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REFRIGERATING APPARATUS

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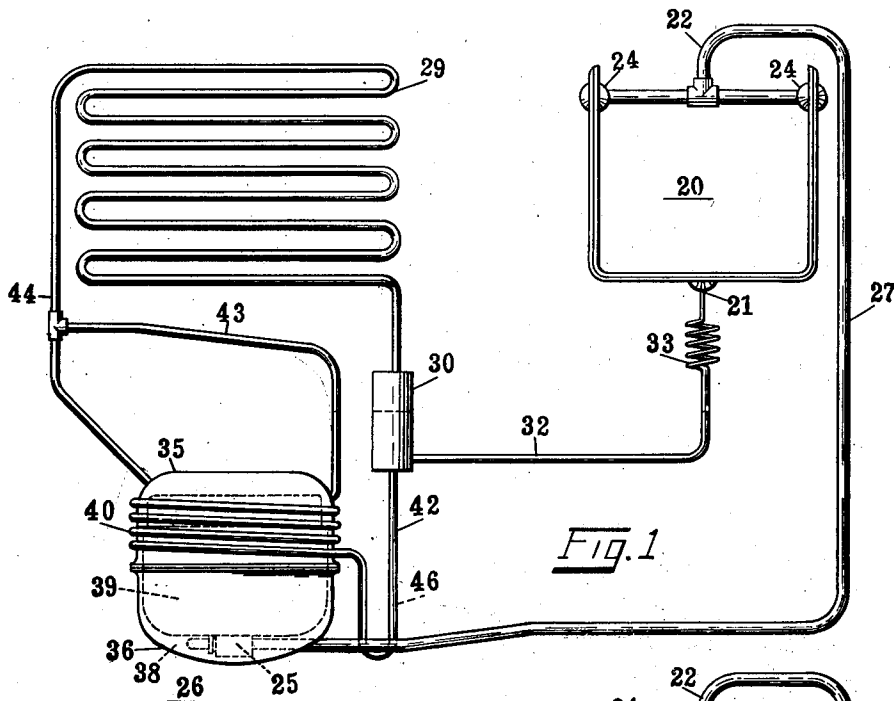


Fig. 1

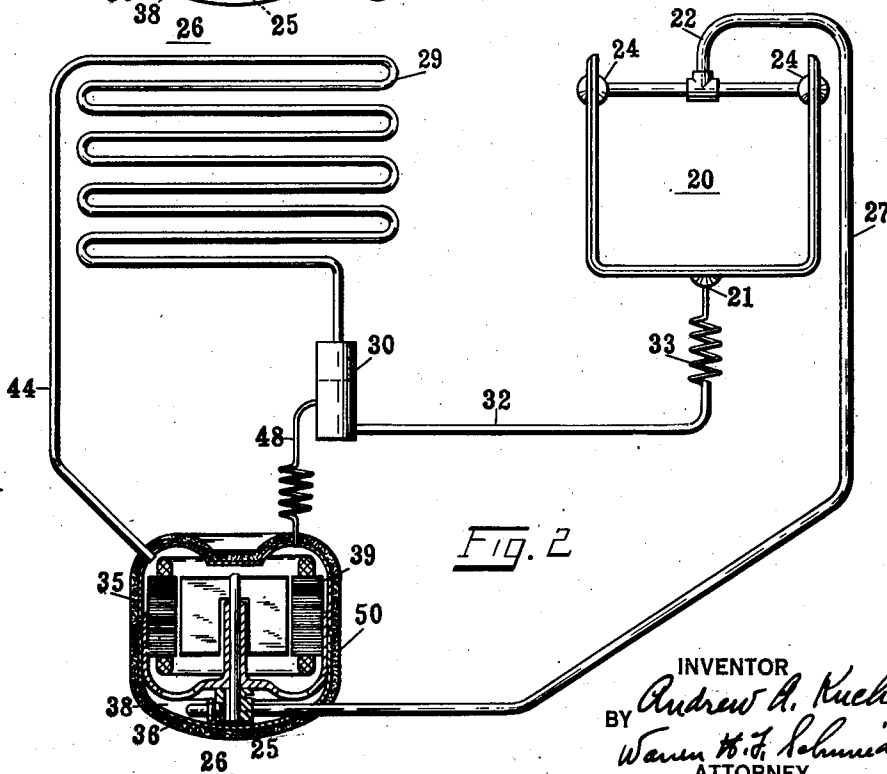


Fig. 2

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REFRIGERATING APPARATUS

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2 Claims. (Cl. 62—115)

The present invention relates to a refrigerating system and more particularly to a refrigerating system of the type employing a compressor.

Refrigerating systems, to which the present invention is directed, usually employ a compressor for withdrawing gaseous refrigerant from an evaporator and for compressing the refrigerant. This compressed refrigerant is forced into a condenser where it is cooled and liquefied. The compressor and driving motor therefor are heated during operation and the present invention is directed to the cooling of the compressor and motor.

One of the objects of the present invention is to provide a refrigerating system in which liquefied refrigerant, which is cooled by the condenser, is utilized for cooling the compressing mechanism of the system.

In carrying out the foregoing object, it is another object of the invention to cause the gaseous refrigerant, which is vaporized due to the exchange of heat with the compressing mechanism, to be recooled by the condenser.

A further object of the invention is to provide a system for cooling the compressor and driving motor therefor and to insulate these elements.

Other and further objects and advantages will be apparent from the following description, reference being had to the accompanying drawing wherein preferred forms of embodiments of the present invention are clearly shown.

In the drawing:

Fig. 1 is a diagrammatic view of a refrigerating system showing one embodiment of the invention, and;

Fig. 2 is a diagrammatic view of another embodiment.

The present invention is particularly applicable to the compressor-condenser-expander type of refrigerating system and in the embodiments illustrated, such type system is shown. The evaporator 20 may be of any approved type and that shown is provided with an inlet 21 for liquid refrigerant at the bottom and a gaseous outlet 22 at the top. The outlet is connected with the two headers 24 disposed at the top of the hollow side walls of the evaporator. The compressor 25 of the motor-compressor unit 26 withdraws gaseous refrigerant from the headers 24, through the outlet 22 and pipe 27 and the refrigerant compressed flows from the unit 26 into a condenser 29. The refrigerant is cooled and liquefied in the condenser, preferably by the air passing thereover, and flows into a receiver 30. From

the receiver, the liquefied refrigerant flows through a pipe 32 to a pressure reducing means of a suitable type and herein shown as a capillary tube type restrictor 33. The refrigerant flows from the restrictor 33 into the inlet 21 of the evaporator 20. It is to be understood that the evaporator is placed in a compartment and that the usual type of temperature control can be employed for starting and stopping the compressor in order to maintain the desired temperature of the evaporator or the compartment containing the same.

The motor-compressor unit 26 includes two shells 35 and 36 formed of sheet metal which are hermetically joined with one another and thereby form a chamber 38 containing the motor 39 and the compressor 25. The gaseous refrigerant from the evaporator 20 is conducted directly to the low pressure side of the compressor 25 and is discharged under pressure into the high pressure chamber 38. Oil for the compressor 25 is contained in the chamber 38 and is pumped, by the action of the compressor, through the compressor and is discharged with the high pressure refrigerant into the chamber 38. Thus, due to the action of the compressor and motor, the entire unit 26, including the motor 39, compressor 25 and shells 35 and 36, increases in temperature.

In both embodiments illustrated the high pressure gaseous refrigerant is discharged from the chamber 38 into the condenser 29.

In hermetically sealed refrigerating systems in which the compressor and the electric driving motor therefor are contained in a hermetically sealed casing, it is essential that the heat, generated in the casing, be dissipated. I have provided for dissipating this heat by utilizing the latent heat of vaporization of condensed and liquefied refrigerant cooled by the condenser.

In the embodiment shown in Fig. 1, a heat absorber, shown for illustrative purpose as a spiral tube 40, is in intimate heat exchange relation with the upper shell 35 of chamber 38, it being hermetically joined therewith in any suitable manner. The tube 40 receives cooled liquefied refrigerant, through the pipe 42, from the receiver 30 and the liquid refrigerant flowing therethrough absorbs heat from the motor-compressor unit 26 and thus cools the entire unit. The refrigerant is vaporized due to the absorption of heat and is conducted to that portion of the high pressure side of the system containing gaseous refrigerant, and, in the specific embodiment, the vaporized refrigerant is conducted by pipe

43 to the pipe 44 which connects the chamber 38 with the condenser 29.

It is important to note that the tube 40 spirals upwardly from its liquid inlet and therefore the vapor generated flows naturally. In order to prevent the vapor generated from reversing its direction of flow, a goose-neck 46 is formed in the pipe 42 which will prevent gas from flowing from tube 44 back into the receiver 30. Also it is important to note that the pipe 43 is connected with the pipe 44 above the liquid level maintained in the receiver 30. In this manner, liquid refrigerant cannot flow from the receiver into the chamber 38 during the idle period of the compressor 25.

In the embodiment illustrated in Fig. 2, the condenser cooled liquid refrigerant is conducted from the receiver 30 into the high pressure chamber 38 by a tube 48. A metering device of any suitable type can be inserted in the tube for metering the flow therethrough and in this embodiment, the tube is proportioned to materially restrict and thereby meter the flow therethrough so as to proportion the rate of flow of liquid from receiver 30 to the chamber 38. The liquid flowing from the receiver 30, having been cooled by the condenser, will absorb heat from the chamber 38 and thus will prevent an excessive temperature of the motor-compressor unit 26. Here again I utilize the latent heat of vaporization of the liquid for cooling the motor-compressor unit 26. The expanded gas from the tube 48, of course, will be forced with the other compressed gas into the condenser for recooling the same.

In order to prevent all of the liquid from draining from the receiver 30 into the chamber 38, during a prolonged idle period of the system, the tube 48 is connected to the receiver at a point below the level normally maintained in the receiver during the operation of the system but sufficiently high to prevent an excessive amount of liquid refrigerant in the chamber 38.

In both embodiments of the invention, cooling of the motor-compressor unit 26 continues after the motor and compressor are stopped. Cooled liquid refrigerant will continue to flow from the receiver 30. In Fig. 1, the thermosiphonic action will continue until the temperature of the refrigerant in the receiver 30 and the temperature of the chamber 38 are substantially the same. Likewise in the embodiment shown in Fig. 2, the point at which tube 48 is connected with receiver 30 will permit sufficient refrigerant to flow therefrom to cool the chamber to substantially the temperature of the refrigerant in the receiver during the idle period of the motor and compressor.

It is apparent that I have provided an efficient and inexpensive method and apparatus for cooling the motor and compressor of a refrigerating system. By this invention, fins have been eliminated from the motor-compressor unit and thereby the cost of manufacture thereof has been materially reduced. It is realized that to carry out my method the condenser must be increased in

size and either of the apparatuses, shown in the embodiments, must be added, however, these additions are less costly than the cost of finning a motor-compressor unit.

The present invention is particularly applicable to refrigerating systems of the air cooled condenser type in which the condenser is cooled by convection currents of air. In that type system, the condenser is mounted on or adjacent the back of a household refrigerator and no fan is employed to cool the condenser nor is any means employed for forcing air over the motor-compressor unit. The unit is usually placed in a compartment below the refrigerated food storage compartment and, due to its location, the air does not circulate readily and consequently the temperature of the unit becomes, at times, excessive. By the present invention, a cooling medium is positively circulated to cool the unit although the unit is located in dormant air.

Since the motor-compressor unit 26 does not depend on air circulating thereover for the cooling of the same, this unit in either embodiment can be incased by sound insulating material 50, such as papier-mâché. Thus noise is substantially eliminated.

Thus it is apparent that I have provided a novel, practical and inexpensive method of cooling the compressor motor, the compressor and the oil for the compressor.

While the forms of embodiment of the present invention as herein disclosed constitute preferred forms, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

I claim:

1. A closed refrigerating system comprising in combination, an evaporator; a compressor for withdrawing gaseous refrigerant from the evaporator and for compressing the same; a motor for driving the compressor; a condenser for receiving the compressed refrigerant and for liquefying the same; a sealed casing enclosing the motor and compressor; sound insulation around the casing; and means for conducting a portion only of the liquid refrigerant, from the condenser, into the casing to cool the compressor and motor.

2. A closed refrigerating system comprising in combination, an evaporator; a high pressure side including a compressor for withdrawing gaseous refrigerant from the evaporator and for compressing the same, a condenser for receiving the compressed refrigerant and for liquefying the same; a motor for driving the compressor; a sealed casing enclosing the motor and compressor; sound insulation around the casing; and means for preventing excessive heating of the motor while permitting the casing to attain a temperature above the temperature of the liquid refrigerant in the high pressure side while the motor is in operation including conduit means for conducting a restricted quantity of liquid refrigerant, from the condenser, into heat exchange relation with the casing.

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