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(54) **PUMP, COMPRESSOR AND VEHICLE**

(57) The application provides a pump body, a compressor, and a vehicle. The pump body includes: two cylinders, each with a back pressure chamber; a crankshaft, with two eccentric portions; an intermediate plate, with an oil inlet channel, communicated with the cylinders, including inlet and outlet sections; two bearings, supporting the crankshaft, wherein an oil passage, communicated with the outlet section and a low-pressure chamber, is formed between the bearings and the crankshaft; blades, driven by the eccentric portion to reciprocate to control opening and closing of the inlet section, enabling lubricating oil to intermittently enter the oil passage through the back pressure chamber and the oil inlet channel. The application achieves oil intermittent supply, solving the problem of insufficient lubrication in the high-pressure chamber due to oil accumulation in the low-pressure chamber.

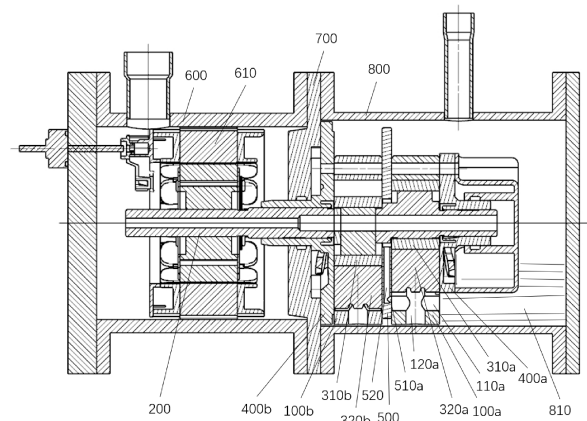


FIG. 8

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to the field of compressor technology, specifically to a pump body, a compressor, and a vehicle.

BACKGROUND

[0002] In modern automotive high-low back pressure rotary compressors, the lubrication of refrigerating oil is crucial. However, existing compressors have issues with uneven oil supply, particularly under conditions with significant differences in back pressure. Refrigerating oil tends to accumulate on the low-pressure side, leading to insufficient lubrication on the high-pressure side, which can cause internal wear and compressor failure, affecting performance and reliability of the air conditioning system. The current oil circuit design cannot effectively resolve the issues of inadequate oil back flow and uneven flow on the low-pressure side, resulting in an imbalance between oil supply and return, increased mechanical wear, and reduced stability and lifespan of the compressor.

[0003] Therefore, designing a lubrication scheme that ensures stable oil supply has become a key technical issue in enhancing compressor reliability and stability.

SUMMARY

[0004] To address the issues in the prior art, the objective of the present disclosure is to provide a pump body, a compressor, and a vehicle, aiming to overcome the difficulties in the prior art by optimizing a pump body structure, and addressing the problem of refrigerating oil accumulation on the low-pressure side in high-low back pressure rotary compressors, which leads to abnormal wear due to oil shortage on the high-pressure side.

[0005] The present disclosure provides a pump body applied to a compressor, wherein the pump body includes: two cylinders, wherein each cylinder has a blade slot, and each blade slot is provided with a back pressure chamber communicated with an oil sump of the compressor; a crankshaft with two eccentric portions, wherein each eccentric portion is disposed in one cylinder, and each eccentric portion is connected to a piston; an intermediate plate and two bearings, wherein the intermediate plate is disposed along an axial direction of the crankshaft between the two cylinders, the intermediate plate has an oil inlet channel communicated with the cylinders, the oil inlet channel includes an inlet section and an outlet section communicated with each other, the two bearings are disposed along the axial direction of the crankshaft on opposite sides of the two cylinders and support the crankshaft; wherein an oil passage communicated with the outlet section is formed between the bearings and the crankshaft, and the oil passage is communicated with a low-pressure chamber of the com-

pressor; blades, wherein one end of each blade is located in one blade slot, and the other end of the blade is driven by the eccentric portion of the crankshaft via the piston; wherein one end face of the blade along the axial direction of the crankshaft is in contact with the intermediate plate, and the blade is driven by the eccentric portion to perform a reciprocating motion in the blade slot to control opening and closing of the inlet section, enabling lubricating oil in the oil sump to intermittently enter the oil passage through the back pressure chamber and the oil inlet channel.

[0006] In some embodiments, an opening of the inlet section is provided on one end face of the intermediate plate along the axial direction of the crankshaft, and the opening and closing of the inlet section are controlled by one of the blades.

[0007] In some embodiments, the other opening of the inlet section is provided on the other end face of the intermediate plate along the axial direction of the crankshaft, and the opening and closing of the inlet section are controlled by the two blades, respectively.

[0008] In some embodiments, the back pressure chamber includes spring holes and through holes communicated with each other, and the two inlet sections provided on different end faces of the intermediate plate are respectively communicated with adjacent spring holes and are respectively controlled by adjacent blades for opening and closing.

[0009] In some embodiments, the inlet section is perpendicular to the end face of the cylinder, the outlet section is parallel to the end face of the cylinder, and the oil inlet channel intermittently communicates the lubricating oil in the oil sump with the oil passage.

[0010] In some embodiments, when the blade performs the reciprocating motion to expose the inlet section and communicate it with the back pressure chamber, the lubricating oil in the oil sump enters the oil passage through the back pressure chamber and oil inlet channel; when the blade performs the reciprocating motion to cover and close the inlet section, the oil inlet channel stops oil intake.

[0011] In some embodiments, the outlet section extends to a circumferential surface of an inner hole of the intermediate plate to form an oil outlet channel communicating with the oil passage.

[0012] In some embodiments, cross-sections of the inlet section and the outlet section are one or more of circular, elliptical, square, and irregular shapes.

[0013] Another aspect of the present disclosure provides a compressor, including a front shell assembly, a rear shell assembly, an intermediate partition plate, motor components, and the aforementioned pump body; wherein the rear shell assembly and the front shell assembly are connected on two sides of the intermediate partition plate, the rear shell assembly includes a high-pressure chamber, and the front shell assembly includes the low-pressure chamber; the motor components are disposed in the low-pressure chamber, the pump body is

disposed in the high-pressure chamber, the crankshaft extends from the high-pressure chamber into the low-pressure chamber and is connected to the motor components, and the oil sump is disposed in the high-pressure chamber.

[0014] Another aspect of the present disclosure provides a vehicle that includes the aforementioned compressor.

[0015] In summary, the present disclosure uses the reciprocating motion of the blades within the blade slots to control the opening and closing of the oil inlet, achieving intermittent supply of the refrigerating oil, effectively addressing the problem of insufficient lubrication on the high-pressure side due to oil accumulation in the low-pressure chamber in the prior art. By controlling the opening and closing of the oil inlet, the present disclosure regulates the oil supply, allowing the flow of lubricating oil to be adjusted according to the compressor's working state. The intermittent oil flow design helps control the supply speed of the lubricating oil, preventing poor oil return caused by excessively fast oil supply, thereby enhancing the stability and reliability of the compressor.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] By reading the detailed description of non-restrictive embodiments with reference to the following drawings, other features, objectives, and advantages of the present disclosure will become more apparent.

FIG. 1 is a sectional view of a pump body according to an embodiment of the present disclosure.

FIG. 2 is a lateral sectional view of an intermediate plate according to an embodiment of the present disclosure.

FIG. 3 is a structural schematic diagram of the intermediate plate according to an embodiment of the present disclosure.

FIG. 4 is a sectional view of the pump body according to another embodiment of the present disclosure.

FIG. 5 is a lateral sectional view of the intermediate plate according to another embodiment of the present disclosure.

FIG. 6 is a structural schematic diagram of the pump body with an oil inlet channel open according to an embodiment of the present disclosure.

FIG. 7 is a structural schematic diagram of the pump body with the oil inlet channel closed according to an embodiment of the present disclosure.

FIG. 8 is a sectional view of a compressor according to an embodiment of the present disclosure.

Reference numerals:

[0017] 100a: first cylinder, 100b: second cylinder, 110: through hole, 110a: first through hole, 110b: second through hole, 120a: first spring hole, 120b: second spring hole, 200: crankshaft, 310a: first piston, 310b: second

piston, 320: blade, 320a: first blade, 320b: second blade, 400: bearing, 400a: first bearing, 400b: second bearing, 500: intermediate plate, 510: inlet section, 510a: first inlet section, 510b: second inlet section, 520: outlet section, 600: front shell assembly, 610: motor components, 700: intermediate partition plate, 800: rear shell assembly, 810: oil sump.

DETAILED DESCRIPTION

[0018] The following provides specific examples to illustrate the embodiments of the present disclosure, allowing those skilled in the art to easily understand the other advantages and benefits of the present disclosure based on its disclosed content. the present disclosure can also be implemented or applied through various other specific embodiments or systems, and the details provided herein may be modified or altered in various ways based on different perspectives and application systems without departing from the spirit of the present disclosure. It should be noted that, in cases where there is no conflict, the embodiments and features of the embodiments described in the present disclosure can be combined with each other.

[0019] Below, with reference to the accompanying drawings, detailed descriptions of the embodiments of the present disclosure are provided so that those skilled in the relevant technical field can readily implement them. the present disclosure may take many different forms and is not limited to the embodiments described herein.

[0020] In the context of the present disclosure, the terms "an embodiment", "some embodiments", "example", "specific example", and "certain examples" indicate that specific features, structures, materials, or characteristics described in connection with the embodiment or example are included in at least one embodiment or example of the present disclosure. Furthermore, the described features, structures, materials, or characteristics may be combined in appropriate ways in one or more embodiments or examples. Additionally, unless there is a conflict, those skilled in the art can combine and integrate different embodiments or examples and their respective features as disclosed in the present disclosure.

[0021] Moreover, the terms "first" and "second" are used solely for descriptive purposes and should not be understood as indicating or implying relative importance or implicitly specifying the number of the indicated technical features. Therefore, features defined as "first" or "second" may explicitly or implicitly include at least one of such features. In the context of the present disclosure, the term "multiple" means two or more unless otherwise specifically defined.

[0022] To clarify the explanations in the present disclosure, components unrelated to the description are omitted, and identical or similar elements throughout the specification are assigned the same reference symbols.

[0023] Throughout the specification, when it is said that one component is "connected" to another, this includes not only cases of "direct connection" but also cases of "indirect connection" where other elements are placed between them. Furthermore, when it is said that a component "includes" certain elements, unless specifically stated otherwise, this does not exclude other elements but rather implies that additional elements may be included.

[0024] It should further be understood that the terms "comprises" and "includes" indicate the presence of features, steps, operations, elements, components, items, categories, and/or groups mentioned, but do not exclude the presence, appearance, or addition of one or more other features, steps, operations, elements, components, items, categories, and/or groups. The terms "or" and "and/or" used herein are interpreted as inclusive, meaning any one or any combination. For example, "A, B, or C" or "A, B, and/or C" means "any of the following: A; B; C; A and B; A and C; B and C; A, B, and C". Exceptions to this definition apply only when the combination of elements, functions, steps, or operations is inherently mutually exclusive in certain ways.

[0025] Unless otherwise defined, technical and scientific terms used herein, as well as other terms, have meanings consistent with the understanding of those skilled in the technical field to which the present disclosure belongs. Terms defined in commonly used dictionaries are additionally interpreted as having meanings consistent with relevant technical literature and the context of the present disclosure unless explicitly defined otherwise, and should not be overly interpreted as idealized or overly formal meanings.

[0026] In high-low back pressure compressors, the refrigerant flow path typically involves: refrigerant being drawn in through a suction port, entering from a low-pressure side to a high-pressure side, being compressed by a pump body of the compressor, and gradually increasing in temperature and pressure. When the pressure of the refrigerant reaches a certain value, it is released through an exhaust port and exits the compressor. To ensure effective lubrication of moving components inside the compressor, particularly rotational connection positions between bearings and the crankshaft, an oil sump is set on the high-pressure side of the compressor, supplying oil from the high-pressure side to the low-pressure side. This process provides necessary lubrication to the rotating components of the pump body, and during operation, the oil return flow path formed inside the compressor allows refrigerating oil to flow back from the low-pressure side to the high-pressure side.

[0027] However, in the prior art, there are certain issues with the oil supply and return method. Since the oil supply from the oil sump relies on the pressure difference between the high and low sides, the oil supply process is relatively fast and forceful, but the oil return path is longer and encounters significant flow resistance (i.e., the oil needs to flow back from the low-pressure side to the high-

pressure side). This asymmetry between oil supply and return disrupts the circulation balance of the compressor's oil system, resulting in an excessively fast oil supply rate and a slower oil return rate. This problem is particularly evident when the compressor operates over a wide range of conditions, further affecting the reliability and stability of the compressor and reducing the overall performance of the refrigeration system.

[0028] An embodiment of the present disclosure provides a pump body, applied to a compressor, primarily includes key components such as cylinders, a crankshaft, an intermediate plate, bearings, and blades. Wherein the pump body has two cylinders, each equipped with a blade slot connected to the compressor's oil sump through a back pressure chamber. The cylinder's structural design aims to provide suitable space to accommodate the movement of the blades. The crankshaft has two eccentric portions, each located within a cylinder and connected to a piston. The intermediate plate is disposed between the two cylinders and along an axial direction of the crankshaft. The intermediate plate includes an oil inlet channel with an inlet section and an outlet section. The two bearings are disposed along the axial direction of the crankshaft on opposite sides of the two cylinders and support the crankshaft. Wherein an oil passage communicated with the outlet section is formed between the bearings and the crankshaft, and the oil passage is communicated with a low-pressure chamber of the compressor. One end of the blade is located in the blade slot, while the other end is driven by the eccentric portion of the crankshaft through the piston. One end face of the blade along the axial direction of the crankshaft is in contact with the intermediate plate. Driven by the eccentric portion of the crankshaft, the blade reciprocates, controlling the opening and closing of the oil inlet channel, allowing refrigerating oil to intermittently enter the oil passage through the back pressure chamber and oil inlet channel for lubrication. By adjusting the open and closed states of the oil inlet channel, the supply of refrigerating oil is intermittent, effectively preventing oil accumulation in the low-pressure chamber. The lubricating oil provides lubrication to various friction pairs, such as the relatively moving bearings, the cylinders, the intermediate plate, the blades, and the pistons, addressing the issue of insufficient lubrication in the high-pressure chamber due to uneven oil supply in the prior art.

[0029] FIG. 1 is a sectional view of the pump body according to an embodiment of the present disclosure, FIG. 2 is a lateral sectional view of the intermediate plate according to an embodiment of the present disclosure, FIG. 3 is a structural schematic diagram of the intermediate plate according to an embodiment of the present disclosure. As shown in FIGS. 1 to 3, in one embodiment, the pump body includes two cylinders, such as a first cylinder 100a and a second cylinder 100b, designed to accommodate and compress refrigerant gas. Each cylinder is equipped with a blade slot, with each blade slot

connected to the compressor's oil sump through a back pressure chamber. The pump body also includes a crankshaft 200 with two eccentric portions. Each eccentric portion is located within its respective cylinder, with a piston sleeved outside the eccentric portion, such as a first piston 310a in the first cylinder 100a and a second piston 310b in the second cylinder 100b. The crankshaft 200, through the movement of the eccentric portions, drives the pistons and blades, such as the second piston 310b and the second blade 320b, to perform a reciprocating motion. When the crankshaft 200 rotates, the eccentric portions drives the pistons to move, which in turn drives the reciprocating motion of the blades. The intermediate plate 500 is axially positioned between the two cylinders along the crankshaft, with the intermediate plate 500 having an oil inlet channel that communicates with the cylinders. The oil inlet channel includes an inlet section 510 and an outlet section 520, such as the second cylinder 100b having a second inlet section 510b and an outlet section 520. Two bearings are axially positioned along the crankshaft 200 on opposite sides of the cylinders, supporting the crankshaft's rotation. An oil passage formed between the bearings and the crankshaft connects with the outlet section 520 and the compressor's low-pressure chamber. One end of the blade is located in the blade slot, while the other end is connected to the eccentric portion of the crankshaft 200 through the piston. For example, the first blade 320a in the first cylinder 100a is connected to the eccentric portion of the crankshaft 200 through the first piston 310a. One side of the blade is in contact with the end face of the intermediate plate 500, for example, the second blade 320b is in contact with the end face of the intermediate plate 500 on the side of the second cylinder 100b. Under the action of the crankshaft 200, the blade reciprocates within the blade slot, controlling the opening and closing of the oil inlet channel. In this embodiment, the back pressure chamber allows the lubricating oil in the oil sump to flow to the respective cylinder and oil inlet channel during pump body operation, thus lubricating the friction pairs and ultimately supplying to the low-pressure chamber through the oil passage. The pump body controls the opening and closing of the oil inlet channel's inlet section 510 through the reciprocating motion of the blades, allowing the lubricating oil to intermittently enter the oil passage, preventing excessive accumulation of oil in the low-pressure chamber. By intermittently controlling the supply of the lubricating oil, effective lubrication of the compressor's internal friction pairs is ensured, thereby improving the stability and lifespan of the compressor.

[0030] In some embodiments, the opening of the inlet section 510 is located on an end face of the intermediate plate 500 along the axial direction of the crankshaft 200, with one blade controlling the opening and closing of the inlet section 510. Specifically, as shown in FIG. 1, the opening of the second inlet section 510b is positioned on the end face of the intermediate plate 500 on the side of the second cylinder 100b along the axial direction of the

crankshaft 200. The second piston 310b, by connecting to the eccentric portion of the crankshaft 200, drives the second blade 320b to reciprocate within the blade slot, with the second blade 320b controlling the opening and closing of the second inlet section 510b. The embodiment of the present disclosure is not limited to this; in other embodiments, the inlet section 510 may also be positioned on the end face of the intermediate plate 500 on the side of the first cylinder 100a, with the opening and closing controlled by the reciprocating motion of the first blade 320a. The embodiment of the present disclosure does not restrict the specific position of the oil inlet channel's inlet section 510 on the intermediate plate 500. Those skilled in the art can design the position of the inlet section 510 on the intermediate plate based on the lubrication needs of different pump bodies and the cooperative relationship between the inlet section 510 and the blade's back pressure chamber.

[0031] In some embodiments, another opening of the inlet section 510 is located on the opposite end face of the intermediate plate 500 along the axial direction of the crankshaft 200, and the opening and closing of the inlet section 510 is controlled by two blades, respectively. FIG. 4 is a sectional view of the pump body according to an embodiment of the present disclosure, FIG. 5 is a lateral sectional view of the intermediate plate of the present disclosure, as shown in FIGS. 4 and 5, the intermediate plate 500 has openings for the inlet section 510 of the oil inlet channel on both end faces situated between the first cylinder 100a and the second cylinder 100b, namely the first inlet section 510a and the second inlet section 510b. Similar to the previous embodiment, the opening and closing of the first inlet section 510a is controlled by the reciprocating motion of the first blade 320a, and the opening and closing of the second inlet section 510b is controlled by the reciprocating motion of the second blade 320b. Both the first inlet section 510a and the second inlet section 510b are communicated with the outlet section 520. However, the present disclosure is not limited to this; in other embodiments, each inlet section 510 may be individually designed with its own corresponding outlet section 520 according to different design requirements. The opening and closing of the first inlet section 510a is controlled by the reciprocating motion of the first blade 320a. The present disclosure optimizes the supply of lubricating oil within the compressor cylinders by providing multiple inlet sections 510 on the intermediate plate 500, each controlled independently by a blade. This flexible design for oil supply can be adapted to meet the requirements of different compressor structures or operating conditions, offering strong versatility and adjustability.

[0032] In some embodiments, the back pressure chamber includes spring holes and through holes communicated with each other, and the two inlet sections on different end faces of the intermediate plate are respectively communicated with adjacent spring holes and are respectively controlled by adjacent blades for opening

and closing. In this embodiment, the back pressure chamber includes a first through hole 110a and a first spring hole 120a at the lower part of the blade slot in the first cylinder 100a, and a second through hole 110b and a second spring hole 120b at the lower part of the blade slot in the second cylinder 100b. In each cylinder, the connectivity between the through holes and spring holes at the lower part of the blade slot and the compressor's oil sump allows lubricating oil to flow through the through holes and the spring holes, maintaining a certain oil pressure within the blade slot and ensuring that oil enters the inlet channel when the blade controlling the inlet section to open. In this way, the lubricating oil ensures good lubrication of the compressor's friction pairs and other components, preventing excessive wear and failure. During the implementation of this embodiment, the design of the back pressure chamber and the control method for opening and closing the inlet sections can be adjusted according to specific compressor design requirements. For example, the size, shape, and position of the through holes and the spring holes within the back pressure chamber can be varied according to the cylinder's size and operating conditions to achieve optimal oil distribution. Additionally, the material, shape, and fit of the blades with the pistons can be adjusted based on the actual usage requirements of the compressor.

[0033] In some embodiments, the outlet section 520 supplies oil through the lubrication path of the inlet section 510. In this embodiment, the outlet section 520 is a blind hole or a blocked through hole, and the outlet section 520 does not directly contact the lubricating oil in the oil sump that is connected to the lubricating oil path through the back pressure chamber. Instead, the lubricating oil in the outlet section 520 is supplied through the lubricating path of the inlet section 510. As shown in FIG. 2, a blind hole is a hole that does not pass through the outer circumferential surface of the middle plate 500. As shown in FIG. 5, the through hole is a hole that penetrates the outer circumferential surface of the middle plate 500. However, a blocking structure is adopted to block the end of the hole that penetrates the outer circumferential surface of the middle plate 500, so that the outlet section 520 does not have a direct communication channel with the refrigeration oil, but the lubricating oil is supplied through the inlet section 510. By designing different forms of the outlet section 520 as a blind hole or a blocked through hole, used in conjunction with the lubrication path of the inlet section 510, the intermittent flow of lubricating oil can be effectively controlled, ensuring that the oil enters the oil passage as required by design and avoiding direct connection with oil channels that are not intended to be contacted.

[0034] In some embodiments, the inlet section 510 is perpendicular to the end face of the cylinder, and the outlet section 520 is parallel to the end face of the cylinder, and the oil inlet channel intermittently communicates the lubricating oil in the oil sump with the oil passage. In this embodiment, the perpendicular design

of the inlet section 510 to the end face of the cylinder allows lubricating oil to enter the oil passage directly and maintain stable flow. The parallel alignment of the outlet section 520 with the end face of the cylinder further ensures that there are no unnecessary changes or resistance in the flow of the lubricating oil, maintaining stable flow of the oil. Due to the perpendicular design of the inlet section 510, the oil can enter the oil passage directly without extensive contact with cylinder walls, thereby reducing friction loss. The oil flows parallel through the outlet section 520, ensuring uniform lubrication.

[0035] In some embodiments, the outlet section 520 extends to a circumferential surface of an inner hole of the intermediate plate 500 to form an oil outlet channel communicating with the oil passage, wherein the oil passage can be an oil outlet hole. In this embodiment, the oil outlet hole communicates with the oil passage, ensuring that the lubricating oil can enter the oil passage directly and continue to flow. This embodiment ensures that the lubricating oil flows from the inlet section 510 through the outlet section 520, eventually passing through the oil outlet hole into the oil passage, forming a closed lubricating oil flow channel, thereby ensuring continuous and stable lubrication.

[0036] In some embodiments, the cross-section of the inlet section 510 and the outlet section 520 can be one or more of circular, elliptical, square, and irregular shapes. In this embodiment, by changing the cross-section shape of the inlet section 510 and the outlet section 520, the flow path and flow rate of the oil can be adjusted. Different cross-section shapes (such as circular, elliptical, square, or irregular) can have varying effects on the flow resistance, flow speed, and distribution of the oil. For example, a circular cross-section generally offers lower flow resistance, suitable for supplying larger volumes of lubricating oil, while elliptical or square cross-sections may be suitable for scenarios requiring flow rate or pressure control. Irregular cross-sections may be used in specific designs to optimize the flow characteristics of the oil. When selecting the cross-section shapes of the inlet section 510 and the outlet section 520, customization can be done based on the specific working requirements and spatial layout of the compressor, and the embodiment of the present disclosure is not specifically limited.

[0037] In some optional embodiments, when the blade 320 reciprocates to expose the inlet section 510 and communicate with the back pressure chamber, the lubricating oil in the oil sump enters the oil passage through the back pressure chamber and the oil inlet channel. When the blade 320 reciprocates to cover the inlet section 510 and close it, the oil inlet channel stops supplying oil. FIG. 6 is a structural schematic diagram of the pump body with the oil inlet channel open, as shown in FIG. 6, the blade 320 is connected to the crankshaft 200 via a piston and reciprocates within the blade slot as the crankshaft 200 rotates. When the blade 320 moves upward as shown in FIG. 6, the inlet section 510 is exposed

and communicates with the through hole 110 of the back pressure chamber, allowing lubricating oil from the oil sump to enter the oil passage through the back pressure chamber and the oil inlet channel, thereby lubricating the friction pairs inside the pump body. FIG. 7 is a structural schematic diagram of the pump body with the oil inlet channel closed, as shown in FIG. 7, when the blade 320 moves downward as shown in FIG. 7, the inlet section 510 is covered by the blade 320, the opening of the oil inlet channel is closed, and the communication between the inlet section 510 and the through hole 110 of the back pressure chamber is blocked by the blade 320, thereby stopping the supply of the lubricating oil to the oil inlet channel. In this embodiment, the end face of the blade covers more than 70% of the area of the oil inlet, but the embodiment of the present disclosure is not limited to this. The back pressure chamber, through its communication with the oil sump, can receive and store the lubricating oil. When the blade 320 controls the inlet section 510 to expose, the oil in the back pressure chamber is guided to the oil inlet channel and then transmitted through the oil passage to the lubrication points of the compressor. The design of the back pressure chamber ensures that the oil can be stored under a certain pressure, thereby ensuring stable flow and pressure during the oil supply process.

[0038] FIG. 8 is a sectional view of the compressor according to an embodiment of the present disclosure. As shown in FIG. 8, the embodiment of the present disclosure also provides a compressor, which includes a front shell assembly 600, a rear shell assembly 800, an intermediate partition plate 700, motor components 610, and the aforementioned pump body. The rear shell assembly 800 is connected to the front shell assembly 600 on both sides of the intermediate partition 700. The rear shell assembly 800 includes a high-pressure chamber, while the front shell assembly 600 includes a low-pressure chamber. The motor components 610 are positioned within the low-pressure chamber, and the pump body is located within the high-pressure chamber. The crankshaft 200 extends from the high-pressure chamber into the low-pressure chamber and is connected to the motor components 610. An oil sump 810 is situated within the high-pressure chamber. In the embodiment of the present disclosure, the crankshaft 200 drives the pistons and the blades, for example, the second piston 310b drives the second blade 320b in a reciprocating motion. When the crankshaft 200 rotates, the eccentric portion pushes the pistons to reciprocate, and the motion of the piston further drives the blades to reciprocate. The intermediate plate 500 is axially positioned between the two cylinders along the crankshaft. The intermediate plate 500 includes an oil inlet channel that communicates with the interior of the cylinders, and the oil inlet channel includes an inlet section 510 and an outlet section 520. For example, a second inlet section 510b and an outlet section 520 are provided on the end face of the intermediate plate 500 towards the second cylinder 100b.

Two bearings are axially positioned along the crankshaft 200 on opposite sides of the cylinders, supporting the rotation of the crankshaft 200. An oil passage is formed between the bearings and the crankshaft, and the oil passage is communicated with the outlet section 520 and the compressor's low-pressure chamber. One end of the blade is located in the blade slot, while the other end is connected to the eccentric portion of the crankshaft 200 via a piston. For example, the first blade 320a in the first cylinder 100a is connected to the eccentric portion of the crankshaft 200 via the first piston 310a. One side of the blade is in contact with the end face of the intermediate plate 500. For example, the second blade 320b is in contact with the end face of the intermediate plate 500 on the side of the second cylinder 100b. Under the action of the crankshaft 200, the blade reciprocates within the blade slot, thereby controlling the opening and closing of the inlet section 510 of the oil inlet channel. During the operation of the pump body, the lubricating oil in the oil sump 810 intermittently flows to the corresponding cylinder and oil inlet channel, and is eventually supplied to the low-pressure chamber through the oil passage, thereby lubricating the friction pairs. The oil then flows back to the oil sump through the corresponding oil return path, completing the cycle of oil supply and return to lubricate the compressor and the pump body components. The pump body controls the opening and closing of the inlet section 510 of the oil inlet channel through the reciprocating motion of the blades, allowing the lubricating oil to intermittently enter the oil passage and preventing excessive accumulation of oil in the low-pressure chamber. By intermittently controlling the supply of lubricating oil, effective lubrication of the internal friction pairs of the compressor is ensured, thereby improving the operational stability and service life of the compressor.

[0039] The present disclosure also provides a vehicle that includes the compressor in any of the embodiments aforementioned. The vehicle may further include a refrigeration system, which includes the compressor. The refrigeration system is used to provide cold air or hot air inside the vehicle, thereby ensuring the comfort of the interior environment of the vehicle.

[0040] The present disclosure proposes an improved technical solution to address the issues in the prior art, optimizing the oil supply and return processes within the compressor through a more rational oil circuit design and control mechanism. The present disclosure achieves a balance between oil supply and return, thereby enhancing the operational stability and reliability of the compressor under different working conditions. The technical solution of the present disclosure, through innovative structural design and operational principles, not only resolves the imbalance in the oil supply and return process of traditional compressors, but also improves the overall performance and long-term stable operation capability of the compressor.

[0041] The above content provides a further detailed explanation of the present disclosure in conjunction with

specific preferred embodiments. The specific implementation of the present disclosure should not be considered limited to these descriptions. For those skilled in the technical field of the present disclosure, various simple deductions or substitutions can be made without departing from the concept of the present disclosure, and these should be considered within the protection scope of the present disclosure.

Claims

1. A pump body, applied to a compressor, **characterized in that** the pump body comprises:

two cylinders, wherein each cylinder has a blade slot, and each blade slot is provided with a back pressure chamber communicated with an oil sump of the compressor;

a crankshaft with two eccentric portions, wherein each eccentric portion is disposed in one cylinder, and each eccentric portion is connected to a piston;

an intermediate plate and two bearings, wherein the intermediate plate is disposed along an axial direction of the crankshaft between the two cylinders, the intermediate plate has an oil inlet channel communicated with the cylinders, the oil inlet channel comprises an inlet section and an outlet section communicated with each other, the two bearings are disposed along the axial direction of the crankshaft on opposite sides of the two cylinders and support the crankshaft; wherein an oil passage communicated with the outlet section is formed between the bearings and the crankshaft, and the oil passage is communicated with a low-pressure chamber of the compressor;

blades, wherein one end of each blade is located in one blade slot, and the other end of the blade is driven by the eccentric portion of the crankshaft via the piston; wherein one end face of the blade along the axial direction of the crankshaft is in contact with the intermediate plate, and the blade is driven by the eccentric portion to perform a reciprocating motion in the blade slot to control opening and closing of the inlet section, enabling lubricating oil in the oil sump to intermittently enter the oil passage through the back pressure chamber and the oil inlet channel.

2. The pump body according to claim 1, wherein an opening of the inlet section is provided on one end face of the intermediate plate along the axial direction of the crankshaft, and the opening and closing of the inlet section is controlled by one of the blades.

3. The pump body according to claim 2, wherein the

other opening of the inlet section is provided on the other end face of the intermediate plate along the axial direction of the crankshaft, and the opening and closing of the inlet section is controlled by the two blades, respectively.

4. The pump body according to claim 3, wherein the back pressure chamber comprises spring holes and through holes communicated with each other, and the two inlet sections provided on different end faces of the intermediate plate are respectively communicated with adjacent spring holes and are respectively controlled by adjacent blades for opening and closing.

5. The pump body according to any one of claims 1 to 4, wherein the inlet section is perpendicular to the end face of the cylinder, the outlet section is parallel to the end face of the cylinder, and the oil inlet channel intermittently communicates the lubricating oil in the oil sump with the oil passage.

6. The pump body according to claim 1, wherein when the blade performs the reciprocating motion to expose the inlet section and communicate it with the back pressure chamber, the lubricating oil in the oil sump enters the oil passage through the back pressure chamber and oil inlet channel; when the blade performs the reciprocating motion to cover and close the inlet section, the oil inlet channel stops oil intake.

7. The pump body according to claim 1, wherein the outlet section extends to a circumferential surface of an inner hole of the intermediate plate to form an oil outlet channel communicating with the oil passage.

8. The pump body according to claim 1, wherein cross-sections of the inlet section and the outlet section are one or more of circular, elliptical, square, and irregular shapes.

9. A compressor, **characterized by** comprising a front shell assembly, a rear shell assembly, an intermediate partition plate, motor components, and the pump body according to any one of claims 1 to 8; wherein the rear shell assembly and the front shell assembly are connected on two sides of the intermediate partition plate, the rear shell assembly comprises a high-pressure chamber, and the front shell assembly comprises the low-pressure chamber; the motor components are disposed in the low-pressure chamber, the pump body is disposed in the high-pressure chamber, the crankshaft extends from the high-pressure chamber into the low-pressure chamber and is connected to the motor components, and the oil sump is disposed in the high-pressure chamber.

10. A vehicle, **characterized by** comprising the compressor according to claim 9.

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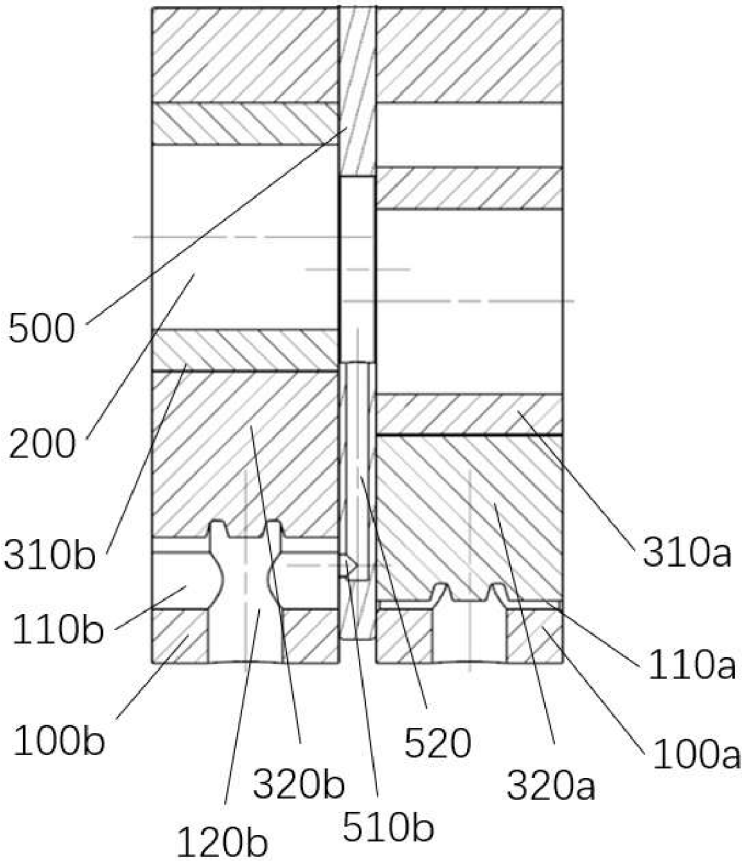


FIG. 1

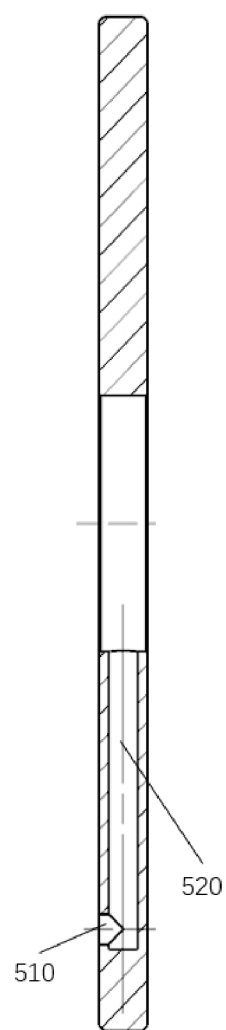


FIG. 2

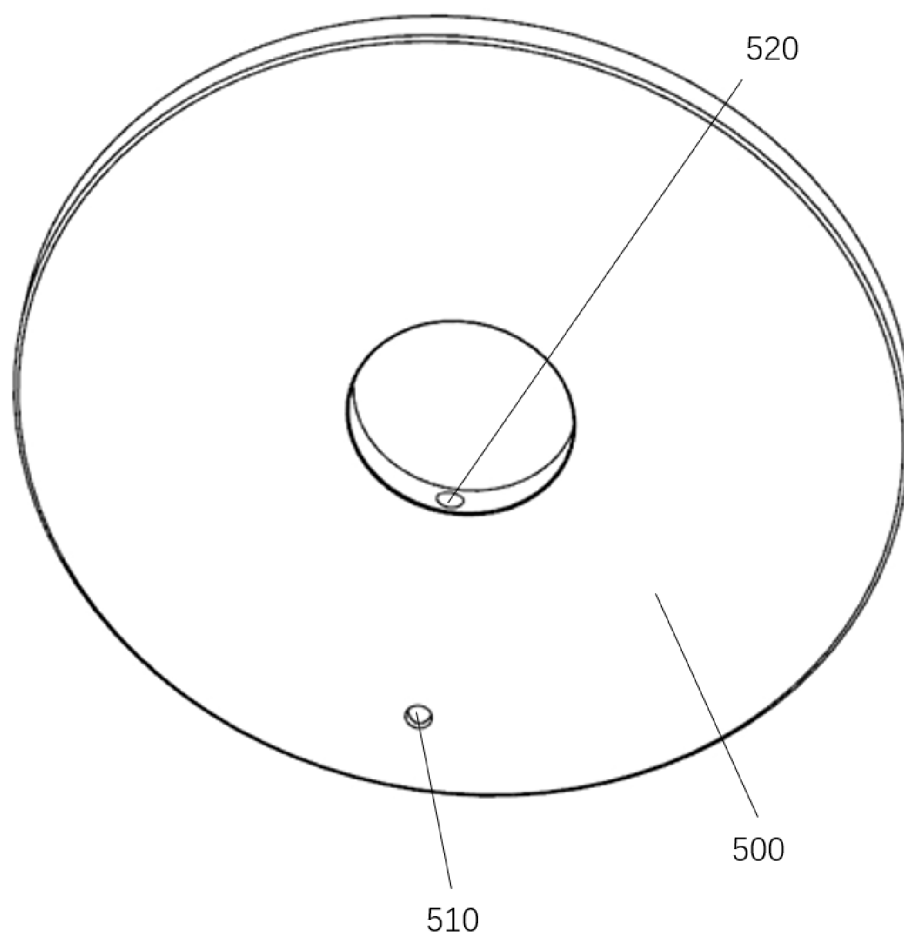


FIG. 3

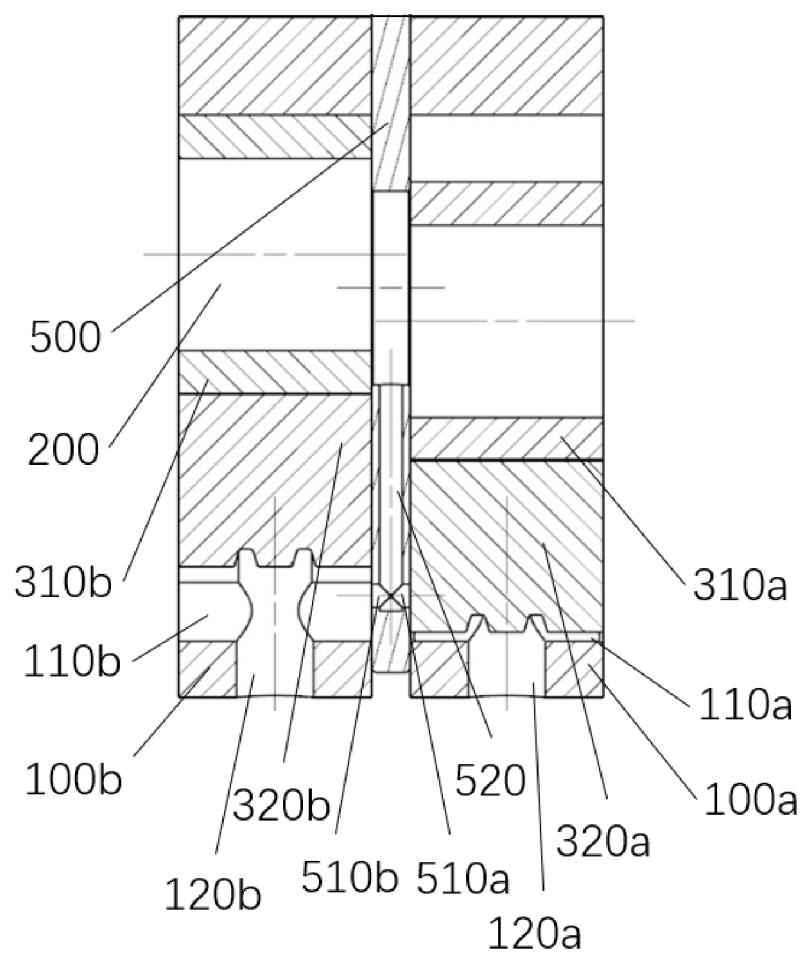


FIG. 4

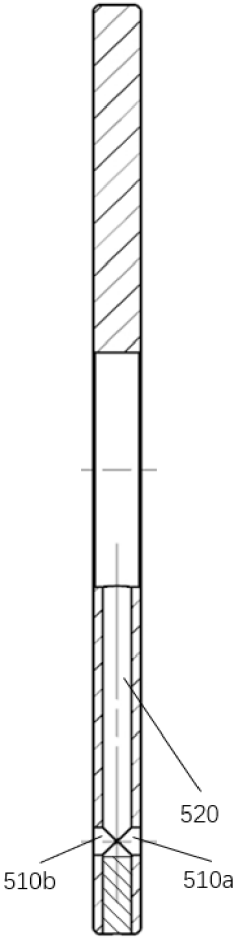


FIG. 5

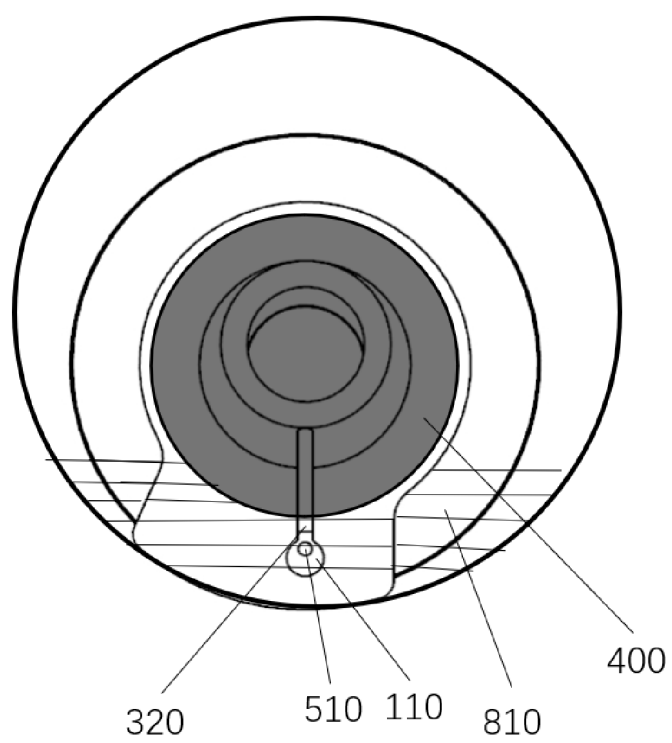


FIG. 6

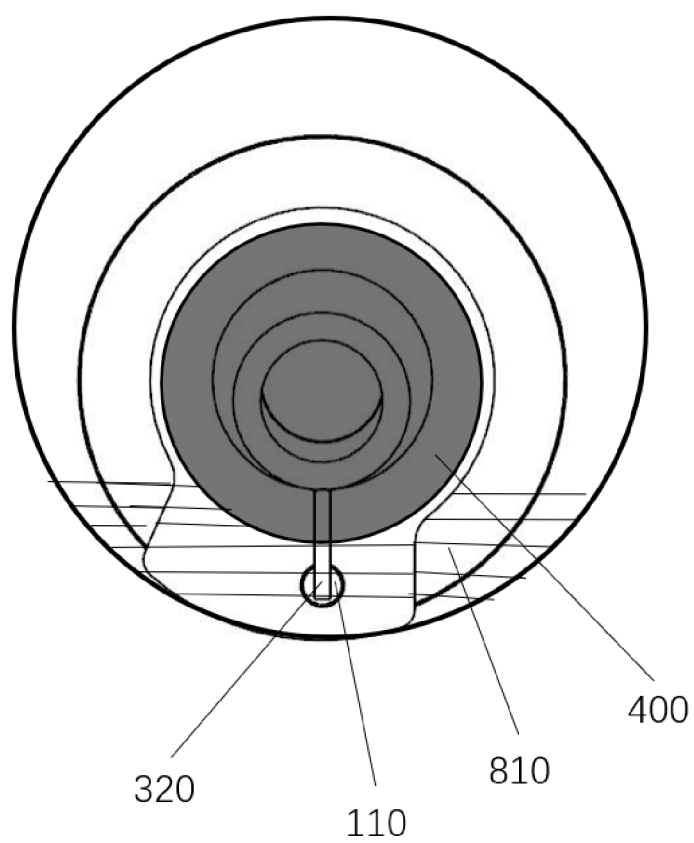


FIG. 7

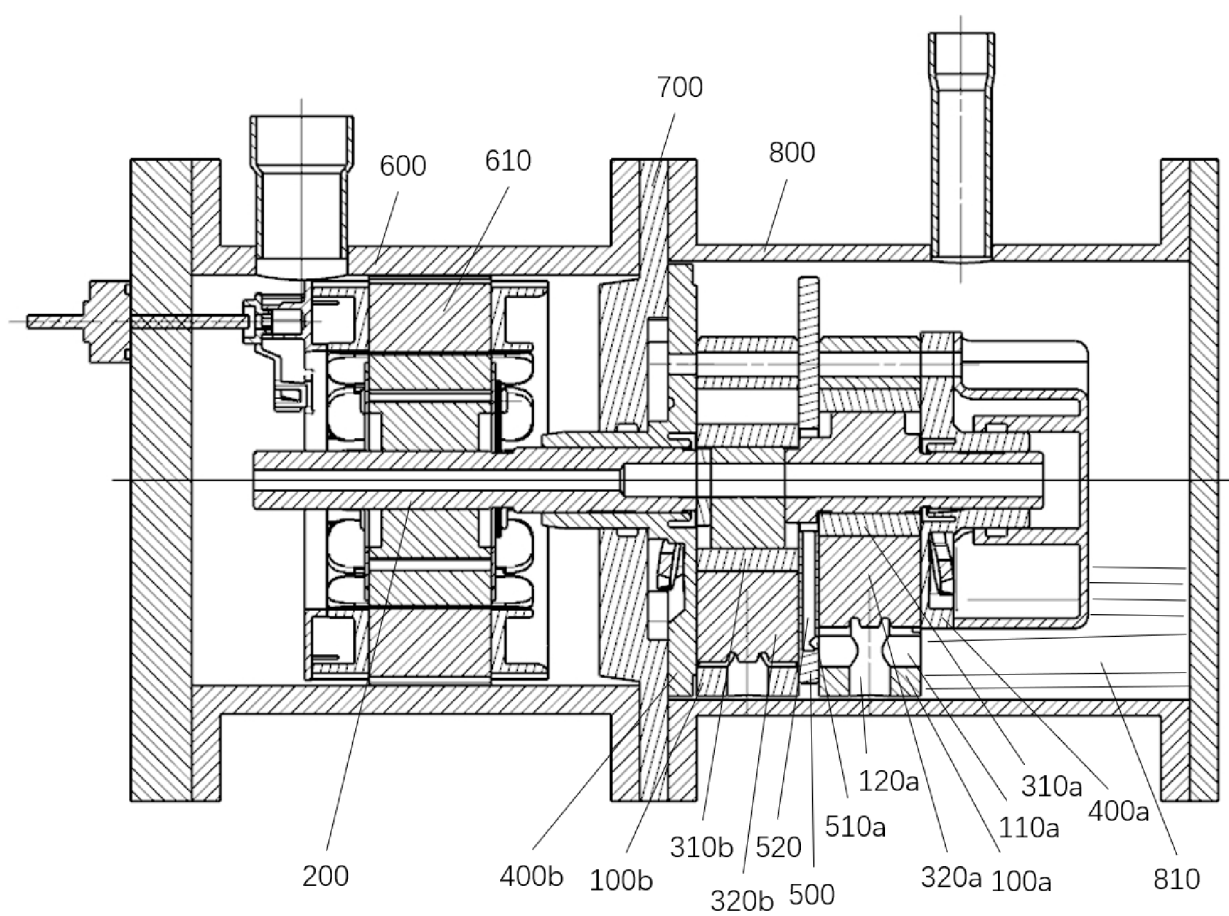


FIG. 8

TRANSLATION

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2025/095911

A. CLASSIFICATION OF SUBJECT MATTER

F04C18/356(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: F04C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNTXT, ENTXT, ENTXTC, CNKI: 泵体, 隔板, 间歇, 进油, 气缸, 通道, 叶片, 中间板, intermittent, partition, pump, intermediate plate, oil inlet, channel?, cylinder?, blade?

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 119982519 A (SHANGHAI HIGHLY ELECTRICAL APPLIANCES CO., LTD.) 13 May 2025 (2025-05-13) claims 1-10	1-10
X	JP S63162991 A (TOSHIBA CORP.) 06 July 1988 (1988-07-06) description, pages 2-3, and figures 1-2	1-5, 7-10
Y	JP S63162991 A (TOSHIBA CORP.) 06 July 1988 (1988-07-06) description, pages 2-3, and figures 1-2	6
Y	JP H0735076 A (TOSHIBA CORP.) 03 February 1995 (1995-02-03) description, embodiments, and figure 1	6
A	CN 119163606 A (SHANGHAI HIGHLY ELECTRICAL APPLIANCES CO., LTD.) 20 December 2024 (2024-12-20) entire document	1-10
A	CN 117869305 A (GUANGDONG MEIZHI COMPRESSOR CO., LTD. et al.) 12 April 2024 (2024-04-12) entire document	1-10

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

08 September 2025

Date of mailing of the international search report

20 September 2025

Name and mailing address of the ISA/CN

China National Intellectual Property Administration (ISA/
CN)
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Beijing 100088

Authorized officer

Telephone No.

International application No.

PCT/CN2025/095911

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 206429421 U (GUANGDONG MEIZHI COMPRESSOR CO., LTD.) 22 August 2017 (2017-08-22) entire document	1-10

TRANSLATION

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2025/095911

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 119982519 A	13 May 2025	None	
JP S63162991 A	06 July 1988	JPH 0826865 B2	21 March 1996
JP H0735076 A	03 February 1995	None	
CN 119163606 A	20 December 2024	None	
CN 117869305 A	12 April 2024	None	
CN 206429421 U	22 August 2017	None	