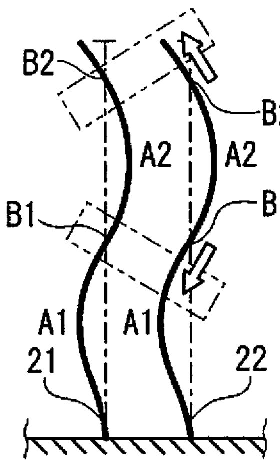
PRIMARY MODE

FIG. 8B



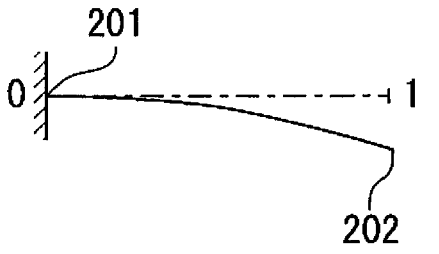
SECONDARY MODE

FIG. 8C



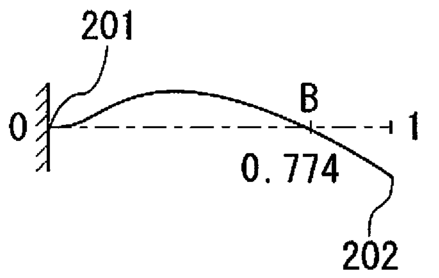
TERTIARY MODE

FIG. 9A



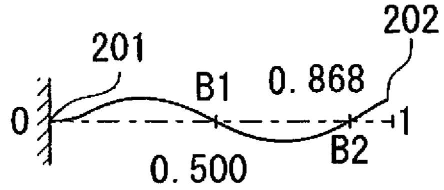
PRIMARY MODE

FIG. 9B

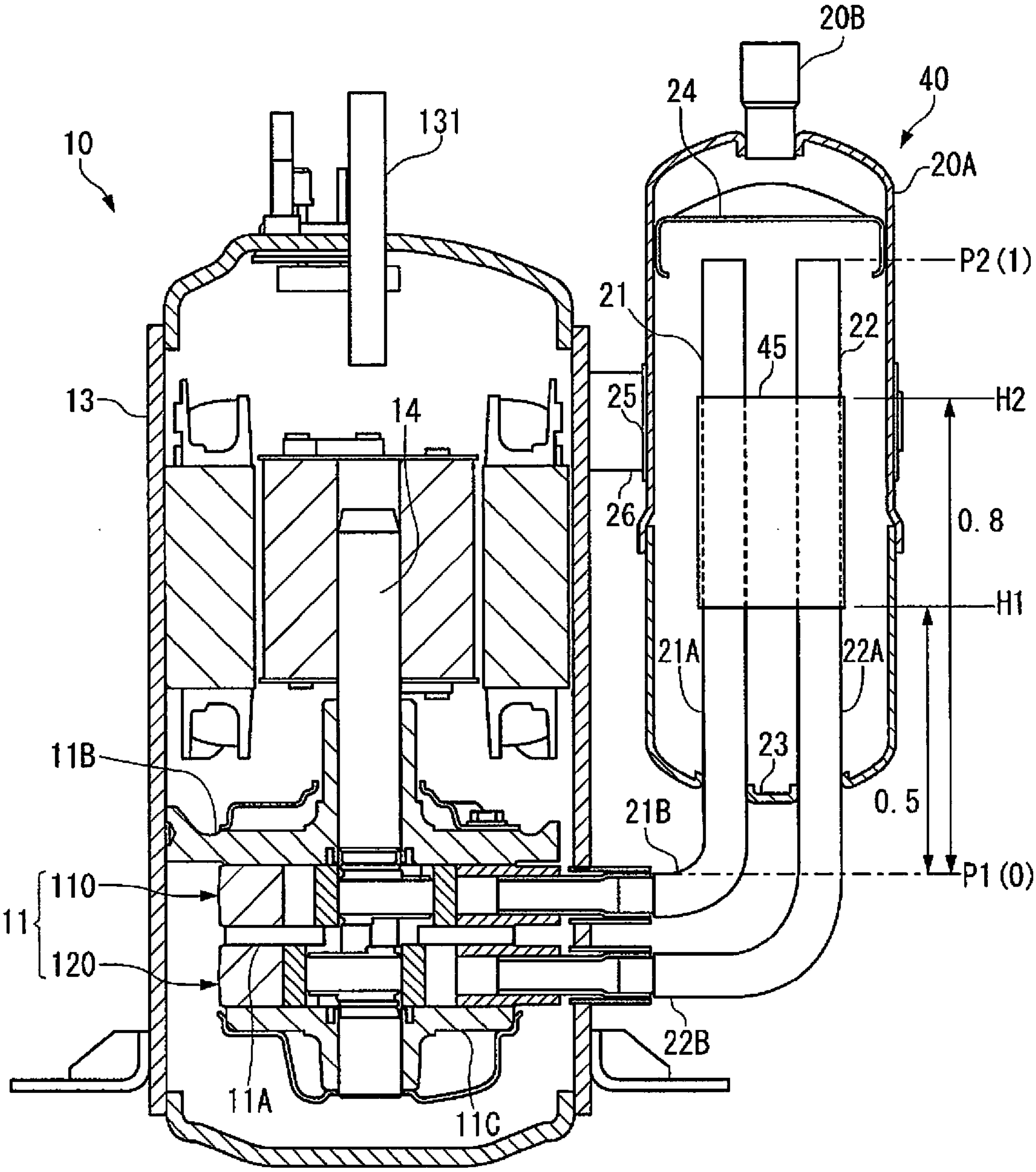


SECONDARY MODE

FIG. 9C



TERTIARY MODE



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P2 (1)
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H2
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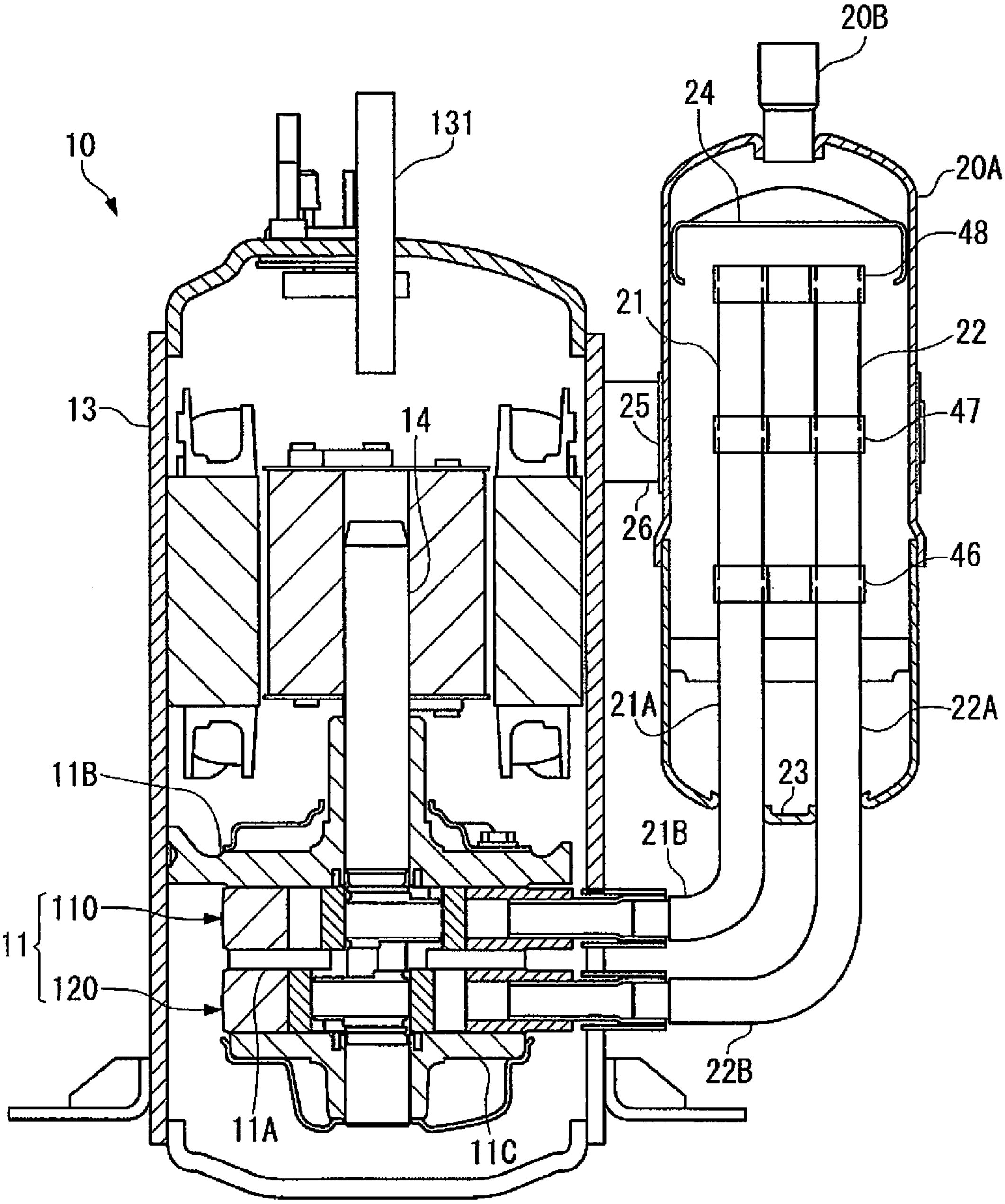
0. 8
H1
21A
22A
11B
23
21B
0. 5
P1 (0)
110
11
120
22B
11A
11C

FIG. 10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47
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46
21A
22A
11B
23
21B
11
110
120
22B
11A
11C

FIG. 11

REFERENCES CITED IN THE DESCRIPTION

Patent documents cited in the description

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