United States Patent

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[54] **REFRIGERATION APPARATUS CABINET CONSTRUCTION**
6 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** ..... **220/9 G,** 220/14, 312/214
[51] **Int. Cl.** **B65d 25/18**
[50] **Field of Search** ..... 220/9 G, 9 F, 14; 312/214

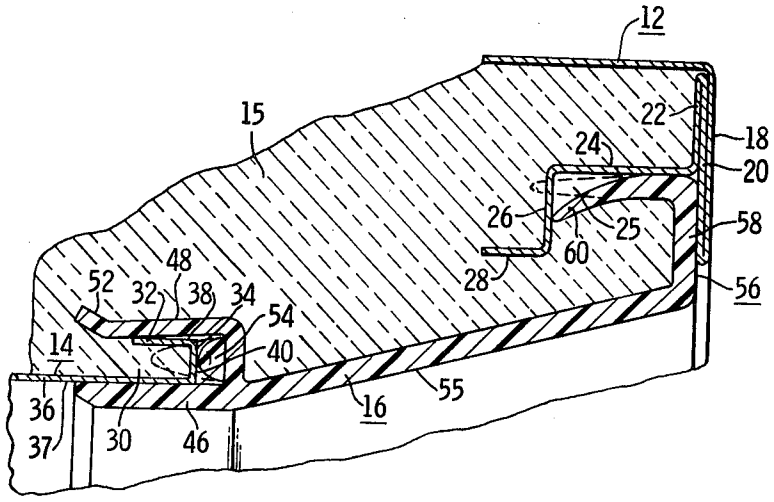
[56] **References Cited**

UNITED STATES PATENTS

3,444,280	5/1969	Pulaski	220/9 F X
3,270,907	9/1966	Swaneck, Jr.	220/9 G
3,338,451	8/1967	Kesling	220/9 F
3,405,986	10/1968	Cannon	220/9 X

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ABSTRACT: The invention provides a thermal breaker trim strip which is snapped into place between the refrigerator inner liner and outer wrapper. This trim strip is put in place before the foaming operation on the refrigerator cabinet and maintains a seal for the expanding liquid polyurethane foam insulation. Accordingly, the trim strip is provided with a forklike end which compressingly envelopes the outer end of the inner liner and a wand end which is disposed in a channel arrangement formed by the outer wrapper. The forklike end includes flexible, compressed fingers which tend to move the trim strip outwardly while the wand end of the trim strip includes a bent over end portion that tends to oppose this motion so that the breaker strip forms a tight seal at both the inner liner and outer wrapper.



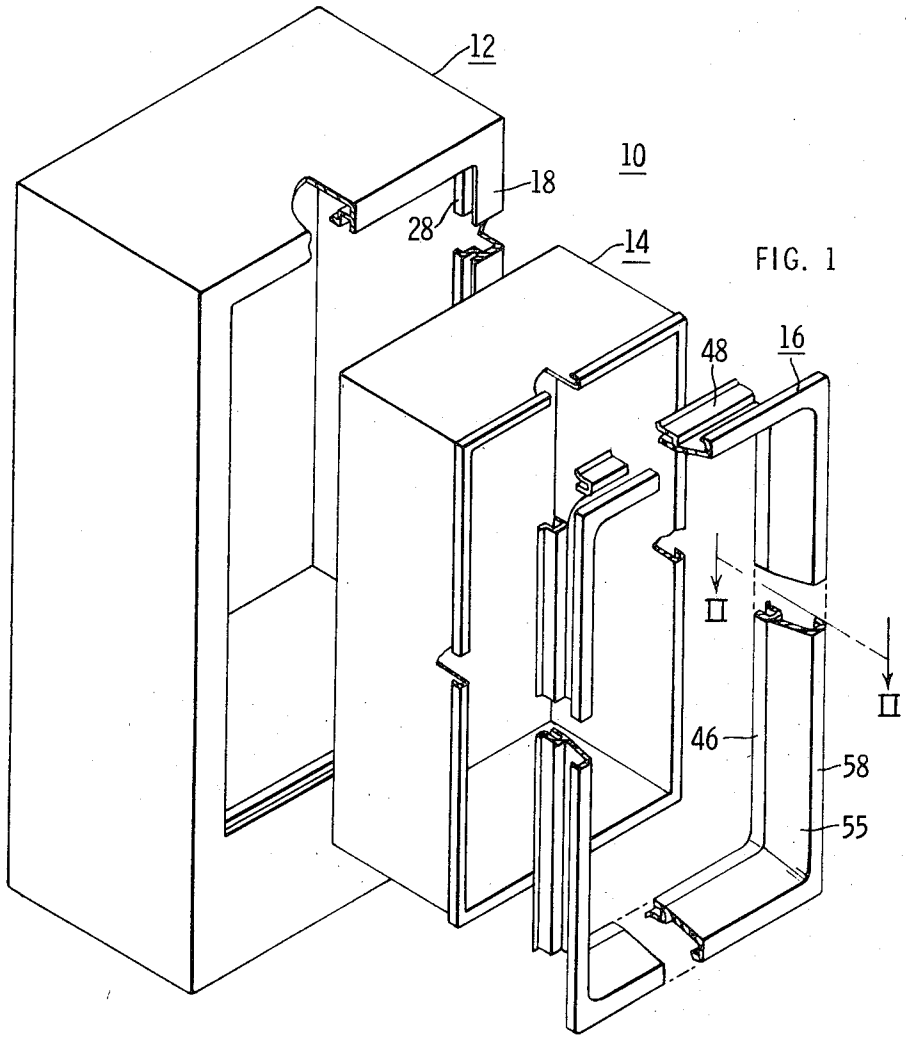


FIG. 1

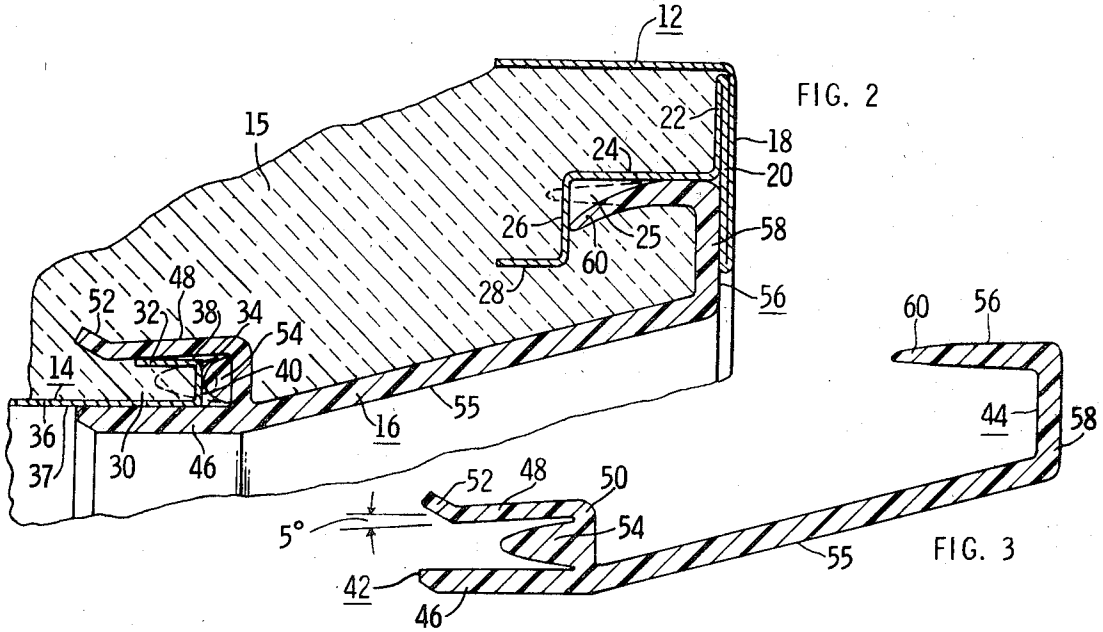


FIG. 2

FIG. 3

REFRIGERATION APPARATUS CABINET CONSTRUCTION

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to a cabinet construction for a refrigeration apparatus and, more particularly, relates to a novel thermal breaker strip arrangement utilized to provide a seal between the inner liner and outer wrapper of the refrigerator cabinet, both in its final configuration and also during the foaming operation when expanding polyurethane foam insulation is inserted between the inner liner and outer wrapper.

2. Description of the Prior Art

A standard method for forming the foam insulation between the inner and outer cabinet walls of a refrigerator calls for expanding the foam in place between the inner liner and outer wrapper with the breaker strip already attached between them so that the gap between the front edges of the inner liner and outer shell are fully sealed to limit the amount of foam cleanup which is required, since such cleanup is a relatively expensive item of refrigeration manufacture. Although previous breaker strips have been designed which perform the foregoing functions, with one of these breaker strip designs being disclosed, for example, in U.S. Pat. No. 3,380,615, owned by a common assignee, such breaker strips have not included a positively acting means for insuring a tight seal between the plastic breaker strip and inner liner and outer wrapper. More specifically, the prior arrangements of breaker strip, such as the one shown in the aforementioned patent, do not provide an integral supplementary means that provides an urging force which tends to provide a positive seal between the breaker strip and the inner liner and the breaker strip and the outer wrapper to maintain the inner liner and, plastic breaker strip and outer shell aligned against the force imposed on them by the expanding polyurethane foam insulation.

SUMMARY OF THE INVENTION

In accordance with the principles of the invention, a novel thermal breaker trim strip is provided between the inner liner and outer wrapper of a refrigerator cabinet. The termination of the inner liner adjacent the trim strip is provided with a connecting flange or web of generally U-shaped cross section that is outwardly directed while the trim strip at this location is provided with a fork end, with one leg of the fork disposed at a slight angle relative to the other so that the fork end compressingly fits over the U-shaped flange of the inner liner. The fork end includes in its bight, a series of flexible, resilient fingers. These fingers deflect upon the assembly of the trim strip to the inner liner thereby tending to force the trim strip forwardly relative to the front of the inner liner. The other end of the trim strip includes a wandlike portion which is nestingly received in a compressing relationship within a U-shaped end formed in the outer wrapper. A flexible end of the wand portion is compressingly disposed against a leg portion of this U-shaped flange so that the aforementioned outward urging imposed on the trim strip by the flexible fingers tends to twist the wand portion outwardly away from the U-shaped panel configuration of the outer wrapper. Movement of the trim strip in this direction is opposed by the fact that the inner flexible end of the wand is received in a bent angular configuration relative to the channel shape which opposes such outward movement. Due to the fact that the ends of the trim strip are acting in opposition to each other, because of the force imposed on the flexible end of the wandlike portion of the trim strip, it is urged more tightly against the outer wrapper to provide an extremely tight seal between this end of the plastic breaker strip and the outer wrapper. At the same time, an outwardly directed portion of the wand is forced into tighter engagement with the outer wrapper.

DRAWING DESCRIPTION

FIG. 1 is an exploded, perspective view of a refrigerator cabinet that utilizes a breaker trim strip according to the principles of the invention;

FIG. 2 is a view in cross section of the breaker trim strip taken on line II—II of FIG. 1 and showing the breaker strip in assembled relation; and

FIG. 3 is an end view of the breaker strip in uncompressed condition.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment of the invention will be described in connection with the accompanying drawings, wherein; a refrigerated cabinet **10**, as shown in FIG. 1, includes an open front shell or outer wrapper **12**, an open front liner or inner liner **14** which is supported by nesting in the open front shell and a breaker strip means **16** disposed between and connecting these two elements. The portions of the open front shell **12** and open front liner **14** which are of particular interest to the instant invention (FIG. 2) are the front edges thereof which define a gap **15** that must be sealed by the breaker strip means **16**.

The front face of the open front shell or outer wrapper **12** that generally frames the front of the refrigerator cabinet **10** includes a right-angle portion **18** which has integrally attached thereto a bent back portion **20**, with this portion and the portion **18** providing a strengthened overlapped steel shell at the front of the refrigerator **10**. Integrally attached to the bent back portion **20** is an overlapping portion **22** that extends for substantially one-half the linear extent of the bent back portion **20** to provide a triple thickness for at least a portion of the outer wrapper disposed at the front of the refrigerator. The bent back portion **20** terminates in a right angle which is formed by its intersection with an inwardly directed portion **24**, with the most outward or forward portion of the bent back portion **20** of the double thickness wall and the inwardly directed portion **24** forming two legs of a generally U-shaped channel member **25** in cross section. The third leg of this U-shaped channel is formed by a web **26** that is integral with inwardly directed portion **24** and at a right angle to it. Attached integrally to the web **26** is a terminal portion **28** that extends at a right angle to this web and forms at its termination along with the outward termination of the inner liner **14**, described below, the gap **15** between the inner liner and outer wrapper.

The open-front liner or inner wrapper **14** terminates, at its outer periphery, in a web or channel means **30**, this web being formed by the outer flange of the inner liner member being folded backwardly on itself to form an inwardly directed portion **32**, a backwardly directed portion **34** and an outwardly directed portion **36** so that the web has an inwardly directed face **38**, a border face **40** and an outwardly directed face **37**.

The plastic breaker strip **16** can be best seen in FIG. 3 in its uncompressed condition, and, there it can be seen that it comprises a wand portion **44** at its one end, and a fork portion **42** at its other end. Fork portion **42** includes a pair of outwardly directed tangs **46** and **48**, with the tang **48** being of slightly less width than the tang **46** (in cross section) so that it has a larger tendency towards bending than the tang **46**. These tangs extend nearly parallel to each other for their full linear extent and are displaced horizontally relative to each other by a connecting portion **50**, which is of the same cross section as tang **48** to insure that no sink appears on the front of the breaker strip when in installed position. As previously set out, the tangs **46** and **48** are nearly parallel to each other; however, the tang **48** is given an inwardly directed slope relative to tang **46** of approximately 5° so that these two tangs when in an assembled relationship with the web of the inner liner **14** compressingly encompass it to maintain the breaker strip **16** in assembled relationship therewith.

The tang **48** also includes, adjacent its termination, short, inwardly directed portion **52** which is angled relative to the

remainder of the tang 48 away from the tang 46 so as to provide an alignment means for the fork portion 42 as it is assembled to the web 30 of inner liner 14. The outwardly directed portion 52, of course, provides no compressing attachment to the inner liner being provided for ease in assembly only. Integrally connected to the connecting portion 50 of the wand portion 44 in the "bight" thereof are a series of upwardly projecting fingers 54, these fingers being of the same material as the remainder of the breaker strip 16 so as to provide a series of members with some inherent resiliency so that assembly of the breaker strip 16 to the inner liner 14 causes a compression on these fingers (FIG. 2) which tends to place these fingers in an inwardly slanted arrangement relative to the open front liner 14. It should be clear that such an assemblage provides a force or unbalanced moment which tends to turn the plastic breaker strip 16 forwardly relative to the inner liner 14.

Integrally attached to the fork portion 42 of the plastic breaker strip 16, outwardly of the fork portion 42, is a generally angularly disposed portion 55 which extends outwardly relative to the inner liner and angularly relative to the tangs 46 and 48 and merges into the wand portion 44. As illustrated in FIG. 3, in uncompressed condition, the wand portion 44 has in cross section or end view the general shape of a right-angled member 56 integrally attached to the angular portion 54. The right-angled member 56 includes an outwardly disposed portion 58 that extends parallel and in alignment to the bent back portion 20 of open front shell 12. Extending inwardly from this outwardly disposed portion is a tang portion 60, this portion being generally parallel to the tangs 46 and 48 of the fork portion 42 when in an uncompressed condition. Tang 60 generally tapers from its outer end joining with outwardly disposed portion 58 to its inner end so as to provide a fairly thin section adjacent its inner termination. Thus, the tang 60 is provided with more inherent resiliency and therefore a greater tendency to bend intermediate its ends than the outwardly disposed portion 58. The wand portion 44 is thereby easily assembled within the open channel configuration formed by the bent back portion 20, inwardly directed portion 24 and web 26 of the outer wrapper 12 with the tang 60 deforming so as to fit within the channel configuration.

Due to the aforementioned forward urging of the breaker strip 16 by the flexible fingers 54 and the resulting forward turning motion imparted to the breaker strip 16, the wand portion 44 tends to be pulled out of its engagement with the open channel configuration of the outer wrapper 12. This movement also tends to pull the wand portion 44 out of the channel-shaped recess, causing the tang 60 to engage even more closely against the web 26 because of the wedging action imparted thereto. This engagement provides the main sealing point between the breaker strip 16 and the open front shell 12. A secondary sealing is occasioned at the abutment of the outwardly disposed portion 58 of the wand with the bent back portion 20 of the outer wrapper 12. Thus, a pair of sealing surfaces are provided by the abutment of the wand 44 with the open front shell 12. Furthermore, since outward turning of the plastic breaker strip 16 is resisted by the tang 60, the deforming force on flexible fingers 54 acts to seal more closely the wand portion 44 to the outer wrapper at the primary and secondary sealing locations.

Although only a breaker strip forming the closure member between the inner liner and outer liner wrapper at one side of the refrigerator 10 has been shown, similarly shaped breaker strips extend completely around the refrigerator enclosure thereby positively assembling the outer wrapper 12 to the inner liner 14 and providing a seal therebetween to enable the foaming of a polyurethane plastic in the space therebetween for insulation purposes. The corners of the breaker strips may be connected together by any conventional arrangement such as an integral molding of the entire breaker strip. Although no corner assembly is shown, the breaker strips for example, may be joined at their corners in a manner similar to that shown in FIG. 3, of U.S. Pat. No. 2,682,965, although four individual pieces could be utilized connected at their corners in a conventional manner.

Although the invention has been illustrated in its preferred form and that form described in detail, it will be apparent to those skilled in the art that various modifications may be made therein without departing from the spirit of the invention and without the exercise of the inventive faculty.

I claim:

1. Refrigerator apparatus cabinet construction comprising:
   a. an outer wrapper,
   b. an inner liner nested in said outer wrapper,
   c. open channel means attached to said outer wrapper and disposed adjacent said inner liner,
   d. channel means attached to said inner liner and disposed adjacent said outer wrapper,
   e. said outer wrapper and said inner liner being spatially displaced from each other,
   f. breaker strip means disposed between said outer wrapper and said inner liner and connected to each to cover the space therebetween,
   g. said breaker strip means including means integral with said breaker strip means for urging said breaker strip means and outer wrapper more closely together for reducing the spatial displacement therebetween, said means for urging said breaker strip means and outer wrapper more closely together including means on one end of said breaker strip means for urging said breaker strip means outwardly and wedging means on the other end of said breaker strip means for opposing outward movement thereof,
   h. said channel means attached to said inner liner having a bight portion that said means for urging said breaker strip means outwardly directly engages against,
   i. said means for urging said breaker strip means outwardly being compressed by said direct engagement with said bight portion to provide for said outward urging.

2. Refrigerator apparatus cabinet construction comprising:
   a. an outer shell,
   b. a nested inner liner,
   c. said outer shell providing channel means opening adjacent said nested inner liner,
   d. said nested inner liner providing a closed channel means adjacent said outer wrapper,
   e. a breaker strip means for covering the space between said web means and said channel means,
   f. said breaker strip means including a fork portion extending over said closed channel means and a wand portion engaged in said channel means,
   g. a foam insulating material expanded in the hollow space between the walls of said shell and liner and in a direct contact with said breaker strip means,
   h. said fork portion including
      1. a pair of tangs,
      2. one of said tangs extending angularly towards the other of said tangs,
      3. flexible fingers disposed between said tangs and
      4. said tangs engaging over said web means with said flexible fingers deformed by said web means whereby said breaker strip means tends to move forwardly relative to the remainder of said refrigerator apparatus cabinet construction.

3. The refrigerator apparatus cabinet set out in claim 2 wherein said wand portion includes (a) a tang portion disposed within said channel means, and (b) said tang portion being deformingly bent when inserted in said channel means.

4. The refrigerator apparatus cabinet construction set out in claim 3 wherein said forward movement of said breaker strip means urges said deformed tang portion into tighter abutting engagement with said channel means for insuring a proper seal therebetween.

5. The refrigerator apparatus cabinet construction set out in claim 4 wherein one of said tangs of said fork portion includes an angled portion extending away from the linear extent of

said other tang for providing ease of assembly between said breaker strip means and said inner liner.

6. The refrigerator apparatus cabinet construction set out in claim 5 wherein polyurethane foam is disposed between said inner liner and said outer shell.

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