

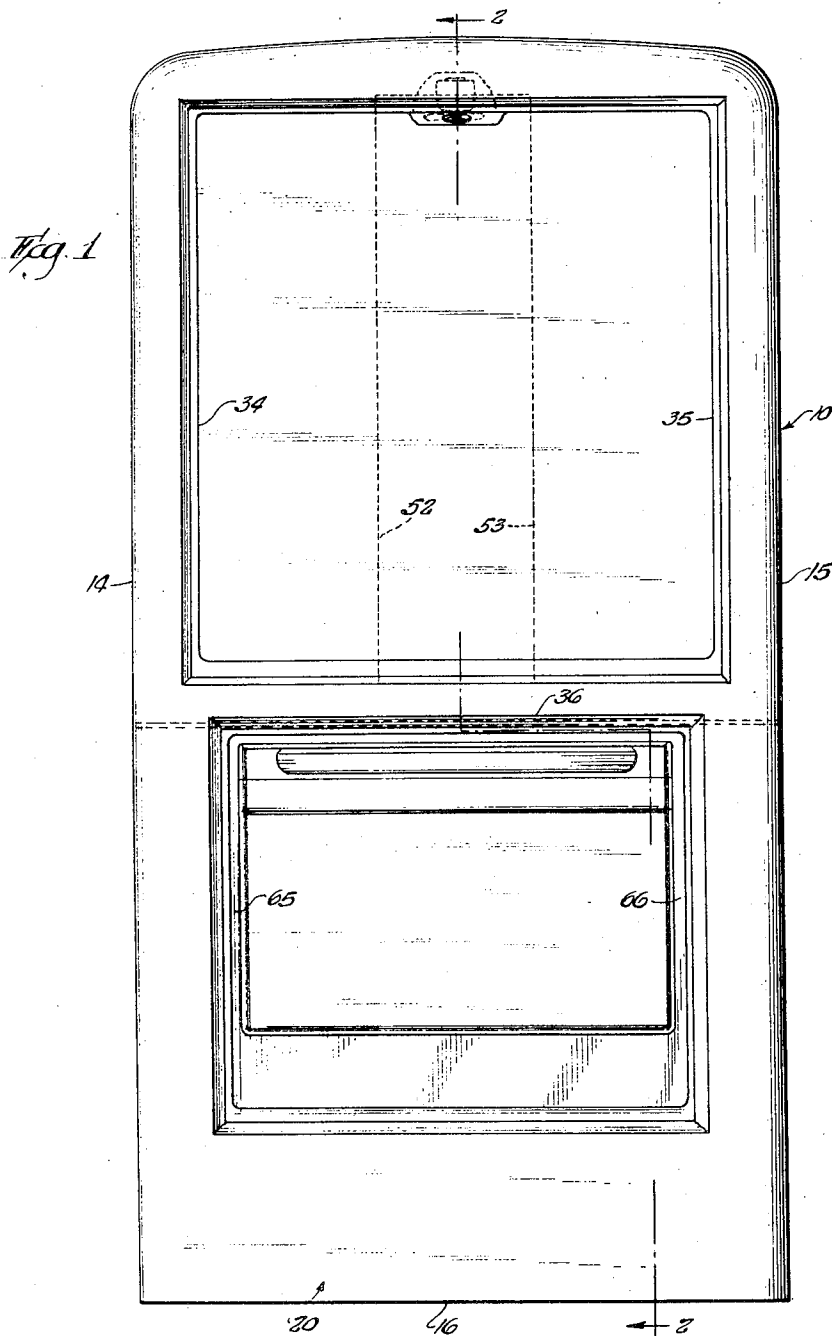
Sept. 13, 1949.

W. E. RICHARD
REFRIGERATOR

2,481,616

Filed March 15, 1946

2 Sheets-Sheet 1



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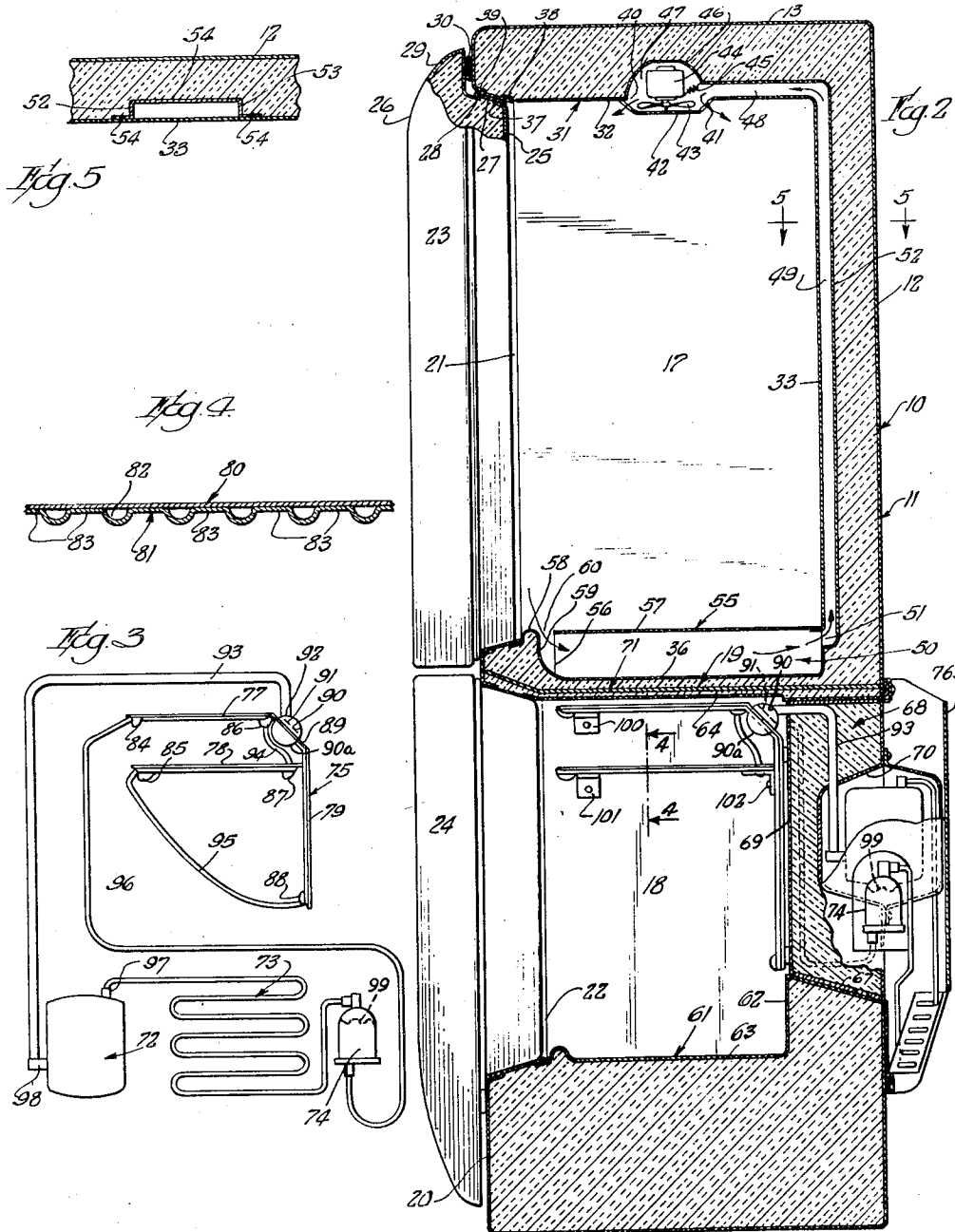
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UNITED STATES PATENT OFFICE

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REFRIGERATOR

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Application March 15, 1946, Serial No. 654,646

9 Claims. (Cl. 62—116)

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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 food stuffs of all kinds which are adaptable for this type of preservation.

One of the objects of the present invention is the provision of an improved refrigerator of the class described which utilizes a minimum amount of mechanism, and in which the refrigeration mechanism may be embodied in a removable unit occupying a minimum amount of space and adapted to be removed from or inserted in the back of the cabinet.

Another object of the 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 a refrigerator of the household type having a freezing compartment and a high humidity food storage compartment, which requires but a single evaporator, adapted to be removably mounted in the back of the cabinet so that no machine compartment is required and practically all of the cabinet may be utilized either for insulation or for food storage.

Another object of the invention is the provision of a refrigerator which is provided with refrigeration apparatus for cooling a freezing compartment, and which is so constructed that sufficient heat is abstracted through a partition wall which separates the freezing compartment from an adjacent food storage compartment so that the food storage compartment is maintained at a higher temperature and higher humidity than the freezing compartment.

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 a refrigerator construction of the class

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described, in which adequate provision has been made by means of a moisture and fluid tight seal between the upper warmer compartment and the lower freezing compartment so that the more humid air in the upper compartment will not find its way into the lower compartment, which would otherwise deprive it of its moisture.

Another object of the invention is the provision of an improved refrigerator construction which is simple, which may be manufactured economically, which is adapted to be serviced readily and which is adapted to maintain a uniform cooling and circulation of air in the warmer food storage compartment to prevent stratification and to utilize to the maximum efficiency the cooling effect of a lower cooling partition which separates the food storage compartment from a freezing 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 front elevational view with the doors removed of a refrigerator cabinet embodying the invention;

Fig. 2 is a vertical sectional view taken on the plane of the line 2—2 of Fig. 1 looking in the direction of the arrows showing the details of construction of the cabinet;

Fig. 3 is a diagrammatic elevational view of the mechanical refrigeration unit, showing the course of the refrigerant through the system;

Fig. 4 is a fragmentary vertical sectional view taken through a portion of the evaporator shelf, taken on the plane of the line 4—4 of Fig. 2 looking in the direction of the arrows; and

Fig. 5 is a fragmentary sectional view taken on the plane of the line 5—5 of Fig. 2, looking in the direction of the arrows.

Referring to Figs. 1 and 2, the refrigerator preferably includes a cabinet which is substantially rectangular in front elevation, as shown in Fig. 1, and also substantially rectangular in side elevation, as shown in section in Fig. 2. The cabinet 10 is preferably constructed with the usual outer shell 11 of sheet metal having a back wall 12, a top wall 13 and the two side walls 14, 15, and the bottom 16.

The cabinet also preferably includes an upper food storage compartment 17 and a lower freezing compartment 18, these being separated by an intermediate insulating partition 19, which although insulated is adapted to transmit a predetermined amount of heat from the food storage compartment 17 to the freezing compartment 18.

The front wall 20 of the cabinet is provided with a pair of door openings, such as the opening 21, for the food storage compartment and the

opening 22 for the freezing compartment, and the size of these openings preferably tapers inwardly, as shown in Fig. 2, so that doors 23 and 24 for these openings, respectively, may be of similar shape and may be adapted to move in and out of the openings with suitable clearance.

The doors 23 and 24 may both be of the usual construction, comprising an inner metal shell 25 and an outer metal shell 26 joined by insulated breaker strips 27, which are secured at the four edges of the two shells to provide a hollow door shell which may be filled with suitable insulation, such as rock-wool or cork, to provide a closure of insulating characteristics similar to the walls of the cabinet compartment which they are to close. Thus the upper door 23 is of a thickness commensurate with the rear wall and side walls of this compartment 17, while the lower door 24 is relatively thicker and in proportion to the rear and side walls of the compartment 18.

The front shell of each door is preferably bordered by an outward projecting U-shaped flange 29 which overlaps the front wall 20 around each door opening 21, 22, and is provided with a suitable tubular rubber seal 30 which extends endlessly around the inside of the flange 29 to seal the doors against the outer shell and to prevent the passage of air through the door openings when the doors are closed.

The doors are mounted upon suitable hinges and provided with a suitable latch, neither of which is shown. The upper compartment is provided with a liner comprising, an inner shell 31 which has a plane top wall 32, plane back wall 33, plane side walls 34, 35 and a plane bottom wall 36.

The top wall 31, side wall 35 and bottom wall 36 of the liner are provided at their forward edges with diagonally outwardly extending attaching flanges 37, which are attached by means of breaker strips 38 of insulating fibre board to the similar inwardly extending attaching flanges 39 on the outer shell 11. The top wall 31 of the liner is provided with a round aperture 40, centrally located in the top wall and provided with an inwardly projecting tapered collar 41 forming a discharge opening 42 for air which is propelled by a circulating fan 43.

The fan 43 is carried by the shaft of a small electric motor 44, preferably of the induction type which does not interfere with radio reception, and the motor 44 may be suspended by a plurality of coil springs 45, preferably three, which are hooked to brackets carried by the lower outer edge of the motor, and also hooked to brackets carried by the adjacent housing 46 which surrounds the motor chamber 47.

The housing 46 may comprise a bowl-shaped sheet metal member of substantially the shape shown in Fig. 2, which has an attaching flange secured to the top wall liner 32 and which communicates at one side with an air conduit 48 that extends backwardly across the top of the compartment 17 and downwardly at 49 along the back wall to communicate with a chamber 50 immediately above the partition 19 through an aperture 51 in the rear wall 33 of the liner.

The conduits 48, 49 and aperture 51 are preferably shallow but relatively wide, as seen by the dotted lines in Fig. 1, indicating the edges 52, 53 of the conduit 49. Thus the conduits 48, 49 may be formed by an angular channeled member which extends from the aperture 51 up to the top wall 32 of the liner, and from the back of the liner over to the housing 46 of the motor chamber 47. This

channeled conduit may comprise a rear wall 54, a pair of edge walls 52, 53 and a pair of attaching flanges 54 that are welded to the rear wall 33 of the liner, as shown in Fig. 5.

The compartment 17 is provided at its lower side with a sheet metal baffle 55, which may consist of a pair of side flanges 56 joined at right angles to the plane top wall 57 and located to be engaged with the inside of the liner walls 34, 35, and to engage the bottom liner wall 36. Thus the baffle 55 is supported in spaced relation to the partition 19.

Baffle 55 may extend into engagement with the rear liner wall 33, but the flanges 56 are preferably wide enough so that the baffle 55 is located immediately above the air circulation opening 51 in the conduit 49. Baffle 55 is also preferably spaced from the upwardly projecting rib 58 and from the front liner wall 59, leaving an opening 60 of substantially rectangular form between the front of the baffle 55 and the door 23 or liner 59 for the air to pass downward into the chamber 50 between baffle 55 and partition 19.

In some embodiments of the invention the baffle 55 may be entirely imperforate, but in other embodiments a multiplicity of air circulation holes may be located in the baffle 55 near its forward edge, performing the same function as the opening 60.

The lower compartment 18 is likewise provided with a liner indicated in its entirety by the numeral 61, and comprising a rear wall 62, bottom wall 63, top wall 64 and the two side walls 65 and 66 of the liner. Liner 61 and the rear wall 12 of the outer shell 11 are provided with a tapered opening 67, which may be of substantially the same construction as the door openings 21 and 22.

Openings 67, however, is adapted to receive an insulating plug 68 similar in construction to the doors 22, 23, and provided with an inner liner shell 69, and an outer liner shell 70 joined by breaker strips in exactly the same manner as the doors and providing a hollow shell for supporting the refrigerating apparatus and closing the aperture 67 with an insulating plug.

The space between the shells 69 and 70 of the plug 68 and the space between the inner liner and outer shell of each compartment may be filled with suitable insulation, such as rock-wool or cork. The space between the liner walls 36 and 64, forming part of the partition 19, is also filled with the same insulation, but it will be observed that these liner walls are close together, forming a relatively thin partition having only a predetermined amount of insulation.

Also, there is preferably interposed between the liner walls 36 and 64 of partition 19 a suitable moisture tight and liquid tight seal 71, which may consist of a sheet of metal or of suitable tough roofing paper impregnated or covered with a bituminous compound which also makes a sealing connection with the adjacent outer shell side walls 14, 15, back wall 12 and front wall 20 of the outer shell.

The purpose of the seal 71 is to positively prevent the travel of the relatively humid air from the food storage chamber 17 into the freezing chamber 18 or the passage of dry air from the latter chamber into the former, as such circulation would inevitably result in the freezing out of the moisture in the air of the upper chamber.

The refrigeration apparatus is shown diagrammatically in Fig. 3, and it preferably includes a sealed motor compressor unit 72, con-

denser 73, a float chamber 74 and an evaporator 75. The entire apparatus is closely coupled as the mechanical units 72, 73 and 74 are located outside the plug 68, but inside the chimney 76, while the evaporator 75 is carried by the inside of the plug 68.

The evaporator 75 is preferably constructed of an upper wall section 77 and a freezing shelf 78 spaced from upper section 77 sufficiently to receive ice cube trays and a vertical extending rear wall section 79. The vertical length of the rear wall section 79 is limited by the size of the inner shell section 69 of plug 68 so that it may be removed with the plug through opening 67.

The front-to-back dimension of the two upper evaporator sections 77 and 78 is limited only by the space permitted between the rear liner wall 69 and the door 22.

The lateral dimensions of the three sections 77, 78, 79 is preferably substantially equal to that of the width of the lower compartment 18 so that one shelf 78 provides space for a multiplicity of ice trays and a maximum cooling area is provided, which substantially covers the top of the compartment 18 and rear wall of the compartment 18.

Each of the sections 77, 78, 79 is constructed in substantially the same way out of two sheets of sheet metal, as shown in fragment in Fig. 4, thus the shelf 78 includes an upper sheet 80 which may be plane and a lower sheet 81 which may have a plurality of equally spaced pressed grooves 82 separated by plane portions 83.

The shape of the grooves 82 may vary, but a maximum strength is provided in the most simple manner by providing partially circular grooves 82. The plane portions 83 may be welded at spaced points or along a line of weld to the plane sheet 80, thus forming a multiplicity of backwardly and forwardly extending refrigerant conduits uniformly spaced over the area of the evaporator sections.

The conduits 82 may be sinuously arranged in the horizontal sections 77, 78 by impressing the grooves therein after the manner of the diagrammatic showing of the condenser 73, but the grooves 72 preferably communicate with a refrigerant distributor header 84, 85 at the front of each horizontal section 77, 78 and with another such header 86, 87 at the rear of each section 77, 78. These headers are merely transversely extending grooves 84—87 located in the lower sheet 83 of each section and communicating with the conduits formed by grooves 82.

The rear wall section 79 also preferably has a lower refrigerant distributor header 88 communicating with its upwardly extending grooves 82, and sections 77 and 79 are joined by a diagonal wall section 89 which communicates with the larger vapor header 90 located in the upper rear corner of the compartment 18.

The header 90 may have a transverse baffle 91 located in front of the discharge opening 92, which communicates with a relatively large suction pipe 93 leading to the motor compressor inlet. The sections 78 and 79 preferably have their plane sides located upward, thus giving the shelf 78 a plane surface for engaging the flat bottoms of the trays, while the vertical section 79 preferably has its plane side toward the back. This engagement also provides for a maximum heat absorbing area on the sides which are located toward the compartment 18, as the sheet 81 which has the grooves 82 presents a greater area than the plane sheet 80.

The discharge header 90 may be formed by making the plane sheets 80 of sections of 77 and 79 of one integral piece of metal formed with the transversely extending header groove 90. The lower and inner sheets of sections 77 and 79 may likewise be formed of one integral sheet of metal which is provided with header grooves 84—88 and refrigerant conduit grooves 82, and another header groove 90a forming the other half of the header 90a.

The conduits 82 in the upper section 77 communicate with header 90 as well as header 86, while the conduits 82 in the vertical section 79 communicate with header 90 below the baffle 91. The header 86 communicates with header 87 through a tubular conduit 94, while the headers 85 and 88 communicate by means of the tubular conduit 95. Header 84 communicates with the float valve chamber 74 through the relatively small liquid conduit 96, and the float chamber 74 is connected to the lower side of the condenser 73. The upper side of condenser 73 is connected to the outlet 97 of the motor compressor, while the conduit 93 leading from the evaporator 75 is connected to the inlet 98 of the motor compressor 72.

The course of the refrigerant coming from the compressor 72 is as follows:

The compressed vapor passes out of the outlet 97 into the condenser 73 where it is cooled and condensed to liquid which passes into the float chamber 74. Float chamber 74 may also have a dehumidifier for the refrigerant in the form of silica gel located above a strainer 99. From the float chamber 74 refrigerant passes through the conduit 96 to the upper section 77 where it is distributed uniformly through the conduits 82 by the header 84. The refrigerant which is part liquid and part vapor is gathered by the header 86 and discharged through conduit 94 to header 87 of the shelf 78 and it passes forwardly through the conduits 82 to header 85 which communicates with tubular conduit 95, carrying the refrigerant partly vapor and partly liquid to the header 88 of the rear section 79.

The refrigerant then passes through the conduits 82 of the rear section 79 into header 90 below the baffle 91, which prevents boiling into the outlet conduit 92, but permits the refrigerant to pass about the baffle into the outlet conduit. Header 90 also serves as a kind of accumulator for liquid refrigerant, permitting the vaporized refrigerant to be drawn off above the baffle 91 through the vapor conduit 93 to the inlet 98 of the motor compressor unit 72.

Thus the coldest part of the evaporator is the upper section 77 which may be in contact with the warmest air in the chamber 18, and the next coldest part of the evaporator is the shelf 78 which contacts the lower side of the ice pans and also cools the air in the upper part of chamber 18. The rear section 79 of the evaporator is of slightly higher temperature than the other two sections, but has its colder portion lowermost and all portions of the evaporator are, of course, colder than the air in the chamber 18. The motor compressor may have its motor controlled by a thermostatically actuated switch located in either chamber 17 or 18.

When the thermostatically controlled switch is located in the upper chamber it presents the advantage that this chamber, which is most frequently opened, will have the refrigeration apparatus operated responsive to its needs, but its needs for cooling are supplied through the parti-

tion wall 19, which maintains a suitable differential between the two chambers. It is desirable to maintain the upper chamber 17 at a temperature around 50° F., while the lower chamber may be at any temperature below freezing.

When the thermostatically responsive switch is located in the lower chamber it presents the advantage that this chamber may be maintained at a suitable temperature well below freezing, which by heat transmission through the partition 19 will serve to keep the upper chamber at a suitable temperature.

In some of the embodiments of the invention I prefer to provide a thermostatically responsive switch in each compartment 17 and 18, which is on open circuit in each compartment whenever the compartment is cooled to a predetermined degree, but which may be closed in either compartment to operate the motor compressor when either compartment reaches a temperature above a predetermined maximum. The latter arrangement has the advantage that when food is placed in the freezing compartment to be frozen the motor compressor will be operated sufficiently to produce a quick freeze, which depends only upon the conduction of heat through the food into the air and the radiation into the air of compartment 18 as the food is being cooled and frozen.

The same is true when an unusual load is placed in the upper compartment which would result in the operation of the motor compressor lowering the temperature in the lower compartment in order to abstract heat from the upper compartment through the partition 19.

The partition 19 is of such characteristics that it will not permit sufficient heat to pass through it to cool the upper compartment 17 below freezing. Therefore, this compartment maintains its humidity, which is dependent only upon the amount of moisture brought into the compartment by air and by the food stored in the compartment.

In the upper compartment the motor 44 and fan 43 may operate continuously, driving the warm air downward and drawing colder air upward through the conduits 48, 49 from the chamber 50 adjacent the partition 19. The warmer air passes in at the forward slot 60 beneath the baffle 55 where it is cooled by contact with the liner wall 36 of partition 19. The cooler air passes from the chamber 56 upward through discharge port 51 into conduit 49.

The compartments 18 and 19 may be provided with a plurality of shelves preferably in the form of perforated or wire shelves so that they will not interfere with the circulation of air.

Thus the fan 43 continuously circulates the cooler air coming from the partition 19 and also dislodges the warmer air from the top of the compartment 17, preventing stratification and maintaining a nearly uniform temperature throughout the compartment 17. There is no frosting and no dehydration in the upper chamber. The lower chamber being opened infrequently for access to or storage of frozen food, frosting occurs, but is not excessive and may be periodically removed by defrosting at relatively long periods of time.

The arrangement of the motor compressor, condenser and food chamber on the supporting insulating plug 68 is preferably substantially as shown in the prior application of Russell W. Ayres on refrigerator construction, Serial No. 494,600, filed July 14, 1943, U. S. Patent No. 2,445,988, issued July 27, 1948.

Suitable angle brackets 100, 101 may be provided on each liner side wall 65, 66 for supporting the forward ends of the evaporator sections 77, 78 and the rear end of section 78 may be secured by a suitable angle bracket 102 to the vertical section 79. The latter is secured by suitable brackets (not shown) to the inner shell 69 of the plug 68. Thus the entire refrigeration unit, including the motor compressor, condenser, evaporator, float chamber and connected conduits may be removed with the plug 68 for repair or replacement.

The float chamber 74, condenser 73 and motor compressor 72 are cooled by convection air currents passing through the bottom of the chimney 70 through the condenser 73, which is suitably located and finned, as shown in the aforesaid Ayres patent.

The float chamber 74 is preferably baffled from the warm air passing through the chimney 76 and exposed, at least in part, to separate cooler currents of air drawn up through a chimney aperture in which the float chamber is located, as shown in said Ayres patent. Thus the entire refrigeration unit is of the most simple construction, requiring no motor driven fans to circulate air for its cooling, and it may be constructed at a low cost.

It will thus be observed that I have invented an improved refrigerator construction in which there is provided a freezing chamber for freezing foods and storage of frozen foods, and a high humidity food storage chamber which is maintained above the freezing temperature to prevent dehydration of the foods stored in said latter chamber. Both these chambers are cooled by a single evaporator, which is located in the freezing chamber and which draws heat through an insulating partition of suitable characteristics to maintain a proper differential between the two chambers.

The migration of air from one chamber to the other which might otherwise take place in spite of the provision of imperforate liners, is positively prevented by a moisture tight sealing layer in the heat transmitting partition, which has a sealing connection with all four side walls of the outer shell.

The lower freezing chamber has the advantage that there is no tendency for cold air to spill out of it into the upper chamber nor is there any tendency for air to spill out of the upper chamber into the lower chamber when both doors are open. The air circulating fan and conduits maintain a continuous circulation of the air in the upper chamber to prevent stratification, and to convey the heat by air driven to the cooling partition from all parts of the upper chamber.

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.

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 having an upper compartment for storage of foods at above-freezing temperatures and predetermined humidity and having a lower compartment for freezing and storage of frozen foods, said lower chamber being provided with an evaporator, and said compartments being separated by a relatively thin heat insulating partition adapted to

maintain a suitable heat gradient between said compartments whereby the upper compartment is maintained at a predetermined temperature by the transmission of heat through said partition, the said partition being provided in its insulation with a moisture and air tight sealing layer having moisture tight connection with the inner surface of the outer shell on all sides of the refrigerator to prevent passage of air from either chamber to the other and to prevent dehumidifying the air of upper chamber.

2. In a refrigerator, the combination of a cabinet having an upper compartment for storage of foods at above-freezing temperatures and predetermined humidity and having a lower compartment for freezing and storage of frozen foods, said lower chamber being provided with an evaporator, and said compartments being separated by a relatively thin heat insulating partition adapted to maintain a suitable heat gradient between said compartments whereby the upper compartment is maintained at a predetermined temperature by the transmission of heat through said partition, the said evaporator comprising an upper horizontal section closely adjacent to said partition for cooling the upper chamber through said partition, and the said evaporator also including a horizontal section spaced from the first-mentioned section in the form of a shelf for receiving ice trays, said evaporator also including a back wall vertical section adapted to cool the air and contents of said lower compartment, the said evaporator being carried by an insulating closure insertable and removable from a back wall opening in said lower compartment.

3. In a refrigerator, the combination of a cabinet having an upper compartment for storage of foods at above-freezing temperatures and predetermined humidity and having a lower compartment for freezing and storage of frozen foods, said lower chamber being provided with an evaporator, and said compartments being separated by a relatively thin heat insulating partition adapted to maintain a suitable heat gradient between said compartments whereby the upper compartment is maintained at a predetermined temperature by the transmission of heat through said partition, the said evaporator comprising an upper horizontal section closely adjacent to said partition for cooling the upper chamber through said partition, and the said evaporator also including a horizontal section spaced from the first-mentioned section in the form of a shelf for receiving ice trays, said evaporator also including a back wall vertical section adapted to cool the air and contents of said lower compartment, the said evaporator being carried by an insulating closure insertable and removable from a back wall opening in said lower compartment, and carrying a motor compressor unit, condenser unit and means for metering refrigerant to said evaporator.

4. A refrigerator cooling unit comprising, an insulating plug adapted to be inserted in a complementary opening in the back of an insulated cabinet, said plug supporting on its front side an evaporator comprising, an upper horizontal section, a spaced shelf section and a vertical back wall section and supporting on its rear side a suitable chimney open at the top and bottom, and provided at the bottom with a condenser, and at an intermediate upper point with a motor compressor unit cooled by convection air currents passing from said condenser, said evaporator having a multiplicity of forwardly and backwardly extending conduits in its horizontal portions and

upwardly and downwardly extending conduits in its back wall portion, said evaporator sections having a take-off header located between its uppermost horizontal section and its back wall section.

5. A refrigerator cooling unit comprising, an insulating plug adapted to be inserted in a complementary opening in the back of an insulated cabinet, said plug supporting on its front side an evaporator comprising, an upper horizontal section, a spaced shelf section and a vertical back wall section and supporting on its rear side a suitable chimney open at the top and bottom, and provided at the bottom with a condenser, and at an intermediate upper point with a motor compressor unit cooled by convection air currents passing from said condenser, said evaporator having a multiplicity of forwardly and backwardly extending conduits in its horizontal portions and upwardly and downwardly extending conduits in its back wall portion, each of said sections having headers at the ends of their conduits and the course of the refrigerant being first to the top section, second to the shelf and third to the bottom of the back wall section.

6. In a refrigerator construction, the combination of an outer shell having a substantially rectangular top, rectangular bottom, rectangular rear wall and two rectangular side walls, the top, bottom and side walls being provided at their forward edges with facing flanges extending from these walls for engagement with door seals, a lower inner liner of substantially rectangular shape in plan and elevation and substantially smaller than the outer shell to form a freezing chamber having relatively thick walls filled with insulation between said inner liner and the outer shell at the bottom, back and two sides, said liner being secured at the forward edge of its bottom wall and its two side walls to the outer shell by means of breaker strips, an upper inner liner of substantially larger size than the lower inner liner for forming a high-humidity compartment, said upper liner being rectangular in plan and elevation and having its open forward edges secured by breaker strips to the outer shell at the top and two sides of said upper liner, the upper and lower liner being secured at the forward edges of the lower wall of the upper liner and the upper wall of the lower liner to breaker strips which are connected to a transverse facing member extending from one side of the outer shell to the other side and forming a facing flange for engaging a door seal, the said liners having their adjacent walls forming a partition between the two compartments and the space between these adjacent walls filled with a thin layer of insulation, and an evaporator having a flat plate-like section located uppermost in the lower freezing compartment adjacent said partition whereby the transmission of heat through said partition to said evaporator maintains the upper chamber at a low food storage temperature and at a predetermined humidity, while the lower compartment is cooled to a freezing temperature.

7. In a refrigerator construction, the combination of an outer shell having a substantially rectangular top, rectangular bottom, rectangular rear wall and two rectangular side walls, the top, bottom and side walls being provided at their forward edges with facing flanges extending from these walls for engagement with door seals, a lower inner liner of substantially rectangular shape in plan and elevation and substantially smaller than the outer shell to form a freezing

chamber having relatively thick walls filled with insulation between said inner liner and the outer shell at the bottom, back and two sides, said liner being secured at the forward edge of its bottom wall and its two side walls to the outer shell by means of breaker strips, an upper inner liner of substantially larger size than the lower inner liner for forming a high-humidity compartment, said upper liner being rectangular in plan and elevation and having its open forward edges secured by breaker strips to the outer shell at the top and two sides of said upper liner, the upper and lower liner being secured at the forward edges of the lower wall of the upper liner and the upper wall of the lower liner to breaker strips which are connected to a transverse facing member extending from one side of the outer shell to the other side and forming a facing flange for engaging a door seal, the said liners having their adjacent walls forming a partition between the two compartments and the space between these adjacent walls filled with a thin layer of insulation, and an evaporator having a flat plate-like section located uppermost in the lower freezing compartment adjacent said partition whereby the transmission of heat through said partition to said evaporator maintains the upper chamber at a low food storage temperature and at a predetermined humidity, while the lower compartment is cooled to a freezing temperature, said partition having a substantially waterproof layer located in the insulation of the partition, and extending from front to back of the outer shell and from side to side of the outer shell in watertight engagement at its edges, whereby moisture in the upper compartment does not find its way through unsealed breaker strips into the lower freezing compartment to prevent dehydration of the upper compartment.

8. In a refrigerator construction, the combination of an outer shell having a substantially rectangular top, rectangular bottom, rectangular rear wall and two rectangular side walls, the top, bottom and side walls being provided at their forward edges with facing flanges extending from these walls for engagement with door seals, a lower inner liner of substantially rectangular shape in plan and elevation and substantially smaller than the outer shell to form a freezing chamber having relatively thick walls filled with insulation between said inner liner and the outer shell at the bottom, back and two sides, said liner being secured at the forward edge of its bottom wall and its two side walls to the outer shell by means of breaker strips, an upper inner liner of substantially larger size than the lower inner liner for forming a high-humidity compartment, said upper liner being rectangular in plan and elevation and having its open forward edges secured by breaker strips to the outer shell at the top and two sides of said upper liner, the upper and lower liner being secured at the forward edges of the lower wall of the upper liner and the upper wall of the lower liner to breaker strips which are connected to a transverse facing member extending from one side of the outer shell to the other side and forming a facing flange for engaging a door seal, the said liners having their adjacent walls forming a partition between the two compartments and the space between these adjacent walls filled with a thin layer of insulation, and an evaporator having a flat plate-like section located uppermost in the lower freezing compartment adjacent said partition whereby the transmission of heat through said partition

to said evaporator maintains the upper chamber at a low food storage temperature and at a predetermined humidity, while the lower compartment is cooled to a freezing temperature, said upper compartment having its liner formed at the top with a fan receiving recess communicating with a rearwardly and downwardly extending conduit leading to the bottom of the upper liner, and baffle means forming the top of a communicating conduit and extending across the bottom of said liner, whereby the fan may impel warmer air downward to pass under said baffle and upwardly in said conduit to the fan to prevent stratification.

9. In a refrigerator construction, the combination of an outer shell having a substantially rectangular top, rectangular bottom, rectangular rear wall and two rectangular side walls, the top, bottom and side walls being provided at their forward edges with facing flanges extending from these walls for engagement with door seals, a lower inner liner of substantially rectangular shape in plan and elevation and substantially smaller than the outer shell to form a freezing chamber having relatively thick walls filled with insulation between said inner liner and the outer shell at the bottom, back and two sides, said liner being secured at the forward edge of its bottom wall and its two side walls to the outer shell by means of breaker strips, an upper inner liner of substantially larger size than the lower inner liner for forming a high-humidity compartment, said upper liner being rectangular in plan and elevation and having its open forward edges secured by breaker strips to the outer shell at the top and two sides of said upper liner, the upper and lower liner being secured at the forward edges of the lower wall of the upper liner and the upper wall of the lower liner to breaker strips which are connected to a transverse facing member extending from one side of the outer shell to the other side and forming a facing flange for engaging a door seal, the said liners having their adjacent walls forming a partition between the two compartments and the space between these adjacent walls filled with a thin layer of insulation, and an evaporator having a flat plate-like section located uppermost in the lower freezing compartment adjacent said partition whereby the transmission of heat through said partition to said evaporator maintains the upper chamber at a low food storage temperature and at a predetermined humidity, while the lower compartment is cooled to a freezing temperature, said outer shell and lower liner being formed at their rear walls with aligned apertures, and said evaporator being supported by an insulating plug fitting in said aligned apertures, and a condenser and motor compressor carried by said plug and located in a chimney rearwardly of said plug.

WILLIAM E. RICHARD.

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