

June 26, 1934.

H. R. VAN DEVENTER

1,964,415

MOTOR COMPRESSOR UNIT

Filed July 31, 1930

2 Sheets-Sheet 1

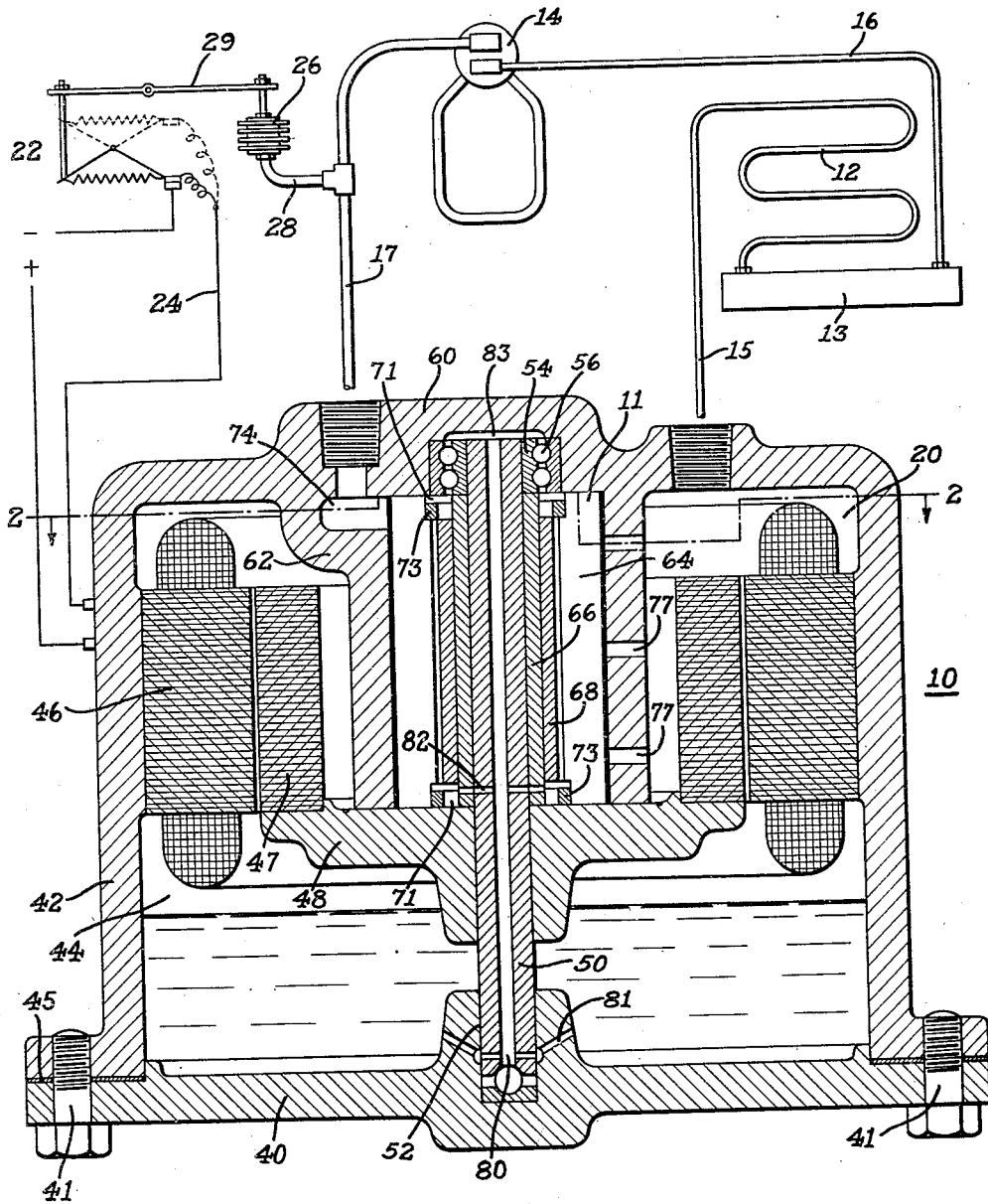


Fig. 1

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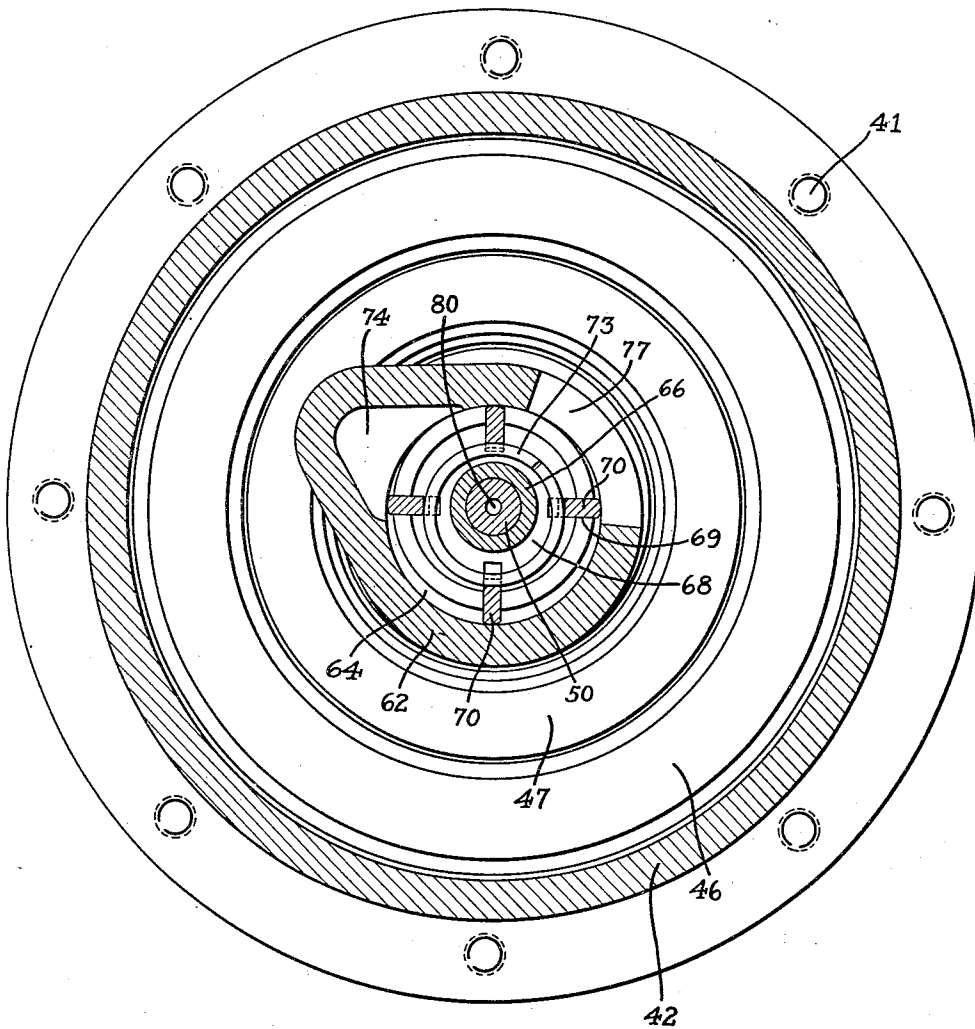


Fig. 2

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UNITED STATES PATENT OFFICE

1,964,415

MOTOR-COMPRESSOR UNIT

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poration of Delaware

Application July 31, 1930, Serial No. 471,946

4 Claims. (Cl. 230—139)

This invention relates to refrigerating apparatus of the compression type and more particularly to motor-compressor units for use with refrigerating apparatus of the compression type.

5 In refrigerating apparatus of the compression type there is generally provided, among other elements, a motor driven compressor having its discharge side connected to a condenser and its intake side connected to an evaporator, the condenser being in turn connected on its discharge side to the evaporator through some sort of pressure reducing device. Refrigeration is produced by evaporating a liquid refrigerant under reduced pressure in the evaporator, the vapors being compressed into and condensed in a condenser from where the refrigerant, in liquid form, returns to the evaporator.

10 It is to the means for compressing the refrigerant vapors that this invention particularly relates, having for one of its objects to provide an improved motor-compressor unit. More particularly, it is an object of this invention to provide a compact and unitary motor-compressor unit wherein the compressor is located within the confines of the motor, to thereby utilize space heretofore generally wasted.

15 A further object of this invention is to provide an hermetically sealed motor-compressor unit wherein both the motor and the compressor are located within a sealed casing and wherein the compressor is located within the confines of the motor. More particularly, to provide in an hermetically sealed motor-compressor unit a common platform or support for carrying the rotating members of both the motor and the compressor.

20 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:

25 Fig. 1 is a diagrammatic view of a refrigerating system of the compression type having incorporated therein a motor-compressor unit shown in vertical section.

Fig. 2 is a horizontal section taken on the line 2—2 of Fig. 1.

30 In order to illustrate my invention, I have disclosed a refrigerating system of the compression type having incorporated therein an hermetically sealed motor-compressor unit embodying the features of my invention. For instance, I have disclosed a motor-compressor unit generally designated by the reference character 10, having

therein a compressor 11, a condenser 12, a receiver 13 and an evaporator 14. Refrigerant may flow through the parts in the order named. That is, refrigerant vapors compressed in the compressor 11, discharged through the conduit 15 into the condenser 12, wherein the compressed vapors are liquefied and finally collected in liquid form in the liquid receiver 13. From the liquid receiver 13, the refrigerant in liquid form flows through the conduits 16 into the evaporator 14. Herein the liquid refrigerant evaporates to produce a cooling effect, the vapors resulting therefrom passing through the conduit 17 to the suction side of the compressor 11 as more fully described hereinafter. A motor 20 is connected to drive the compressor, and in order to maintain the cabinet which generally houses the evaporator 14 at a substantially constant temperature, means are provided for automatically starting the compressor when the temperature of the evaporator or of the refrigerator reaches a predetermined high limit and for stopping the compressor when the temperature reaches a predetermined low limit. To this end a switch 22 is located in the motor circuit 24. A bellows 26 in open communication with the conduit 16 through the conduit 28, is connected through the lever 29 to operate the snap switch 22. Thus the compressor is started and stopped in response to predetermined high and low pressures within the evaporator 14. Since the pressure within the evaporator 14 varies with the temperature therein, the compressor is in reality responsive to the temperature within the evaporator 14.

35 The evaporator 14, which has been disclosed diagrammatically only, may be of any desired construction. For instance, it may be the float control flooded type of evaporator similar to that disclosed in the patent to Osborn, No. 1,556,708 patented October 13, 1925.

40 Referring in detail to the motor-compressor unit, I have shown this unit as comprising a base plate 40 having secured thereto by means of the bolts 41, a bell-shaped member 42, forming with the base plate 40 a chamber 44. A gasket 45 is located between the plate 40 and the member 42 to assure an hermetic seal for the chamber 44. Within the chamber 44 is located the motor 20 comprising a stator 46, secured to and carried by the walls of the member 42 and a rotor 47 secured to and supported by a platform or support 48, the platform 48 being in turn secured to and carried by a shaft 50, having its lower end journaled in the bearing 52 in the base plate 40, and having its upper end secured

to the race 54 mounted to rotate on the bearings 56 located in the end wall 60 of the bell-shaped member 42.

A substantially annular wall 62, integral with and depending from the end wall 60 of the member 42, has its lower end contacting with the platform 48, and forms therewith a cylinder 64 eccentric to and surrounding the shaft 50. Within the cylinder 64, a bushing 66 is secured to the shaft 50 and a rotor 68 provided with a plurality of radial slots 69 is secured to the bushing 66. In each radial slot 69 is positioned a vane or blade 70, and at its upper and lower ends the rotor is cut away as shown at 71 for the reception of split rings 73, which split rings bear against the inner edges of the blades 70, forcing the blades outwardly so that the outer edges thereof bear against the walls of the cylinder 64.

At its upper end, the wall 62 is slightly curved to provide an inlet passage 74, which passage is in communication with the conduit 17 for conducting the vapors of the refrigerant from the evaporator 14 to the intake side of the compressor. The wall 62 is also provided with a plurality of slots 77 constituting discharge passages from the compressor 11, the passages 77 discharging into the chamber 44 whereby the chamber 44 is maintained under high pressure.

It should be noted that the rotor 47 of the motor 20, the platform 48, the shaft 50 and the rotor 68 of the compressor 11 all rotate as a unit.

Means are provided for lubricating the working or moving parts of the apparatus, and to this end a body of oil is contained within the chamber 44. The shaft 50 is provided with a vertical passage 80, communicating with the body of oil through the lateral passages 81 and with the lower end of the cylinder through the passage 82 and the upper end of the cylinder through the passages 83. Since the chamber 44 is under discharge or high pressure, oil is forced from the chamber 44 through the passages 81 upwardly through the passage 80 and outwardly through the passages 82 and 83 to thereby lubricate the moving parts of the compressor and seal the same by forcing the blades 70 outwardly.

The operation of the device as a whole is as follows. Assuming that the compressor is idle, then when the temperature within the evaporator increases to the predetermined high limit, the bellows 26 will expand, thereby throwing the switch 22 to the on position. The motor will then drive the compressor 11, the rotor 47 of the motor rotating with the platform 48, shaft 50 and the rotor 68 within the cylinder 64. Refrigerant vapors will be drawn inwardly through the conduit 17 into the intake passage 74 of the compressor, wherein they will be compressed by passing in a counter-clockwise direction through the cylinder 64. The compressed refrigerant will be discharged through the outlet passages 74 into the chamber 44 and any oil carried thereby will be substantially separated from the high pressure gas and will fall to the lower end of the chamber 44. The high pressure gas will then pass through conduit 15 to the condenser 12 where it will be liquefied and finally will collect in the liquid receiver 13 in liquid form. From the liquid receiver 13 the refrigerant will pass through the conduit 16 back into the evaporator 14 and the cycle will be repeated. During the operation of the compressor the lubricant will be forced as

before stated through the passages 81, 80, 82, and 83 to lubricate and seal the compressor. Some of the lubricant will, of course, be carried along through the system with the compressed refrigerant and will be collected in the evaporator from where it may be returned in the usual way, for instance, as disclosed in the above mentioned Osborn patent.

Thus I have disclosed a motor-compressor unit of the hermetically sealed type wherein the space within the rotor 47 of the motor 20 is utilized as a space for the compressor cylinder. The unit is thus compact, and occupies but a very small space, the space being equal to that normally occupied by the motor alone.

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, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. An hermetically sealed motor-compressor unit comprising an hermetically sealed casing, a lubricant reservoir in said casing, a support within said casing, a motor including a stator, and a rotor carried by said support, a stationary wall depending from the top of said casing and contacting with said support to form a cylinder, and a compressor rotor within said cylinder, said compressor rotor being carried by said support, said cylinder being arranged within said motor rotor, said compressor being located above said reservoir, and said reservoir being subjected to the head pressure of said compressor.

2. A motor compressor unit comprising a sealed casing, a rotary shaft having journals at the lower and upper end of said casing, an oil reservoir in the lower end of said casing surrounding the lower end of said shaft, said shaft having a passageway extending from its lower end to its upper end at the upper journal, a compressor carried by said shaft and by the upper portion of said casing above said reservoir and subjecting said reservoir to compressor head pressure, a motor surrounding said compressor, and means for causing the oil in said reservoir to flow through said shaft to the compressor and upper bearing.

3. An electric motor rotary compressor unit comprising a sealed casing having a cylindrical extension thereof forming a wall of the compressor, a rotary plate carrying the rotary parts of the compressor telescopically engaging said cylindrical extension, a motor stator carried by said casing, a motor rotor carried by said plate, said cylindrical extension, rotary parts, motor stator and motor rotor being positioned to be of substantially the same axial extent.

4. An electric motor rotary compressor unit comprising a sealed casing having a vertically disposed integral cylindrical extension forming a wall of the compressor, a horizontally disposed rotary plate carrying the rotary parts of the compressor telescopically engaging said cylindrical extension, a motor stator carried by said casing, a motor rotor carried by said plate, said cylindrical extension, rotary parts, motor stator and motor rotor being positioned to be of substantially the same axial extent.

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