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(54) **VANE TYPE COMPRESSOR**

(57) A vane type compressor 1 having a drive shaft 2 projecting outward of a housing 5 at a front end and accommodated in the housing 5 at a rear end effectively prevents vanes 4 from generating chattering noise by ensuring biasing of the vanes 4 against an inner peripheral surface of the cylinder 12, for example, in an initial run phase. A high-pressure introduction channel 50 with one end connected to the discharge fluid storage chamber 32 and the other end facing a front end surface of the rotor 3 and configured to communicate with a bottom portion of the vane groove 8 when the distal end of the vane 4 in the corresponding vane groove 8 is in a range

from a halfway of the discharge port 16 to the radially sealed section 40 is provided. The high-pressure introduction channel 50 includes a cylinder-side channel 51 formed in the cylinder 12 and communicating with the discharge fluid storage chamber 32 and a side-block-side channel 52 formed in the front side block 21 facing the front end surface of the rotor 3, and the cylinder-side channel 51 and the side-block-side channel 52 communicate with each other via a through hole 59a of a locating pin 59 configured to locate the cylinder 12 and the front side block 21.

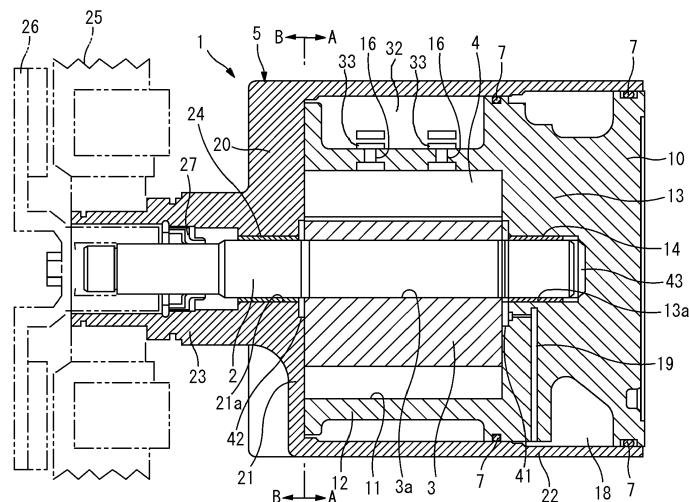


Fig. 1

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a vane type compressor and, specifically to a vane type compressor configured to achieve an effective noise (chattering noise) reduction caused by vibrations of vanes in an initial run phase.

2. Description of the Related Art

[0002] A vane type compressor typically includes: a cylinder having blocked-up both ends and an inner peripheral surface formed as a cam face, a rotor rotatably supported in the cylinder; vane grooves formed inward from an outer peripheral surface of the rotor; and vanes accommodated in the vane grooves and allowed to project from and retract into the vane grooves, and is configured to support the vanes in contact with an inner peripheral surface of the cylinder by using a centrifugal force generated by rotation of the rotor or a back pressure acting from back pressure chamber provided at bottoms of the vane grooves.

[0003] As such a compressor has a small pressure difference in an initial run phase, the vanes moving away from and landing again on the inner peripheral surface of the cylinder tends to generate collision noise (chattering noise) continuously for a significant period.

[0004] This phenomenon may appear particularly when a distal end of the vane is passing across a range from a halfway of a discharge port to an end of a point where the rotor and the inner peripheral surface of the cylinder are in sliding contact with each other (radially sealed section). More specifically, when the distal end of the vane 4 reaches the discharge port 16 (a direction of rotation of the vane in the drawing is indicated by a hollow arrow) as illustrated in Fig. 7, high pressure compressed in the compression chamber on the back side (back side in the direction of rotation of the vane) of a vane 4 moves around the distal end of the vane 4 toward a discharge port 16 and acts on the entirety of the distal end of the vane 4. However, as the back pressure (vane back pressure) acting on the bottom portion of the vane 4 in the initial run phase is not high enough, the vane cannot support the pressure acting on the distal end of the vane when the vane 4 passes by the discharge port. This phenomenon occurs more often when the discharge port 16 has a counterbore 16a formed on an inner peripheral surface of the cylinder at an opening end of the discharge port 16.

[0005] To solve such an inconvenience, the present applicant previously proposed a configuration including a depressed portion formed on an end surface of a rear side block on a compression chamber side to communicate with a bottom portion of a vane groove when a distal

end of a vane in the vane groove is in a range from a halfway of a discharge port to a radially sealed section. IN this configuration, the depressed portion communicates with a discharge fluid storage chamber adapted to store a fluid discharged from a discharge port via a communication channel (hereinafter, referred to as a high-pressure introduction channel) and guides the discharged fluid from the rear side of the rotor toward the bottom portion of the vane groove (back pressure chamber) to ensure biasing of the vane against the inner peripheral surface of the cylinder when the distal end of the vane is in the range from the halfway of the discharge port to the radially sealed section where chattering of the distal end of the vane often occurs (see Patent Literature 1).

Citation List

Patent Literatures

[0006] Patent Literature 1: JP-A-2014-190263

[0007] However, a front end of a drive shaft having a rotor fixed thereto, which needs to be directly connected to a drive source or needs to allow for mounting of power transmission members for transmitting the power of the drive source such as a pulley, an electromagnetic clutch, etc., projects outward of a housing through a front side block.

[0008] The front end of the drive shaft projecting outward from the front side block of such a configuration is subjected to atmospheric pressure, while a rear end of the drive shaft is subjected to a relatively high pressure in the compressor via, for example, a clearance between the rotor and the rear side block or a bearing, and thus the drive shaft is biased toward the front due to difference of pressures acting on both front and rear sides in the axial direction. This makes a clearance between the front end of the rotor and the front side block smaller than the clearance between the rear end of the rotor and the rear side block.

[0009] Consequently, the discharged fluid guided from the discharge fluid storage chamber to the end surface of the rear side block on the compression chamber side via the high-pressure introduction channel tends to leak from the clearance between the rear end of the rotor 3 and the rear side block 13, which may disadvantageously impair effective introduction of the discharged fluid to the bottom portion (back pressure chamber) of the vane groove when the distal end of the vane is in the range from the halfway of the discharge port to the radially sealed section. In addition, this tendency of leakage of the discharged fluid supplied from the discharge fluid storage chamber through the clearance between the rear end of the rotor and the rear side block may also result in disadvantageous removal of oil coat formed therebetween, which may cause lowering of a sealing effect with the oil coat and thus lowering of compression efficiency.

SUMMARY OF THE INVENTION

[0010] In view of such circumstances, a main object of the present invention is to provide a vane type compressor having a drive shaft projecting outward of a housing at a front end and accommodated in the housing at a rear end and configured to prevent vanes from generating chattering noise by ensuring biasing of the vanes against an inner peripheral surface of the cylinder, for example, in an initial run phase.

[0011] In order to achieve the above-described object, a vane type compressor according to the present invention includes: a housing; a cylinder having an inner peripheral surface formed as a cam face and constituting part of the housing; a pair of front and rear side blocks configured to block up both ends of the cylinder in an axial direction, the pair of front and rear side blocks constituting part of the housing; a drive shaft rotatably supported by the pair of side blocks; a rotor fixed to the drive shaft and rotatably accommodated in the cylinder; a radially sealed section where part of an outer peripheral surface of the rotor and part of the inner peripheral surface of the cylinder are in sliding contact with each other; a plurality of vane grooves formed in the rotor; a plurality of vanes slidably inserted into the vane grooves, the plurality of vanes projecting from and retracting into the vane grooves to cause distal ends thereof to slide along the cam face; a compression chamber defined by the rotor and the vanes in a space blocked up by the cylinder and the pair of side blocks; an intake port configured to suck a fluid into the compression chambers; a discharge port configured to discharge the fluid compressed in the compression chamber; and a discharge fluid storage chamber configured to store the fluid discharged from the discharge port, characterized by including a high-pressure introduction channel with one end connected to the discharge fluid storage chamber and the other end facing a front end surface of the rotor and configured to communicate with a bottom portion of the vane groove when the distal end of the vane in the corresponding vane groove is in a range from a halfway of the discharge port to the radially sealed section.

[0012] In this configuration, the discharge fluid storage chamber and the bottom portion of the vane groove communicate with each other via the high-pressure introduction channel in the front side of the rotor when the distal end of the vane in the corresponding vane groove is in a range from the halfway of the discharge port to the radially sealed section. A clearance between the front end surface of the rotor and the front side block is reduced by a biasing force to the front side caused by the pressure difference acting on both ends of the drive shaft and thus rarely allows the discharged fluid supplied from the discharge fluid storage chamber to leak therefrom, such that the discharged fluid is effectively introduced into the bottom portion of the vane grooves.

[0013] This configuration ensures a sufficient back pressure force in an area where the vanes tend to generate chattering noise, can support a pressure applied

to the distal end of the vane right after the distal end of the vane reaches the discharge port, and allows the vanes to be always in abutment with the cam face.

[0014] In addition, the discharged fluid rarely leaks through the clearance between the front end surface of the rotor 3 and the front side block and thus desirable sealing state is maintained without impairing the sealing effect of the oil between the front end surface of the rotor and the front side block.

[0015] When supplying the back pressure to the vane when the distal end of the vane is in a range from the radially sealed section to a point right before reaching the discharge port in the same manner as the related art, an oil accumulation chamber configured to store oil at a pressure corresponding to a pressure of the fluid discharged from the discharge port, an oil introduction groove provided on an end surface of at least one of the side blocks on the compression chamber side and configured to communicate with the bottom portion of the vane groove when the distal end of corresponding one of the plurality of the vanes is in a range from the radially sealed section to a point immediately before the discharge port, and an oil introduction channel configured to communicate the oil accumulation chamber and the oil introduction groove may be provided in addition to the configuration described above.

[0016] The high-pressure introduction channel may connect a cylinder-side channel formed in the cylinder and communicating with the discharge fluid storage chamber and a side-block-side channel formed in the front side block facing the front end surface of the rotor, and the cylinder-side channel and the side-block-side channel may communicate with each other via a through hole provided in a locating pin configured to locate the cylinder and the front side block.

[0017] This configuration eliminates the need for providing the high-pressure introduction channel and the mounting portion of the locating pin separately on the cylinder or the front side block, and thus higher layout flexibility is achieved.

[0018] The locating pin may be a spring pin for easiness of machining and assembly.

The housing may also be a combination of a first housing member integrally including the cylinder and the rear side block configured to block up the rear side of the cylinder, and a second housing member integrally including the front side block configured to block up a front side of the cylinder and a cylindrical portion that covers the outer periphery of first housing member.

[0019] As described thus far, the present invention provides a high-pressure introduction channel with one end connected to the discharge fluid storage chamber for storing fluid discharged from the discharge port and the other end facing a front end surface of the rotor, and communicating with a bottom portion of one of the vane grooves when the distal end of corresponding one of the plurality of the vanes is in a range from a halfway of the discharge port to the radially sealed section, and thus

can secure a sufficient back pressure force in the area where the vanes tend to generate chattering noise, so that the vanes are prevented from generating chattering noise by being biased toward the inner peripheral surface of the cylinder even in the initial run phase.

[0020] The high-pressure introduction channel provided so that the cylinder-side channel formed on the cylinder communicating with the discharge fluid storage chamber and the side-block-side channel formed in the front side block facing the front end surface of the rotor communicate each other via a through hole provided in the locating pin for locating the cylinder and the front side block eliminates the need for providing the high-pressure introduction channel and the mounting portion of the locating pin separately on the cylinder or the front side block, and thus higher layout flexibility is achieved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

Fig. 1 is a cross-sectional side view illustrating a vane type compressor according to the present invention. Fig. 2A is a cross-sectional view taken along the line A-A of the vane type compressor illustrated in Fig. 1. Fig. 2B is a cross-sectional view taken along the line B-B of the vane type compressor illustrated in Fig. 1. Fig. 3 is a perspective view illustrating a first housing member and a second housing member. Fig. 4 is a cross-sectional side view of the compressor illustrated in Fig. 1 for visualizing a high-pressure introduction channel. Fig. 5 is an enlarged cross-sectional view illustrating a mating portion between a cylinder and a front side block, where the high-pressure introduction channel is formed. Fig. 6A is a perspective view of an example of a locating pin in which a spring pin is employed. Fig. 6B is a perspective view of an example of the locating pin in which a cylindrical pin is employed. Fig. 7 is an explanatory drawing for explaining a force acting on a distal end of a vane when the vane passes by a discharge port.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] Referring now to the drawings, a vane type compressor of the present invention will be described.

[0023] Fig. 1 and Fig. 2 illustrate a vane type compressor using a working fluid as refrigerant, suitable for a refrigerating cycle. The vane type compressor 1 includes a drive shaft 2, a rotor 3 fixed to the drive shaft 2 and rotating with the rotation of the drive shaft 2, vanes 4 attached to the rotor 3, and a housing 5 rotatably supporting the drive shaft 2 and accommodating the rotor 3 and the vanes 4. In Fig. 1, the left side corresponds to a front side, and the right side corresponds to a right side.

[0024] The housing 5 includes a combination of two

members; a first housing member 10 and a second housing member 20. The first housing member 10 includes a cylinder 12 configured to accommodate a rotor 3 and having an inner peripheral surface formed as a cam face 11, and a rear side block 13 formed integrally with the cylinder 12 to block up the rear side of the cylinder in the axial direction. The inner peripheral surface (cam face 11) of the cylinder 12 is formed into a true circle in cross section and has an axial length substantially equal to the axial length of the rotor 3, which will be described later.

[0025] The second housing member 20 includes a front side block 21 that abuts a front end surface of the cylinder and blocks up the front side of the cylinder 12, and a cylindrical portion 22 formed integrally with the front side block 21 extending in the axial direction of the drive shaft 2 and surrounding an outer peripheral surface of the first housing member (cylinder 12 and the rear side block 13).

[0026] The first housing member 10 and the second housing member 20 are fastened in the axial direction with fasteners not illustrated such as bolts, and the rear side block 13 of the first housing member 10 and the cylindrical portion 22 of the second housing member 20 are hermetically sealed with an intermediary of a seal member 7 such as an O-ring.

[0027] The second housing member 20 includes a boss portion 23 formed integrally with and extending forward from the front side block 21. The boss portion 23 includes a pulley 25 rotatably fitted thereon for transmitting a rotational power to the drive shaft 2 and the rotational power is transmitted from the pulley 25 to the drive shaft 2 via an electromagnetic clutch 26.

[0028] The rear side block 13 and the front side block 21 support the drive shaft 2 via bearings 14, 24. A distal end of the drive shaft 2 projects through the front side block 21 of the second housing member 20 into the boss portion 23 and is hermetically sealed with respect to the boss portion 23 by a seal member 27 provided between the drive shaft 2 and the boss portion 23.

[0029] The rotor 3 is a true circle in cross section, receives the drive shaft 2 into an insertion hole 3a provided at an axial center O thereof, and is fixed to the drive shaft 2 with the axial centers aligned with each other. An axial center O' of the cylinder 12 and the axial center O of the rotor 3 (drive shaft 2) deviate from each other to form a radially sealed section 40 by an abutment between the outer peripheral surface of the rotor 3 and the inner peripheral surface (cam face 11) of the cylinder 12 at one point in the circumferential direction (deviate by half a difference between the inner diameter of the cylinder 12 and the outer diameter of the rotor 3). Inside a space blocked up by the cylinder 12, the rear side block 13 and the front side block 21 define a compressed space 30 between the inner peripheral surface (cam face 11) of the cylinder 12 and the outer peripheral surface of the rotor 3.

[0030] The outer peripheral surface of the rotor 3 includes a plurality of vane grooves 8 and the vanes 4 are slidably inserted into the respective vane grooves 8. The

vane grooves 8 open not only to the outer peripheral surface of the rotor 3, but also to an end surface facing the rear side block 13 and the front side block 21, and include at bottoms thereof back pressure chambers 8a defined therein by the vanes 4. The plurality of vane grooves 8 are formed equidistantly in the circumferential direction and, in this example, are formed in substantially parallel to each other at two positions having a phase difference of 180 degrees and defined by planes including the vanes 4 and planes parallel to the vanes 4 and including an axial center of the drive shaft 2 apart (offset) from each other by a predetermined distance.

[0031] The vanes 4 have a width along the axial direction of the drive shaft 2 equal to the axial length of the rotor 3, and have a length in the direction of insertion into the vane groove 8 (sliding direction) equal to the length of the vane groove 8 in the same direction. The vanes 4 are pushed out by oil or a refrigerant gas supplied to the back pressure chambers 8a of the vane grooves 8, which will be described later, and protrude from the vane grooves 8, such that the distal ends can come into abutment with the inner peripheral surface (cam face 11) of the cylinder 12.

[0032] Consequently, the vanes 4, which are slidably inserted into the vane grooves 8, divide the compressed space 30 into a plurality of compression chambers 31 each having a variable volume depending on the rotation of the rotor 3.

[0033] The second housing member 20 includes an inlet port, which is not illustrated, to introduce a working fluid (refrigerant gas) from the outside, and an outlet port, which is not illustrated, to discharge the working fluid to the outside. The cylinder 12 of the first housing member 10 includes an intake port 15 configured to communicate with the inlet port to supply the fluid from the vicinity of the front side of the radially sealed section 40 in the direction of rotation of the rotor 3 (direction indicated by an arrow on the rotor) into the compression chambers 31.

[0034] The cylinder 12 includes a discharge port 16 for discharging a fluid compressed in the compression chambers 31 in the vicinity of the rear side of the radially sealed section 40 in the direction of rotation of the rotor 3, and defines a discharge fluid storage chamber 32 for storing the compressed fluid discharged through the discharge port 16 with the cylindrical portion 22.

[0035] The discharge port 16 includes a counterbore 16a formed into a curved depressed shape at an opening end of the inner peripheral surface (cam face 11) of the cylinder 12 along the circumferential direction to discharge the compressed fluid therethrough. The discharge port 16 is blocked up openably by a discharge valve 33 provided in the discharge fluid storage chamber 32.

[0036] Reference numerals 35 in Fig. 2 denote screw holes for engaging fasteners.

[0037] The discharge fluid storage chamber 32 is provided between the cylinder 12 and the cylindrical portion 22 and extends over the circumferential direction, and

the discharged fluid discharged in this chamber is introduced into an oil separator 34 (illustrated in Fig. 4, which will be described later) provided in the rear side block 13, to separate oil and then discharge the oil from the outlet port. The high-pressure oil separated by the oil separator 34 accumulates in an oil accumulation chamber 18 formed between a lower portion of the rear side block 13 of the first housing member 10 and a lower portion of the cylindrical portion 22 of the second housing member 20.

[0038] As also illustrated in Fig. 3, a surface of the rear side block 13 facing an end surface of the rotor 3 includes an oil introduction groove 41 extending in the circumferential direction and depressed along the opening edge of a bearing bore 13a where the drive shaft 2 is to be inserted via the bearing 14. A surface of the front side block 21 facing the end surface of the rotor 3 also includes an oil introduction groove 42 formed by being depressed circumferentially along the opening edge of a bearing bore 21a where the drive shaft 2 is to be inserted via the bearing 24.

[0039] The oil introduction grooves 41 and 42 communicate with the bottom portions (back pressure chambers 8a) of the vane grooves 8 within a range of movement of the distal ends of the vanes 4 from the position of the radially sealed section 40 to a position about to reach the discharge port 16 (before the counterbore 16a).

[0040] The rear oil introduction groove 41 is connected to the oil accumulation chamber 18 via an oil introduction channel 19 having a narrowed portion.

[0041] This configuration thus causes the high-pressure oil stored in the oil accumulation chamber 18 to be fed to the rear oil introduction groove 41 formed in the rear side block 13 via the oil introduction channel 19 and then from the rear oil introduction groove 41 to sliding parts such as the bearing 14 and to a space 43 formed between the rear end of the drive shaft 2 and the rear side block 13, as well as to the back pressure chambers 8a of the rotor 3 when the discharge pressure increases. The oil fed to the back pressure chambers 8a presses the vanes 4 against the inner peripheral surface (cam face 11) of the cylinder 12.

[0042] The oil fed to the back pressure chambers 8a is supplied to the front oil introduction groove 42 when the back pressure chambers 8a communicate with the front oil introduction groove 42, and then is fed to the sliding part such as the bearing 24 via the front oil introduction groove 42.

[0043] The housing 5 includes a high-pressure introduction channel 50 configured to communicate with the discharge fluid storage chamber 32 at one end and face the front end surface of the rotor 3 at the other end as illustrated also in Fig. 4.

[0044] The high-pressure introduction channel 50 in this example connects a cylinder-side channel 51 formed in the cylinder 12 and communicating the discharge fluid storage chamber 32 with a side-block-side channel 52 formed in the front side block 21 and facing the front end surface of the rotor 3.

[0045] The cylinder-side channel 51 includes a radial channel bore 53 formed radially from the discharge fluid storage chamber 32 of the cylinder 12 and an axial channel bore 54 formed axially from the end surface of the cylinder 12 facing the front side block 21 and communicating with the radial channel bore 53 as illustrated also in Fig. 5.

[0046] The side-block-side channel 52 includes a first axial channel bore 55 formed in the front side block 21 axially from the surface facing the cylinder 12, a second axial channel bore 56 formed in the front side block 21 axially from the surface facing the front end surface of the rotor 3, and an inclined channel bore 57 formed obliquely from a peripheral surface of the boss portion 23 and communicating with the first axial channel bore 55 and the second axial channel bore 56. The inclined channel bore 57 is hermetically blocked up by the sealing member 58 at a portion opening to the peripheral surface of the boss portion 23.

[0047] The cylinder-side channel 51 and the side-block-side channel 52 communicate with each other via a through hole 59a provided in a locating pin 59 configured to locate the cylinder 12 and the front side block 21.

[0048] The locating pin 59, which is a spring pin (sprit pin), is press-fitted into the axial channel bore 54 of the cylinder-side channel 51 and is loosely fitted into the first axial channel bore 55 formed in the front side block 21. An area for press-fitting of the locating pin 59 of the axial channel bore 54 has a rather large diameter to avoid narrowing of the high-pressure introduction channel 50 by the position where the locating pin 59 is provided, and the locating pin 59 has an inner diameter substantially the same as the inner diameter of other portions of the high-pressure introduction channel 50.

[0049] The second axial channel bore 56 can communicate with one of the back pressure chambers 8a provided at the bottom portions of the vane grooves 8, and especially in this example, the second axial channel bore 56 communicates with the bottom portion (back pressure chamber 8a) of the vane groove 8 when the distal end of the corresponding vane 4 is in a range from the halfway of the discharge port 16 to the radially sealed section 40.

[0050] This allows an amount of oil corresponding to the discharge pressure supplied from the oil accumulation chamber 18 via the oil introduction channel 19 to be fed to the back pressure chambers 8a when the bottom portion (back pressure chamber 8a) of the vane groove 8 communicates with the oil introduction groove 41. When the bottom portion (back pressure chamber 8a) of the vane groove 8 communicates with the second axial channel bore 56 of the high-pressure introduction channel 50, the discharged fluid supplied from the discharge fluid storage chamber 32 via the high-pressure introduction channel 50 proceeds directly to the back pressure chambers 8a.

[0051] When the compressor 1 in this configuration starts and thus the rotor 3 starts rotation, the discharged gas compressed in the compression chamber 31 dis-

charges into the discharge fluid storage chamber 32 via the discharge port 16. However, the discharge pressure is not sufficiently high in the initial run phase, and the oil to be fed to the oil introduction groove 41 via the oil introduction channel 19 from the oil accumulation chamber 18 by the discharge pressure cannot provide a sufficient back pressure force to the vanes 4 right after the startup due to, for example, its viscous resistance. However, the bottom portion (back pressure chamber 8a) of the vane groove 8 comes into communication with the high-pressure introduction channel 50 when the distal end of the vane 4 reaches the halfway of the discharge port 16 (counterbore 16a), where the distal end of the vane 4 tends to come apart from the inner peripheral surface (cam face 11) of the cylinder 12, to introduce the discharged gas directly into the bottom portion (back pressure chamber 8a) of the vane groove 8. Such a direct supply of the discharged gas to the back pressure chambers 8a via the high-pressure introduction channel 50 immediately after the startup of the compressor 1 presses the vane 4 stably against the inner peripheral surface (cam face 11) of the cylinder 12 even when the distal ends of the vanes 4 pass by the discharge port 16 and prevents the impact sound (chattering noise) generated by the vanes 4 moving away from and landing again to the inner peripheral surface (cam face 11) of the cylinder 12.

[0052] In particular, a clearance between the front end of the rotor 3 and the front side block 21 is reduced by a biasing force toward the front side caused by the pressure difference acting on both ends of the drive shaft 2, and thus the discharged fluid supplied from the discharge fluid storage chamber 32 rarely leaks from the clearance and is effectively introduced into the bottom portion (back pressure chambers 8a) of the vane grooves 8. This reduces an occurrence of chattering more effectively than the configuration having the high-pressure introduction channel 50 on the rear side.

[0053] In addition, as the discharged fluid rarely leaks from the clearance between the front end surface of the rotor 3 and the front side block 21, no impairment of sealing effect of the oil existing therebetween occurs even when the discharged fluid is supplied via the high-pressure introduction channel 50. In contrast, the discharged fluid flows directly to the front end surface of the rotor 3 from the discharge fluid storage chamber 32 without through the oil separator, which advantageously maintain an oil sealing effect with the oil contained in the supplied discharged fluid.

[0054] The high-pressure introduction channel 50 provided on the front side as in the above-described configuration needs to extend across the cylinder 12 and the front side block 21. To this end, areas for forming the high-pressure introduction channel 50 and mounting the locating pin 59 for locating the cylinder 12 and the front side block 21 are required in theory at a mating portion between the cylinder 12 and the front side block 21. In contrast, the locating pin 59 in the configuration de-

scribed above has a cylindrical shape and is integrated with the high-pressure introduction channel 50, and thus higher layout flexibility is achieved for the high-pressure introduction channel 50 either by providing the locating pin 59 at the position for forming the first axial channel bore 55 or by forming the first axial channel at position where the locating pin is already mounted.

[0055] Although the description of the configuration given thus far is directed to the compressor having two vanes 4 as an example, the same configuration may be applied to vane type compressor having three or more vanes. Although the locating pin 59 has been described as the spring pin in the configuration given above as an example, a cylindrical pin as illustrated in Fig. 5(b) is also applicable.

Description of Reference Numerals and Signs

[0056]

- 1: vane type compressor
- 2: drive shaft
- 3: rotor
- 4: vane
- 5: housing
- 8: vane groove
- 8a: back pressure chambers
- 10: first housing member
- 11: cam face
- 12: cylinder
- 13: rear side block
- 15: intake port
- 16: discharge port
- 17: discharge chamber
- 18: oil accumulation chamber
- 19: oil communication channel
- 20: second housing member
- 21: front side block
- 31: compression chamber
- 32: discharge fluid storage chamber
- 50: high-pressure introduction channel
- 51: cylinder-side channel
- 52: side-block-side channel
- 59: locating pin

Claims

1. A vane type compressor (1) comprising:

- a housing (5);
- a cylinder (12) having an inner peripheral surface formed as a cam face (11) and constituting part of the housing (5);
- a pair of front and rear side blocks (21, 13) configured to block up both ends of the cylinder (12) in an axial direction, the pair of front and rear side blocks (21, 13) constituting part of the hous-

- ing (5);
- a drive shaft (2) rotatably supported by the pair of side blocks (21, 13);
- a rotor (3) fixed to the drive shaft (2) and rotatably accommodated in the cylinder (12);
- a radially sealed section (40) where part of an outer peripheral surface of the rotor (3) and part of the inner peripheral surface of the cylinder (12) are in sliding contact with each other;
- a plurality of vane grooves (8) formed in the rotor (3);
- a plurality of vanes (4) slidably inserted into the vane grooves (8), the plurality of vanes (4) projecting from and retracting into the vane grooves (8) to cause distal ends thereof to slide along the cam face (11);
- a compression chamber (31) defined by the rotor (3) and the vanes (4) in a space blocked up by the cylinder (12) and the pair of side blocks (21, 13);
- an intake port (15) configured to suck a fluid into the compression chamber (31);
- a discharge port (16) configured to discharge the fluid compressed in the compression chamber (31);
- a discharge fluid storage chamber (32) configured to store the fluid discharged from the discharge port (16); and
- a high-pressure introduction channel (50) with one end connected to the discharge fluid storage chamber (32) and the other end facing a front end surface of the rotor (3) and configured to communicate with a bottom portion of the vane groove (8) when the distal end of the vane (4) in the corresponding vane groove (8) is in a range from a halfway of the discharge port (16) to the radially sealed section (40).

2. The vane type compressor (1) according to claim 1, further comprising:

- an oil accumulation chamber (18) configured to store oil at a pressure corresponding to a pressure of the fluid discharged from the discharge port (16);
- an oil introduction groove (41) provided on an end surface of at least one of the side blocks (21, 13) on the compression chamber (31) side and configured to communicate with the bottom portion of the vane groove (8) when the distal end of corresponding one of the plurality of the vanes (4) is in a range from the radially sealed section (40) to a point immediately before the discharge port (16); and
- an oil introduction channel (19) configured to communicate the oil accumulation chamber (18) and the oil introduction groove (41).

3. The vane type compressor (1) according to claim 1 or 2,
wherein the high-pressure introduction channel (50) connects a cylinder-side channel (51) formed in the cylinder (12) and communicating with the discharge fluid storage chamber (32) to a side-block-side channel (52) formed in the front side block (21) facing the front end surface of the rotor (3), and
wherein the cylinder-side channel (51) and the side-block-side channel (52) communicate with each other via a through hole (59a) provided in a locating pin (59) configured to locate the cylinder (12) and the front side block (21). 5 10
4. The vane type compressor (1) according to claim 3, wherein the locating pin (59) is a spring pin. 15
5. The vane type compressor (1) according to any one of claims 1 to 4, wherein the housing (5) is a combination of a first housing member (10) integrally including the cylinder (12) and the rear side block (13) configured to block up the rear side of the cylinder (12), and a second housing member (20) integrally including the front side block (21) configured to block up a front side of the cylinder (12) and a cylindrical section (22) covering an outer periphery of the first housing member (10). 20 25

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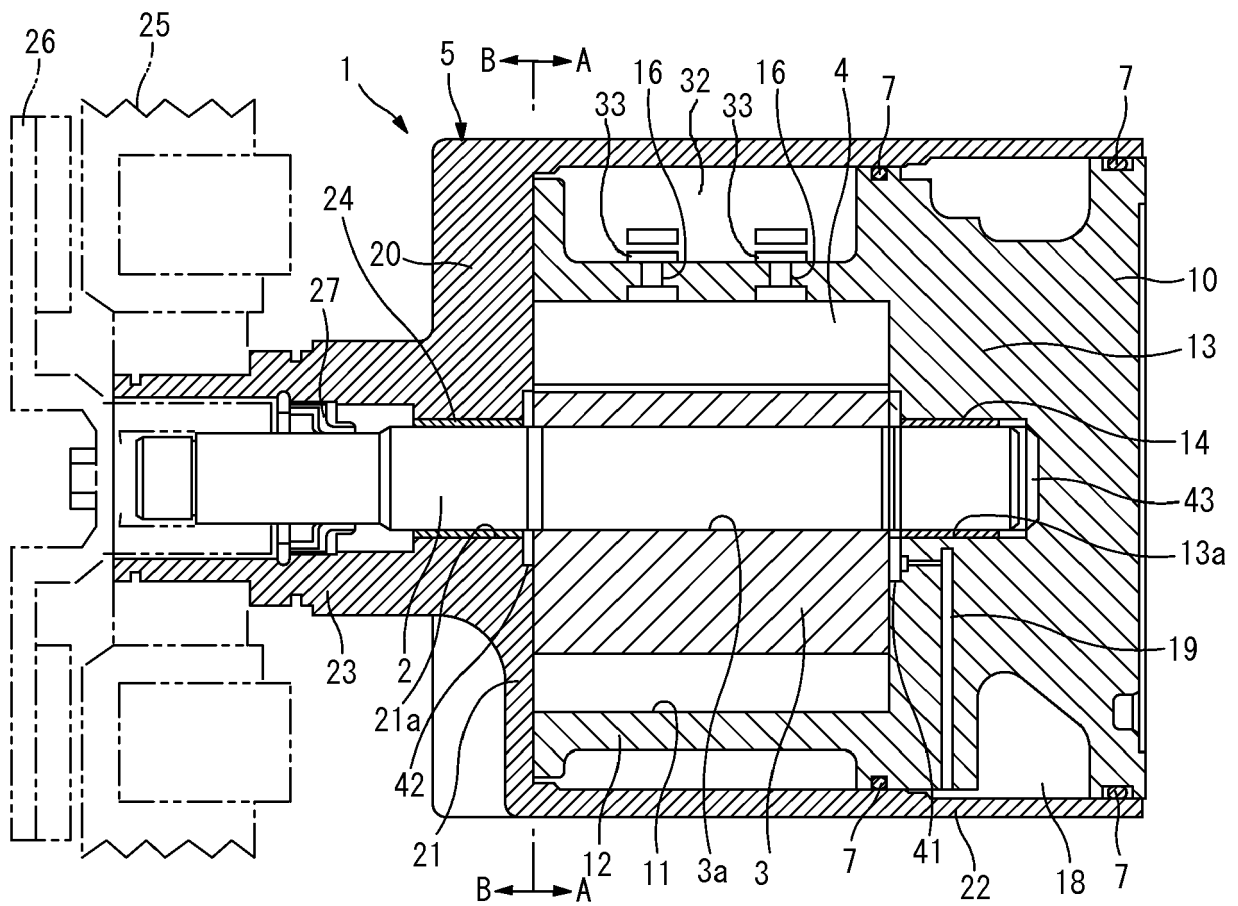
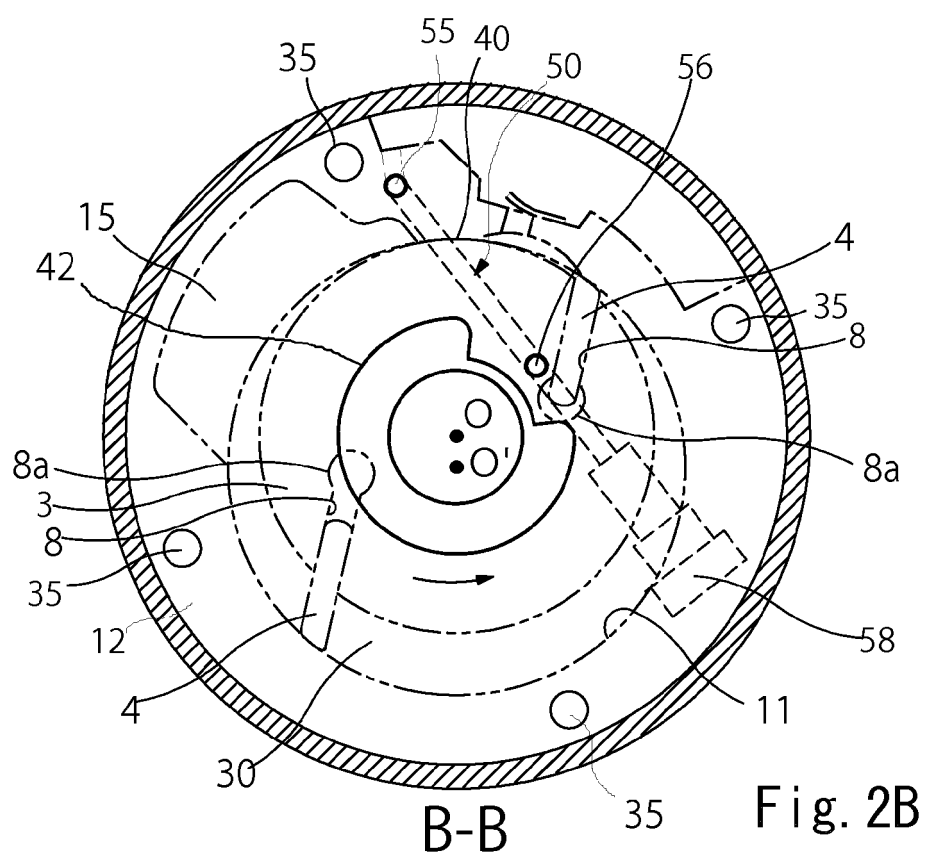
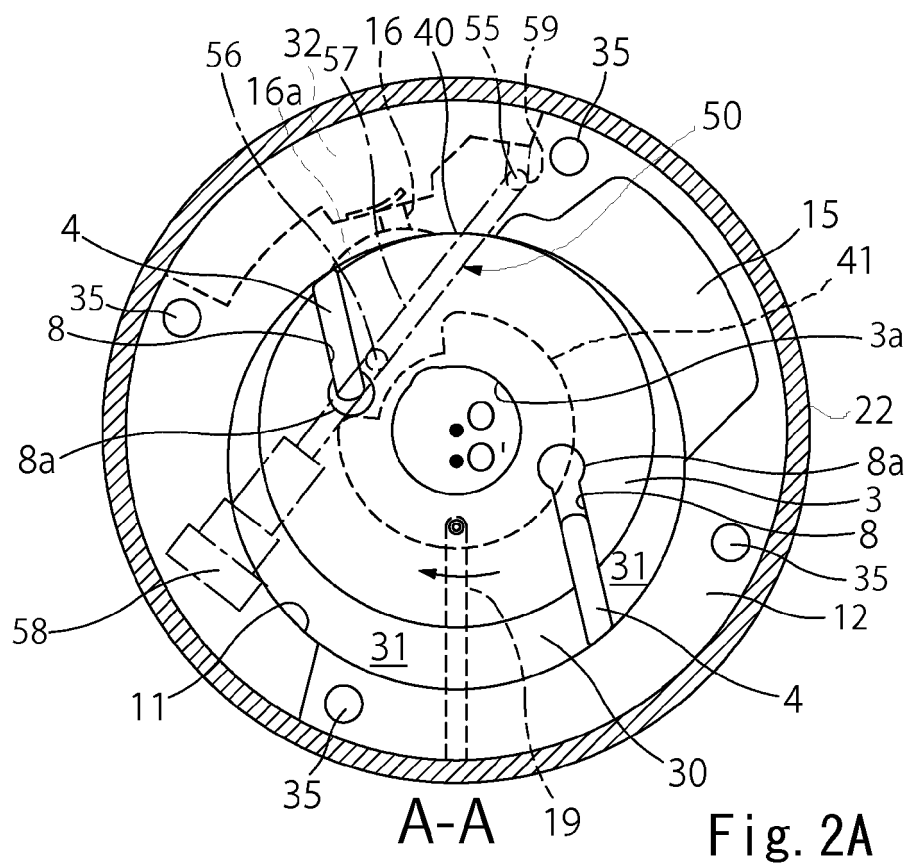


Fig. 1



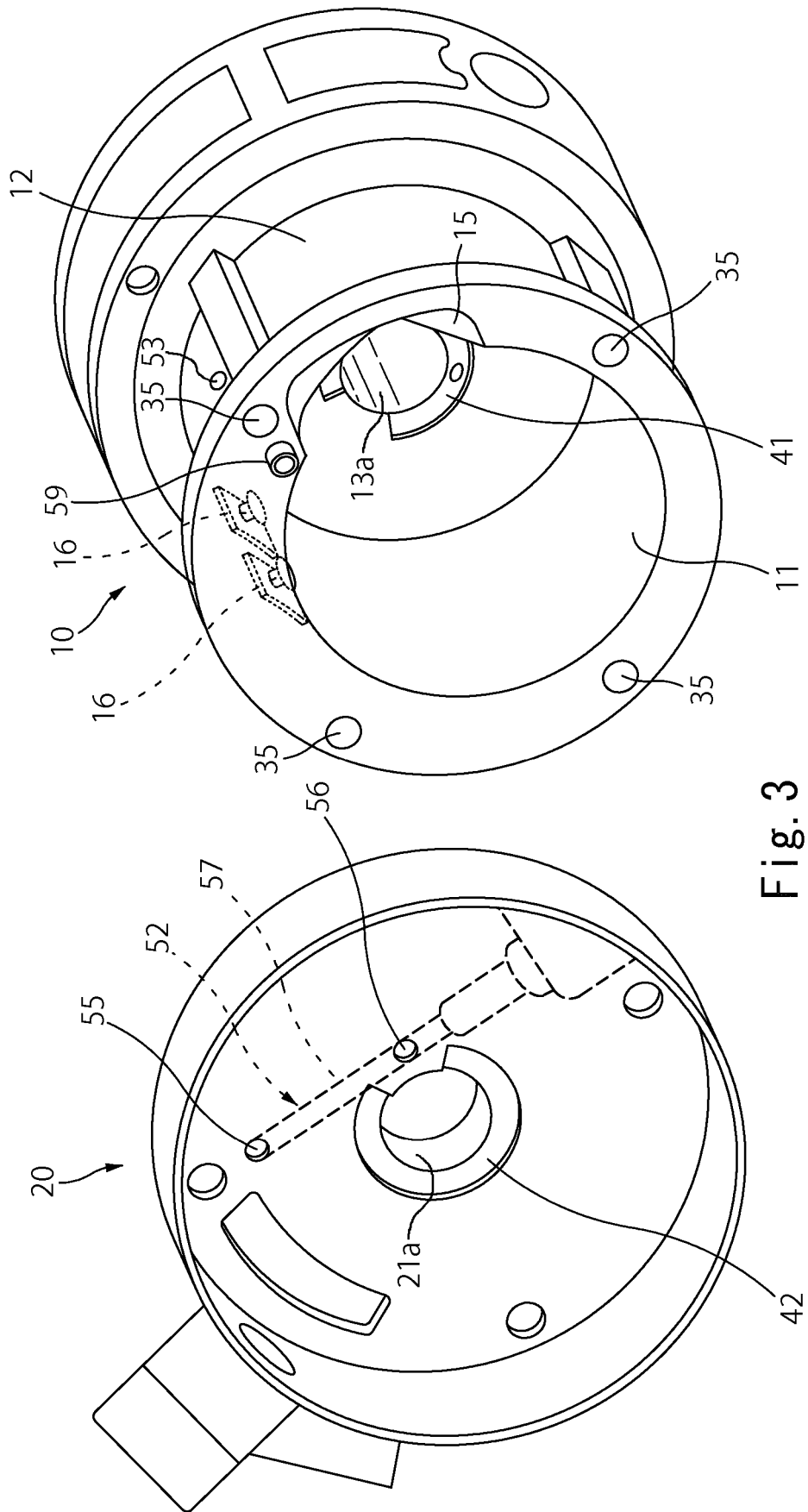


Fig. 3

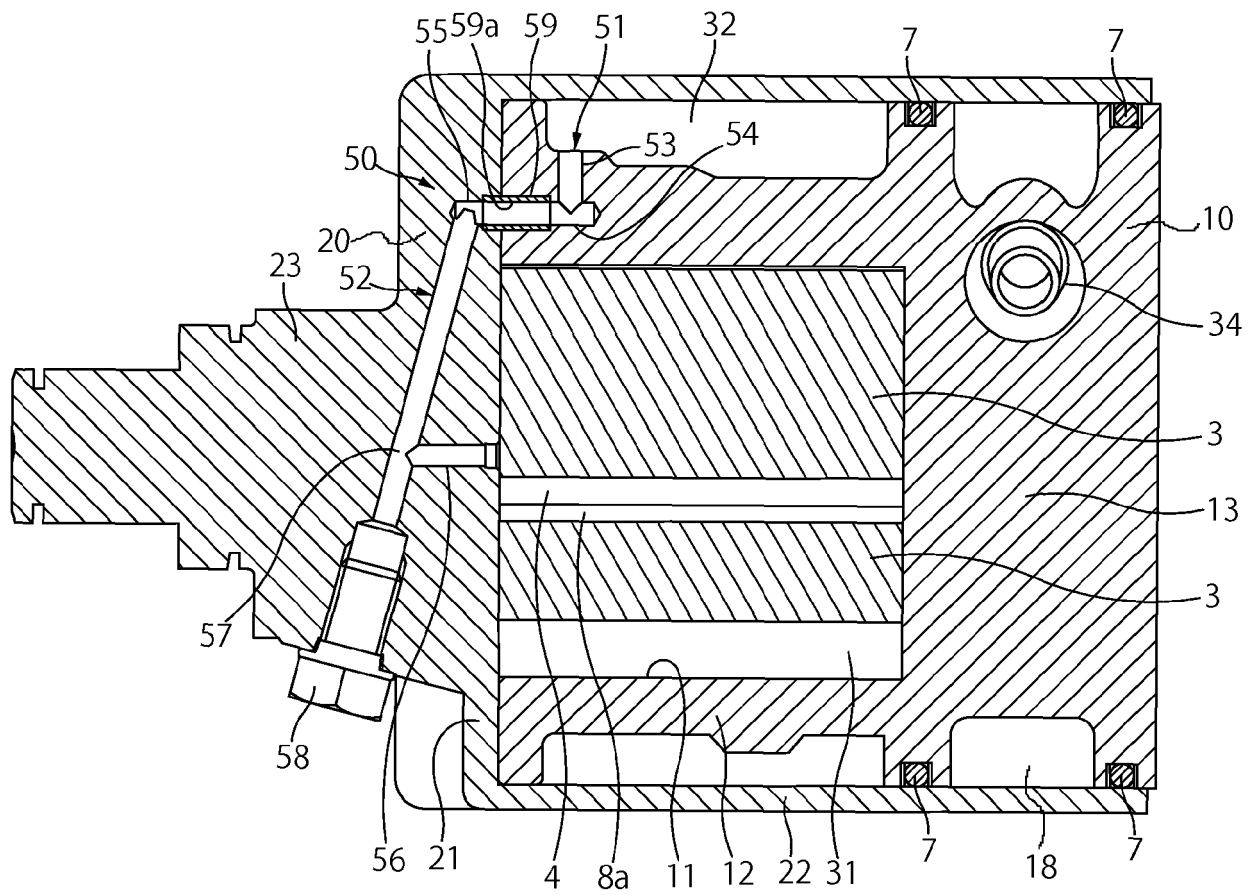


Fig. 4

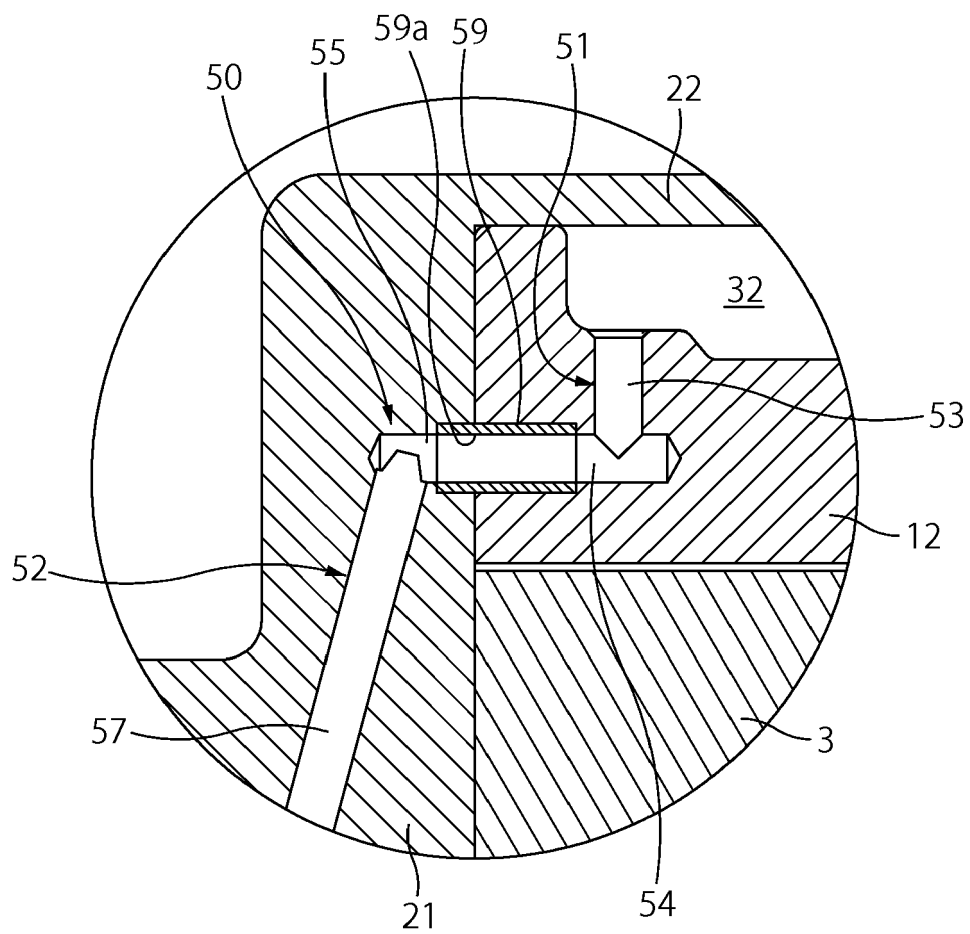


Fig. 5

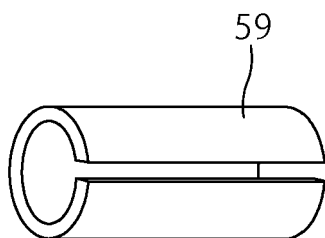


Fig. 6A

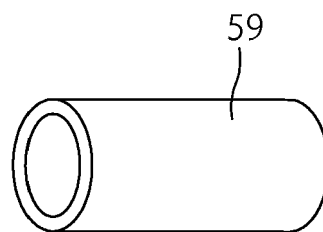


Fig. 6B

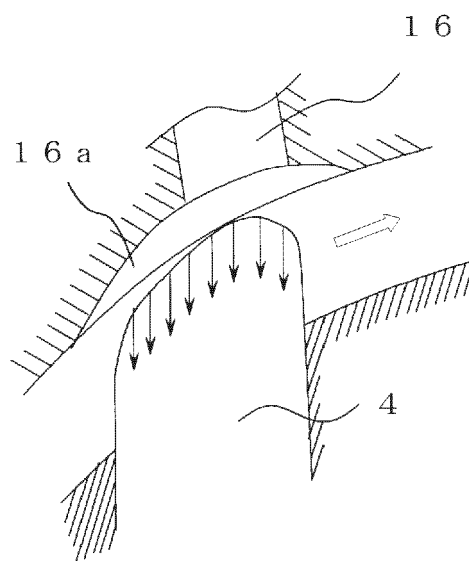


Fig. 7



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Application Number
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			F01C F04C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 22 October 2018	Examiner Durante, Andrea
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			

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