

Description

The present invention relates to a rotary machine, more particularly, to a horizontally oriented rotary machine having an internal lubrication oil pump.

A rotary machine, such as a scroll type refrigerant compressor which is horizontally oriented is disclosed in U.S. Patent No. 4,917,582 issued to Fraser, Jr. et. al.. In U.S. '582 patent, the horizontally oriented scroll type refrigerant compressor includes an internal lubrication oil pump which functions to supply a lubrication oil in an oil sump of a compressor casing to the frictional surfaces of the internal component parts of the compressor. The oil pump operates by virtue of the reciprocating motion of one component part of an Oldham coupling mechanism which is used for preventing the rotation of an orbiting scroll member.

In comparison with a vertically oriented scroll type refrigerant compressor having an internal lubrication oil pump as disclosed in Japanese Patent Application Publication No. 63-36076, the above U.S. '582 patent can downsize the compressor. Especially, the height of the compressor can be remarkably reduced.

However, the oil pump disclosed in the above U.S. '582 patent can not be applied to the scroll type refrigerant compressors having a non-Oldham coupling type rotation preventing mechanism, such as a ball coupling type rotation preventing mechanism because the oil pump can only operate by virtue of the reciprocating motion of one component part of the Oldham coupling mechanism.

Furthermore, in US '582 patent, one member which is rotatable with a drive shaft, such as a balancing weight which is fixedly connected to the drive shaft may pass through the lubrication oil in oil sump located at an inner bottom portion of the compressor casing when a level of the lubrication oil in oil sump is excessively increased. This causes a defective torque fluctuation and useless operation of the drive shaft due to oil viscous drag.

JP-A-5960092 discloses a rotary machine comprising a housing; an inner block fixedly disposed within the housing so as to divide an inner hollow space of the housing into first and second portions; a drive shaft extending, in use, substantially in the horizontal direction and being rotatably supported at one end by the inner block; a driven mechanism driven by and operatively associated with the one end of the drive shaft and being disposed within the second portion; and pumping means for pumping a lubricating liquid, in use, stored in a lower region of the first portion, the pumping means being associated with the drive shaft so as to be operated by virtue of a rotational motion of the drive shaft; and according to the present invention,

such a machine is characterised by the drive shaft extending across the first portion to terminate at the other end and being rotatably supported at the other end by the housing.

The rotary machine may still further include a shielding element which is held between the inner block and one part of the housing in order to shield the drive shaft from the lubrication liquid in the lower region of the first portion of the inner hollow space of the casing.

In the accompanying drawings:-

Figure 1 is a longitudinal sectional view of a scroll type refrigerant compressor in accordance with one embodiment of the present invention.

Figure 2 is a perspective view of an annular cylindrical pipe member spacedly surrounding a drive shaft of the scroll type refrigerant compressor shown in Figure 1.

Figure 3 is a perspective view of a semi-annular cylindrical pipe member which may be replaced with the cylindrical pipe member shown in Figure 2.

Figure 4 is an enlarged cross-sectional view taken on line 4-4 of Figure 1.

Figure 5 is an enlarged cross-sectional view taken on line 5-5 of Figure 1.

Figure 6 is an enlarged side view of an annular plate which forms a part of a trochoid type pump mechanism shown in Figure 1.

Figure 7 is a cross-sectional view taken on line 7-7 of Figure 6.

Figure 1 illustrates an overall construction of a horizontally oriented scroll type refrigerant compressor. For purposes of explanation only, the left side of the Figure will be referenced as the forward end or front and the right side of the Figure will be referenced as the rearward end.

With reference to Figure 1, horizontally oriented scroll type refrigerant compressor 10 includes compressor casing 11 having first cup-shaped portion 12, second cup-shaped portion 13 and cylindrical portion 14 disposed between first and second cup-shaped portions 12 and 13. An opening end of first cup-shaped portion 12 is fixedly attached to an opening end of second cup-shaped portion 13 by a plurality of bolts 110 through cylindrical portion 14. Annular gasket 111 is sandwiched between the opening end of first cup-shaped portion 12 and the front end of cylindrical portion 14 so as to seal the mating surfaces of first cup-shaped portion 12 and cylindrical portion 14. A pair of annular gaskets 112 between which an outer peripheral portion of annular member 113 of an elastic material, for example, spring steel are sandwiched between the opening end of second cup-shaped portion 13 and the rear end of cylindrical portion 14 so as to seal the mating surfaces of cylindrical portion 14, annular elastic

member 113 and second cup-shaped portion 13.

First cup-shaped portion 12 includes hole 121a centrally formed at a bottom region 121 thereof. Drive shaft 20 penetrates through hole 121a, and is rotatably supported by plain bearing 21 fixedly disposed within hole 121a. Annular projection 122 forwardly extends from bottom region 121 of first cup-shaped portion 12, and surrounds an outer end portion of drive shaft 20. Electromagnetic clutch 200 through which the rotating motion of an external driving source (not shown) is intermittently transmitted to drive shaft 20 is mounted on annular projection 122. Shaft seal cavity 122a is defined in annular projection 122 for disposing shaft seal mechanism 123 therewithin. First cup-shaped portion 12 is provided with inlet port 121b formed at a side wall thereof. Inlet port 121b links an inner hollow space of compressor casing 11 to an external element of a refrigeration circuit, for example, an evaporator (not shown) through a pipe member (not shown).

Inner block 141 is integral with and radially inwardly extends from a front end region of cylindrical portion 14. Cylindrical projection 142 is centrally formed at inner block 141, and includes opening 142a. An inner end of drive shaft 20 is rotatably supported by plain bearing 22 which is fixedly disposed within opening 142a. First cup-shaped portion 12 and inner block 141 define first inner hollow space 11a. Second cup-shaped portion 13 and inner block 141 define second inner hollow space 11b. Hole 143 is formed through an upper portion of inner block 141 so as to link first inner hollow space 11a to second inner hollow space 11b.

Fixed and orbiting scroll members 30 and 40 are disposed within second inner hollow space 11b of compressor casing 11. Fixed scroll member 30 includes first circular end plate 31 and first spiral element or wrap 32 extending from a front end surface of first circular end plate 31. Orbiting scroll member 40 includes second circular end plate 41 and second spiral element or cap 42 extending from a rear end surface of second circular end plate 41. First and second spiral elements 32 and 42 interfit with each other with an angular and radial offset.

Second cup-shaped portion 13 is provided with outlet port 131a centrally formed at a bottom region 131 thereof. Axial annular projection 132 spacedly surrounding outlet port 131a is formed at an inner surface of bottom region 131 of second cup-shaped portion 13. Circular depression 311 is centrally formed at a rear end surface of first circular end plate 31 of fixed scroll member 30 so as to face outlet port 131a. Valved discharge port 31a is formed through first circular end plate 31 so as to link circular depression 311 to a central sealed-off

fluid pocket 50 defined by the central region of fixed and orbiting scroll members 30 and 40. Annular depression 312 spacedly surrounding circular depression 311 is formed at the rear end surface of first circular end plate 31 so as to receive axial annular projection 132 of second cup-shaped portion 13 therewithin.

First annular rubber member 320 is compressedly disposed between the inner side surface of annular depression 312 and the inner peripheral surface of axial annular projection 132. Second annular rubber member 321 is compressedly disposed between the outer side surface of annular depression 312 and the outer peripheral surface of axial annular projection 132. First and second annular rubber members 320 and 321 seal the mating surfaces of annular depression 312 and axial annular projection 132 so that circular depression 311 is defined as a discharge chamber which is sealingly isolated from second inner hollow space 11b of compressor housing 11. Outlet port 131a links discharge chamber 311 to an external element of a refrigeration circuit, for example, a condenser (not shown) through a pipe member (not shown).

Annular wall 33 is formed at an outer peripheral portion of first circular end plate 31 so as to surround first and second spiral elements 32 and 42. Annular flange 331 radially extends from an outer surface of a front end portion of annular wall 33, and is fixedly attached to an inner peripheral portion of annular elastic member 113 by a plurality of bolts (not shown). According to the above-mentioned construction, fixed scroll member 30 is allowed to resiliently move in the axial direction within a small distance.

Front circular depression 23 is centrally formed at the front end surfaces of cylindrical projection 142. The axis of front circular depression 23 is radially offset with the axis of opening 142a in horizontal direction. Front circular depression 23 includes large diameter section 23a and small diameter section 23b rear to large diameter section 23a. Rear circular depression 24 is centrally formed at the rear end surface of inner block 141. First balancing weight 60 is disposed within rear circular depression 24 and is fixedly connected to a front portion of pin member 25 which is integral with an axially extends from the inner end surface of drive shaft 20. The axis of pin member 25 is radially offset with the axis of drive shaft 20. Boss 43 is centrally formed at a front end surface of second circular end plate 41 opposite to second spiral element 42, and rotatably receives disc-shaped rotor 44 therewithin through plain bearing 26. Disc-shaped rotor 44 is connected to pin member 25. Accordingly, orbiting scroll member 40 is operatively connected to drive shaft 20 through pin member 25, disc-shaped rotor 44 and plain bearing

26. Oldham coupling mechanism 70 is interposed between inner block 141 and second circular end plate 41 of orbiting scroll meter 40. Oldham coupling mechanism 70 allows orbiting scroll 40 only to orbit during rotation of drive shaft 20.

Second balancing weight 27 is fixedly connected to drive shaft 20 by bolt 271 at a location between bottom region 121 of first cup-shaped portion 12 and inner block 141.

With reference to Figures 4-7 additionally, circular plate 81 is fitly disposed within small diameter section 23b of front circular depression 23, and includes hole 81a centrally formed therethrough. An inner periphery of hole 81a is generally sine curved, thereby forming a plurality of teeth 81b. Cavity 142b having a irregular curve-shaped cross section is formed at cylindrical projection 142, and is linked to hole 81a of circular plate 81. Annular plate 82 fixedly mounted on drive shaft 20 by key-groove mechanism 83 is loosely disposed within hole 81a. An outer periphery of annular plate 82 is generally sine curved, thereby forming a plurality of teeth 82b. The number of teeth 81b of circular plate 81 is greater than the number of teeth 82b of annular plate 82 by one. In this embodiment, the number of teeth 81b of circular plate 81 is eight and the number of teeth 82b of annular plate 82 is seven.

Circular side plate 84 is fixedly disposed within large diameter section 23a of front circular depression 23 by a plurality of securing bolts (not shown), and includes hole 84a through which drive shaft 20 closely passes. Depression 841 having a irregular curve-shaped cross section is formed at a rear end surface of circular side plate 84. A lower part of depression 841 is linked to an upper part of hole 84a. Circular side plate 84 prevents the axial movement of circular plate 81 and annular plate 82. Circular plate 81 and annular plate 82 substantially form trochoid type pump mechanism 80. Circular plate 81 and annular plate 82 function as an outer and inner rotors of trochoid type pump mechanism 80, respectively.

Axial hole 20a is axially formed through drive shaft 20. Axial hole 20a extends from the inner end surface of drive shaft 20 to a position rear to shaft seal mechanism 123 mounted about a front end portion of drive shaft 20. First, second, third and fourth radial holes 20b, 20c, 20d and 20e are radially formed through drive shaft 20. First radial hole 20b links a front end portion of axial hole 20a to shaft seal cavity 122a. Second radial hole 20c links axial hole 20a to depression 841 formed at the rear end surface of circular side plate 84. Third and fourth radial holes 20d and 20e links axial hole 20a to a gap created between plain bearing 22 and drive shaft 20.

First conduit 121c is formed in bottom region 121 of first cup-shaped portion 12 and plain bearing 21 so as to link a gap created between plain bearing 21 and drive shaft 20 to first inner hollow space 11a. Second conduit 142c is formed in the lower region of inner block 141 so as to link cavity 142b to oil sump 11a which positions at a lower portion of first inner hollow space 11c.

Annular cylindrical member 90 as shown in Figure 2 is fixedly and hermetically bolted between bottom region 121 of first cup-shaped portion 12 and cylindrical projection 142 of inner block 141, and spacedly surrounds an intermediate portion of drive shaft 20 and second balancing weight 27. As a result, an invasion of the lubrication oil to an inner hollow space of annular cylindrical member 90 is prevented even when a level of the lubrication oil in oil lump 11c is excessively increased. Therefore, second balancing weight 27 rotates with drive shaft 20 without passing through the oil sump even when a level of the lubrication oil in oil sump 11c is excessively increased. Accordingly, drive shaft 20 can rotate without a defective torque fluctuation and useless operation thereof.

Furthermore, semi-annular cylindrical member 90' may be fixedly held between bottom region 121 of first cup-shaped portion 12 and cylindrical projection 142 of inner block 141 with allowing an inner hollow space thereof to open upwardly, if an amount of the lubrication oil in the refrigeration circuit is determined to be able to avoid the overflowing of the lubrication oil into the inner hollow space of semi-annular cylindrical member 90' in any operational condition of the refrigeration circuit.

Rectangular plate 91 is fixedly connected to the upper front end surface of cylindrical projection 142 of inner block 141 by a plurality of bolts 91a.

In operation of compressor 10, the refrigerant gas flowing from the evaporator (not shown) is flows into first inner hollow space 11a through inlet port 121b, and further flows to second inner hollow space 11b through hole 143. Rectangular plate 91 locates on a flow path of the refrigerant gas from first inner hollow space 11a to hole 143 so that the suspended lubrication oil mist in the refrigerant gas is effectively separated therefrom due to a collision with rectangular plate 91. The refrigerant gas flowing into second inner hollow space 11b is taken into the outermost located sealed-off fluid pockets between scroll members 30 and 40 via Oldham coupling mechanism 70, then moves toward the center of spiral elements 32 and 42 during the orbital motion of orbiting scroll 40 with a resultant volume reduction and compression, and is discharged to discharge chamber 311 through valved discharge port 31a. The discharged refrigerant gas in discharge chamber 311 then flows to the condenser (not shown) through outlet port 131a.

Operation of trochoid type pump mechanism 80 is as follows. With reference to Figures 4-7 in addition to Figure 1, when inner rotor 82 rotates with drive shaft 20 in clockwise as shown by arrow "A" in Figure 5, outer rotor 81 dependently rotates in also clockwise due to an engagement between a part of teeth 82b of inner rotor 82 with a part of teeth 81b of outer rotor 81. With paying attention to the arrows in Figure 1, by virtue of the rotational motion of both inner and outer rotors 82 and 81, the lubrication oil is continuously pumped from oil sump 11c via second conduit 142c and cavity 142b, and is continuously discharged to depression 841 of circular side plate 84. The lubrication oil in depression 841 radially inwardly flows through second radial hole 20c with overcoming the centrifugal force generated by the rotational motion of drive shaft 20, and then flows into axial hole 20a. The lubrication oil flowing into axial hole 20a further flows through axial hole 20a in both the forward and rearward directions.

The lubrication oil flowing through axial hole 20a in the forward direction further flows into shaft seal cavity 122a through first radial hole 20b so as to lubricate the frictional surfaces of drive shaft 20 and shaft seal mechanism 123. The lubrication oil in shaft seal cavity 122a flows into the gap created between drive shaft 20 and plain bearing 21 so as to lubricate the frictional surfaces of drive shaft 20 and plain bearing 21, and further flows to the lower portion of first inner hollow space 11a through first conduit 121c so as to be joined to the lubrication oil in oil sump 11c.

On the other hand, the lubrication oil flowing through axial hole 20a in the rearward direction further flows into the gap created between the inner end portion of drive shaft 20 and plain bearing 22 through third and fourth radial holes 20d and 20e so as to lubricate the frictional surfaces of drive shaft 20 and plain bearing 22, and then flows out rear circular depression 24.

Furthermore, axial hole 20a may be extended to a rear end surface of disc-shaped rotor 44 in order to more effectively lubricate the frictional surfaces of plain bearing 26 and disc-shaped rotor 44.

As described above, the internal lubrication oil pump is formed by the elements which are associated with the drive shaft, and operates by virtue of the rotational motion of the drive shaft. According to the construction and operational manner, the internal lubrication oil pump can be used for the various types of the horizontally oriented rotary machine.

Claims

1. A rotary machine comprising a housing (11); an inner block (141) fixedly disposed within the housing so as to divide an inner hollow space of the housing into first (11a) and second (11b) portions; a drive shaft (20) extending, in use, substantially in the horizontal direction and being rotatably supported at one end by the inner block (141); a driven mechanism (40) driven by and operatively associated with the one end of the drive shaft and being disposed within the second portion (11b); and pumping means (81,82) for pumping a lubricating liquid, in use, stored in a lower region of the first portion (11a), the pumping means being associated with the drive shaft (20) so as to be operated by virtue of a rotational motion of the drive shaft; characterised by the drive shaft (20) extending across the first portion (11a) to terminate at the other end and being rotatably supported at the other end by the housing (11).
2. A rotary machine according to claim 1, wherein the driven mechanism comprises an orbiting scroll (40) which is operatively connected to the one end of the drive shaft and works against a fixed scroll (30).
3. A rotary machine according to claim 2, wherein the driven mechanism includes a rotation preventing mechanism (70) for preventing a rotation of the orbiting scroll (40) during rotational motion of the drive shaft (20).
4. A rotary machine according to claim 3, wherein the rotation preventing mechanism is an Oldham coupling (70).
5. A rotary machine according to any one of the preceding claims, wherein the pumping means (81,82) is a trochoid type pump mechanism.
6. A rotary machine according to claim 5, wherein the inner block (141) includes a circular depression centrally formed at one end surface thereof opposite to the second portion (11b), the axis of the circular depression being offset with respect to the axis of the drive shaft, the circular depression including a small diameter portion (23b) and a large diameter portion (23a) which faces the first portion (11a), a first circular plate (81) fitted within the small diameter portion, the first circular plate including a hole (81a) the periphery of which is generally sine curve shaped so as to form a plurality of first teeth (81b), a second circular plate (82)

Operation of trochoid type pump mechanism 80 is as follows. With reference to Figures 4-7 in addition to Figure 1, when inner rotor 82 rotates with drive shaft 20 in clockwise as shown by arrow "A" in Figure 5, outer rotor 81 dependently rotates in also clockwise due to an engagement between a part of teeth 82b of inner rotor 82 with a part of teeth 81b of outer rotor 81. With paying attention to the arrows in Figure 1, by virtue of the rotational motion of both inner and outer rotors 82 and 81, the lubrication oil is continuously pumped from oil sump 11c via second conduit 142c and cavity 142b, and is continuously discharged to depression 841 of circular side plate 84. The lubrication oil in depression 841 radially inwardly flows through second radial hole 20c with overcoming the centrifugal force generated by the rotational motion of drive shaft 20, and then flows into axial hole 20a. The lubrication oil flowing into axial hole 20a further flows through axial hole 20a in both the forward and rearward directions.

The lubrication oil flowing through axial hole 20a in the forward direction further flows into shaft seal cavity 122a through first radial hole 20b so as to lubricate the frictional surfaces of drive shaft 20 and shaft seal mechanism 123. The lubrication oil in shaft seal cavity 122a flows into the gap created between drive shaft 20 and plain bearing 21 so as to lubricate the frictional surfaces of drive shaft 20 and plain bearing 21, and further flows to the lower portion of first inner hollow space 11a through first conduit 121c so as to be joined to the lubrication oil in oil sump 11c.

On the other hand, the lubrication oil flowing through axial hole 20a in the rearward direction further flows into the gap created between the inner end portion of drive shaft 20 and plain bearing 22 through third and fourth radial holes 20d and 20e so as to lubricate the frictional surfaces of drive shaft 20 and plain bearing 22, and then flows out rear circular depression 24.

Furthermore, axial hole 20a may be extended to a rear end surface of disc-shaped rotor 44 in order to more effectively lubricate the frictional surfaces of plain bearing 26 and disc-shaped rotor 44.

As described above, the internal lubrication oil pump is formed by the elements which are associated with the drive shaft, and operates by virtue of the rotational motion of the drive shaft. According to the construction and operational manner, the internal lubrication oil pump can be used for the various types of the horizontally oriented rotary machine.

Claims

1. A rotary machine comprising a housing (11); an inner block (141) fixedly disposed within the housing so as to divide an inner hollow space of the housing into first (11a) and second (11b) portions; a drive shaft (20) extending, in use, substantially in the horizontal direction and being rotatably supported at one end by the inner block (141); a driven mechanism (40) driven by and operatively associated with the one end of the drive shaft and being disposed within the second portion (11b); and pumping means (81,82) for pumping a lubricating liquid, in use, stored in a lower region of the first portion (11a), the pumping means being associated with the drive shaft (20) so as to be operated by virtue of a rotational motion of the drive shaft; characterised by the drive shaft (20) extending across the first portion (11a) to terminate at the other end and being rotatably supported at the other end by the housing (11).
2. A rotary machine according to claim 1, wherein the driven mechanism comprises an orbiting scroll (40) which is operatively connected to the one end of the drive shaft and works against a fixed scroll (30).
3. A rotary machine according to claim 2, wherein the driven mechanism includes a rotation preventing mechanism (70) for preventing a rotation of the orbiting scroll (40) during rotational motion of the drive shaft (20).
4. A rotary machine according to claim 3, wherein the rotation preventing mechanism is an Oldham coupling (70).
5. A rotary machine according to any one of the preceding claims, wherein the pumping means (81,82) is a trochoid type pump mechanism.
6. A rotary machine according to claim 5, wherein the inner block (141) includes a circular depression centrally formed at one end surface thereof opposite to the second portion (11b), the axis of the circular depression being offset with respect to the axis of the drive shaft, the circular depression including a small diameter portion (23b) and a large diameter portion (23a) which faces the first portion (11a), a first circular plate (81) fitted within the small diameter portion, the first circular plate including a hole (81a) the periphery of which is generally sine curve shaped so as to form a plurality of first teeth (81b), a second circular plate (82)



- loosely disposed with the hole of the first circular plate, the second circular plate including a central hole through with the drive shaft (20) passes, a key-groove mechanism (83) fixedly connecting the drive shaft to the second circular plate, an outer periphery of the second circular plate generally sine curve shaped so as to form a plurality of second teeth (82b), a part of the second teeth engaging with a part of the first teeth so as to rotate dependently the first circular plate during rotation of the drive shaft and second circular plate, a third circular plate (84) fixedly disposed within the large diameter portion of the circular depression so as to prevent the axial movement of the first and second circular plates, the third circular plate including a central hole (84a) through which the drive shaft closely passes.
7. A rotary machine according to any one of the preceding claims, further comprising shielding means (90,90') for shielding the drive shaft from the lubricating liquid in the lower region of the first portion (11a).
8. A rotary machine according to claim 7, wherein the shielding means is an annular cylindrical member (90) fixedly and hermetically held between the inner block (141) and the housing (11) in the first portion (11a) and spacedly surrounding the drive shaft (20).
9. A rotary machine according to claim 7, wherein the shielding means is a semi-annular cylindrical member (90') fixedly held between the inner block (141) and the housing (11) in the first portion (11a) and allowing an inner space of the shielding means to open upwardly.
- Patentansprüche**
1. Rotierende Maschine, welche umfaßt: ein Gehäuse (11); einen Innenblock (141), der in dem Gehäuse starr angeordnet ist, so daß er einen Innenhohlraum des Gehäuses in einen ersten Abschnitt (11a) und einen zweiten Abschnitt (11b) teilt; eine Antriebswelle (20), die bei Verwendung im wesentlichen in der horizontalen Richtung verläuft und an dem einen Ende durch den Innenblock (141) drehbar abgestützt ist; einen getriebenen Mechanismus (40), der durch das eine Ende der Antriebswelle getrieben wird und mit ihm wirksam verbunden ist und in dem zweiten Abschnitt (11b) angeordnet ist; und ein Pumpmittel (81, 82) zum Pumpen einer Schmierflüssigkeit, welche bei Verwendung in einem unteren Bereich des ersten Abschnitts (11a) aufbewahrt ist, wobei das Pumpmittel mit der Antriebswelle (20) verbunden ist, so daß es aufgrund einer Drehbewegung der Antriebswelle betrieben wird; gekennzeichnet durch die Antriebswelle (20), welche so durch den ersten Abschnitt (11a) verläuft, daß sie an dem anderen Ende endet, und an dem anderen Ende durch das Gehäuse (11) drehbar abgestützt ist.
2. Rotierende Maschine nach Anspruch 1, bei welcher der getriebene Mechanismus eine umlaufende Spirale (40) umfaßt, welche mit dem einen Ende der Antriebswelle wirksam verbunden ist und gegen eine festgelegte Spirale (30) arbeitet.
3. Rotierende Maschine nach Anspruch 2, bei welcher der getriebene Mechanismus einen Mechanismus zum Verhindern einer Drehung (70) zum Verhindern einer Drehung der umlaufenden Spirale (40) während einer Drehbewegung der Antriebswelle (20) enthält.
4. Rotierende Maschine nach Anspruch 3, bei welcher der Mechanismus zum Verhindern einer Drehung eine Oldham-Kupplung (70) ist.
5. Rotierende Maschine nach einem der vorhergehenden Ansprüche, bei welcher das Pumpmittel (81, 82) ein Trochoidentyp-Pumpeummechanismus ist.
6. Rotierende Maschine nach Anspruch 5, bei welcher der Innenblock (141) enthält: eine kreisförmige Vertiefung, die an seiner einen Endfläche gegenüber dem zweiten Abschnitt (11b) zentral gebildet ist, wobei die Achse der kreisförmigen Vertiefung bezüglich der Achse der Antriebswelle versetzt ist und die kreisförmige Vertiefung einen Abschnitt mit kleinem Durchmesser (23b) und einen dem ersten Abschnitt (11a) gegenüberliegenden Abschnitt mit großem Durchmesser (23a) enthält, eine erste kreisförmige Platte (81), die in dem Abschnitt mit kleinem Durchmesser eingepaßt ist, wobei die erste kreisförmige Platte ein Loch (81a) enthält, dessen Umfang im allgemeinen als Sinuskurve geformt ist, so daß er eine Mehrzahl von ersten Zähnen (81b) bildet, eine zweite kreisförmige Platte (82), die in dem Loch der ersten kreisförmigen Platte lose angeordnet ist, wobei die zweite kreisförmige Platte ein zentrales Loch enthält, durch welches die Antriebswelle (20) hindurchgeht, einen Keil-Nut-Mechanismus (83), der die Antriebswelle mit der zweiten kreisförmigen Platte starr verbindet, wobei ein Außenumfang der zweiten kreisförmigen Platte im allgemeinen als Sinuskurve



geformt ist, so daß er eine Mehrzahl von zweiten Zähnen (82b) bildet, wobei ein Teil der zweiten Zähne in einen Teil der ersten Zähne eingreift, um dadurch bedingt die erste kreisförmige Platte während einer Drehung der Antriebswelle und der zweiten kreisförmigen Platte zu drehen, eine dritte kreisförmige Platte (84), die in dem Abschnitt mit großem Durchmesser der kreisförmigen Vertiefung starr angeordnet ist, so daß sie die Axialbewegung der ersten und der zweiten kreisförmigen Platte verhindert, wobei die dritte kreisförmige Platte ein zentrales Loch (84a) enthält, durch welches die Antriebswelle eng hindurchgeht.

7. Rotierende Maschine nach einem der vorhergehenden Ansprüche, welche ferner ein Abschirmmittel (90, 90') zum Abschirmen der Antriebswelle vor der Schmierflüssigkeit in dem unteren Bereich des ersten Abschnitts (11a) umfaßt.
8. Rotierende Maschine nach Anspruch 7, bei welcher das Abschirmmittel ein ringförmiges Zylinderteil (90) ist, das zwischen dem Innenblock (141) und dem Gehäuse (11) in dem ersten Abschnitt (11a) starr und hermetisch gehalten ist und die Antriebswelle (20) mit Zwischenraum umgibt.
9. Rotierende Maschine nach Anspruch 7, bei welcher das Abschirmmittel ein halbringförmiges Zylinderteil (90') ist, das zwischen dem Innenblock (141) und dem Gehäuse (11) in dem ersten Abschnitt (11a) starr gehalten ist und einen nach oben offenen Innenraum des Abschirmmittels gewährt.

Revendications

1. Machine rotative comprenant un carter (11) ; un bloc intérieur (141) monté de façon fixe à l'intérieur du carter pour diviser un espace creux intérieur de ce carter en une première partie (11a) et une seconde partie (11b) ; un arbre d'entraînement (20) s'étendant essentiellement dans la direction horizontale, en cours d'utilisation, et se trouvant supporté en rotation, à une extrémité, par le bloc intérieur (141) ; un mécanisme entraîné (40) se trouvant entraîné et associé en fonctionnement à l'extrémité ci-dessus de l'arbre d'entraînement, en étant disposé à l'intérieur de la seconde partie (11b) ; et des moyens de pompage (81, 82) pour pomper, en cours d'utilisation, un liquide de lubrification stocké dans une zone inférieure de la première partie (11a), ces moyens de pompage étant associés à l'arbre d'entraîne-

ment (20) de manière à être actionnés sous l'effet d'un mouvement de rotation de l'arbre d'entraînement ; caractérisée en ce que l'arbre d'entraînement (20) s'étend en travers de la première partie (11a) pour se terminer à l'autre extrémité, en étant supporté en rotation, à l'autre extrémité, par le carter (11).

2. Machine rotative selon la revendication 1, caractérisée en ce que le mécanisme entraîné comprend une volute orbitale (40) qui est reliée en fonctionnement à la première extrémité de l'arbre d'entraînement, et travaille contre une volute fixe (30).
3. Machine rotative selon la revendication 2, caractérisée en ce que le mécanisme entraîné comprend un mécanisme anti-rotation (70) pour empêcher une rotation de la volute orbitale (40) pendant le mouvement de rotation de l'arbre d'entraînement (20).
4. Machine rotative selon la revendication 3, caractérisée en ce que le mécanisme anti-rotation est un accouplement de Oldham (70).
5. Machine rotative selon l'une des quelconques revendications précédentes, caractérisée en ce que les moyens de pompage (81, 82) sont un mécanisme de pompe de type trochoïde.
6. Machine rotative selon la revendication 5, caractérisée en ce que le bloc intérieur (141) comprend une dépression circulaire formée au centre d'une surface d'extrémité de celle-ci, à l'opposé de la seconde partie (11b), l'axe de la dépression circulaire étant décalé par rapport à l'axe de l'arbre d'entraînement, la dépression circulaire comprenant une partie de petit diamètre (23b) et une partie de grand diamètre (23a) venant en face de la première partie (11a), une première plaque circulaire (81) ajustée dans la partie de petit diamètre, la première plaque circulaire comprenant un trou (81a) dont la périphérie est généralement en forme de courbe sinusoïdale de manière à former une pluralité de premières dents (81b), une seconde plaque circulaire (82) montée de façon lâche à l'intérieur du trou de la première plaque circulaire, la seconde plaque circulaire comprenant un trou central à travers lequel passe l'arbre d'entraînement (20), un mécanisme de clavette-rainure (83) reliant de façon fixe l'arbre d'entraînement à la seconde plaque circulaire, la périphérie extérieure de la seconde plaque circulaire étant généralement en forme de courbe sinusoïdale de manière à former une pluralité de secondes dents (82b), une



partie des secondes dents s'engageant dans une partie des premières dents de manière à tourner solidairement de la première plaque circulaire pendant la rotation de l'arbre d'entraînement et de la seconde plaque circulaire, une troisième plaque circulaire (84) montée de façon fixe à l'intérieur de la partie de grand diamètre de la dépression circulaire, de manière à empêcher le mouvement axial de la première plaque circulaire et de la seconde plaque circulaire, la troisième plaque circulaire comprenant un trou central (84a) à travers lequel passe étroitement l'arbre d'entraînement.

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7. Machine rotative selon l'une quelconque des revendications précédentes, caractérisée en ce qu'elle comprend en outre des moyens de protection (90, 90') pour protéger l'arbre d'entraînement du liquide de lubrification se trouvant dans la zone inférieure de la première partie (11a).

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8. Machine rotative selon la revendication 7, caractérisée en ce que les moyens de protection sont constitués par un élément cylindrique annulaire (90) maintenu de façon fixe et hermétique entre le bloc intérieur (141) et le carter (11) dans la première partie (11a), en entourant à une certaine distance l'arbre d'entraînement (20).

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9. Machine rotative selon la revendication 7, caractérisée en ce que les moyens de protection sont constitués par un élément cylindrique semi-annulaire (90') maintenu de façon fixe entre le bloc intérieur (141) et le carter (11) dans la première partie (11a), en permettant à un espace intérieur des moyens de protection de déboucher vers le haut.

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