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(54) **MEDIUM-FREQUENCY HERMETICALLY SEALED REFRIGERANT COMPRESSOR HAVING ACTIVATION AND UNLOADING FUNCTIONS**

(57) A medium-frequency hermetically sealed refrigerant compressor capable of unloading during start, comprising: an electric connector (2), a front end socket (1), a rear end socket (6), a barrel (7), a medium-frequency motor (3) disposed in the barrel (7), a movable disc (4), a motion transmission sleeve (8), a main shaft (9), a clutch coil (10) and a clutch friction plate (11); the front and back ends of the barrel (7) are respectively connected to the front end socket (1) and the rear end socket (6); the barrel (7) has a stator disc (5) fixed therein co-operating with the movable disc (4); the movable disc (4) and the stator disc (5) are sleeved on one side of the main shaft (9), and the clutch friction plate (11) and the clutch coil (10) are sleeved on another side of the main shaft (9); the movable disc (4) and the clutch friction plate (11) are fixed on a side surface of the main shaft (9); the output shaft of the medium-frequency motor (3) is connected to the clutch coil (10) via the motion transmission sleeve (8); the electric connector (2) is fixed on the barrel (7); and the electric connector (2) is connected to the clutch coil (10). The compressor achieves a low current start, and reduces the impact against the on-board power

supply.

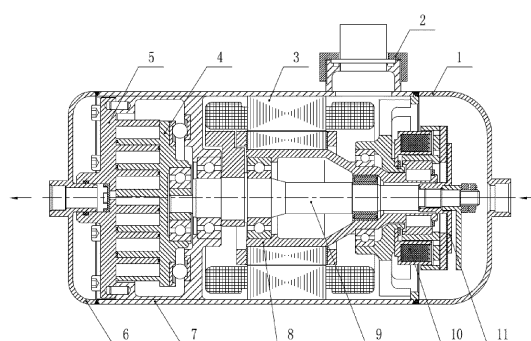


FIG.1

Description

Technical Field

[0001] The present invention relates to the technical field of vapor cycle refrigerant system in a helicopter, and more specifically relates to a medium-frequency hermetically sealed refrigerant compressor capable of unloading during start.

[0002] Nowadays, a vapor cycle refrigerant system of a helicopter mainly comprises a compressor, a medium-frequency motor, an evaporator, a condenser, an evaporation fan, a condensing fan and an expansion valve. Motion transmission of the medium-frequency motor is achieved by a belt so as to drive the compressor to realize refrigeration. This method of driving the compressor has the following disadvantages: 1) motion transmission by using a belt occupies a large area of spaces and requires good positioning of the components and high precision with respect to installation; 2) the motor has an independent cooling mechanism which requires additional cooling fan and air ducts etc. to be provided, thereby resulting in undesirable bulkiness and heaviness; 3) tension of the belt and its limited service life requires additional maintenance and replacement. A hermetically sealed refrigerant compressor may effectively solve the above problems. However, a hermetically sealed refrigerant compressor according to prior art generally has a start current 5-7 times stronger than a working current. In an on-board device, such a strong start current will trigger power protection of the helicopter and thus causes power failure which is dangerous.

Disclosure of the Invention

[0003] In view of the aforesaid disadvantages now existing in the prior art, the present invention provides a medium-frequency hermetically sealed refrigerant compressor capable of unloading during start. The medium-frequency hermetically sealed refrigerant compressor achieves a low current start.

[0004] In order to attain the above object, the medium-frequency hermetically sealed refrigerant compressor provided by the present invention comprises an electric connector, a front end socket, a rear end socket, a barrel, a medium-frequency motor provided inside the barrel, a movable disc, a motion transmission sleeve, a main shaft, a clutch coil and a clutch friction plate.

[0005] A front end and a rear end of the barrel are connected with the front end socket and the rear end socket respectively; a stator disc cooperating with the movable disc is fixed in the barrel; the movable disc and the stator disc are sleeved on one side of the main shaft; the clutch friction plate and the clutch coil are sleeved on another side of the main shaft; the movable disc and the clutch friction plate are fixed on a side surface of the main shaft; an output shaft of the medium-frequency motor is connected with the clutch coil via the motion transmission

sleeve; the electric connector is fixed on the barrel; the electric connector is connected with the clutch coil.

[0006] The stator disc is fixed in the barrel by using screws.

[0007] A seal ring is provided between the stator disc and the side surface of the main shaft.

Beneficial effects of the present invention

[0008] The medium-frequency hermetically sealed refrigerant compressor capable of unloading during start provided by the present invention comprises an electric connector, a barrel, a medium-frequency motor provided inside the barrel, a movable disc, a motion transmission sleeve, a main shaft, a clutch coil and a clutch friction plate. During operation, the voltage value is lowered upon starting, and the medium-frequency motor drives the clutch coil to rotate via the motion transmission sleeve to achieve an unloaded start; when rotation of the medium-frequency motor becomes stable, the electric connector supplies power to the clutch coil so that the clutch coil and the clutch friction plate will be mutually attracted to each other; as such, the main shaft will be driven by the medium-frequency motor to rotate to achieve a low current start. With the same refrigeration capacity, the present invention uses a hermetically sealed structure so as to significantly reduce the size and weight of the vapor cycle refrigeration system. At the same time, the present invention achieves a low current start of the medium-frequency hermetically sealed refrigerant compressor to reduce the impact against the on-board power supply.

Brief Description of Drawings

[0009]

FIG. 1 is a structural view of the present invention.

[0010] In the figure, 1 refers to a front end socket, 2 refers to an electric connector, 3 refers to a medium-frequency motor, 4 refers to a movable disc, 5 refers to a stator disc, 6 refers to a rear end socket, 7 refers to a barrel, 8 refers to a motion transmission sleeve, 9 refers to a main shaft, 10 refers to clutch coil, and 11 refers to clutch friction plate.

Best Mode for Carrying out the Invention

[0011] The present invention will be described further in detail below with reference to the figure.

[0012] In FIG. 1, the medium-frequency hermetically sealed refrigerant compressor provided by the present invention comprises an electric connector 2, a front end socket 1, a rear end socket 6, a barrel 7, a medium-frequency motor 3 provided inside the barrel 7, a movable disc 4, a motion transmission sleeve 8, a main shaft 9, a clutch coil 10 and a clutch friction plate 11. A front end

and a rear end of the barrel 7 are connected with the front end socket 1 and the rear end socket 6 respectively. A stator disc 5 cooperating with the movable disc 4 is fixed in the barrel 7. The movable disc 4 and the stator disc 5 are sleeved on one side of the main shaft 9. The clutch friction plate 11 and the clutch coil 10 are sleeved on another side of the main shaft 9. The movable disc 4 and the clutch friction plate 11 are fixed on a side surface of the main shaft 9. An output shaft of the medium-frequency motor 3 is connected with the clutch coil 10 via the motion transmission sleeve 8. The electric connector 2 is fixed on the barrel 7. The electric connector 2 is connected with the clutch coil 10. The stator disc 5 is fixed in the barrel 7 by using screws. A seal ring is provided between the stator disc 5 and the side surface of the main shaft 9. The clutch friction plate 11 is made by iron material.

[0013] The present invention has the following working principle: At first, power is not supplied by the electric connector 2 to the clutch coil 10, and the clutch coil and the clutch friction plate 11 are separated; next, activate the medium-frequency motor 3 so that the medium-frequency motor 3 drives the clutch coil 10 to rotate via the motion transmission sleeve 8; when rotation of the medium-frequency motor 3 becomes stable, the electric connector 2 supplies electricity to the clutch coil 10, and then the clutch coil 10 is magnetized by the received electricity; the clutch coil 10 and the clutch friction plate 11 will then be mutually attracted to each other to drive the main shaft 9 to rotate via the medium-frequency motor 3; the movable disc 4 at another side of the main shaft will then also rotate to achieve compression refrigeration.

Claims

1. A medium-frequency hermetically sealed refrigerant compressor capable of unloading during start comprises an electric connector (2), a front end socket (1), a rear end socket (6), a barrel (7), a medium-frequency motor (3) provided inside the barrel (7), a movable disc (4), a motion transmission sleeve (8), a main shaft (9), a clutch coil (10) and a clutch friction plate (11); a front end and a rear end of the barrel (7) are connected with the front end socket (1) and the rear end socket (6) respectively; a stator disc (5) cooperating with the movable disc (4) is fixed in the barrel (7); the movable disc (4) and the stator disc (5) are sleeved on one side of the main shaft (9); the clutch friction plate (11) and the clutch coil (10) are sleeved on another side of the main shaft (9); the movable disc (4) and the clutch friction plate (11) are fixed on a side surface of the main shaft (9); an output shaft of the medium-frequency motor (3) is connected with the clutch coil (10) via the motion transmission sleeve (8); the electric connector (2) is fixed on the barrel (7); the electric connector (2) is connected with

the clutch coil (10).

2. The medium-frequency hermetically sealed refrigerant compressor capable of unloading during start according to claim 1, wherein the stator disc (5) is fixed in the barrel (7) by using screws.
3. The medium-frequency hermetically sealed refrigerant compressor capable of unloading during start according to claim 1, wherein a seal ring is provided between the stator disc (5) and the side surface of the main shaft (9).

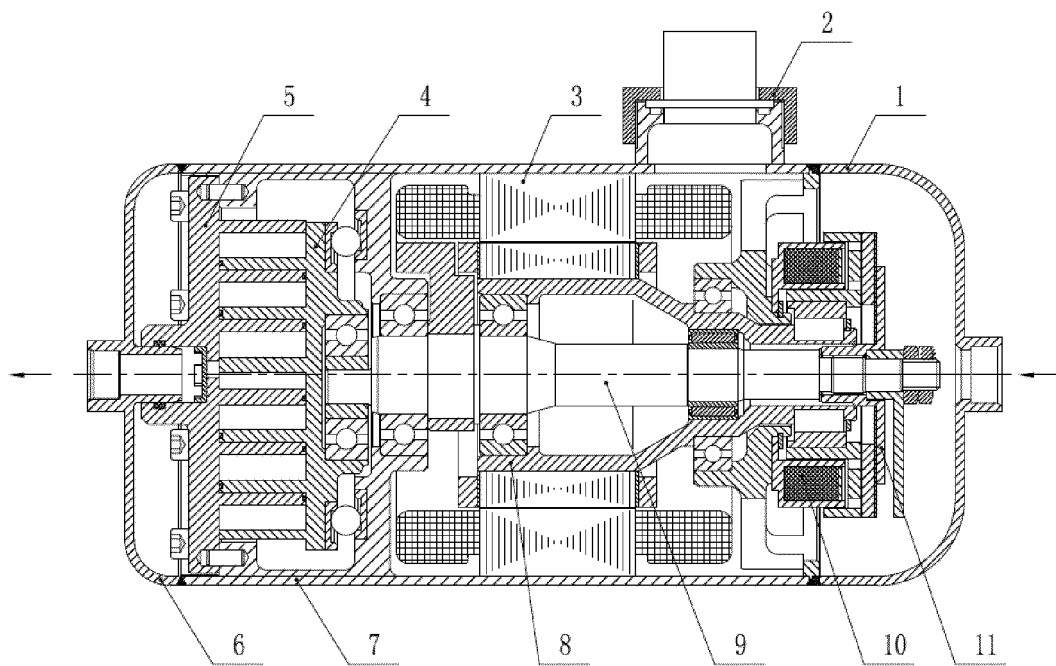


FIG.1

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2015/072404

A. CLASSIFICATION OF SUBJECT MATTER

F04C 18/02 (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)

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)

CNABS; SIPOABS, DWPI, CNKI: compress+, scroll+, vehicle??. aircondition+, clutch+, low w current+, intermediate w frequenc+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 103982431 A (SHAANXI CHANG LING SPECIAL EQUIPMENT CO., LTD. et al.), 13 August 2014 (13.08.2014), see description, paragraphs [0010]-[0015], and figure 1	1-3
A	CN 202971189 U (QIAO, Jianshe), 05 June 2013 (05.06.2013), see description, paragraphs [0007]-[0023], and figure 1	1-3
A	CN 202971188 U (LAN, Wei), 05 June 2013 (05.06.2013), see the whole document	1-3
A	CN 103047141 A (PI, Dezhi), 17 April 2013 (17.04.2013), see the whole document	1-3
A	US 2004184926 A1 (IGUCHI, M. et al.), 23 September 2004 (23.09.2004), see the whole document	1-3
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A	US 6234769 B1 (DENSO CORP. et al.), 22 May 2001 (22.05.2001), see the whole document	1-3

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

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	
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"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

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Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
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