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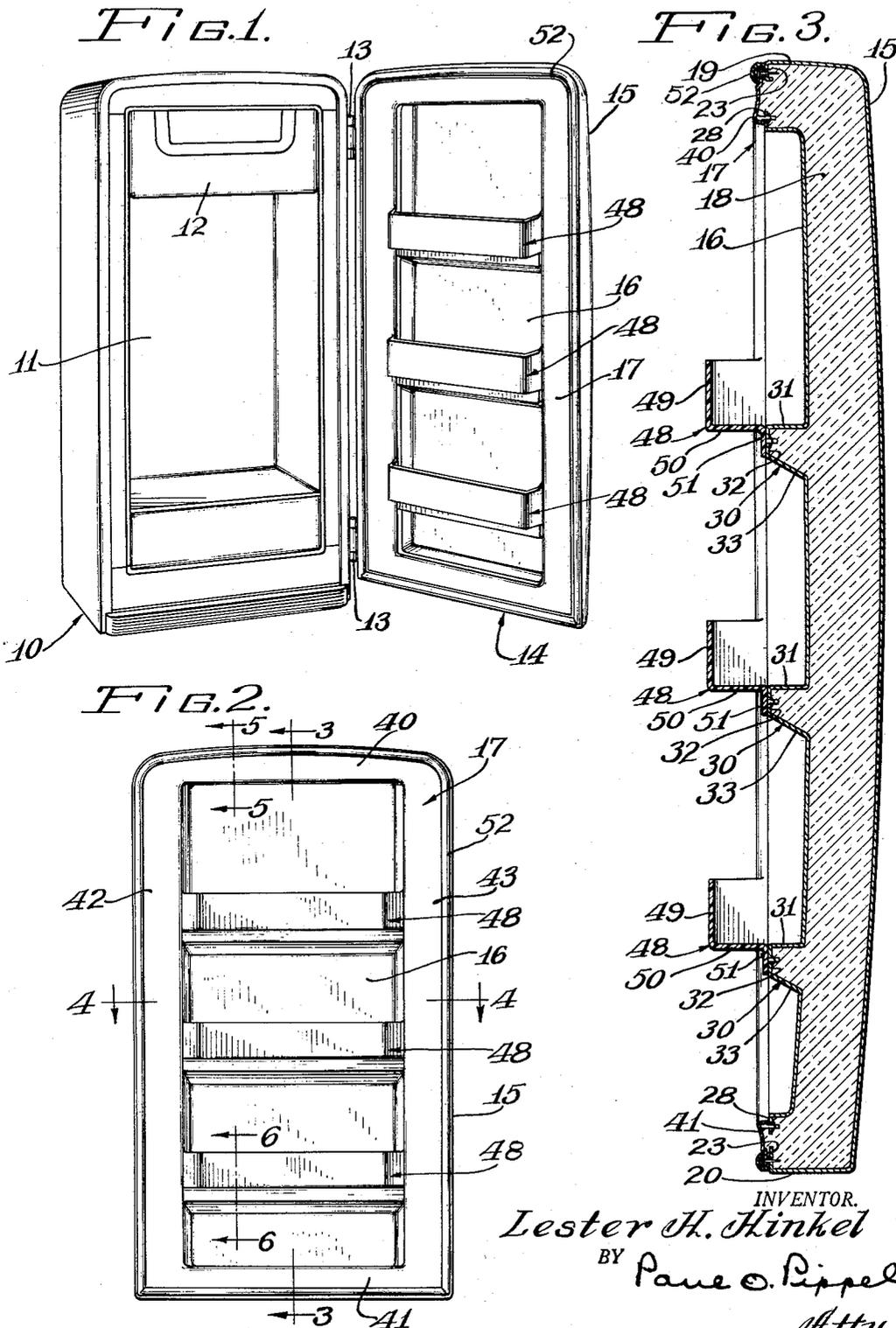
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REFRIGERATOR DOOR AND SHELF STRUCTURE

Filed Nov. 20, 1951

2 Sheets-Sheet 1



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FIG. 4.

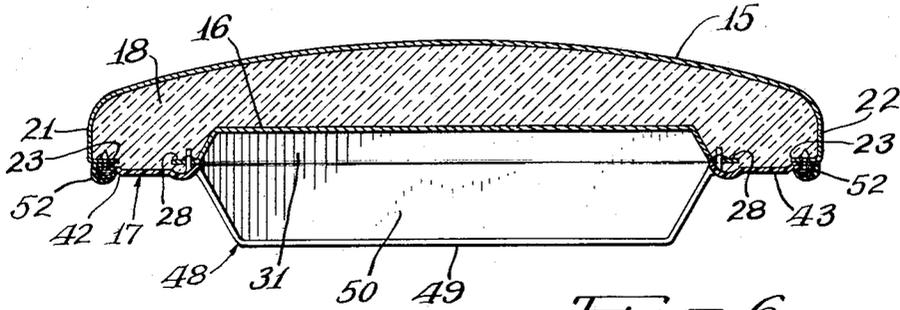


FIG. 6.

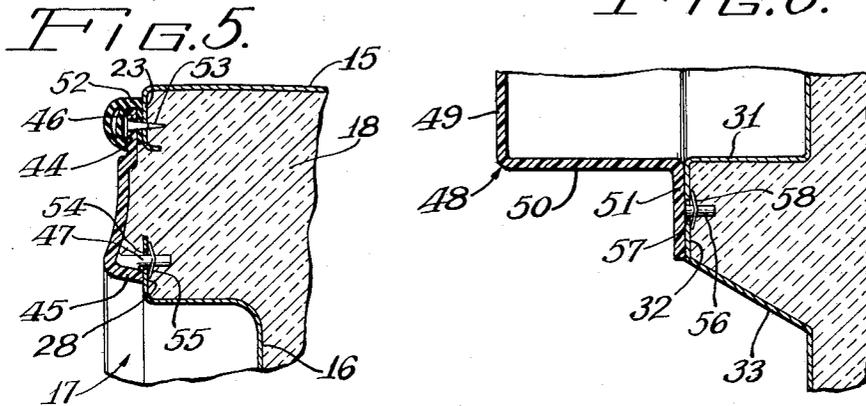
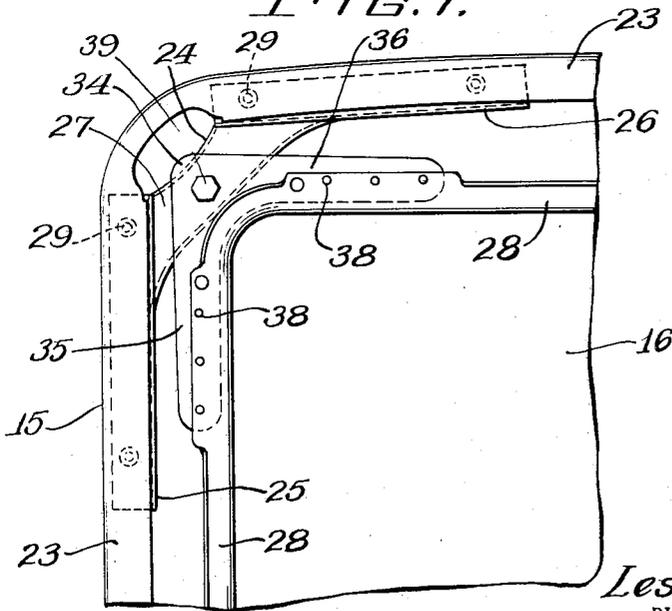


FIG. 7.



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REFRIGERATOR DOOR AND SHELF STRUCTURE 5

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6 Claims. (Cl. 312—214)

This invention relates generally to a refrigerator door and more specifically to a refrigerator door for closing and sealing the food storage compartment of a refrigerator cabinet.

In the manufacture of refrigerators of the household type, it has been the practice to provide a door having an outer pan and inner liner spaced apart with insulating material therebetween. In the older type unit, both the outer pan and inner liner were generally constructed from sheet metal, whereas, in the newer designs, the inner liner is often formed from plastic. The plastic inner liner is advantageous over the metal pan in that it transfers less heat, is more economical to manufacture and produces a lighter door. However, the plastic inner liner has the disadvantages of having a high coefficient of expansion which presents the problem of securing the liner to the outer shell, having poor structural strength so that door braces are required, and being susceptible to cracking and warping. It is becoming common to provide food storage shelves on the inner pan of the door but because of the difficulty of making long draws and sharp corners in plastic sheets, it is impractical to construct a plastic liner with shelves formed as a part thereof. The present invention is concerned with overcoming the disadvantages of both the metal and plastic inner liners.

One object of the present invention is to provide a refrigerator door having a metallic outer pan and a metallic inner liner spaced therefrom with insulating material therebetween.

Another object of the invention is to provide the door with a plastic frame having a portion thereof secured between the edges of the outer pan and inner liner so that the transfer of heat between the pan and liner will be reduced.

Another object of the invention is to secure the plastic frame to said pan and liner in a manner that will allow expansion and contraction of the various parts of the door without producing any stresses therein.

Another object of the invention is to provide the inner surface of said inner liner with projections which serve as the inner portion of door shelves.

Another object of the invention is to provide the plastic frame with horizontal channels which serve as the outer portion of the door shelves.

Another object of the invention is to provide means for attaching the plastic frame to the inner liner so that the channels and projections cooperate to form door shelves.

Another object is to provide the corners of the inner liner with non-conducting support brackets by which the inner liner is secured to said outer pan.

These and other objects of the invention and the various features and details of the construction, arrangement and operation thereof are hereinafter fully set forth and described, and shown in the accompanying drawings, in which:

Figure 1 is a perspective view of a domestic refrigerator

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embodying the present invention, the refrigerator door being in open position to better illustrate its construction.

Figure 2 is a rear elevational view of the refrigerator door of Figure 1.

Figure 3 is an enlarged sectional view of the door taken along line 3—3 of Figure 2.

Figure 4 is an enlarged sectional view of the door taken along line 4—4 of Figure 2.

Figure 5 is an enlarged fragmentary view in section taken along line 5—5 of Figure 2.

Figure 6 is an enlarged fragmentary view in section taken along line 6—6 of Figure 2.

Figure 7 is an enlarged rear elevational view of one corner of the door having the plastic frame removed in order to better illustrate the supporting means for the inner liner.

Referring now more particularly to the drawings, reference number 10 designates the usual refrigerator cabinet having an interior food storage compartment 11 with a refrigerant evaporator 12 suspended in the upper portion thereof. It is contemplated that refrigerant compressing and condensing means (not shown) be supplied for delivering refrigerant to the evaporator 12 whereby the compartment 11 will be cooled by the cold surfaces of the evaporator. Shelves (not shown) may also be positioned within the compartment 11 on which food articles may be placed for storage. Hingedly connected to cabinet 10 by hinges 13 is a door 14 which is adapted to close and seal the open front of compartment 11.

The door 14 comprises generally an outer pan 15, an inner liner 16, a frame member 17 and insulating material 18. Outer pan 15 is preferably constructed from sheet metal and is generally rectangular shaped with the edges thereof bent inwardly into a top wall 19, bottom wall 20 and side walls 21 and 22 each of which is provided with a bent in edge or flange 23. As best seen in Figure 7, each of the four corners of outer pan 15 is provided with a corner bracket 24 having a first leg 25 and a second leg 26 connected by a web portion 27. The legs 25 and 26 are inserted under flanges 23 and secured thereto by rivets 29. The brackets 24 strengthen the door and provide means for securing the inner liner 16 thereto as explained hereinafter.

The inner liner 16 may also be constructed from sheet metal and is generally rectangular shaped with the edges curved inwardly and being provided with outturned flanges 28. The central portion of the inner liner 16 is formed with three transversely extending projections 30, each of which comprises a top horizontal wall 31, a vertical front wall 32 and a bottom inclined wall 33. As seen in Figure 7, each corner of the inner liner is provided with a support bracket 34 having the legs 35 and 36 thereof placed under the flange 28 and being secured thereto by rivets 38. The support brackets 34 overlap the corner brackets 24 and are secured thereto by bolts 39 with the flanges 28 of the inner liner 16 being disposed in the same vertical plane as the flanges 23 of the outer pan 15. The space enclosed by the pan 15 and liner 16 is filled with an insulating material 18.

With the inner liner 16 and outer pan 15 secured in assembled position, the flanges 28 of the inner liner are spaced inwardly from the flanges 23 of the outer pan. In order to provide a finished appearance to the door 14, a frame 17 is supplied for bridging between the flanges 23 and 28. This frame is preferably fabricated from plastic or other material having a low coefficient of heat conductivity. The frame comprises a top section 40, bottom section 41 and side sections 42 and 43 which are fabricated into a rectangular shape. Each of these sections is provided with an offset outer edge 44 and an inwardly turned inner edge 45. The outer edges 44 of

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the frame 17 are provided with spaced apart apertures 46 therethrough whereas the inner edges 45 are provided with spaced apart cylindrical shaped projections 47. The frame 17 is further provided with three transverse channels 48 which connect to side sections 42 and 43. Each channel 48 comprises a front wall 49 and bottom wall 50 having a downwardly extending edge 51.

Frame 17 is positioned with offset edges 44 adjacent flanges 23 of outer pan 15, inturned edges 45 abutting flanges 28 of inner pan 16 and downturned edges 51 of the channels 48 contacting front walls 32 of projections 30. A rubber gasket 52 fits over the offset edges 44 of the frame 17 and clips 53 extend through apertures 46 and fasten to flange 23 whereby the gasket 52 and edge 44 are secured thereto. Flanges 28 of the inner pan 17 are provided with apertures 54 through which the projections 47 of frame 17 extend and are secured thereto by fasteners 55. The downturned edges 51 of channels 48 are also provided with cylindrical projections 56 which extend through apertures 57 provided in front walls 32 of projections 30 and are secured thereto by fasteners 58. The apertures 54 in the flanges 28 and the apertures 57 in the projections 30 of the inner pan 16 have a substantially larger diameter than the cylindrical projections 47 and 56 in order that the frame will be free to contract and expand during temperature changes.

The bottom walls 50 of the channels 48 are in alignment with the top walls 31 of projections 48 and cooperate therewith to provide shelf space. The frame 17 bridges across the flanges 23 and 28 and since it is constructed from plastic or similar material, it will transfer a minimum amount of heat between the outer pan 15 and inner liner 16. When the door 14 is closed, the gasket 52 will contact the cabinet 10 and will seal the food storage compartment 11 from the outside air. The shelves are readily accessible when the door is opened so that food articles can be conveniently placed thereon and removed therefrom.

From the foregoing it can be seen that the present invention provides a refrigerator door which incorporates many advantages and desirable design features. It is economical to manufacture and can be easily and quickly assembled. The inner liner 16 is well insulated from the outer pan 15 so that the efficiency of the refrigerator will not be affected by heat transfer between the pan and liner. The door is sturdily constructed whereby warping and twisting is prevented without the necessity of braces. The frame and inner liner cooperate to form the food storage shelves whereby deep draws and sharp bends are eliminated in both the inner pan and frame.

While a preferred form has been disclosed hereinbefore, it is realized that other forms will readily suggest themselves to those skilled in the art and consequently it is to be understood that, consistent with the principles hereinbefore enumerated, the invention is not limited to the particular form disclosed.

What is claimed is:

1. A refrigerator door comprising, an outer pan and an inner liner spaced therefrom with insulating material therebetween, the edges of said inner liner being spaced inwardly from the edges of said outer pan, a plurality of brackets mounted to said edges at the corners of said inner liner and said outer pan for mounting said inner liner to said outer pan and means for bridging across said edge portions and for providing for portions of a number of storage shelves, said means comprising a frame member having the outer edges thereof in engagement with the edges of said outer pan and the inner edges thereof in engagement with the edges of said inner liner, said inner liner being formed with a number of horizontal projections, said frame member further being formed as a unitary structure having transverse channels which cooperate with said projections to form a number of storage shelves.

2. A refrigerator door comprising an outer pan having

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inturned edge portions which are provided with flanges, an inner liner secured in spaced relationship to said outer pan with the edges thereof spaced from said flanges, insulating material disposed between said pan and said liner, said inner liner being formed with a projection which has a horizontally disposed top wall, a frame member having the outer edge thereof secured to said flanges and the inner edge thereof secured to the edges of said liner, said frame being formed as a unitary structure having a transverse member which is located adjacent to said projection in alignment with said top wall, said transverse member and said top wall forming a storage shelf.

3. A refrigerator door comprising an outer pan having inturned edge portions which are provided with flanges, an inner liner secured in spaced relationship to said outer pan with the edges thereof spaced from said flanges, insulating material disposed between said pan and said liner, said inner liner being formed with a projection which has a front wall and a top wall, a frame member having the outer edge thereof secured to said flanges and the inner edge thereof secured to the edges of said liner, said frame being formed as a unitary structure having a transverse member having a bottom wall and a downturned edge portion, and means for securing said downturned edge portion to said front wall with said bottom wall and said top wall disposed in a common plane whereby they cooperate to form a storage shelf.

4. A refrigerator door comprising an outer metallic pan having inturned edge portions which are provided with flanges, an inner metallic liner secured in spaced relationship to said outer pan with the edges thereof spaced from said flanges, insulating material disposed between said pan and said liner, said inner liner being formed with a projection which has a horizontally disposed top wall, a frame member having the outer edge thereof secured to said flanges and the inner edge thereof secured to the edges of said liner, said frame being constructed from material having a low coefficient of heat conductivity, said frame further being formed as a unitary structure having a transverse member which is located adjacent said projection and cooperates with said top wall to form a storage shelf.

5. In a refrigerator door, an outer pan and an inner liner spaced therefrom with insulating material therebetween, the edges of said inner liner being spaced inwardly from the edges of said outer pan, means for bridging across said edge portions and for providing a storage shelf, said means comprising a frame member having the outer edge thereof secured to the edges of said outer pan and the inner edge thereof slidably secured in one plane to the edges of said inner liner whereby the frame member is free to expand and contract, said liner being formed with a projection which has a horizontally disposed top wall, and said frame further being formed as a unitary structure having a transverse member which is located adjacent said projection in alignment with said top wall so that a storage shelf is formed thereby.

6. In a refrigerator door, an outer panel formed to have side walls at the outer marginal edges thereof, an inwardly extending flange formed at the outer edges of said side walls, an inner panel having the peripheral edge portions thereof positioned substantially in a plane including said flange, said inner panel formed to have projections disposed transversely thereof, four brackets, each of said brackets mounted to said flange diagonally across one of the corners of said outer panel, each one of said brackets further mounted to one of the corners of said inner panel, insulation disposed between said inner and outer panels, a framing member formed of a material of low heat conductivity and having a shape conforming to the shape of the space between the outer marginal edges of said inner and outer panels, said framing member further integrally formed to have channels disposed transversely thereof, and means for mounting said framing member to said flange and said inner panel with said

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channels in cooperation with said projections, whereby the space between the outer marginal edges of said inner and outer panels is sealed and shelves are formed on said door.

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