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(54) **A COMPRESSOR**

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Description

[0001] The present invention relates to a compressor whereof the first start-up lubrication is improved.

[0002] In household appliances, preferably in cooling devices, the circulation of the refrigerant used to provide the refrigeration is provided by a compressor. In the hermetic compressors utilized in cooling devices, the delivery of the lubricating oil to the bearings formed by the movable surfaces is provided by means of an oil suction duct.

[0003] However, at the stop time of the compressor, the oil in the oil suction duct is drained into the lower casing by the effect of gravity. This results in an insufficient amount of lubricating oil to remain in the oil suction duct when the compressor operates again and causes dry friction in the bearings until the oil suction duct re-aspirates the lubricating oil in the lower casing for delivering to the bearings.

[0004] In the state of the art Korean Patent Application No KR20010038460, a compressor comprising a check valve disposed at the lower end of the oil suction duct in order to solve the lubrication problem during the first start-up is explained.

[0005] In another state of the art Japanese Application No JP2007255213, a compressor comprising an oil suction duct having two different regions, wherein the inner diameters are wide and narrow, is explained for the solution of a similar problem. In this embodiment, a valve is disposed at the point where the diameter becomes narrow.

[0006] Document SU840464A discloses a compressor according to the preamble of claim 1.

[0007] In these state of the art embodiments, the first lubrication cannot be provided as fast as required when the compressor is restarted after being stopped. This situation affects the efficiency of the compressor adversely and causes the movable parts to wear out in the course of time due to friction generated in the bearings during the first start-up.

[0008] The aim of the present invention is the realization of a compressor whereof the lubrication at the first start-up is improved.

[0009] The compressor realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, comprises a valve disposed in the oil suction duct allowing the sucked lubricant oil to pass to the bearing during operation, but preventing the oil from turning back by closing in the course of stopping.

[0010] The valve comprises an open bottom body in form of a cylinder, at least one hole located on the lateral surface of the body, at least one lower stopper extending along the wall of the oil suction duct at the lower end of the body and at least one upper stopper extending along the wall of the oil suction duct at the upper end of the body.

[0011] The compressor furthermore comprises at least one ring-shaped set located between the lower stopper

and the upper stopper at the inner wall of the oil suction duct. The valve is seated at the center of the set movable upwards and downwards. During the operation of the compressor, the lower stopper bears on the set from below by the oil being sucked. Thus, the oil sucked into the oil suction duct can pass to the upper side of the set and then to the bearing by exiting the holes after entering the valve.

[0012] In the course of the stopping of the compressor, the upper stopper bears on the set from above because of the valve falling down by the effect of gravity. Since the holes remain below the set in this situation, the oil draining down the oil suction duct cannot pass to the lower side of the set since the entrance is totally closed by the set and the valve. Thus, the draining oil forms an oil pool by accumulating just on the set and the first lubrication of the bearing can be provided by this oil when the compressor starts operating again.

[0013] In an embodiment of the present invention, the valve comprises more than one hole located at the same height level equally distanced from each other, placed almost on a circle.

[0014] In an embodiment of the present invention, the set is located close by the point where the oil suction duct is mounted to the crankshaft. Consequently, in the position where the valve enables the lubricating oil to pass by elevating, the oil exiting the holes directly reaches the crankshaft. Thus, the rapid realization of the lubrication during the first start-up is provided.

[0015] In the preferred embodiment of the present invention, the upper stopper is shaped like a ring flange.

[0016] In different embodiments of the present invention, the lower stopper is shaped like a ring flange each or detent means.

[0017] The model embodiments relating to a compressor realized in order to attain the aim of the present invention are illustrated in the attached figures, where:

[0018] Figure 1 - is the schematic view of the compressor of the present invention.

[0019] Figure 2 - is the detailed schematic view of the oil suction duct when the valve is in the aspirating position in an embodiment of the present invention.

[0020] Figure 3 - is the detailed schematic view of the oil suction duct when the valve is in the closed position in an embodiment of the present invention.

[0021] Figure 4 - is the side schematic view of the valve in an embodiment of the present invention.

[0022] Figure 5 - is the upper schematic view of the valve in an embodiment of the present invention.

[0023] The elements illustrated in the figures are numbered as follows:

1. Compressor
2. Motor
3. Stator
4. Rotor
5. Crankshaft
6. Oil Suction Duct

7. Cylinder Block

8. Bearing

[0024] 9. Valve

[0025] 10. Set

[0026] 11. Body

[0027] 12. Hole

[0028] 13. Lower Stopper

[0029] 14. Upper Stopper

[0030] The compressor (1) comprises a motor (2) consisting of two main components, a stator (3) and a rotor (4), a crankshaft (5) that delivers the motion received from the motor (2), a cylinder block (7), a bearing (8) that maintains the crankshaft (5) to be born on the cylinder block (7) in the radial direction, an oil suction duct (6), which enables the lubricant oil to be sucked and which is secured to the end of the crankshaft (5), and a valve (9) allowing the lubricant oil to pass from the oil suction duct (6) to the bearing (8) during operation, but preventing the oil from turning back by closing in the course of stopping.

[0031] The valve (9) is disposed in the oil suction duct (6) and comprises

[0032] - an open bottom body (11) in form of a cylinder,

[0033] - at least one hole (12) located on the lateral surface of the body (11),

[0034] - at least one lower stopper (13) forming a protrusion towards the wall of the oil suction duct (6) at the lower end of the body (11) and

[0035] - at least one upper stopper (14) forming a protrusion towards the wall of the oil suction duct (6) at the upper end of the body (11).

[0036] The compressor (1) furthermore comprises at least one set (10) located between the lower stopper (13) and the upper stopper (14) at the inner wall of the oil suction duct (6), whereon the lower stopper (13) bears from below during operation and the upper stopper (14) bears from above in the course stopping.

[0037] The set (10) is ring-shaped. The valve (9) is seated at the center of the set (10) movable upwards and downwards, this movement is limited by the lower stopper (13) below and by the upper stopper (14) above.

[0038] The holes (12) remain above the set (10) when the lower stopper (13) bears on the set (10) from below and thus, the lubricating oil located at the part of the body (11) that is at the lower side of the set (10) is delivered to the upper side of the set (10).

[0039] During the operation of the compressor (1), the valve (9) moves upwards in the oil suction duct (6) by the effect of the suction and the pressure of the sucked oil and the lower stopper (13) bears on the set (10) from below. In this position, the body (11) of the valve (9) and hence, the holes (12) located on the body (11) remain at the side of the oil suction duct (6) that is above the set (10). Thus, the lubricating oil that is sucked into the oil suction duct (6) enters the body (11) through the open bottom of the valve (9) and proceeds to the side of the oil suction duct (6) that remains above the set (10) by

exiting the holes (12). The lubricating oil provides the bearing (8) to be lubricated by reaching the bearing (8) from here.

[0040] The valve (9) falls down by the end of the suction effect and by the effect of gravity when the compressor (1) stops. In this position, the upper stopper (14) bears on the set (10) from above and the body (11) of the valve (9) and hence the holes (12) located on the body (11) remain at the side of the oil suction duct (6) that is below the set (10). Therefore, the oil remaining at the side of the oil suction duct (6) that is above the set (10) will not be able to pass to the lower part of the set (10). Thus, an oil pool is formed on the set (10) in the oil suction duct (6) and the lubrication of the bearing (8) at the first start-up of the compressor (1) is provided by the oil accumulated in this pool.

[0041] In an embodiment of the present invention, the valve (9) comprises more than one hole (12) located on the body (11) at the same height level equally distanced from each other, placed almost on a circle.

[0042] In an embodiment of the present invention, the set (10) is located in the area where the oil suction duct (6) is secured to the crankshaft (5). Consequently, in the position where the valve (9) enables the lubricating oil to pass by elevating, the oil exiting the holes (12) directly reaches the crankshaft (5). Thus, the rapid lubrication during the first start-up is provided.

[0043] In the preferred embodiment of the present invention, the lower and upper stoppers (13, 14) are shaped like a ring flange each, disposed at the lower and the upper ends of the body (11). Thus, the stoppers (13, 14) are provided to seat on the set (10) in a balanced manner and almost leak-proofingly.

[0044] In another embodiment of the present invention, the lower stoppers (13) are shaped like detent means each. Thus, the realization of the present invention is provided with low material costs.

[0045] It is to be understood that the present invention is not limited to the embodiments disclosed above and an expert in the technique can easily introduce different embodiments. These may be within the scope of the protection, which is defined by the appended claims.

45 Claims

1. A compressor (1) that comprises a motor (2) consisting of two main components, a stator (3) and a rotor (4), a crankshaft (5) that delivers the motion received from the motor (2), a cylinder block (7), a bearing (8) that maintains the crankshaft (5) to be born on the cylinder block (7) in the radial direction, an oil suction duct (6) providing the lubricant oil to be sucked and secured to the end of the crankshaft (5) and a valve (9) disposed in the oil suction duct (6), allowing the lubricant oil to pass from the oil suction duct (6) to the bearing (8) during operation, but preventing the oil from turnina back by closing in the

course of stopping and **characterized in that** the valve (9) has an open bottom body (11) in form of a cylinder, at least one hole (12) located on the lateral surface of the body (11), at least one lower stopper (13) forming a protrusion towards the wall of the oil suction duct (6) at the lower end of the body (11) and at least one upper stopper (14) forming a protrusion towards the wall of the oil suction duct (6) at the upper end of the body (11) and by a set (10) located between the lower stopper (13) and the upper stopper (14) at the inner wall of the oil suction duct (6), whereon the lower stopper (13) bears from below during operation and the upper stopper (14) bears from above in the course of stopping.

2. A compressor (1) as in Claim 1, **characterized in that** the holes (12) remain above the set (10) when the lower stopper (13) bears on the set (10) from below.
3. A compressor (1) as in Claim 1 or 2, **characterized in that** more than one hole (12) is located on the body (11) at the same height equally distanced from each other, placed almost on a circle.
4. A compressor (1) as in any one of the above Claims, **characterized in that** the set (10) is located in the area where the oil suction duct (6) is secured to the crankshaft (5).
5. A compressor (1) as in any one of the above Claims, **characterized in that** the lower and upper stoppers (13, 14) are shaped like a ring flange, disposed at the lower and the upper ends of the body (11).
6. A compressor (1) as in any one of the Claims 1 to 4, **characterized in that** the lower stoppers (13) are shaped like detent means.

Patentansprüche

1. Verdichter (1), umfassend:

- einen Motor (2), der aus zwei Hauptbauteilen, einem Stator (3) und einem Rotor (4), besteht,
- eine Kurbelwelle (5), die die vom Motor (2) erhaltene Bewegung bereitstellt,
- einen Zylinderblock (7),
- ein Lager (8), das die Kurbelwelle (5) in radialer Richtung auf dem Zylinderblock (7) trägt,
- eine Ölsaugleitung (6), die vorsieht, dass das Schmieröl angesaugt wird, und die am Ende der Kurbelwelle (5) gesichert ist, und
- ein Ventil (9), das in der Ölsaugleitung (6) angeordnet ist und zulässt, dass das Öl während des Betriebs von der Ölsaugleitung (6) zum Lager (8) gelangt, aber verhindert, dass das Öl

wieder zurückfließt, indem es sich beim Anhalten schließt, und **dadurch gekennzeichnet, dass** das Ventil (9) Folgendes aufweist:

- einen Körper mit offenen Boden (11) in Form eines Zylinders,
- Mindestens eine Öffnung (12), die an der Seitenfläche des Körpers (11) angeordnet ist,
- wenigstens einen unteren Anschlag (13), der am unteren Ende des Körpers (11) einen Vorsprung zur Wand der Ölsaugleitung (6) bildet, und
- wenigstens einen oberen Anschlag (14), der am oberen Ende des Körpers (11) einen Vorsprung zur Wand der Ölsaugleitung (6) bildet,

und eine Sperre (10),

- die zwischen dem unterem Anschlag (13) und dem oberen Anschlag (14) an der Innenwand der Ölsaugleitung (6) angeordnet ist,
- an dem der untere Anschlag (13) während des Betriebs von unten her ruht, und
- an dem der obere Anschlag (14) beim Anhalten von oben her ruht.

2. Kompressor (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Öffnungen (12) über der Sperre (10) bleiben, wenn der untere Anschlag (13) von unten her an der Stufe (10) ruht.
3. Kompressor (1) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** mehr als eine Öffnung (12) in derselben Höhe und in gleichem Abstand voneinander nahezu an einem Kreis am Körper (11) angeordnet ist.
4. Kompressor (1) nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Stufe (10) in einem Bereich angeordnet ist, in dem die Ölsaugleitung (6) an der Kurbelwelle (5) gesichert ist.
5. Kompressor (1) nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** der untere und obere Anschlag (13, 14) wie ein Ringflansch geformt sind und am unteren bzw. oberen Ende des Körpers (11) angeordnet sind.
6. Kompressor (1) nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** die unteren Anschläge (13) wie ein Arretiermittel geformt sind.

Revendications

1. Un compresseur (1) comprenant

- un moteur (2) constitué de deux composantes

principales, un stator (3) et un rotor (4),
 - un vilebrequin (5) qui transmet le mouvement
 reçu du moteur (2),
 - un bloc-cylindres (7),
 - un palier (8) qui permet au vilebrequin (5) d'être
 supporté sur le bloc-cylindres (7) dans la direc-
 tion radiale,
 - un conduit d'aspiration d'huile (6) qui permet
 à l'huile lubrifiante d'être aspirée et qui est fixé
 à l'extrémité du vilebrequin (5) et
 - une vanne (9) disposée dans le conduit d'as-
 piration d'huile (6), permettant à l'huile lubrifiante
 de passer du conduit d'aspiration d'huile (6)
 au palier (8) pendant le fonctionnement, mais
 en empêchant l'huile de retourner en se fermant
 au cours de l'arrêt et **caractérisé en ce que** la
 vanne (9) a
 - un corps à fond ouvert (11) en forme de cylin-
 dre,
 - au moins un trou (12) situé sur la surface laté-
 rale du corps (11),
 - au moins une butée supérieure (13) qui forme
 une protubérance vers la paroi du conduit d'as-
 piration d'huile (6) à l'extrémité inférieure du
 corps (11) et
 - au moins une butée inférieure (14) qui forme
 une protubérance vers la paroi du conduit d'as-
 piration d'huile (6) à l'extrémité supérieure du
 corps (11) et

une barrière (10)

- située entre la butée inférieure (13) et la butée
 supérieure (14) sur la paroi interne du conduit
 d'aspiration d'huile (6),
 - sur laquelle la butée inférieure (13) s'appuie
 d'en bas pendant le fonctionnement et
 - sur laquelle la butée supérieure (14) s'appuie
 d'en haut au cours de l'arrêt.

2. Un compresseur (1) selon la Revendication 1, **ca-
 caractérisé en ce que** les trous (12) restent sur la
 barrière (10) lorsque la butée inférieure (13) s'appuie
 sur la barrière (10) d'en bas.
3. Un compresseur (1) selon la Revendication 1 ou 2,
caractérisé en ce que plus d'un trou (12) est placé
 sur le corps (11) à la même hauteur, à intervalles
 égaux de telle sorte d'être situé sur un cercle.
4. Un compresseur (1) selon l'une quelconque des re-
 vendications précédentes, **caractérisé en ce que**
 la barrière (10) est situé dans la région où le conduit
 d'aspiration d'huile (6) est fixé au vilebrequin (5).
5. Un compresseur (1) selon l'une quelconque des re-
 vendications précédentes, **caractérisé en ce que**
 les butées inférieure et supérieure (13, 14) sont en

forme de bride annulaire, disposée sur les extrémités
 inférieure et supérieure du corps (11).

6. Un compresseur (1) selon l'une quelconque des re-
 vendication de 1 à 4, **caractérisé en ce que** les
 butées inférieures (13) sont en forme de moyen de
 détente.

Figure 1

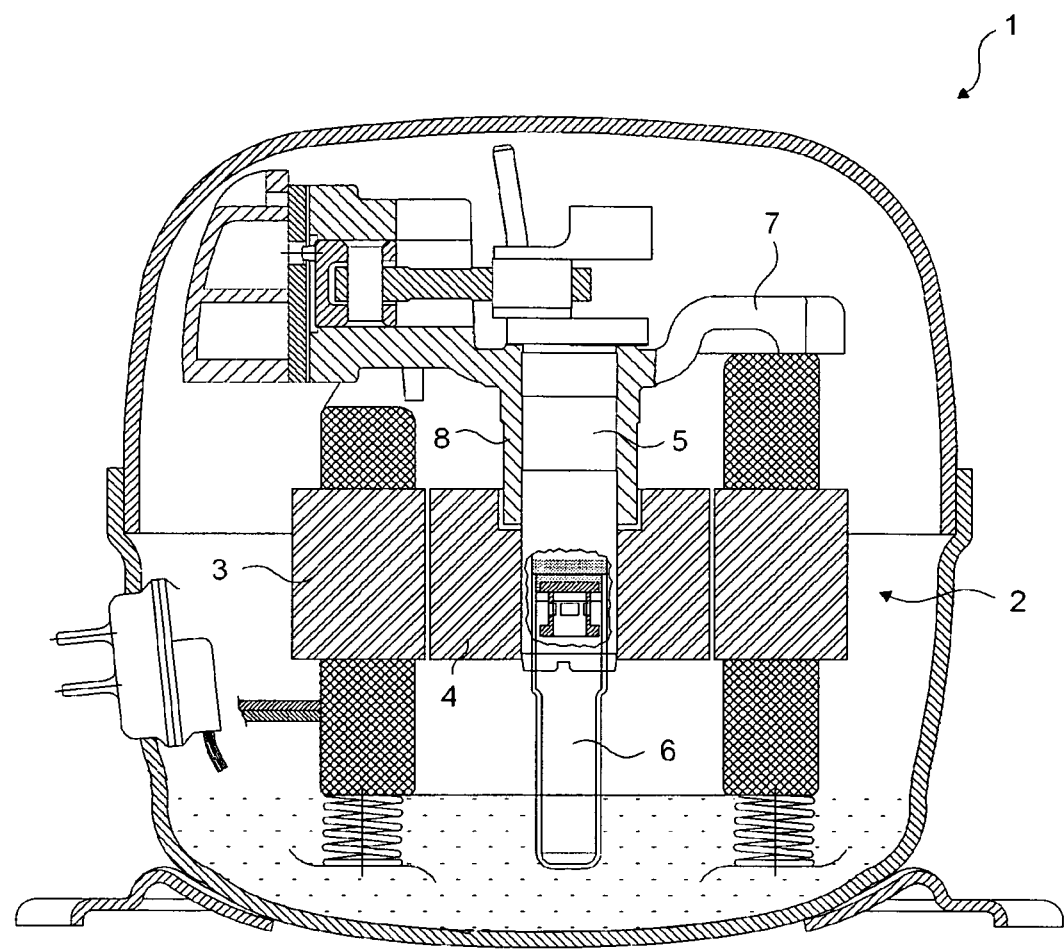


Figure 2

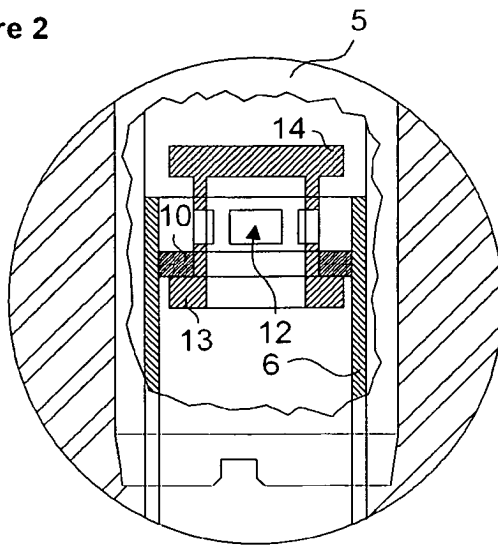


Figure 3

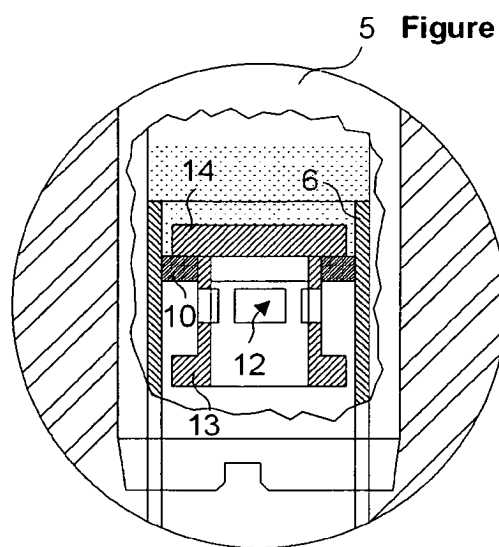


Figure 4

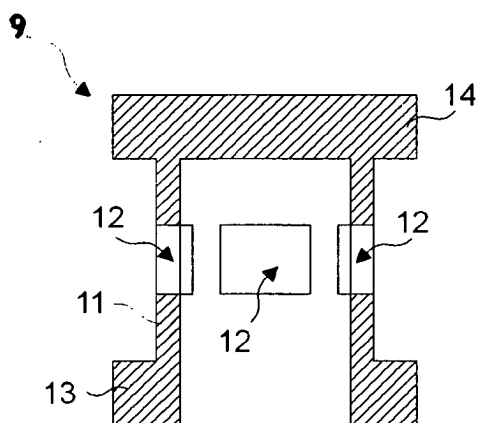
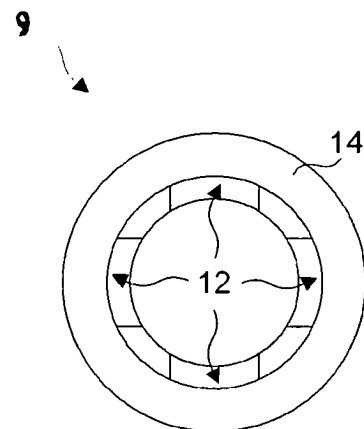


Figure 5



REFERENCES CITED IN THE DESCRIPTION

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