(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 495 659 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
12.06.2019 Bulletin 2019/24

(51) Int Cl.:
F04B 39/02 *(2006.01)*

(21) Application number: **18208169.5**

(22) Date of filing: **23.11.2018**

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

(30) Priority: **11.12.2017 KR 20170168932**

(71) Applicant: **Samsung Electronics Co., Ltd.**
Gyeonggi-do 16677 (KR)

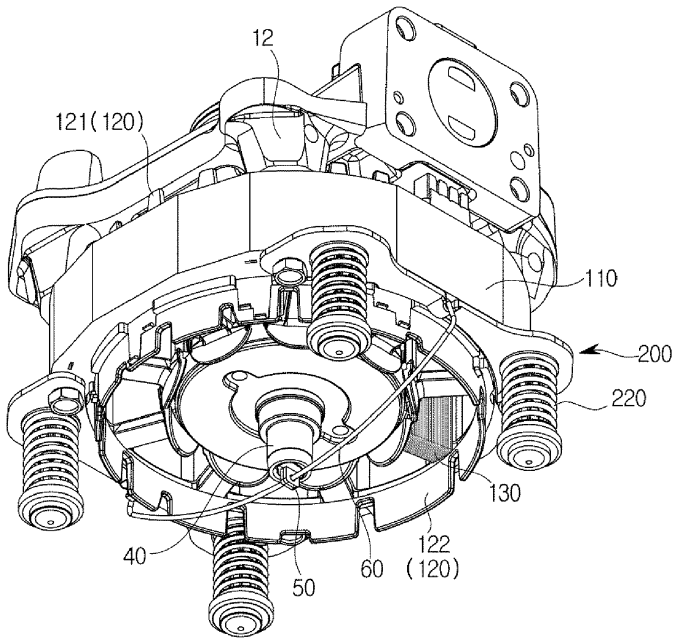
(72) Inventors:
- **NAM, Ki Sun**
  Gyeonggi-do (KR)
- **YOON, Yong Tae**
  Gyeonggi-do (KR)
- **KIM, Jong Youb**
  Gyeonggi-do (KR)

(74) Representative: **Walaski, Jan Filip et al**
Venner Shipley LLP
200 Aldersgate
London EC1A 4HD (GB)

(54) **COMPRESSOR**

(57) A compressor includes: a case (10); a stator (100) accommodated in the case, and including a stator core (110); a rotor (31) rotatably disposed in an inside of the stator core; a bracket (200) coupled to a lower portion of the stator core; a rotation shaft (40) configured to rotate together with the rotor, and having a cavity (44) for raising oil stored in the case; a pickup shaft (50) accommodated in the cavity; and a support member (60) connected to the pickup shaft to support the pickup shaft, and coupled to the bracket (200) or the stator core (110).

FIG. 4



EP 3 495 659 A1

Description

BACKGROUND

1. Field

[0001] The present disclosure relates to a compressor having an improved oil supply structure.

2. Description of the Related Art

[0002] In general, a compressor is a machine which receives power from a power generator, such as a motor or a turbine, and compresses air, a refrigerant, or other various operating gas to increase pressure. The compressor is widely used in home appliances, such as a refrigerator, an air conditioner, etc., or industrial machinery.

[0003] Compressors are classified into a reciprocating compressor, a rotary compressor, and a scroll compressor according to compressing methods and sealing structures.

[0004] The reciprocating compressor has a structure that forms compressing space in which operating gas is inhaled or discharged between a piston and a cylinder to compress a refrigerant when the piston performs a linear reciprocating motion in the inside of the cylinder.

[0005] A hermetic reciprocating compressor includes compressing mechanism for compressing a refrigerant through a reciprocating motion of a piston and electrically-driven mechanism for driving the compressing mechanism, wherein the compressing mechanism and the electrically-driven mechanism are installed in the inside of a single case.

[0006] The hermetic reciprocating compressor includes a shaft for transferring a driving force of the electrically-driven mechanism to the compressing mechanism. In the lower portion of the case, oil for lubricating and cooling the components of the individual mechanisms is stored, and the shaft includes an oil supply structure for raising the oil to supply it to the components.

[0007] There are various oil supply structures, and generally, a centrifugal pump structure that supplies oil upward by the centrifugal force of a shaft and a viscous liquid pump structure that supplies oil upward by the viscosity of oil are used.

[0008] Particularly, the viscous liquid pump structure includes a rotation shaft having a cavity through which oil moves, a pickup shaft accommodated in the cavity of the rotation shaft, and a support member for supporting the pickup shaft.

SUMMARY

[0009] Therefore, it is an aspect of the present disclosure to provide a compressor including an improved oil supply structure for efficiently raising oil stored in the lower portion of a case even when a rotation shaft rotates at low revolutions per minute (RPM).

[0010] It is another aspect of the present disclosure to provide a compressor including an improved bracket or an improved stator core to which a support member for supporting a pickup shaft is coupled.

[0011] Additional aspects of the disclosure will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the disclosure.

[0012] In accordance with an aspect of the present disclosure, there is provided a compressor including: a case; a stator, accommodated in the case, and including a stator core; a rotor rotatably disposed in an inside of the stator core; a bracket coupled to a lower portion of the stator core; a rotation shaft configured to rotate together with the rotor, and having a cavity for raising oil stored in the case; a pickup shaft accommodated in the cavity; and a support member connected to the pickup shaft to support the pickup shaft, and coupled to the bracket or the stator core.

[0013] The stator may include an insulator disposed below the stator core, and bracket may be made of a material having higher strength than a material of the insulator.

[0014] The bracket may be made of steel.

[0015] The bracket may include a bracket body, and a coupling portion which is provided in the bracket body and to which the support member is coupled.

[0016] The coupling portion may include a coupling portion body extending downward from the bracket body, and an accommodating space which is provided in the coupling portion body and in which the support member is inserted.

[0017] The support member may include an insertion portion inserted in the accommodating space.

[0018] The insertion portion inserted in the accommodating space may be positioned between the coupling portion body and the stator core.

[0019] The insertion portion inserted in the accommodating space may be spaced from the bracket body.

[0020] The support member may further include an extension portion bent from the insertion portion, and the pickup shaft may include a through portion which the extension portion penetrates.

[0021] The extension portion may include a first extension portion bent downward from the insertion portion, and a second extension portion bent from the first extension portion and penetrating the through portion.

[0022] The stator core may include a coupling portion which is disposed in an outer wall of the stator core and to which the support member is coupled.

[0023] The stator may include a stator coil, the stator core may include a core body, and a winding portion extending inward from the core body, the stator coil may be wound around the winding portion, and the coupling portion may be provided in the core body.

[0024] The stator core may include a plurality of unit cores stacked on one another, and the coupling portion

may include a coupling portion body extending downward from a lowest unit core of the plurality of unit cores, and an accommodating space which is provided in the coupling portion body and in which the support member is inserted.

[0025] The core body may include a first core body to which the bracket is coupled, and a second core body extending from the first core body, and the coupling portion may be provided in the second core body.

[0026] A diameter of the accommodating space may be equal to or smaller than three times a diameter of the support member.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] These and/or other aspects of the disclosure will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1 is a schematic cross-sectional view of a compressor according to an embodiment of the present disclosure;

FIG. 2 is an exploded perspective view showing a coupling structure of a rotation shaft and a pickup shaft in a compressor according to an embodiment of the present disclosure;

FIG. 3 shows a structure for raising oil in a compressor according to an embodiment of the present disclosure;

FIG. 4 is a perspective view showing the bottom of a support structure of a pickup shaft in a compressor according to an embodiment of the present disclosure;

FIGS. 5 and 6 show a bracket in a compressor according to an embodiment of the present disclosure;

FIGS. 7 and 8 show a bracket in a compressor according to another embodiment of the present disclosure;

FIG. 9 is a perspective view showing the bottom of a support structure of a pickup shaft in a compressor according to another embodiment of the present disclosure;

FIG. 10 shows a coupling portion provided in a stator core in the compressor shown in FIG. 9;

FIG. 11 is a perspective view showing the bottom of a support structure of a pickup shaft in a compressor according to another embodiment of the present disclosure; and

FIG. 12 shows a coupling portion provided in a unit core in the compressor shown in FIG. 11.

DETAILED DESCRIPTION

[0028] Configurations illustrated in the embodiments and the drawings described in the present specification are only the preferred embodiments of the present disclosure, and thus it is to be understood that various modified examples, which may replace the embodiments and the drawings described in the present specification, are possible when filing the present application.

[0029] Also, like reference numerals or symbols denoted in the drawings of the present specification represent members or components that perform the substantially same functions. Also, the terms used in the present specification are used to describe the embodiments of the present disclosure, not for the purpose of limiting the disclosure.

[0030] It is to be understood that the singular forms "a," "an," and "the" include plural referents unless the context clearly dictates otherwise. It will be understood that when the terms "includes," "comprises," "including," and/or "comprising," when used in this specification, specify the presence of stated features, figures, steps, components, or combination thereof, but do not preclude the presence or addition of one or more other features, figures, steps, components, members, or combinations thereof.

[0031] It will be understood that, although the terms "first", "second", etc., may be used herein to describe various elements, these elements should not be limited by these terms. The above terms are used only to distinguish one component from another. For example, a first component discussed below could be termed a second component, and similarly, a second component may be termed a first component without departing from the teachings of this disclosure.

[0032] As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items.

[0033] In the following description, the terms "front", "rear", "upper", and "lower" are defined based on the drawings, and the shapes and positions of the corresponding components are not limited by the terms.

[0034] Hereinafter, the embodiments of the present disclosure will be described in detail with reference to the accompanying drawings. An embodiment of a compressor according to the present disclosure relates to a hermetic reciprocating compressor, however, the present disclosure is not limited to this.

[0035] Also, the compressor according to the present disclosure is used in various home appliances, such as a refrigerator, a water purifier, etc., however, the compressor 1 is not limited to being used in such home appliances.

[0036] FIG. 1 is a schematic cross-sectional view of a compressor according to an embodiment of the present disclosure. As shown in FIG. 1, a compressor 1 may in-

clude a case 10 forming the outer appearance. The case 10 may be made of a metal material.

[0037] Generally, the case 10 may be manufactured by plastic working a steel sheet by a deep drawing method, etc. That is, the case 10 may be manufactured by welding two steel plate structures manufactured in the shape of a hemisphere, and a press method may be used to manufacture a steel plate sheet in the shape of a hemisphere having a predetermined thickness.

[0038] The case 10 may include accommodating space 11 for accommodating components installed in the inside of the compressor 1 in such a way for the components to be spaced a predetermined distance from the inner wall of the case 10 in order to be prevented from contacting the case 10.

[0039] The compressor 1 may include a frame 12 for fixing the components installed in the inside of the case 10. The compressor 1 may include compressing mechanism 20 installed above the frame 12, and electrically-driven mechanism 30 installed below the frame 12 for driving the compressing mechanism 20.

[0040] The compressing mechanism 20 may include a cylinder 21 forming compressing space for a refrigerant and fixed on the frame 12, and a piston 22 moving back and forth in the inside of the cylinder 21 to compress the refrigerant.

[0041] The electrically-driven mechanism 30 may include a stator 100 fixed on the frame 12, and a rotor 31 rotating in the inside of the stator 100.

[0042] The cylinder 21 may be made of an aluminum material. The aluminum material may be aluminum or an aluminum alloy. Due to the aluminum material which is a nonmagnetic material, magnetic flux generated in the rotor 31 may be not transferred to the cylinder 21.

[0043] Accordingly, the magnetic flux generated in the rotor 31 may be prevented from being transferred to the cylinder 21 to leak to the outside of the cylinder 21.

[0044] The piston 22 may also be made of an aluminum material, like the cylinder 21. Accordingly, like the cylinder 21, magnetic flux generated in the rotor 31 may be prevented from being transferred to the piston 22 to leak to the outside of the piston 22.

[0045] Since the piston 22 is made of the same material as the cylinder 21, the piston 22 may have the nearly same thermal expansion coefficient as the cylinder 21.

[0046] Since the piston 22 has the nearly same thermal expansion coefficient as the cylinder 21, the piston 22 may be deformed by the nearly same amount as the cylinder 21 in the high-temperature inside environment of the case 10 when the compressor 1 is driven.

[0047] Accordingly, when the piston 22 reciprocates in the inside of the cylinder 21, the piston 22 may be prevented from interfering with the cylinder 21.

[0048] The rotor 31 may include a cavity 31 a. The stator 100 may include a stator core 110 corresponding to a fixed portion when the electrically-driven mechanism 30 is driven, and a stator coil 130 (see FIG. 4) installed in the inside of the stator core 110.

[0049] The stator core 110 may be made of a metal material, and may be in the shape of a cylinder. When a voltage is applied from a power supply (not shown), the stator coil 130 may generate an electromagnetic force to perform an electromagnetic interaction together with the stator core 110 and the rotor 31.

[0050] The electrically-driven mechanism 30 may include an insulator 120 disposed between the stator core 110 and the stator coil 130. The insulator 120 may prevent the stator core 110 from directly contacting the stator coil 130.

[0051] The insulator 120 may include an upper insulator 121 (see FIG. 4) disposed on the stator core 110, and a lower insulator 122 disposed below the stator core 110.

[0052] The stator coil 130 may be wound together with the stator core 110, the upper insulator 121, and the lower insulator 122.

[0053] When the stator coil 130 directly contacts the stator core 110, the stator core 110 may interfere with generation of an electromagnetic force from the stator coil 130. The insulator 120 may space the stator coil 130 from the stator core 110 by a predetermined distance.

[0054] The rotor 31 may be rotatably installed in the inside of the stator core 110. The rotor 31 may include a magnet (not shown). The rotor 31 may rotate by an electromagnetic interaction between the stator core 110 and the stator coil 130, when a voltage is applied to the rotor 31.

[0055] The compressor 1 may be disposed vertically to transfer a driving force of the electrically-driven mechanism 30 to the compressing mechanism 20, and include a rotation shaft 40 rotatably supported by a shaft support portion 13 of the frame 12.

[0056] The rotation shaft 40 may be pressed in the cavity 31a of the rotor 31, and rotate together with the rotor 31.

[0057] On the rotation shaft 40, an eccentric portion 41 may be formed to be eccentric from the center axis of rotation of the rotor 31, and the eccentric portion 41 may be connected to the piston 22 by a connecting rod 23.

[0058] Accordingly, a rotation motion of the rotation shaft 40 may be converted to a linear motion of the piston 22 by the connecting rod 23. The connecting rod 23 may be made of a sintered alloy material.

[0059] Below the eccentric portion 41, a disk portion 42 may extend in a radial direction. Between the disk portion 42 and the shaft support portion 13, a trust bearing 43 (see FIG. 3) may be interposed to smoothly rotate the rotation shaft 40 and simultaneously support the axial-direction weight of the rotation shaft 40.

[0060] In the lower portion of the case 10, oil for lubricating and cooling the individual components of the compressor 1 may be stored, and the oil may be raised through the rotation shaft 40 to be supplied to the individual components.

[0061] The rotation shaft 40 may have a cavity 44 for raising oil stored in the case 10 through the inner circumferential surface. The pickup shaft 50 may be inserted

into the cavity 44.

[0062] The pickup shaft 50 may be supported by a support member 60. Accordingly, when the rotation shaft 40 rotates, the pickup shaft 60 may not rotate.

[0063] The compressor 1 may include a bracket 200 coupled to the lower portion of the stator core 110. The bracket 200 may support the stator core 110.

[0064] The support member 60 according to an embodiment of the present disclosure may be coupled to the bracket 200 or the stator core 110. The pickup shaft 60 may be inserted into the cavity 44, and supported on the bracket 200 or the stator core 110 by the support member 60.

[0065] A coupling structure of the support member 60 with the bracket 200 or the stator core 100 will be described in detail, later.

[0066] FIG. 2 is an exploded perspective view showing a coupling structure of a rotation shaft and a pickup shaft in a compressor according to an embodiment of the present disclosure, and FIG. 3 shows a structure for raising oil in a compressor according to an embodiment of the present disclosure.

[0067] Hereinafter, a structure for raising oil will be described in detail with reference to the drawings.

[0068] As shown in FIGS. 2 and 3, a spiral wing 51 may be formed in the outer circumferential surface of the pickup shaft 50 to raise oil stored in the case 10 together with the inner circumferential surface of the rotation shaft 40.

[0069] Accordingly, when the rotation shaft 40 rotates, oil stored in the case 10 may rotate in the rotation direction of the rotation shaft 40 by viscosity with the rotation shaft 40 to raise along the spiral wing 51 of the pickup shaft 50.

[0070] In FIG. 3, A represents the rotation direction of the rotation shaft 40, and means that the rotation shaft 40 rotates in a clockwise direction as seen from above the rotation shaft 40. Hereinafter, the rotation direction of the rotation shaft 40 will be described as the rotation direction of the rotation shaft 40 when seen from above the rotation shaft 40. In FIG. 3, B represents a direction in which oil rises.

[0071] When the rotation shaft 40 rotates in the clockwise direction, the oil stored in the case 10 may rotate in the clockwise direction by viscosity with the rotation shaft 40.

[0072] The oil rotating in the clockwise direction may rise along the spiral wing 51 formed in the outer circumferential surface of the pickup shaft 50. That is, a centrifugal force generated by a rotation of the rotation shaft 40 may be converted to a lifting force by the spiral wing 51 to thus raise the oil.

[0073] At this time, the pickup shaft 50 and the spiral wing 51 may not rotate by the support member 60 although the rotation shaft 40 rotates, as described above.

[0074] As such, the compressor 1 according to an embodiment of the present disclosure may raise oil through the inner circumferential surface of the rotation shaft 40.

[0075] In the case of a structure of raising oil through the outer circumferential surface of the rotation shaft 40, the oil may be prevented from being raised by surface pressure (or viscosity with the shaft support portion 13) of the shaft support portion 13, and accordingly, it may be necessary to maintain predetermined RPM of the rotation shaft 40 in order to raise the oil.

[0076] The compressor 1 according to an embodiment of the present disclosure may raise oil even at low RPM since rising oil is not subject to surface pressure from the shaft support portion 13.

[0077] Also, for the same reason, since the compressor 1 can raise oil with a small centrifugal force, it may be possible to reduce the diameter of the rotation shaft 40.

[0078] The pickup shaft 50 may include a through portion 52 which protrudes downward and to which the support member 60 is coupled. In the through portion 52, a through hole 53 which the support member 60 penetrates may be formed.

[0079] The support member 60 may be a wire. The support member 60 may be a wire bent at a plurality of positions. The support member 60 may include an extension portion 61 penetrating the through hole 53 of the pickup shaft 50, and an insertion portion 62 coupled to the bracket 200 (see FIG. 1) or the stator core 110 (see FIG. 1).

[0080] The extension portion 61 may include a first extension portion 61a bent downward from the insertion portion 61, and a second extension portion 61b bent from the first extension portion 61a and penetrating the through portion 52.

[0081] The pickup shaft 50 may be first coupled with the support member 60, and the support member 60 may be coupled with the bracket 200 or the stator core 110. The extension portion 61 of the support member 60 may be inserted into the through hole 53 of the pickup shaft 50, and then, the insertion portion 62 of the support member 60 may be coupled to the bracket 200 or the stator core 110.

[0082] At this time, the support member 60 may be made of a material having elasticity, such as a flat spring. Accordingly, when the support member 60 is coupled to the bracket 200 or the stator core 110, the support member 60 may be more or less widened.

[0083] After the support member 60 is coupled to the bracket 200 or the stator core 110, the support member 60 may be firmly coupled to the bracket 200 or the stator core 110 by the restoring force.

[0084] Hereinafter, a structure in which the support member 60 is coupled to the bracket 200 or the stator core 100 will be described in detail.

[0085] FIG. 4 is a perspective view showing the bottom of a support structure of a pickup shaft in a compressor according to an embodiment of the present disclosure, and FIGS. 5 and 6 show a bracket in a compressor according to an embodiment of the present disclosure.

[0086] As shown in FIGS. 4 to 6, the bracket 200 may be disposed adjacent to the insulator 120. The bracket

200 may be disposed adjacent to the lower insulator 122. The bracket 200 may be spaced from the lower insulator 122. The bracket 200 may be spaced outward from the lower insulator 122.

[0087] The bracket 200 may be coupled to the frame 12 with the stator core 110 in between. The bracket 200 may be coupled to the frame 12 by a coupling member (not shown) penetrating the stator core 110.

[0088] A plurality of brackets 200 may be provided. The compressor 1 according to an embodiment of the present disclosure may include two brackets 200. However, the bracket 200 may be configured in various forms, as long as it can couple and support the components installed in the inside of the case 10.

[0089] The bracket 200 may include a bracket body 210, and a first coupling hole 211 formed in the bracket body 210 and coupled to the frame 12.

[0090] A plurality of first coupling holes 211 may be formed. The bracket 200 according to an embodiment of the present disclosure may include two first coupling holes 211, although not limited thereto.

[0091] The bracket 200 may include a bumper portion 212 to which a bumper member 220 for reducing vibrations of the compressor 1 is coupled. The bumper portion 212 may extend downward from the bracket body 210.

[0092] The bumper member 220 may be disposed below the bracket body 210.

[0093] A plurality of bumper portions 212 may be provided. The bracket 200 according to an embodiment of the present disclosure may include two bumper portions 212, although not limited thereto.

[0094] Also, a plurality of bumper members 220 may be provided to correspond to the number of the bumper portions 212.

[0095] The bracket 200 may include a coupling portion 300 which is formed in the bracket body 210 and to which the support member 60 is coupled.

[0096] The bracket 200 may be made of a material having higher strength than a material forming the insulator 120. For example, the bracket 200 may be made of steel.

[0097] Accordingly, compared with a case of coupling the support member 60 for supporting the pickup shaft 50 to the insulator 120, the compressor 1 according to an embodiment of the present disclosure may couple the support member 60 to the bracket 200, thereby preventing breakage and abrasion of the coupling portion 300, while further strengthening coupling of the support member 60.

[0098] The coupling portion 300 may be disposed in the center of the bracket body 210.

[0099] The coupling portion 300 may include a coupling portion body 310 extending downward from the bracket body 210, and accommodating space 320 which is formed in the coupling portion body 310 and in which the support member 60 is inserted.

[0100] Since the coupling portion body 310 is curved downward from the bracket body 210 to form the accommodating space 320, the coupling portion 300 may form a nearly "U"-shaped groove.

[0101] The insertion portion 62 (see FIG. 3) inserted in the accommodating space 320 may be positioned between the coupling portion body 310 and the stator core 110.

[0102] The area of the accommodating space 320 may be larger than the cross-section area of the support member 60, and may be equal to or smaller than three times the cross-section area of the support member 60, although not limited thereto.

[0103] The coupling portion 300 may be formed by applying a press method on the bracket body 210.

[0104] FIGS. 7 and 8 show a bracket in a compressor according to another embodiment of the present disclosure. A bracket 201 according to another embodiment of the present disclosure may have the substantially same structure as the bracket 200 according to the embodiment of the present disclosure, except for the structure of a coupling portion (400 in FIG. 7).

[0105] As shown in FIGS. 7 and 8, the bracket 201 may include a bracket body 210, and a first coupling hole 211 formed in the bracket body 210 to couple the bracket 201 to the frame 12 (see FIG. 4).

[0106] The bracket 201 may include the bumper portion 212 to which the bumper member 220 (see FIG. 4) for reducing vibrations of the compressor 1 is coupled. The bumper portions 212 may be provided in plural numbers corresponding to the number of the buffer members 220. Also.

[0107] The bracket 201 may include a coupling portion 400 which is formed in the bracket body 210 and to which the support member 60 (see FIG. 4) is coupled.

[0108] The bracket 201 may be made of a material having higher strength than the material forming the insulator 120 (see FIG. 4). For example, the bracket 201 may be made of steel.

[0109] The coupling portion 400 may be disposed in the center of the bracket body 210.

[0110] The coupling portion 400 may include a coupling portion body 410 extending downward from the bracket body 210, and accommodating space 420 which is formed in the coupling portion body 410 and in which the support member 60 is inserted.

[0111] The coupling portion 400 may include the coupling portion body 410 curved downward from the bracket body 210, and the accommodating space 420 forming a hole in the coupling portion body 410.

[0112] The insertion portion 62 (see FIG. 3) inserted in the accommodating space 420 may be spaced from the stator core 110 (see FIG. 4). The insertion portion 62 (see FIG. 3) inserted in the accommodating space 420 may be spaced from the bracket body 210.

[0113] The diameter of the accommodating space 420 may be larger than the diameter of the support member 60, and may be equal to or smaller than three times the diameter of the support member 60, although not limited thereto.

[0114] FIG. 9 is a perspective view showing the bottom of a support structure of a pickup shaft in a compressor according to another embodiment of the present disclosure. FIG. 10 shows a coupling portion provided in a stator core in the compressor shown in FIG. 9.

[0115] As shown in FIGS. 9 and 10, a bracket 202 according to another embodiment of the present disclosure may be disposed adjacent to the lower insulator 122. The bracket 202 may be spaced from the lower insulator 122. The bracket 202 may be spaced outward from the lower insulator 122.

[0116] The bracket 202 may be coupled to the frame 12 with the stator core 110 in between. The bracket 202 may be coupled to the frame 12 by a coupling member (not shown) penetrating the stator core 110.

[0117] A plurality of brackets 202 may be provided. The bracket 202 according to the other embodiment of the present disclosure may be configured as two pieces, although not limited thereto. However, the bracket 202 may be configured in various forms, as long as it can couple and support the components installed in the inside of the case 10 (see FIG. 1).

[0118] The bracket 202 may include a bumper member 220 for reducing vibrations of the compressor 1. A plurality of bumper members 220 may be provided. Two bumper members 220 may be included in each of the brackets 202 according to the other embodiment of the present disclosure, although not limited thereto.

[0119] The stator core 110 may include a coupling portion 500 which is formed in the stator core 110 and to which the support member 60 is coupled. The coupling portion 500 may be disposed in the outer wall of the stator core 110.

[0120] The coupling portion 500 may be disposed at one edge of the stator core 110.

[0121] The stator core 110 may be made of a material having higher strength than the material forming the insulator 120. For example, the stator core 110 may be an electromagnetic steel sheet.

[0122] Accordingly, compared with the case of coupling the support member 60 for supporting the pickup shaft 50 to the insulator 120, by coupling the support member 60 to the stator core 110, it may be possible to prevent breakage and abrasion of the coupling portion 500, while further strengthening coupling of the support member 60.

[0123] The stator core 110 may include a core body 111, and a winding portion 112 extending inward from the core body 111, wherein the stator coil 130 (see FIG. 4) is wound around the winding portion 112.

[0124] The core body 111 may be in the shape of a circle, and a plurality of winding portions 112 may be provided. The coupling portion 500 may be formed in the core body 111.

[0125] The core body 111 may include a first core body 113 to which the bracket 202 is coupled, and a second core body 114 extending from the first core body 113.

[0126] The coupling portion 500 may be formed in the first core body 113, although not limited thereto.

[0127] The core body 111 may include a second coupling hole 115 which a coupling member (not shown) to be coupled to the frame 12 (see FIG. 4) penetrates.

[0128] A plurality of second coupling holes 115 may be provided. The core body 111 according to the other embodiment of the present disclosure may include four second coupling holes 115, although not limited thereto.

[0129] The stator core 110 may include a plurality of unit cores 110a that are stacked on one another. At least one part of the plurality of unit cores 110a may include a unit coupling portion 500a. Since the plurality of unit cores 110a are stacked to form the stator core 110, a plurality of unit coupling portions 500a may form the coupling portion 500.

[0130] The plurality of unit cores 110a including the unit coupling portion 500a forming the coupling portion 500 may be disposed below a plurality of different unit cores 110a, although not limited thereto.

[0131] The coupling portion 500 may include a groove in which the support member 60 is inserted. The insertion portion 62 inserted in the coupling portion 500 may be positioned on the bracket 202.

[0132] The bracket 202 may cover an open side of the coupling portion 500.

[0133] The area of the coupling portion 500 may be larger than the cross-section area of the support member 60, and may be equal to or smaller than three times the cross-section area of the support member 60, although not limited thereto.

[0134] FIG. 11 is a perspective view showing the bottom of a support structure of a pickup shaft in a compressor according to another embodiment of the present disclosure. FIG. 12 shows a coupling portion provided in a unit core in the compressor shown in FIG. 11.

[0135] As shown in FIGS. 11 and 12, the bracket 202 according to the other embodiment of the present disclosure may be disposed adjacent to the lower insulator 122. The bracket 202 may be spaced from the lower insulator 122. The bracket 202 may be spaced outward from the lower insulator 122.

[0136] The bracket 202 may be coupled with the frame 12 (see FIG. 4) with the stator core 110 in between. The bracket 202 may be coupled to the frame 12 by a coupling member (not shown) penetrating the stator core 110.

[0137] A plurality of brackets 202 may be provided. The bracket 202 according to the other embodiment of the present disclosure may be configured as two pieces, although not limited thereto. However, the bracket 202 may be configured in various forms, as long as it can couple and support the components installed in the inside of the case 10 (see FIG. 1).

[0138] The bracket 202 may include the bumper member 220 for reducing vibrations of the compressor 1. A plurality of bumper members 220 may be provided. The bracket 202 according to the other embodiment of the present disclosure may include two bumper members 220 for each bracket 202, although not limited thereto.

[0139] The stator core 110 may include a coupling portion 600 which is formed in the stator core 110 and to which the support member 60 is coupled. The coupling portion 600 may be formed in the outer wall of the stator core 110.

[0140] The stator core 110 may be made of a material having higher strength than the material forming the insulator 120. For example, the stator core 110 may be an electromagnetic steel sheet.

[0141] The stator core 110 may include a core body 111, and a winding portion 112 extending inward from the core body 111, wherein the stator coil 130 (see FIG. 4) is wound around the winding portion 112.

[0142] The core body 111 may be in the shape of a circle, and a plurality of winding portions 112 may be provided. The coupling portion 600 may be formed in the core body 111.

[0143] The core body 111 may include a first core body 113 to which the bracket 202 is coupled, and a second core body 114 extending from the first core body 113. The coupling portion 600 may be formed in the second core body 114, although not limited thereto.

[0144] The core body 111 may include the second coupling hole 115 which a coupling member (not shown) to be coupled to the frame 12 penetrates.

[0145] The core body 111 may include a second coupling hole 115 which a coupling member (not shown) to be coupled to the frame 12 (see FIG. 4) penetrates.

[0146] A plurality of second coupling holes 115 may be provided. The core body 111 according to the other embodiment of the present disclosure may include four second coupling holes 115, although not limited thereto.

[0147] The stator core 110 may include a plurality of unit cores 110a that are stacked on one another.

[0148] The coupling portion 600 may be formed in the lowest unit core 110a of the plurality of unit cores 110a. The coupling portion 600 may include a coupling portion body 610 extending downward from the lowest unit core 110a of the plurality of unit cores 110a, and accommodating space 620 which is formed in the coupling portion body 610 and in which the support member 60 is inserted.

[0149] Since the coupling portion body 610 is curved downward from the lowest unit core 110a of the plurality of unit cores 110a to form the accommodating space 620, the coupling portion 600 may form a nearly "U"-shaped groove.

[0150] Another unit core 110a neighboring the lowest unit core 110a of the plurality of unit cores 110a may be stacked on the lowest unit core 110a to cover one side of the accommodating space 620.

[0151] The accommodating space 620 may open in both front and rear directions in which the insertion portion 62 (see FIG. 3) is inserted. Accordingly, the coupling portion 600 may form a hole, although not limited thereto.

[0152] The insertion portion 62 inserted in the accommodating space 620 may be positioned between the plurality of unit cores 110a.

[0153] The area of the accommodating space 620 may be larger than the cross-section area of the support member 60, and may be equal to or smaller than three times the cross-section area of the support member 60, although not limited thereto.

[0154] Since oil stored in the case rises along the inner circumferential surface of the rotation shaft, the oil may be efficiently supplied to the individual components even when the rotation shaft rotates at low RPM.

[0155] Since the coupling portion to which the support member for supporting the pickup shaft is coupled is disposed at the bracket or the stator core having high strength, it may be possible to prevent breakage or abrasion of the coupling portion.

[0156] Although a few embodiments of the present disclosure have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the disclosure, the scope of which is defined in the claims and their equivalents.

Claims

1. A compressor comprising:

a case;
a stator, accommodated in the case, and including a stator core;
a rotor rotatably disposed in an inside of the stator core;
a bracket coupled to a lower portion of the stator core;
a rotation shaft configured to rotate together with the rotor, and having a cavity for raising oil stored in the case;
a pickup shaft accommodated in the cavity; and
a support member connected to the pickup shaft to support the pickup shaft, and coupled to the bracket or the stator core.

2. The compressor according to claim 1, wherein
the stator includes an insulator disposed below the stator core, and
the bracket or the stator core is made of a material having higher strength than a material of the insulator.

3. The compressor according to claim 1, wherein the bracket is made of steel.

4. The compressor according to claim 1, wherein the bracket comprises a bracket body, and a coupling portion which is provided in the bracket body and to which the support member is coupled.

5. The compressor according to claim 4, wherein the coupling portion comprises a coupling portion body extending downward from the bracket body, and an

accommodating space which is provided in the coupling portion body and in which the support member is inserted.

6. The compressor according to claim 5, wherein the support member comprises an insertion portion inserted in the accommodating space.

7. The compressor according to claim 6, wherein the insertion portion inserted in the accommodating space is positioned between the coupling portion body and the stator core.

8. The compressor according to claim 6, wherein the insertion portion inserted in the accommodating space is spaced from the bracket body.

9. The compressor according to claim 6, wherein the support member further comprises an extension portion bent from the insertion portion, and the pickup shaft comprises a through portion which the extension portion penetrates.

10. The compressor according to claim 9, wherein the extension portion comprises a first extension portion bent downward from the insertion portion, and a second extension portion bent from the first extension portion and penetrating the through portion.

11. The compressor according to claim 1, wherein the stator core comprises a coupling portion which is disposed in an outer wall of the stator core and to which the support member is coupled.

12. The compressor according to claim 11, wherein
the stator includes a stator coil,
the stator core comprises

a core body, and
a winding portion extending inward from the core body,

the stator coil is wound around the winding portion, and
the coupling portion is provided in the core body.

13. The compressor according to claim 11, wherein
the stator core comprises a plurality of unit cores stacked on one another, and
the coupling portion comprises

a coupling portion body extending downward from a lowest unit core of the plurality of unit cores, and
an accommodating space which is provided in the coupling portion body and in which the support member is inserted.

14. The compressor according to claim 12, wherein the core body comprises

a first core body to which the bracket is coupled, and
a second core body extending from the first core body, and

the coupling portion is provided in the second core body.

15. The compressor according to claim 5, wherein a diameter of the accommodating space is equal to or smaller than three times a diameter of the support member.

FIG. 1

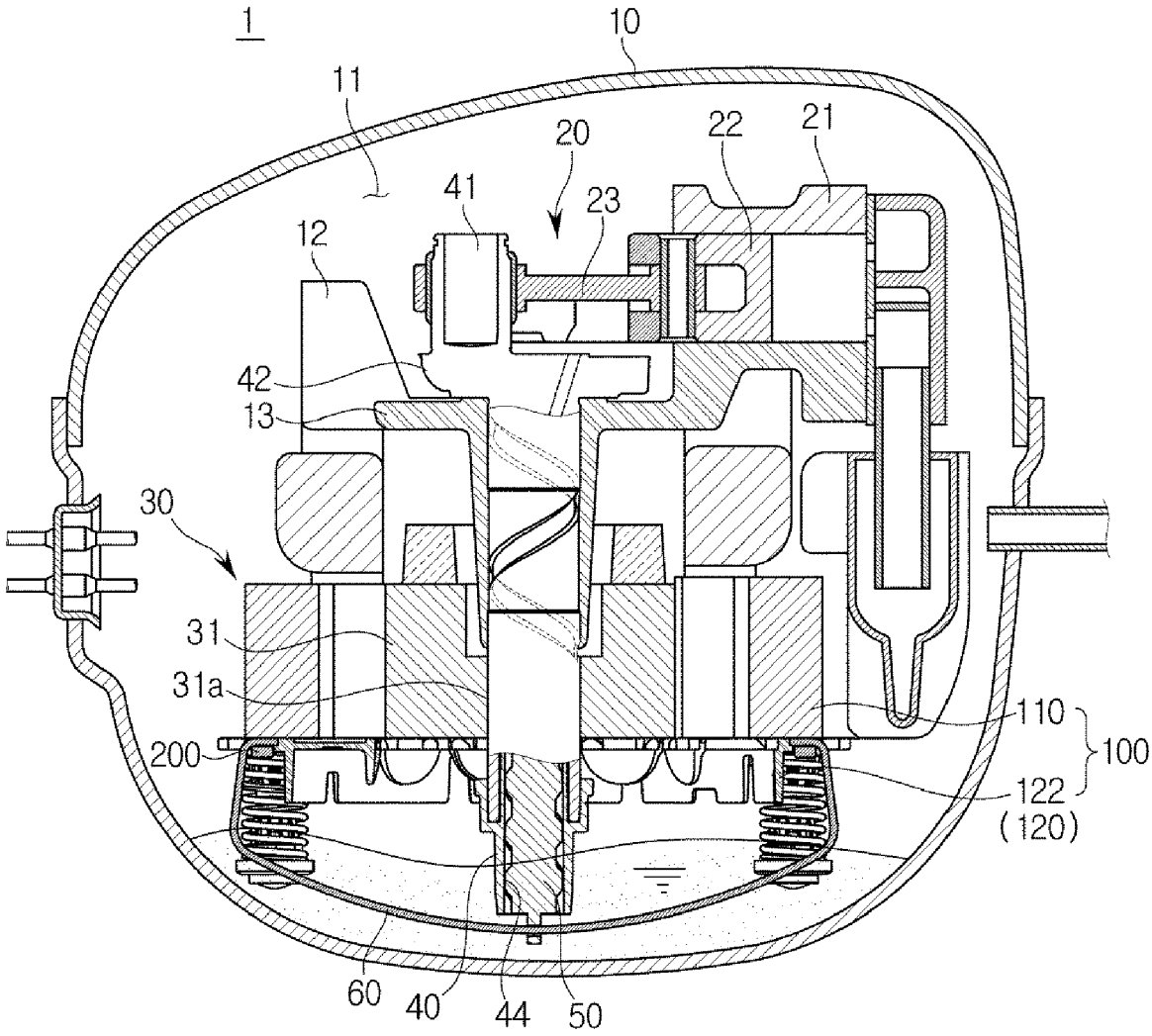

1
10
11
20
22
21
41
23
12
42
13
30
31
31a
110
100
200
122
(120)
60
40
44
50

FIG. 2

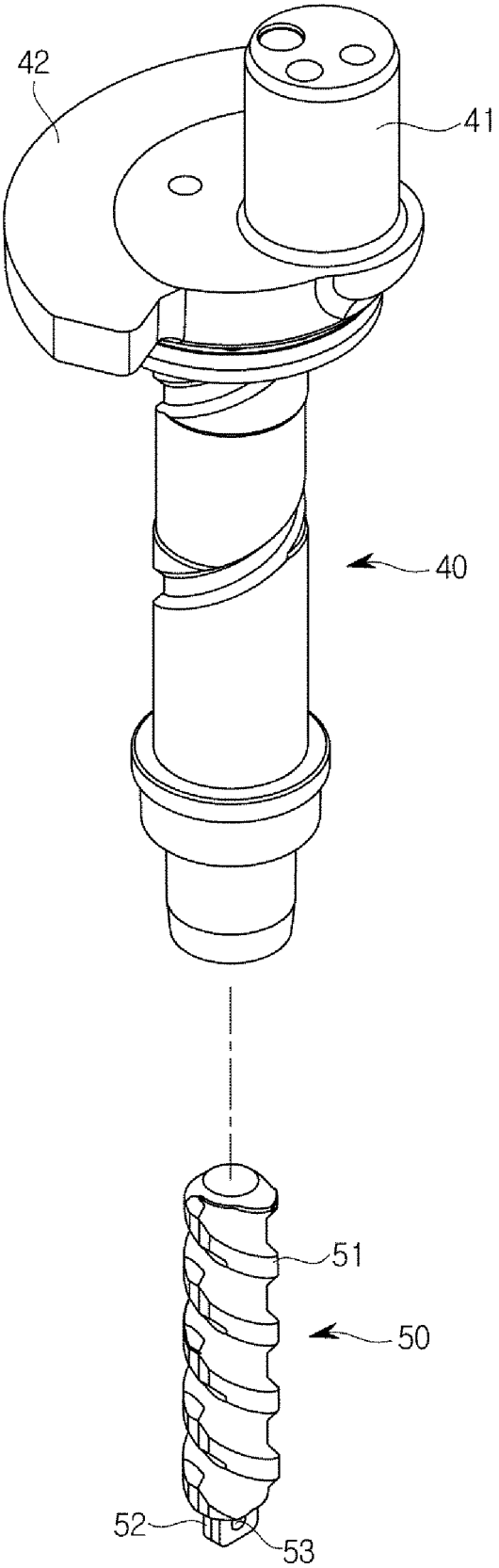


FIG. 3

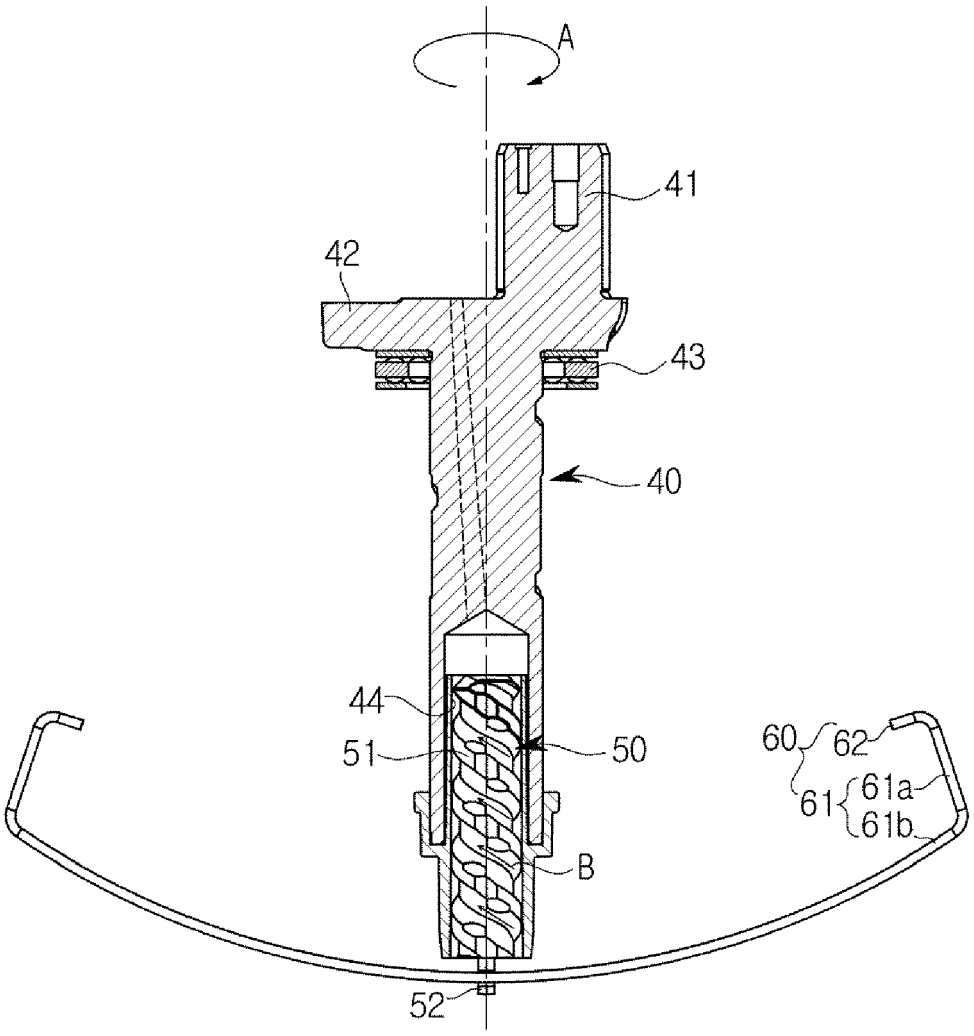


FIG. 4

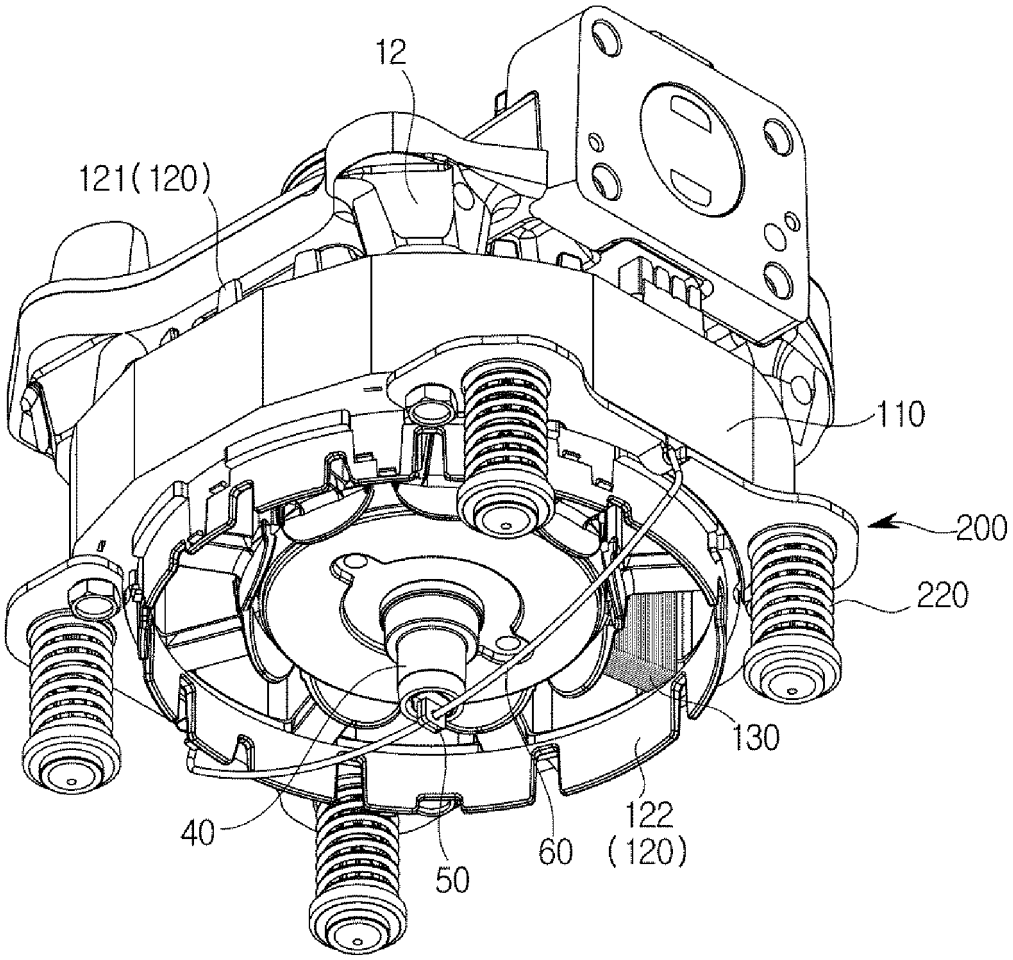


FIG. 5

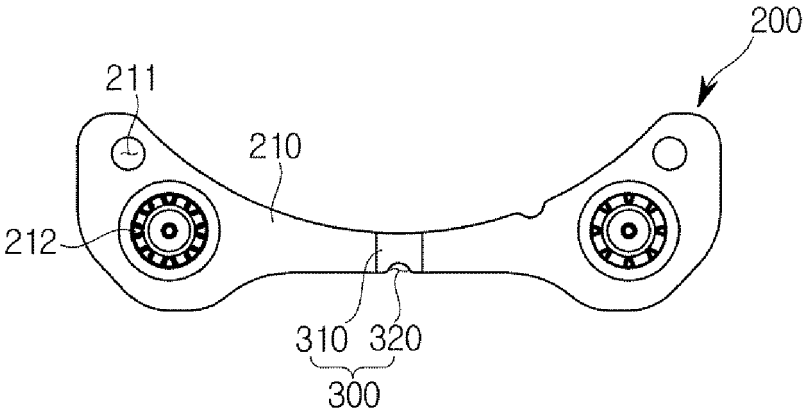


FIG. 6

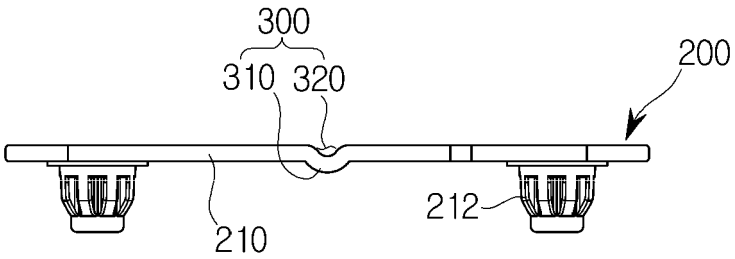


FIG. 7

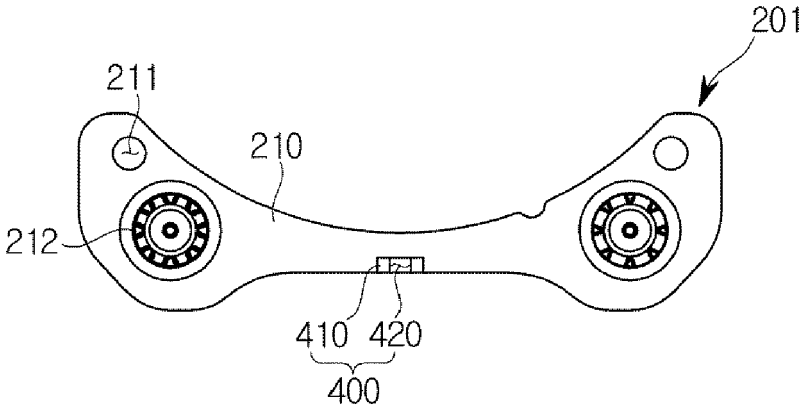


FIG. 8

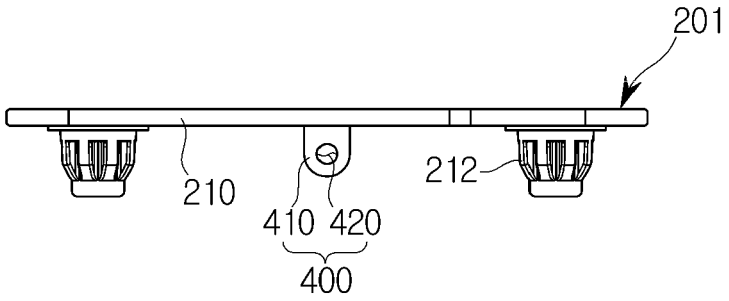

201
210
212
410
420
400

FIG. 9

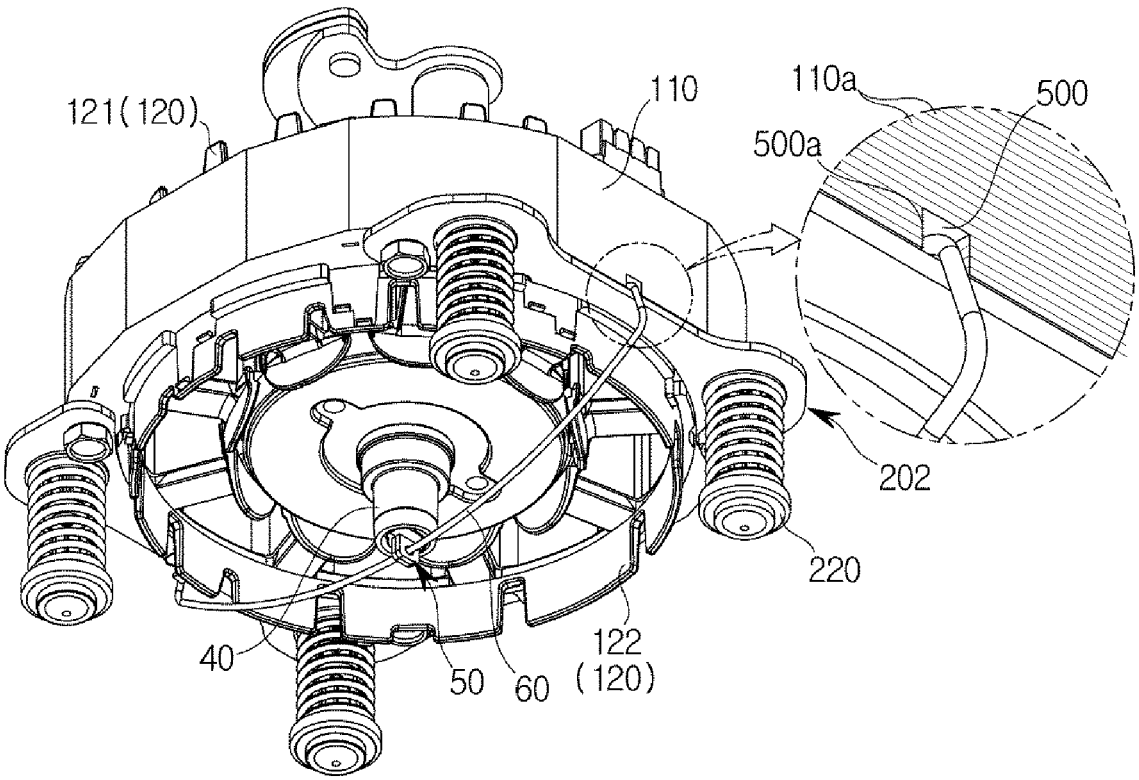

121(120)
110
110a
500
500a
202
220
40
50
60
122
(120)

FIG. 10

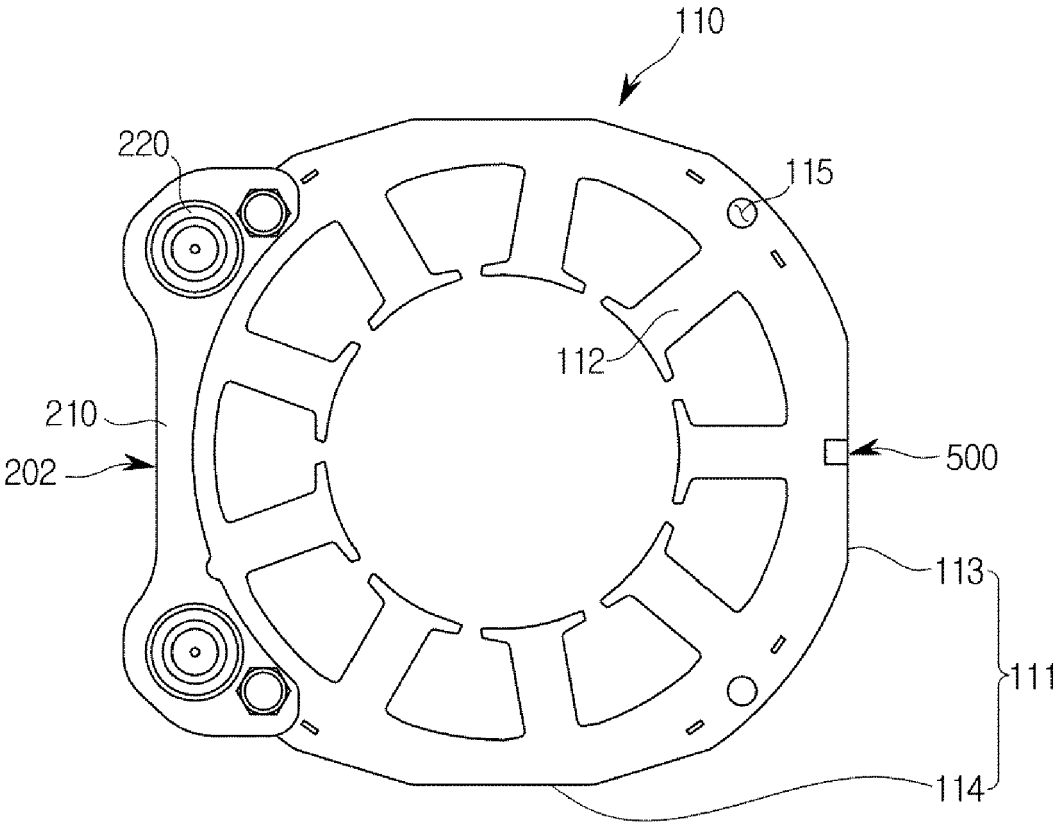


FIG. 11

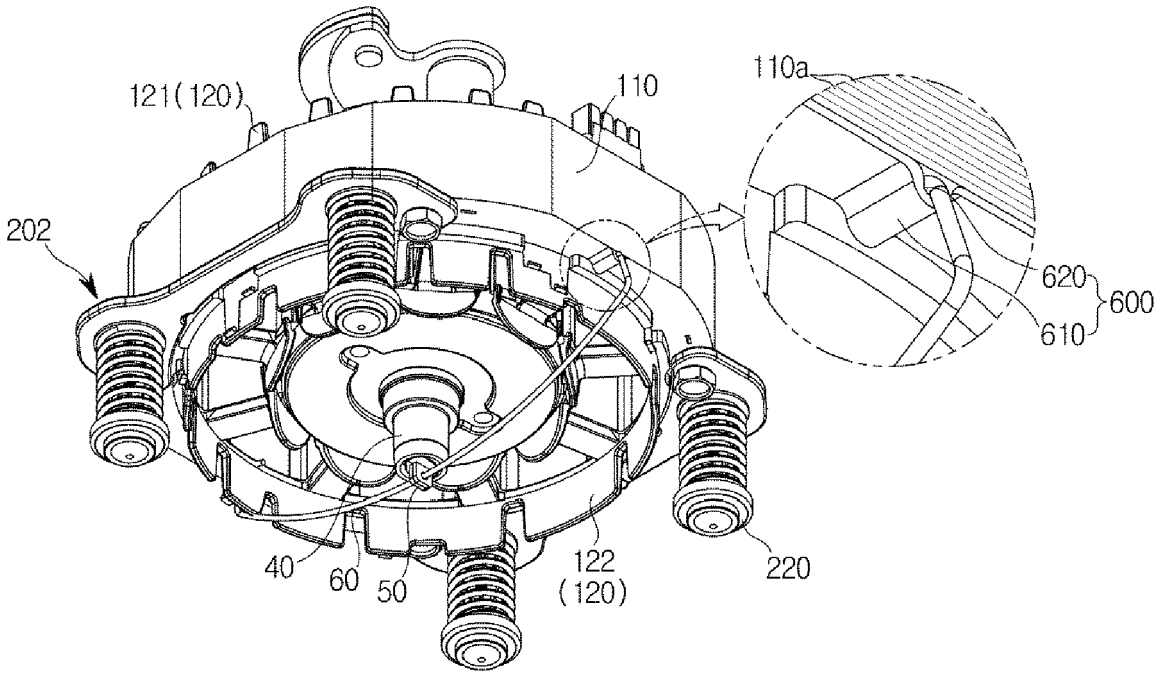
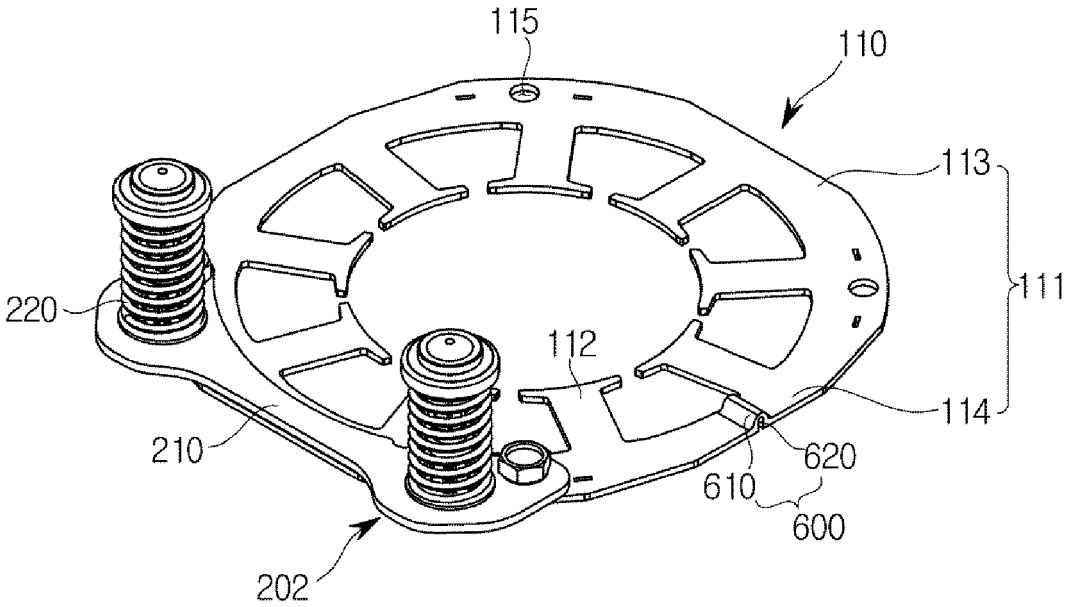


FIG. 12



Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 18 20 8169

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 00/01949 A1 (ZANUSSI ELETTROMECC [IT]; DELLBY FREDRIK [SE]; ZONTA CARLO [IT]) 13 January 2000 (2000-01-13) * page 4, lines 17-24; figures 1,2 *	1-15	INV. F04B39/02
X	EP 2 664 795 A2 (SAMSUNG ELECTRONICS CO LTD [KR]) 20 November 2013 (2013-11-20) * paragraphs [0038] - [0045]; figures 1-4 *	1-3, 11-15	
X	JP S60 119389 A (TOSHIBA KK) 26 June 1985 (1985-06-26) * figure 2 *	1-5,11	
X	DE 195 10 015 A1 (DANFOSS COMPRESSORS GMBH [DE]) 26 September 1996 (1996-09-26) * column 5, lines 8-17; figure 1 *	1,4, 11-14	
			TECHNICAL FIELDS SEARCHED (IPC)
			F04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 January 2019	Olona Laglera, C

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 20 8169

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

24-01-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0001949 A1	13-01-2000	BR 9907107 A	24-10-2000
		CN 1300347 A	20-06-2001
		DE 69905572 T2	25-09-2003
		DK 1092092 T3	02-06-2003
		EP 1092092 A1	18-04-2001
		ES 2193715 T3	01-11-2003
		IT PN980036 U1	03-01-2000
		JP 2002519589 A	02-07-2002
		US 6450785 B1	17-09-2002
		WO 0001949 A1	13-01-2000
EP 2664795 A2	20-11-2013	BR 112014028040 A2	08-08-2017
		CA 2874438 A1	21-11-2013
		CN 104302915 A	21-01-2015
		EP 2664795 A2	20-11-2013
		KR 20130127640 A	25-11-2013
		US 2013309119 A1	21-11-2013
		US 2014314589 A1	23-10-2014
		WO 2013172578 A1	21-11-2013
JP S60119389 A	26-06-1985	NONE	
DE 19510015 A1	26-09-1996	AU 4939896 A	08-10-1996
		DE 19510015 A1	26-09-1996
		EP 0815360 A1	07-01-1998
		WO 9629516 A1	26-09-1996

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82