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(54) **A COMPRESSOR COMPRISING A CONNECTING ROD HAVING A CHANNEL**

(57) The present invention relates to a compressor (1) comprising a casing (2); a motor (3) which is disposed in the casing (2) and which provides the movement; a piston (6) which compresses a refrigerant gas; a crank (5) which transfers the movement from the motor (3); a connection rod (7) which transfers the movement taken from the crank (5) to the piston (6); a crankpin (9) which connects the connection rod (7) and the piston (6) to each other; lubricant (4) which is provided in the casing (2) and which facilitates the movement of the crank (5), the motor (3), the piston (6) and the connection rod (7); a crank hole (10) which transfers the lubricant (4) passing

through the crank (5) to the connection rod (7); a crankpin hole (11) which transfers the lubricant (4) passing through the connection rod (7) to the crankpin (9); a connection rod body (8) which extends between the crank hole (10) and the crankpin hole (11); the connection rod (7) having a channel (12) which extends from the crank hole (10) to the crankpin hole (11) in the connection rod body (8) and through which the lubricant (4) is delivered; and at least one first guiding channel (13) and at least one second guiding channel (14) which extend from the end of the channel (12) facing the crankpin hole (11) towards the connection rod body (8).

Description

[0001] The present invention relates to a compressor comprising a connection rod having a channel configured to deliver the lubricant to the piston more efficiently.

[0002] In household appliances, preferably in cooling devices, the circulation of the refrigerant fluid used for refrigeration is provided by the compressor. The compressor comprises a motor which operates the compressor; a lower casing which supports the components therein; an upper casing which is disposed above the lower casing; a cylinder which is disposed in the lower casing and the upper casing so as to ensure the pumping of the refrigerant fluid therein; a valve table which enables the low pressure fluid to be taken into the cylinder and the high pressure fluid to be delivered from the cylinder; a cylinder head which is provided on the cylinder and which provides the circulation of the low and high pressure refrigerant fluid; a piston which compresses the refrigerant gas/fluid in the cylinder hole; a crank which transfers the movement from the motor; a connection rod which transfers the movement from the crank to the piston; a crankpin which connects the connection rod and the piston to each other; and a fluid lubricant which is provided in the lower casing and which provides ease of movement for the components operating in the compressor.

[0003] The rotational movement of the motor is delivered to the piston by means of the crank-connection rod-crankpin mechanism, thus realizing the reciprocating movement of the piston. By means of the reciprocating movement of the piston, the refrigerant fluid in the cylinder hole is compressed. As the suction leaf on the valve table opens to the cylinder hole, the gas entering through the suction valve is compressed and brought to the desired pressure. With the opening of the exhaust leaf on the valve table, high pressure gas passes through the exhaust port to be delivered to the cylinder head exhaust chamber. The refrigerant gas is delivered from the exhaust chamber to the system. During the operation of the compressor, the rotational movement received from the motor is converted to translational movement by means of the crank-connection rod-crankpin mechanism. It is always a problem open to optimization in terms of life and lubrication that the lubricant taken from the lower casing during the rotation of the crank is delivered from the crank long journal to the crank eccentric journal to be delivered to the piston surfaces, the connection rod and the crankpin. Moreover, since the flow rate of the lubricant exiting through the top of the eccentric journal is much higher at high rotation speeds, the user encounters the problem of a higher alerting sound in terms of sound quality as the lubricant hits the upper casing.

[0004] In the state of the art Chinese Utility Model Document No. CN202900569U, a compressor is disclosed, comprising a connection rod wherein a lubricant transmission channel is provided, extending on the body between the crank hole and the crankpin hole.

[0005] The aim of the present invention is the realization of a compressor comprising a connection rod with improved piston lubrication performance.

[0006] Another aim of the present invention is to reduce the noise caused by the lubricant being sprayed upwards from the crank eccentric journal while being delivered from the crank to the connection rod-piston-crankpin.

[0007] The compressor of the present invention comprises a motor which provides the movement of the compressor components, and lubricant which is provided in the casing (lower casing), which decreases the friction between the movable components and which enables the same to move easily. When the motor starts to move, the lubricant in the casing is sucked by the crank. Said lubricant is delivered upwards from the crank long journal towards the crank eccentric journal to facilitate the movement of the movable components. The connection rod is composed of a crank hole, a crankpin hole and a cylindrical connection rod body extending between the crank hole and the crankpin hole. The lubricant is sucked through the connection rod crank hole to deliver the lubricant to the piston and moves through a channel provided on the connection rod body.

[0008] The lubricant is delivered to the crankpin by means of the connection rod crankpin hole. At least two guiding channels are disposed at the end of a channel which is arranged in the connection rod body and which is shorter than the length of the body.

[0009] Said guiding channels are arranged at angle with the channel at the end of the main channel in the body facing the crankpin hole. Thus, the channel and the guiding channels gain the shape of a fork. Consequently, the lubricant leaving the channel is divided into two arms to be sprayed onto the lateral surfaces of the piston.

[0010] By means of the compressor of the present invention, the connections of the first guiding channel and the second guiding channel arranged at the end of the channel opened in the connection rod are divided to correspond to the two lateral surfaces of the piston, thus ensuring more targeted lubricant delivery and an effective lubrication performance. A higher amount of lubricant is delivered from the crank eccentric journal to the piston surfaces, thus improving performance and increasing economic life. The upwards flow rate of the lubricant towards the upper casing is decreased such that the noise level caused by the lubricant hitting the upper casing is reduced.

[0011] By means of the present invention, the field performance is improved in terms of economic life and sound quality of the compressor especially for the user.

[0012] The model embodiments related to the compressor realized in order to attain the aim of the present invention are shown in the attached figures, where:

Figure 1 - is the general view of the compressor in an embodiment of the present invention.

Figure 2 - is the cross-sectional view showing the

interior of the compressor of the present invention.

Figure 3 - is the perspective view of the connection rod of the compressor of the present invention.

Figure 4 - is the view showing the channel, the first guiding channel and the second guiding channel in the connection rod of the compressor of the present invention.

[0013] The elements illustrated in the figures are numbered as follows:

1. Compressor
2. Casing
3. Motor
4. Oil
5. Crank
6. Piston
7. Connection rod
8. Connection rod body
9. Crankpin
10. Crank hole
11. Crankpin hole
12. Channel
13. First guiding channel
14. Second guiding channel
- M1. Crank hole central point
- M2. Crankpin hole central point

[0014] The compressor (1) comprises a casing (2); a motor (3) which is disposed in the casing (2) and which provides the movement; a piston (6) which compresses a refrigerant gas; a crank (5) which transfers the movement from the motor (3); a connection rod (7) which transfers the movement taken from the crank (5) to the piston (6); a crankpin (9) which connects the connection rod (7) and the piston (6) to each other; lubricant (4) which is provided in the casing (2) and which facilitates the movement of the crank (5), the motor (3), the piston (6) and the connection rod (7); a crank hole (10) which transfers the lubricant (4) passing through the crank (5) to the connection rod (7); a crankpin hole (11) which transfers the

lubricant (4) passing through the connection rod (7) to the crankpin (9); a connection rod body (8) which extends between the crank hole (10) and the crankpin hole (11); and the connection rod (7) having a channel (12) which extends from the crank hole (10) to the crankpin hole (11) in the connection rod body (8) and through which the lubricant (4) is delivered.

[0015] The compressor (1) of the present invention comprises at least one first guiding channel (13) and at least one second guiding channel (14) which extend from the end of the channel (12) facing the crankpin hole (11) towards the connection rod body (8). After passing through the crank (5), the lubricant (4) in the casing (2) is the connecting rod (7) is transferred to the connection rod (7) through the crank hole (10). The lubricant (4) is delivered towards the crankpin hole (11) through the channel (12) provided in the connection rod body (8). While leaving the crankpin hole (11), the lubricant (4) reaches both the crankpin (9) and the piston (6). By means of the forkshaped structure formed by the first guiding channel (13) and the second guiding channel (14) together with the channel (12), the lubricant (4) is delivered to the lateral surfaces of the piston (6). Thus, the lubricant (4) is effectively delivered in the compressor (1) and the flow rate of the lubricant (4) sprayed from the crank (5) upper journal is reduced. Consequently, especially at high operating speeds, the noise in the casing (2) caused by the impact of the lubricant (4) impact is also reduced.

[0016] In an embodiment of the present invention, the compressor (1) comprises the channel (12) with a length between $\frac{1}{4}$ and $\frac{3}{4}$ of the length between the crank hole (10) central point (M1) and the crankpin hole (11) central point (M2). By means of the length of the channel (12) in this range, the lubricant (4) is enabled to be efficiently delivered as desired.

[0017] In an embodiment of the present invention, the compressor (1) comprises the channel (12) with a length half the length between the crank hole (10) central point (M1) and the crankpin hole (11) central point (M2).

[0018] In an embodiment of the present invention, the compressor (1) comprises the first guiding channel (13) and the second guiding channel (14) which are placed at an angle between 15° and 60° with the horizontal axis, which is the length of the channel (12). In this embodiment, each guiding channel (13, 14) is separately placed at the end of the channel such that the first guiding channel (13) makes an angle between 15° and 60° with the horizontal length of the channel (12) and the second guiding channel (14) makes an angle between 15° to 60° with the horizontal length of the channel (12). In a preferred embodiment of the present invention, both the first guiding channel (13) and the second guiding channel (14) are placed so as to make an angle of 30° with the horizontal axis, which is the length of the channel (12). Thus a total angle of 60° is obtained between the first guiding channel (13) and the second guiding channel (14). In this preferred embodiment, the lubricant (4) is delivered to

the lateral surfaces of the piston (6) in the most effective manner.

[0019] In an embodiment of the present invention, the compressor (1) comprises the first guiding channel (13) and the second guiding channel (14) which are shorter than the length of the channel (12).

[0020] In an embodiment of the present invention, the compressor (1) comprises the first guiding channel (13) and the second guiding channel (14) which are half the length of the channel (12). Thus, a maximum level of lubrication is provided on the lateral surfaces of the piston (6).

5. A compressor (1) as in any one of the above claims, **characterized by** the first guiding channel (13) and the second guiding channel (14) which are shorter than the length of the channel (12).

6. A compressor (1) as in Claim 5, **characterized by** the first guiding channel (13) and the second guiding channel (14) which are half the length of the channel (12).

Claims

1. A compressor (1) comprising a casing (2); a motor (3) which is disposed in the casing (2) and which provides the movement; a piston (6) which compresses a refrigerant gas; a crank (5) which transfers the movement from the motor (3); a connection rod (7) which transfers the movement taken from the crank (5) to the piston (6); a crankpin (9) which connects the connection rod (7) and the piston (6) to each other; lubricant (4) which is provided in the casing (2) and which facilitates the movement of the crank (5), the motor (3), the piston (6) and the connection rod (7); a crank hole (10) which transfers the lubricant (4) passing through the crank (5) to the connection rod (7); a crankpin hole (11) which transfers the lubricant (4) passing through the connection rod (7) to the crankpin (9); a connection rod body (8) which extends between the crank hole (10) and the crankpin hole (11); and the connection rod (7) having a channel (12) which extends from the crank hole (10) to the crankpin hole (11) in the connection rod body (8) and through which the lubricant (4) is delivered, **characterized by** at least one first guiding channel (13) and at least one second guiding channel (14) which extend from the end of the channel (12) facing the crankpin hole (11) towards the connection rod body (8).
2. A compressor (1) as in Claim 1, **characterized by** the channel (12) with a length between $\frac{1}{4}$ and $\frac{3}{4}$ of the length between the crank hole (10) central point (M1) and the crankpin hole (11) central point (M2).
3. A compressor (1) as in Claim 2, **characterized by** the channel (12) with a length half the length between the crank hole (10) central point (M1) and the crankpin hole (11) central point (M2).
4. A compressor (1) as in any one of Claims 1 to 3, **characterized by** the first guiding channel (13) and the second guiding channel (14) which are placed at an angle between 15° and 60° with the horizontal axis, which is the length of the channel (12).

Figure 1

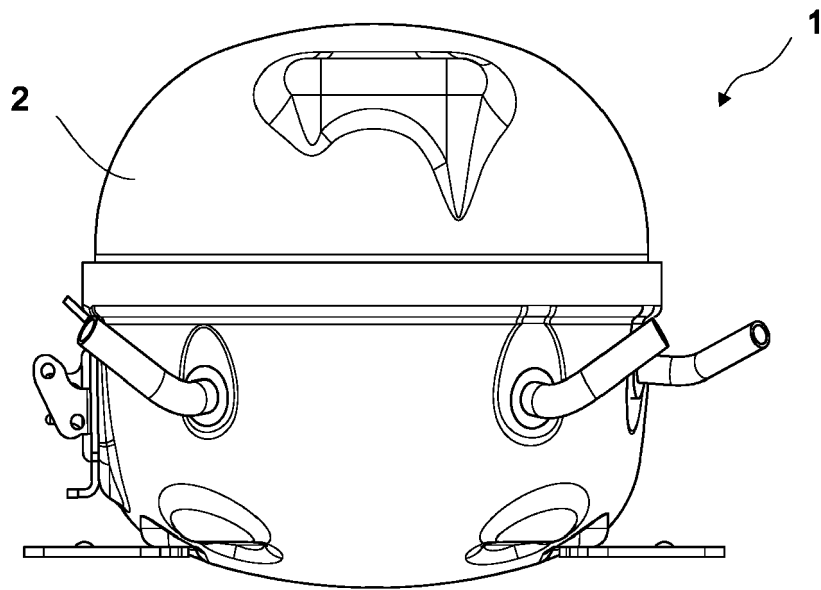


Figure 2

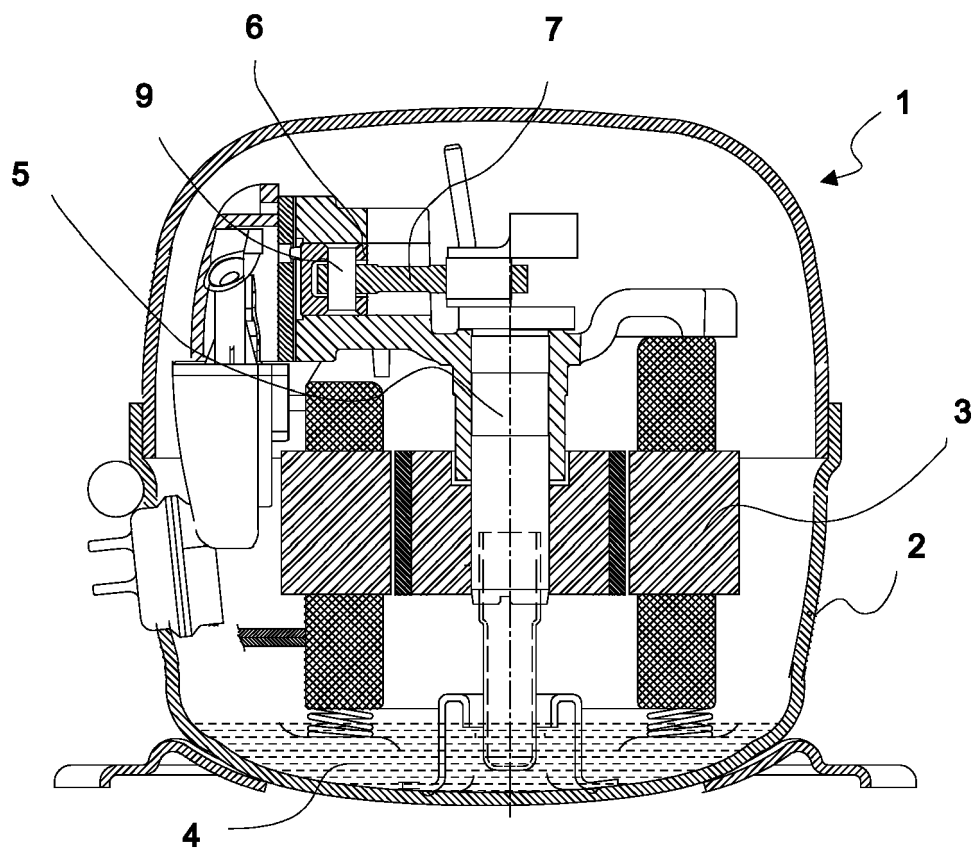


Figure 3

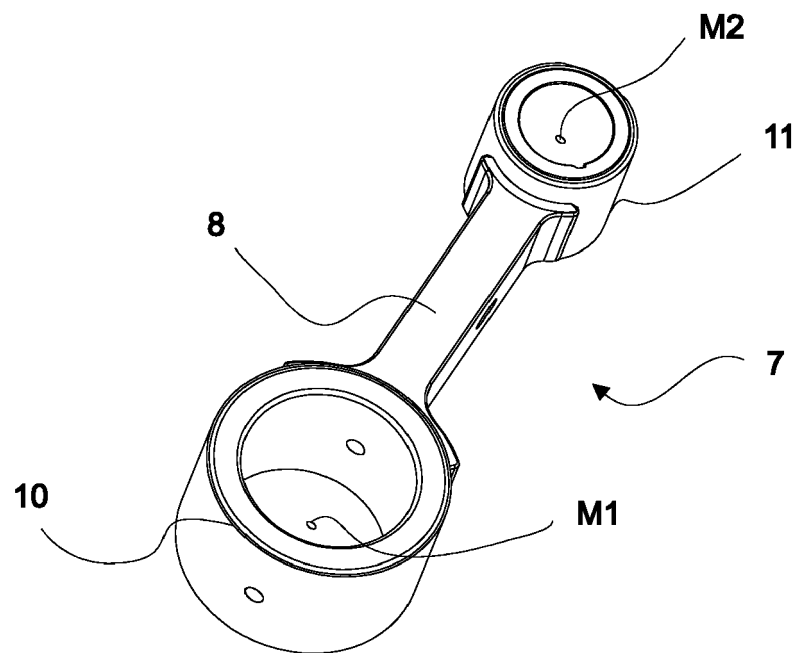
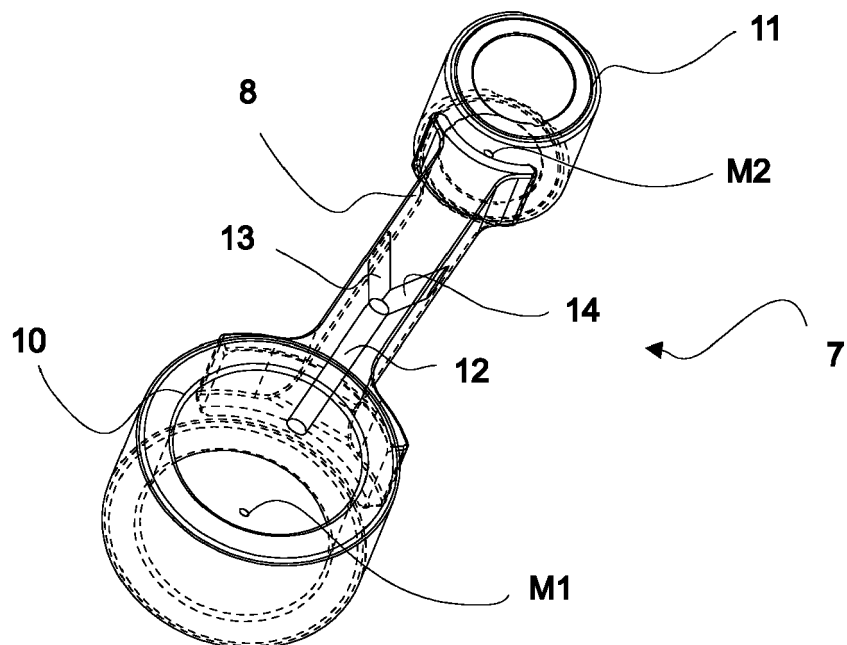


Figure 4





EUROPEAN SEARCH REPORT

Application Number

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EPO FORM 1503 03.82 (P04C01)

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			TECHNICAL FIELDS SEARCHED (IPC) F04B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 15 September 2023	Examiner Olona Laglera, C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EP 23 17 6332

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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15-09-2023

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REFERENCES CITED IN THE DESCRIPTION

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