

[54] **SLIDING VANE ROTARY COMPRESSOR**
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[57] **ABSTRACT**

A rotary compressor of the sliding vane type for operation with a working medium containing a finely-dispersed lubricant for lubrication and cooling of the compressor is disclosed. Passages and spaces are provided to permit flow of the lubricant-bearing working medium to all moving parts before introduction into the working chamber of the compressor for compression.

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3 Claims, 3 Drawing Figures

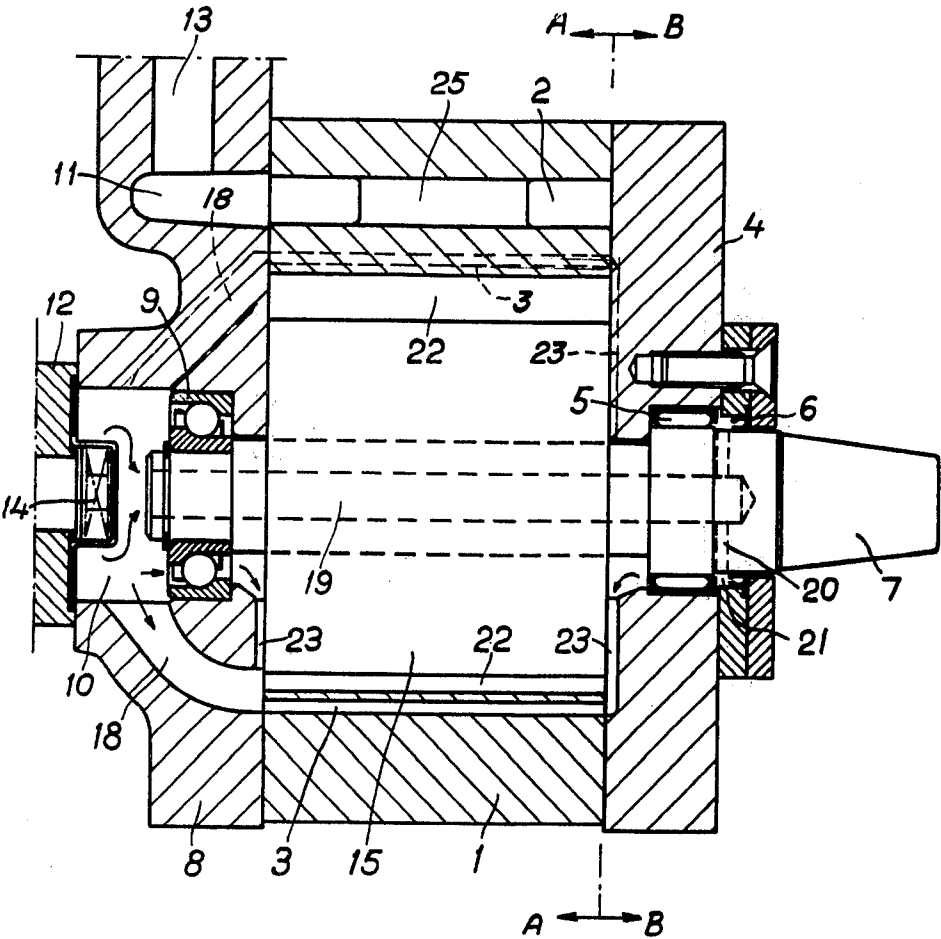


Fig. 1

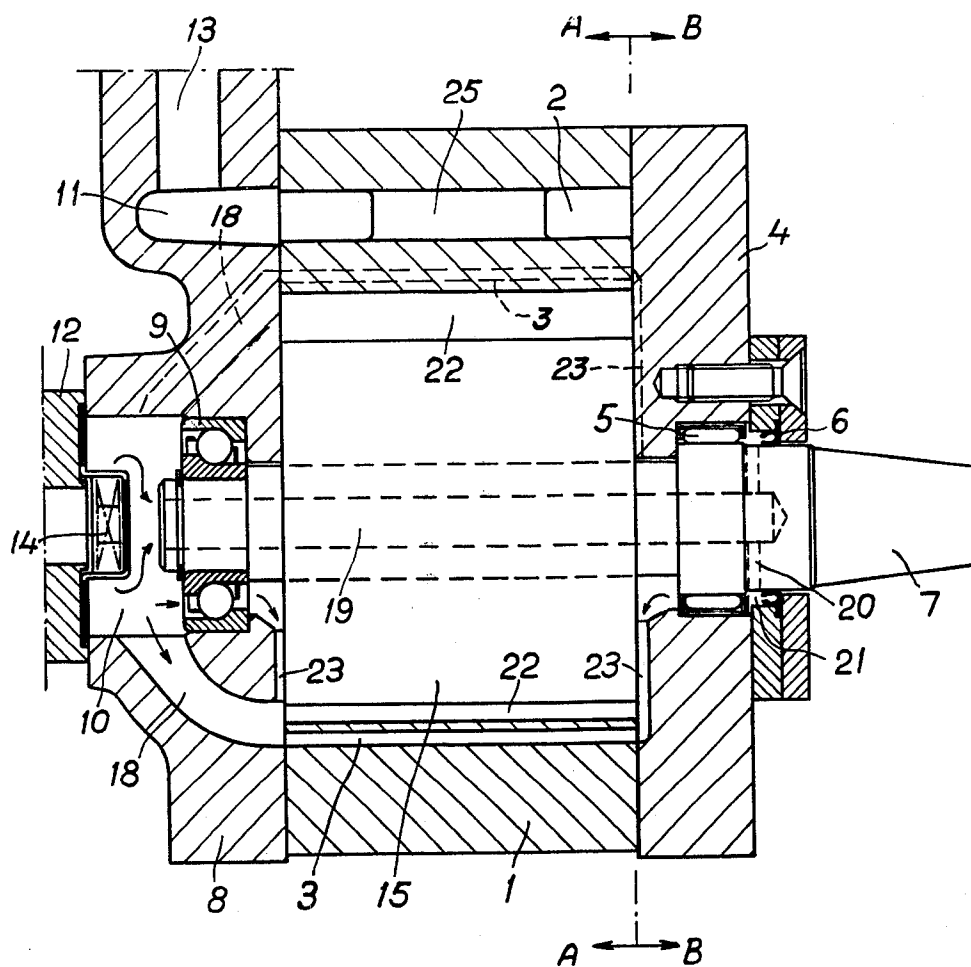


Fig. 2

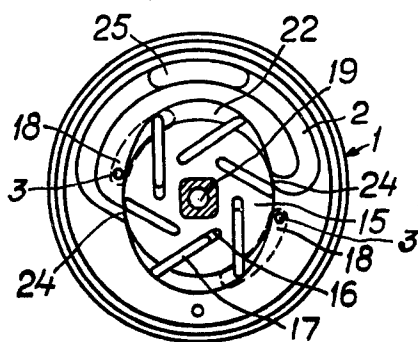
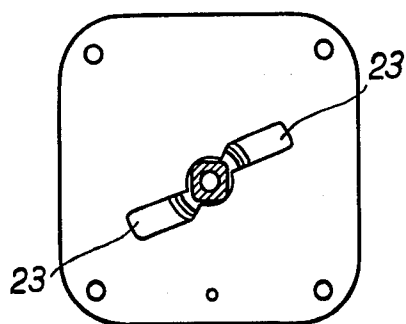


Fig. 3



SLIDING VANE ROTARY COMPRESSOR

SUMMARY OF THE INVENTION

The primary object of this invention is to provide a compressor capable of operating with a finely-dispersed lubricant in the working medium, which, for example, may be a refrigerant. No specific lubricating system nor oil sump is required for such a compressor which, if part of a cooling plant, needs no oil separator or the like and cooperates with substantially only a condenser and an evaporator on the refrigerant side of the cooling plant.

A cooling plant of this kind, therefore, is most suitable for use in small transportable units which are exposed to shocks and subject to motions which alter their orientation. Installations in vehicles and craft of all kinds are particularly desirable.

A compressor constructed in accordance with this invention comprises a stator, a rotor, and end sections which define the working chamber of the compressor and which support bearings for the rotor shaft. Inlet and outlet parts for the working medium are also provided in the end sections.

The inventive concept herein disclosed is to permit access of the working medium, with its finely-dispersed lubricant, to those parts of the compressor which require lubrication and cooling, i.e., the rotor, vanes, shaft bearings, and washer. According to the invention, this is achieved by providing spaces which surround the bearings at each end of the rotor shaft and which are connected to the inlet side of the compressor by passages, including a channel drilled in the rotor shaft, enabling the working medium carrying the lubricant to be flushed through the bearings. In addition, by suitable shaping of the various channels on the suction side of the compressor, working medium and lubricant will flow through or coat the various moving parts before the medium is sucked into the working chamber of the compressor for compression.

The construction of the novel compressor will be further described in clear and concise detail with reference to the accompanying drawings, which illustrate a preferred embodiment of this invention.

DRAWINGS

In the drawings,

FIG. 1 is an axial sectional view of a compressor constructed in accordance with this invention;

FIG. 2 is a cross-sectional view taken along line A—A of FIG. 1; and

FIG. 3 is a cross-sectional view taken along line B—B of FIG. 1 and showing a stator end section as seen from inside the compressor.

DESCRIPTION

The illustrative compressor in the drawings, shown with double chambers and symmetrical construction but not limited thereto, has a central portion, the stator 1, containing outlet channels 2 for the suction gas medium. End section 4 supports a bearing 5 and sealing means 6 against rotor shaft 7, as well as assembly means and related accessories. Opposite end section 8 supports bearing 9 for shaft 7 and includes suction chamber 10, inlet passage 18, and outlet channel (s) 11, with connections 12 and 13 for necessary appurtenances, such as stop valves (not shown) and check

valve 14. Rotor 15, containing the necessary slots 16 for vanes 17, is mounted on rotor shaft 7.

The oil-carrying working medium reaching the compressor flows through check valve 14 into suction chamber 10. Channel 19, bored in shaft 7, and bearing 9 communicate directly with suction chamber 10. Shaft channel 19 is connected through one or more cross-channels 20 to space 21, in which bearing 5 and shaft washer 6 are mounted. Channels 20 are drilled radially in rotor shaft 7, and create a pumping effect on the working medium from channel 19 out into space 21, and hence into bearing 5 and washer 6.

Suction chamber 10 is in communication with working chamber 22 of the compressor through passages 18 in end section 8 and channels 3 in stator 1. Channels 23 in both end sections 4 and 8 connect suction chamber 10 and space 21 with working chamber 22 in the same locations as inlet passages 18.

Grooves 23 in end sections 4 and 8 are positioned and shaped in such a way that, during a portion of the working cycle of the compressor, they connect vane slots 16 of rotor 15 under vanes 17 with the suction side of the compressor, and working medium is sucked into vane slots 16; as the compressor cycle progresses, this connection is closed by the shutting off of grooves 23.

During the second part of the working cycle, the working medium flowing into vane slots 16 may possibly expand, but, most importantly, it will be compressed during the inward movement of vanes 17, thus preventing the well-known so-called "vane jumping" which, among other things, causes a high sound level, considerable wear, and a very high risk of damage.

From suction chamber 10, a portion of the oil-bearing working medium flows through shaft channel 19 to space 21, thus lubricating and cooling shaft washer 6, the working medium then passes and lubricates bearing 5 and flows further through groove 23 into working chamber 22 of the compressor. A corresponding flow of gas through bearing 9 accomplishes a similar result. Within working chamber 22, the working medium is compressed and, when the compressor cycle exposes outlet ports 24 to chamber 22, flows into outlet channel 11 and further out into the cooling plant system (not shown).

Since the compressor of this invention is not provided with discharge valves, the desired compression ratio in the working chamber may be established by the selective placement of outlet ports 24.

For efficient operation, the various channels and spaces provided in the compressor should be so dimensioned with respect to each other and to the capacity of the compressor that the velocity of flow through the compressor is sufficiently high to keep the lubricant dispersed and floating in the working medium. This requires, for example, that shaft channel 19 be large enough and channel 3 be small enough to avoid the short-circuiting of one parallel passage by the other.

The rotary compressor of this invention has been described; the concepts embodied therein are defined by the scope of the ensuing claims.

I claim:

1. In a rotary compressor for compressing a gaseous lubricant bearing working medium, means for passing said medium to the moving parts of the compressor, comprising:

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- a. a stator having a peripheral wall and end walls defining a working chamber and having outlet passage means for the compressed medium;
- b. a slotted rotor accommodating a plurality of vanes slidably mounted in the slots thereof for frictionally engaging the walls of said working chamber to compress said medium;
- c. said rotor being carried by a rotary shaft the ends of which are journaled in bearings in said end walls and having a channel extending axially there-through in lubricant communication relationship with said bearings;
- d. passage means in said stator for discharging the compressed medium from said working chamber to said outlet passage means in at least one of said end walls;
- e. a suction chamber in one of said end walls adjacent the bearing located therein and in lubricating communication therewith;
- f. means for supplying said medium to said suction chamber;

- g. first passage means for passing said medium from said suction chamber into said working chamber;
 - h. a space in the end wall opposite to said suction chamber in lubrication relationship with respect to the bearing located in said end wall;
 - i. second passage means for passing said medium from said space into said working chamber, and
 - j. third passage means for passing said medium into said working chamber from said suction chamber through the adjacent bearing.
2. A rotary compressor according to claim 1, in which said third passage means are so located and dimensioned as to provide communication with the slots in said rotor during a predetermined portion of the working cycle.
3. A rotary compressor according to claim 1, in which said rotary shaft is provided with channels extending radially from said axially extending channel and effective to pump lubricant gas into said space by the rotation of the shaft.

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