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Inventor Richard Helmick

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ROTARY COMPRESSOR WITH PULSATION
MINIMIZING DISCHARGEBACKGROUND OF THE INVENTION

The present invention relates generally to a positive displacement type of rotary compressor from which fluids are centrifugally driven for discharge into a receiver.

Rotary compressors having single screw type of bladed rotors for pressurized discharge of a fluent material such as refrigerant, are generally known in the art. Such compressors impart a radial velocity component to the refrigerant being pressurized for flow to the condenser of a refrigeration system, as the receiver for example. Accordingly the pressurized refrigerant when delivered to the receiver by compressor discharge porting along a flow path having sharp turns, results in pulsation induced vibration noise dependent on the rotor blade threading and rotor driving frequency.

In an effort to deal with the foregoing pulsation noise problem, diffusers and discharge mufflers have been proposed for rotary compressors, as disclosed for example in U.S. Patent Nos. 4,330,239, 5,205,719 and 5,249,919 to Gannaway, Childs et al. and Sishtla et al., respectively. However, such prior art muffler arrangements introduce other flow path problems which adversely affect efficient compressor operation.

It is therefore an important object of the present invention to provide a rotary type of positive displacement compressor from which pulsations are minimized to reduce vibrations while maintaining optimized operation under different installational conditions.

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SUMMARY OF THE INVENTION

In accordance with the present invention, the foregoing rotary type of positive displacement compressor is provided with a discharge muffler through which fluids pressurized by rotation of a single screw bladed rotor are conducted to the receiver along a single continuous volute-shaped flow passage having a flow path geometry tailored to both minimize pulsations and optimize operation. Toward that end, the volute flow passage may be provided with a diffuser portion for converting kinetic energy into pressure of the fluid discharged with a radial velocity component from the rotor housing of the compressor. Also, the geometry of the volute-shaped passage flow path may be adjustably changed to accommodate different installational conditions for optimized compressor operation.

BRIEF DESCRIPTION OF DRAWING FIGURES

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A more complete appreciation of the invention and many of its attendant advantages will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawing wherein:

FIG. 1 is a partial side section view of a compressor constructed in accordance with one embodiment of the invention for a refrigeration system installation as also diagrammed; and

FIG. 2 is a transverse section view through the compressor taken substantially through a plane indicated by section line 2-2 in FIG. 1.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

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Referring now to the drawing in detail, FIG. 1 illustrates a positive displacement type of compressor, generally referred to by reference numeral 10. According to one embodiment the compressor 10 is installed in a refrigeration system by interconnection between its evaporator 12

1 and condenser 14, the refrigeration system also having a source of refrigerant 16 as
2 diagrammatically shown in FIG. 1. Also diagrammed in FIG. 1 is a motor 18 driving the
3 compressor for operation thereof. The refrigerant is accordingly drawn from source 16 through
4 the evaporator 12 by operation of the compressor 10 to absorb heat from a refrigerated zone, and
5 deliver the refrigerant to the condenser 14 before return to the source 16.
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7 The compressor 10, as shown in FIG. 1, has a rotor shaft 20 driven by the motor 18 for
8 rotation about an axis 22 established by its rotational support within a pressure-sealed housing 24
9 having an inlet port 26 connected to the evaporator 12 to receive fluent material therefrom in the
10 form of refrigerant under a relatively low pressure. A single screw or helix type of blade 28 is
11 fixed to the rotor shaft 20 within the housing 24 so as to centrifugally displace the refrigerant
12 outwardly from the housing 24 with a radial velocity component into a flow controlling muffler
13 30 fixed to the housing adjacent one axial end thereof axially spaced from the inlet port 26.
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15 As shown in FIG. 2, the housing 24 is provided with a pair of outlet ports 32 and 34 spaced
16 180° apart, from which the refrigerant is delivered with a radial velocity component into an
17 arcuate collector portion 36 of a single continuous flow passage of muffler 30. The refrigerant
18 flow stream follows a smooth volute-shaped, direction-changing flow path within the flow
19 passage through a diffuser portion 38 thereof having a minimum cross-sectional throat. The flow
20 passage cross-sectionally increases in flow area from the diffuser portion 38 through an
21 adjustable discharge duct portion 40 in a direction perpendicular to the radial outflow of the
22 refrigerant from ports 32 and 34.
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24 According to the embodiment shown in FIG. 2, the cross-sectional flow area of duct portion
25 40 may be changed by adjustable displacement of an internal passage wall 42 through adjustment
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1 control 44 in order to change flow passage geometry within the muffler 30. Such capability for
2 adjustable change in flow passage geometry is desirable so as to accommodate different
3 installational conditions with which the compressor 10 may be associated. Efficiency optimized
4 operation for different installations of the compressor 10 is thereby achievable. Thus, in addition
5 to the refrigeration system described, the compressor 10 may be adapted for optimized operation
6 for example in various AC power installations and as a pump, with increased efficiency and
7 reduced noise level from vibrations.
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10 Obviously, other modifications and variations of the present invention may be possible in
11 light of the foregoing teachings. It is therefore to be understood that

12 the invention may be practiced otherwise than as specifically described.
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1 Navy Case No. 71,405

2 ROTARY COMPRESSOR WITH PULSATION
3 MINIMIZING DISCHARGE

4 ABSTRACT OF THE DISCLOSURE

5 Fluent material is discharged with a radial velocity component from outlet ports of a positive
6 displacement compressor for flow through a continuous volute passage to a receiver. The volute
7 passage has a flow path geometry arranged to both minimize pulsations of the fluent material
8 delivered to the receiver and optimize operation of the compressor.
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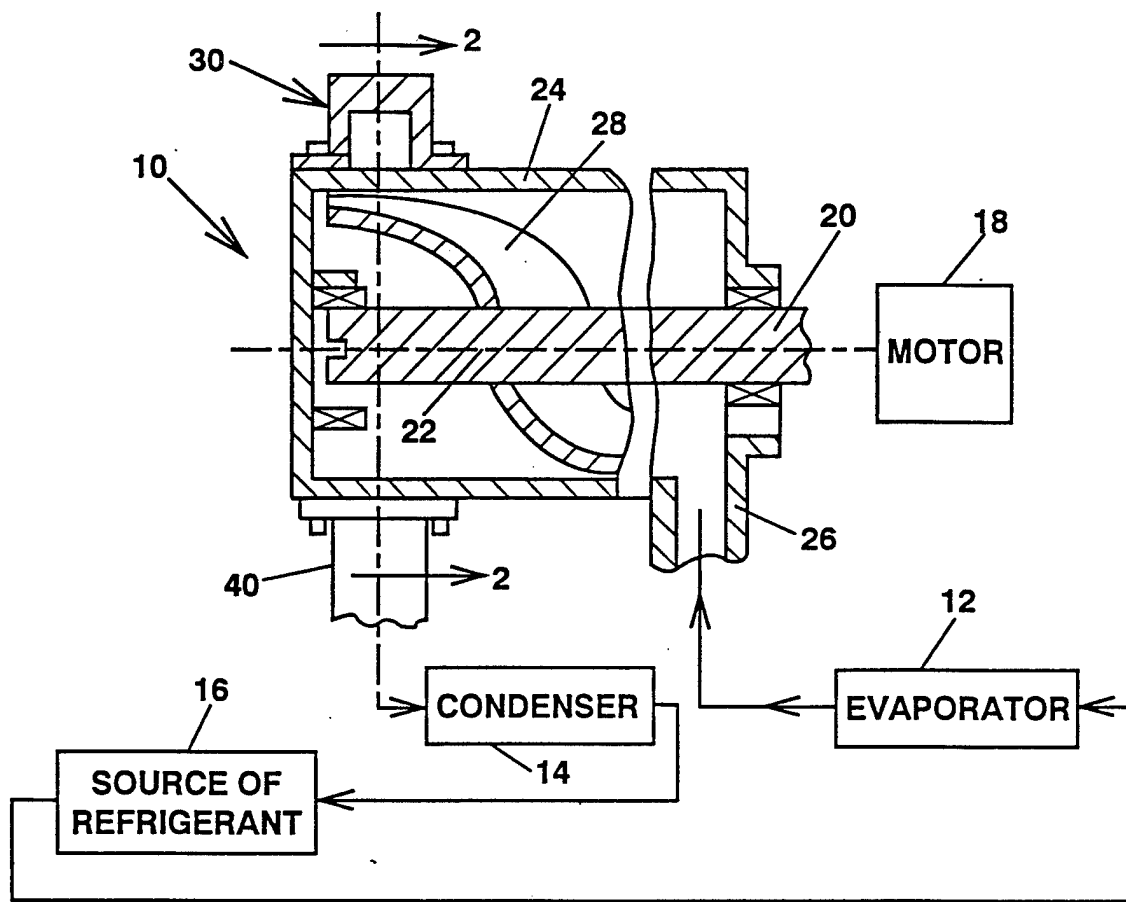


FIG. 1

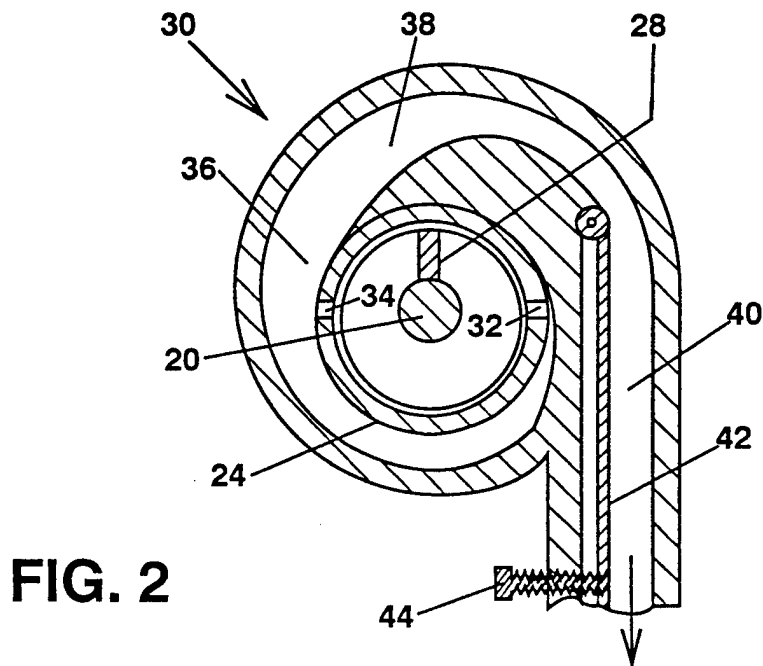


FIG. 2