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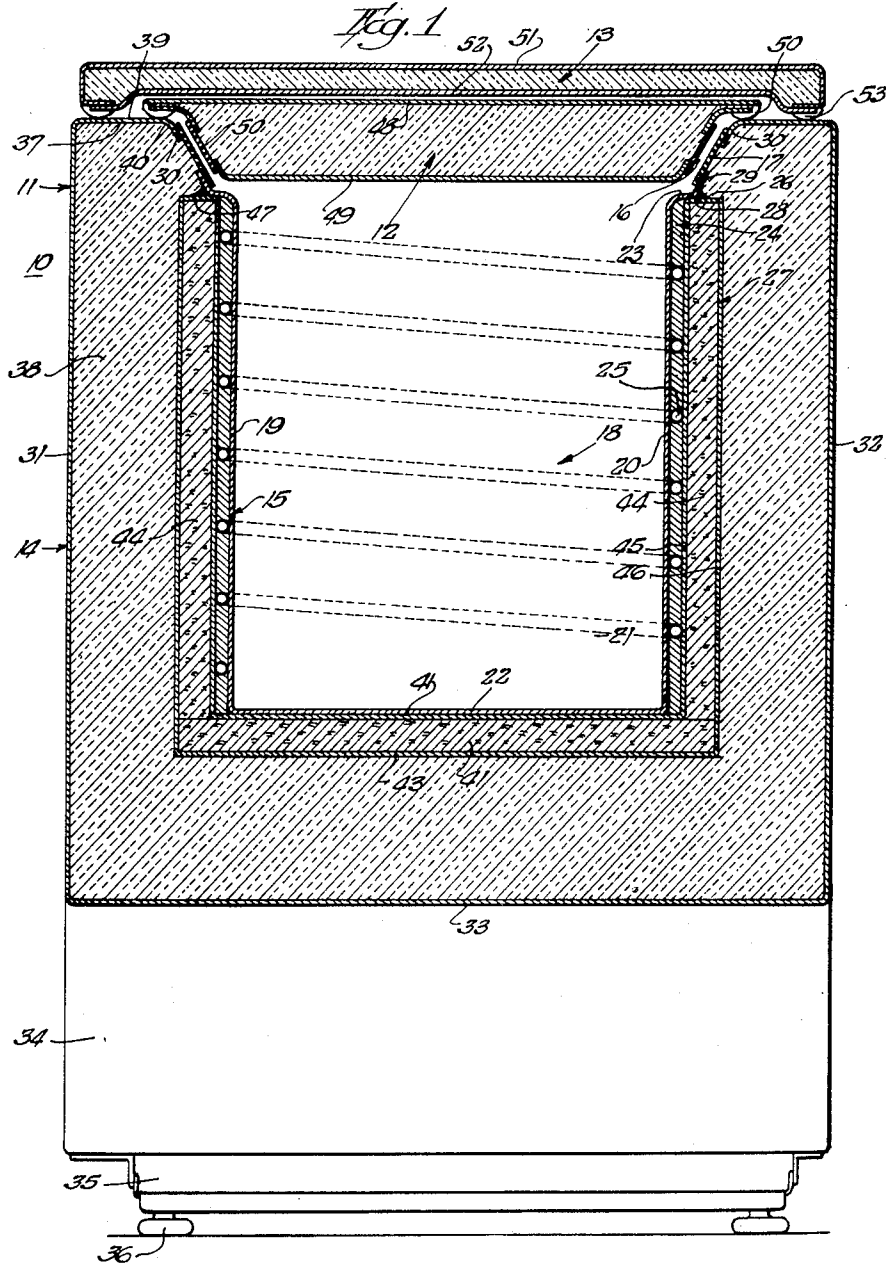
W. E. RICHARD

2,432,042

REFRIGERATOR CABINET CONSTRUCTION HAVING MEANS TO  
RESTRICT MOISTURE IN THE WALLS OF THE CABINET

Filed Oct. 15, 1945

3 Sheets-Sheet 1



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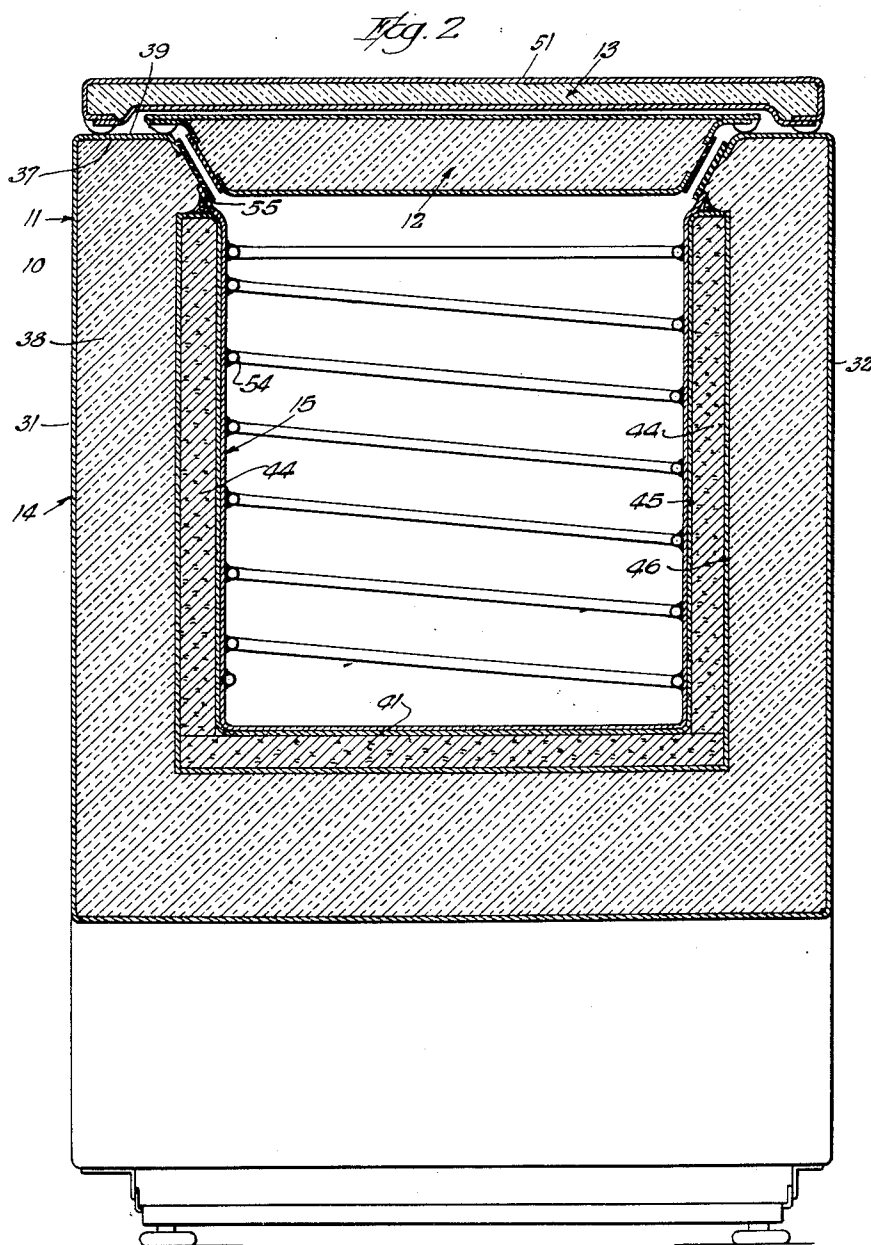
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

Fig. 3

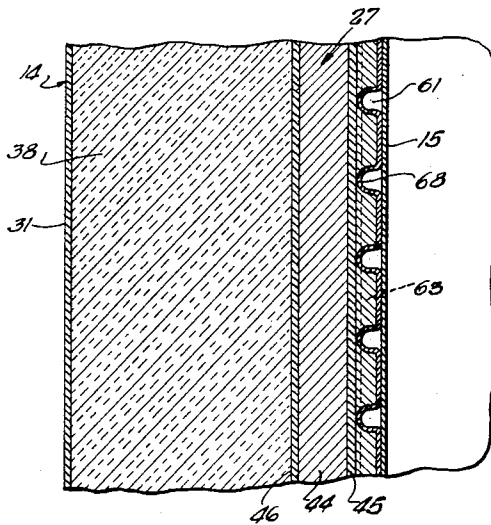
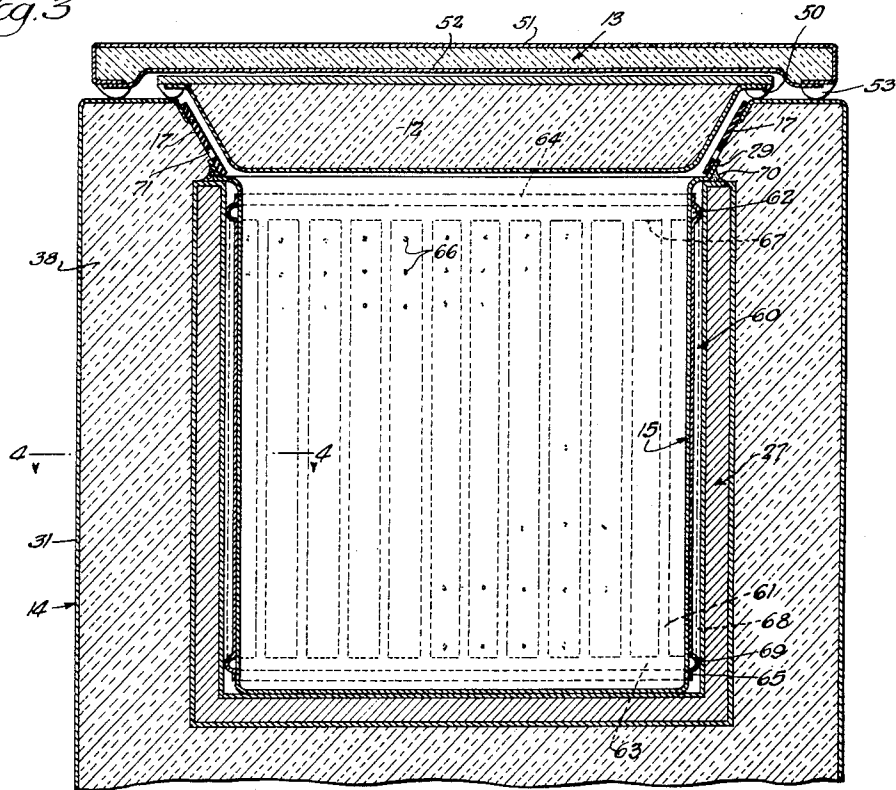


Fig. 4

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## UNITED STATES PATENT OFFICE

2,432,042

REFRIGERATOR CABINET CONSTRUCTION  
HAVING MEANS TO RESTRICT MOISTURE  
IN THE WALLS OF THE CABINETWilliam E. Richard, Evansville, Ind., assignor to  
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Minnesota

Application October 15, 1945, Serial No. 622,254

12 Claims. (Cl. 62—89)

1 The present invention relates to refrigerator cabinet construction, and is particularly concerned with an improved construction for low temperature refrigerator cabinets, such as, for example, freezer chests and cabinets, to eliminate the difficulties encountered in the devices of the prior art in keeping the insulation dry.

In any refrigerator cabinet in which the refrigeration coils are attached to the lining or inner compartment walls, the problem of keeping the insulation dry becomes one of paramount importance. In the devices of the prior art moisture will condense and freeze on the outside of the liner wall as well as on the inside, since both sides are at the same temperature. Moisture and frost on the outside or the insulation side of the inner liner reduces the effectiveness of the insulation and, in time, causes damage to the cabinet itself. The insulating value of a fibrous insulation such as glass wool, rock wool, etc., depends largely upon the fluffy, porous condition of the wool, in which dead air spaces constitute the main insulation, and if this wool becomes wet with water its heat insulating value is greatly decreased.

Another type of porous insulation which may be used is a granular insulation, such as granulated cork or other cellular or porous insulation.

In the devices of the prior art it has been customary to seal the insulating breaker strips which bridge the space between the inner and the outer metal liners against the entrance of moisture to the insulation from either the outside of the cabinet or from the contents of the liner. One method of doing this is to provide a double breaker strip comprising two spaced insulating walls, the space being filled with a moisture-proof mastic sealing compound. It is very difficult to get a perfect moisture-proof seal at the breaker strips with this method or any other methods, and even if the breaker strip were perfectly sealed there may be imperfections in the outer wall through which possible moisture leakage may take place. The moisture which gets into the space between the walls is, of course, carried by moisture-laden air which comes in contact with the cold walls of the inner liner and condenses on this liner. It is a well known fact that moisture carried by the air will condense upon the coldest surface to which it has access in the refrigerator cabinet, even though, during the course of its movement, it may at some earlier time condense partially upon some slightly warmer surface.

One of the objects of the invention is the provision of an improved cabinet construction by

2 means of which the matter of getting a perfect hermetic seal about the fibrous insulation becomes unnecessary, and by means of which fibrous insulation is maintained in a dry and high insulating condition.

Another object of the invention is the provision of an improved method of constructing refrigerator cabinets and of maintaining such a temperature differential between the surfaces which are in contact with the fibrous insulation and the inner metal liner that the moisture will condense upon the latter so that any moisture which penetrates into the space where the fibrous insulation is located will not condense in any space where it can damage the insulation.

Another object of the invention is the provision of an improved refrigerator cabinet construction which is so constructed that any moisture which is carried into the main body of fibrous insulation by the air will eventually travel through the non-sealed breaker strips and will be deposited on the inside liner walls of the cabinet.

Another object of the invention is the provision of an improved refrigerator cabinet construction which is simple, sturdy, capable of economical manufacture, and adapted to be used for a long period of time, and to maintain the best insulating conditions at a minimum amount of expense and without the necessity for repair or replacement of its parts.

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 vertical sectional view of a low temperature freezing cabinet or chest embodying the invention;

Fig. 2 is a similar view of a modification in which the freezing coils are located on the inside of the inner liner;

Fig. 3 is a similar view of a modification in which the evaporator is of the two sheet type, one of the walls of the lining being one of the sheets of the evaporator; and

Fig. 4 is a fragmentary sectional view taken on the plane of the line 4—4 of Fig. 3.

While the present cabinet construction is peculiarly adapted to be of great utility in connection with low temperature freezer chests or cabinets I desire it to be understood that it may also be employed in any type of refrigerator cabinet and, in particular, any refrigerator cabinets

which are to include a chamber for freezing or storing frozen food.

The present invention is illustrated in connection with a freezer cabinet of the type illustrated in my prior application, Serial No. 547,682, Home freezer cabinets, filed August 2, 1944, and all of the other details of construction may be substantially as disclosed in that application.

The freezer cabinet is indicated in its entirety by the numeral 10, and it preferably includes the cabinet proper, which is indicated at 11, a cover 12 for the chamber in the cabinet, and an auxiliary cover 13 which covers the top of the cabinet over-all, and so effectively insulates the top of the cabinet that sweating of the upper working surface is effectively prevented, as described in my application. The vertical sections illustrated are taken on a plane passing through the body of the freezer chest in such position that the front and rear walls and bottom wall of an insulated compartment are shown in section. The cabinet in question includes a sheet metal outer lining 14 and a sheet metal inner lining 15, these linings being joined at the top opening 16 by a plurality of insulating breaker strips 17 which may be made of suitable insulating fibre-board. The inner lining 15 may take any shape or size, depending upon the desired shape or size of the freezing chamber 18. In the embodiment illustrated the chamber 18 is defined by the flat side walls 19 and 20 and by similar flat end walls 21, 21, one of which is shown in elevation in Fig. 1. The side walls and end walls are joined to a bottom wall 22, thus forming a liquid-tight sheet metal box which is open at the top.

At their upper edges the side walls 19 and 20 and end walls 21 are preferably formed with an outwardly curved portion 23 which has an easy bend, and which extends at substantially right angles to the walls 19-21. The outwardly turned flange 23 is of sufficient width to span the spaces 24 for the freezing coils 25 and to extend over and overlap a part of the upper edge 26 of a moisture-proof sealed insulating envelope which is indicated in its entirety by the numeral 27. At 28 the flange 23 is bent diagonally upward and outward, the angle being the same as the angle at which the breaker strips 17 are disposed in the opening 16, and here the upwardly turned end portion 29 is secured to the breaker strips 17 by means of threaded members, such as tapered screws which pass through the fibre insulation and are threaded into holes in the flange 29 and a downwardly and diagonally inwardly extending flange 30 on the outer liner 14 at the opening 16. The breaker strips are not sealed against passage of air or moisture, but they merely close the spaces between the adjacent flanges of the outer shell and inner lining and insulate the inner lining from the outer shell and aid in defining the tapered opening 16 at the top of the cabinet.

The outer shell 14 may also be made of sheet metal, and it consists of the flat side walls 31, 32 joined by the integral bottom wall 33, and also joined to the end walls, not shown, which are similar in construction and shape to the arrangement of the side walls 31 and 32, but are at right angles thereto, thus forming a box with rectangular sides. As described in my prior application, the outer shell is supported by a downwardly extending leg 34 at each end of the cabinet, which may also be of box-like shape and made of sheet metal, and which may be provided with the base 35 which carries a plurality (four in number) of adjustable feet 36 so that the support

of the chest may be made stable upon floors or surfaces which are not level, or even those which are irregular, by adjusting the threaded feet 36 up or down with respect to the base 35. The side and end walls 31, 32 of the outer shell 14 are bent over at the top at right angles to form a plane top flange 37 which is of substantially the same width as the thickness of the fibrous insulation 38 located between the inner liner 15 and outer shell 14. The horizontal flange 37 also provides the cabinet with a flat upper surface 39 which may be engaged by the covers to effect an hermetic seal of the opening 16 in the cabinet. At 40 each top flange 37 of the outer shell 14 is bent diagonally downward and inward at an obtuse angle, this being at the same angularity as the breaker strips 17 so that the flange 30 may be secured to the breaker strips to complete the housing for the fibrous insulation 38 at the top.

The evaporator cooling coils 25 consist of metal coils which are in heat conducting contact with the sheet metal inner liner 15 at the walls 19, 20 and 21, and in some embodiments of the invention freezing or cooling coils may also be arranged spirally and engaged with the outside of the bottom wall 22 of the liner 15. Not only do these coils merely engage the outside of the liner, but they are preferably soldered thereto to increase the heat conductivity from metal coil to liner wall.

The moisture-proof sealed insulating envelope 27 may consist of a relatively thin layer of sheet cork, such as, for example, a sheet one inch thick, which is covered and sealed with a water-tight and air-tight layer of mastic or initially plastic asphalt compound so as to provide a complete moisture-tight and air-tight envelope about the liner and coil. For example, the bottom of this envelope may consist of the sheet of cork 41, rectangular in shape, and covered above and below by water-tight asphalt layers 42, 43.

This sheet 41 abuts against the lower edges of the side sheets 44 of cork, which are also provided with an inner layer 45 and an outer layer 46 of asphalt, the asphalt also extending over the upper edges at 47 and over the lower edge between sheet 44 and sheet 41 of cork.

At the upper edge the asphalt 26 engages the lower side of flange 23 to effect a moisture-tight seal. The thickness of the moisture-tight insulating envelope 27 may vary, depending upon the temperatures to which it is subjected, but this envelope preferably occupies only a minor amount of the space for insulation 38, the rest being of the fibrous type, such as glass wool and rock wool.

The spaces 24 between the freezing coils are also preferably filled with bituminous compound in order to eliminate any space in which moisture may accumulate between the air-tight envelope and the inner liner 15. It is of particular importance that there be an air-tight and moisture-tight seal between the envelope 27 and the inner liner 15 at the top, and this may be accomplished by the liberal use of sealing asphalt between the end portions 26 of the envelope and the flange 29 of the liner.

This air-tight and moisture-tight seal between the envelope and the liner prevents any moisture from getting into contact with the outside of the liner. The only part carried by the outside of the liner which is accessible to moisture is the outer surface 43 of asphalt on the moisture-tight envelope 27, but this is at a higher temperature than the inside of the liner so that moisture tends

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to accumulate and condense only on the inside of the liner.

As described in my prior application, the opening 16 in the top of the chest may be closed by the cover 12, which also consists of the upper and lower shells 48 and 49, joined by breaker strips 50. A plurality of such tapered covers 12 may be employed, filled with fibrous insulation, and they may be separated by a removable mullion, as described in my prior application. The cover 12 is provided with a rubber sealing strip 50, extending completely around the top of the opening 16 and engaging the top flange 37 to effect an air-tight closure. Above the covers 12 there is preferably an auxiliary cover 13 hingedly mounted as shown in my prior application, and comprising the upper and lower shells 51, 52, joined by suitable breaker strips and provided with a rubber sealing strip 53 engaging the top flange 37 adjacent the outer walls of the cabinet. The outer cover 13 provides a dead air space which reduces greatly the temperature differential between the inside and the outside of the cabinet at the top, and prevents sweating.

Referring to Fig. 2, the construction of this cabinet is substantially the same except that in this case the evaporator cooling coils 54 are located inside the inner liner 15, to which they may be secured in heat conducting relation by being soldered in place. In this case the inner liner is merely bent diagonally upward and outward at the upper flange 55, conforming to the shape of the adjacent cork sheets 44, which again are covered with the water-imperious asphalt 45, 46, and which engage directly with the outside surface of the inner liner 15 to provide a water-imperious and air-tight insulating envelope for this liner.

All of the coils 25 of Fig. 1 and 54 of Fig. 2 are, of course, in heat conducting contact with the inner liner 15, and are soldered or brazed to the liner, to increase the conductivity of the connection between the coils and the liner.

Referring now to Figs. 3 and 4, this is another modification, in which the evaporator is of the two-sheet type. In this case the liner may be of similar shape to that previously described, but the coils are formed by means of a generally cylindrical metal sheet 60, which extends about the inner liner 15 and cooperates with it to form vertical refrigerator passages 61 and a pair of horizontal upper and lower headers 62, 63.

This outer sheet 60 of the evaporator is formed with a multiplicity of axially extending grooves 61, which communicate at the bottom and the top with the circumferentially extending grooves 62, 63. The grooves in this case are stamped in a sheet of metal, which is then bent to cylindrical form and has its ends brought into abutting relation with the sheet extending about the liner 15. The grooved sheet 60 is then welded along the flat contacting portions 64 at the top and 65 at the bottom so that the sheet 60 is sealed to the liner 15 at the top and bottom. It is also secured to the liner by a multiplicity of spot welds 66 located between the vertical grooves 61 and adapted to segregate the vertical channels 61 from each other.

In some embodiments of the invention these axially extending cylindrical portions 67 of the outer sheet 60 may also be provided with a continuous line of weld, securing each of them to the outside of the liner 15. The upper and lower header conduits 62, 63 are, of course, provided with an outlet and inlet, respectively, by means

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of which liquid refrigerant is brought to the bottom of the evaporator and evaporated refrigerant is pumped off the top.

Here again the spaces between the ribs 68, 69 on the outside of the sheet 60 are preferably filled with asphaltum, and of course the water-tight envelope 27 is of similar construction and has an air- and water-tight seal at 70 between the upper edge of the envelope and the upper flange 29 of the liner.

In order to permit any moisture which has gained access to the porous insulation 38 to find its way to the inner surface of the liner 15 the liner may be provided with a plurality of apertures 71, at its upper end, adjacent the breaker strips 17, so that there will be direct communication between the space for the porous insulation 38 and the interior of the liner 15.

The operation of the present cabinet construction is as follows:

With a cabinet construction according to the present invention there is a temperature differential between the inside of the metal liner 15 and the outside of the moisture-proof insulating layer 44 at the surface 46. This amounts to several degrees, and the exterior of the surface of the moisture-proof layer of insulation being several degrees warmer than the inside of the liner, any moisture leaking into the main body of insulation will eventually travel through the non-sealed breaker strips 17 and will be deposited upon the inside liner walls.

In the embodiment of Fig. 2 the asphalt layer, which coats the inside of the cork sheets 44, 41 at 45, is applied directly to the outside of the metal liner so that there is no room for the condensation of moisture on the outside of the liner, and the outside of the cork sheets 44 at the asphalt 46 is warmer than the temperature of the liner 15.

In the embodiment of Fig. 1 the spaces between the coils 25 and between the liner and the cork sheets 44 may also be filled either with cork or asphalt compound so as to eliminate any space 45 for condensation.

It is a fact that in a refrigerator the moisture always travels to the coldest surface, where it is condensed, even though it may be condensed originally on a slightly warmer surface, and the rate of travel of this moisture depends upon the temperature difference.

Another way of explaining the result accomplished is that the moisture-proof insulating envelope around the low temperature liner establishes a vapor pressure difference between the outer insulation and the interior of the liner, which causes moisture to travel from the insulation to the interior of the liner. This vapor pressure difference is the result of a differential of temperature between the inside of the liner and the outside of the moisture-proof envelope. In any event, tests of the refrigerator cabinet structures illustrated have shown that a cabinet of this construction may be operated for months at various room temperatures and relative humidities, and on inspection thereafter the insulation was found to be absolutely dry. Thereafter, four one-eighth inch holes were drilled in the outer shell of a cabinet on test, which was then operated for two weeks at 0° F. inside temperature and 100° F. room temperature, and 70 percent relative humidity in the room.

On inspection, after this test, no trace of moisture was found in the insulation.

Experience with low temperature cabinets in-

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dicates that moisture in the insulation is one of the worst conditions which may be encountered with the devices of the prior art, and this has been one of the most difficult conditions to correct. The present cabinet construction eliminates entirely the condensation of moisture in the fibrous insulation between the inner and outer shells of the cabinet, and thus overcomes the difficulty at a low cost and without detracting from the over-all insulating value of the assembly.

In actual practice the outer shell would be free of any apertures through which moisture would penetrate to the fibrous insulation, but the breaker strips would be unsealed purposely to permit any moisture which might get into the fibrous insulation to pass through these breaker strips into the inner chamber, where it may condense on the inner surface of the liner.

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 cabinet construction, the combination of an inner liner of heat conducting material with an outer shell, insulating means for joining the liner and shell adjacent an opening in said cabinet, said liner including means for the circulation of cooling refrigerant, porous insulation between the shell and liner, and a relatively thin insulating envelope surrounding the liner and located adjacent thereto, said envelope being sealed against the access of moisture to the insulation of the envelope, for establishing a temperature differential between the liner and the outside of said envelope, and an insulating closure for closing said opening and having engagement with the outer shell outside of said insulating means whereby there is air communication between the insulating means and the interior of the inner liner whereby moisture in the air finding its way into said porous insulation will be condensed on the liner and kept away from the porous insulation to maintain the latter in a dry and high insulating state, said insulating means between the liner and shell comprising breaker strips which are not sealed against the passage of moisture so that the moist air which may get between the shell and liner may have its moisture taken into the inside of the liner at the breaker strips to be condensed on the liner.

2. In a refrigerator cabinet construction, the combination of an inner liner of heat conducting material with an outer shell, insulating means for joining the liner and shell adjacent an opening in said cabinet, said liner including means for the circulation of cooling refrigerant, porous insulation between the shell and liner, and a relatively thin insulating envelope surrounding the liner and located adjacent thereto, said envelope being sealed against the access of moisture to the insulation of the envelope, for establishing a temperature differential between the liner and the outside of said envelope and an insulating closure for closing said opening and having engagement with the outer shell outside of said insulating means whereby there is air communication between the insulating means

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and the interior of the inner liner whereby moisture in the air finding its way into said porous insulation will be condensed on the liner and kept away from the porous insulation to maintain the latter in a dry and high insulating state, said insulating means between the liner and shell comprising breaker strips which are not sealed against the passage of moisture so that the moist air which may get between the shell and liner may have its moisture taken into the inside of the liner at the breaker strips to be condensed on the liner, the said envelope comprising a layer of relatively rigid insulation covered with a compound impervious to water which seals the insulation against access of air or moisture.

3. In a freezer chest construction, the combination of an outer shell provided with a supporting base, said shell having the bottom, side, and end walls formed of sheet metal and having a top flange defining a plane area around a top opening in said chest, with an inner liner of sheet metal, said liner being formed with bottom, side, and end walls and having an open top, the top edge of said liner being joined to the top flange of said shell by insulating breaker strips, refrigerant coils engaging said liner and adapted to cool the liner to a low temperature, a heat insulating, water-impervious and air-impervious envelope surrounding said liner and located closely adjacent thereto, insulating closure means for closing said open top and having engagement with said outer shell whereby the space inside said breaker strips is in communication with the interior of said liner, said breaker strips being unsealed and porous insulation filling the space between said envelope and said shell, the said envelope establishing a temperature differential between the outside of the liner and the outside of the envelope whereby the coldest exposed surface for condensation is the inside of the liner, and moisture condensation from the air is eliminated from the porous insulation to keep the latter in the best insulating condition, said envelope including plates of substantially rigid insulation located to enclose the bottom, side, and end walls of the liner, each of said plates being surrounded by a water-impervious sealing compound comprising a layer of asphaltum about each plate of rigid insulation extending over the sides and edges thereof.

4. In a freezer chest construction, the combination of an outer shell provided with a supporting base, said shell having the bottom, side, and end walls formed of sheet metal and having a top flange defining a plane area around a top opening in said chest, with an inner liner of sheet metal, said liner being formed with bottom, side, and end walls and having an open top, the top edge of said liner being joined to the top flange of said shell by insulating breaker strips, refrigerant coils engaging said liner and adapted to cool the liner to a low temperature, a heat insulating, water-impervious and air-impervious envelope surrounding said liner and located closely adjacent thereto, insulating closure means for closing said open top and having engagement with said outer shell whereby the space inside said breaker strips is in communication with the interior of said liner, said breaker strips being unsealed and porous insulation filling the space between said envelope and said shell, the said envelope establishing a temperature differential between the outside of the liner and the outside of the envelope whereby the coldest exposed surface for condensation is the inside of the liner,

and moisture condensation from the air is eliminated from the porous insulation to keep the latter in the best insulating condition, said liner being formed with an outwardly turned flange at the top for engagement with the envelope and the breaker strips, and said envelope being hermetically sealed against said flange to prevent access of moisture between the envelope and outer wall of the liner.

5. In a freezer chest construction, the combination of an outer shell provided with a supporting base, said shell having the bottom, side, and end walls formed of sheet metal and having a top flange defining a plane area around a top opening in said chest, with an inner liner of sheet metal, said liner being formed with bottom, side, and end walls and having an open top, the top edge of said liner being joined to the top flange of said shell by insulating breaker strips, refrigerant coils engaging said liner and adapted to cool the liner to a low temperature, a heat insulating, water-impervious and air-impervious envelope surrounding said liner and located closely adjacent thereto, porous insulation filling the space between said envelope and said shell, a heat insulating closure for said open top arranged to engage said outer shell and to maintain communication between the interior of the liner and the space adjacent said insulating breaker strips, said breaker strips being unsealed, the said envelope establishing a temperature differential between the outside of the liner and the outside of the envelope whereby the coldest exposed surface for condensation is the inside of the liner, and moisture condensation from the air is eliminated from the porous insulation to keep the latter in the best insulating condition, said liner being formed with an outwardly turned flange at the top for engagement with the envelope and the breaker strips, said envelope being hermetically sealed against said flange to prevent access of moisture between the envelope and outer wall of the liner, and said refrigerant coils comprising metal tubular coils extending about the outer wall of the liner between the envelope and liner.

6. In a freezer chest construction, the combination of an inner lining of heat conducting material with a grooved metal member engaging the outside of said inner liner and having grooves therein for forming a plurality of refrigerant conduits, said conduits communicating with a groove at one end to provide an inlet manifold with a groove at another end of said conduits to provide an outlet manifold, the said grooved metal member being secured to the outside of the liner at its edges in liquid-tight sealing contact and having a plurality of points of securement located between the said refrigerant conduits for segregating said conduits from each other, and a relatively thin insulating envelope surrounding the said grooved metal member and engaging the outer surface of said grooved metal member and having moisture-tight covering in sealing engagement with the outside of said liner, whereby the temperature differential is established between the outside of said envelope and the inside of said liner, an outer shell for said freezer chest, insulating breaker strips joining said inner shell and said outer shell at an opening in said chest, an insulating closure for said opening, said insulating closure engaging said outer shell and maintaining communication between the interior of said lining and the space adjacent said breaker strips, said breaker strips being unsealed and porous insulation between the outer shell and in-

ulating envelope, whereby moisture which finds access to the porous insulation will be condensed on the inside of the liner in preference to the warmer outside of the envelope, to maintain the porous insulation in a dry and highly insulating state.

7. In a freezer chest construction, the combination of an inner lining of heat conducting material with a grooved metal member engaging the outside of said inner liner and having grooves therein for forming a plurality of refrigerant conduits, said conduits communicating with a groove at one end to provide an inlet manifold with a groove at another end of said conduits to provide an outlet manifold, the said grooved metal member being secured to the outside of the liner at its edges in liquid-tight sealing contact and having a plurality of points of securement located between the said refrigerant conduits for segregating said conduits from each other, and a relatively thin insulating envelope surrounding the said grooved metal member and engaging the outer surface of said grooved metal member and having moisture-tight covering in sealing engagement with the outside of said liner, whereby the temperature differential is established between the outside of said envelope and the inside of said liner, an outer shell for said freezer chest, and porous insulation between the outer shell and insulating envelope, whereby moisture which finds access to the porous insulation will be condensed on the inside of the liner in preference to the warmer outside of the envelope, to maintain the porous insulation in a dry and highly insulating state, the said outer shell being provided with closure means for closing and opening in said chest and liner, and the said liner being provided with a plurality of apertures extending through the liner to the porous insulation beneath said closure means whereby any moisture which finds its way into the porous insulation will eventually be condensed on the inside of the liner, which is of lower temperature than any other part to which the moisture has access.

8. The method of eliminating condensation of water in the fibrous insulation which insulates a refrigerator cabinet, having an inner lining at a low temperature, which comprises maintaining an insulation of all of the outer parts of said inner lining by a close, thin layer of insulation, maintaining an hermetic seal about all sides of the latter insulation from the external air and from said lining by a waterproof compound, excluding air from the space between said latter insulation layer and the outside of said inner lining, by occupying said space with said waterproof compound, maintaining the exterior of said hermetically sealed insulation layer at a temperature above that of the liner, and maintaining an open communication air path from the space occupied by said fibrous insulation to the interior of said liner, so that all condensing moisture finds its way to the inner surface of the liner while the fibrous insulation is kept dry and of high insulating value.

9. In a refrigerator cabinet construction, the combination of an outer substantially hermetic shell with an inner shell, the inner shell and outer shell being joined about a door opening by an insulating breaker strip means which is maintained in an unsealed air leaking condition, closure means for said opening engaging the outer shell and projecting inwardly in said opening but spaced from said insulating breaker means to permit access to the insulating breaker

means from the interior of the inner shell, a relatively thin layer of rigid insulation provided on its outside, inside and edges with an air-tight and waterproof layer of sealing compound, said rigid insulation surrounding all of the outer surface of said inner shell and said sealing compound filling the space between said rigid insulation and said inner shell to exclude any air from contact with the exterior of said inner shell, and fibrous insulation disposed between said outer shell and the waterproof covering of said rigid insulation, the exterior of said rigid insulation being maintained at a temperature differential above that of the interior of the inner shell to establish a vapor pressure difference between the inside of the liner and the outside of the moisture-proof rigid insulation, whereby the moisture which finds its way into the space between the shells passes through the unsealed breaker strips into the inner shell and is condensed on the inside of the inner shell, maintaining the porous insulation in a dry and high insulating condition.

10. In a refrigerator cabinet construction, the combination of an outer substantially hermetic shell with an inner shell, the inner shell and outer shell being joined about a door opening by an insulating breaker strip means which is maintained in an unsealed air leaking condition, closure means for said opening engaging the outer shell and projecting inwardly in said opening but spaced from said insulating breaker means to permit access to the insulating breaker means from the interior of the inner shell, a relatively thin layer of rigid insulation provided on its outside, inside and edges with an air-tight and waterproof layer of sealing compound, said rigid insulation surrounding all of the outer surface of said inner shell and said sealing compound filling the space between said rigid insulation and said inner shell to exclude any air from contact with the exterior of said inner shell, and fibrous insulation disposed between said outer shell and the waterproof covering of said rigid insulation, the exterior of said rigid insulation being maintained at a temperature differential above that of the interior of the inner shell to establish a vapor pressure difference between the inside of the liner and the outside of the moisture-proof rigid insulation, whereby the moisture which finds its way into the space between the shells passes through the unsealed breaker strips into the inner shell and is condensed on the inside of the inner shell, maintaining the porous insulation in a dry and high insulating condition, said inner shell having evaporator tubing on its inner wall, said tubing being secured to the inner wall by a heat conducting securing means.

11. In a refrigerator cabinet construction, the combination of an outer substantially hermetic shell with an inner shell, the inner shell and outer shell being joined about a door opening by an insulating breaker strip means which is maintained in an unsealed air leaking condition, closure means for said opening engaging the outer shell and projecting inwardly in said opening but spaced from said insulating breaker means to permit access to the insulating breaker means from the interior of the inner shell, a relatively thin layer of rigid insulation provided on its outside, inside and edges with an air-tight and waterproof layer of sealing compound, said rigid insulation surrounding all of the outer

surface of said inner shell and said sealing compound filling the space between said rigid insulation and said inner shell to exclude any air from contact with the exterior of said inner shell, and fibrous insulation disposed between said outer shell and the waterproof covering of said rigid insulation, the exterior of said rigid insulation being maintained at a temperature differential above that of the interior of the inner shell to establish a vapor pressure difference between the inside of the liner and the outside of the moisture-proof rigid insulation, whereby the moisture which finds its way into the space between the shells passes through the unsealed breaker strips into the inner shell and is condensed on the inside of the inner shell, maintaining the porous insulation in a dry and high insulating condition, said inner shell having an evaporator tubing secured to its outer wall surface by a heat conducting means and said sealing compound also filling the spaces between the tubing and between the inner shell and the rigid insulation.

12. In a refrigerator cabinet construction, the combination of an outer substantially hermetic shell with an inner shell, the inner shell and outer shell being joined about a door opening by an insulating breaker strip means which is maintained in an unsealed air leaking condition, closure means for said opening engaging the outer shell and projecting inwardly in said opening but spaced from said insulating breaker means to permit access to the insulating breaker means from the interior of the inner shell, a relatively thin layer of rigid insulation provided on its outside, inside and edges with an air-tight and waterproof layer of sealing compound, said rigid insulation surrounding all of the outer surface of said inner shell and said sealing compound filling the space between said rigid insulation and said inner shell to exclude any air from contact with the exterior of said inner shell, and fibrous insulation disposed between said outer shell and the waterproof covering of said rigid insulation, the exterior of said rigid insulation being maintained at a temperature differential above that of the interior of the inner shell to establish a vapor pressure difference between the inside of the liner and the outside of the moisture-proof rigid insulation, whereby the moisture which finds its way into the space between the shells passes through the unsealed breaker strips into the inner shell and is condensed on the inside of the inner shell, maintaining the porous insulation in a dry and high insulating condition, the said inner shell having joined to it a second metal shell provided with a plurality of embossed grooves which form evaporator conduits.

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