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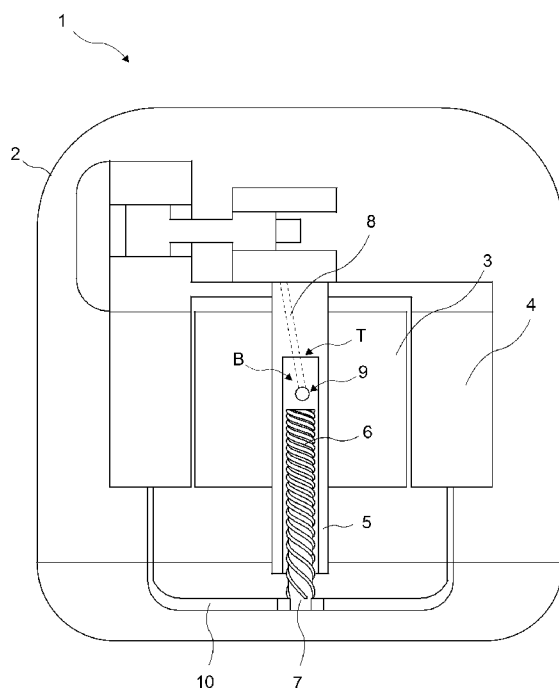
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(54) Title: A HERMETIC COMPRESSOR COMPRISING AN OIL SUCKING MEMBER

Figure 1



(57) Abstract: The present invention relates to a hermetic compressor (1) comprising a casing (2), a motor having a rotor (3) and a stator (4), a crankshaft (5) that is snap-fittingly mounted to the core of the rotor (3) in the direction of the rotation axis thereof and that provides the rotational motion of the rotor (3) to be transmitted to the piston, the lower end of which is immersed into the oil in the casing (2), an oil sucking member (7) disposed through the lower end of the crankshaft (5) into the interior thereof and concentrically with the crankshaft (5), that is stationary during the rotation of the rotor (3) and the crankshaft (5), and at the outer circumference of which a helical groove (6) is disposed, an oil transportation path (8) disposed on the crankshaft (5) and an oil passage hole (9) providing the oil sucked into the crankshaft (5) to pass to the oil transportation path (8).



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Description**A HERMETIC COMPRESSOR COMPRISING AN OIL SUCKING MEMBER**

[0001] The present invention relates to a hermetic compressor comprising an oil sucking member improving the lubrication conditions of the movable members thereof.

[0002] In the reciprocating hermetic compressors used in refrigerators, the sliding bearings wherein the crankshaft operates and the other movable members are lubricated with the oil disposed in the compressor casing. In compressors, lubrication provides friction losses of the movable members to be decreased, abrasion to be prevented and heat resulting from friction to be removed by decreasing the temperature of the compressor members. In the compressor lubrication system, the oil at the base of the casing is sucked to be delivered to the bearings and compressor members that are to be lubricated. Generally, the centrifugal force that acts on the oil as a result of the rotation of the crankshaft is utilized for delivering the oil at the base of the casing to the bearings. In variable capacity compressors used in refrigerators, the refrigeration capacity that changes depending on the operating conditions is provided by changing the compressor rotational speed. Since the compressor motor operates at low speed in cases where low capacity is to be met, abrasion may occur in bearings operating in hydrodynamic lubrication conditions. In order to deliver the oil required in cases where the compressor motor operates at low speed, a cylindrical oil sucking member having helical oil transportation grooves is concentrically disposed at the lower end of the crankshaft immersed into oil in the rotation axis of the crankshaft. If the flow rate of the oil delivered is not high enough by means of the oil sucking member, the movable members and the sliding bearings cannot be sufficiently lubricated and abrasion problems occur.

[0003] In the state of the art United States Patents No. US6716001 and US6450785, and European Patents No. EP0815360 and EP1412640, a cylindrical oil supply apparatus with helical grooves that is used in hermetic compressors, disposed at the lower end of the crankshaft and that is stationary during the operation of the motor is explained.

- [0004] The aim of the present invention is the realization of a hermetic compressor comprising an oil sucking member providing the lubrication of the movable members and the oil transportation performance of which is improved.
- [0005] The hermetic compressor realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof comprises a crankshaft mounted to the rotor core and the lower end of which is immersed into the oil in the outer casing, an oil sucking member disposed through the lower end of the crankshaft into the interior thereof and concentrically with the crankshaft and at the outer circumference of which a helical groove is disposed, and the helical groove is narrowed from bottom to top.
- [0006] The helix angle and the pitches of the helical groove are narrowed from the lower end of the oil sucking member towards the upper end thereof extending into the crankshaft, in other words the coils of the helical groove thicken in the upward direction.
- [0007] In an embodiment of the present invention, an oil passage hole is disposed in the crankshaft, providing the oil to be transported to the members to be lubricated at the upper side of the motor, and the upper end of the oil sucking member wherein the helical groove narrows extends up to the oil passage hole level. Thus, oil leaving the oil sucking member is directed directly to the oil passage hole without hitting the inner walls of the crankshaft and a large portion of the oil sucked reaches the members required to be lubricated by moving upwards through the oil transportation path in the crankshaft.
- [0008] The helical groove thickened bottom to top of the oil sucking member delivers oil to the lubrication system at a desired flow rate and in a controlled manner, the movable members and the sliding bearings are provided to be effectively lubricated by decreasing lubrication losses and abrasion thereof is decreased.
- [0009] The hermetic compressor realized in order to attain the aim of the present invention is illustrated in the attached figures, where:
- [0010] Figure 1 – is the schematic view of a hermetic compressor comprising an

oil sucking member.

[0011] Figure 2 – is the front view of an oil sucking member.

[0012] The elements illustrated in the figures are numbered as follows:

1. Hermetic compressor
2. Casing
3. Rotor
4. Stator
5. Crankshaft
6. Helical groove
7. Oil sucking member
8. Oil transportation path
9. Oil passage hole
10. Bracket

[0013] The hermetic compressor (1) comprises a casing (2) supporting the members therein and wherein oil lubricating the movable members is placed, a variable speed motor having a rotor (3) and a stator (4), a piston providing the refrigerant fluid to be delivered to the cooling system in a pressurized state, a cylinder wherein the piston operates, a crankshaft (5) that is snap-fittingly mounted to the core of the rotor (3) in the direction of the rotation axis thereof and that provides the rotational motion of the rotor (3) to be transmitted to the piston, the lower end of which is immersed into the oil in the casing (2) and wherein a gap (B) opening into the body thereof in the axial direction starting from the lower end thereof is disposed, an oil sucking member (7) in cylindrical form, disposed through the lower end of the crankshaft (5) into the interior thereof and concentrically with the crankshaft (5), having a helical groove (6) carrying the oil in the casing (2) to the crankshaft (5), disposed at the outer circumference thereof, an oil transportation path (8) preferably in helical configuration, disposed on the crankshaft (5), transporting the oil sucked by means of the oil sucking member (7) to the sliding bearings and the other movable members at the upper side of the crankshaft (5), an oil passage hole (9) providing the oil sucked into the crankshaft (5) to pass to the oil transportation path (8) and a bracket (10) connecting the oil sucking

member (7) to the stator (4) and providing the oil sucking member (7) to be stationary during the operation of the motor.

[0014] The hermetic compressor (1) of the present invention comprises the oil sucking member (7) having the helical groove (6) that extends from the lower end of the crankshaft (5) in the oil into the crankshaft (5) and that is thickened (narrowed) bottom to top by decreasing the helix angle (A) and the pitch (P) thereof towards the upper end thereof extending into the crankshaft (5), thus providing the oil to be delivered in a controlled manner by lowering the oil flow passing therethrough.

[0015] The oil sucking member (7) is fixed to the stator (4) by means of the bracket (10) and is stationary in the gap (B) in the crankshaft (5) during the operation of the motor. The lower end of the crankshaft (5) is immersed into the oil in the casing (2) and the oil in the casing (2) is sucked into the crankshaft (5) by the effect of the centrifugal force. The oil is transported upwards into the gap (B) in the crankshaft (5) by means of the helical groove (6) on the oil sucking member (7) concentrically disposed into the crankshaft (5), from this gap (B) to the helical oil transportation path (8) located at the circumference of the crankshaft (5) by means of the oil passage hole (9) and then to the movable members and the sliding bearings on the motor. The helical groove (6) on the oil sucking member (7) is in a bottom-to-top thickened configuration and the oil flow in the helical groove (6) is decreased. The bottom-to-top thickened configuration of the helical groove (6) provides the flow speed of the oil sucked from the casing (2) to be controlled (decreased) without reducing the flow rate of the oil. Thus, the oil moving through the helical groove (6) is prevented from leaving the upper end of the oil sucking member (7) at high speed and from returning without entering through the oil passage hole (9) by hitting the inner wall of the crankshaft (5). Oil with desired flow rate is delivered to the oil transportation path (8) in the crankshaft (5) and the movable members on the motor.

[0016] In an embodiment of the present invention, the upper end of the oil sucking member (7) where the helical groove (6) narrows extends up to the level of the oil passage hole (9) in the crankshaft (5). Thus, oil sucked

at a desired flow rate and a controlled speed by means of the bottom-to-top narrowed helical groove (6) enters directly into the oil passage hole (9), the risk of oil returning without entering through the oil passage hole (9) by hitting the inner wall of the crankshaft (5), especially the ceiling (T) above the gap (B) is reduced.

- [0017] In another embodiment of the present invention, the upper end of the oil sucking member (7) extends up to a level under the oil passage hole (9) in the crankshaft (5). In this embodiment, since the distance between the upper end of the oil sucking member (7) and the ceiling (T) increases, the risk of oil that leaves the upper end of the oil sucking member (7), reaching up to the ceiling (T) and returning without entering through the oil passage hole (9) by hitting is reduced.
- [0018] In the hermetic compressor (1), the helical groove (6) thickened bottom to top of the oil sucking member (7) that provides oil to be delivered to the crankshaft (5) from the casing (2) delivers the oil to the lubrication system at a desired flow rate and in a controlled manner, the movable members and the sliding bearings are provided to be effectively lubricated by decreasing lubrication losses and abrasion thereof is decreased.
- [0019] It is to be understood that the present invention is not limited by the embodiments disclosed above and a person skilled in the art can easily introduce different embodiments. These should be considered within the scope of the protection postulated by the claims of the present invention.

Claims

1. A hermetic compressor (1) **comprising** a casing (2) supporting the members therein and wherein oil lubricating the movable members is placed, a motor having a rotor (3) and a stator (4), a crankshaft (5) that is snap-fittingly mounted to the core of the rotor (3) in the direction of the rotation axis thereof and the lower end of which is immersed into the oil in the casing (2) and wherein a gap (B) opening into the body thereof in the axial direction starting from the lower end thereof is disposed, an oil sucking member (7) in cylindrical form, disposed through the lower end of the crankshaft (5) into the interior thereof and concentrically with the crankshaft (5), having a helical groove (6) disposed at the outer circumference thereof, an oil transportation path (8) disposed on the crankshaft (5) and an oil passage hole (9) providing the oil sucked into the crankshaft (5) to pass to the oil transportation path (8), **characterized by** the oil sucking member (7) having the helical groove (6) that extends from the lower end of the crankshaft (5) in the oil into the crankshaft (5) and that is thickened by decreasing the helix angle (A) and the pitch (P) thereof bottom to top.
2. A hermetic compressor (1) as in Claim 1, **characterized by** the oil sucking member (7), the upper end of which extends up to the level of the oil passage hole (9) in the crankshaft (5).
3. A hermetic compressor (1) as in Claim 1, **characterized by** the oil sucking member (7), the upper end of which extends up to a level under the oil passage hole (9) in the crankshaft (5).

Figure 1

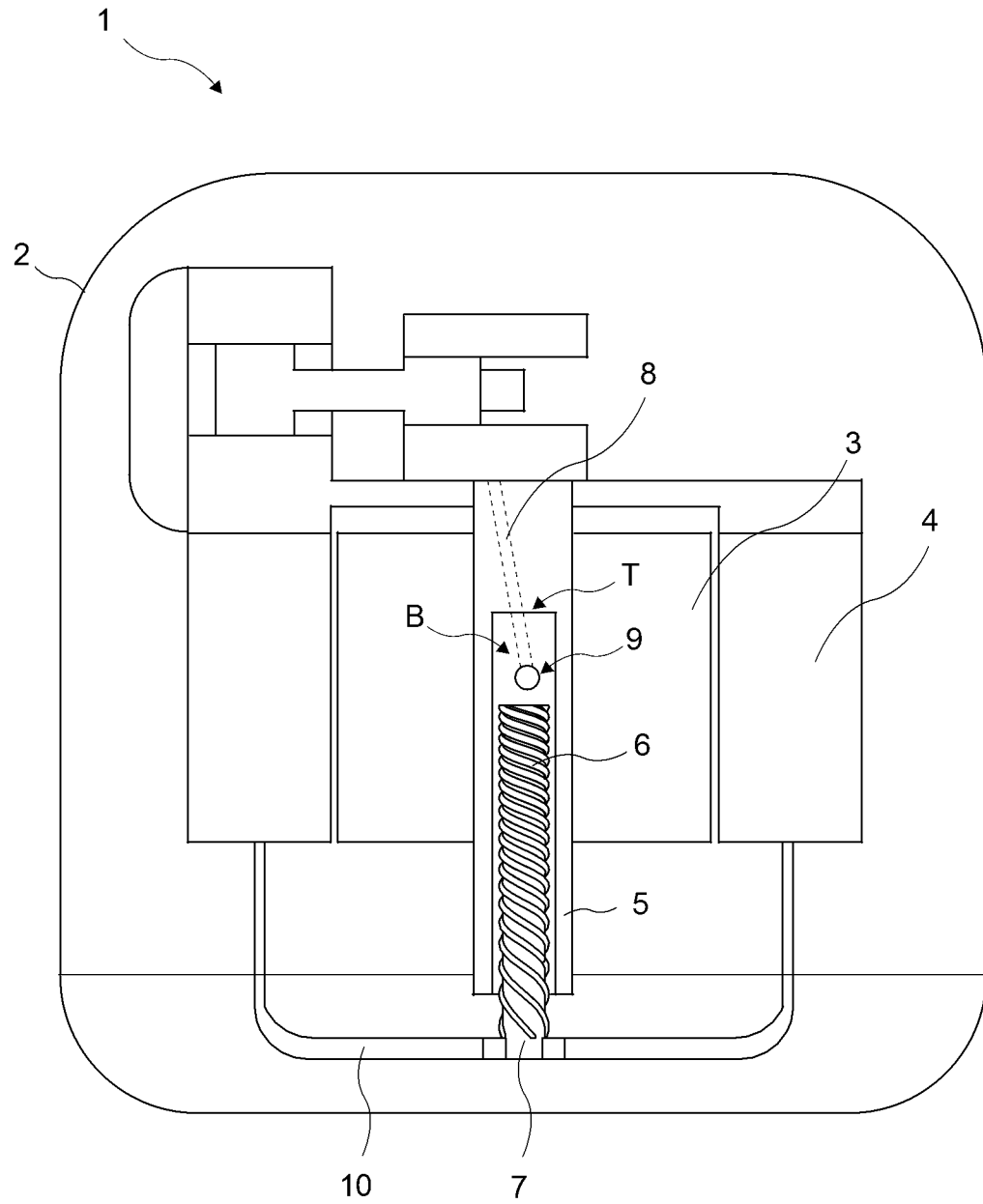
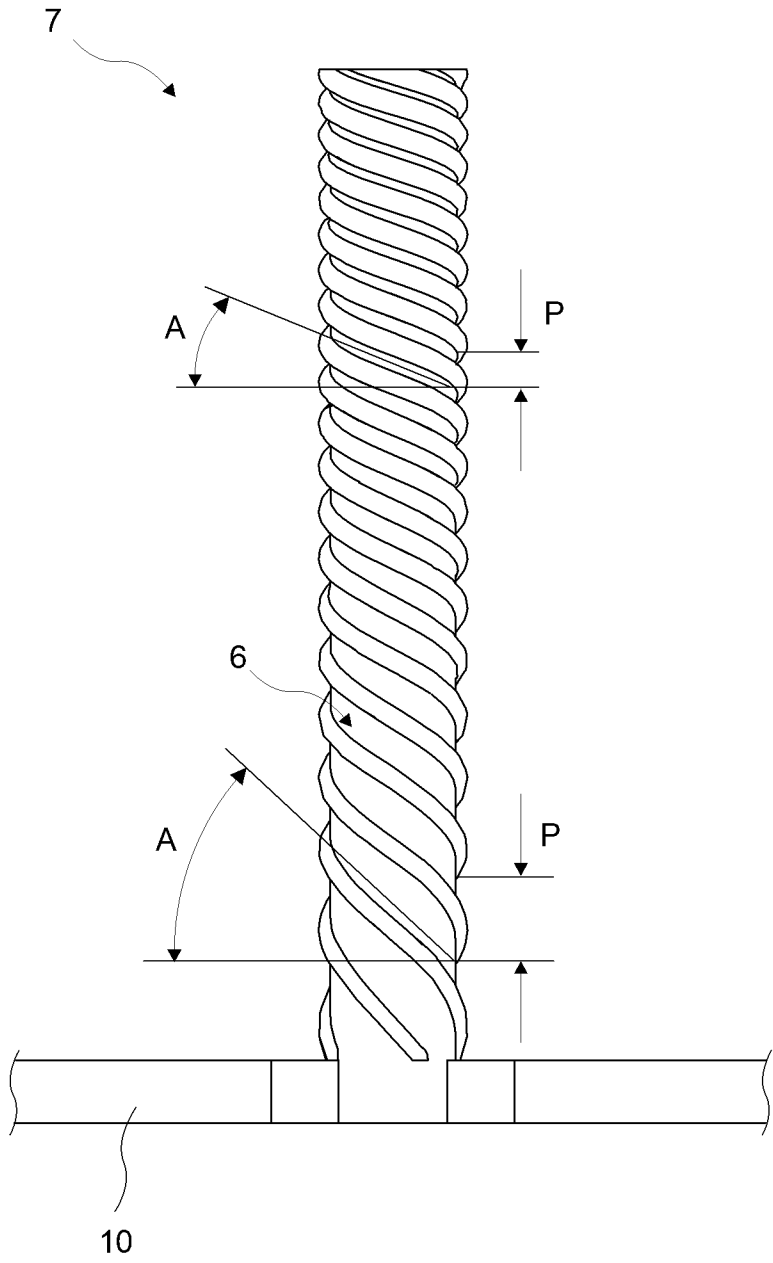


Figure 2



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2011/069833

A. CLASSIFICATION OF SUBJECT MATTER
INV. F04B39/02 F04C23/00
ADD.

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)
F04B 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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of Box C.



See patent family annex.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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