

Sept. 9, 1947.

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2,427,048

SPACED WALL HEAT INSULATED REFRIGERATOR CABINET

Filed Oct. 22, 1943

2 Sheets-Sheet 1

FIG. 1.

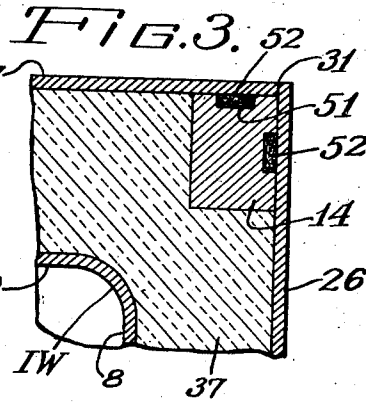
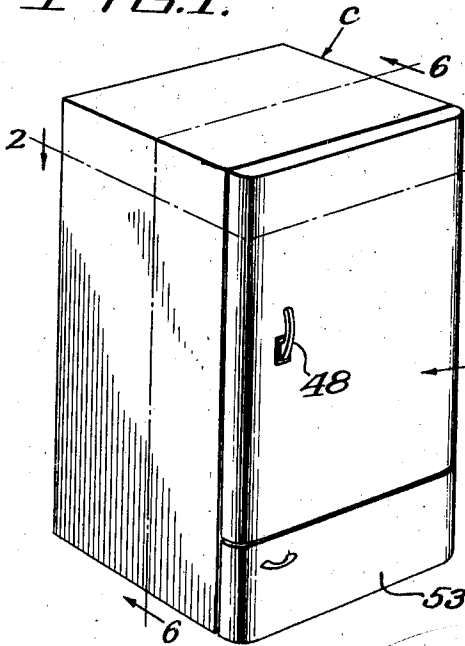


FIG. 4.

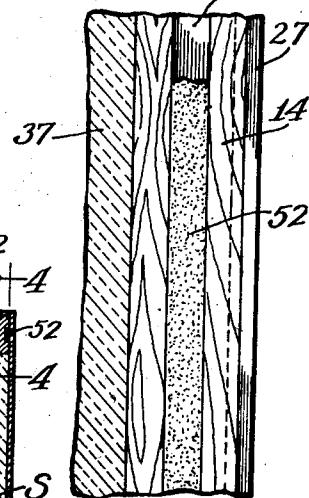


FIG. 2.

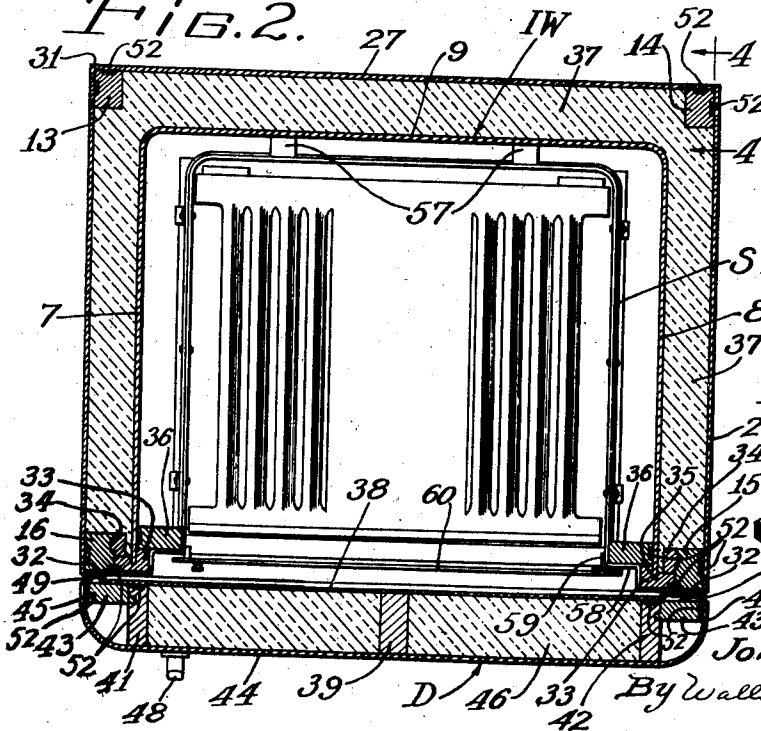
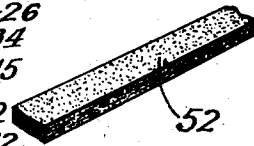


FIG. 5.



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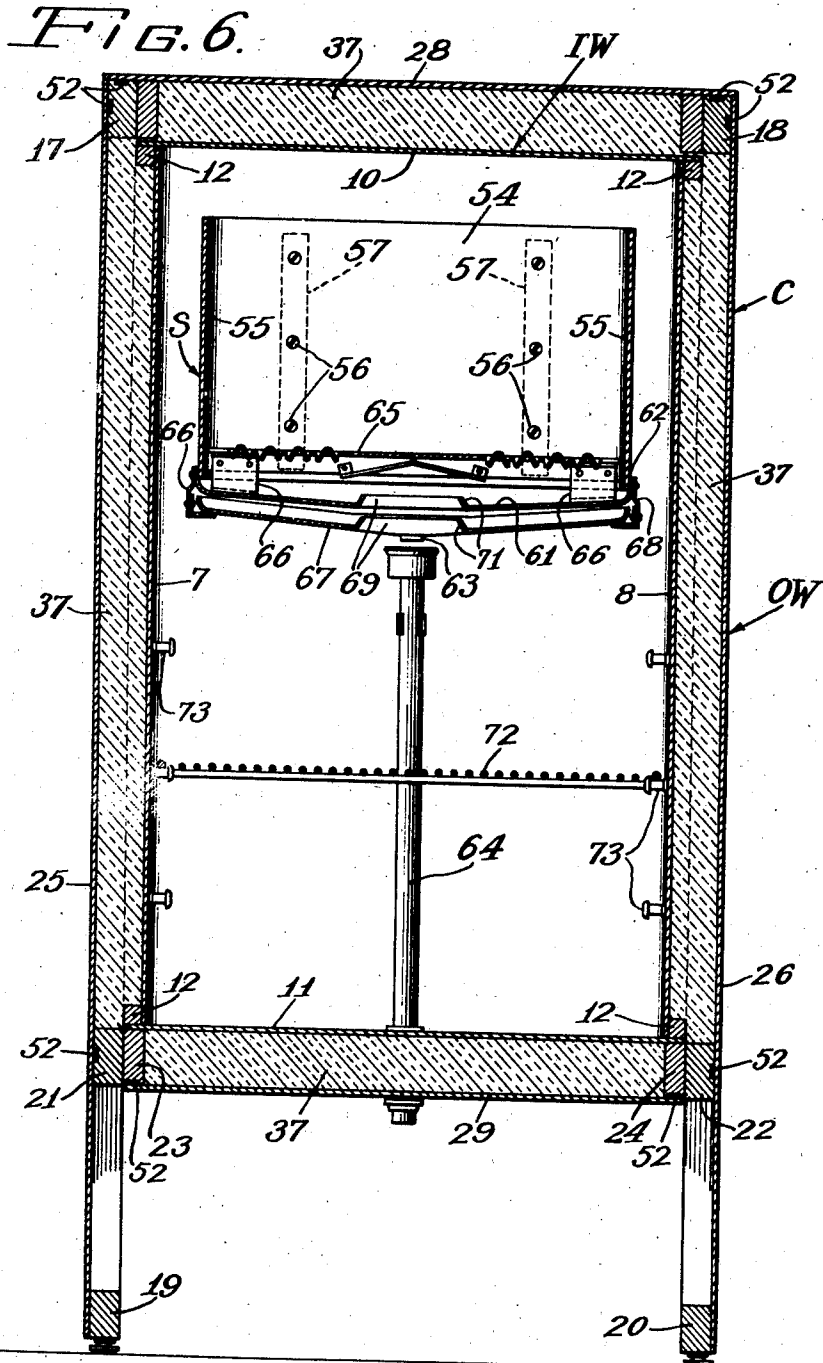
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SPACED WALL HEAT INSULATED REFRIGERATOR CABINET

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2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE

2,427,048

## SPACED WALL HEAT INSULATED REFRIGERATOR CABINET

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4 Claims. (Cl. 220—9)

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This invention relates to refrigerator and like cabinets that include one or more compartments surrounded by insulation to enable maintenance of a temperature therein below or above that of the surrounding atmosphere and this invention primarily has to do with sealing the insulation provided about such a compartment or compartments from the atmosphere surrounding such a cabinet.

A refrigerator or like cabinet which includes one or more compartments in which a temperature is maintained below or above that of the atmosphere surrounding the cabinet usually has an inner wall structure that defines the compartment or compartments and also an outer wall structure that is spaced from the inner wall structure so as to thereby afford an area in which suitable insulating material may be confined to thereby insulate the compartment or compartments enclosed by the inner wall structure. Usually in such arrangements the inner wall structure is effectively sealed so as to prevent the ingress or egress of air into or out of the compartment enclosed by such wall structure and from and into the area in which the insulating material about such wall structure is confined. In such cabinets, however, it is difficult to arrange the outer wall structure in such a way as to prevent the ingress or egress of air into and from the area in which the insulating material is confined and particularly past joints or seams in the outer wall structure. It is therefore an important object of this invention to so seal an area in which insulating material may be confined in a refrigerator or like cabinet that the ingress or egress of air into and from such insulated area in so far as the outer wall structure of the refrigerator may be concerned will be prevented.

In a refrigerator where the compartment or compartments defined by the inner wall structure usually consist of a compartment in which food may be stored, commonly called a food compartment, and sometimes also a compartment in which a coolant such as ice or the evaporator of a refrigerating system may be arranged, the temperature maintained in such compartments is effective to cool the inner wall structure. In such circumstances if air from the surrounding atmosphere may pass into the area in which the insulation is confined about the inner wall structure, it has been found that such air upon coming in contact with the cooled inner wall structure gives up its moisture with the result that free water collects in the insulating area and in the insulation and this reduces the insulating effect

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and is otherwise objectionable. Therefore, yet another object of my invention is to prevent the collection of free water in the insulation and insulating area of a refrigerator.

Refrigerator and like cabinets usually include upright posts at the corners thereof and rails are extended between these posts to interconnect the same, and the various walls of an outer wall structure are joined to these posts and rails to be retained in position. I have observed that the ingress and egress of air into and from the insulating area in a refrigerator is usually past the surfaces of such posts and rails because of the difficulty of uniting the walls of the outer wall structure with the faces of such posts and rails in such a way as to prevent air seepage therebetween. Hence, yet another object of this invention is to seal the connection between the faces of posts, rails or the like in a cabinet structure and the walls laid thereagainst in such a way as to prevent air seepage past faces of such posts, rails or the like and the walls laid thereagainst; and a related object is to provide sealing strips in between the faces of posts, rails or the like and the walls laid against such faces of such posts, rails or the like so as to thereby prevent air seepage past the faces of posts, rails or the like and walls laid thereagainst.

Yet further objects are to form grooves or rabbets in the outer faces of posts or rails included in a cabinet structure, such as a refrigerator cabinet, in which grooves or rabbets strips of sealing material may be laid; to employ a resilient sealing material which may be compressed into such grooves when a wall is secured to the face of the rail or post in which the groove or rabbet receiving the sealing strip is formed; and to locate such grooves and sealing strips adjacent to joints in the outer wall structure of a refrigerator or like cabinet so as to thereby insure against the seepage of air into an insulating area in the cabinet from such joints.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment and the principle thereof and what I now consider to be the best mode in which I have contemplated applying that principle. Other embodiments of the invention embodying the same or equivalent principle may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

Fig. 1 is a perspective view of a cabinet of the character in which my invention may be embodied.

Fig. 2 is a horizontal sectional view taken substantially on the line 2—2 on Fig. 1;

Fig. 3 is a fragmentary sectional view drawn to an enlarged scale of a portion of the cabinet as it is illustrated in Fig. 2;

Fig. 4 is a sectional view drawn to an enlarged scale and taken substantially on the line 4—4 on Fig. 2;

Fig. 5 is a fragmentary perspective view of a sealing strip of the character employed in the practice of this invention; and

Fig. 6 is a vertical sectional view taken substantially on the line 6—6 on Fig. 1.

The cabinet C illustrated in the accompanying drawings is adapted for use as an ice refrigerator and includes an inner wall structure, generally indicated by IW, which embodies vertical side walls 7 and 8 and a vertical back wall 9 that are desirably formed from a single sheet of material. The inner wall structure IW also includes a top wall 10 and a bottom wall 11 which, as best shown in Fig. 6, desirably extend beyond and outwardly of the side walls 7 and 8 and which, in a like manner, extend beyond and outwardly of the rear wall 9. Strips as 12 may be provided to engage the marginal portions of the walls 10 and 11 that extend outwardly of the walls 7, 8 and 9 and these strips 12 are also laid against the adjacent faces of the walls 7, 8 and 9. The aforesaid outwardly extended marginal portions of the walls 10 and 11 and the adjacent portions of the walls 7, 8 and 9 are desirably joined to the adjacent strips as 12 in a suitable manner. In some instances a suitable sealing compound may be provided along the joints or seams at the junctures of the walls 10 or 11 with the walls 7, 8 and 9 so as to effectively seal the compartment enclosed by the inner wall structure IW from the insulating area afforded in the cabinet, as will be described presently. Moreover, the inner wall structure is suitably supported in the cabinet in a manner described hereinafter.

The cabinet C has four upright posts 13, 14, 15 and 16 at the corners thereof. As best shown in Fig. 6 a rail as 17 extends between adjacent faces of the posts 13 and 16 at the upper ends thereof and a rail 18 correspondingly extends between the adjacent faces of the posts 14 and 15. The ends of the rails 17 and 18 are united with the adjacent post by a mortise and tenon joint or in any other suitable manner, as is well understood in the art. Likewise, rails as 19 and 20 respectively extend between the posts 13 and 16 and 14 and 15 at the lower ends thereof. Yet, further, rails as 21 and 22 respectively extend between the posts 13 and 16 and 14 and 15, the rails 21 and 22 being respectively spaced above the lower rails 19 and 20 to provide means to support the bottom wall 11 of the inner wall structure IW. For this purpose rails as 23 and 24 are respectively secured to the inner faces of the rails 21 and 22, and the marginal portions of the bottom wall 11 that are disposed outwardly of the walls 7 and 8 are rested on the upper edges of the rails 23 and 24, as shown in Fig. 6. Rails, not shown, extend between the posts 13 and 14 in alignment with the rails 17 and 18 and similarly located rails, not shown, extend between the posts 15 and 16. Yet other rails, not shown, extend between the posts 13 and 14 in alignment

with the rails 21 and 22 and yet other similarly located rails, not shown, extend between the posts 15 and 16.

The refrigerator cabinet also includes an outer wall structure, generally indicated at OW which embodies vertical side walls 25 and 26 and a vertical back wall 27 each fashioned from sheet material. A top wall 28 of sheet material also comprises a part of the outer wall structure and a bottom wall 29 of sheet material completes the outer wall structure of the compartment or compartments of the refrigerator cabinet. Preferably, the rear margins of the side walls 25 and 26 and the rear margin of the top wall 28, overlap the respective edges of the rack wall 27 to provide joints as best indicated at 31 in Fig. 3. The inside faces of the marginal portions of the side walls 25 and 26 of the outer wall structure are laid against and suitably secured to the outwardly disposed faces of the related posts 13, 14, 15 and 16, and the related rails 17 and 18. These side walls also lie against the outwardly disposed faces of the respective side rails 21 and 22, and the marginal portions of the top wall 28 of said outer wall structure are laid on and suitably secured to the top faces of the rails 17 and 18 as well as on the corresponding top rails, not shown, which extend between the posts 13 and 14 and 15 and 16, respectively. Similarly, the marginal portions of the back wall 27 are laid against the rear faces of the rear posts 13 and 14 and against the upper and lower rails, not shown, connecting said posts. The bottom wall 29 has its marginal portions laid against the bottom faces of the supporting rails 23 and 24 of the frame structure.

Facing strips 32 which may be of sheet material like that constituting the wall structures are laid against the front faces of the front posts 15 and 16 and the margins of said strips extend inwardly beyond the inner opposed faces of said posts. A finishing or filler strip 33 is united to the rear face of the marginal portion of each facing strip 32, one in tight abutment respectively, with each opposed face of the front posts 15 and 16 as shown in Fig. 2, and similar strips, not shown, are likewise secured to the front, top and bottom rails, not shown, extending between the front posts 15 and 16. Joining of the finishing strips 33 to the respective posts 15 and 16 and to the connecting top rail is reinforced by supplemental strips 34 which are laid against and united as by a mortise and tenon joint to the respective posts or rails and as by an adhesive to the rear or inside face of the related finishing strips 33. The finishing strips 33 are mortised as at 35 on their faces disposed toward the interior of the refrigerator so as to snugly receive respectively the front edge portions of the inner wall structure side, top and bottom walls. The portion of each finishing strip 33 as is disposed inwardly of the respective walls of the inner wall structure provide surface abutments against each of which a rail 36 is secured in a manner to position an edge in tight abutment with the inner face of the respective inner walls 7 and 8. The area between the inner wall structure IW and the outer wall structure OW is completely filled with suitable insulation material 37 which is confined between the walls of said structures to thereby insulate the compartment or compartments enclosed by the inner wall structure.

Access is gained to the interior of the compartment or compartments within the inner wall structure IW through the open front of the refrigerator cabinet. This opening is suitably closed

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by a door structure D including an inner wall 38 of sheet material carried on the inside face of a frame structure consisting of vertically arranged spaced intermediate and side members 39, 41 and 42 respectively, which are interconnected by top and bottom rails, not shown, so as to provide a rigid frame structure. The side margins of the inner wall 38 extend beyond and outwardly of the end members 41 and 42 and likewise the top end margin of said wall extends upwardly beyond the top connecting rail, not shown. Strips 43 are laid against the marginal portions of the inner wall 38 that extend outwardly beyond the frame structure and these strips 43 also abut the related faces of the respective end members 41 and 42 and of the top connecting rail, not shown. The strips 43 may be secured in place by a mortise and tenon joint or in any other suitable manner as is well understood in the art of cabinet making.

The door structure D also includes an outer wall 44 which is laid against the edges of the members 39, 41 and 42 and against the connecting rails constituting the door frame structure. The side and top marginal edges 45 of the outer wall 44 are rolled or otherwise turned rearwardly to lie against the free edge faces of the respective strips 43; and the area between the inner and outer walls is filled with a suitable insulation material 46. Hinges 47 (only one being shown) serve to secure the door structure in place and a latch-handle 48 of any practical construction is provided in a readily accessible place on the outside face of the door structure. When the door structure D is in the closed position shown in Fig. 2, resiliently compressible sealing strips 49 provided on the margins of the inside face of the door structure bear against the facing strips 32 with sufficient firmness as to effect an efficient seal around the door opening.

As previously noted hereinabove the ingress or egress of air into and from the areas in which insulating material 37 and 46 is confined, through seams or joints in the outer wall structures may result in the collection of moisture in the insulation containing areas so as to thereby reduce the insulating effect and in instances of use of certain types of insulation material result in ultimate damage to said material and perhaps damage, by rotting, to the frame structures. The undesirable characteristic in known refrigerator cabinets of the type to which this invention pertains is successfully overcome by the present construction.

As will be more fully explained hereinafter, the various joints or seams, such as at 31, or other places at which there is a possibility of air seepage into or out of the areas containing the insulating material are adequately provided with associated means to effect an hermetic seal. Thus, it will be observed that the faces of various parts of the frame structure against which the walls of the outside wall structure OW are laid, as well as the faces of the door frame structure against which the inner wall of the door structure D is laid, are suitably provided with strips of resiliently compressible sealing material preferably of a kind known to the trade as "Cellufoam." More specifically, the outside faces of the upright posts 13, 14, 15 and 16, and the outside faces of the connecting rails 17, 18, 21 and 22 and 23 and 24, as well as the outside faces of the corresponding rails, not shown, connecting the posts 13 and 14 and 15 and 16 respectively, of the refrigerator cabinet are each suitably grooved or rabbeted as best

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illustrated at 51 in Figs. 3 and 4, to receive snugly a strip of the resiliently compressible sealing material 52 best shown in Fig. 5. The strip of sealing material 52 is of course initially of a width and thickness exceeding the width and depth of the groove into which it is placed so that it must be compressed as to its width upon being laid in said groove prior to mounting of the walls of the outer wall structure. When the respective walls of the outer wall structure OW are laid thereover, as has been described hereinabove, the sealing material is further compressed so as to be wholly contained within the grooves but under sufficient tension to always bear tightly against the overlying wall portion. In this manner a tight hermetic seal is provided at all of the margins of the walls of the outer wall structure so as to thereby prevent seepage of air into the area containing the insulation material through the seams or joints as at 31.

The faces of the strips 36 in abutment with the inside front edge margins of the side walls 7 and 8 of the inner wall structure IW similarly are grooved or rabbeted each to receive a strip of such sealing material 52 to thereby insure an airtight seal at the open front edge of the inner wall structure to prevent seepage of air from the inside of the compartment into the area containing the insulation material 37.

The rear faces of the end frame members 41 and 42 as well as the corresponding faces of the top and bottom rails, not shown, of the frame structure of the door D are similarly grooved or rabbeted each to receive a strip of such sealing material 52 which is compressed by the inner wall 38 of the door when the latter is laid against and secured to the door frame structure. Also, the strips 43 extending outwardly laterally from the door frame side members 42 are likewise grooved on their free edge faces so as to receive a strip each of such sealing material 52 which strips are compressed when the side margins of the rolled over edge portions of the outer wall 44 of the door are located thereover.

It should be evident at this time that the inner and outer wall structures of the refrigerator cabinet are so constructed and assembled that any air which may pass through the seams and joints as 31 in their construction is barred from passage into and from the area between the inner and outer wall structures containing the insulation material 37 by the sealing strips 52. Thus seepage of air at atmospheric temperatures into the interior of the compartment or compartments contained within the inner wall structure IW as well as the ingress or egress of air into or from the area containing the insulation material is thus prevented in an efficient and inexpensive manner and the damaging effect of such seepage on the insulation material is avoided and the efficiency of the refrigerator is maintained at a high level. The refrigerator cabinet is made complete by the inclusion of a drawer 53 which is slidable into the space beneath the bottom wall 29 of the outer wall structure OW and between the downwardly extending portions of the side walls 25 and 26 of the outer wall structure.

The compartment provided within the inner wall structure IW of the refrigerator cabinet is of course intended to be divided into what may be called a food compartment and a refrigerant compartment. The latter compartment may contain an evaporator of a refrigerating system or, as shown in the present exemplification of the invention, may contain a suitable structure S to

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support a coolant, such as ice. The structure, best illustrated in Figs. 1 and 6, includes a substantially U-shaped shell positioned within the upper portion of the compartment in such manner that its intermediate portion provides a back wall 54 of an ice receiver and its spaced walls 55 define the side walls of such receiver. The shell is secured in place by screws 56 extending through straps 57 mounted on the back wall 9 of the inner wall structure IW in a manner to hold the shell spaced from said back wall to allow for the free circulation of air. The free front margins of the side walls 55 rest against related edges of the strips 36 and they may be secured thereto by angle brackets 58 one of which affords, a mounting for hinges 59 (only one shown) by means of which a closure 60 is attached to the U-shaped shell so that the inside of the ice receiver may be closed from view when the refrigerator cabinet door D is open.

A bottom wall or drain pan 61 is secured by its surrounding flanges 62 to the lower margin of the U-shaped shell and it is depressed to direct water resulting from the melting of ice in the receiver and collected thereon through a drain spout 63 into the cupped upper end of a drain pipe 64. The ice is supported upon a corrugated and perforated floor 65 mounted within the shell and spaced above the drain pan 61 by depending legs 66. Because of the probability of condensation forming on the outside surfaces of the U-shaped shell and the drain pan 61, it is necessary to suspend a drip pan 67 below the drain pan 61 preferably by means of hanger straps 68. This drip pan 67 is similar to the drain pan 61 in that its bottom is inclined towards and communicates with the drain spout 63. The drain pan and the drip pan are each formed with a central opening 69 having an upstanding surrounding flange 71 to prevent collected water from flowing out of the pans through the openings. These openings are to facilitate circulation of air, within the compartments, through and around the ice receiver whereby maximum cooling efficiency results.

The lower or food compartment within the inner wall structure IW may contain one or more shelves 72 each of which will be supported at its side edges upon suitable supports such as the studs 73 mounted in any suitable manner on the inside faces of the side walls 7 and 8 of said inner wall structure.

Hence, while I have illustrated and described a preferred embodiment of the invention, it is to be understood that it is capable of variation and modification and it is therefore not intended that the invention be limited to the precise details set forth, but that it is capable of embodying such changes and alterations as fall within the purview of the following claims:

I claim:

1. A refrigerator cabinet including an inner wall structure including side walls defining a compartment having an open front side, a frame structure including upright front and back pairs of posts and connecting rails surrounding said inner wall structure each having a groove in their outwardly disposed faces, top, bottom, back and side wall portions arranged with their margins laid against the said outside faces of related posts and rails to define an outer wall structure having a corresponding open front side, a strip of resiliently compressible sealing material contained in each groove having surface contact with such outer wall margins overlying the grooves to

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prevent air seepage between the margins and related posts and rails into and out of the areas between the inner and outer wall structures, a filler strip joined to the inside opposed faces of each of the front posts in overlapping relation with the free front edges of the side walls of the inner wall structure, a mortise in the back face of each strip to receive the front edge margins of the said inner side walls, the front faces of the front posts and the joined filler strips being recessed at the joint between said parts, a strip of resilient sealing material in said recesses, and a facing strip laid against the front face of each front post and its joined filler strip, said sealing strips preventing air seepage into the space between the inner and outer wall structures past the joints between the front posts and their joined filler strips.

2. A refrigerator cabinet including an inner wall structure including top, bottom, back and side walls, defining a compartment having an open front side, a frame structure including upright front and back pairs of posts and connecting rails surrounding said inner wall structure, the outwardly disposed faces of the posts and rails each having a groove therein substantially co-extensive therewith, top, bottom, back and side wall portions arranged with their margins laid against the outside faces of related posts and rails to define an outer wall structure enclosing the inner wall structure and having a corresponding open front side, a strip of resiliently compressible sealing material compressed in each groove having surface contact with such outer wall margins overlying the grooves to prevent air seepage between the margins and related posts and rails into and out of the areas between the inner and outer wall structures, an insulation material filling the area between said wall structures, a filler strip on each front post disposed in overlapping relation with the free front edges of the side walls of the inner wall structure, each filler strip being formed to engage a front edge margin of an inner side wall, a second strip laid against and secured to the back face of each filler strip each with edge abutment with the inside marginal face of a side wall of the inner wall structure, a strip of sealing material carried in said wall abutting edges of the second strips and at the joint in the front face of the front post and attached filler strip, and a facing strip laid against the front face of each front post and its attached filler strip, said sealing strips preventing air seepage into the space between the inner and outer wall structures past the second strips and the abutted wall margins and past the joints between the front posts and their attached filler strips.

3. A refrigerator cabinet including an inner wall structure including top, bottom, back and side walls surrounding a compartment having an open front side, a frame structure including upright front and back pairs of posts and connecting rails surrounding said inner wall structure, the outwardly disposed faces of the posts and rails each having a groove therein, said grooves being substantially co-extensive with the lengths of the posts and rails, top, bottom, back and side wall portions arranged with their margins laid against the outside faces of related posts and rails to define an outer wall structure enclosing the inner wall structure and having a corresponding open front side, a strip of resiliently compressible sealing material laid in each groove having surface contact with such outer

5 wall margins overlying the grooves to prevent air seepage between the margins and related posts and rails into and out of the areas between the inner and outer wall structures, a filler strip arranged on inside opposed faces of each of the front posts in overlapping relation with the free front edges of the side walls of the inner wall structure, a mortise in the back face of each filler strip to receive the front edge margins of the said inner side walls, a second strip laid against and united to the back face of each filler strip each with edge abutment with the inside marginal faces of the side walls of the inner wall structure, said wall abutting edges of said second strips having a groove therein and a groove at the joint in the front face of the front post and attached filler strip, a strip of resiliently compressible sealing material in each of said grooves, and a facing strip laid against the front face of each front post and its attached filler strip, said sealing strips preventing air seepage into the area between the inner and outer wall structures past the second strip and the abutted inner wall margins and past the joints between the front posts and their attached filler strips.

4. A refrigerator cabinet including an inner wall structure surrounding a compartment having an open front side, a frame structure including upright front and back pairs of posts and connecting rails surrounding the inner wall structure, the outwardly disposed faces of the posts and rails each having a groove therein, top, bottom, back and side wall portions arranged with their margins laid against the outside faces of related posts and rails to define an outer wall structure enclosing the inner wall structure and having a corresponding open front side, a strip of sealing material laid in each groove having surface contact with such outer wall margins overlying the grooves to prevent air seepage between the margins and related posts and rails into and out of the areas between the inner and outer wall structures, a filler strip arranged on inside opposed faces of each of the front posts in overlapping relation with the free front edges

of the side walls of the inner wall structure, a mortise in the back face of each filler strip to receive the front edge margins of the said inner side walls, a second strip laid against and united to the back face of each filler strip each with edge abutment with the inside marginal faces of the side walls of the inner wall structure, said wall abutting edges of said second strips having a groove therein and a groove at the joint in the front face of the front post and attached filler strip, a strip of sealing material in each of said grooves, and a facing strip laid against the front face of each front post and its attached filler strip, said sealing strips preventing air seepage into the area between the inner and outer wall structures past the second strip and the abutted inner wall margins and past the joints between the front posts and their attached filler strips.

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