

[54] REFRIGERATOR DOOR CONSTRUCTION
AND METHOD OF FORMING THE SAME

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49/478, 501; 52/615, 619, 621; 312/214, 315

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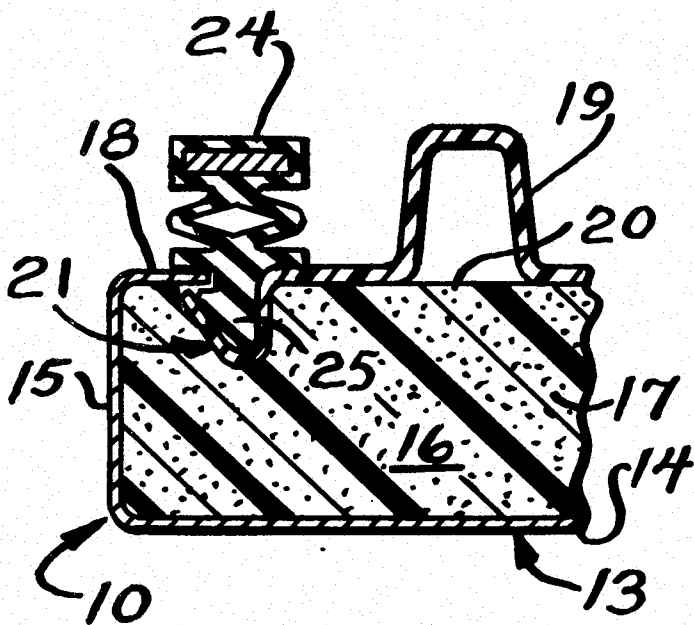
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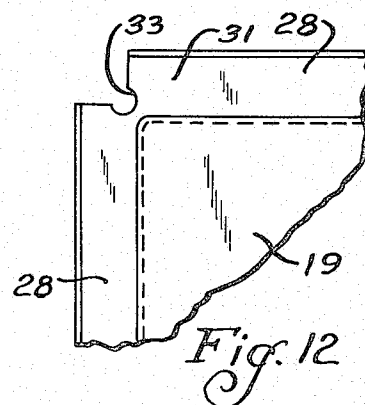
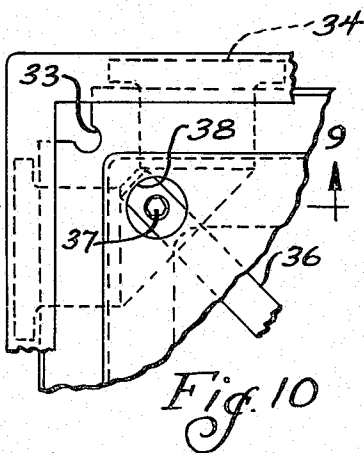
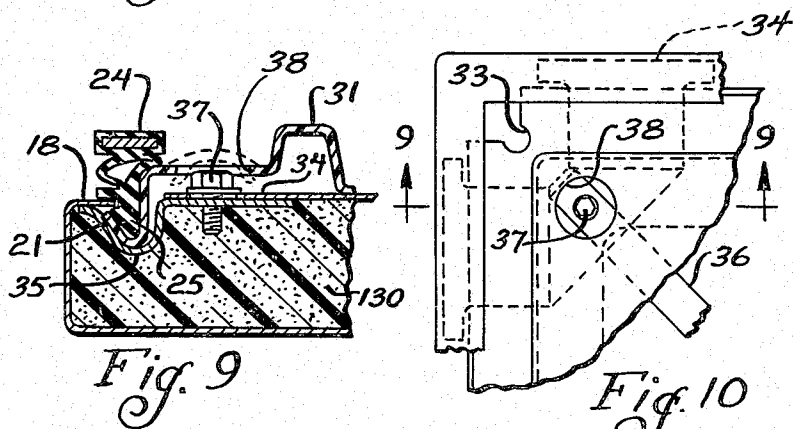
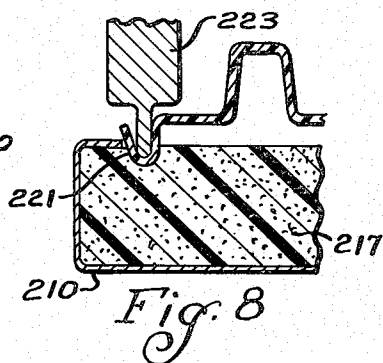
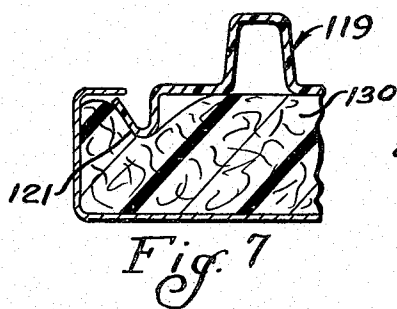
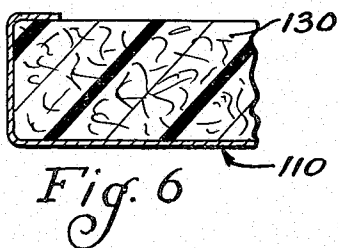
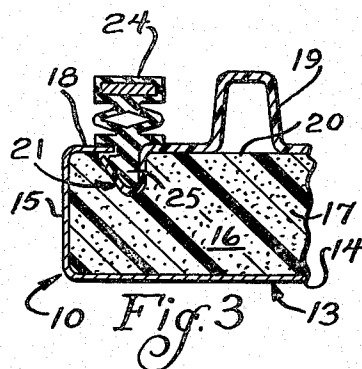
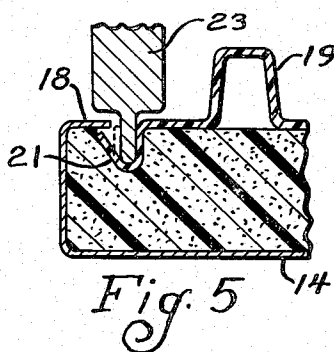
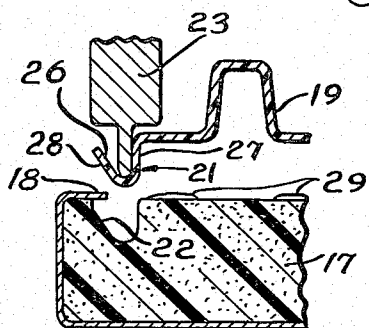
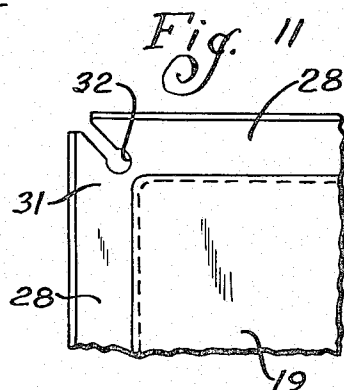
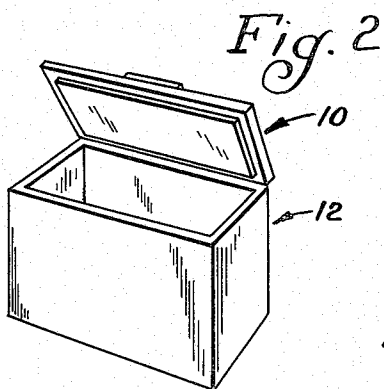
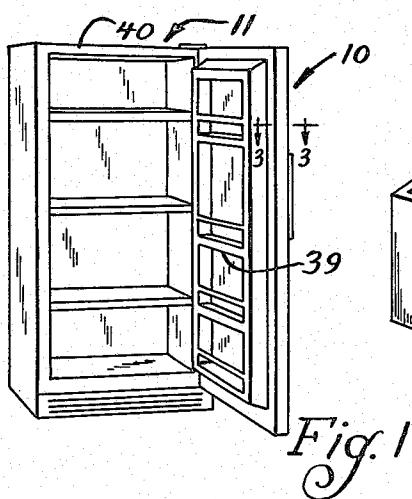
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[57] ABSTRACT

An insulated door construction such as for use as a re-
frigerator door having an inner liner secured to an
outer panel by a snap-in association. A gasket is se-
cured to the door by a portion of the snap-in retaining
structure eliminating the need for screws and gasket
retainers. The door is reinforced by corner brackets
and cross braces. The brackets may be used to posi-
tion the liner relative to the outer panel where the in-
sulation in the door is relatively soft insulation, such as
fiberglass insulation.

19 Claims, 12 Drawing Figures





REFRIGERATOR DOOR CONSTRUCTION AND METHOD OF FORMING THE SAME

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to cabinet constructions, and in particular to insulated door constructions such as for use as refrigerator doors.

2. Description of the Prior Art

In one conventional form of refrigerator door, a body of insulating material, such as foamed plastic, is disposed between an outer painted steel panel and an inner plastic liner. A gasket is mounted to the door to extend around the inner periphery thereof for sealing the door to the body of the refrigerator cabinet across the front opening thereof.

In conventional insulated door constructions of this type, screws and other securing means are employed for retaining the door elements in assembled relationship. One example of a door assembly of the prior art is that shown in U.S. Pat. No. 2,707,808 of F. B. Anderson et al. An evaporator door assembly is disclosed having inner and outer door panels with a body of insulation disposed therebetween with connecting means at the edges of the outer panel and inner panel engageable by movement of each inner panel part relative to the outer panel.

In U.S. Pat. No. 3,097,030 of R. L. Hartley, a closure door for a bread box is shown utilizing a snap-in inner door panel.

In U.S. Pat. No. 3,403,477 of J. W. Light, a door construction is shown having a panel welded to the outer door panel for receiving a gasket in the peripheral edge of the liner.

In U.S. Pat. No. 3,286,424 of R. G. Weyant, a door construction is shown having internal braces to insure desired alignment of the door parts.

In U.S. Pat. No. 3,179,987 of C. Banzet, a flexible door seal is disclosed comprising a gasket carried by connecting means separate from the outer panel and liner.

SUMMARY OF THE INVENTION

The present invention comprehends an improved insulated door construction and method of forming the same wherein an inner liner is retained in association with an outer panel by a snap-in association. The door construction includes a body of insulating material between the inner liner and outer panel effectively supporting the liner in position in the snap-in arrangement.

The snap-in means provided in the door construction further serves to retain a sealing gasket at the periphery of the door, thereby further minimizing the cost of construction.

More specifically, the invention comprehends providing an insulated door construction including an outer panel having an inturned peripheral flange means defining an insulation space adjacent the panel, insulation within the space, means on the flange defining a retaining shoulder overlying a peripheral portion of the space, an inner liner having a resilient peripheral lip portion resiliently snapped under the shoulder, the inner liner covering the first space and retained in place by the snapped under relationship with the shoulder, and door gasket means retained by the shoulder for sealing the liner to the outer panel.

The liner lip portion may be pressed into the insulation in one form of the invention. In another form, the insulation is formed with an inwardly opening recess for receiving the lip portion of the liner.

The lip portion of the liner defines a channel which receives a mounting portion of the sealing gasket and which supports the mounting portion of the gasket in retained association with the retaining shoulder of the outer panel whereby the retaining shoulder serves not only to retain the liner but also the sealing gasket.

The distal portion of the liner lip may extend angularly outwardly so as to permit flexing thereof for facilitated snapped-under association with the outer panel shoulder.

Bracket means may be provided at the corners of the door construction for retaining the liner lip portion in snapped-under association with the outer panel shoulder such as where the insulation material is a relatively soft material, such as fiberglass material. The brackets further may be interconnected by suitable cross braces for rigidifying the door construction.

The corners of the liner may be notched to permit flexing of the adjoining sides concurrently for facilitated installation of the liner in the snap-under operation.

The invention further comprehends the improved method of constructing a refrigerator door including the steps of providing an outer panel having an inturned peripheral flange defining an insulation space, and shoulder means inturned from the flange to overlie a peripheral portion of the space filling the insulation space with insulation, providing an inner liner with a resilient peripheral lip portion, pressing the lip portion into the insulation under the shoulder to retain the inner liner to the outer panel, and installing a door gasket having a portion extending between the lip portion and the shoulder to seal between the inner liner and outer panel.

As indicated above, the insulation may be preformed with a recess for receiving the liner lip portion or, alternatively, the liner lip portion may be pressed into the insulation as by the use of a suitable presser element such as a ram.

The liner panel may be secured to the insulation as by the provision of adhesive means therebetween for further improved retained assembly of the door construction.

Thus, the insulated door construction of the present invention is extremely simple and economical of construction while yet providing the highly desirable advantages discussed above.

BRIEF DESCRIPTION OF THE DRAWING

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a perspective view of an upright refrigeration apparatus having a door construction embodying the invention;

FIG. 2 is a perspective view of a chest-type freezer refrigeration apparatus having a door construction embodying the invention;

FIG. 3 is an enlarged fragmentary horizontal section taken substantially along the line 3—3 of FIG. 1 illustrating the association of the outer panel, insulation, inner liner, and gasket at the periphery of the door construction;

FIG. 4 is a fragmentary section illustrating an intermediate step in the construction of the insulated door;

FIG. 5 is a fragmentary section illustrating a subsequent step in the construction of the insulated door;

FIG. 6 is a fragmentary section illustrating the first step in a modified door construction utilizing a fiberglass pad insulation;

FIG. 7 is a fragmentary section illustrating a subsequent step in a modified door construction utilizing a fiberglass pad insulation;

FIG. 8 is a fragmentary section illustrating another modified method of forming the door construction wherein the liner lip portion is pressed into the insulation;

FIG. 9 is a section illustrating another modified form of door construction embodying the invention utilizing bracket means at the corner of the door construction taken substantially along the line 9—9 of FIG. 10;

FIG. 10 is a fragmentary plan view thereof;

FIG. 11 is a fragmentary plan view of the liner illustrating a notched corner construction thereof; and

FIG. 12 is a fragmentary plan view of a liner utilizing a modified form of notched corner construction.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the exemplary embodiment of the invention as disclosed in the drawing, a door construction generally designated 10 is shown to comprise an insulated door such as for use in an upright refrigeration apparatus, such as freezer 11. As shown in FIG. 2, the door construction 10 may be similarly utilized in connection with a chest-type refrigeration apparatus such as chest freezer 12.

Door construction 10 as shown in FIG. 3 includes an outer panel 13, which may comprise a conventional painted steel panel having an outer face portion 14 provided with an intumed peripheral flange 15 defining an insulation space 16. Insulation 17 may be provided in space 16, and in the illustrated embodiment of FIG. 3, comprises foamed-in-place insulation.

Means defining a retaining shoulder 18 are provided on flange 15 and in the illustrated embodiment, comprise a turned distal portion of flange 15 overlying the periphery of space 16 adjacent flange 15.

An inner liner 19 extends across the inner surface 20 of insulation 17 and includes a resilient peripheral lip portion 21 resiliently snapped under shoulder 18 for retaining the liner in place in the door construction.

As shown in FIG. 4, insulation 17 may be provided with a recess 22 adapted to receive the lip portion 21 of liner 19 when the lip portion is urged past the shoulder 18 as by a suitable presser ram 23 to a snapped-in arrangement, as shown in FIG. 5. As best seen in FIG. 4, liner lip portion 21 includes an outturned flange portion 27 and a reversely turned outwardly angled distal portion 28 cooperatively defining channel 26. Flexing of distal portion 28 at the outer end of flange 21 permits the snapping in of the lip portion 28 under shoulder 18, as shown in FIG. 5.

A sealing gasket 24 having a mounting portion 25 may be installed in the door construction as shown in FIG. 3. By inserting the mounting portion 25 into the outwardly opening channel 26 defined by liner lip portion 21 whereby gasket mounting portion 25 is similarly retained by a snapped-in association with shoulder 18.

As illustrated in FIG. 3, gasket 24 may comprise a magnetic gasket, although as will be obvious to those skilled in the art, any suitable gasket may be employed as desired.

Further, to provide augmented securing of the liner 19 in the door construction, adhesive 29 may be utilized between the panel and inner surface 20 of insulation 17.

Thus, the liner 19 is installed in association with the outer panel 13 and insulation 17 without the need for screws or other fasteners and similarly, the gasket 24 is installed in the door construction without the need for screws or other fasteners, thereby providing an extremely simple and low cost door construction.

Referring to FIGS. 6 and 7, a modified form of door construction 110 utilizing fiberglass insulation 130 in lieu of foamed-in-place insulation of door construction 10, is shown to be generally similar to door construction 10 except that the lip portion 121 of liner 119 is easily pressed into the fiberglass insulation 130. This allows a relatively flexible door for use with the chest-type freezer of FIG. 2 wherein the door can easily conform to the top opening by flexing due to its own weight.

As illustrated in FIG. 8, a further modified form of door construction generally designated 210 is shown to be generally similar to door construction 10 except that the foam insulation 217 is not provided with the recess 22. In this form of door construction, the liner lip portion 22 is pressed into the foam insulation 217 by the presser ram 223.

As illustrated in FIGS. 11 and 12, the liner may be provided at the corners 31 with suitable notches, such as notch 32 illustrated in FIG. 11 and notch 33 as illustrated in FIG. 12, to permit the distal portion 28 at each side of corner 31 to be flexed concurrently in the installation of the liner by the snap-in action under shoulder 18.

As further illustrated in FIGS. 9 and 10, a bracket 34 may be utilized adjacent the corner 31 of the liner, such as where the relatively soft fiberglass insulation 130 is utilized. As shown in FIG. 9, channel 35 receives the mounting portion 25 of the gasket 24 for providing improved retention of the gasket. The brackets 34 may be interconnected by suitable cross braces 36 for further rigidifying the door. The cross braces may be secured to the brackets by suitable means, such as screws 37, with the liner being provided with a suitable opening 38 to provide access to the screws therethrough at the corner portions 31 as shown. The use of the cross braces 36 provides more stability in the door structure and increased strength for improved support of shelves 39 on the liner, as shown in FIG. 1. Further, the cross braces provide an adjustment of the door structure to assure proper sealing of the gasket to the front wall 40 of the cabinet defining the cabinet opening.

The door construction of the present invention simplifies the construction of the insulated door both as to the mounting of the liner to the outer door panel and the mounting of the gasket to the door construction.

The foregoing disclosure of specific embodiments is illustrative of the broad inventive concepts comprehended by the invention.

What is claimed is:

1. An insulated door construction comprising: an outer panel having an intumed peripheral flange means defining an insulation space adjacent said panel; insula-

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tion within said space; means on said flange defining a retaining shoulder overlying a peripheral portion of said space; an inner liner having a resilient peripheral lip portion defining an inwardly opening channel resiliently snapped under said shoulder, said inner liner covering said first space and retained in place by said snapped under relationship with said shoulder, said channel being disposed adjacent said shoulder; and door gasket means having a portion received in said channel with an edge thereof underlying said shoulder to be retained by said shoulder for sealing said liner to said outer panel.

2. The insulated door construction of claim 1 wherein said liner lip portion is pressed into said insulation.

3. The insulated door construction of claim 1 wherein said liner lip portion comprises an outturned flange portion having a reversely turned distal portion engaging said shoulder.

4. The insulated door construction of claim 1 wherein said liner lip portion comprises an outturned flange portion having a reversely turned distal portion engaging said shoulder, said lip portion flange portion and distal portion defining a channel structure projecting outwardly into said insulation and inwardly defining said channel.

5. The insulated door construction of claim 1 wherein said liner lip portion comprises an outturned flange portion having a reversely turned distal portion engaging said shoulder, said lip portion flange portion and distal portion defining a channel structure projecting outwardly into said insulation.

6. The insulated door construction of claim 1 wherein said insulation comprises foamed-in-place insulation.

7. The insulated door construction of claim 1 wherein said insulation comprises fibrous insulation.

8. The insulated door construction of claim 1 wherein said liner lip portion comprises an outturned flange portion having a reversely turned distal portion engaging said shoulder, said reversely turned distal portion comprising a flat wall extending angularly toward said shoulder from the outer end of said liner outward flange portion.

9. An insulated door construction comprising: an outer panel having an intumed peripheral flange means defining an insulation space adjacent said panel, said panel defining a rectangular door means having four corners; insulation within said space; means on said flange defining a retaining shoulder overlying the peripheral portion of said space; an inner liner having a resilient peripheral lip portion defining an inwardly opening channel resiliently snapped under said shoulder, said inner liner covering said first space and retained in place by said snapped under relationship with said shoulder, said channel being disposed adjacent said shoulder; and door gasket means having a portion received in said channel with an edge thereof underlying said shoulder to be retained by said shoulder for

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sealing said liner to said outer panel; and bracket means disposed at each of said door means corners defining means for retaining said liner lip portion in snapped under relationship with said shoulder.

10. The insulated door construction of claim 9 wherein said bracket means extend inwardly of said insulation and include an edge portion underlying said retaining shoulder.

11. The insulated door construction of claim 9 wherein said bracket means defines inwardly opening recesses receiving a portion of said door gasket means and retaining said portion in underlying, retained association with said shoulder means.

12. The insulated door construction of claim 9 wherein cross braces are connected between said bracket means for further rigidifying said door construction.

13. The insulated door construction of claim 9 wherein cross braces are adjustably connected between said bracket means for further rigidifying said door construction.

14. The insulated door construction of claim 9 wherein said inner liner defines corner portions provided with notches extending inwardly through said lip portion to permit concurrent flexing of adjacent side portions of said liner for facilitated snapping-under installation.

15. The method of constructing a refrigerator door comprising the steps of: providing an outer panel having an intumed peripheral flange defining an insulation space and shoulder means intumed from said flange to overlie a peripheral portion of said space; filling said insulated space with insulation; providing an inner liner with a resilient peripheral lip portion defining an inwardly opening channel; pressing said lip portion into said insulation under said shoulder to retain said inner liner to said outer panel and with said channel exposed adjacent said shoulder means; and installing a door gasket in said channel, said gasket having a portion extending between said lip portion and said shoulder to seal between said inner liner and outer panel.

16. The method of constructing a refrigerator door of claim 15 further including the step of preforming a recess in said insulation for receiving said liner lip portion.

17. The method of constructing a refrigerator door of claim 15 further including the step of providing adhesive means between said inner liner and insulation.

18. The method of constructing a refrigerator door of claim 15 further including the step of notching the corners of said liner to permit flexing of the lip portion along the intersecting edges of the liner adjacent the corners.

19. The method of constructing a refrigerator door of claim 15 wherein said insulation is yieldable and said lip portion is forced into the insulation by a pressure element.

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