REFRIGERATION APPARATUS INCLUDING DEFOSTING MEANS

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Fig. 2

Fig. 3

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REFRIGERATION APPARATUS INCLUDING DEFOSTING MEANS

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2 Claims. (Cl. 62—115)

1. This invention relates to refrigeration apparatus and more particularly to a means for defrosting an evaporator.

It is an object of the invention to provide novel means for regulating the refrigeration of an evaporator.

Another object of the invention is to provide novel means for rendering one evaporator of a plurality of evaporators supplied by a common refrigerant supplying apparatus inactive without interfering with the refrigeration of the other evaporators.

A further object of the invention is to stop the flow of liquid refrigerant to an evaporator of a plurality of evaporators, forming a part of a hermetically-sealed system, without introducing valves into the system and without affecting the flow of liquid refrigerant to the remainder of the evaporators.

A still further object of the invention is to provide means which permit defrosting of one evaporator of a plurality of evaporators served by common refrigerant circulation apparatus without affecting the operation of the remaining evaporators.

These and other objects are effected by my invention as will be apparent from the following description and claims taken in connection with the accompanying drawing, forming a part of this application, in which:

Fig. 1 is a sectional view of a mechanical refrigerator embodying the invention and showing a schematic arrangement of the refrigerant passages and the electric wiring. The view is taken on line I—I of Fig. 2;

Fig. 2 is a view of the food storage compartment of the refrigerator of Fig. 1 with the doors of the food storage compartment and the frozen food compartment removed, and the refrigerant passages shown schematically; and,

Fig. 3 is a view, with parts broken away, of the refrigerator regulating chamber of this invention with the regulating cylinder in the lower position.

Fig. 4 is a vertical sectional view of the refrigerator regulating chamber with the regulating cylinder in the upper position.

Referring now to the drawings for a detail description of the invention, the reference numeral 18 designates a refrigerator cabinet having an insulated food storage compartment 12 in the upper portion and a machine compartment 14 in the lower portion of the cabinet. The food storage compartment 12 is provided with a drain tube 16. A metal receptacle 18 for frozen foods is located in the lower portion of the food storage compartment 12.

The food storage compartment comprises an inner metal liner 18 and an outer metal shell 20 spaced from the inner liner 18. The inner liner 18 is coated on the inner and outer sides with vitreous enamel. Thermal insulating material 22 is positioned between the metal liner 18 and the metal shell 20. The food storage compartment 12 is provided with an access opening and a door 24 for closing the same. A separate door 26 is provided for the frozen food receptacle 18.

The food storage compartment 12 is maintained at an average temperature of about 40° F. by a refrigerant carrying tube 28 secured to the metal liner 18. The tube 28 is shown located on the inner side of the metal liner 18 for the sake of clearness. In actual practice, it is located on the outer side thereof embedded in the thermal insulation 22. The frozen food receptacle 18 is maintained at an average temperature of about 25° F. by a second refrigerant carrying tube 28 which is caulked around and brazed to the receptacle 16. The tubes 28 and 28 are connected in series and a suction tube 30 is connected to one end of the tube 28 to withdraw refrigerant vapor therefrom.

The tube 30 conducts the refrigerant vapor to a hermetically-sealed refrigerant liquefying apparatus, comprising a sealed casing 32 which contains a refrigerant compressor and a motor for driving the same. The compressor and the motor are not shown in the drawings. The compressed refrigerant vapor passes through a tube 34 to a refrigerant condenser 36, wherein the refrigerant vapor is cooled and condensed into a liquid. The condenser 36 is cooled by a current of air drawn therethrough by a motor-driven fan 38, and:

A chamber 42, forming a part of this invention, is located in the thermal insulating material 22 of the rear wall of the food storage compartment 12. The chamber 42 is formed of brass or other non-magnetic material. The liquid refrigerant is conducted by a capillary tube 40 from the condenser 36 to the upper portion of the chamber 42. The capillary tube 40 affords such impedance to the flow of refrigerant that substantially no liquid refrigerant is retained in the condenser 36 during normal operation. The chamber 42 has an opening 44 approximately midway between its top and bottom, and a tube 46 communicates with the opening 44 to conduct the refrigerant liquid flowing from said opening 44 to the tube 28. The chamber 42 is continuously
filled with refrigerant liquid to the level of the opening 44 and with refrigerant vapor above said said opening. The refrigerant liquid in the chamber 42 is comparatively inactive because the thermal insulation 32 surrounding the chamber 42 prevents heat from being conducted to the liquid and vaporizing it.

A cylinder 48 of iron or other magnetic material is located in the chamber 42 and normally occupies substantially all of the portion of the winding 50 lying below the level of the opening 44.

An electric winding 50 is placed around the upper portion of the chamber 42 and when energized raises the cylinder 48 and retains it in the upper portion of the chamber 42. The chamber 42, therefore, will fill up with refrigerant liquid to the level of opening 44. The electric winding 50 on the chamber 42 is energized from supply lines 52 and 54 through leads 56 and 58. A switch 60 is located in series in the lead 56.

The temperature of the food storage compartment 12 is controlled by a thermostat 64 comprising a bulb 66 containing a volatile refrigerant liquid. The bulb 66 is in thermal contact with the metal liner 18 and connects with a Sylphon bellows 68 through a tube 70. The Sylphon bellows 68 opens and closes a switch 72 located in a lead 74 which together with lead 76 supplies electrical energy from the supply lines 52 and 54 to the compressor located in the housing 32. The temperature of the food storage compartment 12 thus will be maintained substantially constant regardless of the position of the cylinder 48.

Operation

During normal operation, the switch 60 is open and the refrigerating apparatus supplies both the tubes 26 and 28 with refrigerant liquid, and only the tube 28 and frozen food receptacle 16 will accumulate frost. If it is desired to defrost the frozen food receptacle 16, the switch 60 is closed. This energizes the winding 50 on the chamber 42 and elevates the cylinder 48. Refrigerant liquid of the system will then accumulate in the chamber 42 to the level of opening 44, and the chamber 42 thereby abstracts a quantity of refrigerant liquid from the system and renders the system inactive. The active refrigerant liquid remaining in the system is sufficient to refrigerate only the food storage compartment 12 because the refrigerant liquid is completely vaporized in the tube 28 so that only refrigerant vapor passes through the tube 28. The vapor, however, is at the temperature prevailing in the tube 26 and furthermore does not have the heat absorbing capacity of the refrigerant liquid. The frozen food receptacle 16 will, therefore, increase in temperature to that of the food storage compartment 12, the frost on the frozen food receptacle 16 will melt, and the defrost water will flow out through the drain tube 15.

It will be apparent from the above that this invention provides apparatus for defrosting one evaporator of a plurality of evaporators supplied by a common refrigerant supplying apparatus. The invention also provides a means for varying the amount of effective refrigerant in a closed refrigerating system. It will be further apparent that the apparatus of this invention does not introduce valves into a hermetically-sealed refrigerating system, which valves might be causes of leakage.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. A refrigerating comprising first and second evaporators connected in series, first and second storage chambers in heat-transfer relation with said first and second evaporators respectively, a compressor for withdrawing refrigerant vapor, the suction side of said compressor being connected to said second evaporator at a point remote from the connection of said second evaporator to said first evaporator, a condenser, receiving compressed refrigerant vapor from said compressor, a tube connected to conduct refrigerant liquid from said condenser to said first evaporator, a thermostatic control for said compressor to maintain said first chamber at an above-freezing temperature, and means for providing the effect of selectively varying the refrigerant charge of the refrigerating system, which valves might be causes of leakage.

2. A refrigerating comprising first and second evaporators connected in series, first and second storage chambers in heat-transfer relation with said first and second evaporators respectively, a compressor for withdrawing refrigerant vapor, the suction side of said compressor being connected to said second evaporator at a point remote from the connection of said second evaporator to said first evaporator, a condenser receiving compressed refrigerant liquid from said condenser to said first evaporator, a thermostatic control for said compressor to maintain said first chamber at an above-freezing temperature, and means for providing the effect of selectively varying the refrigerant charge of the refrigerating system, which valves might be causes of leakage.

RAYMOND E. TOBBY.

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