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REFRIGERATOR CABINET CONSTRUCTION

Filed June 21, 1968

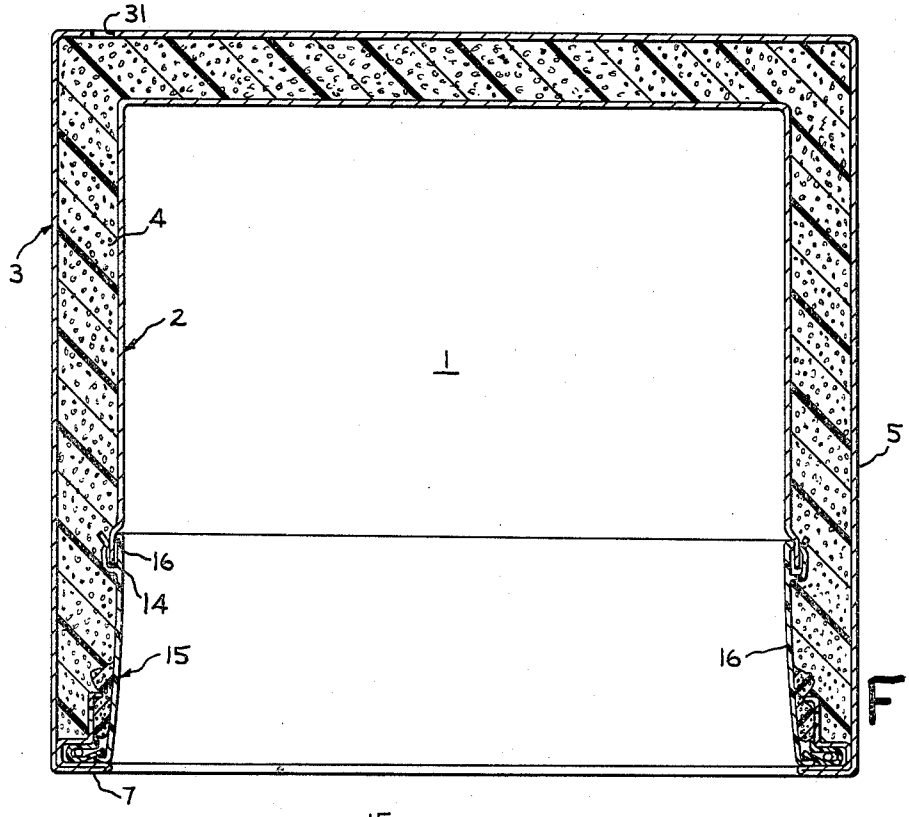


FIG. 1

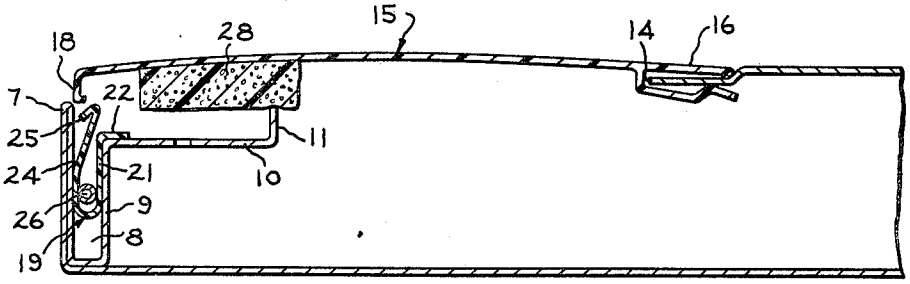


FIG. 2

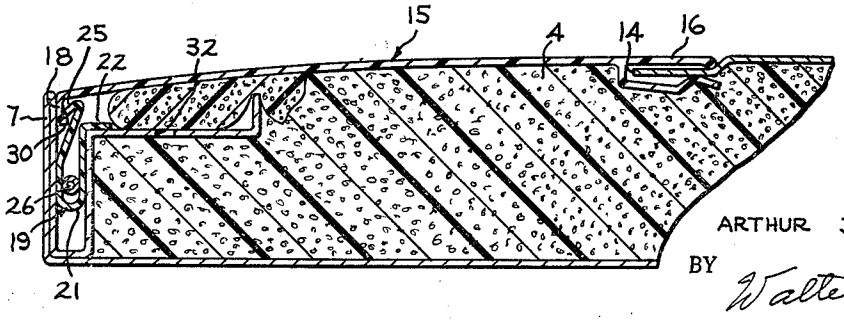


FIG. 3

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REFRIGERATOR CABINET CONSTRUCTION

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ABSTRACT OF THE DISCLOSURE

A refrigerator cabinet comprising an outer shell and inner liner bonded to the shell by a body of foamed plastic insulating material formed in the space between the shell and liner after assembly of the liner within the shell. The shell has a forward edge portion formed to include an inwardly opening U-shaped channel, and an inwardly extending flange spaced rearwardly from the channel. A breaker strip of resilient material, bridging the space between the front wall and the liner includes foam sealing means engaging the flange and an outwardly extending lip at the forward edge thereof overlying the rear surface of the front channel wall. A spring clip of U-shaped cross section positioned within the channel includes one leg overlying the breaker strip flange for anchoring the strip relative to the shell.

BACKGROUND OF THE INVENTION

In the construction of many household refrigerator cabinets, the shell and liner are bonded together by a body of foamed resin insulation filling the space between the shell and liner. Also in accordance with the usual practice, the front edge of the liner is spaced from the front edge of the shell and this space bridged by a heat insulating breaker strip surrounding and more or less defining the access opening to the compartment formed by the liner. To minimize the number of assembly steps, the breaker strip is frequently positioned between the liner and shell prior to the foaming operation and thus becomes anchored in place by the foamed insulation. A problem encountered in making refrigerators of such construction involves preventing the foam from contacting and encapsulating the case heater which is used to warm the front portion of the shell defining the face of the cabinet sufficiently to prevent sweating of such surfaces under relatively high humidity conditions.

SUMMARY OF THE INVENTION

The present invention is directed to an improved construction of a foamed insulated household refrigerator in which the outer shell and inner liner are bonded together by means of an insulating foam formed in place between these components after the assembly thereof and is more particularly concerned with an improved construction of such a cabinet in the breaker strip area.

In accordance with the invention, there is provided a refrigerator cabinet including an outer shell and an inner liner spaced from the shell with the space between these two components filled with foamed resin insulation, preferably a foamed polyurethane resin. The forward edge portion of the shell, which forms the face of the cabinet is shaped to include an inwardly opening U-shaped channel including front and rear walls and an inwardly extending flange spaced rearwardly from the rear wall of the channel. A breaker strip of flexible plastic material bridges the space between the forward edge of the liner, which is positioned rearwardly of the shell flange, and the front wall of the channel and includes an outwardly extending lip overlying the rear surface of the front channel wall. A spring clip which also functions to position

a case heater within the channel includes one leg adapted to engage this lip and anchor the breaker strip relative to the shell. In order to prevent foam from entering the channel during the foaming operation, a sealing strip of flexible foam, glass fiber or the like which is preferably adhesively secured to the breaker strip, seals the space between the breaker strip and the shell flange.

BRIEF DESCRIPTION OF THE DRAWING

In the accompanying drawings, FIGURE 1 is horizontal sectional view of a refrigerator cabinet incorporating the present invention;

FIGURE 2 is an enlarged view of the breaker strip portion of the cabinet of FIGURE 1 illustrating one step in the assembly of the liner and breaker strip within the shell; and

FIGURE 3 is a view similar to FIGURE 2 illustrating the final assembly of the cabinet.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the accompanying drawing, FIGURE 1 illustrates, in section, a generally rectangular refrigerator cabinet comprising a storage compartment **1** defined by a liner **2** and having an access opening at the front thereof closed by a door (not shown). The liner **2** is contained within and and spaced from an outer shell **3** forming the exterior surfaces of the cabinet and the space between the inner liner and the outer shell is filled with a foamed resin insulating material **4** which is foamed in place between the liner and shell and serves to bond these two components together.

The outer shell **3** includes opposed side walls **5**, as well as top and bottom walls, and the forward edge portions of each of these walls surrounding the access opening to the storage compartment **1** is formed to include an inwardly extending flange **7** extending at right angles to the side wall. This flange is bent back upon itself as shown more clearly in FIGURE 2 of the drawing then rearwardly along the side wall and then inwardly in spaced relationship with the flange **7** to define an inwardly open channel sections **8** including a front wall composed of the double thickness flange **7** and a rear wall **9**. The material of the shell is further bent to include a rearwardly extending web **10** and an inwardly extending flange **11** parallel to the channel wall **7** and spaced rearwardly from the channel **8**. In the illustrated embodiment, the inner or free edge of the flange **11** is in substantial alignment with the inner edge of the flange or front wall **7** of the channel **8**.

The rectangular liner **2** which is of dimensions such that it can be inserted into the formed shell through the rectangular opening defined by the face flanges **7** includes forward edges **14** which are spaced rearwardly from the flange **11** when the liner is assembled within the shell **3**. Breaker strips **15** includes relatively flat main portions **16** bridging the spaces between the flanges **7** forming the front wall of the channel **8** and the forward edges **14** of the liner **2**.

Each breaker strip **15**, which is preferably formed of a resilient platic material, includes a narrow channel section **16** along the rear edge thereof for receiving and resiliently engaging the forward edge **14** of the liner. Each breaker strip **15** also includes, as is shown more clearly in FIGURES 2 and 3 of the drawing, an outwardly extending lip portion **18** along the forward edge thereof adapted to overlie and engage the rear surface of the shell flange or front wall of the channel **8**.

For the purpose of locking or anchoring the forward edge portion of the breaker strip in substantial alignment with the inner edge of wall **7**, there is provided a plurality

of spring clips generally indicated by the numeral **19**. Each of these clips is of a generally U-shaped cross section and preferably is composed of plastic and extends substantially the full height or width of a wall of the shell **3**. Each of the clips is shown more clearly in FIGURES 2 and 3 of the drawing, includes a rear leg **21** in contact with the rear wall **9** of channel **8** with the end of the leg **21** bent rearwardly as indicated by the numeral **22** to overlie the inner edge of a channel rear wall **9** and the adjacent portion of the web **10**. A portion of the forward leg **24** of each of the clips **19** resiliently engages the rear surface of a flange or channel front wall **7** and the inner end or edge thereof is shaped to provide a hook portion **25** adapted, as shown in FIGURE 3, to engage the rear surface of a breaker strip lip **18**.

In accordance with the preferred aspect of the present invention, the spring clips **19** also provide means for positioning an electric heating element **26** within the channel **8** in heating relationship with the front portions of the shell defining the face of the cabinet. Such heaters are normally provided for warming this portion of the cabinet surrounding the access opening to the storage compartment sufficiently to prevent sweating thereof under high humidity operating conditions.

In order to prevent the liquid foam insulating material from flowing into the channel portion of the cabinet walls during the foaming operation, a pad **28** of sealing material such as a strip of flexible polyurethane foam or of glass fiber is positioned between the rear surface of the breaker strip and the flange **11**. This pad is preferably adhesively secured to the rear surface of the breaker strip in a position such that when the strip is assembled between the liner and shell, the pad **28** will be compressed between the breaker strip and the flange **11** to form a foam-tight seal as illustrated in FIGURE 3 of the drawing.

Some of the advantages of this cabinet construction will become more apparent from a consideration of the ease with which the cabinet components can be assembled. A preferred routine of assembly comprises attaching suitable lengths of breaker strip material or a pre-assembled "frame" of breaker strips to the forward edges **14** of the liner **2**. The clips **19**, with or without the heaters **26** inserted between the legs thereof, are wholly or partially inserted into the channels **8** a distance sufficient to wedge the clips within the channels. Thereafter, with the outer shell **3** lying on its back, the liner and breaker strip assembly is dropped into the shell to the position generally illustrated in FIGURE 2 of the drawing in which the lips **18** are in a position to be pressed outwardly along the inner surfaces of the front walls **7** of the channels **8** or more specifically between these surfaces and the end portions **25** of the clips **19**. These end portions of the clips then resiliently engage the rear surfaces of the lips **18** to lock the breaker strips in engagement with the forward walls of channels **8**. Preferably, as illustrated in FIGURE 3 of the drawing, the hook portions **25** are so shaped as to substantially engage both the rear surface of the adjacent portion of the breaker strip and beads **30** extending along the outer edge of the lip **18** so as to prevent substantial lateral movement of the breaker strips relative to the shell. The portions **22** of the clips engaging the inner edges of the channel rear walls **9** limit the distance which the clips can slide into the channels **8** and hence also serve to position the breaker strip relative to the shell.

As the breaker strips are pressed into position in locking relationship with the spring clips **19**, the sealing material **28** is compressed into engagement with the flange **11** about substantially the entire periphery of the cabinet access opening.

Thereafter, the cabinet is turned on its face in a suitable mold designed to maintain the shell and liner in their proper spaced relationship and support the walls thereof. A liquid foamable resin, which is preferably a foamable polyurethane resin, is introduced into the space between the liner **2** and the shell **3** through one or more openings **31** in the back wall of the shell. If a froth foam, or in other words a partially foamed liquid polyurethane resin, is employed a plurality of vent holes **32** are provided in the webs **10** for permitting the escape of air from the adjacent spaces between the liner and shell as the partially foamed resin flows downwardly towards the forward edges of the cabinet walls. These vents **32** are positioned at a point such that they are covered by uncompressed portions of the sealing strips **28**. Thus air, under the pressure of the expanding foam, can escape through the valves formed by the sealing strip **28** into the area of the channel **8** then outwardly through small cracks or crevices between the breaker strip and the shell. On the other hand, when the foam reaches the vents **32** at a time it is substantially thickened or partially solidified, the strips **28** provide enough resistance to the flow of the foaming resin through the vents **32** as to prevent migration thereof into the channel **8** or into engagement with the forward edges of the breaker strip or the heater **26**.

By this construction, the heater **26** and the clips **19** are prevented from being foamed in place. However, if need be the heater can be easily replaced. This can be conveniently done merely by cutting the breaker strip along a line surrounding the access opening to the cabinet forwardly of the flanges **11**. After heater replacement, the opening between the remaining portions of the breaker strip and the front or face of the cabinet is closed by a properly shaped breaker strip which can be provided as a service package along with the replacement heater.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A refrigerator cabinet comprising:

an outer shell

an inner liner within and spaced from said shell and bonded thereto by a body of foamed plastic insulating material formed in the space between said shell and liner after assembly of said liner within said shell;

said shell including a forward edge portion formed to include an inwardly opening U-shaped channel including front and rear walls, and an inwardly extending flange spaced rearwardly from said rear wall;

said liner including a forward edge spaced rearwardly from said flange,

a breaker strip of resilient material including a main portion bridging the space between said front wall and said liner forward edge in spaced relation to said flange,

said strip including a channel at the rear edge thereof for receiving said liner forward edge and an outwardly extending lip at the forward edge thereof overlying the rear surface of said front wall;

a spring clip of U-shaped cross section positioned within said channel an dincluding one leg engaging the inner edge of said rear wall and the other leg overlying the said breaker strip lip for anchoring said strip relative to said shell,

and a pad of sealing material between said breaker strip and said flange.

2. The cabinet of claim **1** in which said sealing material is a flexible polyurethane foam.

3. The cabinet of claim **1** in which the forward portion of said shell includes a plurality of air vent holes between said channel and said flange and said sealing material overlies said holes.

4. The cabinet of claim **1** including an electric heater for heating said channel front wall, said heater being positioned within said clip.

5. The cabinet of claim **1** in which said lip includes a bead on the rear surface thereof and said other leg of said clip includes a slanting hook portion engaging said lip between said main portion and said bead for restricting movement of said strip relative to said front wall.

6. The cabinet of claim 4 in which said clip extends substantially the full length of said channel.

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220—9, 14; 312—214