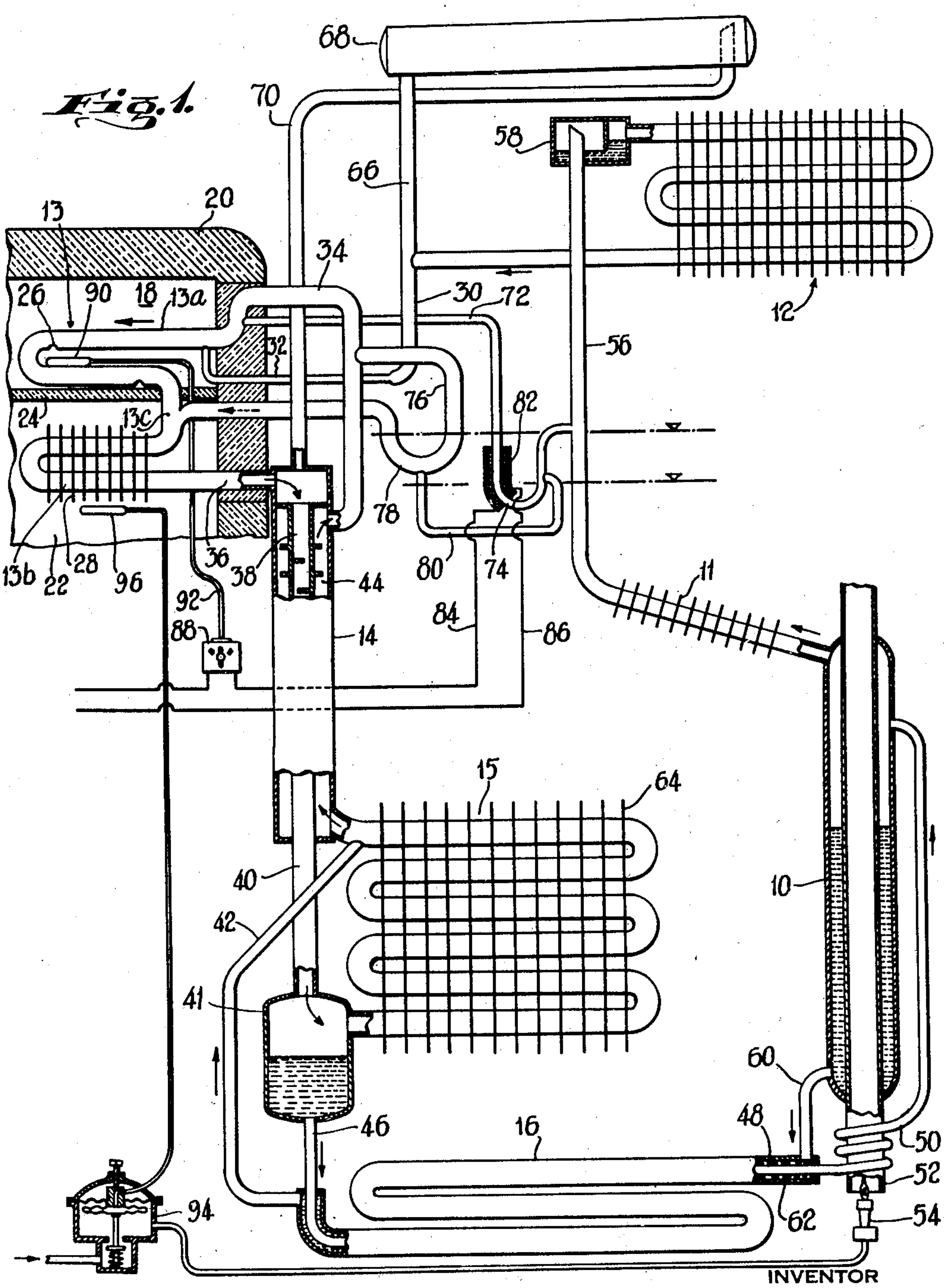
April 26, 1949. B. A. PHILLIPS 2,468,104

ABSORPTION REFRIGERATION SYSTEM, INCLUDING DEFROSTING APPARATUS AND METHOD

Filed May 2, 1945 2 Sheets-Sheet 1

Fig. 1.



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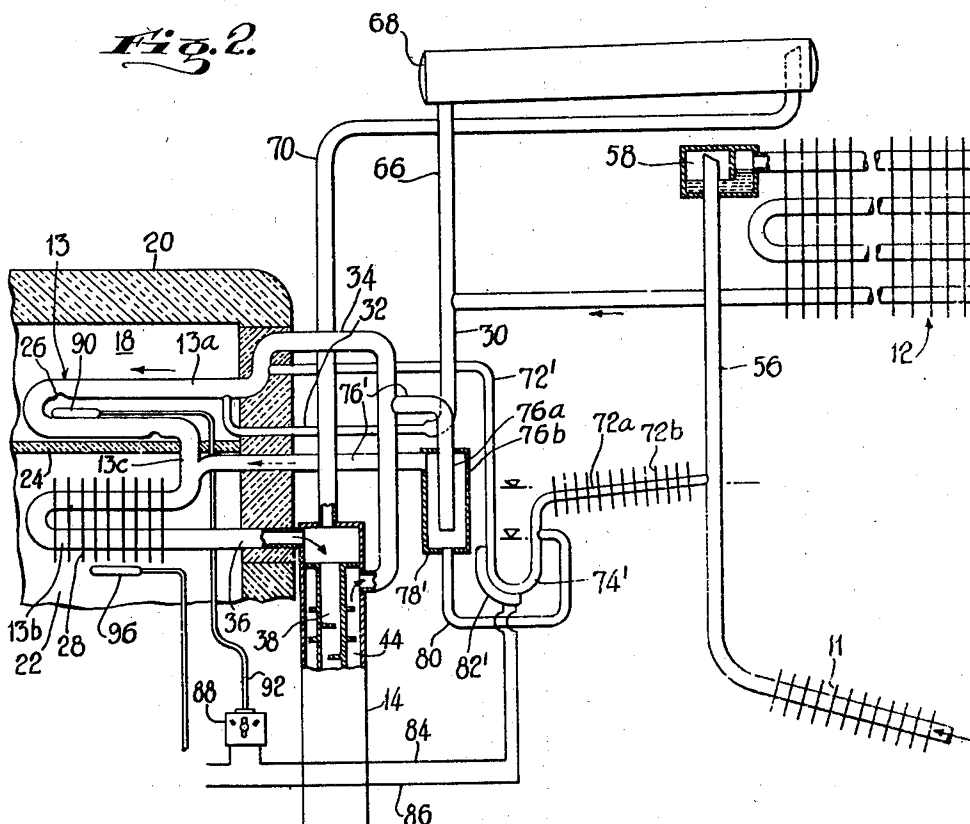
2 Sheets-Sheet 2

Fig. 2.



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ABSORPTION REFRIGERATION SYSTEM, INCLUDING DEFROSTING APPARATUS AND METHOD

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20 Claims. (Cl. 62—119.5)

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My invention relates to refrigeration and particularly to removal of frost or ice from the exterior surface of the evaporator or cooling unit of a unipressure absorption refrigerating system.

In domestic refrigerators, it is desirable and advantageous to provide a low temperature or freezing compartment and a high temperature or food storage compartment. The low temperature compartment is provided with a cooling unit or evaporator wherein refrigerant evaporates at a temperature well below the freezing temperature of water. Due to condensation of water vapor from air coming in contact with the cooling unit, this low temperature causes a layer of frost or ice to form on the exterior surface of the cooling unit. This frost accumulates and, because it retards refrigeration and also for sanitary reasons, it is desirable that it be removed. The food storage compartment, on the other hand, is provided with a cooling unit or evaporator wherein refrigerant evaporates at a temperature well above the freezing temperature of water. Therefore, water vapor which may condense on this cooling unit does not congeal. In other words, the cooling unit of the food storage compartment does not require defrosting.

It is, therefore, an object of my invention to provide a refrigerating system wherein frost is quickly removed from a low temperature evaporator without interrupting refrigeration produced by a high temperature evaporator.

It is a further object of my invention to provide a refrigerating system wherein the removal of frost from a low temperature evaporator causes or aids in the production of refrigeration in a high temperature evaporator.

One manner of carrying out the above and other objects and advantages of my invention is by the use of an absorption refrigerating system of the unipressure or three-fluid type wherein refrigerant fluid evaporates and diffuses into an inert pressure-equalizing gas, and wherein the inert pressure-equalizing gas circulates between the cooling unit or evaporator and the absorber by gravity flow. In the evaporator of such a system, liquid refrigerant evaporates at temperatures corresponding to the partial pressure of its vapor. I provide an evaporator formed of two sections arranged for series flow of liquid refrigerant and inert pressure-equalizing gas. The two sections are arranged one above the other and are thermally insulated from each other. Liquid refrigerant and weak inert gas, that is, inert gas weak in refrigerant vapor, first enter the upper evaporator section. The partial pressure of refrigerant vapor being low in this section, the refrigerant evaporates and diffuses into the inert gas at low temperatures. Therefore, this section of the evaporator may be termed a freezing or low temperature section. From the upper or low temperature section liquid refrigerant and inert gas enriched in refrigerant vapor flow into the lower section of the evaporator. Here the partial pressure of refrigerant vapor is relatively high; therefore, the liquid refrigerant evaporates and diffuses into the enriched inert gas at relatively high temperatures. Therefore, this section of the evaporator may be termed a high temperature or box cooling section.

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As stated above, the low temperature section of the evaporator accumulates frost which must be removed at intervals. By my invention, this frost is removed by condensing refrigerant vapor in this section and by utilizing the resulting heat of condensation to warm the section. This is accomplished by retarding the flow of weak inert gas to this section, thereby raising the partial pressure of refrigerant vapor therein, and by causing warm refrigerant vapor to flow directly into this section. The partial vapor pressure of refrigerant having been raised in the low temperature section, the warm refrigerant vapor flowing thereinto condenses therein and the latent heat of condensation raises the temperature of this section causing the accumulated frost to be melted. During this operation, liquid refrigerant accumulates in the low temperature section and flows into the high temperature section wherein it evaporates and diffuses into inert gas flowing therethrough. In other words, refrigeration is continuously produced by the high temperature section even though the low temperature section is being defrosted. Also, by accumulating liquid refrigerant in the low temperature section during a defrosting period, this refrigerant is immediately available for producing refrigerant in this section at the end of a defrosting period at which time the flow of warm refrigerant vapor to this section is stopped and the normal flow of weak inert gas is resumed.

Referring now to the drawings, wherein like reference characters are used to designate like parts throughout the different views, and wherein:

Fig. 1 illustrates more or less diagrammatically a refrigerating system incorporating one embodiment of my invention; and

Fig. 2 is a fragmentary view illustrating a second embodiment of my invention.

In Fig. 1 of the drawing, I have illustrated my invention embodied in an absorption refrigerating system of the uni-pressure type. A system of this type includes a generator 10, a rectifier 11, a condenser 12, an evaporator 13, a gas heat exchanger 14, an absorber 15 and a liquid heat exchanger 16 all interconnected in a manner well known in the art which will be described more in detail hereinafter. The system is charged with a solution of refrigerant and absorption liquid, and with a pressure-equalizing gas which is inert with respect to the refrigerant and absorption liquid. While I do not wish to be limited to these particular media, I prefer to use ammonia as the refrigerant, water as the absorbent, and hydrogen as the inert pressure-equalizing gas.

The cooling element or evaporator 13 includes an upper or low temperature section 13*a* located in a freezing compartment 18 of a thermally insulated refrigerator cabinet 20 and a lower or high temperature section 13*b* located in a food storage compartment 22 of the refrigerator cabinet. Evaporator sections 13*a* and 13*b* are connected for series flow of refrigerant fluid and inert gas by a conduit 13*c*. Freezing compartment 18 and storage compartment 22 are separated by a thermal insulating panel 24. Evaporator section 13*a* is provided with a plurality of dams 26, only two of which are shown, for accumulating liquid refrigerant in said section. Evaporator section 13*b* is provided with heat transfer fins 28. Fins 28 are preferably of a self-draining type such as that disclosed in the co-pending application of Alvin O. Brothers, Serial No. 543,088, filed July 1, 1944, and which matured into Patent No. 2,433,825 on January 6, 1948. As shown, liquid refrigerant flows from condenser 12 through conduits 30 and 32 into the upper portion of low temperature section 13*a* of the evaporator where it evaporates and diffuses into weak inert gas flowing into said evaporator section through a conduit 34 connected to gas heat exchanger 14, thereby producing a desired refrigerating effect. The enriched inert gas along with liquid refrigerant flows from low temperature section 13*a* through conduit 13*c* to high temperature section 13*b* where additional refrigerant vaporizes and diffuses into the inert gas producing additional refrigeration, but at a higher temperature. The resulting gas mixture of refrigerant and inert gas flows from evaporator section 13*b* through a conduit 36, inner passage 38 of gas heat exchanger 14, a conduit 40 and a vessel 41 into the lower portion of absorber 15.

In absorber 15 refrigerant vapor is absorbed by absorption liquid which enters the upper portion of the absorber through a conduit 42. The inert gas stripped of refrigerant vapor flows from the upper portion of the absorber, through outer passage 44 of gas heat exchanger 14 and conduit 34 back to low temperature evaporator section 13*a* to complete the inert gas circuit. The circulation of inert gas between the evaporator and absorber is due to the difference in specific weight of the column of inert gas rich in refrigerant flowing from evaporator section 13*b* to the absorber and the column weak in refrigerant vapor flowing from the absorber to evaporator section 13*a*. The column of inert gas rich in refrigerant vapor being heavier than that weak in refrigerant, a force is produced which causes circulation of inert gas through and between the evaporator sections and the absorber.

Absorption liquid enriched in refrigerant flows from the lower portion of absorber 15 into and through vessel 41, through a conduit 46, inner passage 48 of liquid heat exchanger 16 and a vapor lift pump 50 into generator 10. A flue 52 extends axially and concentrically through generator 10, and is arranged to be heated by any suitable means such, for example, as a gas burner 54. As shown, the lower portion of vapor lift pump 50 is coiled about and is in intimate heat exchange relation with the lower portion of flue 52. Refrigerant vapor is expelled from the refrigerant-absorbent solution in generator 10 due to heating by burner 54, and this vapor together with vapor entering through vapor lift pump 50, flows through rectifier 11, a conduit 56 and a liquid trap 58 into the upper portion of condenser 12. In passing through the rectifier, any water vapor which may have been expelled from the generator with the refrigerant vapor is condensed and flows back to the generator. The refrigerant vapor is condensed in condenser 12 and the liquefied refrigerant is returned to the upper evaporator section through conduits 30 and 32 to complete the refrigerant circuit.

The absorption liquid which has been weakened by expulsion of refrigerant therefrom flows from the lower portion of generator 10 through a conduit 60, outer passage 62 of liquid heat exchanger 16 and conduit 42 back to the upper portion of absorber 15 completing the absorption liquid circuit. The circulation of absorption liquid results from raising liquid into the generator by vapor lift action through pump 50. The heat produced in the absorber by the absorption of refrigerant vapor into absorption liquid may be transferred from the absorber by any suitable means such, for example, as by air-cooled heat transfer fins 64.

The outlet end of condenser 12 is connected by a conduit 66, a pressure vessel 68 and a conduit 70 to a part of the inert gas circuit, as at the upper end of gas heat exchanger 14, for example, so that any inert gas which passes through the condenser may flow back to the gas circuit. Refrigerant vapor not liquefied in the condenser flows through conduit 66 and into vessel 68, displacing inert gas therefrom and forcing said gas through conduit 70 into the gas circuit. In this manner, the total pressure in the entire system is increased to insure continuous refrigeration.

The supply of fuel gas to burner 54 may be controlled in any suitable manner as, for example, by a thermostatically-operated valve 94. As shown, valve 94 is operated responsive to the temperature of food compartment 22 by a fluid thermostat including a thermal bulb 96 located in said compartment.

In accordance with my invention, in order to provide a path of flow for rectified refrigerant vapor from rectifier 11 to low temperature evaporator section 13*a*, a conduit 72 is connected at one end to conduit 56 and at its opposite end to conduit 34 leading to the inlet end of evaporator section 13*a*. Conduit 72 is formed with a U-shaped portion to provide a liquid trap 74. In order to retard or stop the flow of weak inert gas into evaporator section 13*a* during a defrosting period, I provide a by-pass in the inert gas circuit. This by-pass includes a conduit 76 connected at one end to conduit 34 and at its opposite end to conduit 13*c* which leads from the low to the high temperature evaporator section. Conduit 76 is formed with a U-shaped portion to provide a liquid trap 78. In practice, conduits 34 and 76 and gas heat exchanger 14 are provided with suitable thermal insulation (not shown). Trap 78 is connected to trap 74 by means of a conduit 80. Liquid in trap 74 is arranged to be heated by any suitable means, such for example as an electric heating element 82. Heating element 82 is connected to a suitable source of electrical energy, as a house line, by means of conductors 84 and 86. As shown, a switch 88 is located in conductor 84 for energizing and deenergizing heating element 82. This switch may be of any suitable type, either completely automatic or semi-automatic. As shown, switch 88 is manually operated to energize the heating element and thermostatically operated to deenergize said element. A thermal bulb 90, postioned in heat exchange relation with low temperature evaporator section 13*a* and connected to switch 88 by a capillary tube 92, controls the deenergization of the heating element.

In order to defrost low temperature evaporator section 13*a*, liquid is removed from traps 74 and 78. This permits refrigerant vapor to flow from conduit 56, through conduits 72 and 34, into evaporator section 13*a*, and it also causes weak inert gas to by-pass the low temperature section of the evaporator and flow directly into high temperature section 13*b*. Liquid is removed from trap 74 by energizing heating element 82 which causes the liquid to vaporize. This removal of liquid from trap 74 may be effected entirely by vaporization of the liquid or by vapor liquid lift action. I prefer to utilize the latter method; therefore, the internal diameter of conduit 72 is made sufficiently small so that vapor bubbles cannot freely pass liquid therein, whereby the liquid is removed from trap 74 by lifting of liquid in conduit 72 by vapor lift action. As the liquid level in trap 74 lowers, liquid flows from trap 78 through conduit 80 into trap 74. In this manner, the liquid is drained from trap 78 causing weak inert gas to flow through conduit 76 into high temperature evaporator section 13*b*. Heating element 82 is so arranged relative to trap 74 that, if necessary, the last portion of liquid is removed from the bottom of the trap by vaporizing the liquid. When trap 74 is depleted of liquid, rectified refrigerant vapor flows from conduit 56 through conduits 72 and 34 into evaporator section 13*a*.

The flow of refrigerant vapor directly into evaporator section 13*a*, together with the by-passing of inert gas around evaporator section 13*a*, greatly increases the partial pressure of refrigerant vapor in said section which causes the refrigerant vapor to condense therein and the heat of condensation rapidly melts the frost from the exterior of said section. The liquefied refrigerant accumulates in evaporator section 13*a* until it overflows the dams 26 at which time it flows through conduit 13*c* into high temperature evaporator section 13*b*. In the high temperature evaporator section, the liquid refrigerant vaporizes and diffuses into the inert gas flowing thereinto through by-pass conduit 76. In this manner, food storage compartment 22 continues to be refrigerated even though the low temperature evaporaor is being defrosted. It is to be noted that the melting of frost from the low temperature section of the evaporator causes refrigerant vapor to be condensed therein, which liquefied refrigerant produces refrigeration in the high temperature section of the evaporator. In other words, the refrigerating effect of the frost on the low temperature section is used to produce refrigeration in the high temperature section.

The size and arrangement of conduit 34 and by-pass 76 is such that during a defrosting period sufficient inert gas is by-passed around the low temperature section of the evaporator to cause an increase in the partial pressure of refrigerant vapor in this section, resulting in condensation of refrigerant vapor therein, while at the same time this quantity of inert gas is not sufficient to reduce the partial pressure of refrigerant vapor in the high temperature evaporator section to the point that this latter section would become a freezing section.

To insure that all the refrigerant vapor that is expelled from generator 10 during a defrosting period passes directly to the low temperature section of the vaporator, trap 58 is provided at the inlet to condenser 12. When trap 74 is open, the liquid head in trap 58, through which the refrigerant vapor bubbles during normal operation, prevents the vapor from dividing between the evaporator and condenser.

When the low temperature evaporator has been heated to a temperature at which the frost has been melted therefrom, control switch 88 automatically opens, thereby deenergizing heating element 82. As shown, thermal bulb 90 is arranged in heat exchange relation with the low temperature evaporator at a point some distance from the outlet end thereof. By this arrangement, the heating element is deenergized before the entire low temperature evaporator is defrosted. However, for a short period after the heating element has been deenergized, condensation of refrigerant vapor continues in the low temperature evaporator until trap 74 cools to a temperature that liquid refrigerant collects therein and stops the flow of refrigerant vapor to the evaporator, during which interval the remainder of the low temperature evaporator will have been defrosted. The heat capacity of heating element 82 and of the vapor lift pump portion of conduit 72 is low so that after the heating element has been deenergized, this assembly cools rapidly, causing refrigerant vapor to be condensed therein and fill trap 74. In order to expedite the filling of trap 74, conduit 72 may be cooled in any suitable manner, as by heat transfer fins (not shown). As refrigerant vapor condenses and fills trap 74, liquefied refrigerant flows therefrom through conduit 80 into trap 78, thereby closing by-pass 76 and causing all of the weak inert gas to flow through conduit 34 into the low temperature evaporator. Liquid refrigerant having been accumulated in the low temperature evaporator section during the defrosting period, refrigeration is resumed in this section immediately upon the closing of trap 78 in by-pass 76. It is to be noted that conduit 72 is so arranged relative to conduit 56 that when trap 74 is filled with liquid, at which time trap 78 is also filled, vapor no longer condenses in conduit 72. Therefore there is no overflow of wasted condensate from conduit 72 into conduit 56.

In Fig. 2 there is shown a fragmentary view illustrating a second embodiment of my invention. In order to simplify the drawings, certain parts of the refrigerating system in Fig. 2, which are similar to those in Fig. 1, have been omitted. The parts of the system which are shown in Fig. 2 and which are similar to those illustrated in Fig. 1, are designated by the same reference numerals. As shown, conduit 72′, which connects conduit 56 with conduit 34 for flow of rectified refrigerant vapor into the low temperature section of the evaporator, is provided with an elongate inclined portion 72a upon which are mounted a plurality of heat transfer fins 72b. As in Fig. 1, a conduit 80 connects liquid trap 74' of conduit 72' with liquid trap 78' of by-pass conduit 76'. Trap 74' is generally similar to trap 74. Trap 78' includes a pair of concentric conduits 76a and 76b arranged to receive a body of liquid to prevent flow of inert gas through the by-pass connection. An electric heating element 82' is provided for heating the liquid in trap 74'.

The operation and control of this second embodiment is generally similar to that illustrated in Fig. 1. That is, when it is desired to defrost the low temperature section of the evaporator, traps 74' and 78' are opened by energizing heating element 82'. The energization of heating element 82' causes liquid to be lifted from trap 74' through conduit 72' by vapor lift action and liquid to flow from trap 78' through conduit 80 into trap 74'. When both traps are depleted of liquid, weak inert gas by-passes the low temperature evaporator and flows directly into the high temperature evaporator, and rectified refrigerant vapor by-passes the condenser and flows through conduit 72a, trap 74', conduit 72' and conduit 34 into the low temperature evaporator. During a defrosting period, any condensate that forms in conduit 72a is immediately vaporized as it passes into trap 74' thereby keeping the trap open. It is noted that the input to heater 82', as is the case with heater 82, does not greatly exceed the heat required to vaporize this condensate.

When the low temperature evaporator has been defrosted, heating element 82' is automatically deenergized and now refrigerant vapor that condenses in conduit 72a flows into trap 74' where, if it is vaporized, it must receive its heat of vaporization from the trap. In this manner, the trap is rapidly cooled to a temperature at which liquid refrigerant collects therein and, as before, flows through conduit 80 to fill trap 78'. In order to further expedite the filling of traps 74' and 78', the vertical portion of conduit 72' may be provided with heat transfer fins (not shown). As in the embodiment illustrated in Fig. 1, after traps 74' and 78' have been filled with liquid, substantially no condensation, except that required to keep the traps filled, takes place in conduit 72a; therefore, there is no wasted condensate flowing back into conduit 56. It is to be noted that trap 78 illustrated in Fig. 1 and trap 78' illustrated in Fig. 2 are interchangeable.

While I have illustrated and described two specific embodiments of my invention, it obviously may take other forms and be variously applied within the scope of the following claims.

What is claimed is:

1. An absorption refrigerating system of the unipressure type including a generator, a rectifier, a condenser, an evaporator, an absorber and conduits connecting said elements to form a refrigerant circuit and an inert pressure-equalizing gas circuit, a conduit for by-passing said condenser and for conveying refrigerant vapor from said rectifier into said evaporator, a conduit for by-passing a part of said evaporator and for conveying inert pressure-equalizing gas into a second part of said evaporator, and means for closing each of said by-pass conduits.

2. In an absorption refrigerating system of the unipressure type, a generator, a condenser, an evaporator, an absorber, conduits interconnecting said elements to form a refrigerant circuit, additional conduits interconnecting said evaporator and said absorber to form an inert pressure-equalizing gas circuit, a by-pass in said refrigerant circuit for conveying refrigerant vapor directly into said evaporator, a liquid trap in said by-pass, a second by-pass in said inert pressure-equalizing gas circuit for retarding the flow of inert pressure-equalizing gas to a part of said evaporator, a liquid trap in said second by-pass, and means interconnecting said by-passes for flow of liquid therebetween.

3. In a refrigerating system of the unipressure type, a generator, a condenser, an evaporator, an absorber, conduits interconnecting said elements to form a refrigerant circuit, additional conduits interconnecting said evaporator and said absorber to form an inert pressure-equalizing gas circuit, said evaporator including a low temperature and a high temperature section, a conduit connecting said generator and the low temperature section of said evaporator for flow of refrigerant vapor therethrough, a liquid trap in said last-mentioned conduit, a conduit in said inert pressure-equalizing gas circuit for by-passing the low temperature section of said evaporator and for conveying inert pressure-equalizing gas directly into the high temperature section of said evaporator, a liquid trap in said last-mentioned conduit, and means for rendering each of said traps ineffective.

4. In an absorption refrigerating system of the unipressure tpye, a generator, a condenser, an evaporator, an absorber and conduits connecting said elements to form a refrigerant circuit, additional conduits connecting said evaporator and absorber to form a pressure-equalizing gas circuit, said evaporator including low temperature and high temperature sections, a first by-pass in said refrigerant circuit for flow of refrigerant vapor from said generator to one of said evaporator sections, a second by-pass in said pressure-equalizing gas circuit for retarding the flow of pressure-equalizing gas to said one evaporator section, and means for opening and closing each of said by-passes.

5. In an absorption refrigerant system of the unipressure type, a generator, a rectifier, a condenser, an evaporator, an absorber and conduits connecting said elements to form a refrigerant circuit, additional conduits connecting said evaporator and absorber to form a pressure-equalizing gas circuit, said evaporator including low temperature and high temperature sections, a first by-pass in said refrigerant circuit connected for flow of refrigerant vapor from said rectifier to one of said evaporator sections, a second by-pass in said pressure-equalizing gas circuit for by-passing pressure-equalizing gas around said one evaporator section, means for accumulating liquid in each of said by-passes to render them ineffective, and means for removing liquid from said accumulating means.

6. In an absorption refrigerating system of the unipressure type, a generator, a rectifier, a condenser, an evaporator, an absorber and conduits connecting said elements to form a refrigerant circuit, additional conduits connecting said evaporator and absorber to form a pressure-equalizing gas circuit, said evaporator including low temperature and high temperature sections interconnected for series flow of refrigerant fluid and pressure-equalizing gas, a first by-pass in said refrigerant circuit connecting said rectifier

and said low temperature evaporator section for flow of rectified refrigerant vapor to said low temperature evaporator section, a second by-pass in said pressure-equalizing gas circuit for retarding the flow of pressure-equalizing gas to said low temperature evaporator section and for causing pressure-equalizing gas to flow directly into said high temperature evaporator section, traps for accumulating liquid in each of said by-passes to render them ineffective, and means for removing liquid from each of said traps.

7. In an absorption refrigerating system of the unipressure type, a generator, a rectifier, a condenser, an evaporator, an absorber and conduits connecting said elements to form a refrigerant circuit, additional conduits connecting said evaporator and absorber to form a pressure-equalizing gas circuit, said evaporator including low temperature and high temperature sections interconnected for series flow of refrigerant fluid and pressure-equalizing gas, a first by-pass in said refrigerant circuit connecting said rectifier and said low temperature evaporator section for flow of rectifier refrigerant vapor to said low temperature evaporator section, a second by-pass in said pressure-equalizing gas circuit for retarding the flow of pressure-equalizing gas to said low temperature evaporator section and for causing pressure-equalizing gas to flow directly into said high temperature evaporator section, traps for accumulating liquid in each of said by-passes to render them ineffective, means for removing liquid from each of said traps, and means in said refrigerant circuit for blocking the flow of refrigerant vapor to said condenser when liquid is removed from said traps and for causing refrigerant vapor to flow through said first by-pass into said low temperature evaporator.

8. An absorption refrigeration system of the unipressure type, including a generator, a condenser, a rectifier, an evaporator, an absorber and conduits connecting said elements to form a refrigerant circuit and an inert pressure-equalizing gas circuit, means for by-passing said condenser and for flowing refrigerant vapor directly from said rectifier into said evaporator, said means including a by-pass conduit for conveying refrigerant vapor from said rectifier to said evaporator and a liquid seal for stopping flow of refrigerant vapor to said condenser when said by-pass conduit is open, a conduit for by-passing a part of said evaporator and for flowing inert pressure-equalizing gas directly into another part of said evaporator, and means for closing each of said by-pass conduits.

9. A method of refrigeration which includes flowing refrigerant vapor to a place of condensation where said vapor is liquefied, flowing said liquefied refrigerant to a first place of evaporation where said refrigerant evaporates and diffuses into an inert pressure-equalizing gas flowing through said first place of evaporation thereby producing refrigeration and causing frost to form on the exterior surface of said first place of evaporation, stopping the flow of refrigerant vapor to said place of condensation and causing refrigerant vapor to flow to said first place of evaporation while retarding the flow of pressure-equalizing gas therethrough, whereby refrigerant vapor is condensed in said first place of evaporation and accumulated frost is melted from the exterior surface thereof, and flowing the liquid refrigerant produced by the condensation of vapor in said first place of evaporation to a second place of evaporation wherein said refrigerant is vaporized simultaneously with the melting of frost from the first place of evaporation.

10. A method of refrigeration which includes melting frost from one section of a cooling unit by condensing refrigerant vapor therein and vaporizing the liquid refrigerant resulting therefrom to simultaneously produce refrigeration in another section of said cooling unit.

11. A method of refrigeration which includes melting frost from a low temperature section of a cooling unit by condensing refrigerant vapor therein and vaporizing the liquid refrigerant resulting therefrom to produce refrigeration in a high temperature section of said cooling unit simultaneously with the melting of frost from the low temperature section of the cooling unit.

12. A method of controlling the operation of a unipressure absorption refrigerating system which includes evaporating liquid refrigerant into an inert pressure-equalizing gas at a relatively low partial pressure of refrigerant vapor in a first part of the cooling unit of such system, evaporating liquid refrigerant into an inert pressure-equalizing gas at a relatively high partial pressure of refrigerant vapor in a second part of said cooling unit, heating the first part of said cooling unit by condensing refrigerant vapor therein to thereby melt frost from the exterior surface thereof, and simultaneously evaporating liquid refrigerant produced thereby in the second part of said cooling unit.

13. A method of controlling the operation of a unipressure absorption refrigerating system which includes evaporating liquid refrigerant into an inert pressure-equalizing gas at a relatively low partial pressure of refrigerant vapor in a first part of the cooling unit of such system, evaporating liquid refrigerant into an inert pressure-equalizing gas at a relatively high partial pressure of refrigerant vapor in a second part of said cooling unit, condensing refrigerant vapor in the first part of said cooling unit to thereby melt accumulated frost from the exterior surface thereof, and flowing the liquid refrigerant resulting therefrom into the second part of said cooling unit to produce refrigeration therein.

14. A method of refrigeration which includes evaporating liquid refrigerant at a low partial vapor pressure of refrigerant vapor in a place of evaporation, creating said low partial pressure by flowing an inert pressure-equalizing gas into the presence of liquid refrigerant in said place of evaporation, intermittently raising said partial vapor pressure by retarding the flow of said inert pressure-equalizing gas into said place of evaporation while introducing refrigerant vapor thereinto, condensing said refrigerant vapor at said raised partial vapor pressure in said place of evaporation and accumulating liquid refrigerant therein, stopping the flow of refrigerant vapor, and resuming the flow of inert pressure-equalizing gas into the presence of said accumulated liquid refrigerant.

15. A method of refrigeration which includes flowing refrigerant vapor to a place of condensation where said vapor is liquefied, flowing said liquefied refrigerant to a place of evaporation, evaporating said liquefied refrigerant at a low partial vapor pressure of refrigerant in said place of evaporation, creating said low partial pressure by flowing an inert pressure-equalizing gas into the presence of said liquid refrigerant in said place of evaporation, intermittently raising said

partial vapor pressure by stopping the flow of refrigerant vapor to said place of condensation and flowing said refrigerant vapor to said place of evaporation while retarding the flow of inert pressure-equalizing gas to said place of evaporation, condensing said refrigerant vapor at said raised partial vapor pressure in said place of evaporation and accumulating liquid refrigerant therein, stopping the flow of refrigerant vapor to said place of evaporation, and resuming the flow of inert pressure-equalizing gas into the presence of accumulated liquid refrigerant in said place of evaporation.

16. A method of defrosting one section of an evaporator of a unipressure absorption refrigerating system while producing refrigeration in another section of said evaporator which includes controlling the flow of refrigerant vapor and inert pressure-equalizing gas in certain parts of said system by trapping liquid in a plurality oı places in said system, removing said trapped liquid to thereby cause refrigerant vapor to pass into one section of said evaporator and to cause pressure-equalizing gas to change its path and flow directly into another section of said evaporator, condensing said refrigerant vapor in said one section of the evaporator to thereby melt frost from said one evaporator section, and flowing said condensed refrigerant into the other section of said evaporator for evaporation and diffusion into inert pressure-equalizing gas flowing thereinto thereby producing refrigeration in said other section.

17. A method of defrosting a low temperature evaporator of a unipressure absorption refrigerating system while producing refrigeration in a high temperature evaporator of such system which includes controlling the flow of refrigerant vapor and inert pressure-equalizing gas in certain parts of said system by trapping liquid in a plurality of places in said system, removing said trapped liquid to thereby cause refrigerant vapor to pass into the low temperature evaporator and to cause pressure-equalizing gas to change its path and flow directly into the high temperature evaporator, condensing said refrigerant vapor in said low temperature evaporator to thereby melt frost therefrom, and flowing said condensed refrigerant into the high temperature evaporator for evaporation and diffusion into inert pressure-equalizing gas flowing thereinto thereby producing refrigeration in said high temperature evaporator.

18. A method of refrigeration by the aid of a unipressure absorption refrigerating system consisting of a generator, a condenser, an evaporator and an absorber, which includes flowing liquid refrigerant into said evaporator, flowing a pressure-equalizing gas through said evaporator to thereby reduce the partial vapor pressure of said refrigerant whereby said refrigerant evaporates and diffuses into said pressure-equalizing gas producing refrigeration and causing frost to form on the exterior surface of said evaporator, retarding the flow of pressure-equalizing gas through said evaporator while flowing refrigerant vapor into said evaporator, thereby raising the partial vapor pressure of refrigerant therein, condensing said refrigerant vapor at said raised partial vapor pressure to thereby melt accumulated frost from said evaporator while accumulating liquid refrigerant in said evaporator, stopping the flow of refrigerant vapor to said evaporator, resuming the flow of pressure-equalizing gas through said evaporator, and resuming the flow of liquid refrigerant to said evaporator.

19. A method of refrigeration by the aid of a unipressure absorption refrigerating system consisting of a generator, a rectifier, a condenser, an evaporator and an absorber, which includes flowing liquid refrigerant from said condenser into said evaporator, flowing a pressure-equalizing gas from said absorber through said evaporator to thereby reduce the partial vapor pressure of said refrigerant whereby said refrigerant evaporates and diffuses into said pressure-equalizing gas producing refrigeration and causing frost to form on the exterior surface of said evaporator, retarding the flow of pressure-equalizing gas through said evaporator while flowing refrigerant vapor from said rectifier into said evaporator, thereby raising the partial vapor pressure of refrigerant therein, condensing said refrigerant vapor at said raised partial vapor pressure to thereby melt accumulated frost from said evaporator while accumulating liquid refrigerant in said evaporator, stopping the flow of refrigerant vapor to said evaporator, resuming the flow of pressure-equalizing gas through said evaporator, and resuming the flow of liquid refrigerant to said evaporator.

20. A method of refrigeration with a system in which liquid refrigerant evaporates at a relatively low partial pressure of refrigerant vapor in a place of evaporation in the presence of an inert pressure-equalizing gas which includes accumulating liquid in a first place of accumulation, flowing liquid refrigerant and inert gas to said place of evaporation, evaporating and diffusing the liquid refrigerant into the inert pressure-equalizing gas thereby producing a refrigerating effect and causing the formation of frost or ice on the exterior surface of said place of evaporation, removing the liquid from the first place of accumulation thereby retarding the flow of inert pressure-equalizing gas to said place of evaporation and causing flow of refrigerant vapor to said place of evaporation whereby the partial pressure of refrigerant vapor is raised in said place of evaporation, condensing the refrigerant vapor in the place of evaporation at the raised partial vapor pressure to thereby melt accumulated frost or ice from the exterior surface of said place of evaporation while accumulating liquid refrigerant therein, and again accumulating liquid in said first place of accumulation thereby stopping the flow of refrigerant vapor to said place of evaporating and resuming the flow of liquid refrigerant and inert pressure-equalizing gas to said place of evaporation.

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