

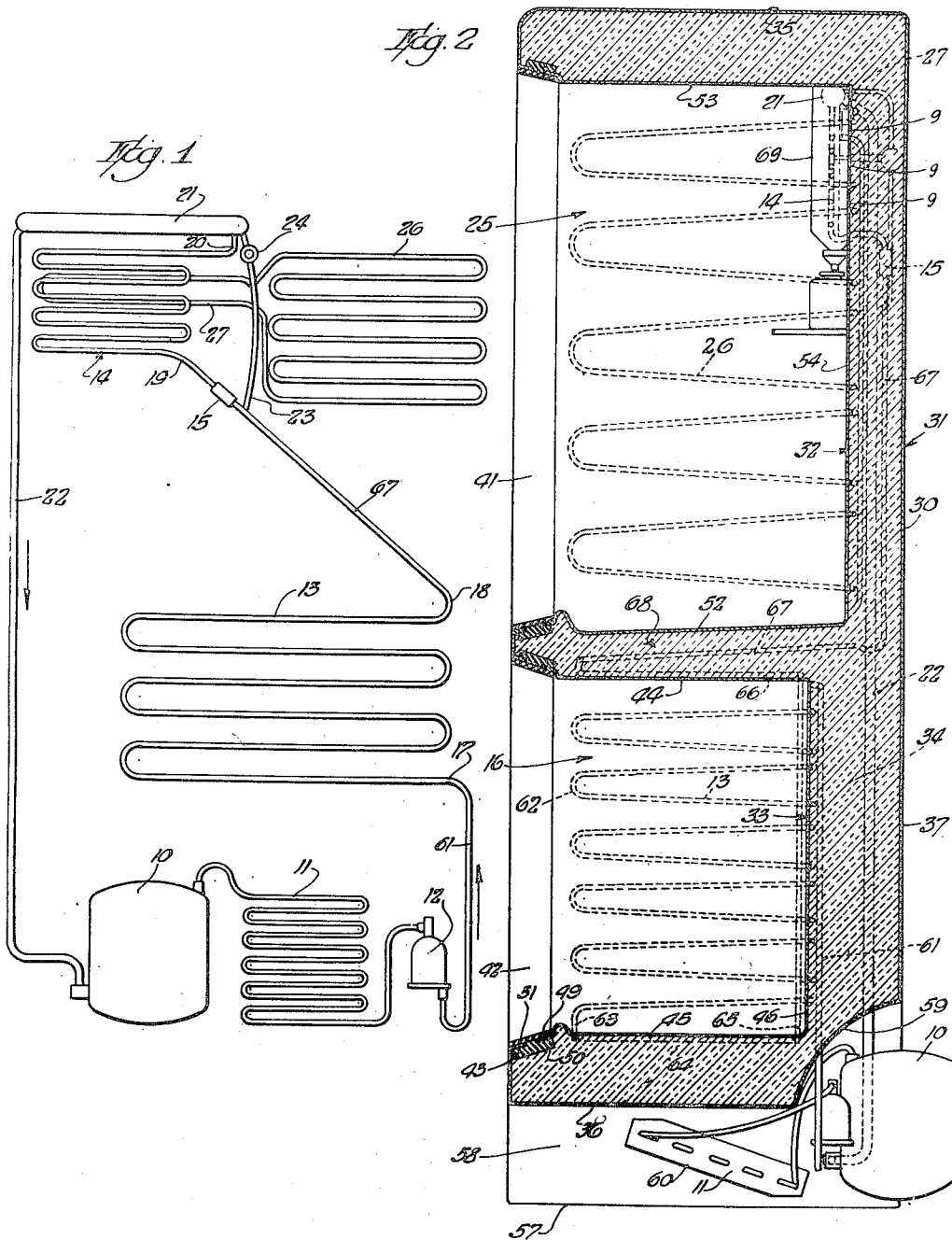
Oct. 11, 1949.

W. E. RICHARD
REFRIGERATING APPARATUS HAVING A FREEZING
CHAMBER AND A STORAGE CHAMBER

2,484,588

Filed Feb. 14, 1947

2 Sheets-Sheet 1



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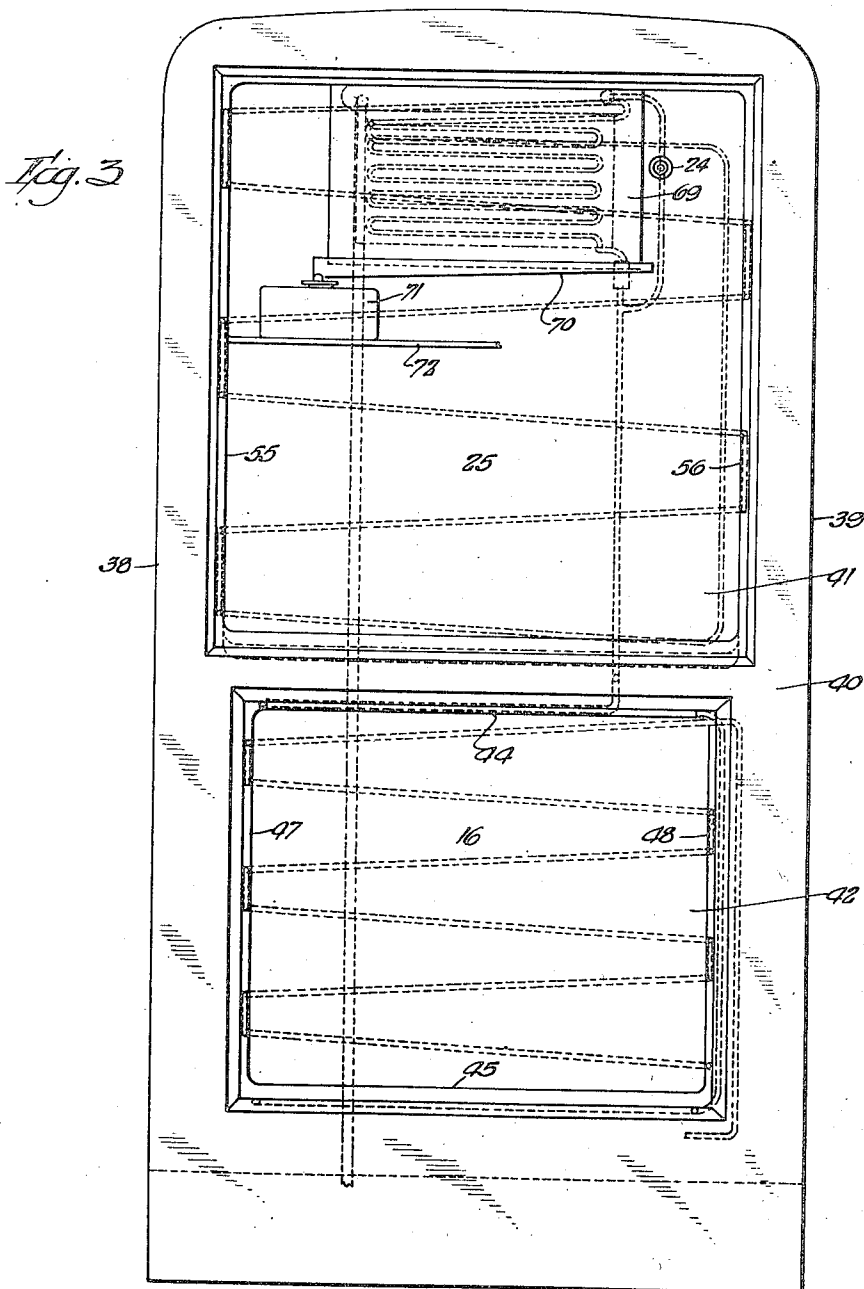
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UNITED STATES PATENT OFFICE

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REFRIGERATING APPARATUS HAVING A
FREEZING CHAMBER AND A STORAGE
CHAMBERWilliam E. Richard, Evansville, Ind., assignor to
Seeger Refrigerator Company, a corporation of
Minnesota

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14 Claims. (Cl. 62-103)

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The present invention relates to refrigerators, and is particularly concerned with a refrigerator of the household type which is not only adapted for the cooling and preserving of food products to a temperature above freezing, but is also adapted to freeze ice cubes and to freeze and store in the frozen condition foodstuffs of all kinds which are adaptable for this type of preservation.

One of the objects of the present invention is the provision of a refrigerator of the class described, in which there is a separate compartment for freezing foods and maintaining them at a temperature below freezing and another compartment adapted to be maintained at a temperature above freezing and adapted to be maintained at a predetermined humidity so that the food stored in the latter compartment may not be dried out.

Another object of the invention is the provision of an improved refrigerator construction, in which the freezing compartment is located in the lowermost part of the cabinet and the moderately cooled, food storage compartment is located in the upper part of the cabinet, each compartment having its own separate door so that only the one to which access is desired need be opened, but when both are opened for transfer of food from one to the other, there will be no tendency for the cold air in the lower compartment to spill out and pass into the upper compartment or vice versa, as the warmer air is already above and the colder air is already below.

Another object of the invention is the provision of an improved method of controlled dehydration which results in the continuous dehydration of the insulation, removal of frost from the walls of the lower freezing compartment, and removal of a predetermined amount of moisture from the air of the upper humid compartment so as to avoid excessive humidity by causing the excess moisture to accumulate upon a special dehydration coil operated at a lower temperature than either evaporator.

Another object of the invention is the provision of an improved refrigerator construction of the class described which is simple, which may be manufactured economically, which is adapted to be serviced readily and which is adapted to maintain a uniform temperature throughout each compartment, and in some embodiments which is provided with a removable refrigeration apparatus.

Another object of the invention is the provision of an improved refrigerator apparatus of the class described, including provision for defrosting the dehydration coil, the said means consist-

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ing of a bypass conduit and a shut-off valve whereby the bypass valve may be opened and the conduit leading past the dehydration coil may be opened to bypass the refrigerant around said dehydration coil to effect the defrosting.

Another object of the invention is the provision of an improved refrigerator of the class described, which is provided with a lower freezing compartment and an upper high-humidity compartment in which the lower compartment is cooled by means of evaporator coils applied to the outside of the liner, and the upper compartment is cooled by means of a secondary system having evaporator coils applied to the outside of the liner and provided with a secondary condenser that is disposed in heat conducting relation with a second primary evaporator located inside the upper compartment and adapted to accumulate frost to effect a predetermined amount of dehumidification and to avoid excessive humidity in the high-humidity compartment, the said second primary evaporator also serving to accomplish continuous dehydration of the insulation, and progressive defrosting of the lower compartment by migration of the moisture from all parts of the refrigerator cabinet to the coldest coil in the upper compartment.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the drawings of which there are two sheets,

Fig. 1 is a diagrammatic elevational view of the elements of the refrigeration system;

Fig. 2 is a vertical sectional view of the cabinet shown in connection with the refrigeration system, taken on a plane located just inside and parallel to the right wall of the cabinet; and

Fig. 3 is a front elevational view of the refrigerator with the doors removed, showing the arrangement of the evaporator coils in both compartments and the arrangement of the dehydration coil in the upper compartment.

Referring to Fig. 1, the present refrigeration apparatus preferably includes a motor compressor 10 of the sealed type, a condenser 11 and a float controlled valve chamber 12 for compressing, condensing and controlling the flow of the refrigerant.

The condenser 11 is connected to the outlet of the motor compressor 10, and in turn has its outlet connected to the inlet of the float chamber 12. The system includes two evaporators or evap-

orator sections indicated at 13 and 14 with a differential valve 15 between them for controlling differential in pressure between these evaporators.

Evaporator 13 is the primary evaporator for the lower freezing chamber 16, and it has its inlet end 17 connected to the outlet of the float valve chamber 12. Its outlet end 18 is connected through the differential valve 15 to the inlet end 19 of the evaporator 14, which has its outlet end 20 connected to a header or reservoir 21 that is in turn connected by a relatively larger pipe 22 to the inlet of the motor compressor.

A by-pass pipe 23 extends from a point below the spring pressed differential valve 15 to the reservoir receiver 21, and is provided with a hand valve 24. When this hand valve 24 is opened the evaporator 14 is by-passed and immediately begins to defrost so that defrosting can be accomplished at any time without stopping the operation of the refrigeration system in so far as the primary evaporator 13 is concerned.

The upper compartment 25 is the high-humidity compartment, and it is cooled by a secondary system which includes the secondary evaporator 26 and the secondary condenser 27, the latter being illustrated in the high-humidity compartment, but in some embodiments of the invention the secondary condenser and the evaporator which cools it may be located in the liner wall or back of it in the insulation, with a suitable defrost drain.

The secondary system includes the secondary evaporator 26 and the secondary condenser 27 which are joined to each other in such manner that refrigerant which evaporates in the evaporator 26 passes to the top thereof, which is connected to the top of the secondary condenser 27 where it is cooled and condensed to liquid that runs to the bottom of secondary condenser 27 and, thence, to the bottom of secondary evaporator 26 where it may be used over again.

The secondary condenser 27 is in heat conducting contact with certain coils of the primary evaporator 14 in the upper chamber 25 so that this evaporator cools 27 of the secondary system.

The cabinet, which is indicated in its entirety by the numeral 30, consists of an outer shell 31, a pair of inner liners 32, 33 and insulation 34 located between them. The outer shell 31 may consist of a top wall 35, bottom wall 36, back wall 37, the two side walls 38, 39 and front wall 40.

The front wall 40 is provided with a pair of door apertures 41 and 42 leading to the chambers 25 and 16. The outer shell 31 is provided with an inwardly extending supporting flange 43 completely surrounding each of the openings 41 and 42. The inner shell 33 comprises a top wall 44, bottom wall 45, rear wall 46 and the two side walls 47, 48.

The liner 33 is also provided with an attaching flange 49 completely surrounding the door opening 42 and extending diagonally outward into substantially the same plane as the supporting flange 43 of the outer shell 31.

At a plurality of regularly spaced points the inner liner 33 is supported on the outer shell 31 by means of a plurality of insulating blocks 50, which are secured to the flanges 43 and 49 in such manner as to hold the liner 33 in spaced relation to the shell 31. As this leaves openings between the flanges 43 and 49 at spaces where the blocks 50 are not located, the flanges 43 and 49 may be covered by continuous masking strip 51 of insulation, such as fibre board, indurated fibre or a molded plastic insulated frame tapered to fit in

the tapered opening 42, and presenting a finished appearance without providing heat conducting contact between the liner 33 and outer shell 31, and without providing any support for the liner on the shell.

According to the present invention it is not necessary to effect a moisture tight, liquid tight or air tight seal between the liner 33 and the shell 31, as it is contemplated that the dehydration coil will cause any moisture that might gather in the insulation or on the outside of any liner to travel to the dehydration coil 14 located in the upper chamber 25.

The primary evaporator 13 may be formed out of coils of pipe sinuously arranged in heat conducting contact with the outside of the liner 33, preferably at the bottom 45, top 44, rear wall 46 and side walls 47 and 48. This provides a maximum cooled wall surface for effecting quick freezing in the lower chamber and for maintaining the air in this chamber at a temperature around 0° F.

The upper liner 32 also includes a bottom wall 52, top wall 53, rear wall 54 and the two side walls 55 and 56. The liner 32 is spaced from the shell 31 and from the liner 33 on all sides sufficiently to provide a thickness of insulation 34 adequate to maintain the differential of temperature which exists between the inside and the outside of the cabinet at the upper chamber 25.

In the same way the lower chamber 16, being the colder freezing chamber, and the liner 33 are spaced sufficiently from the walls of the shell 31 to provide a correspondingly greater thickness of insulation 34 adequate to maintain this greater differential of temperature which exists between the inside of the freezing chamber 16 and the outside of the cabinet.

The lower wall 36 being close to the motor compressor 10 and condenser 11, this wall may be made correspondingly thicker. The bottom wall 52 of the upper liner 32 is spaced from the top wall 35 of the lower liner 33 sufficiently to provide insulation of adequate thickness between these two liner walls.

The arrangement of the supporting flanges 43 on the shell 31 around to door opening 41, carrying the connecting blocks 50 securing to the attaching flanges 49 on the liner 32, and the covering frame of insulating strip 51 may be exactly the same with regard to the door opening 41 as was described for the door opening 42.

In order to provide space for the motor compressor and condenser the side walls 38 and 39 of the outer shell 31 may extend downwardly below the bottom wall 36 of the cabinet, and may have inwardly turned flanges 57 providing a stable lower supporting surface for the cabinet, between which there is a channel-shaped space 58 for receiving the condenser 11. Condenser 11 may be tilted so that air passing into the front of the space 58 must pass over some part of the condenser coils 11, which are arranged in advance of the motor compressor 10. The shell 31 may be provided with a partially spherical recess 59 at its lower rear corner for providing some space for the motor compressor 10, which is located half way inside the cabinet wall and half way outside.

Thus the recess 59 slopes upward and hot air which comes from contact with the motor compressor housing 10 tends to move upward out of the recess 59, drawing with it the air which comes into the channel space 58 below the cabinet and which passes over the condenser 11 which, of course, is provided with suitable fins 60.

Referring now to the lower compartment 16,

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the pipe 61 from the float valve chamber 12 preferably extends upwardly just inside the liner 33, and is then directed in sinuous fashion in substantially horizontal portions, but always extending downward slightly across the back wall 46 about the corner, and across the side wall 48 where it is bent backwardly with a U-turn of the type shown at 62, and thereafter the coils of the evaporator 13 extend back and forth and downwardly until the rear wall and side walls are substantially covered with sinuous coils.

At the lower end 63 of these coils the pipe extends over the bottom wall 45 where it is arranged in similar sinuous fashion, as indicated at 64, in heat conducting contacting engagement with the outside of the bottom wall 45 of liner 33. From these coils there is a vertical pipe 65 extending upwardly close to the outside of liner 33 to the outside of the top wall 44 where the coils 66 are arranged in similar sinuous fashion on the top wall.

Thence the pipe 67 passes backwardly in the partition 68 and upwardly in the insulation of the back wall between liner 32 and shell 31 to the spring pressed differential valve 15, which may be located inside the insulation. Thence the pipe 19 passes through the rear wall 54 of liner 32 to the bottom of the second primary evaporator 14, which is arranged in the sinuous fashion extending in the plane parallel to the rear wall 54 and slightly spaced therefrom, and terminating at the top in the header or reservoir 21.

Like the coils of evaporator 13 are arranged around the liner 33, the coils of secondary evaporator 26 are arranged around the outside of liner 32 and connected by conduits with the single U-shaped condenser coil 27 of the secondary evaporator, that is preferably arranged in heat conducting contact with the primary coils 14.

The amount of cooling which is accomplished by the secondary system, comprising the condenser 27 and evaporator 26, is limited by the size of the condenser 27, and although the dehydration coil 14 which cools the condenser 27 may be extremely cold, such as below zero, being the coldest coil in the system, the upper chamber 25 is, nevertheless, maintained at a temperature above the freezing point of water.

The primary evaporator 14 is preferably covered with a suitable shield 68, either or both ends of which may be closed to limit the contact of the air with the coil 14, and a trough 70 may be provided below the coil 14 in position to receive all drippage which is conducted to a suitable receptacle 71 supported on a bracket or shelf 72.

The cabinet is, of course, provided with suitable doors.

The operation of the system is as follows: The refrigerant is pumped from the evaporator receiver 21 in the form of vapor and compressed by the motor compressor 10 and discharged into the condenser 11 where it is condensed to liquid. The flow of this liquid is controlled by the float chamber 12, which prevents the back flow of refrigerant during the off-periods of the motor compressor.

The motor compressor may be controlled responsive to the operation of a thermostatic switch located in the lower or freezing chamber 16 so that whenever there is a demand for cooling in the lower chamber the motor compressor 10 is operated.

The characteristics of the two evaporators 13 and 14 and the secondary system 26 and 27 are such that when the lower freezing chamber is

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adequately cooled the upper high-humidity chamber 25 is maintained at a temperature above freezing point.

By adjusting the spring pressed differential valve 15 the suction applied to evaporator 14, as compared to evaporator 13, can be adjusted at will, and the coil 14 is preferably made the colder coil operating at a temperature below freezing and preferably below zero so that it presents the coldest surface that exists anywhere in the cabinet.

Thus the secondary condenser 27 receives adequate cooling although it is only of limited size while the coil 14 is cold enough to condense moisture which travels to it from all parts of the cabinet, including the insulation between the shells. The moisture can pass out of the space between the shells at the breaker strip, or, in some embodiments of the invention, suitably located holes 9 may be provided in both compartment liner walls. Holes 9 in the storage compartment should preferably be behind or adjacent to the coil 14 for the greatest effect. Moisture may thus travel from all parts of the cabinet to effect a continuous defrosting of the insulation, and of the lower compartment. As the upper compartment is operated at a temperature above freezing there will be no frosting on the walls of its liner, but frost will gather on the dehydration coil 14, the amount of which depends upon the temperature and area of the coil and the amount of its exposure to air by means of valve 24, this coil 14 can be defrosted at any time without interfering with the refrigeration of the lower freezing chamber 16 where food may be frozen at any time or frozen food stored in this chamber may be kept continuously at a temperature below freezing.

The defrosting of the coil 14 is accomplished by opening the valve 24, by-passing the coil 14 directly from the evaporator 13 to the receiver 21. The evaporator coil 14 will then take on heat from the chamber 25 and the condenser 27, and the frost will be melted into the trough 70 and deposited into the receptacle 71. As soon as the defrosting is accomplished the valve 24 should be closed again.

It will thus be observed that I have invented an improved system in which continuous dehydration of the insulation may be accomplished by means of a special evaporator coil operated at the lowest temperature of any coil in the cabinet so that even moisture which may be initially deposited upon some other cold surface, will eventually find its way to this dehydration coil.

The same evaporator which accomplishes a predetermined dehydration of the upper chamber is also used for maintaining this chamber at a cooling temperature above freezing, and the frost which is regularly deposited on this dehydration coil may be removed by defrosting, which is accomplished by means of a bypass conduit and a valve.

The present refrigeration system is simple and involves a minimum amount of mechanism, which occupies a minimum space, so that a maximum amount of space is left for the storage of food.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

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Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a refrigerator, the combination of a cabinet provided with an outer shell and a pair of inner liners carried by said outer shell and insulated from the outer shell by means of suitable insulation, the said liners forming a freezing chamber and a food storage chamber, a primary evaporator in heat conducting relation with the liner of said freezing chamber, a secondary system including a secondary evaporator in heat conducting contact with the liner of said storage chamber, said secondary system including a condenser chamber, a second primary evaporator located inside said outer shell and in heat conducting engagement with said condenser of said secondary system, said second primary evaporator being operated at a lower temperature than said first-mentioned primary evaporator, the space between the inner liners and outer shell being in air communication with each other through predetermined leakage points connecting said spaces, so that the second primary evaporator is adapted to effect a predetermined dehydration of the insulation and of the liner of said freezing compartment.

2. In a refrigerator, the combination of a cabinet provided with an outer shell and a pair of inner liners carried by said outer shell and insulated from the outer shell by means of suitable insulation, the said liners forming a freezing chamber and a food storage chamber, a primary evaporator in heat conducting relation with the liner of said freezing chamber, a secondary system including a secondary evaporator in heat conducting contact with the liner of said storage chamber, said secondary system including a condenser, a secondary primary evaporator located inside said outer shell and in heat conducting engagement with said condenser of said secondary system, said second primary evaporator being operated at a lower temperature than said first-mentioned primary evaporator, the space between the inner liners and outer shell being in air communication with each other through predetermined leakage points connecting said spaces, so that the second primary evaporator is adapted to effect a predetermined dehydration of the insulation and of the liner of said freezing compartment, and means for temporarily disabling said second primary evaporator, whereby it may be defrosted at will while the refrigerator system is operating.

3. In a refrigerator, the combination of a cabinet provided with an outer shell and a pair of inner liners carried by said outer shell and insulated from the outer shell by means of suitable insulation, the said liners forming a freezing chamber and a food storage chamber, a primary evaporator in heat conducting relation with the liner of said freezing chamber, a secondary system including a secondary evaporator in heat conducting contact with the liner of said storage chamber, said secondary system including a condenser chamber, a second primary evaporator located inside said outer shell and in heat conducting engagement with said condenser of said secondary system, said second primary evaporator being operated at a lower temperature than said first-mentioned primary evaporator, the space between the inner liners and outer shell being in air communication with each other through predetermined leakage points connecting said spaces, so that the second primary evaporator

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is adapted to effect a predetermined dehydration of the insulation and of the liner of said freezing compartment, and means for temporarily disabling said second primary evaporator, whereby it may be defrosted at will while the refrigerator system is operating, comprising an auxiliary conduit adapted to by-pass said second primary evaporator.

4. In a refrigerator, the combination of a cabinet provided with an outer shell and a pair of inner liners carried by said outer shell and insulated from the outer shell by means of suitable insulation, the said liners forming a freezing chamber and a food storage chamber, a primary evaporator in heat conducting relation with the liner of said freezing chamber, a secondary system including a secondary evaporator in heat conducting contact with the liner of said storage chamber, said secondary system including a condenser chamber, a second primary evaporator located inside said outer shell and in heat conducting engagement with said condenser of said secondary system, said second primary evaporator being operated at a lower temperature than said first-mentioned primary evaporator, the space between the inner liners and outer shell being in air communication with each other through predetermined leakage points connecting said spaces, so that the second primary evaporator is adapted to effect a predetermined dehydration of the insulation and of the liner of said freezing compartment, and means for temporarily disabling said second primary evaporator, whereby it may be defrosted at will while the refrigerator system is operating, comprising an auxiliary conduit adapted to by-pass said second primary evaporator, and valve means in said conduit adapted to be opened for defrosting and closed to render said second primary evaporator operative.

5. In a refrigerator, the combination of a cabinet provided with an outer shell and a pair of inner liners carried by said outer shell and insulated from the outer shell by means of suitable insulation, the said liners forming a freezing chamber and a food storage chamber, a primary evaporator in heat conducting relation with the liner of said freezing chamber, a secondary system including a secondary evaporator in heat conducting contact with the liner of said storage chamber, said secondary system including a condenser located in said storage chamber, a second primary evaporator located in said storage chamber and in heat conducting engagement with said condenser of said secondary system, said second primary evaporator being operated at a lower temperature than said first-mentioned primary evaporator, moisture in the insulation having access to the compartment in which the first primary evaporator is located, in predetermined leakage points leading to the space between the outer shell and the inner liners for each compartment whereby the second primary evaporator is adapted to effect a predetermined dehydration of the insulation and of the liner of said freezing compartment, and means for temporarily disabling said second primary evaporator, whereby it may be defrosted at will while the refrigerator system is operating, and means in said storage chamber for collecting the liquid resulting from the defrosting from said second primary evaporator.

6. In a refrigerator, the combination of a cabinet provided with a high-humidity compartment and a freezing compartment, an evaporator for

cooling said freezing compartment, an evaporator for cooling said high-humidity compartment, compressing and condensing apparatus for providing liquid refrigerant for said evaporators, one of said evaporators being a primary evaporator and the other being a part of a secondary system and having a condenser in heat exchange relation with a second primary evaporator disposed inside said cabinet, and means for maintaining a pressure differential between said primary evaporators the space between the two compartments and the cabinet and the spaces inside the two compartments being in air communication with each other through predetermined leakage points connecting said spaces so that the second primary evaporator is maintained at a temperature below that of the first primary evaporator to act as a dehydration coil for the space inside the said cabinet.

7. In a refrigerator, the combination of a cabinet provided with a high-humidity compartment and a freezing compartment, an evaporator for cooling said freezing compartment, an evaporator for cooling said high-humidity compartment, compressing and condensing apparatus for providing liquid refrigerant for said evaporators, one of said evaporators being a primary evaporator and the other being a part of a secondary system and having a condenser in heat exchange relation with a second primary evaporator disposed in one of said compartments, and means for maintaining a pressure differential between said primary evaporators whereby the second primary evaporator is maintained at a temperature below that of the first primary evaporator to act as a dehydration coil for the compartment in which the primary evaporator is located, and for the insulation and other compartment, the moisture having access to the compartments at a predetermined leakage point leading to the space between an outer shell and an inner liner for each compartment.

8. In a refrigerator, the combination of a cabinet provided with a high-humidity compartment and a freezing compartment, an evaporator for cooling said freezing compartment, an evaporator for cooling said high-humidity compartment, compressing and condensing apparatus for providing liquid refrigerant for said evaporators, one of said evaporators being a primary evaporator and the other being a part of a secondary system and having a condenser in heat exchange relation with a second primary evaporator disposed in one of said compartments, and means for maintaining a pressure differential between said primary evaporators whereby the second primary evaporator is maintained at a temperature below that of the first primary evaporator to act as a dehydration coil for the compartment in which the primary evaporator is located, and for the insulation and other compartments, the moisture having access to the compartments at a predetermined leakage point leading to the space between an outer shell and an inner liner for each compartment, and means for effecting a defrosting of the secondary primary evaporator while the first-mentioned primary evaporator is still in operating condition.

9. In a refrigerator, the combination of a cabinet provided with a high-humidity compartment and a freezing compartment, an evaporator for cooling said freezing compartment, an evaporator for cooling said high-humidity compartment, compressing and condensing apparatus for providing liquid refrigerant for said evaporators, one

of said evaporators being a primary evaporator and the other being a part of a secondary system and having a condenser in heat exchange relation with a second primary evaporator disposed in one of said compartments, and means for maintaining a pressure differential between said primary evaporators whereby the second primary evaporator is maintained at a temperature below that of the first primary evaporator to act as a dehydration coil for the compartment in which the primary evaporator is located, and for the insulation and other compartments, the moisture having access to the compartments at a predetermined leakage point leading to the space between an outer shell and an inner liner for each compartment, and means for effecting a defrosting of the second primary evaporator while the first-mentioned primary evaporator is still in operating condition, comprising an auxiliary by-pass conduit for by-passing the second primary evaporator.

10. In a refrigerator, the combination of a cabinet provided with a high-humidity compartment and a freezing compartment, an evaporator for cooling said freezing compartment, an evaporator for cooling said high-humidity compartment, compressing and condensing apparatus for providing liquid refrigerant for said evaporators, one of said evaporators being a primary evaporator and the other being a part of a secondary system and having a condenser in heat exchange relation with a second primary evaporator disposed in one of said compartments, and means for maintaining a pressure differential between said primary evaporators whereby the second primary evaporator is maintained at a temperature below that of the first primary evaporator to act as a dehydration coil for the compartment in which the primary evaporator is located, and for the insulation and other compartments, the moisture having access to the compartments at a predetermined leakage point leading to the space between an outer shell and an inner liner for each compartment, and means for effecting a defrosting of the second primary evaporator while the first-mentioned primary evaporator is still in operating condition, comprising an auxiliary by-pass conduit for by-passing the second primary evaporator and said means for maintaining a pressure differential.

11. In a refrigerator, the combination of a cabinet provided with a high-humidity compartment and a freezing compartment, an evaporator for cooling said freezing compartment, an evaporator for cooling said high-humidity compartment, compressing and condensing apparatus for providing liquid refrigerant for said evaporators, one of said evaporators being a primary evaporator and the other being a part of a secondary system and having a condenser in heat exchange relation with a second primary evaporator disposed in one of said compartments, and means for maintaining a pressure differential between said primary evaporators whereby the second primary evaporator is maintained at a temperature below that of the first primary evaporator to act as a dehydration coil for the compartment in which the primary evaporator is located, and for the insulation and other compartments, the moisture having access to the compartments at a predetermined leakage point leading to the space between an outer shell and an inner liner for each compartment, and means for effecting a defrosting of the second primary evaporator while the first-

mentioned primary evaporator is still in operating condition, comprising an auxiliary by-pass conduit for by-passing the second primary evaporator and said means for maintaining a pressure differential, and valve means in said auxiliary conduit manually operable to effect said defrosting.

12. In a refrigerator, the combination of a refrigerator cabinet having an outer metal shell of substantially rectangular form in plan and elevation, said shell being formed with a forwardly and rearwardly open channel and with an upwardly tapered recess communicating with said channel and opening at the rear of the cabinet, a motor compressor unit located in said recess and having a condenser tilted across said channel forwardly of said motor compressor, said motor compressor projecting rearwardly out of the shell and causing upward currents of air which draw the air through the channel over the condenser, a pair of inner liners supported from the outer shell and insulated from the outer shell and having predetermined air access openings from the inside of the liners to the space between the liners and the shell, fibrous insulation located in the insulation space between the liners and between the liners and shell, an evaporator for cooling each of the chambers formed by said liners, and a third evaporator maintained at a temperature colder than any of the evaporators, said third evaporator being located in one of the compartments and drawing to it the moisture from the insulation space and from said compartments to produce a predetermined humidity in the compartments.

13. In a refrigerator, the combination of a refrigerator cabinet having an outer metal shell of substantially rectangular form in plan and elevation, said shell being formed with a forwardly and rearwardly open channel and with an upwardly tapered recess communicating with said channel and opening at the rear of the cabinet, a motor compressor unit located in said recess and having a condenser tilted across said channel forwardly of said motor compressor, said motor compressor projecting rearwardly out of the shell and causing upward currents of air which draw the air through the channel over the condenser, a pair of inner liners supported from the outer shell and insulated from the outer shell and having predetermined air access openings from the inside of the liners to the space between the liners and the shell, fibrous insulation located in the insulation space between the liners and between the liners and shell, an evaporator for cooling each of the chambers formed by said liners, and a third evaporator maintained at a temperature colder than any of the evaporators,

said third evaporator being located in one of the compartments and drawing to it the moisture from the insulation space and from said compartments to produce a predetermined humidity in the compartments, and means for disabling the coldest evaporator only at will whereby the coldest evaporator may be defrosted while the other evaporators are maintained in operation.

14. In a refrigerator, the combination of a refrigerator cabinet having an outer metal shell of substantially rectangular form in plan and elevation, said shell being formed with a forwardly and rearwardly open channel and with an upwardly tapered recess communicating with said channel and opening at the rear of the cabinet, a motor compressor unit located in said recess and having a condenser tilted across said channel forwardly of said motor compressor, said motor compressor projecting rearwardly out of the shell and causing upward currents of air which draw the air through the channel over the condenser, a pair of inner liners supported from the outer shell and insulated from the outer shell and having predetermined air access openings from the inside of the liners to the space between the liners and the shell, fibrous insulation located in the insulation space between the liners and between the liners and shell, an evaporator for cooling each of the chambers formed by said liners, and a third evaporator maintained at a temperature colder than any of the evaporators, said third evaporator being located in one of the compartments and drawing to it the moisture from the insulation space and from said compartments to produce a predetermined humidity in the compartments, and means for disabling the coldest evaporator only at will whereby the coldest evaporator may be defrosted while the other evaporators are maintained in operation, said means comprising a by-pass conduit short circuiting the coldest evaporator and having a normally closed valve in said conduit, the valve being opened to accomplish the defrosting.

WILLIAM E. RICHARD.

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