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REFRIGERATING APPARATUS

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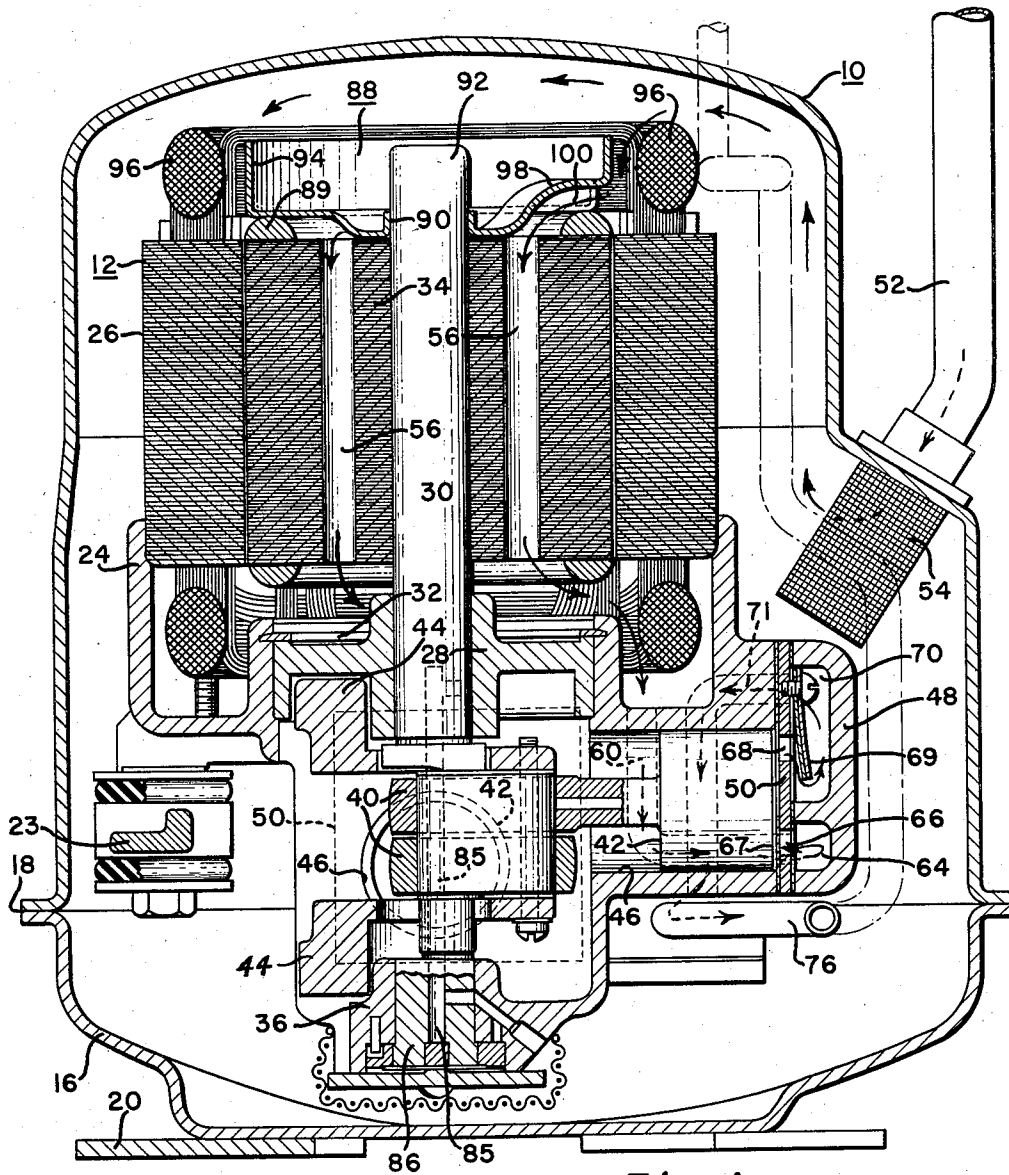


Fig. 1

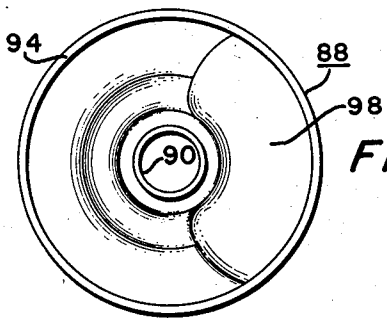


Fig. 2

INVENTOR.
John Weibel Jr.
BY R. R. Candor
His Attorney

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John Weibel, Jr., Dayton, Ohio, assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

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4 Claims. (Cl. 230—58)

This invention relates to refrigerating apparatus and more particularly to a hermetically sealed motor-compressor assembly.

It is an object of this invention to provide a low-cost direct connected reciprocating compressor which may be manufactured on a mass production basis.

Another object of this invention is to provide an improved low-cost arrangement for cooling the motor stator. More particularly, it is an object of this invention to provide a motor drive shaft with a baffle which serves to direct the relatively cold incoming refrigerant in close thermal exchange relationship with the motor stator.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Figure 1 is a vertical sectional view showing the invention applied to a motor compressor unit of the type disclosed in copending application Serial No. 517,603, filed June 23, 1955; and

Figure 2 is a plan view of the baffle and the motor showing the relationship between the motor windings and the baffle.

Referring to the drawings wherein preferred embodiments of the invention have been shown, reference numeral 10 generally designates one form of outer shell for enclosing the motor and compressor assembly generally designated by the reference numeral 12. The casing 10 consists of an upper inverted cup-shaped member 14 which serves as the main support for the motor-compressor assembly and a lower cup-shaped element 16 which is welded to the element 14 along the seam 18. Suitable mounting brackets 23 are secured to the lower cup-shaped element 16 for supporting the entire assembly on a suitable support, which has not been shown.

The motor compressor assembly 12 is adapted to be supported within the outer shell or casing 10 in any suitable manner such as by means of the mounting brackets 23. For a more complete description of the manner in which the compressor assembly is supported within the outer casing, reference is hereby made to said copending application which more fully describes the construction and operation of the compressor apparatus shown in this application.

The main casting 24 in turn supports the motor stator 26 in the manner shown. The casting 24 also supports a bearing 28 in which the main drive shaft 30 is journaled. The bearing element 28 is held in place within a machined circular recess provided in the main support 24 by means of a split ring element 32. As shown in Fig. 1 of the drawing, the split ring is beveled so as to cam the bearing 28 downwardly. The motor rotor 34 is secured to the upper end of the drive shaft 30 in accordance with conventional practice. The lower end of the drive shaft 30 is journaled in a lower bearing portion 36 provided as a part of the main casting or frame 24.

An offset crank-like portion 38 is provided on the drive

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shaft 30 and serves to operate a pair of connecting rods 40 which drive the pistons 42 in accordance with well-known practice. A pair of counterweights 44 are secured to the offset portion of the drive shaft, as shown, for the purpose of balancing the crankshaft. The main casting 24 is provided with a pair of cylinder bores 46 in which the pistons 42 operate. Cylinder heads and valve plates 48 and 50, respectively, are bolted directly to the casting 24 opposite the cylinder bores 46 in accordance with well-known practice.

The gas to be compressed is supplied to the casing 10 through the suction line 52 which is arranged as shown. It will be noted that this suction line enters the upper portion of the shell 14 and that a screen 54 is provided for screening out any sediment or the like which may be supplied along with the gas and lubricant through the line 52. The incoming mixture of gas and lubricant is dumped directly into the outer shell 10 and is required to flow upwardly around the motor stator and then to flow downwardly through the motor. Holes 56 are provided in the motor rotor so as to help cool the motor.

The gas then flows downwardly through one or more passages 60 formed in the casting 24 and then into the chamber 64 provided in each of the cylinder heads 48. The gas then flows through the usual suction port 66 and around the flexing reed 67 into the cylinder where the gas is compressed before being discharged through the corresponding outlet port 68 and outlet valve 69 into the outlet chamber 70 in the cylinder head. The outlet chamber 70 in each cylinder head communicates with a hole 71 in the main casting 24 which connects to the outlet line 76 which passes through the wall of the upper shell portion 14.

The construction and arrangement of the cylinder head and the inlet and outlet ports and valves carried by the valve plate 50 is intended to represent conventional construction, which needs no further description as the construction thereof is well known to those skilled in the art. The arrangement of the gas passages within the main casting 24, however, is novel in that the incoming gas serves to cool vital parts of the motor-compressor assembly and a minimum number of pipe connections are necessary with the construction shown.

An oil pump, generally designated by the reference numeral 86, which will pump oil irrespective of the direction of rotation of the motor is provided for supplying lubricant under pressure to the various bearing surfaces of the motor compressor unit through passage means 85 in the main drive shaft 30.

It has been found that the temperature of the motor may be reduced an appreciable amount by adding a cup-shaped element or baffle 88 to the upper end of the motor rotor. This element is provided with a central aperture 90 which has a press fit on the motor shaft extension 92 so as to cause the element 88 to rotate in unison with the shaft and the motor rotor 34. An upwardly extending flange 94 is provided as shown, and is arranged sufficiently close to the motor stator windings 96 so as to require the relatively cold refrigerant vapor entering the casing 14 through the line 52 to pass in close thermal exchange relationship with an appreciable portion of the motor stator windings 96 on its way to the compressor inlet passage 60 via the air passages 56 in the rotor 34 and the air gap between the stator 12 and the rotor 34. The bottom portion of the element 88 rests on the usual raised circumferentially extending ridge 89 formed on the rotor. The bottom wall of the element 88 is provided with a raised portion 98 which provides a clearance 100 between the motor rotor and the bottom wall of the cup-shaped element 88 throughout a portion of the circumference, as shown in Fig. 2. By virtue of the construction shown, it is obvious that much of the refrigerant

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vapor is required to pass through the clearance 100 which is formed between the raised portion 98 and the rotor 34. It is also obvious that this clearance constitutes an inlet opening which is caused to move around or rotate with the rotor, with the result that a rotating blast of relatively cold refrigerant vapor sweeps the motor windings.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. In a sealed motor-compressor unit, a sealed casing, a frame supported in said casing, a shaft journaled in said frame, a motor rotor secured to said shaft, a motor stator having a central opening surrounding said rotor and supported within said casing, compressor means drivingly connected to said shaft, inlet means for supplying a relatively cool gas to be compressed into said casing in the area surrounding said motor rotor and stator, means for directing said gas into thermal exchange relationship with said stator and thereafter downwardly through said central opening before entering said compressor means, said last-named means comprising a cup-shaped gas directing baffle secured to said rotor and having a portion disposed adjacent a portion of said stator.

2. In a sealed motor-compressor unit, a sealed casing, a frame supported in said casing, a shaft journaled in said frame, a motor rotor secured to said shaft, a motor stator having a central opening for receiving said motor rotor, means for supporting said motor stator within said casing, compressor means within said casing drivingly connected to said shaft, said compressor having an inlet arranged adjacent one end of said motor stator, inlet means for supplying a relatively cool gas to be compressed into said casing in the area surrounding said motor stator and rotor, means for directing said gas upwardly adjacent the outer periphery of said motor stator and thereafter downwardly through said central opening before said gas enters said compressor inlet, said last-named means comprising a gas directing baffle secured to the upper end of said rotor and having a flange portion disposed adjacent a portion of said stator so as to form a narrow circular passageway adjacent said stator.

3. In a sealed motor-compressor unit, a sealed casing, a frame supported in said casing, a shaft journaled in said frame, a motor rotor secured to said shaft, a motor

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stator having a central opening for receiving said motor rotor, means for supporting said motor stator within said casing in spaced relationship thereto, compressor means within said casing drivingly connected to said shaft, said compressor having an inlet for gas to be compressed, means for supplying a relatively cool gas to be compressed into the space between said casing and said motor stator, means for directing said gas downwardly through said central opening into thermal exchange relationship with said motor before entering said compressor inlet, said last-named means comprising a gas directing baffle secured to said rotor and having a portion extending axially alongside of a portion of said stator for directing said relatively cool gas in thermal exchange relationship with said portion of said stator, said rotor having axially extending gas passages formed therein for conveying a portion of said gas to said compressor inlet.

4. In a sealed motor-compressor unit, a sealed casing, a frame supported in said casing, a shaft journaled in said frame, a motor rotor secured to said shaft, a motor stator having a central opening for receiving said motor rotor, means for supporting said motor stator within said casing, compressor means drivingly connected to said shaft, said compressor having an inlet for gas to be compressed, means for supplying a relatively cool gas to be compressed into said casing in the area surrounding said motor stator and rotor, means for directing said gas into thermal exchange relationship with a portion of said motor before entering said compressor inlet, said last-named means comprising a gas directing baffle secured to said rotor and having a portion disposed adjacent a portion of said stator for directing said relatively cool gas in thermal exchange relationship with a portion of said stator, said baffle comprising a cup-shaped element secured to one end of said motor rotor and having a raised portion in its bottom wall for providing a gas passage between said raised portion and said rotor, said rotor having a plurality of axially extending apertures communicating at one end with said gas passage and at the other end with said inlet.

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