March 2, 1948. O. B. SUTTON 2,436,945

TWO TEMPERATURE ABSORPTION REFRIGERATING APPARATUS AND METHOD

Filed June 10, 1942 2 Sheets-Sheet 1

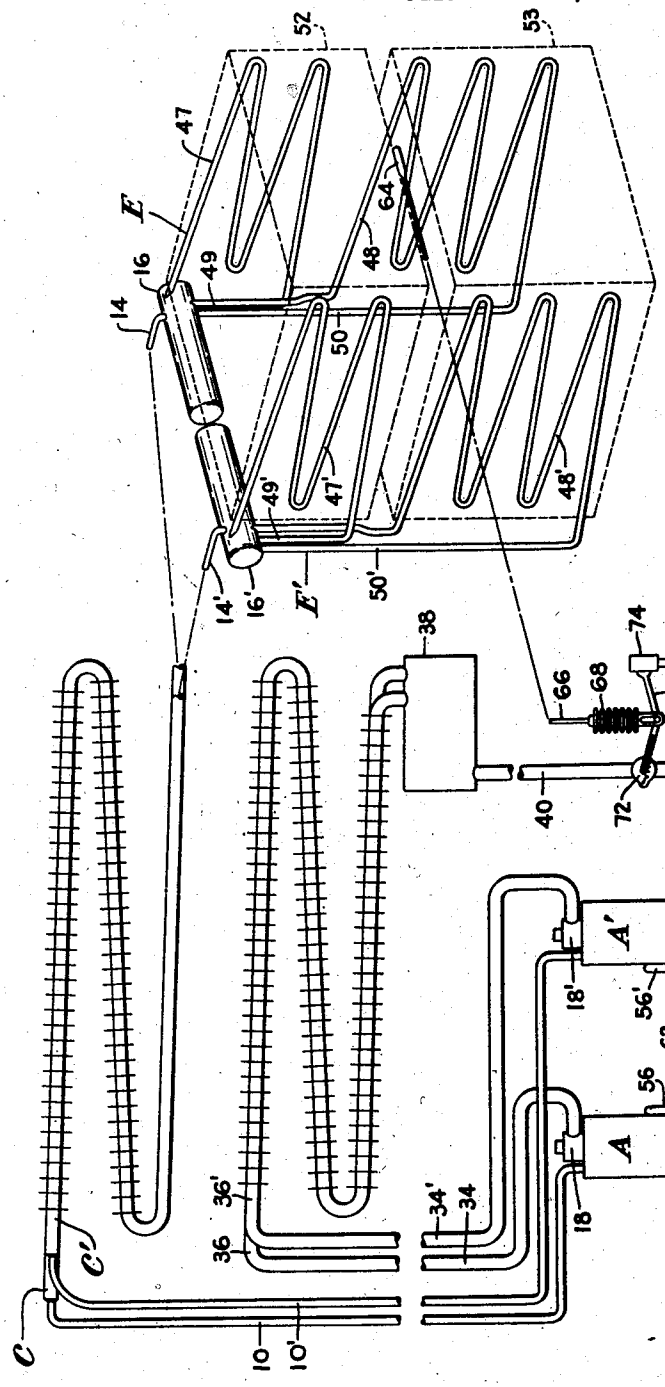


Fig. 1

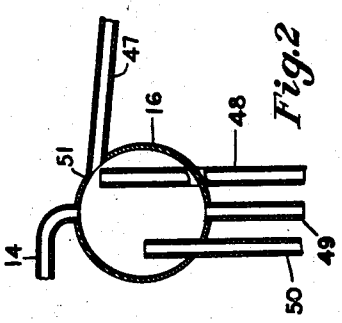


Fig. 2

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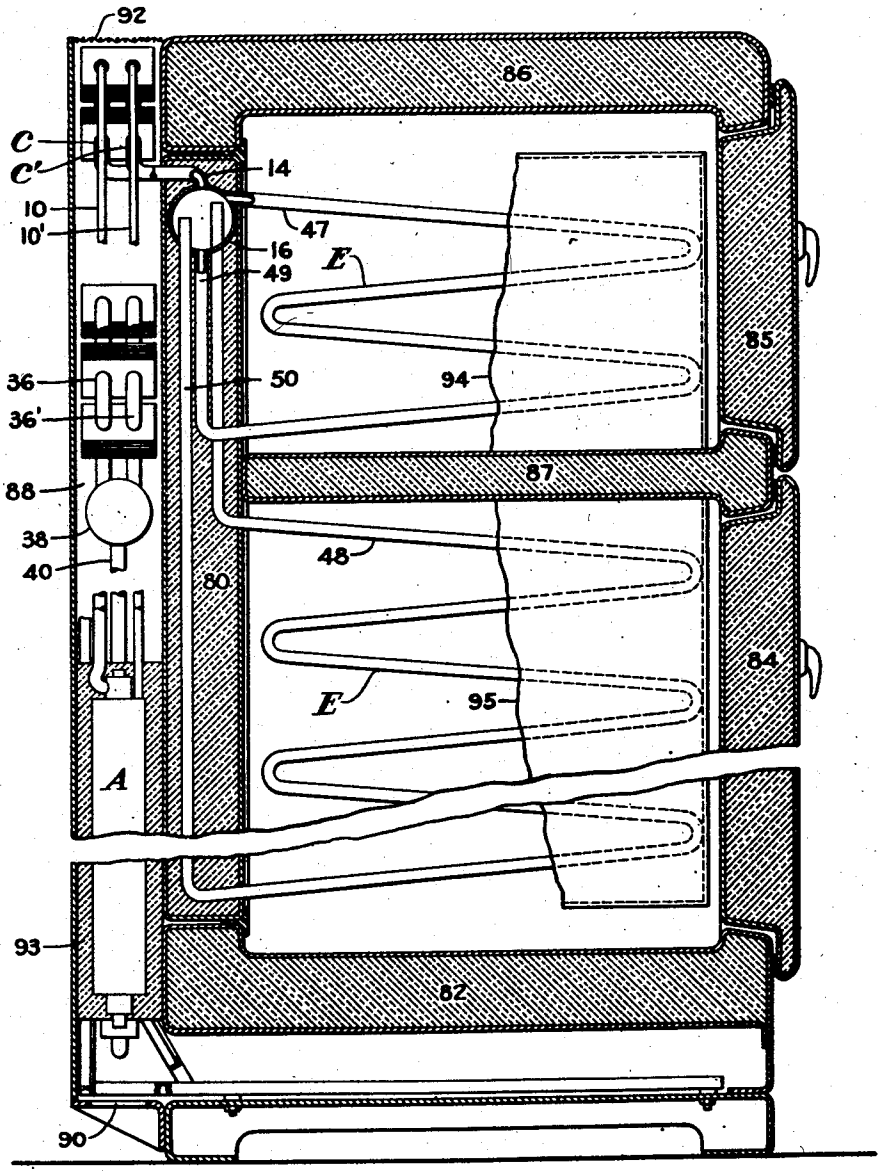


Fig. 3

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Patented Mar. 2, 1948 2,436,945

UNITED STATES PATENT OFFICE

2,436,945

TWO TEMPERATURE ABSORPTION REFRIGERATING APPARATUS AND METHOD

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Application June 10, 1942, Serial No. 446,471

10 Claims. (Cl. 62—118)

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This invention relates to refrigeration and more particularly to a means and method for maintaining a temperature differential in two refrigerated zones while maintaining the same vapor pressure in the evaporators in heat exchange relationship with said zones.

In modern domestic refrigerating apparatus in which the same evaporator is used for freezing purposes or maintaining foods in frozen condition and also for maintaining the food storage compartment refrigerated, the air in the food storage compartment is dehydrated by deposition of the moisture from the air on the cold evaporator in the form of frost with the result that this dehydrated air picks up moisture from the food in the food storage compartment and dehydrates the same.

It is accordingly an object of this invention to provide a means and method by which a portion of the evaporator of a refrigerating apparatus can be maintained at a temperature sufficiently low for freezing purposes or for maintaining comestibles in frozen condition and another portion maintained at a mean temperature slightly above freezing so that the air and accordingly the food in the storage compartment will not be dehydrated and will be maintained at the proper temperature and humidity.

More particularly according to this invention, a dual intermittent absorption machine is provided comprising two intermittent units operating alternately on absorption and generating periods to produce substantially continuous refrigeration in which the evaporator of each unit is provided with two coils, one for a high temperature chamber and the other for a low temperature chamber. The coils for the high temperature chamber are connected to a receiver vessel in such a manner that the supply of liquid refrigerant to the high temperature coil is maintained for only a portion of the evaporating period.

It is another object of this invention to provide a process and apparatus for maintaining a temperature differential in two zones in which liquid refrigerant is supplied to the coils for both zones for a period and evaporated at the same vapor pressure and in which the supply of liquid refrigerant to the coils for the high temperature zone is discontinued while the vapor pressure in the two coils is equalized.

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

Figure 1 is a diagrammatic representation of a refrigerating apparatus according to this invention;

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Figure 2 is a detail of the evaporator showing how the tubes of the high and low temperature coils are connected to the receiver vessel; and

Figure 3 shows the manner in which the refrigeration apparatus of Figure 1 may be mounted upon a domestic refrigerator cabinet.

Referring to Figure 1 of the drawings, A, A' represent two generator-absorbers, C, C' two primary condensers, and E, E' two evaporators. The absorbent-receiving chambers of the generator-absorbers A, A' are connected to condensers C, C' by conduits 10, 10'. The condensers C, C' have a downwardly inclined slope throughout and are connected by conduits 14, 14' to receiving vessels 16, 16' which form a part of the evaporators E, E'. The construction and operation of the evaporators E, E' will be discussed in more detail hereinafter.

Each generator-absorber A, A' has an absorbent-receiving chamber formed by the outer cylindrical walls of the vessels A, A', the outer cylindrical walls of the heat exchange vessels 18, 18' and end closures (not shown) welded to the cylindrical walls. The annular chambers so formed are provided with suitable trays (not shown) having openings through the walls thereof and being welded to the inner and outer cylindrical walls of the annular chambers. These trays support any well known solid absorbent such as strontium chloride which will absorb the refrigerant vapor such as ammonia, which solid absorbent may be charged into the absorption chamber in any manner well known to the art.

The heat exchange vessels 18, 18' are formed of inner and outer concentric cylindrical walls having end closures welded thereto and form annular receiving chambers for an indirect cooling fluid of the indirect cooling circuit for the generator-absorbers A, A', the construction and operation of which will be described in more detail hereinafter. In the cylindrical space formed by the inner cylindrical walls of the heat exchange vessels 18, 18' are electric heating cartridges 20, 20' of any suitable construction known to the art.

The upper end of each of the annular heat exchange chambers 18, 18' of the generator-absorbers A, A' is connected by conduits 34, 34' to the secondary condensers 36, 36'. The secondary condensers 36, 36' have a continuous downward slope throughout and lead to a reservoir 38. The reservoir 38 is connected by conduit 40 to a valve chamber 42. The valve chamber 42 is connected

by conduits 44, 44' to the lower end of the annular heat exchange vessels 18, 18' for the generator-absorbers A, A'. The valves 46, 46' are designed to be operated by a snap acting device 45 of any suitable construction.

Each of the evaporators E, E' consists of two coiled conduits 47, 47' and 48, 48' having legs 49, 49' and 50, 50' which extend vertically downward from the receiving vessels 16, 16'. As shown in Figure 2, the downwardly extending legs 50, 50' extend upwardly into the interior of the vessels 16, 16' to approximately the mid portion thereof while the downwardly extending legs 49, 49' lead into the vessels 16, 16' at the bottom thereof. The coiled conduits 47, 47' enter the vessels 16, 16' near the top as shown at 51 in Figure 2, while the coiled conduits 48, 48' extend upwardly into the vessels 16, 16' to adjacent the point of entrance of the coiled conduits 47, 47'. The coiled conduits 47, 47' and 48, 48' are in thermal contact with walls forming chambers 52 and 53, respectively. Chambers 52 and 53 may form the low and high temperature chambers respectively, of a domestic refrigerator as will appear hereinafter.

The thermostatic bulbs 56, 56' contact the outer surfaces of the generator-absorbers A, A' and are connected by capillary tubes 58, 58' to bellows 60, 60', which upon expansion and contraction are adapted to operate the snap-acting device 45. The bulbs 56, 56', tubes 58, 58' and bellows 60, 60' are filled with a suitable vaporizable fluid so that the bellows 60, 60' will expand and contract upon variations in temperature of the bulbs 56, 56' as is well known in the art. A snap-acting switch 62 of any well known construction is positioned to be actuated by the snap acting device 45.

A thermostatic bulb 64 is positioned in contact with the low temperature chamber 52 and is responsive to the temperature of that chamber. The bulb 64 is connected by a capillary tube 66 to a bellows 68. The bulb 64, tube 66 and bellows 68 are filled with suitable vaporizable fluid so that the bellows 68 will expand and contract upon variations in temperature of the low temperature chamber 52, as is well known in the art. The bellows 68, upon expansion and contraction is adapted to actuate a snap acting device 70 which in turn operates the valve 72 in the conduit 40 and an electric switch 74.

The indirect cooling circuits for the generator-absorbers A, A' which are formed by the heat exchange vessels 18, 18', conduits 34, 34', secondary condensers 36, 36', storage vessel 38, conduit 40, valve chamber 42 and conduits 44, 44', is suitably charged with a vaporizable liquid such as methyl chloride. The pressure within the indirect cooling circuit is not high so that the snap acting device 45 may be led into the interior of the valve chamber 42 through a suitable flexible joint 76.

The refrigerating apparatus just described and shown diagrammatically in Figure 1 is adapted to be arranged so as to be mounted in a domestic refrigerator cabinet, as shown in Figure 3. The cabinet comprises a back insulated wall 80, lower insulated wall 82, front access doors 84 and 85, top insulated wall 86 and intermediate insulated wall 87. At the rear of the cabinet is provided a flue 88 for the circulation of air over the heat rejecting parts of the apparatus. An opening 90 at the bottom of the flue 88 provides for the entrance of cooling air and a screen 92 at its top provides for its exit. The generator-absorbers

A, A' are imbedded in insulation 93 and are arranged at the sides of the flue 88 so as not to interfere with the air circulation. The primary condensers C, C' extend across the flue 88 near its upper end slightly above the evaporators E, E' and the secondary condensers 36, 36' are similarly arranged below the primary condensers.

Preferably the walls 94 and 95 forming the chambers 52 and 53 are secured to the coiled conduits 47, 47' and 48, 48', respectively, so as to be removable from the cabinet proper and the back insulated wall 80 is removable so that the entire unit can be assembled and disassembled from the cabinet as a unit. As an alternative construction, the coiled conduits 47, 47' and 48, 48' may be imbedded in the insulation forming the sides of the cabinet and bonded to the lining forming the inner walls of the chambers 52 and 53. In any event, as shown, the collecting vessels 16, 16' and the downwardly extending conduits 49, 49' and 50, 50' are imbedded in the insulated back wall 80.

As shown in Figure 1, the valve 72 is open and the switch 74 is closed. The switch 62 is set so that electricity will be conducted to heating cartridge 20 of the generator-absorber A which will be heated. The bulb 60 is contracted and the bulb 60' is expanded by previous heating of the generator-absorber A' as will be described hereinafter. Thus the snap acting device will be positioned to the left, the valve 46 will be closed and the valve 46' open.

With the control set as in Figure 1, the heating of the generator-absorber A will drive refrigerant vapor from the solid absorbent contained therein. The refrigerant vapor thus driven off will pass by the conduit 10 to the condenser C where it will be condensed and the heat of condensation carried away by air flowing over the heat rejecting fins mounted upon the tubes of the condenser. The condenser C has a continuous downward slope throughout and the condensed refrigerant will flow by conduit 14 into the receiving vessel 16 and the conduits 47, 48, 49 and 50.

During the heating of the generator-absorber A the auxiliary cooling liquid in the annular heat exchange chamber 18 of the generator-absorber A will quickly vaporize and flow by conduit 34 into the secondary condenser 36. The air flowing over the fins of the condenser 36 will carry away the heat of condensation of the auxiliary fluid whereby it will condense and flow downwardly through the tubes of the condenser 36 into the reservoir 38. This liquid auxiliary cooling fluid cannot return to the generator-absorber A at this time because the valve 46 is closed.

In the meantime absorption of refrigerant vapor is taking place in the generator-absorber A' in a manner which will be described in connection with the absorption which takes place in the generator-absorber A when the control operates to shift the generator-absorber A from the generating period to the absorption period and the generator-absorber A' from the absorption period to the generating period.

When sufficient refrigerant has been driven from the absorbent in the generator-absorber A, the heat from the heating cartridge 20 will no longer be utilized in driving refrigerant vapor from the absorbent in the generator-absorber A and it will rise in temperature. This rise in temperature will be quite abrupt even though the heat supplied to the generator-absorber A remains

constant. This comes about by reason of the fact that while refrigerant is being driven from the solid absorbent the heat supplied thereto is being utilized to vaporize the refrigerant and when the refrigerant is vaporized, the heat supplied quickly raises the temperature of the generator-absorber to a much higher value. This will cause the liquid in the bulb 56 to vaporize whereby the bellows 60 will be expanded. At this time the bellows 60' will be in contracted position because absorption is taking place in the generator-absorber A' and the fluid in the bulb 56' will be condensed. Expansion of the bellows 60 will push the snap acting device 45 to the right which will operate the switch 62 to de-energize the heating element 20 and to energize the heating element 20'. At the same time it will operate to open the valve 46 and to close the valve 46'.

The indirect cooling system is charged with sufficient auxiliary cooling medium so that the reservoir 38 will always contain auxiliary cooling medium in liquid form. When the control operates to open the valve 46, the liquid in the reservoir 38 will be dumped into the annular heat exchanger 18 of the generator-absorber A. Since the generator-absorber A is hot at this time, the auxiliary cooling liquid will be quickly vaporized by the transfer of heat of vaporization of the auxiliary liquid from the generator-absorber A and it will thus be quickly cooled. The cooling of the generator-absorber A will reduce the vapor pressure therein and the solid absorbent therein will begin to absorb refrigerant vapor and vaporization of the liquid refrigerant in the evaporator E will begin.

It is evident that since the coils 47 and 48 are in open communication with the receiver 16 that the vapor pressure of the refrigerant in each coil will be the same. Since the downwardly extending conduits 49 and 50 are imbedded in the insulation 80 and the coiled conduits 47 and 48 are in heat exchange relationship with the walls of the chambers 52 and 53, no refrigerant will be vaporized in the conduits 49 and 50 and considerable evaporation will take place in the coiled conduits 47 and 48 as the vapor pressure in the vessel 16 is reduced.

This will cause a rapid ebullition of refrigerant vapor in the upwardly extending coiled conduits 47 and 48 and a positive circulation of liquid refrigerant will take place from the vessel 16, downwardly through the conduits 49 and 50 and upwardly through the coiled conduits 47 and 48 and back to the vessel 16. This circulation takes place by the lifting action of the refrigerant vapor evaporated in the coiled conduits 47 and 48 and is known in the art as a vapor lift pump action. Thus the more refrigerant vapor that is evaporated in the conduits 47 and 48, the more rapid will be the circulation. Furthermore, the greater the refrigerant load that is placed in the chambers 52 and 53, the greater will be the amount of heat which will be transferred to the liquid refrigerant in the coiled conduits 47 and 48. This will produce a greater or lesser evaporation of refrigerant in the conduits 47 and 48 depending upon the refrigeration load placed in the chambers 52 and 53. Thus it can be seen that the relative amount of refrigeration taking place in the coils 47 and 48 depends upon the relative load placed upon the chambers 52 and 53, respectively.

During this period the temperature of the coils 47 and 48 will be substantially the same because the vapor pressure on their interior will be the same and each contains liquid refrigerant. However, the temperature of the chamber 53 can be maintained higher than that of the chamber 52 by altering the characteristics of the heat conducting path from the chamber walls and the coiled conduits.

The circulation of liquid refrigerant will continue in both conduits 47 and 48 until the level of liquid in the vessel 16 falls below the upper end of the downwardly extending conduit 50. Thereafter the liquid refrigerant in the conduit 48 will be quickly emptied by the vapor lift action of the evaporating refrigerant and no more refrigeration will take place in the conduit 48 even though the vapor pressure therein is the same as in the vessel 16. The circulation of refrigerant and the production of refrigeration in the conduit 47, however, will continue until the control operates to switch the generator-absorber A back to the generating phase as will be later described.

Since the production of refrigeration in the coil 48 has ceased the temperature of the chamber 53 will slowly rise and any frost which may have frozen to the walls of the chamber 53 during the first part of the evaporating period will melt loose and the chamber 53 will be maintained in a moist cool condition.

The point to which the conduit 50 extends upwardly into the vessel 16 must be so selected that sufficient refrigeration will take place in the coils 48, 48' to maintain the proper mean temperature in the chamber 53. This will of course depend to some extent on the relative loads which are placed in the chambers 52 and 53.

As absorption proceeds in the generator-absorber A, the heat of absorption is transferred to the auxiliary cooling liquid in the annular heat exchange chamber 18. This vaporizes the auxiliary liquid and this vapor flows to the condenser 36 by conduit 34. Here the vapor is condensed and the heat of condensation carried away by air flowing over the heat rejecting fins of the condenser 36. The tubes of the condenser 36 have a continuous downward slope and the liquid auxiliary cooling fluid returns to the reservoir 38 to return in due course to the annular heat exchange chamber 18 for further cooling action.

As evaporation and absorption is taking place in the evaporator E and the generator-absorber A, the generator-absorber A' is being heated by the heating element 20'. Vapor is being driven from solid absorbent in the generator-absorber A', condensed in the condenser C' and collected in the evaporator E' as previously described in connection with the ebullition of vapor from the generator-absorber A.

By the time that substantially all the liquid refrigerant in the evaporator E is evaporated, the refrigerant vapor will be driven from the solid absorbent in the generator-absorber A'. This will cause the medium in the bulb 56' to expand the bellows 60' in the manner previously described in connection with the generator-absorber A. Snap acting device 45 will be moved to the left as viewed in Figure 1 whereby the valve 46 will be closed, the valve 46' opened, and the switch 62 operated to energize the heating cartridge 20 and to de-energize the heating cartridge 20'. This will cause vaporization to take place in the generator-absorber A and absorption in the generator-absorber A', which will proceed as previously described.

The control will function to operate alternately the generator-absorbers A, A' on the generating

period and on the absorption period, as just described, until the temperature of the chamber **52** goes below a predetermined limit which may be very substantially below the temperature in the chamber **53**. At this time the bulb **64** will operate to collapse the bellows **68** and operate to close the valve **72** and open the switch **74**. This will operate to de-energize that generator-absorber which is then being energized and to stop the flow of cooling fluid in the indirect cooling circuit.

The liquid cooling medium in the annular heat exchange chamber of the generator-absorber which has been operating on the absorption period will soon vaporize due to the heat of absorption and will pass through the secondary condenser where it will be condensed. Since the tubes of the secondary condenser slope toward the reservoir **38**, this condensed liquid cannot return to the cooling space of the generator-absorber being cooled, but will flow to the reservoir **38** to be trapped out of circuit by the closed valve **72**. When the absorption of refrigerant vapor in the generator-absorber being cooled ceases, no more liquid refrigerant will evaporate in the evaporator of that unit. Thereafter the temperature of the air in the chamber **52** and also in the chamber **53** will slowly rise until the control bulb **64** again acts to open the valve **72** and close the switch **74**. The two units will then operate cyclically as previously described.

When the one unit is operating on the generating period, the other is always operating on the evaporation-absorption period and substantially continuous refrigeration is being produced so that the chambers **52** and **53** are always maintained at their proper temperatures.

From the foregoing it can be seen that this invention provides a method and apparatus by which a temperature differential can be maintained between the two chambers, the evaporator coils of which are in open communication with each other and the vapor pressure in each of the coils is the same.

Also the chamber **53** can be maintained in a cool moist condition while the chamber **52** can be maintained at a very low temperature for ice freezing purposes or for maintaining comestibles in a frozen condition.

While I have shown but a single embodiment of my invention, it is to be understood that this embodiment is to be taken as illustrative only and not in a limiting sense. I do not wish to be limited to the specific structure shown and described but to include all equivalent variations thereof except as limited by the scope of the claims.

I claim:

1. The method of maintaining a temperature differential in two zones by means of an intermittently operating absorption refrigerating apparatus including an evaporator having coils in heat exchange relationship with said zones and in open communication with a common source of supply of liquid refrigerant supplied by said intermittently operating absorption refrigerating apparatus comprising, the steps of reducing the vapor pressure in the coils of the two zones by operating said intermittently operating absorption refrigerating apparatus on the absorption phase of operation to thereby evaporate liquid refrigerant in the coils of each zone at the same temperature and at a rate depending upon the load on the respective zones, discontinuing the evaporation of liquid refrigerant in the coil of the zone to be maintained at a higher temperature while continuing the evaporation of liquid refrigerant in the coil of the zone to be maintained at a lower temperature and maintaining the same vapor pressure in the coils of each zone throughout all of the foregoing steps.

2. The method of maintaining a temperature differential in two zones by means of an intermittently operating absorption refrigerating apparatus including an evaporator having coils in heat exchange relationship therewith comprising, providing a common source of supply of liquid refrigerant for the coils of each zone supplied by said intermittently operating absorption refrigerating apparatus, reducing the vapor pressure over the common source by operating said intermittently operating refrigerating apparatus on the absorption phase of operation, utilizing the reduced vapor pressure to thereby evaporate refrigerant in the coils of each zone, utilizing the evaporating refrigerant for circulating liquid refrigerant from the common source through the coils of each zone and back to the common source, and discontinuing the circulation of liquid refrigerant through the coil of the zone to be maintained at the higher temperature while continuing the circulation of liquid refrigerant through the coil of the zone to be maintained at the lower temperature and while maintaining the same vapor pressure in the coils of both zones.

3. The method of maintaining a temperature differential in two zones by means of an intermittently operating absorption refrigerating apparatus including an evaporator having coils in heat exchange relationship therewith comprising, providing a common source of supply of liquid refrigerant for the coils of each zone supplied by said intermittently operating absorption refrigerating apparatus, reducing the vapor pressure over the common source by operating said intermittently operating refrigerating apparatus on the absorption phase of operation, utilizing the reduction in vapor pressure to thereby evaporate refrigerant in the coils of each zone, utilizing the evaporating refrigerant for circulating liquid refrigerant from the common source through the coils of each zone and back to the common source, discontinuing the supply of liquid refrigerant to the coil of the zone to be maintained at the higher temperature, continuing the circulation of refrigerant from the coil of the zone to be maintained at the higher temperature to the common source for a period after the discontinuance of the supply of liquid refrigerant thereto and thereafter discontinuing the circulation of liquid refrigerant from the coil of the zone to be maintained at the higher temperature to the common source while continuing the circulation of liquid refrigerant through the coil of the zone to be maintained at the lower temperature.

4. An evaporator for a refrigerating apparatus comprising, a receiver vessel, a pair of coiled conduits connected to said receiver vessel, each conduit having an outlet from and an inlet to said vessel, said inlets opening into said vessel at a point above said outlets and the outlet of one coil opening into said vessel at a point above the outlet of the other coil, said coiled conduits including a straight portion extending downwardly from said receiver vessel from the outlet thereof and coiled portions extending upwardly from the straight portion to said inlets.

5. An evaporator for a refrigerating apparatus comprising, a receiver vessel constructed to be flooded with liquid refrigerant and a pair of

evaporator conduits connected thereto, each of said conduits comprising an insulated downwardly extending portion and an upwardly extended coiled portion, one of said coiled portions being in heat exchange relationship with a high temperature compartment and the other in heat exchange relationship with a low temperature compartment, each of said upwardly extending coiled portions opening into said vessel at a point above the point where the downwardly extending portions enter said vessel and one of said downwardly extending portions opening into said vessel at a point above the point where the other of said downwardly extending portions enters said vessel.

6. An evaporator for a refrigerating apparatus comprising, a receiver vessel constructed to be flooded with liquid refrigerant and a pair of evaporator conduits connected thereto, each of said conduits comprising an insulated downwardly extending portion and an upwardly extended coiled portion, one of said coiled portions being in heat exchange relationship with a high temperature compartment and the other in heat exchange relationship with a low temperature compartment, each of said upwardly extending coiled portions opening into said vessel at a point above the point where the downwardly extending portions enter said vessel, and one of said downwardly extending portions opening into said vessel at a point above the point where the other of said downwardly extending portions enters said vessel, and said upwardly extending coiled portions being so constructed and arranged as to act as vapor lift pumps when refrigerant vapor evaporates therein.

7. In combination, a refrigerator cabinet, a refrigerating apparatus assembled therewith, said cabinet comprising a high temperature compartment and a low temperature compartment, said apparatus including an evaporator coil in heat exchange relationship with each compartment, a common source of supply of liquid refrigerant for said coils and means for reducing the vapor pressure in each coil to produce evaporation of refrigerant therein, said coils being so constructed and arranged as to utilize the refrigerant vapor for circulating liquid refrigerant from the common source through each coil and back to the common source, said source of supply of liquid refrigerant being so constructed and arranged as to discontinue the circulation of liquid refrigerant through the coil in heat exchange relationship with the high temperature compartment and to continue the circulation of liquid refrigerant through the coil in heat exchange relationship with the low temperature compartment.

8. A two temperature refrigerating apparatus comprising, a high temperature compartment; a low temperature compartment; an evaporator in heat exchange relationship with each compartment; liquid supply means for supplying liquid refrigerant to the evaporator of each compartment; each end of each evaporator being in constant open communication with said liquid supply means; and means for reducing the vapor pressure on said liquid supply means and correspondingly on the evaporator of each compartment; said liquid supply means being so constructed and arranged as to periodically terminate the supply of liquid refrigerant to the evaporator of the high temperature compartment, while maintaining the vapor pressure therein at the same value as in the evaporator of the low temperature compartment while continuing to supply liquid refrigerant to the evaporator of the low temperature compartment.

9. A two temperature refrigerating apparatus comprising, a high temperature compartment; a low temperature compartment; an evaporator in heat exchange relationship with each compartment; liquid supply means for supplying liquid refrigerant to the evaporator of each compartment; each end of each evaporator being in constant open communication with said liquid supply means; and means for reducing the vapor pressure on said liquid supply means and correspondingly on the evaporator of each compartment; said evaporators being so constructed and arranged that the refrigerant vapor circulates liquid refrigerant through the evaporator of each compartment; said liquid supply means being so constructed and arranged that the circulation of liquid refrigerant through the evaporator of the high temperature compartment is periodically terminated while the circulation of liquid refrigerant through the evaporator of the low temperature compartment is continued.

10. A two temperature refrigerating apparatus comprising, a high temperature compartment; a low temperature compartment; an evaporator in heat exchange relationship with each compartment; liquid supply means for supplying liquid refrigerant to the evaporator of each compartment; each end of each evaporator being in constant open communication with said liquid supply means, and means for reducing the vapor pressure in the evaporator of each compartment to produce evaporation of liquid refrigerant therein; said evaporator being so constructed and arranged that the refrigerant vapor circulates liquid refrigerant through the evaporator of each compartment; said liquid supply means being so constructed and arranged as to periodically terminate the circulation of liquid refrigerant through the evaporator of the high temperature compartment while continuing the circulation of liquid refrigerant through the evaporator of the low temperature compartment and preserving communication between the evaporators of each compartment and the vapor pressure reducing means so as to maintain the same vapor pressure in the evaporator of each compartment.

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