

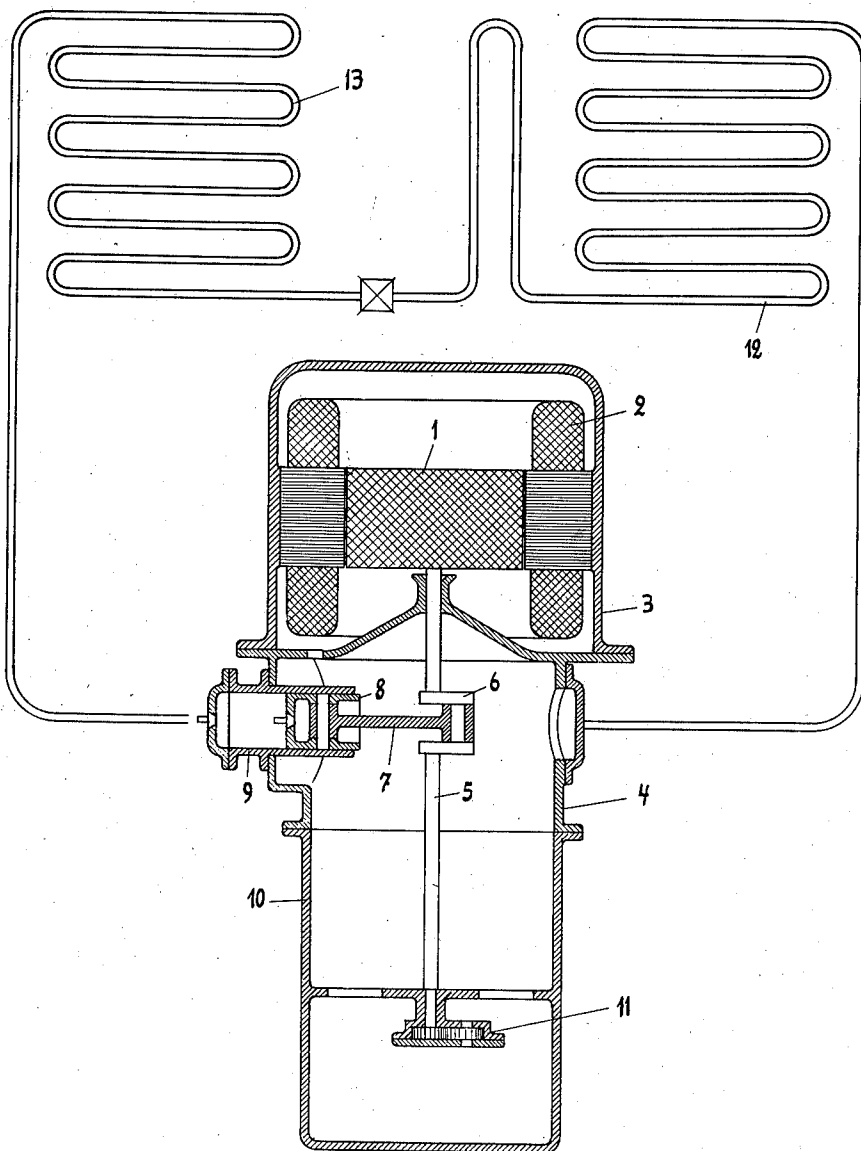
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COMPRESSION REFRIGERATING MACHINE

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COMPRESSION REFRIGERATING MACHINE

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This invention relates to a compression refrigerating machine, in which a liquid refrigerant is employed which does not combine with the lubricant. The two liquids as far as possible circulate separately. In the known refrigerating machines of this type trouble is frequently caused by one of the liquids entering those parts of the apparatus which should only receive the other liquid. The trouble is particularly serious when lubricating oil escapes into the portions of the machine which are reserved for the refrigerant. This may be caused for instance by the machine being tilted during transport or in the case of refrigerating plants on trains or in ships by excessive vibration. Moreover the refrigerant can enter in the form of vapor the parts served with lubricant and then condense therein. It is always difficult to re-establish the correct working condition.

It has been proposed to employ in a refrigerating machine a larger quantity of lubricant than is necessary for the normal lubrication of the plant, the object being to allow for the unknown quantities of oil which are withdrawn from the circulation by collecting at different points of the machine.

A refrigerating machine has become known in which the collecting chamber for the lubricant is arranged in the crank case which is always under vacuum. A second oil collecting chamber is also provided in the evaporator from which lubricant must be returned to the crank casing. If in this machine liquid refrigerant has entered the crank case owing to displacement of the liquids, the refrigerant evaporates first and produces a certain over-pressure in the crank case which absolutely prevents lubricating oil being sucked into the evaporator. As less lubricant flows into the crank case than is consumed therein, the circulation of the lubricating oil is not regulated.

This invention has for its object to avoid this inconvenience. This is attained by providing in the compressor housing an especially large oil collecting space which is subjected to the suction of the compressor and making the combined capacities of the condenser and the evaporator small in relation to the quantity of oil and the capacity of the condenser smaller than the quantity of the liquid refrigerant introduced. In a machine which possesses these characteristics displacement of liquids is also possible but quite harmless as, even under the most adverse circumstances the lubrication cannot fail and the liquids are automatically returned to their proper places.

An embodiment of the invention is diagram-

matically illustrated by way of example in the only figure of the accompanying drawing.

In the form of construction shown by way of example the compression refrigerating machine is vertical.

An electric motor consisting of the rotor 1 and of the stator 2 is located in a housing 3 mounted above a crank case 4 on the flanges of the latter. A vertical driving shaft 5, which carries the rotor 1 reciprocates a piston 8 in a compressor cylinder 9 by means of a crank 6 and connecting rod 7. A condenser 13 is connected with the cylinder 9 and an evaporator 12 is connected with the outlet end of the condenser and the crank case 4. A container 10 designed to hold a large quantity of lubricating oil communicates with the bottom end of the crank case into a pump 11 of any suitable construction mounted in the container 10. The pump 11 is arranged at such a height in the container that it can only suck in lubricant. If the refrigerant is heavier than the lubricant the pump will be arranged higher in the container than if the refrigerant is lighter than the lubricant. In any case the quantity of oil in the plant must be greater than the combined capacities of the condenser 13 and evaporator 12.

The plant operates in the following manner:—

It will be assumed that condenser 13 and evaporator 12 have become completely filled with oil and the whole of the refrigerant is in the container 10. The conditions would then be the worst imaginable. There is then in the container 10 above the liquid refrigerating medium still so much oil that the pump 11 commences to operate immediately the plant is started up and delivers oil to the points to be lubricated. As soon as the compressor 8, 9 begins to work, a vacuum is established in the container 10 so that the liquid refrigerant in the container 10 immediately commences to evaporate. The vapors are pressed into the condenser 13 and force the oil through the evaporator and thence into the container 10. The liquid refrigerant in the container 10 gradually evaporates and the whole of the oil is forced out of the condenser and evaporator into the container 10. The plant commences to function properly after the first stroke of the piston and the proper circulation of the liquids is re-established automatically without any external assistance.

If there is no liquid refrigerant in the container 10, but only lubricating oil, there must still be sufficient oil to cover the suction end of the pump. The quantity of oil in the plant and also the position of the pump are determined by the two

extreme cases, namely that either the whole of the liquid refrigerant is in the container 10, or this container contains no liquid refrigerant.

5 The pump must be arranged in such a manner that it is situated in the oil layer in both instances, that is, in the zone between maximum and minimum levels.

10 The liquids may also become displaced by condensation during the time the plant is not working, if, for instance, a compressor is stored in an unprotected shed in the winter and is cooled by the air to a lower temperature than that prevailing in the evaporator in the refrigerating chamber. Also in this instance the condensed product deposited in the crank case will be evaporated immediately the plant is started up and any oil which may have become displaced will be immediately returned into the gear case.

15 It may happen that the condenser is completely filled with liquid refrigerating medium. If the condenser is capable of accommodating the whole quantity of liquid refrigerant the plant could not work as there would be no liquid refrigerant to evaporate. To make the plant absolutely reliable, it is further necessary that the capacity of the condenser is smaller than the quantity of liquid refrigerant introduced into the plant so that there is always a certain excess of liquid refrigerant in the evaporator or in the container 20 10 and evaporation can commence immediately the plant is started up. Instead of the pump

other means may be provided to convey the oil to the points of lubrication, for instance lubricating chains, lubricating rings or centrifuging blades which dip into the oil and convey the same to the points of lubrication.

I claim:—

1. A compression refrigerating machine comprising in combination a housing, a motor accommodated in said housing, a shaft driven by said motor and projecting from said housing, a crank 10 formed on said shaft, a crank case accommodating said crank, a compressor driven by said crank and accommodated in said crank case, a condenser connected with said compressor, an evaporator forming an extension of said con- 15 denser, and connected to said crank case, a container forming an extension of said crank case, adapted to accommodate lubricant and refrigerant of different specific gravities, the combined capacities of said condenser and evaporator being less than the quantity of oil required to fill said container up to a point between the maximum and minimum levels of lubricant accommodated in said container.

2. A compression refrigerating machine as 25 specified in claim 1 having a condenser of such size that its volumetric capacity is less than the quantity of liquid refrigerant in the container mentioned in said claim 1.

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