# United States Patent [19]

**Endress**

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[54] **MOTOR COOLING APPARATUS UTILIZING A REFRIGERANT FLOW CIRCUIT**


[75] Inventor: **James W. Endress,** Syracuse, N.Y.

[73] Assignee: **Carrier Corporation,** Syracuse, N.Y.



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[52] **U.S. Cl.** ..... **62/468,** 62/505

[51] **Int. Cl.** ..... **F25b 43/02**

[58] **Field of Search** ..... 62/84, 468, 505



[56] **References Cited**

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*Primary Examiner*—Meyer Perlin

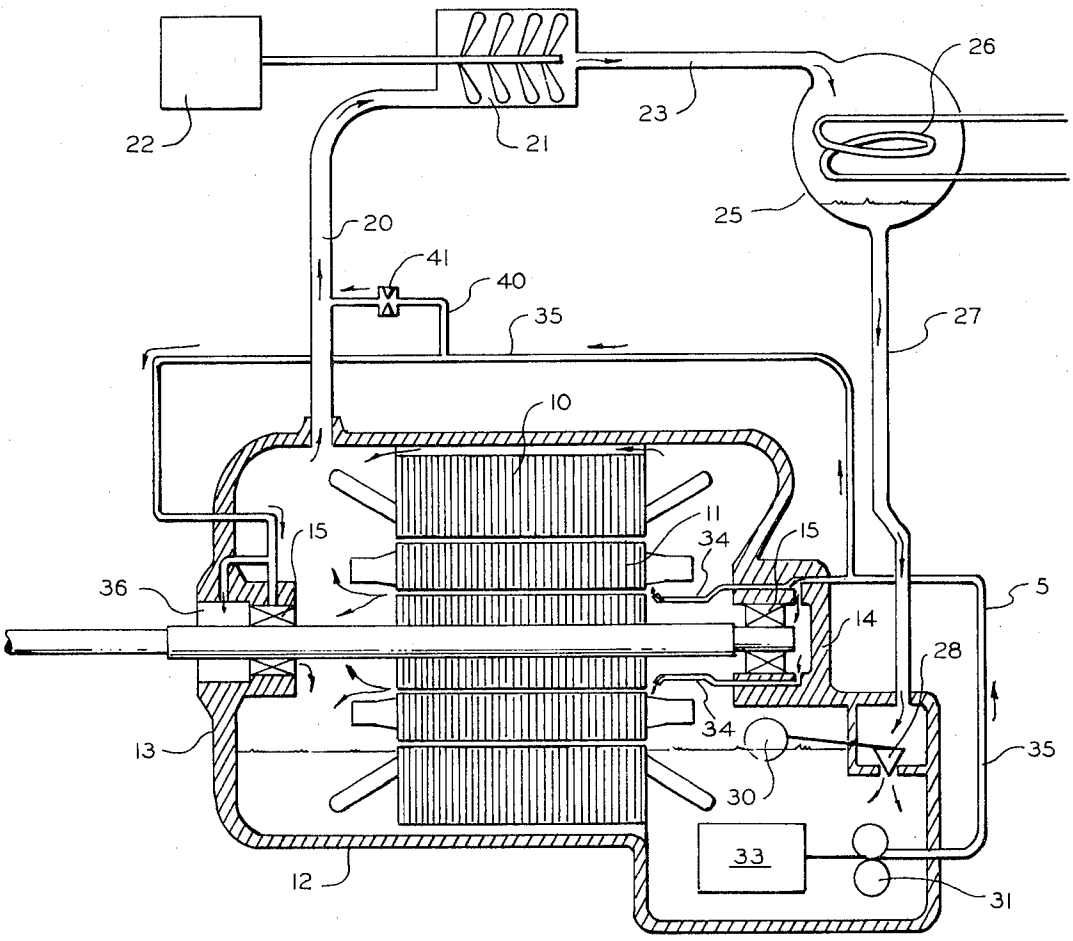
*Attorney, Agent, or Firm*—J. Raymond Curtin

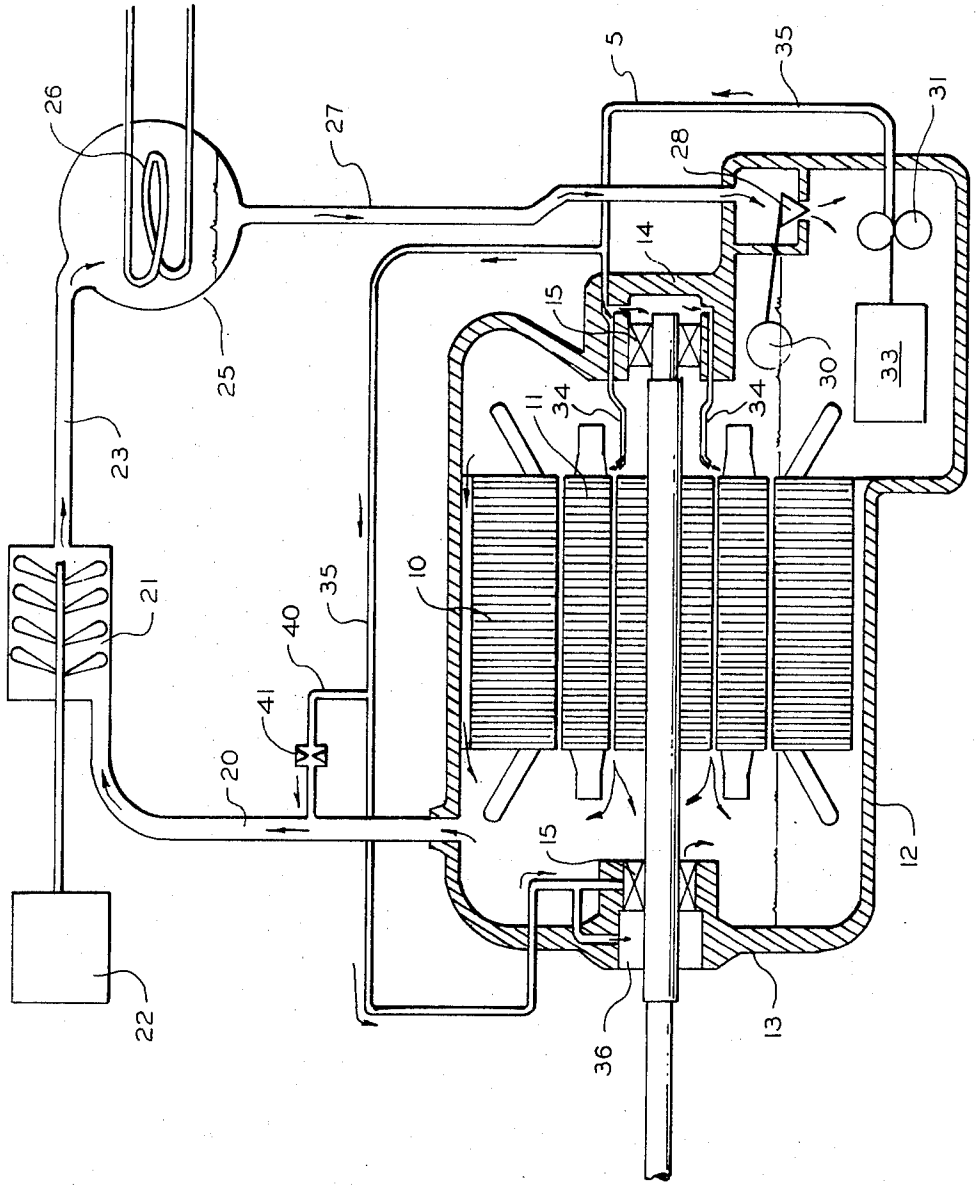


[57] **ABSTRACT**

An electric motor is mounted in a hermetic casing. There is a supply of a mixture containing a refrigerant and a lubricating oil in the lower portion of the casing. A flow passage extends from the upper portion of the casing to the inlet of a screw type compressor, the output of which is discharged to a condenser. There is a flow passage from the condenser to the motor casing and a float operated valve to maintain the mixture in the motor casing at a preselected level. A pump is employed to discharge the mixture through a line to the motor bearings and shaft seal. A branch line is connected to the pump discharge line for discharging a metered flow of the mixture into the passage leading to the intake of the screw compressor to insure a sufficient supply of oil to the compressor when the motor is operating under light load.


**1 Claim, 1 Drawing Figure**




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# MOTOR COOLING APPARATUS UTILIZING A REFRIGERANT FLOW CIRCUIT

## BACKGROUND OF THE INVENTION

The many advantages of a hermetically sealed refrigerant cooled electric motor are well known. The advantages of a screw type gas compressor are also well known. One of the characteristics of the screw type compressor is that it has to be supplied with oil to provide both lubrication and also an effective seal between the helical rotors.

This invention has as an object a refrigerant cooled motor wherein a screw compressor is employed to compress the refrigerant vapor for discharge to a condenser with means for assuring a proper flow of refrigerant oil mixture to the screw compressor.

## SUMMARY OF THE INVENTION

A predetermined quantity of a mixture containing a refrigerant and a lubricating oil is maintained in the motor casing. The refrigerant vapor produced in the cooling of the motor is passed to a screw compressor, the vapor containing an amount of oil carryover; the compressed vapor is condensed and returned to the motor casing. The vapor passage from the motor casing to the compressor is supplied directly with a supply of the refrigerant oil mixture to assure a sufficient supply of oil to the compressor when the motor is operating at light load.

## BRIEF DESCRIPTION OF THE DRAWING

The drawing depicts a schematic arrangement of a refrigerant cooled motor embodying my invention.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

The motor consists of the conventional stator **10** and rotor **11** in a hermetic casing **12** having end walls **13,** 14. The rotor is journaled for rotation in bearings **15** mounted in the end walls **13, 14.** A flow passage **20** extends from the upper portion of the casing **12** to the inlet of a screw type compressor **21** driven by a motor **22.** The discharge line **23** from the compressor extends to a condenser **25.** The condenser may be an air cooled condenser or it may be cooled by a tube bundle **26** through which a cooling medium is circulated. A second flow passage **27** extends from the condenser **25** to the motor casing. The refrigerant oil mixture is maintained at a level to cover the lower portion of the motor stator by a metering valve **28** operated by a float **30.**



A pump **31,** driven by a motor **33,** discharges the oil refrigerant mixture through a line **35** for discharge on the bearing **15** in the end wall **14** and for discharge against the confronting end of the rotor **11,** through spray tubes **34.** The line **35** also discharges the mixture on the bearing **15** and a shaft seal **36** mounted in the end wall **13.**

A branch line **40** is connected to the line **35** for discharging the mixture into the passage **20.** A flow metering device **41,** which may be in the form of a fixed orifice or an adjustable valve, controls the volume of the mixture discharged into the passage **20.** The flow device **41** provides a sufficient quantity of the oil containing mixture to the passage **20** to assure proper lubrication and sealing for the screw compressor **21** at all times.

While I have described the preferred embodiments of my invention, it is to be understood that the invention is not limited thereto, but may be otherwise embodied within the scope of the following claims.

I claim:

**1.** Apparatus for cooling an electric motor of the type having a casing, a stator and rotor arranged within the casing, and bearing and seal means supporting the rotor, including:

sump means within the casing adapted to hold a supply of liquid refrigerant and lubricant,

first conduit means extending from the sump to the portions of the motor requiring cooling and lubrication,

pump means within the sump to pump liquid refrigerant and lubricant through the first conduit means,

second conduit means extending from the casing to the sump,

a condenser positioned in the second conduit means to condense vaporized refrigerant for return to the sump,

a compressor positioned in the second conduit means ahead of the condenser to draw gaseous refrigerant with entrained lubricant from the casing and compress the refrigerant and to move the refrigerant through the conduit to the condenser, and

means communicating with the first conduit means so as to be subject to pressure developed by the sump to provide liquid refrigerant and lubricant from the sump into the second conduit ahead of the compressor to provide lubrication for the compressor.

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