Feb. 9, 1943. A. D. SIEDLE 2,310,875

REFRIGERATION

Filed Dec. 31, 1938 2 Sheets-Sheet 1

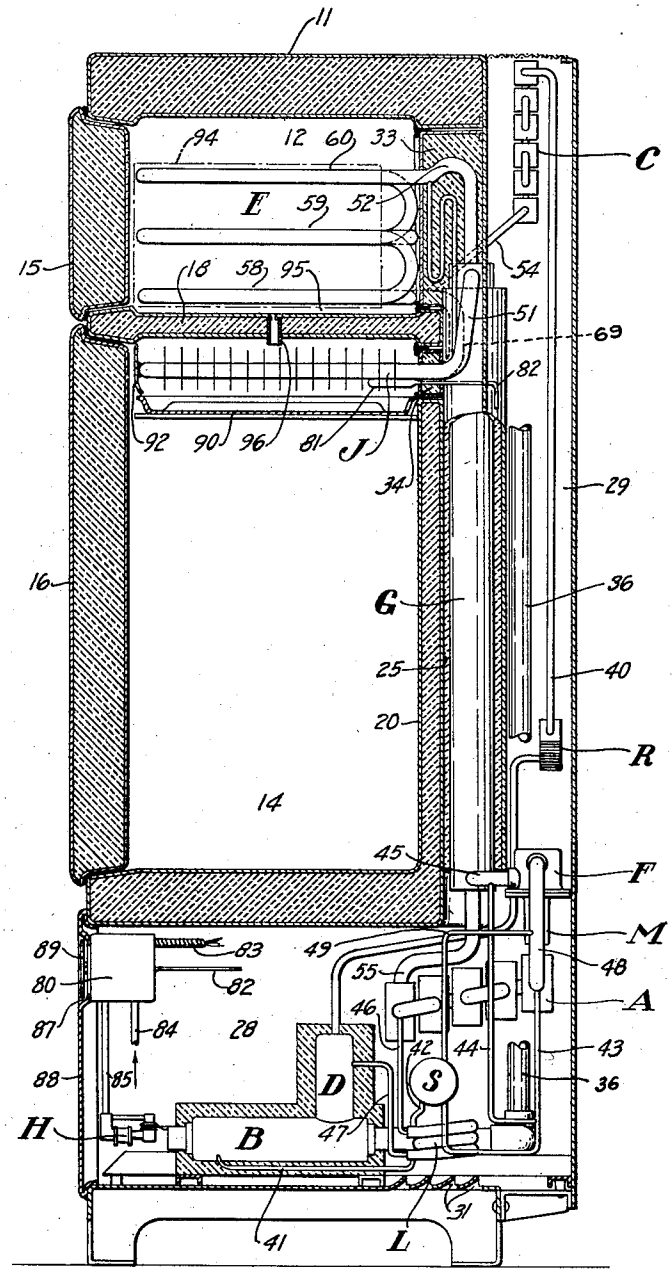


Fig. 1

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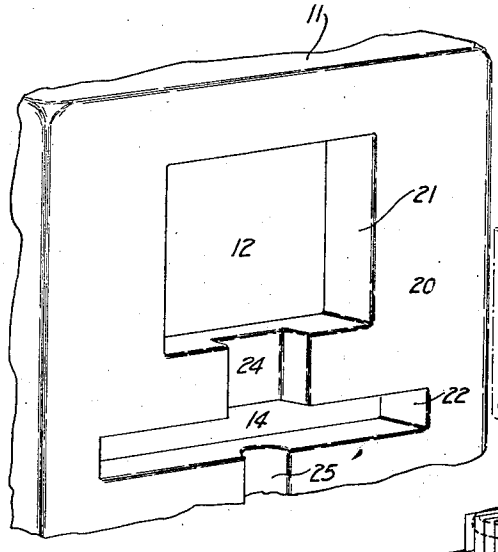
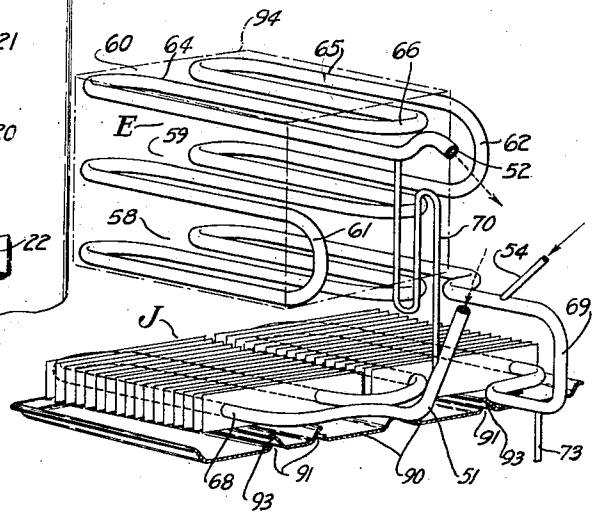


Fig. 2

Fig. 3



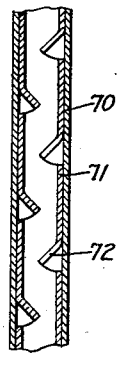


Fig. 4

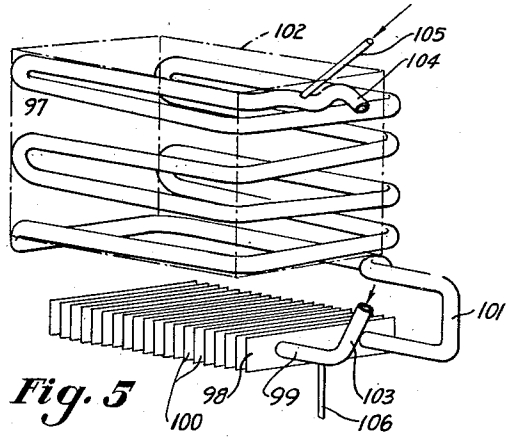


Fig. 5

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UNITED STATES PATENT OFFICE

2,310,875

REFRIGERATION

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Application December 31, 1938, Serial No. 248,699

20 Claims. (Cl. 62—119.5)

This invention relates to the art of refrigeration and more particularly to a novel arrangement of the evaporator and cabinet of an absorption refrigerating machine.

In previous three-fluid absorption refrigerating systems the box-cooling element of the evaporator is supplied with inert gas which has already traversed the entire ice-freezing sections of the evaporator. As a result of this construction the concentration of the inert gas has risen to such value by the time it reaches the box-cooling sections of the evaporator that the temperature of the box-cooling element occasionally rises above 50° F. and very frequently is not low enough to maintain the food storage space at a temperature below 50° F. when the temperature of the space within which the refrigerator cabinet is placed reaches a high value, such as commonly occurs during the summer months. Due to this arrangement and to the prevailing inert gas concentration previous systems have shown a marked inability to govern the temperature of the food storage space properly and to maintain the same within safe limits during periods when such conditions are made most necessary by atmospheric temperature and humidity conditions.

Accordingly, it is an object of the present invention to provide a three-fluid absorption refrigerating system in which the box-cooling section of the evaporator is supplied with lean gas and in which only sufficient liquid refrigerant is permitted to reach the box-cooling coil to maintain the temperature thereof at a safe value as determined by the control mechanism for the refrigerating apparatus.

It is a further object of the invention to provide an absorption refrigerating system which is mounted within a cabinet having distinct low temperature freezing and high temperature high humidity and storage compartments.

It is a further object of the invention to provide a refrigerating system of the above described character in which the apparatus is controlled in such fashion that the storage compartment cooling evaporator always operates at a temperature sufficient to maintain the storage compartment within safe temperature limits.

It is a further object of the invention to provide an absorption refrigerating system of the type in which the cabinet is arranged to receive the evaporator and a sealing panel through the rear wall thereof provided with separate openings for individual evaporator sections and with recesses to receive elements of the refrigerating system.

It is a further object of the invention to provide a new and improved apparatus for removing frost drainage from the area around the evaporator.

Other objects and advantages of the invention will become apparent as the description proceeds when taken in connection with the accompanying drawings in which:

Figure 1 is a side sectional elevational view of the refrigerating apparatus embodying the present invention.

Figure 2 is a perspective fragmentary view of the rear wall of the cabinet construction.

Figure 3 is a perspective view of the evaporating mechanism.

Figure 4 is a cross-sectional detail on an enlarged scale, and

Figure 5 is a perspective view of a modified form of evaporating mechanism.

The refrigerating apparatus comprises a boiler B, an analyzer D, an air-cooled rectifier R, a tubular air-cooled condenser C, a freezing evaporator E, a box-cooling evaporator J, a gas heat exchanger G, a tubular air-cooled absorber A, a solution reservoir S, a liquid heat exchanger L, and a circulating fan F which is driven by a hermetically sealed motor M. These elements are suitably connected by various conduits to form a plurality of gas and liquid circuits constituting a complete refrigerating system to which reference will be made in more detail hereinafter.

The above described system will be charged with a suitable refrigerant, such as ammonia, a suitable absorbent, such as water, and an inert pressure equalizing medium, preferably a dense inert gas like nitrogen.

The refrigerator cabinet indicated generally at 11 is heavily insulated on all walls which are subjected to a temperature differential. The cabinet includes a top freezing chamber 12 and a lower and larger storage chamber 14. The compartments 12 and 14 are provided with suitable insulated doors 15 and 16, respectively. A horizontal insulated partition 18 which is integral with the side and rear walls of the cabinet separates the compartments 12 and 14 and provides a rest for the doors 15 and 16.

Referring now to Figure 2, the rear wall 20 of the cabinet proper, as will be seen from Figure 2, includes an upper opening 21 providing access to the compartment 12 and a lower elongated opening 22 which provides access to the upper portion

of the compartment 14. The central portion of the rear wall 20 of the cabinet is provided with a channel-shaped recess 24 extending between the openings 12 and 14 and a smaller downwardly extending recess 25 which is semi-circular in cross-section and extends from the bottom level of the opening 14 to the bottom portion of the insulated cabinet structure.

The cabinet will be mounted on a suitable framework, not shown, to provide a mechanism compartment 28 directly beneath the storage compartment 14 and a vertically extending flue 29 which is positioned rearwardly of the rear wall 20 of the cabinet construction. Air may be supplied to the compartments 28 and 29 in any desired manner. As shown, the bottom wall of the compartment 28 is provided with a plurality of air supply louvers 31 and the bottom of the cabinet directly beneath the flue 29 is open.

The boiler-analyzer and its associated insulating blanket are mounted in the compartment 28 directly beneath the compartment 14 and extend from front to rear of the compartment 28. The liquid heat exchanger L, solution reservoir S and absorber A are mounted in the rear portion of the compartment 28 and partially beneath the flue 29. The condenser C is mounted in the upper portion of the flue 29 and the rectifier is mounted at an intermediate level of that flue.

The gas heat exchanger G and its associated insulation are partially received in the recesses 24 and 25 previously described. The evaporator E is passed through the opening 21 whereby the same extends into the central portion of the freezing chamber 12. The evaporator J is passed through the elongated narrow opening 22 to position the evaporator J in the top portion of the compartment 14 directly beneath the insulated dividing partition 18. The opening 21 is sealed by a suitable block of insulating material 33 which is rigidly mounted upon the refrigerating mechanism. Likewise the opening 22 is sealed by a block of insulating material 34 which is also rigidly mounted upon the refrigerating mechanism. As will be seen from Figure 1, the insulating blocks 33 and 34 may be integral with each other and with the insulation for the recess 24. As a result of this construction, the refrigerating mechanism and the insulating blocks 33 and 34 may be completely assembled after which this unit is assembled with the cabinet 11 by inserting the mechanism into the cabinet from the rear thereof. The gap between the blocks 33 and 34 and the associated rear wall element 20 may be sealed by any suitable gasket device.

Referring now to Figure 1, the refrigerating system will be described in detail. The boiler B is heated by a suitable fluid fuel burner H which discharges its products of combustion into a central tube fastened to the boiler. Waste products of combustion are conveyed from the boiler to the top portion of the flue 29 by means of a suitable conduit 36. The application of heat to the boiler B generates refrigerant vapor from the strong solution normally therein contained. This vapor passes upwardly through the analyzer D through which it flows in counterflow relationship with strong solution flowing downwardly therethrough. Further refrigerant vapor is generated in the analyzer from the strong solution by the heat of condensation of absorption solution vapor produced in the boiler. The vapor thus formed in the analyzer is then conveyed to the upper portion of the tubular air-cooled condenser C by means of a conduit 40 which includes the rectifier R. The refrigerant vapor is then liquefied in the condenser by heat exchange with atmospheric air flowing through the flue 29.

The weak solution formed in the boiler by the generation of refrigerant vapor is conveyed therefrom into the solution reservoir S by means of the conduit 41, the outer path of the liquid heat exchanger L and a conduit 42. The solution is then conveyed from the reservoir S into the upper end of the absorber A by means of a conduit 43. It is apparent that the absorber is at an elevation above the liquid level normally prevailing in the boiler-analyzer system wherefore some means must be provided to elevate the weak solution thereinto. For this purpose a small gas bleed conduit 44 is connected between the discharge conduit 45 of the circulating fan F and the conduit 43 below the liquid level normally prevailing therein, whereby the weak solution is elevated into the absorber by gas lift action. The solution reservoir S is vented by means of a conduit 49 to the suction conduit 48 which is connected between the upper or gas discharge end of the absorber and the suction side of the circulating fan F.

The weak solution flows downwardly through the absorber in counterflow relationship with a mixture of pressure equalizing medium and refrigerant vapor formed in the evaporator. The refrigerant vapor content of the mixture is absorbed by solution and the heat of absorption is rejected to the cooling air flowing over the exterior walls of the absorber and the fins mounted thereon. The strong solution is then returned from the bottom portion of the absorber to the upper portion of the analyzer by means of the conduit 46, the inner path of the liquid heat exchanger L, and a conduit 47.

The lean pressure equalizing medium formed in the absorber is conveyed by the conduit 48 into the suction side of the circulating fan F in which it is placed under pressure and is discharged through the conduit 45 into the outer path of the gas heat exchanger G from which it is conveyed by means of a conduit 51 into the storage compartment cooling evaporator J. The exact construction and operation of the evaporator will be described in detail hereinafter. For the present it is sufficient to state that the inert gas supplied to the conduit 51 circulates through the evaporators J and E and is discharged from the evaporator E into the inner path of the gas heat exchanger G by means of the conduit 52. The liquid refrigerant which is formed in the condenser is supplied to the evaporator through the conduit 54. The liquid refrigerant evaporates into the pressure equalizing medium to produce useful refrigeration and the resulting rich mixture is conveyed through the conduit 52, the inner path of the gas heat exchanger G, and a conduit 55 into the bottom portion of the absorber A through which the gas flows counter to the solution in the manner heretofore described.

Referring now particularly to Figures 3 and 4, the evaporator per se will be described in detail. The evaporator E comprises three horizontal parallel vertically spaced coil sections 58, 59 and 60. The coil sections 58 and 59 are serially connected by a riser conduit 61 and the coil sections 59 and 60 are serially connected by a riser conduit 62. All the coil sections are identical in shape and configuration. Therefore, a description of one will suffice for a description of all. The coil section 60 comprises a pair of U-shaped conduit elements 64 and 65 which have the inner adjacent

legs thereof joined by a conduit 66 wherefore the fluids may flow through the entire coil section serially.

The evaporator J comprises a coil 68 which is identical in shape with the coil section 60 but is spread out to cover a greater horizontal area. The inert gas supply conduit 51 connects directly to the coil section 68 which in turn is connected to the coil section 58 by means of a suitable riser conduit 69. It will be noted from Figure 3 that the vertical portions of the conduits 51 and 69 are connected to the coil section 68 by suitable offset conduits to bring the conduits 51 and 69 adjacent to each other and spaced an appreciable distance rearwardly of the coil section 68 for a purpose to be described more fully hereinafter.

The inert gas discharge conduit 52 is connected to one end of the coil section 60. The coil section 60 adjacent its point of connection to the conduit 52 is drained to the gas inlet conduit 51 by means of a small diameter conduit 70 which includes a deep U-shaped portion. As is shown in Figure 4, the conduit 70 is provided with an inner liner 71 which includes a multiplicity of staggered in-struck tongues 72 for a purpose to be described hereinafter. A small drain conduit 73 is connected between the strong solution return line and the conduit 69 which forms the gas outlet portion of the coil 68.

The entire evaporator is constructed of relatively small diameter tubing in order that the inert gas will flow therethrough with a velocity sufficient to drag or sweep the liquid refrigerant through all portions of the evaporator as it is evaporating into the inert gas stream. This evaporator arrangement is fully disclosed and claimed in the co-pending application of Curtis C. Coons and William H. Kitto, Serial No. 386,395, filed April 2, 1941, which is a continuation-in-part of application Serial No. 220,189, filed July 20, 1938. For the present case it is sufficient to note that, using nitrogen, an evaporator conduit having an inside diameter of approximately one-half inch the nitrogen will circulate the refrigerant satisfactorily if the system pressure is not lower than approximately 270 pounds per square inch and a gas pressure drop of from 2½" to 4" of water is permissible between the gas inlet and outlet portions of the evaporator.

The liquid refrigerant formed in the condenser is supplied to the conduit 69 adjacent its point of connection with the coil section 58 by the drain conduit 54 and is swept through the coil sections 58, 59 and 60 and their associated riser conduits 61 and 62 by the inert gas stream as the refrigerant is evaporating into the inert gas to produce refrigeration. The balance of the liquid refrigerant and any non-volatile foreign materials which may find their way into the evaporator are then conveyed from the gas outlet portion of the coil 60 to the gas inlet conduit 51 by means of the conduit 70. The conduit 70 is so constructed and arranged that it will prevent by-passing of the inert gas when the apparatus is started without impeding liquid discharge between the conduits 52 and 51. Also the looped portion of the conduit 70 will quickly fill with liquid refrigerant thereby preventing all gas flow therethrough after which liquid flowing thereinto from the conduit 52 will displace equal amounts on the other side of the loop into the conduit 51. This drain construction forms the subject matter of the co-pending application of Curtis C. Coons and William H. Kitto, Serial No. 234,165, filed October 10, 1938, now Patent No. 2,281,828, dated May 5, 1942. The liquid refrigerant and non-volatile matter discharged into the conduit 51 are then swept through the coil section 68 by the inert gas stream as it is evaporating to produce refrigeration. Any excess material, such as absorption solution, is then returned to the absorption solution circuit through the conduit 73 and the inert gas flows through the conduit 69 to the upper freezing evaporator E.

The heater H for the boiler B and the electrical motor M for the circulating fan F are controlled by a single control mechanism 80 of any suitable or desired type. The control mechanism 80 may either simultaneously energize and de-energize the motor and heater, it may permit the motor to operate substantially continuously except during defrosting and modulate the flame on the burner H in response to refrigeration demand, or it may modulate the flame on the burner H and cycle the circulating motor M. Preferred constructions of these respective types are illustrated in applications of Curtis C. Coons, Serial No. 148,424, filed June 16, 1937, now Patent No. 2,228,343, dated January 14, 1941; and Arnold D. Siedle and William H. Kitto, Serial No. 160,274, filed August 21, 1937, now Patent No. 2,262,656 dated November 11, 1941. The control mechanism operates in response to temperature changes produced in the box-cooling evaporator J. For this purpose a suitable thermal bulb 81 is attached to the bottom side of a portion of the coil 68 and is connected to the control mechanism 80 by a capillary conduit 82. The control mechanism is suitably connected to a source of electrical energy and to the motor M through the electrical connection 83. Gas is supplied to the control mechanism from a conduit 84 and gas is supplied from the control mechanism to the burner H through a conduit 85. It will be understood that suitable means will be provided to insure the presence of an igniting flame at all times on the burner H or a separate igniting burner may be provided. The burner H will also be provided with suitable safety cut-off mechanism to prevent the escape of raw gas in the event of ignition failure.

Various arrangements may be provided for housing the control mechanism 80. However, as illustrated, the control mechanism 80 is mounted in any suitable manner directly rearwardly of an opening in a recessed portion 87 of a front panel 88 for the mechanism compartment 28. A suitably manually adjustable dial 89 is received within the recess 87 for the purpose of regulating the control mechanism 80 and thereby the operation of the refrigerating apparatus.

Suitable drip trays 90 will be supported in the upper portion of the storage compartment 14 directly beneath the evaporator element J to receive drippings therefrom. As shown diagrammatically in Figure 3, a drip tray 90 is positioned beneath each section of the evaporator J to receive drippings therefrom. Each tray is provided with openings 91 and overhanging flanges 93 whereby free air flow is provided through the drip trays 90 but passage of drippings therethrough is prevented. If desired, the trays can be drained to the exterior of the refrigerator cabinet in a manner disclosed in the co-pending application of George A. Brace, Serial No. 236,274, filed October 21, 1938, now Patent No. 2,250,945, dated July 29, 1941. A decorative panel 92 may be carried by the evaporator J at the front portion thereof to hide the fins and to harmonize with the trays 90. Defrosting drippings formed in the

low temperature freezing compartment are caught in the top wall 95 of the panel 18. The wall 95 is sloped to a discharge tube 96 which passes through the panel 18 and discharges into one of the drip trays 90.

The gas heat exchanger G and its associated insulation and the conduits 51, 69, 70 and 52 all extend into the insulating blocks 33 and 34 whereby they are thermally insulated and form a support for the blocks 33 and 34. The conduit 69 and portions of the conduits 51 and 70 are received within the recess 24 and are covered with insulating material. The evaporator E may be encased in a suitable housing which is indicated at 94 in dotted lines in Figures 1 and 3. Suitable ice tray supporting shelves will be attached to the coil sections 58 and 59.

In the operation of this form of the invention the lean inert gas is supplied directly from the absorber to the conduit 68 whereas the liquid refrigerant is supplied to the bottom portion of the ice-freezing evaporator section E. As a result of this action, the liquid refrigerant traverses the entire ice-freezing evaporator section before being supplied to the higher temperature storage compartment refrigerating evaporator J. This construction permits very desirable control of the apparatus. The control mechanism operates in response to the thermal condition of the storage compartment refrigerator J wherefore it will be appropriately set to maintain the temperature of the storage compartment within safe values. Now the large finned area provided for the storage compartment cooling unit permits this unit to maintain safe temperatures within that compartment without being cooled below 32° F. wherefore frost does not collect upon the storage compartment cooling element J and a relatively high humidity is maintained within the storage compartment 14. This simultaneously eliminates the highly objectionable frost problem and also improves the refrigerating capability of the machine because it does not objectionably dry foodstuffs stored in the compartment 14. There will be some condensation or moisture on the fins on the evaporator J but this will not unduly dehumidify the air within the refrigerator and the moisture so condensed will remain in contact with the air stream. As a result of these factors it is entirely possible to maintain the relative humidity within the compartment 14 at a figure of 60% or higher.

The control mechanism, of course, operates the refrigerating system only sufficiently to maintain safe temperature limits within the compartment 14. However, no refrigeration can be produced within the compartment 14 until the refrigerating demand of the low temperature compartment 12 has been satisfied for the reason that evaporation will occur first in the evaporator E. Therefore, only sufficient liquid refrigerant reaches the evaporator J to provide adequate cooling for the compartment 14 and this refrigerant evaporates directly into lean inert gas coming from the absorber. Therefore, the storage compartment of the refrigerator is always maintained at safe temperature limits and refrigeration in the low temperature compartment 12 is assured by reason of the fact that the refrigerant is first supplied thereto.

In Figure 5 there is illustrated a modified form of the invention. This form of the invention is designed and intended to be utilized with the same type of refrigerating system as that illustrated in Figure 1 but the inert gas may be circulated by gravity, if desired, in which event hydrogen will be selected as the pressure equalizing medium and the absorption solution may be circulated by a heat operated pump mounted on the boiler. As this construction is well known and common in the art it is not believed necessary to illustrate or to describe the same in detail.

In the form of the invention illustrated in Figure 5 the evaporator comprises an upper freezing section 97 and a lower storage compartment cooling section 98. The cooling section 98 is composed of a U-shaped coil 99 which is provided with a plurality of air-cooling fins 100. The U-shaped coil 99 terminates in an upstanding and inwardly projecting attaching conduit 101 which connects to the upper or freezing evaporator 97. The evaporator 97 consists of a plurality of U-shaped coils slanted slightly from the horizontal, vertically superposed and serially connected at their ends whereby to form a U-shaped freezing chamber which is adapted to enclose a freezing compartment indicated by the dotted line 102. The inert gas is supplied to the lower coil 99 through a conduit 103 and it exits from the coil 97 through a conduit 104. Liquid refrigerant is supplied from the condenser through a conduit 105 to the gas outlet portion of the evaporator 97. The gas inlet portion of the coil 99 is provided with a suitable drain 106 which will connect to the strong solution return line or any other suitable part of the apparatus.

The evaporator in this form of the invention will be constructed of conduits considerably larger than those utilized for the form of the invention disclosed in Figures 1 to 4 for the reason that the liquid refrigerant in this form of the invention flows downwardly through the evaporator by gravity in counterflow relationship to the inert gas flowing upwardly therethrough.

In this form of the invention, as in the form previously disclosed, the liquid refrigerant first traverses the entire freezing section of the evaporator after which any unevaporated liquid and non-volatile material which finds its way into the evaporating system are conveyed through the storage compartment cooling evaporator and any excess is then drained through a suitable drain.

This form of the invention may be housed within a cabinet identical except as to the size of the evaporating element receiving openings with that disclosed in connection with Figure 1.

From the above description it will be seen that I have provided evaporators particularly designed for use with either the gravity or the forced circulation type of three-fluid absorption refrigerating system in which the liquid refrigerant first traverses an ice-freezing evaporator section after which the liquid is conveyed into a storage compartment cooling evaporator which is supplied initially with lean gas directly from the absorber. This construction, acting in conjunction with a control mechanism which is responsive to the storage compartmerrt evaporator, provides very excellent control over the operation of the system as a whole for the reason that it assures that foodstuffs placed in the storage compartment will be maintained at a proper condition at all times regardless of changes in atmospheric condition and, further, that the temperature of the box-cooling section of the evaporator will never be permitted to rise above safe refrigerating values.

Though in each form of the invention the

evaporator has been shown in the manner in which the same is preferably constructed in order to fit a cabinet having an upper low temperature ice-freezing and low temperature storage compartment and a lower higher temperature high humidity food storage compartment hermetically sealed from the upper compartment, it is by no means limited to that type of cabinet construction. For example, either of the evaporators illustrated could be incorporated in the conventional type cabinet which has only one compartment in which event it would still be highly desirable to place the air-cooling evaporating section below the ice-freezing evaporating section in order to provide proper control and to insure safe storage conditions within the refrigerating compartment at all times.

While the invention has been illustrated and described in considerable detail, it is not to be construed as being limited to the precise type, construction and arrangement shown as various changes may be made in the construction, arrangement and proportion of parts without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. Absorption refrigerating apparatus comprising an evaporator having a freezing section and a space cooling section, means for propelling a dense inert gas through said cooling section and then through said freezing section in the order named with sufficient pressure and velocity to sweep or drag refrigerant liquid therethrough, means for supplying refrigerant liquid to the gas inlet portion of said freezing section, and means for conveying unevaporated liquid from the gas outlet portion of said freezing section into the gas inlet portion of said cooling section.

2. Absorption refrigerating apparatus comprising an evaporator having a freezing section and a space cooling section, means for propelling a dense inert gas through said cooling section and then through said freezing section in the order named with sufficient pressure and velocity to sweep or drag refrigerant liquid therethrough, means for supplying refrigerant liquid to the gas inlet portion of said freezing section, means for conveying unevaporated liquid from the gas outlet portion of said freezing section into the gas inlet portion of said cooling section, and means responsive to space cooling refrigeration demand for controlling the supply of refrigerant liquid to said evaporator.

3. Refrigerating apparatus comprising an insulated cabinet having insulated freezing and storage compartments, refrigerating mechanism associated with said cabinet including an evaporator having a freezing section in said freezing compartment and a cooling section in said storage compartment, means for propelling a dense inert gas through said cooling section and then through said freezing section in the order named under conditions such that it will sweep or drag refrigerant liquid therethrough, means for supplying refrigerant liquid to the gas inlet portion of said freezing section, and means for conveying unevaporated liquid from the gas outlet portion of said freezing section into the gas inlet portion of said cooling section.

4. Refrigerating apparatus comprising an insulated cabinet including storage and freezing compartments insulated from each other, refrigerating mechanism comprising storage and freezing compartment evaporators positioned in said storage and freezing compartments, respectively, means serially connecting said evaporators, the rear wall of said cabinet being provided with openings communicating with said compartments and shaped to allow said evaporators to pass therethrough into said compartments, and insulated closure plates carried by said mechanism and positioned in said openings to seal the same.

5. Refrigerating apparatus comprising an insulated cabinet including storage and freezing compartments insulated from each other, refrigerating mechanism comprising storage and freezing compartment evaporators positioned in said storage and freezing compartments, respectively, means serially connecting said evaporators, the rear wall of said cabinet being provided with openings communicating with said compartments and shaped to allow said evaporators to pass therethrough into said compartments, a channel in the rear wall of said cabinet communicating said openings and adapted to receive said connecting means, and insulated closure plates carried by said mechanism and positioned in said openings to seal the same.

6. Refrigerating apparatus including a cabinet having a mechanism compartment and a pair of insulated refrigerating chambers, evaporator receiving openings in the rear wall of each of said chambers, a channel in the rear wall of said cabinet connecting said openings, a second and smaller channel in the rear wall of said cabinet terminating in one of said openings, an absorption refrigerating mechanism including an evaporator having sections adapted to pass through each of said openings and positioned in said chambers, means for serially connecting said evaporators positioned in said first-mentioned channel, a gas heat exchanger positioned in said channels, and closure elements mounted in said openings and carried by said mechanism rearwardly of said evaporators.

7. Refrigerating apparatus comprising an evaporator having an air-cooling section and a superposed freezing section, means connecting said sections for conducting inert gas therebetween, means for supplying inert gas to said air-cooling section for circulation upwardly through said sections, means for supplying refrigerant liquid to said freezing section and means for conveying unevaporated refrigerant from said freezing section into said cooling section.

8. That method of producing refrigeration which includes the steps of flowing a pressure equalizing medium through a high temperature evaporating zone and then through a low temperature refrigerating zone, supplying refrigerant to be evaporated to the low temperature zone, directing refrigerant which has passed through the low temperature evaporating zone into the high temperature evaporating zone, and regulating the supply of refrigerant to the low temperature evaporating zone in accordance with the temperature of the high temperature evaporating zone.

9. That method of regulating the refrigerating effect in a domestic refrigerator which includes the steps of circulating an inert gas from an absorption zone in which the gas is deprived of refrigerant vapor by contact with an absorbent to a space cooling refrigerating zone and then to a low temperature freezing zone, supplying liquid refrigerant to the freezing zone from a source of supply, conducting unevaporated refrigerant from the freezing zone into the space cooling zone into contact with the inert gas flowing therethrough, and regulating the supply of liquid refrigerant to

the freezing zone by the temperature of the cooling zone to maintain a desired thermal condition in the cooling zone.

10. In an absorption refrigerating apparatus of the three-fluid type, an evaporator having a low temperature freezing section and a high temperature space cooling section, means for supplying refrigerant liquid to said low temperature freezing section, means arranged to supply lean inert gas to said high temperature space cooling section, means for conducting inert gas from said high temperature space cooling section to said low temperature freezing section and for conducting unevaporated refrigerant liquid from said low temperature freezing section to said high temperature space cooling section, and means for withdrawing rich inert gas from said low temperature freezing section.

11. In an absorption refrigerating apparatus of the three-fluid type, an evaporator having a low temperature freezing section and a high temperature space cooling section, each of said evaporator sections being arranged for gravity circulation of refrigerant liquid therethrough, means for supplying refrigerant liquid to said low temperature freezing section, means arranged to supply lean inert gas to said high temperature space cooling section, means for conducting inert gas from said high temperature space cooling section to said low temperature freezing section and for conducting unevaporated refrigerant liquid from said low temperature freezing section to said high temperature space cooling section, and means for withdrawing rich inert gas from said low temperature freezing section.

12. In an absorption refrigerating apparatus of the three-fluid type, an evaporator having a low temperature freezing section and a high temperature space cooling section, means for supplying refrigerant liquid to said low temperature freezing section, means arranged to supply lean inert gas to said high temperature space cooling section, means for conducting inert gas from said high temperature space cooling section to said low temperature freezing section and for conducting unevaporated refrigerant liquid from said low temperature freezing section to said high temperature space cooling section, means for withdrawing rich inert gas from said low temperature freezing section, and means responsive to space cooling refrigeration demand for controlling the supply of refrigerant liquid to said evaporator.

13. In an absorption refrigerating apparatus of the three-fluid type, an evaporator having a low temperature freezing section and a high temperature space cooling section, each of said evaporator sections being arranged for gravity circulation of refrigerant liquid therethrough, means for supplying refrigerant liquid to said low temperature freezing section, means arranged to supply lean inert gas to said high temperature space cooling section, means for conducting inert gas from said high temperature space cooling section to said low temperature freezing section and for conducting unevaporated refrigerant liquid from said low temperature freezing section to said high temperature space cooling section, means for withdrawing rich inert gas from said low temperature freezing section, and means responsive to space cooling refrigeration demand for controlling the supply of refrigerant liquid to said evaporator.

14. Refrigerating apparatus comprising an insulated cabinet having insulated freezing and storage compartments, refrigerating mechanism associated with said cabinet including an evaporator having a freezing section designed to operate at a low temperature level in said freezing compartment and a space cooling section designed to operate at a high temperature level in said storage compartment, means for supplying refrigerant liquid to said low temperature section, means arranged to supply lean inert gas to said high temperature section, means for conducting inert gas from said high temperature section to said low temperature section and for conducting unevaporated refrigerant liquid from said low temperature section to said high temperature section, and means for withdrawing rich inert gas from said low temperature section.

15. Refrigerating apparatus comprising an insulated cabinet having insulated freezing and storage compartments, refrigerating mechanism associated with said cabinet including an evaporator having a freezing section designed to operate at a low temperature level in said freezing compartment and a space cooling section designed to operate at a high temperature level in said storage compartment, said sections being designed for gravity flow of refrigerant liquid therethrough, means for supplying refrigerant liquid to said low temperature section, means arranged to supply lean inert gas to said high temperature section, means for conducting inert gas from said high temperature section to said low temperature section and for conducting unevaporated refrigerant liquid from said low temperature section to said high temperature section, and means for withdrawing rich inert gas from said low temperature section.

16. Refrigerating apparatus comprising an insulated cabinet having insulated freezing and storage compartments, refrigerating mechanism associated with said cabinet including an evaporator having a freezing section designed to operate at a low temperature level in said freezing compartment and a space cooling section designed to operate at a high temperature level in said storage compartment, means for supplying refrigerant liquid to said low temperature section, means arranged to supply lean inert gas to said high temperature section, means for conducting inert gas from said high temperature section to said low temperature section and for conducting unevaporated refrigerant liquid from said low temperature section to said high temperature section, means for withdrawing rich inert gas from said low temperature section, and means responsive to the temperature of said storage compartment for regulating the supply of refrigerant to said evaporator.

17. Refrigerating apparatus comprising an evaporator having a freezing section designed to operate at a low temperature and a space cooling section designed to operate at a high temperature positioned beneath said freezing section, means for supplying refrigerant liquid to said low temperature section, means arranged to supply lean inert gas to said high temperature section, means for conducting inert gas from said high temperature section to said low temperature section and for conducting unevaporated refrigerant liquid from said low temperature section to said high temperature section, and means for withdrawing rich inert gas from said low temperature section.

18. In a refrigerating apparatus an insulated cabinet structure, refrigerating mechanism associated with said cabinet structure and comprising an evaporator positioned in the upper portion of said cabinet structure, said evaporator having a

low temperature ice freezing section and a high temperature section provided with a large area of air cooling heat conducting surface, means for supplying refrigerant liquid to said low temperature section, means arranged to supply lean inert gas to said high temperature section, means for conducting inert gas from said high temperature section to said low temperature section and for conducting unevaporated refrigerant liquid from said low temperature section to said high temperature section, and means for withdrawing rich inert gas from said low temperature section.

19. Refrigerating apparatus comprising a cabinet having an upper freezing compartment and a lower storage compartment, an insulated panel forming a dividing wall between said compartments, a freezing evaporator mounted within said freezing compartment, an air-cooling evaporator mounted within said storage compartment, means for supplying refrigerant liquid solely to said freezing evaporator, means for supplying lean inert gas to said air cooling evaporator and for withdrawing rich inert gas from said freezing evaporator, and means for conveying inert gas from said air-cooling evaporator to said freezing evaporator and for conveying unevaporated refrigerant liquid from said freezing evaporator to said air cooling evaporator.

20. Refrigerating apparatus comprising a cabinet having an upper freezing compartment and a lower storage compartment, an insulated panel forming a dividing wall between said compartments, a freezing evaporator mounted within said freezing compartment, an air-cooling evaporator mounted within said storage compartment, means for supplying refrigerant liquid solely to said freezing evaporator, means for supplying lean inert gas to said air-cooling evaporator and for withdrawing rich inert gas from said freezing evaporator, means for conveying inert gas from said air-cooling evaporator to said freezing evaporator and for conveying unevaporated refrigerant liquid from said freezing evaporator to said air cooling evaporator, and means responsive to the refrigerating demand in said storage compartment for controlling the supply of refrigerant to said freezing evaporator.

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