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(54) **COMPRESSOR SYSTEM**
VERDICHTERSYSTEM
SYSTÈME DE COMPRESSEUR

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Description

Solution to Problem

Technical Field

[0001] The present invention relates to a compressor system.

Background Art

[0002] For example, as a device used for compressing a refrigerant in an air conditioner, a device equipped with an accumulator and a compressor is known (see PTL 1 below). The accumulator performs a gas-liquid separation of the refrigerant prior to introduction to the compressor. The compressor and the accumulator are connected to each other by a suction pipe. The compressor compresses only the vapor-phase refrigerant supplied from the accumulator through the suction pipe to generate a high-pressure gas-phase refrigerant.

[0003] More specifically, the compressor includes a compression mechanism unit which has a suction port for sucking in the refrigerant, a cylinder in which a compression chamber for compressing the sucked in refrigerant and a piston rotor rotating eccentrically in the cylinder are formed, and a housing that accommodates the compression mechanism unit. The high-pressure refrigerant generated in the compression chamber is discharged outside via a space inside the housing.

Citation List

Patent Literature

[0004] [PTL 1] Japanese Unexamined Patent Application, First Publication No. 2014-190267

Summary of Invention

Technical Problem

[0005] In this type of compressor, the suction pipe extends from the accumulator located outside the housing to a suction port in the housing. Here, the high-pressure refrigerant generated in the compression chamber circulates in the space inside the housing. The refrigerant has a higher temperature than the refrigerant before compression. Therefore, in the above configuration, there is a possibility that the heat of the high-pressure refrigerant will propagate to the refrigerant flowing through the suction pipe before compression. As a result, the efficiency of the compressor will decrease.

[0006] The present invention has been made to solve the aforementioned problems, and an object of the present invention is to provide a compressor system in which the efficiency of the compressor is able to be improved, while the suction pipe is reliably fixed to the suction port.

[0007] According to a first aspect of the present invention, there is provided a compressor system as defined in claim 1, including a crankshaft that is configured to rotate about an axis; a compression mechanism unit which includes a piston rotor that is configured to rotate eccentrically with rotation of the crankshaft, and a cylinder having a compression chamber accommodating the piston rotor formed inside; a housing which accommodates the crankshaft and the compression mechanism unit and through which a high-pressure refrigerant generated by the compression mechanism unit flows; an accumulator in which the refrigerant is stored; and a suction pipe in which an insertion end portion to be inserted into an suction port formed in the cylinder is formed at an end portion and which supplies the refrigerant before compression from the accumulator to the compression chamber. Between an outer peripheral surface of the insertion end portion and an inner peripheral surface of the suction port, an abutment region in which the outer peripheral surface of the insertion end portion and the inner peripheral surface of the suction port abut each other, and a non-abutment region forming a space between the outer peripheral surface of the insertion end portion and the inner peripheral surface of the suction port are formed.

[0008] According to this configuration, in the non-abutment region, a space is formed between the outer peripheral surface of the insertion end portion and the inner peripheral surface of the suction port. The inside of the housing and the inside of the suction pipe are separated from each other by the space. Therefore, it can be made difficult for the heat of the high-temperature and high-pressure refrigerant flowing through the housing to be transmitted to the refrigerant before compression flowing through the suction pipe. As a result, it is possible to minimize a temperature rise of the refrigerant before compression. On the other hand, in the abutment region, the outer peripheral surface of the insertion end portion abuts against the inner peripheral surface of the suction port. Accordingly, even when an external force is applied to the suction port or the insertion end portion due to the vibration of the suction pipe, it is possible to sufficiently resist the external force. Therefore, the insertion end portion can be firmly fixed to the suction port.

[0009] According to a second aspect of the present invention, the non-abutment region may be formed at least on one side in an axial line direction in which the axial line extends with respect to the insertion end portion.

[0010] According to this configuration, the non-abutment region A2 is formed in a portion in which the temperature easily rises. Therefore, it can be made difficult for the heat of the high-temperature and high-pressure refrigerant in the housing to be transmitted to the refrigerant in the suction pipe.

[0011] According to a third aspect of the present invention, the non-abutment region may be formed on both sides in the axial line direction with respect to the insertion

end portion.

[0012] According to a fourth aspect of the present invention, the abutment region may be formed on both sides in a horizontal direction orthogonal to the axial line direction in which the axial line extends with respect to the insertion end portion.

[0013] According to a fifth aspect of the present invention, in the abutment region, the insertion end portion may abut the inner peripheral surface of the suction port in an elastically deformed state.

[0014] According to this configuration, the outer peripheral surface of the insertion end portion and the inner peripheral surface of the suction port are strongly brought into contact with each other by the restoring force caused by the elastic deformation. Therefore, the insertion end portion can be more firmly fixed to the suction port.

[0015] According to a sixth aspect of the present invention, the suction pipe may have a suction pipe main body which abuts the inner peripheral surface of the suction port over the entire circumference, and a connecting portion which connects the suction pipe main body and the insertion end portion, and a suction pipe end surface, which is an end surface of the insertion end portion, may abut a suction port bottom surface facing the suction pipe end surface in the suction port.

[0016] According to this configuration, in the non-abutment region, a space independent from the outside is formed by the outer peripheral surface of the insertion end portion, the suction port end surface, the inner peripheral surface of the suction port, and the outer peripheral surface of the connecting portion. That is, it is possible to form a space thermally independent from the outside, and to more effectively minimize heat transfer between the inside of the housing and the inside of the suction pipe.

[0017] According to the present invention, the suction port or the insertion end portion has a circular cross section. When the suction port has a circular cross section, the insertion end portion has an elliptical cross section, and an end edge in a major axis direction of the ellipse forms the abutment region, and an end edge in a minor axis direction forms the non-abutment region.

[0018] According to this configuration, it is possible to easily form the abutment region and the non-abutment region simply by making the insertion end portion have an elliptical cross section. As a result, the time required for and costs incurred in processing can be reduced.

[0019] When the insertion end portion has a circular cross section, the suction port has an elliptical cross section, and an end edge in the minor axis direction of the ellipse forms the abutment region, and an end edge in the major axis direction forms the non-abutment region.

[0020] According to this configuration, it is possible to easily form the abutment region and the non-abutment region simply by forming the suction port with an elliptical cross section. As a result, the time and cost required for processing can be reduced.

Advantageous Effects of Invention

[0021] According to the present invention, it is possible to improve the efficiency of the compressor, while reliably fixing the suction pipe to the suction port.

Brief Description of Drawings

[0022]

FIG. 1 is a longitudinal sectional view illustrating a configuration of a compressor according to a first embodiment of the present invention.

FIG. 2 is an enlarged view of a main part of the compressor according to the first embodiment of the present invention.

FIG. 3 is a cross-sectional view taken along line A-A of FIG. 2.

FIG. 4 is a cross-sectional view taken along line B-B of FIG. 2.

FIG. 5 is an enlarged view of a main part of a compressor according to a modified example that does not form part of the invention.

FIG. 6 is a cross-sectional view taken along line C-C of FIG. 5.

FIG. 7 is a cross-sectional view taken along line D-D of FIG. 5.

FIG. 8 is an enlarged view of a main part of a compressor according to a second embodiment of the present invention.

FIG. 9 is a cross-sectional view taken along line E-E of FIG. 8.

Description of Embodiments

[First embodiment]

[0023] A first embodiment of the present invention will be described with reference to FIGS. 1 to 4. It should be noted that the expression "same" in the following description refers to substantially the same, and for example, design tolerance and manufacturing error are acceptable.

[0024] As illustrated in FIG. 1, a compressor system 100 according to the present embodiment includes an accumulator 24, suction pipes 26A and 26B (a first suction pipe 26A and a second suction pipe 26B), and a compressor 10. The compressor 10 according to the present embodiment is a two-cylinder type rotary compressor. The compressor 10 includes a motor 18 driven by an external power source, a compression mechanism unit 10A that compresses a refrigerant (fluid) by being driven with the motor 18 such that it generates a high-pressure refrigerant, and a housing 11 which covers the motor 18 and the compression mechanism unit 10A.

[0025] The compression mechanism unit 10A includes a crankshaft 16 rotated by the motor 18, piston rotors 13A and 13B (a first piston rotor 13A and a second piston

rotor 13B) which rotate eccentrically with rotation of the crankshaft 16, and cylinders 12A and 12B (a first cylinder 12A and a second cylinder 12B) in which compression chambers for accommodating the piston rotors 13A and 13B are formed inside.

[0026] In the compression mechanism unit 10A, the disk-shaped first cylinder 12A and the disk-shaped second cylinder 12B are provided inside the cylindrical housing 11 in two stages in a vertical direction. The housing 11 surrounds the first cylinder 12A and the second cylinder 12B, thereby forming a discharge space V through which the compressed refrigerant is discharged. A cylindrical first piston rotor 13A and a second piston rotor 13B having an outer shape smaller than the inner side of its inner wall surface are disposed inside the first cylinder 12A and the second cylinder 12B, respectively. The first piston rotor 13A and the second piston rotor 13B are inserted and fixed to eccentric shaft portions 14A and 14B of the rotation axis along the center axial line of the housing 11, respectively.

[0027] The first piston rotor 13A of the cylinder of the upper stage side, and the second piston rotor 13B of the lower stage side are provided so that their phases differ from each other by 180°. Further, a disc-shaped partition plate 15 is provided between the upper first cylinder 12A and the lower second cylinder 12B. The space R in the first cylinder 12A on the upper stage side and the space R in the second cylinder 12B on the lower stage side are divided into the compression chamber R1 and the lower stage compression chamber R2 by the partition plate 15 and do not communicate with each other.

[0028] The crankshaft 16 is supported to be rotatable around an axial line O by an upper bearing portion 17A fixed to the first cylinder 12A and a lower bearing portion 17B fixed to the second cylinder 12B. The crankshaft 16 has eccentric shaft portions 14A and 14B that are offset in a direction orthogonal to the axial line O which is a center line of the crankshaft 16. As the eccentric shaft portions 14A and 14B turn about the central axial line of the crankshaft 16, the upper first piston rotors 13A and the lower second piston rotors 13B follow the turning and eccentrically rotate inside the first cylinder 12A and the second cylinder 12B.

[0029] The crankshaft 16 protrudes upward from the upper bearing portion 17A (that is, a direction in which the motor 18 is located as viewed from the compression mechanism unit 10A). A rotor 19A of a motor 18 for rotationally driving the crankshaft 16 is integrally provided in a portion protruding upward from the upper bearing portion 17A of the crankshaft 16. A stator 19B is provided by being fixed to the inner peripheral surface of the housing 11 to face the outer peripheral portion of the rotor 19A.

[0030] In the compressor 10, an accumulator 24 for performing gas-liquid separation of refrigerant prior to supplying to the compressor 10 is fixed to the housing 11 via a stay 25. The refrigerant before compression is stored in the accumulator 24. A first suction pipe 26A and a second suction pipe 26B for sucking the refrigerant in

the accumulator 24 into the compressor 10 are provided between the accumulator 24 and the compressor 10. One ends of the first suction pipe 26A and the second suction pipe 26B are connected to the lower portion of the accumulator 24. The other ends of the first suction pipe 26A and the second suction pipe 26B are connected to the suction ports 23A and 23B (the first suction port 23A and the second suction port 23B) formed in each of the first cylinder 12A and the second cylinder 12B through the openings 22A and 22B (a first opening 22A and a second opening 22B) formed in the housing 11.

[0031] Next, detailed configurations of the first suction port 23A and the second suction port 23B, and the first suction pipe 26A and the second suction pipe 26B will be described with reference to FIGS. 2 to 4. Since the connection mode of the first suction port 23A and the first suction pipe 26A is the same as the connection mode of the second suction port 23B and the second suction pipe 26B, in the following description, only the first suction port 23A and the first suction pipe 26A will be representatively described.

[0032] As illustrated in FIG. 2, the first suction port 23A is recessed radially inward from a surface facing radially outwards centered on the axial line O of the first cylinder 12A. The first suction port 23A has a circular cross section when viewed from the radial direction (see FIG. 3 or FIG. 4). A surface facing the radially outer side inside the first suction port 23A serves as a suction port bottom surface 31. The inner peripheral surface of the first suction port 23A is the suction port inner peripheral surface 32. A space surrounded by the suction port bottom surface 31 and the suction port inner peripheral surface 32 is an insertion space Vs into which the first suction pipe 26A is inserted. A communicating hole H1 through which the insertion space Vs and the aforementioned compression chamber R1 communicate with each other is formed on the suction port bottom surface 31.

[0033] The first suction pipe 26A has a suction pipe main body 41, an insertion end portion 42, and a connecting portion 43. An insertion end portion 42 that forms an end portion on one side of the first suction pipe 26A is inserted into the insertion space Vs in the first suction port 23A. As illustrated in FIG. 3, the insertion end portion 42 has an elliptical cross section when viewed from the radial direction. More specifically, the insertion end portion 42 is inserted into the first suction port 23A to make a minor axis direction of the ellipse coincident with the direction of the axial line O (a vertical direction) extending the axial line O. A distal end surface of the insertion end portion 42 (that is, an end surface of the insertion end portion 42 facing the communicating hole H1) is a suction pipe end surface 42A. The suction pipe end surface 42A abuts against the above-described suction port bottom surface 31. An inner diameter (a length in a minor axis direction) of the insertion end portion 42 is larger than a diameter of the communicating hole H1.

[0034] The insertion end portion 42 is connected to the suction pipe main body 41 via the connecting portion 43

on a side opposite to the suction pipe end surface 42A. More specifically, the connecting portion 43 has a first connecting portion 43A, an extending portion 43B, and a second connecting portion 43C. The first connecting portion 43A is connected to the other side of the insertion end portion 42 (the suction pipe main body 41 side with respect to the insertion end portion 42). The extending portion 43B is connected to the other side of the first connecting portion 43A. The extending portion 43B has a circular cross section when viewed from the radial direction. A diameter of the extending portion 43B is substantially equal to a length of the first connecting portion 43A in a major axis direction. That is, the cross-sectional shape of the first connecting portion 43A gradually changes from an elliptical shape to a circular shape, from the insertion end portion 42 side to the suction pipe main body 41 side. More specifically, in the first connecting portion 43A, the length of the elliptical shape in the minor axis direction gradually increases from the insertion end portion 42 side toward the suction pipe main body 41 side to coincide with the dimension of the elliptical shape in the major axis direction. As illustrated in FIG. 4, the outer peripheral surface (an extending portion outer peripheral surface 43b) of the extending portion 43B abuts the suction port inner peripheral surface 32 over the entire circumference. The second connecting portion 43C is connected to the other side of the extending portion 43B. The second connecting portion 43C connects the extending portion 43B and the suction pipe main body 41. Here, the diameter dimension of the suction pipe main body 41 is larger than the diameter dimension of the extending portion 43B. That is, the second connecting portion 43C gradually expands in diameter from the insertion end portion 42 side to the suction pipe main body 41 side. The suction pipe main body 41 extends toward the accumulator 24 through a first opening 22A formed in the housing 11. Further, as illustrated in FIG. 2, an annular guide tube P fixed in a state of being inserted through the first opening 22A is attached to the first opening 22A to cover an end edge of the first opening 22A.

[0035] As illustrated in FIG. 3, an abutment region A1 and a non-abutment region A2 are formed between the outer peripheral surface (the insertion end portion outer peripheral surface 42B) of the insertion end portion 42 and the suction port inner peripheral surface 32. In the abutment region A1, the insertion end portion outer peripheral surface 42B and the suction port inner peripheral surface 32 abut each other. More specifically, the insertion end portion outer peripheral surface 42B forming the end portions on both sides in the major axis direction of the insertion end portion 42 having an elliptical cross section abuts the suction port inner peripheral surface 32, thereby forming an abutment region A1. That is, the abutment region A1 of the present embodiment is formed on both sides in the horizontal direction orthogonal to the direction of the axial line O with respect to the insertion end portion 42. In the abutment region A1, the insertion end portion 42 abuts against the suction port inner pe-

ripheral surface 32 in a state of being slightly elastically deformed inward in the major axis direction.

[0036] In the non-abutment region A2, a space is formed between the insertion end portion outer peripheral surface 42B and the suction port inner peripheral surface 32. This space is a part of the insertion space Vs and is referred to as a heat insulation space Vh. That is, since the insertion end portion outer peripheral surface 42B and the suction port inner peripheral surface 32 forming the end portions on both sides of the insertion end portion 42 having an elliptical cross section in the short axis direction are separated from each other, the non-abutment region A2 is formed. More specifically, the heat insulation space Vh is a space defined by the suction port bottom surface 31, the suction port inner peripheral surface 32, the outer peripheral surface (a first connecting portion outer peripheral surface 43a) of the first connecting portion 43A, and the insertion end portion outer peripheral surface 42B. As described above, in the present embodiment, since the insertion end portion 42 has an elliptical cross section with the minor axis as the direction of the axial line O, the heat insulation space Vh is formed on both sides of the insertion end portion 42 in the direction of the axial line O across the abutment region A1.

[0037] Next, the operation of the compressor system 100 according to the present embodiment will be described. In the operation of the compressor system 100, the motor 18 is driven first by power supply from the outside. The compressor 10 takes the refrigerant into the accumulator 24 from the suction port 24a of the accumulator 24. Specifically, the refrigerant is separated into a liquid phase component and a gas phase component in the accumulator 24. The separated gas phase components are supplied from the first suction pipe 26A and the second suction pipe 26B to the compression chambers R1 and R2 as the internal spaces of the first cylinder 12A and the second cylinder 12B via the first suction port 23A and the second suction port 23B. As the first piston rotor 13A and the second piston rotor 13B rotate eccentrically, the volumes of the compression chambers R1 and R2 gradually decrease and the refrigerant is compressed. The refrigerant passes through the vicinity of the motor 18 in the housing 11 and the periphery of the first suction port 23A and the second suction port 23B, and then is discharged to a piping 27 constituting the refrigeration cycle via the discharge port provided in the upper portion.

[0038] Here, the refrigerant discharged from the compression chambers R1 and R2 is heated to a high temperature with the compression in addition to having a high pressure. The high-temperature and high-pressure refrigerant passes around the first suction port 23A and the second suction port 23B when flowing through the housing 11 as described above. On the other hand, the refrigerant before compression (that is, low-temperature and low-pressure refrigerant compared with the compressed refrigerant) flows through the inside of the first

suction port 23A and the second suction port 23B, and the inside of the first suction pipe 26A and the second suction pipe 26B inserted therein. Therefore, there is a possibility that heat will be transferred from the high-temperature and high-pressure refrigerant flowing in the housing 11 toward the low-temperature and low-pressure refrigerant flowing inside the first suction pipe 26A and the second suction pipe 26B. When such a heat transfer occurs, the refrigerant before compression is heated, and the compression efficiency which should inherently be obtained by the compression mechanism unit 10A may be impaired.

[0039] However, in the compressor system 100 according to the present embodiment, as described above, the abutment region A1 and the non-abutment region A2 are formed between the insertion end portion 42 of the first suction pipe 26A and the first suction port 23A. Specifically, in the non-abutment region A2, a heat insulation space Vh is formed between the insertion end portion outer peripheral surface 42B and the suction port inner peripheral surface 32. The inside of the housing 11 and the inside of the first suction pipe 26A are separated from each other by the heat insulation space Vh. Therefore, it can be made difficult for the heat of the high-temperature and high-pressure refrigerant flowing through the housing 11 to be transmitted to the refrigerant before compression flowing through the first suction pipe 26A. As a result, it is possible to minimize a temperature rise of the refrigerant before compression.

[0040] On the other hand, in the abutment region A1, the insertion end portion outer peripheral surface 42B abuts the suction port inner peripheral surface 32. Accordingly, even when an external force is applied to the first suction port 23A or the insertion end portion 42 due to the vibration of the first suction pipe 26A caused by pulsation or the like of the inflowing refrigerant, it is possible to sufficiently resist the external force. Therefore, the insertion end portion 42 can be firmly fixed to the first suction port 23A. Thus, it is possible to improve the efficiency of the compressor 10, while the first suction pipe 26A is reliably fixed to the first suction port 23A.

[0041] Here, on both sides in the direction of the axial line O of the first suction pipe 26A, which is liable to come into contact with the high-temperature and high-pressure refrigerant flowing through the housing 11, the temperature easily rises due to the high-temperature and high-pressure refrigerant in the housing 11. However, according to the above configuration, the non-abutment region A2 is formed in a portion in which the temperature easily rises. Therefore, the heat of the high-temperature and high-pressure refrigerant in the housing 11 can be made hard to be transmitted by the refrigerant in the first suction pipe 26A.

[0042] Further, according to the above configuration, since the insertion end portion outer peripheral surface 42B abuts the suction port inner peripheral surface 32 in the elastically deformed state, the insertion end portion outer peripheral surface 42B and the suction port inner

peripheral surface 32 strongly come into contact each other by the restoring force due to the elastic deformation. Therefore, the insertion end portion 42 can be more firmly fixed to the first suction port 23A.

[0043] In addition, according to the above configuration, the extending portion 43B connected to the insertion end portion 42 abuts the suction port inner peripheral surface 32 over the entire circumference. Further, the end surface (the suction pipe end surface 42A) of the insertion end portion 42 abuts against the suction port bottom surface 31. Therefore, in the non-abutment region A2, a space independent from the outside is formed by the insertion end portion outer peripheral surface 42B, the suction port bottom surface 31, the suction port inner peripheral surface 32, and the outer peripheral surface of the first connecting portion 43A (the first connecting portion outer peripheral surface 43a), and the space can be the above-described heat insulation space Vh. That is, the heat insulation space Vh can be a space thermally independent from the outside. As a result, it is possible to more effectively suppress the heat transfer between the inside of the housing 11 and the inside of the first suction pipe 26A.

[0044] In addition, according to the above configuration, the first suction port 23A has a circular cross section, and the insertion end portion 42 has an elliptical cross section. That is, the abutment region A1 and the non-abutment region A2 can be easily formed only by setting the insertion end portion 42 to have an elliptical cross section. As a result, the time and cost required for processing can be reduced.

[0045] In the above embodiment, since the connection mode between the first suction port 23A and the first suction pipe 26A, and the connection mode between the second suction port 23B and the second suction pipe 26B are identical to each other, the first suction port 23A and the first suction pipe 26A has been described, and the function and effect thereof has been described with reference to only these configurations. However, the second suction port 23B and the second suction pipe 26B can also obtain the same configuration and the same operation and effect on the basis thereof.

[0046] The first embodiment of the present invention has been described above. It is to be noted that various changes and modifications can be made to the above-described structure without departing from the gist of the present invention.

[Modified example that does not form part of the invention]

[0047] A modified example that does not form part of the present invention, but represent background art that is useful for understanding the invention, will be described with reference to FIGS. 5 to 7. The same configurations as those of the first embodiment are denoted by the same reference numerals, and the detailed explanation thereof will not be provided. Further, as in the afore-

mentioned first embodiment, since the connection mode between the first suction port 23A and the first suction pipe 26A and the connection mode between the second suction port 23B and the second suction pipe 26B are identical to each other, the configuration of the first suction port 23A and the first suction pipe 26A will be representatively described.

[0048] As illustrated in FIGS. 5 and 6, in this modified example, the cross sectional shape of the insertion end portion 242 of the first suction pipe 26A is different from that of the first embodiment. Specifically, the insertion end portion 242 has a circular cross section smaller than the suction pipe main body 41 and has a pair of protruding portions 242P protruding from the insertion end portion outer peripheral surface 242B toward the suction port inner peripheral surface 32. The pair of protruding portions 242P extends in a direction (a horizontal direction) orthogonal to the axial line O from the insertion end portion outer peripheral surface 242B.

[0049] Since the distal end surface Pa (that is, the end surface facing the suction port inner peripheral surface 32) of the protruding portion 242P is curved to conform to the curved shape of the suction port inner peripheral surface 32, the distal end surface Pa abuts against the suction port inner peripheral surface 32 without a gap. That is, between the suction port inner peripheral surface 32 and the insertion end portion outer peripheral surface 242B, the protruding portion 242P forms the abutment region A1. Further, as illustrated in FIG. 5, the protruding portion 242P extends from the suction pipe end surface 242A to the boundary position between the connecting portion 243 and the insertion end portion 242 in the extending direction of the insertion end portion 242. The connecting portion 243 is integrally connected to a suction pipe main body 41 having a circular cross section. More specifically, similarly to the first embodiment, the connecting portion 243 has a first connecting portion 243A, an extending portion 243B, and a second connecting portion 243C. The first connecting portion 243A is connected to the other side of the insertion end portion 242. The extending portion 243B is connected to the other side of the first connecting portion 243A. The extending portion 243B has a circular cross section when viewed from the radial direction. The outer peripheral surface (the extending portion outer peripheral surface 243b) of the extending portion 243B abuts the suction port inner peripheral surface 32 over the entire circumference. The second connecting portion 243C connects the extending portion 243B and the suction pipe main body 41.

[0050] On the other hand, between the suction port inner peripheral surface 32 and the insertion end portion outer peripheral surface 242B, a region in which the protruding portion 242P is not formed is the non-abutment region A2. In the non-abutment region A2, the protruding portion 242P, the insertion end portion outer peripheral surface 242B, the suction port inner peripheral surface 32, and the first connecting portion outer peripheral surface 243a form the above-described heat insulation

space Vh.

[0051] With the configuration according to the present modification, it is also possible to obtain the same operational effects as those described in the first embodiment.

[Second embodiment]

[0052] Subsequently, a second embodiment of the present invention will be described with reference to FIGS. 8 and 9. The same components as those of the first embodiment are denoted by the same reference numerals, and a detailed description thereof will not be provided. Further, as in the first embodiment, since the connection mode between the first suction port 23A and the first suction pipe 26A, and the connection mode between the second suction port 23B and the second suction pipe 26B are identical to each other, the configuration of the first suction port 23A and the first suction pipe 26A will be representatively described.

[0053] As illustrated in FIG. 8, in the present embodiment, the insertion end portion 342 is connected to the suction pipe main body 41 via the connecting portion 343. The insertion end portion 342 has a circular cross section smaller than the suction pipe main body 41.

[0054] On the other hand, the suction port 323A has an elliptical cross section and is recessed. The inner peripheral surface (the suction port inner peripheral surface 332) forming the end portion in the minor axis direction of the elliptical shape abuts the insertion end portion outer peripheral surface 342B to form the abutment region A1. Further, the suction port inner peripheral surface 332 forming the end portion in the major axis direction forms the non-abutment region A2 by forming the heat insulation space Vh between the suction port inner peripheral surface 332 and the insertion end portion outer peripheral surface 342B.

[0055] With this configuration, it is also possible to obtain the same operational effects as those described in the first embodiment. In addition, in the above configuration, the insertion end portion 342 has a circular cross section, and the suction port 323A has an elliptical cross section. That is, the abutment region A1 and the non-abutment region A2 can be easily formed only by forming the suction port 323A into an elliptical cross section. As a result, the time and cost required for processing can be reduced.

Industrial Applicability

[0056] According to the present invention, it is possible to improve the efficiency of the compressor, while reliably fixing the suction pipe to the suction port.

Reference Signs List

[0057]

100 Compressor system

10 Compressor	
10A Compression mechanism unit	
11 Housing	
12A, 12B Cylinder	
13A, 13B Piston rotor	5
14A, 14B Eccentric shaft portion	
16 Crankshaft	
17A Upper bearing portion	
17B Lower bearing portion	
18 Motor	10
19A Rotor	
19B Stator	
22A, 22B Opening	
23A, 23B, 323A Suction port	
24 Accumulator	15
24a Suction port	
25 Stay	
26A, 26B Suction pipe	
27 Piping	
31 Suction port bottom surface	20
32 Suction port inner peripheral surface	
41 Suction pipe main body	
41A Main body outer peripheral surface	
42, 242, 342 Insertion end portion	
42A Suction pipe end surface	25
42B, 242B, 342B Insertion end portion outer peripheral surface	
43 Connecting portion	
43A, 243A First connecting portion	
43a, 243a First connecting portion outer peripheral surface	30
43B, 243B Extending portion	
43b, 243b Extending portion outer peripheral surface	
43C, 243C Second connecting portion	
242P Protruding portion	35
H1 Communicating hole	
A1 Abutment region	
A2 Non-abutment region	
O Axial line	
P Guide pipe	40
V Discharge space	
Vs Insertion space	

Claims

1. A compressor system (100) comprising:

a crankshaft (16) that is configured to rotate about an axial line (O);
a compression mechanism unit (10A) which includes a piston rotor (13A, 13B) that is configured to rotate eccentrically with rotation of the crankshaft (16), and a cylinder (12A, 12B) having a compression chamber (R1, R2) accommodating the piston rotor formed inside;
a housing (11) which accommodates the crankshaft (16) and the compression mechanism unit

(10A) and which is configured to allow a high-pressure refrigerant generated by the compression mechanism unit (10A) to flow therethrough; an accumulator (24) in which the refrigerant is stored; and

a suction pipe (26A, 26B) in which an insertion end portion (42, 242, 342) to be inserted into a suction port (23A, 23B, 323A) formed in the cylinder is formed at an end portion and which is configured to supply the refrigerant before compression from the accumulator (24) to the compression chamber, wherein, between an outer peripheral surface (42B) of the insertion end portion and an inner peripheral surface (32) of the suction port, an abutment region (A1) in which the outer peripheral surface of the insertion end portion and the inner peripheral surface of the suction port abut each other, and a non-abutment region (A2) forming a space between the outer peripheral surface (42B) of the insertion end portion and the inner peripheral surface (32) of the suction port are formed, the compressor system being **characterized in that**,

the suction port (23A, 23B, 323A) or the insertion end portion (42, 242, 342) has a circular cross section, and

when the suction port (23A, 23B, 323A) has a circular cross section, the insertion end portion (42, 242, 342) has an elliptical cross section, an end edge in a major axis direction of the ellipse forming the abutment region (A1), and an end edge in a minor axis direction forming the non-abutment region (A2), and

when the insertion end portion (42, 242, 342) has a circular cross section,

the suction port (24a) has an elliptical cross section, an end edge in the minor axis direction of the ellipse forming the abutment region (A1), and an end edge in the major axis direction forming the non-abutment region (A2).

2. The compressor system (100) according to Claim 1, wherein the non-abutment region (A2) is formed at least on one side in an axial line direction in which the axial line extends with respect to the insertion end portion (42, 242, 342).

3. The compressor system (100) according to Claim 2, wherein the non-abutment region (A2) is formed on both sides in the axial line direction with respect to the insertion end portion (42, 242, 342).

4. The compressor system (100) according to any one of Claims 1 to 3, wherein the abutment region (A1) is formed on both sides in a horizontal direction orthogonal to the axial line direction in which the axial line extends with respect to the insertion end portion

(42, 242, 342).

5. The compressor system (100) according to any one of Claims 1 to 4, wherein, in the abutment region (A1), the insertion end portion abuts the inner peripheral surface (32) of the suction port in an elastically deformed state. 5
6. The compressor system (100) according to any one of Claims 1 to 5, wherein the suction pipe (26A, 26B) further has: 10
 - a suction pipe main body (41) which abuts against the inner peripheral surface (32) of the suction port over the entire circumference, and a connecting portion (43) which connects the suction pipe main body (41) and the insertion end portion (42, 242, 342), and 15
 - a suction pipe end surface (42A), which is an end surface of the insertion end portion, abuts against a suction port bottom surface (31) facing the suction pipe end surface (42A) in the suction port (23A, 23B, 323A). 20

Patentansprüche

1. Verdichtersystem (100), umfassend: 25

eine Kurbelwelle (16), die dazu ausgestaltet ist, sich um eine axiale Linie (O) zu drehen, eine Verdichtungsmechanismuseinheit (10A), die einen Kolbenrotor (13A, 13B) beinhaltet, der dazu ausgestaltet ist, sich mit Drehung der Kurbelwelle (16) exzentrisch zu drehen, und einen Zylinder (12A, 12B), der eine Verdichtungskammer (R1, R2) aufweist, die den Kolbenrotor aufnimmt, der darin gebildet ist, ein Gehäuse (11), das die Kurbelwelle (16) und die Verdichtungsmechanismuseinheit (10A) aufnimmt und das dazu ausgestaltet ist, zu ermöglichen, dass ein Hochdruckkältemittel, das durch die Verdichtungsmechanismuseinheit (10A) erzeugt wird, dort hindurch strömt, einen Akkumulator (24), in dem das Kältemittel gespeichert ist, und ein Saugrohr (26A, 26B), in dem ein Einführungsabschnitt (42, 242, 342), der in einen Sauganschluss (23A, 23B, 323A) einzuführen ist, der in dem Zylinder gebildet ist, an einem Endabschnitt gebildet ist und das dazu ausgestaltet ist, das Kältemittel vor Verdichtung von dem Akkumulator (24) zu der Verdichtungskammer zu liefern, wobei zwischen einer äußeren Umfangsfläche (42B) des Einführungsabschnittes und einer inneren Umfangsfläche (32) des Sauganschlusses ein Anstoßbereich (A1), in dem die äußere 30

Umfangsfläche des Einführungsabschnittes und die innere Umfangsfläche des Sauganschlusses aneinander anstoßen, und ein Nichtanstoßbereich (A2), der einen Raum zwischen der äußeren Umfangsfläche (42B) des Einführungsabschnittes und der inneren Umfangsfläche (32) des Sauganschlusses bildet, gebildet sind, wobei das Verdichtersystem **dadurch gekennzeichnet ist, dass** der Sauganschluss (23A, 23B, 323A) oder der Einführungsabschnitt (42, 242, 342) einen kreisförmigen Querschnitt aufweist, und wenn der Sauganschluss (23A, 23B, 323A) einen kreisförmigen Querschnitt aufweist, der Einführungsabschnitt (42, 242, 342) einen elliptischen Querschnitt aufweist, wobei eine Endkante in einer Hauptachsenrichtung der Ellipse den Anstoßbereich (A1) bildet und eine Endkante in einer Nebenachsenrichtung den Nichtanstoßbereich (A2) bildet, und wenn der Einführungsabschnitt (42, 242, 342) einen kreisförmigen Querschnitt aufweist, der Sauganschluss (24a) einen elliptischen Querschnitt aufweist, wobei eine Endkante in der Nebenachsenrichtung der Ellipse den Anstoßbereich (A1) bildet und eine Endkante in der Hauptachsenrichtung den Nichtanstoßbereich (A2) bildet. 35

2. Verdichtersystem (100) nach Anspruch 1, wobei der Nichtanstoßbereich (A2) zumindest auf einer Seite in einer axialen Linienrichtung gebildet ist, in der sich die axiale Linie in Bezug auf den Einführungsabschnitt (42, 242, 342) erstreckt. 40
3. Verdichtersystem (100) nach Anspruch 2, wobei der Nichtanstoßbereich (A2) auf beiden Seiten in der axialen Linienrichtung in Bezug auf den Einführungsabschnitt (42, 242, 342) gebildet ist. 45
4. Verdichtersystem (100) nach einem der Ansprüche 1 bis 3, wobei der Anstoßbereich (A1) auf beiden Seiten in einer horizontalen Richtung orthogonal zu der axialen Linienrichtung, in der sich die axiale Linie in Bezug auf den Einführungsabschnitt (42, 242, 342) erstreckt, gebildet ist. 50
5. Verdichtersystem (100) nach einem der Ansprüche 1 bis 4, wobei in dem Anstoßbereich (A1) der Einführungsabschnitt an der inneren Umfangsfläche (32) des Sauganschlusses in einem elastisch verformten Zustand anstößt. 55
6. Verdichtersystem (100) nach einem der Ansprüche 1 bis 5, wobei das Saugrohr (26A, 26B) ferner aufweist:

einen Saugrohrhauptkörper (41), der an der in-

neren Umfangsfläche (32) des Sauganschlusses über den gesamten Umfang anstößt, und einen Verbindungsabschnitt (43), der den Saugrohrhaupte Körper (41) und den Einführungsendschnitt (42, 242, 342) verbindet, und
 5 eine Saugrohrendfläche (42A), die eine Endfläche des Einführungsendschnittes ist, an einer Sauganschlussbodenfläche (31) anstößt, die der Saugrohrendfläche (42A) in dem Sauganschluss (23A, 23B, 323A) zugewandt ist.
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Revendications

1. Système de compresseur (100) comprenant :

un vilebrequin (16) qui est configuré pour tourner autour d'une ligne axiale (O) ;
 une unité de mécanisme de compression (10A) qui comprend un rotor de piston (13A, 13B) qui est configuré pour tourner de manière excentrique avec la rotation du vilebrequin (16), et un cylindre (12A, 12B) ayant une chambre de compression (R1, R2) logeant le rotor de piston formé à l'intérieur de cette dernière ;
 20 un boîtier (11) qui loge le vilebrequin (16) et l'unité de mécanisme de compression (10A) et qui est configuré pour permettre à un réfrigérant haute pression généré par l'unité de mécanisme de compression (10A) de s'écouler à travers ce dernier ;
 25 un accumulateur (24) dans lequel le réfrigérant est stocké ; et
 un tuyau d'aspiration (26A, 26B) dans lequel une partie d'extrémité d'insertion (42, 242, 342), destinée à être insérée dans un orifice d'aspiration (23A, 23B, 323A) formé dans le cylindre, est formée au niveau d'une partie d'extrémité, et qui est configurée pour fournir le réfrigérant avant la compression de l'accumulateur (24) à
 30 la chambre de compression, dans lequel, entre une surface périphérique externe (42B) de la partie d'extrémité d'insertion et une surface périphérique interne (32) de l'orifice d'aspiration, une région de butée (A1) dans laquelle la surface périphérique externe de la partie d'extrémité d'insertion et la surface périphérique interne de l'orifice d'aspiration viennent en butée entre elles, et une région sans butée (A2) formant un espace entre la surface
 35 périphérique externe (42B) de la partie d'extrémité d'insertion et la surface périphérique interne (32) de l'orifice d'aspiration, sont formées, le système de compresseur étant **caractérisé en ce que** :
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l'orifice d'aspiration (23A, 23B, 323A) ou la partie d'extrémité d'insertion (42, 242, 342)

a une section transversale circulaire, et lorsque l'orifice d'aspiration (23A, 23B, 323A) a une section transversale circulaire, la partie d'extrémité d'insertion (42, 242, 342) a une section transversale elliptique, un bord d'extrémité dans une direction d'axe majeur de l'ellipse formant la région de butée (A1), et un bord d'extrémité dans une direction d'axe mineur formant la région sans butée (A2), et
 lorsque la partie d'extrémité d'insertion (42, 242, 342) a une section transversale circulaire, l'orifice d'aspiration (24a) a une section transversale elliptique, un bord d'extrémité dans la direction d'axe mineur de l'ellipse formant la région de butée (A1) et un bord d'extrémité dans la direction d'axe mineur formant la région sans butée (A2).

2. Système de compresseur (100) selon la revendication 1, dans lequel la région sans butée (A2) est formée au moins d'un côté dans une direction de ligne axiale dans laquelle la ligne axiale s'étend par rapport à la partie d'extrémité d'insertion (42, 242, 342).
3. Système de compresseur (100) selon la revendication 2, dans lequel la région sans butée (A2) est formée des deux côtés dans la direction de ligne axiale par rapport à la partie d'extrémité d'insertion (42, 242, 342).
4. Système de compresseur (100) selon l'une quelconque des revendications 1 à 3, dans lequel la région de butée (A1) est formée des deux côtés dans une direction horizontale, orthogonale à la direction de ligne axiale dans laquelle la ligne axiale s'étend par rapport à la partie d'extrémité d'insertion (42, 242, 342).
5. Système de compresseur (100) selon l'une quelconque des revendications 1 à 4, dans lequel, dans la région de butée (A1), la partie d'extrémité d'insertion vient en butée contre la surface périphérique interne (32) de l'orifice d'aspiration dans un état élastiquement déformé.
6. Système de compresseur (100) selon l'une quelconque des revendications 1 à 5, dans lequel le tuyau d'aspiration (26A, 26B) a en outre :

un corps principal de tuyau d'aspiration (41) qui vient en butée contre la surface périphérique interne (32) de l'orifice d'aspiration sur toute la circonférence, et
 une partie de raccordement (43) qui raccorde le corps principal de tuyau d'aspiration (41) et la partie d'extrémité d'insertion (42, 242, 342), et

une surface d'extrémité de tuyau d'aspiration (42A), qui est une surface d'extrémité de la partie d'extrémité d'insertion, vient en butée contre une surface inférieure d'orifice d'aspiration (31) faisant face à la surface d'extrémité de tuyau d'aspiration (42A) dans l'orifice d'aspiration (23A, 23B, 323A).

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FIG. 1

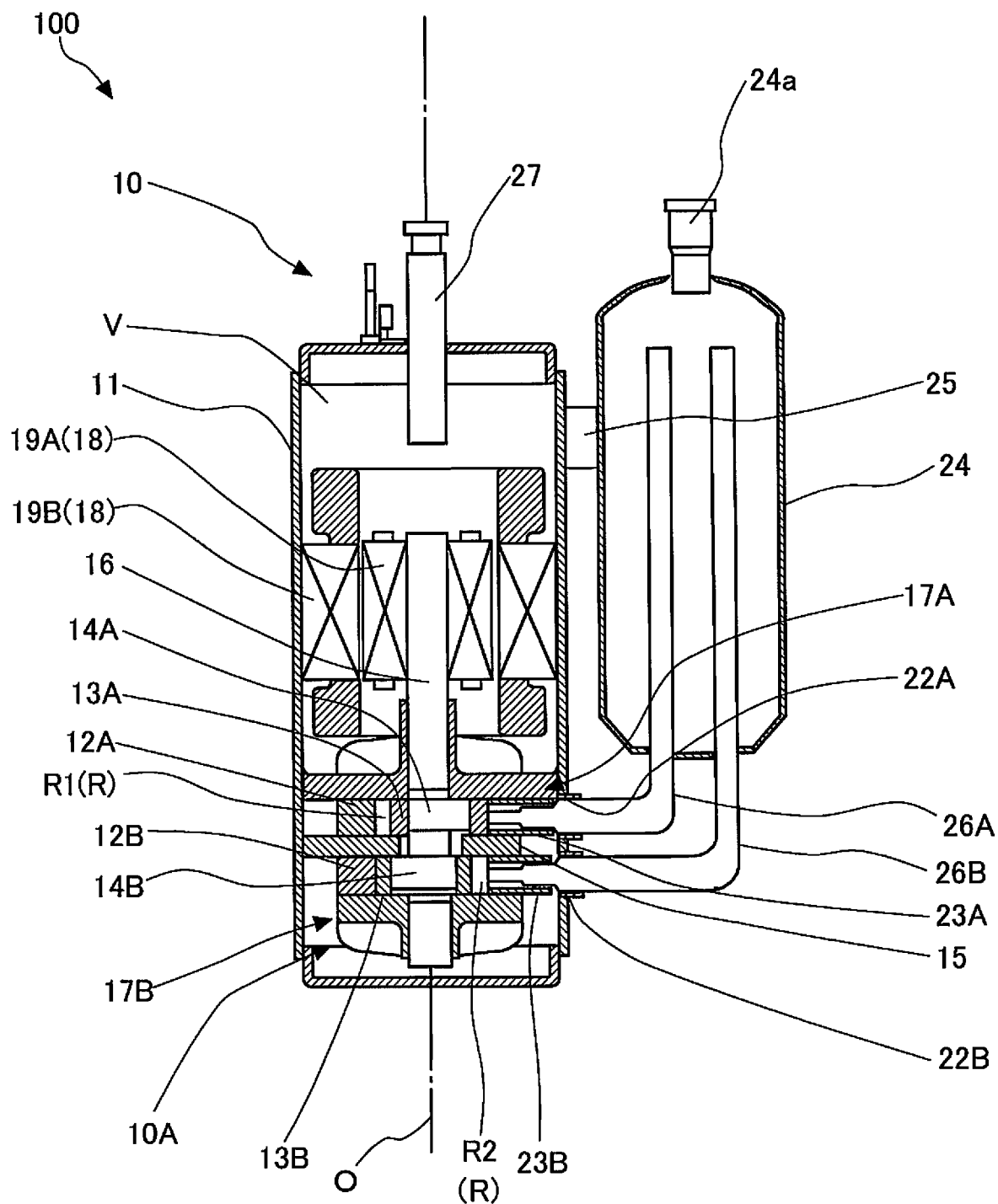


FIG. 2

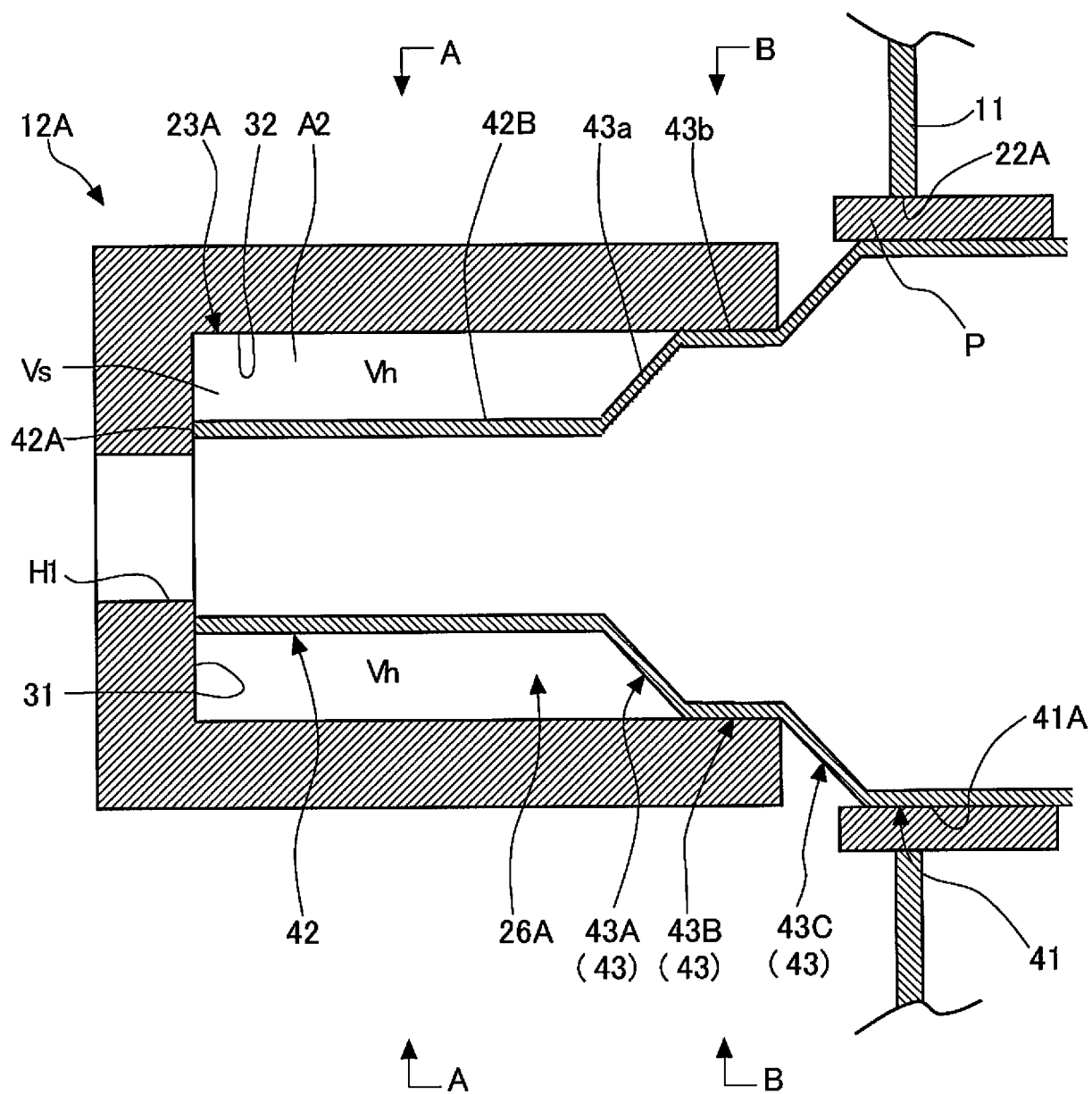


FIG. 3

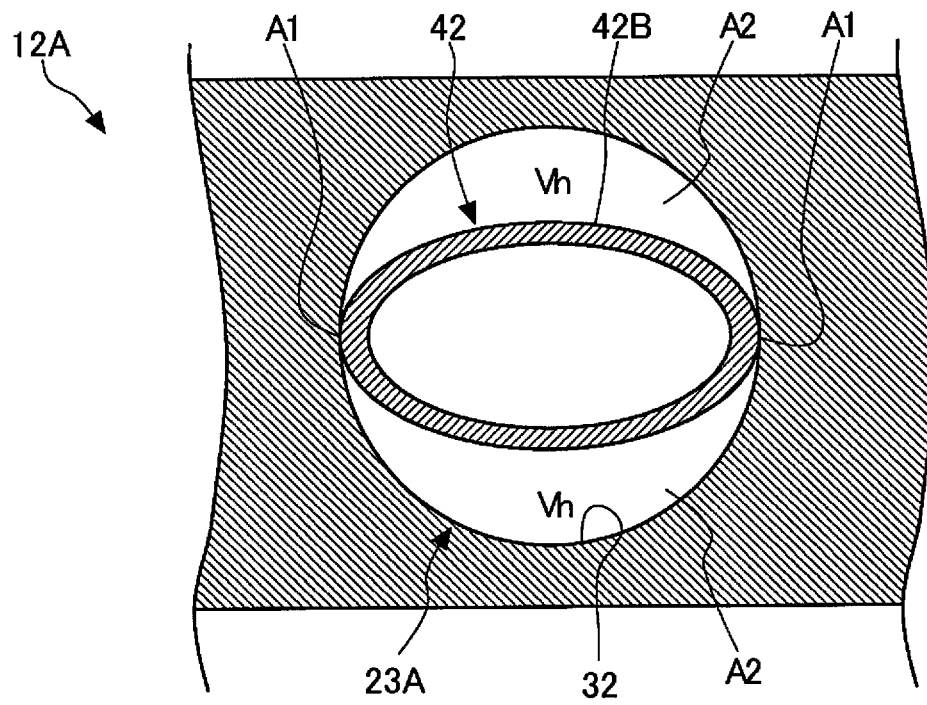


FIG. 4

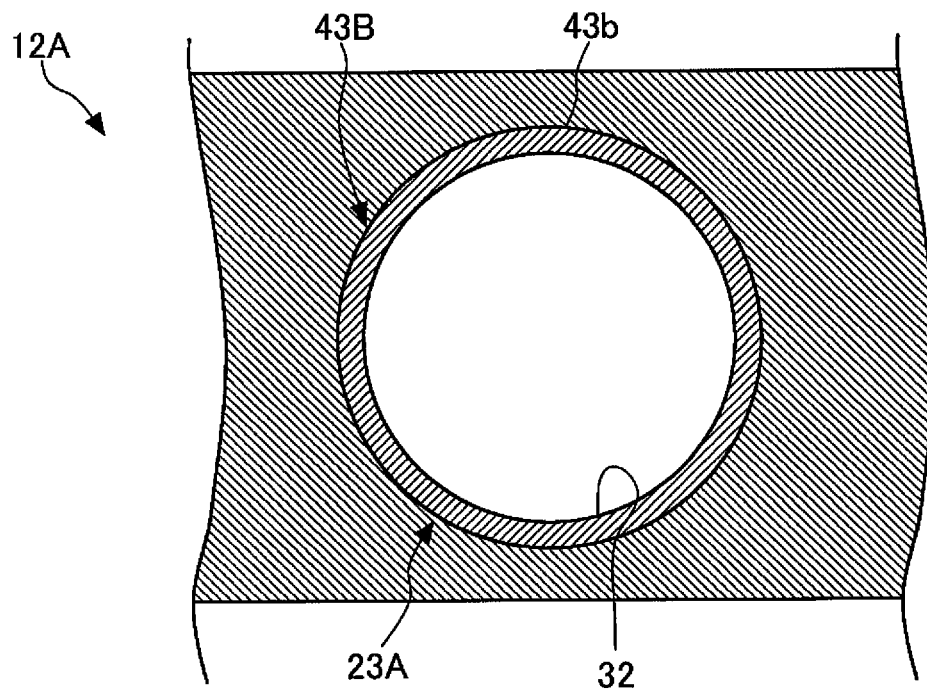


FIG. 5

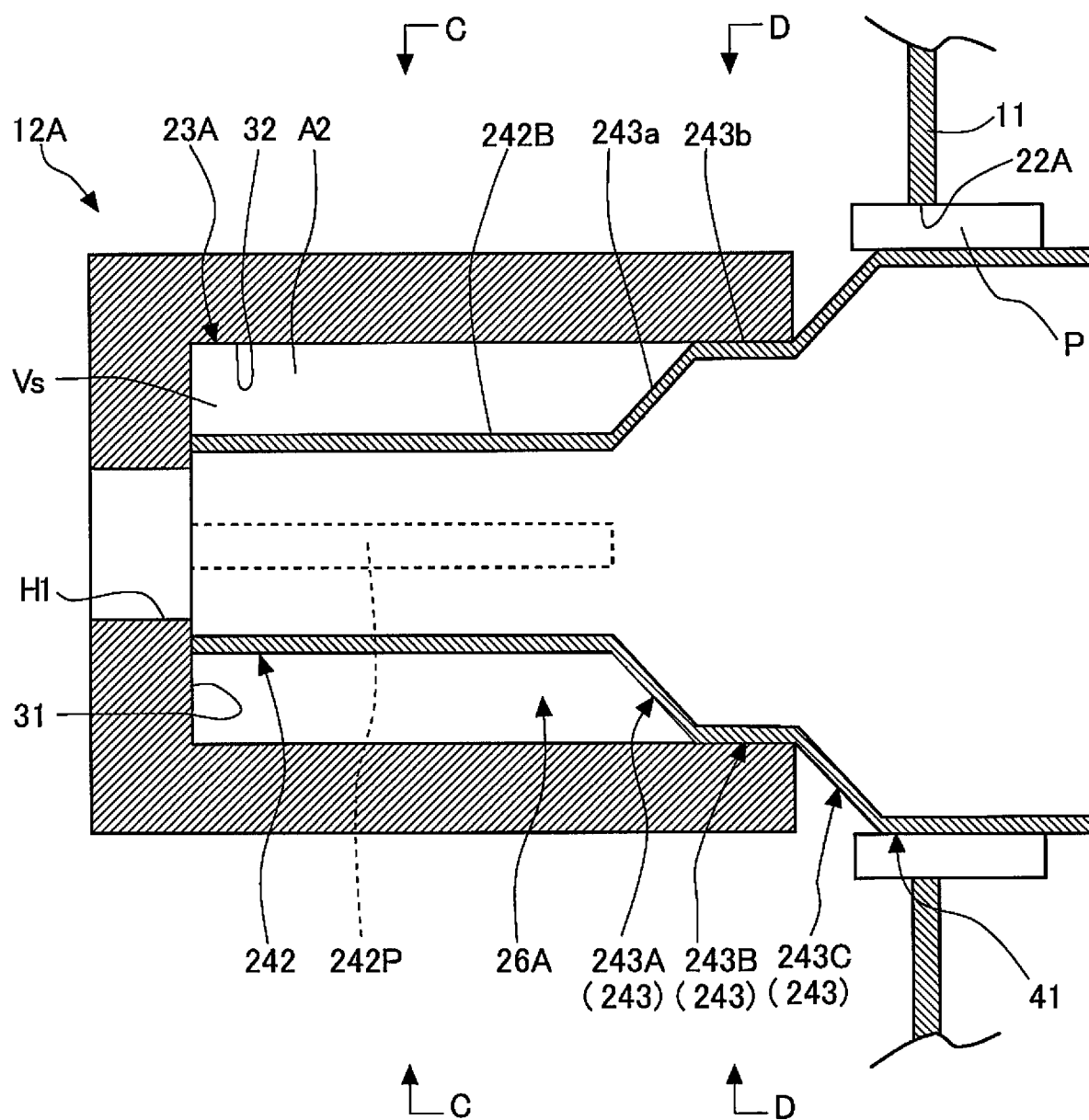


FIG. 6

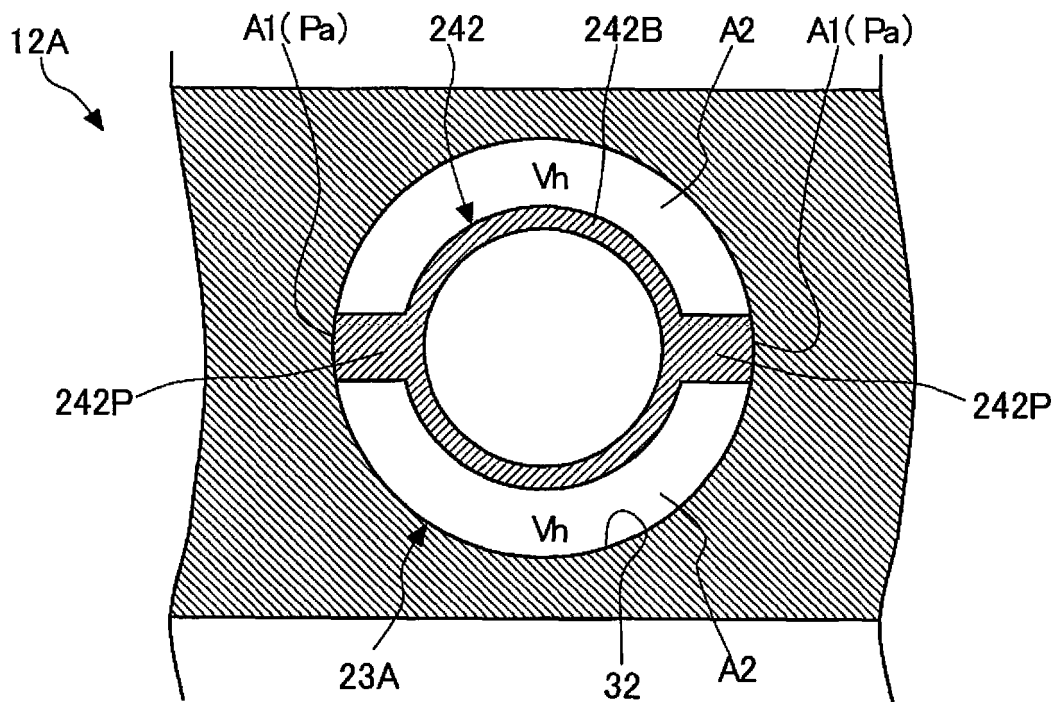


FIG. 7

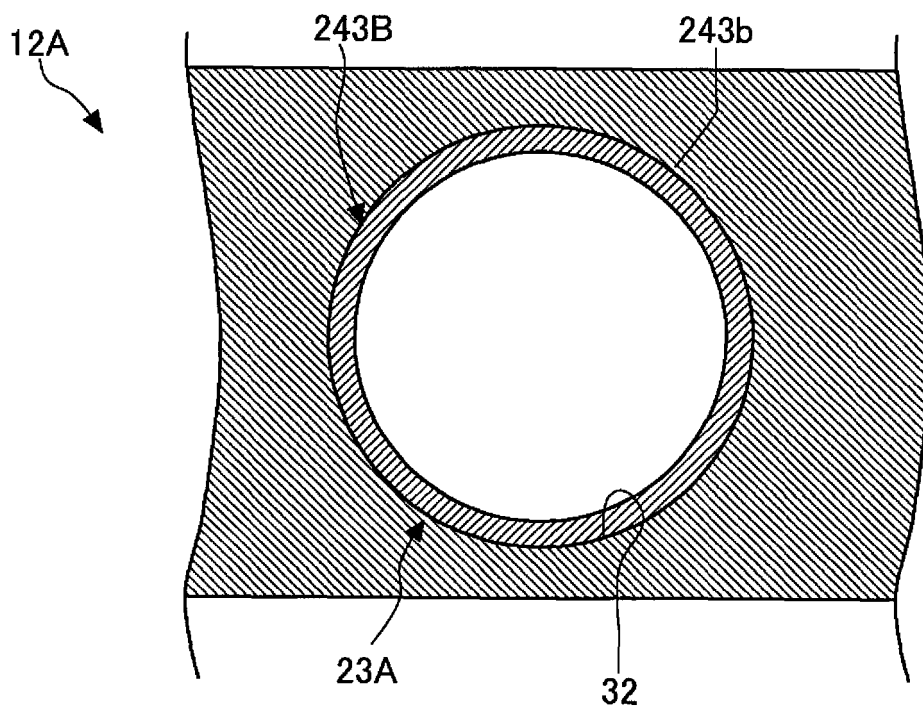


FIG. 8

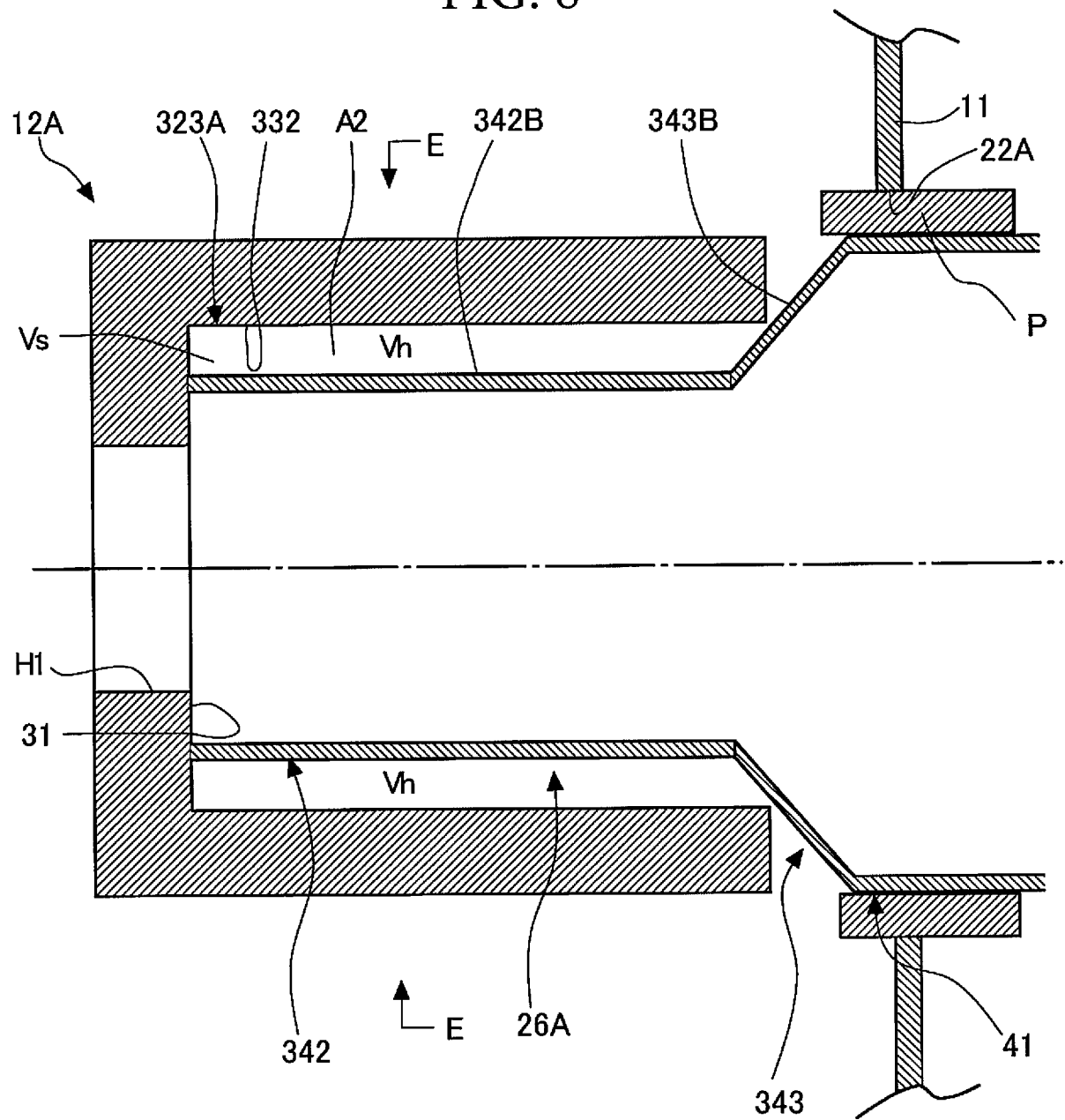
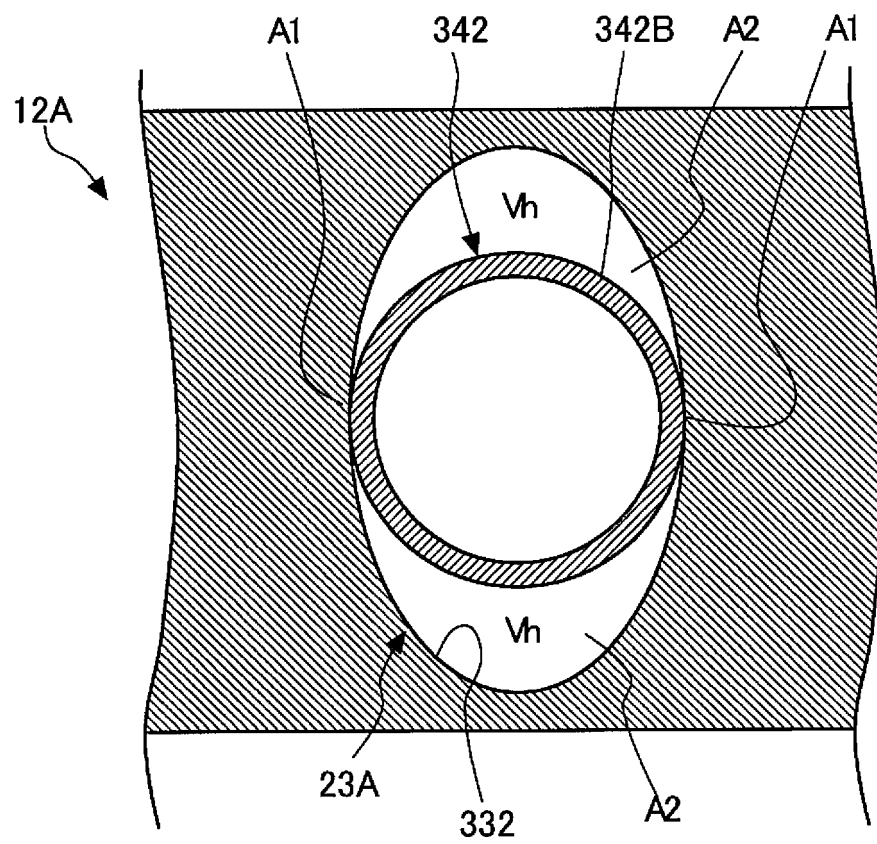


FIG. 9



REFERENCES CITED IN THE DESCRIPTION

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