July 4, 1972 W. P. CROWE 3,674,359

REFRIGERATOR CABINET WITH REMOVABLE PARTITION

Filed Nov. 17, 1970 2 Sheets-Sheet 1

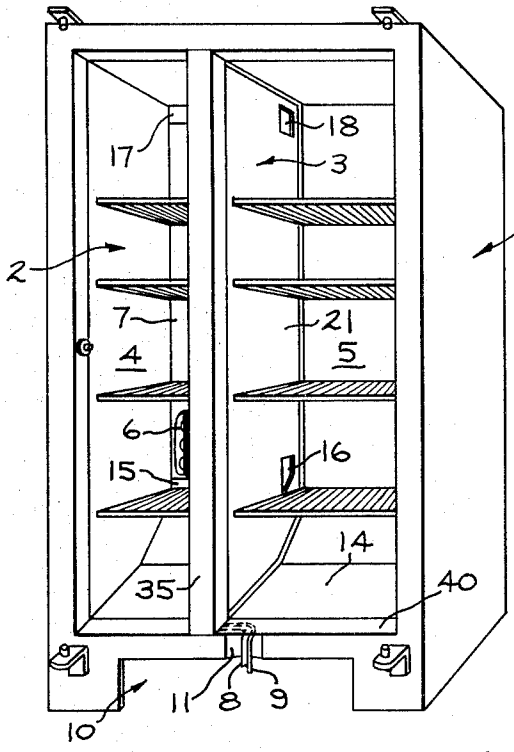

FIG. 1

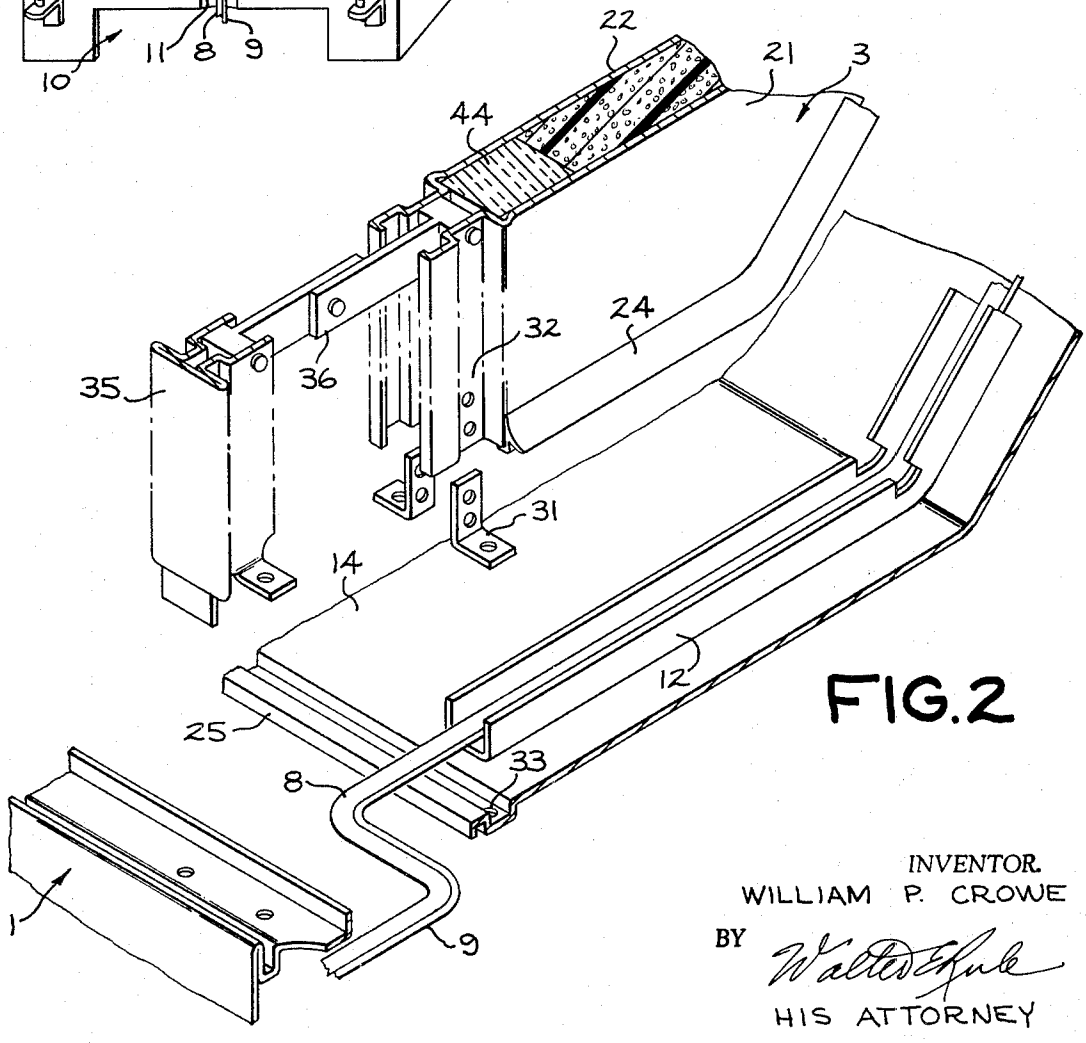

FIG. 2

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REFRIGERATOR CABINET WITH REMOVABLE PARTITION

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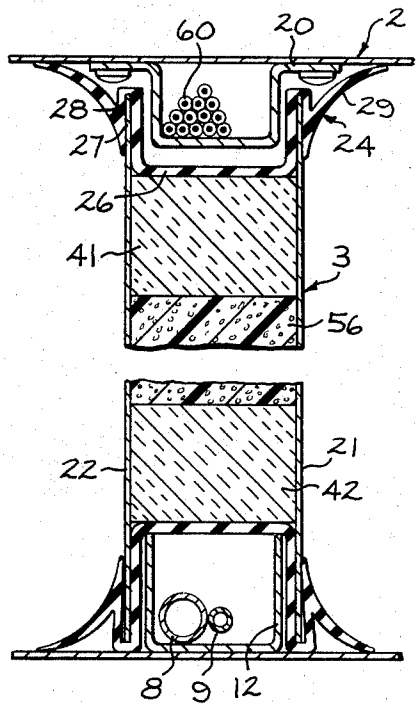

FIG.3

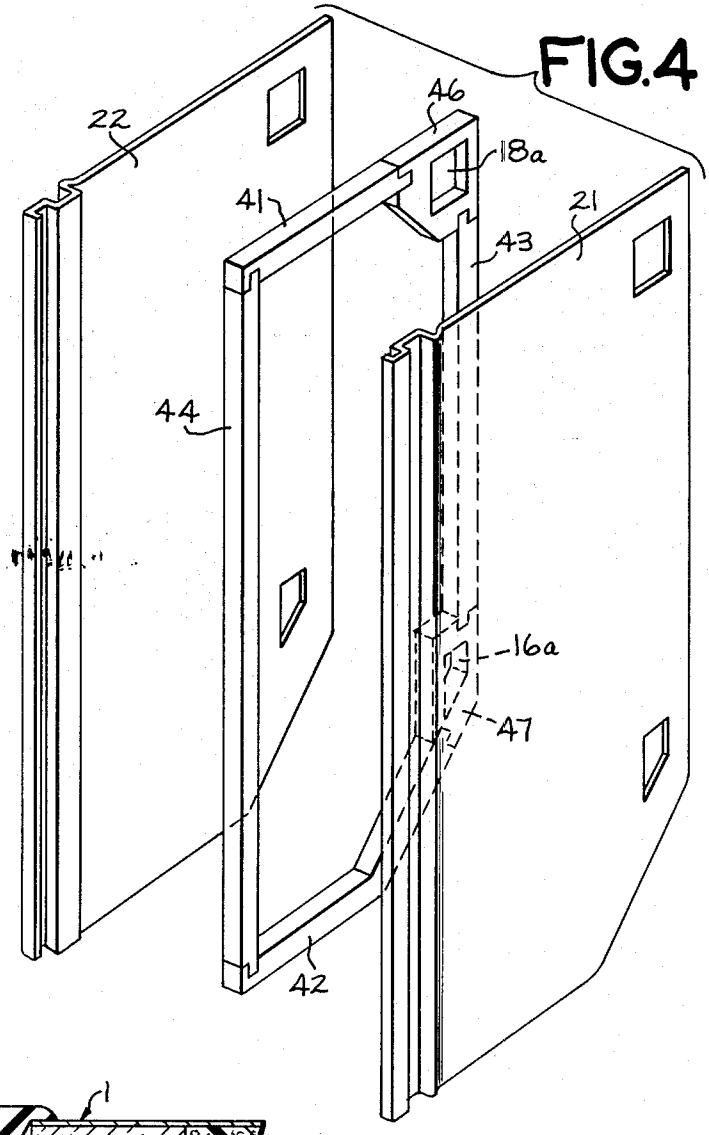

FIG.4

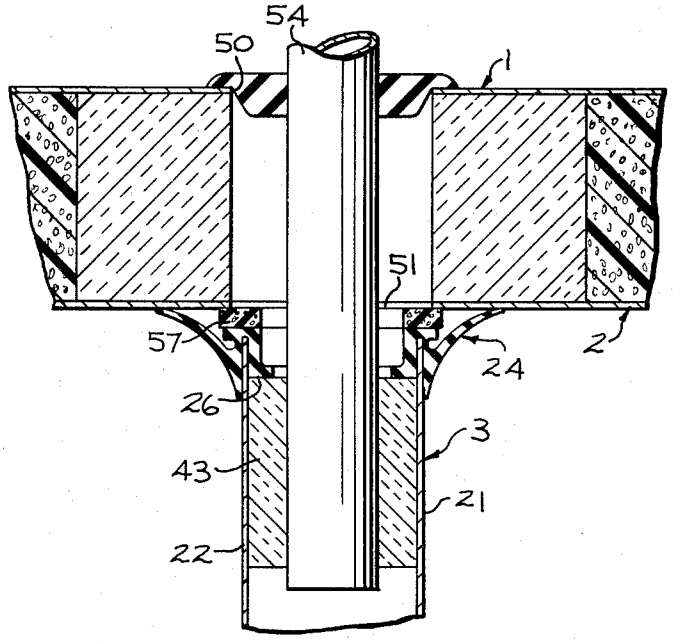

FIG.5

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3,674,359

REFRIGERATOR CABINET WITH REMOVABLE PARTITION

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Int. Cl. A47b *81/00*; F25d *11/00*; B65d *25/18*
U.S. Cl. 312—214 3 Claims

ABSTRACT OF THE DISCLOSURE

A resin foam insulated refrigerator cabinet comprising a single liner defining a storage space is provided with a vertical partition separating that space into side-by-side storage compartments. The partition is so designed that it can be foamed in place at the same time as the remaining cabinet walls and then easily removed for installation of the refrigeration system.

BACKGROUND OF THE INVENTION

Household refrigerators having below and above freezing compartments located in side-by-side relationship and separated by an insulating wall commonly include a refrigerant evaporator which is positioned along the rear wall of the below freezing compartment and an air circulating system for conducting refrigerated air to the two compartments. The condensing unit component of the refrigeration system is mounted in the machinery compartment in the lower portion of the cabinet and is connected to the evaporator by the usual refrigerant conduits. The compartments may be formed by separate liners or by a single liner and a dividing partition.

Most modern refrigerators of this type also contain foamed in place polyurethane foam insulation with the refrigerant conduits passing through the foam insulation. This type of construction requires the final assembly of the refrigeration system after the cabinet has been foamed. A construction which permits the installation of a unitary refrigeration system following the foaming operation is described and claimed in the copending application Ser. No. 90,376 filed concurrently herewith in the names of Gerald F. Dodge and Howard D. F. True, Jr. and assigned to the same assignee as the present invention. The construction employs a single liner defining the cabinet storage space and after foaming the wall areas defined by this liner and an outer shell, a unitary refrigeration system is installed in the cabinet and the conduits connecting the evaporator with the condensing component are positioned so that they run from the front to the rear of the bottom wall of the liner along a line to be occupied by the partition. A partition is thereafter inserted into the liner to divide the liner space into a freezer and a fresh food compartment.

This construction has as its primary advantage, the fact that no part of the refrigeration system is embedded in the foam insulation.

SUMMARY OF THE INVENTION

The present invention has as its primary object the provision of an improved side-by-side refrigerator construction which permits the foam in place insulation of the partition along with the remaining wall structure of the cabinet while at the same time providing the ready removal of the partition from the remaining cabinet structure for the assembly of the refrigeration unit into the cabinet.

In accordance with the illustrated embodiment of the invention, there is provided a refrigerator cabinet including an outer shell and inner liner spaced from the shell and defining a storage space having an access at the front thereof. The storage space is divided by a vertical partition into side-by-side storage compartments, this partition engaging the bottom, rear and top walls of the liner. The partition, which is designed to be foam insulated along with the remaining wall portions of the cabinet, comprises side walls of sheet material which are initially assembled in spaced relationship by means of a gasket engaging the top, rear and bottom edges thereof. The gasket includes a generally U-shaped relatively rigid center portion positioned between these side wall members and the arms of the center portion includes slots for receiving the edges of the side wall members. Preferably, also sealing strips of flexible or compressible insulating material such as sponge rubber, polyurethane foam or fiber glass are positioned between the side wall members just inwardly of the gasket and also along the front edges of the side wall members.

This sub-assembly is adapted to be inserted into the liner and suitably positioned by guides and fastening means prior to foaming. This assembly and the outer shell are then supported within a suitable forming mold and the outer walls of the cabinet as well as the partition foam insulated in one operation. The gasket, and if used the sealing strips, substantially prevent the escape of foam from the partition so that the foamed partition with its side wall members firmly joined by means of the foamed insulation can then be removed from the liner to allow for the assembly of the refrigeration system in the cabinet after which the partition is replaced.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

FIG. 1 is a perspective view, with the doors removed, of a household refrigerator embodying one form of the present invention;

FIG. 2 is an exploded view of portions of the cabinet illustrated in FIG. 1;

FIG. 3 is a vertical sectional view of upper and lower portions of the cabinet of FIG. 1;

FIG. 4 is an exploded view of the cabinet partition; and

FIG. 5 is a horizontal sectional view of a portion of the cabinet illustrating the manner in which the partition is insulated during foaming of the cabinet structure.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With particular reference to FIG. 1 of the drawing, there is illustrated a refrigerator cabinet comprising an outer shell **1** and an inner liner **2** which are spaced from one another and which together define the outer wall portions of the cabinet. The space within the liner **2** is divided by means of a partition **3** into separate compartments, specifically a freezer compartment **4** and a fresh food compartment **5**.

To cool the refrigerator, there is provided a refrigeration unit including a vertically mounted evaporator **6** positioned along the rear wall of the freezer compartment **5** behind a face plate or cover **7**. The evaporator **6** is connected by conduit means including a suction line **8** and a capillary tube **9** (FIG. 2) to the refrigerant condensing component (not shown) of the unit mounted within the machinery compartment **10** at the bottom of the cabinet.

In accordance with the teachings of the aforementioned Dodge and True application, the refrigerant conduits **8** and **9** as shown in FIGS. 1 and 2, extend upwardly through a recess **11** in the bottom face portion of the cabinet shell adjacent the partition **3** and through a channel shaped guide **12** extending rearwardly along the bottom wall of the liner where they are normally hidden from view by the partition **3**.

For cooling the two compartments **4** and **5**, fan means (not shown) is provided for withdrawing air from the freezer compartment through an opening **15** and from the fresh food compartment through an opening **16** in the partition **3** and this air after passing over the evaporator **6** is discharged into the freezer compartment through an outlet **17** and into the fresh food compartment through an outlet **18**.

In accordance with the present invention, the partition **3** is so designed that it can be foam insulated during the foaming of the exterior walls of the cabinet without becoming bonded by the foam insulation to any remaining portions of the cabinet. That is the partition **3** is so designed that it can be foam insulated during the foaming of the exterior walls of the cabinet without becoming bonded by the foam insulation to any remaining portions of the cabinet. That is the partition **3** is so designed that, following the foaming operation, it can be removed from the cabinet to permit front mounting of the refrigeration unit or system, which includes placement of the conduits **8** and **9** within the channel **12** at the bottom of the liner.

The partition **3**, as shown in FIG. 3 of the drawing, is laterally positioned within the liner **2** by means of the channel shaped member **12** extending rearwardly along the bottom wall of the liner and a similar channel shaped member **20** secured to the top wall of the liner and paralleling the member **12**.

The partition comprises spaced side wall members **21** and **22** of sheet material which are substantially coextensive with the vertical cross section of the liner in the partition area so that they extend from the top to the bottom walls of the liner and from the rear wall to the front edge **25** of the liner. These side wall members **21** and **22** are initially joined in spaced relationship by means of a gasket **24** which, as is shown in FIGS. 3 and 5 of the drawing, extends along the top, rear and bottom edges of the partition. This gasket **24** which is preferably of dual durometer construction is formed of a rubber-like material and comprises a relatively rigid U-shaped center portion **26** generally positioned between the side wall members **21** and **22** with the arms **27** of this center portion being provided with slots **28** adapted to receive the adjacent edges of the side members **21** and **22**.

As is shown in FIGS. 3 and 5 of the drawing, this U-shaped center portion opens outwardly and defines the edges of the partition for sliding engagement with the guide members **12** and **20**.

The longitudinally extending edge portions **29** of the gasket **24** are preferably more flexible than the center portion **26** and are shaped to bridge the space between the partition **3** and the adjacent surface portions of the liner **2**. In the illustrated embodiment of the invention these edge portions **29** are of arcuate cross section and extend laterally outwardly from the center portion of the gasket, with the outer edges thereof slidingly engaged with the adjacent liner surfaces.

The partition wall members **21** and **22** are secured to the liner **2** adjacent its upper and lower front corners by means of pairs of brackets **31** as illustrated in FIG. 2 of the drawing in connection with the lower edges thereof. The brackets **31** on opposite sides of the partition **3** are secured to the front edges of the side wall members **21** and **22** within the strengthening channel **32** provided on the front edges of these side wall members and to the liner **2** within a similar strengthening channel **33**.

A mullion **35** is spaced from the front edge of the partition **3** and suitably connected at its upper and lower ends to the front edge portions of the shell **1**. Adjustable braces **36** may be provided at various points along the mullion **35** for securing the mullion to the partition. A breaker frame generally indicated by the numeral **40** in FIG. 1 of the drawing is employed for bridging the space between the forward edges of the partition **3** or the liner **2** and the adjacent end of the forward edges of the outer shell **1** or the mullion **35**. This breaker strip which overlaps the strengthening channels **32** and **33** also hides the brackets **31**.

The advantages of the above described partition construction will become more apparent from consideration of the method of assembling a complete refrigerator.

An initial step in the assembly of the partition **3** comprises positioning the side wall members **21** and **22** in spaced relationship and securing the top, rear and side edges thereof together by means of the gasket **24**. Preferably, prior to the mounting of the gasket onto the side wall members, strips or blocks of sealing material such as fiber glass are positioned between the outer edge portions of the side wall members **21** and **22** for the purpose of assuring confinement of the subsequently introduced resin foamed insulation. This foam seal is illustrated in FIGS. 3, 4 and 5 of the drawings as including upper and lower strips **41** and **42** and a rear strip **43** positioned between the side wall members just inwardly of the position which will be occupied by the gasket **24** and preferably in a position in which these strips will engage the bottom wall of the U-shaped gasket portion **26**. A similar strip of foamed sealing material **44** is positioned between the side wall members adjacent the front channel sections **32**. Blocks of foam sealing material **46** and **47** are also provided adjacent the lower and upper corners of the side wall members **21** and **22**, these blocks having openings **16***a* and **18***a* which partially define the passages **16** and **18** in the finished partition.

After the various foam seals are positioned between the side wall members **21** and **22** and the side wall members are secured by means of the gasket **24**, this subassembly is slid into the liner **2** with the lower and upper guides **12** and **20** positioning the subassembly within the liner. Thereafter, the front edges of the side wall members **21** and **22** are secured to the liner by the brackets **31**.

The liner and partition subassembly is then placed within the outer shell **1** in a suitable foaming mold having wall structure for supporting the outer surfaces of the shell **1** and the inner surfaces of the liner **2** as well as the side wall members **21** and **22**. Following the usual practice, the spaces between the front edges of the liner and shell are sealed with glass fiber or the like. A foamable resin insulating material is then introduced into the spaces between the liner and the shell and into the partition through suitable openings in the rear wall of the shell **1**.

The foaming of the partition is illustrated particularly in FIG. 5 of the drawing. Prior to the foaming operation, suitable openings **50** and **51** are provided in the rear walls of the shell and liner in the area of the partition **3** and than gasket **24** and strips **43** are cored in alignment with these openings for insertion of a foam resin nozzle **54** into the space within the partition defined by the sidewall members **21, 22** and the foam seal strips. The foamable resin is introduced into the partition through the nozzle **54** at the same time that the foamable resin is being introduced into other spaces between the liner and shell. As the resin foams and expands within the partition to provide the foam insulation thereof as indicated by the numeral **56**, any of the expanding resin passing through the openings in the foam seal **43** and the gasket **24** is prevented from reaching the flexible portions of the gasket by a flexible foam washer **57** provided between the gasket and the portions of the liner surrounding the liner **41**. As the nozzle **54** is removed prior to full expansion of the foam, some of the foamed resin may enter the space within the outer wall portions of the cabinet. However, the only foam connection between the partition and the outer walls of the cabinet is the plug of resin in passage **51**.

It will be noted that prior to the foaming operation, the side wall members **21** and **22** are respectively positioned accurately with regards to the inner surfaces of the liner by means including brackets **31**. The gasket **24** has sufficient "give" to permit some relative movement between the side wall members **21** and **22** to assure the

proper positioning of the side wall members with reference to the interior of the liner and the proper sealing of the gasket portions **29** with the liner walls. After the foaming operation, the wall members **21** and **22** are firmly and rigidly secured to one another by the rigid foam, thus providing a unitary partition assembly.

The foamed cabinet is removed from the foaming mold and the brackets **31** unfastened from the liner and partition so that the partition **3** can be slid out of the liner to expose the channel **12**. The refrigerating unit, as a completed subassembly with the evaporator **6** connected to the condensing unit through the conduits **8** and **9**, is then assembled through the front of the cabinet with the conduits **8** and **9** positioned with the channel **12**. After the refrigeration unit has been installed in the cabinet, the partition is again slid into the liner, a positive matching fit of the partition within the liner being assured by the fact that it was initially foamed in place. The cabinet assembly is completed by securing the mullion **35** in position and the mounting of the breaker strips **40**.

As shown in FIG. 3 of the drawing, the upper channel member **20** may be employed to contain some of the electrical conductors **60** leading from the machinery compartment **10** to various portions of the cabinet. Other portions of these conductors will generally be positioned within the spaces between the forward edges of the liner and shell which contained the glass fiber sealing material during the foaming operation.

While there has been shown and described a preferred embodiment of the invention, it will be understood that it is not limited thereto and it is intended by the appended claims to cover all such modifications that fall within the true spirit and scope of the invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A foam insulated refrigerator cabinet comprising:

an outer shell and an inner liner spaced from said shell and having top, bottom and rear walls defining a storage space having an access opening at the front thereof;

a vertical partition extending between said top and bottom walls and dividing said space into side-by-side storage compartments;

said partition including spaced side wall members of sheet material separately secured only adjacent the front ends thereof to said liner by removable fastening means and sealing means including a gasket secured to and bridging the top, rear and bottom edges of said side wall members and extending between said wall members and said liner and having a generally U-shaped relatively rigid center portion positioned between said side wall members sealing the spaces between the edges of said wall members;

guides mounted on the top and bottom walls of said liner received in the adjacent U-shaped portion of said gasket for positioning said partition;

openings in the rear walls of said shell and liner aligned with an opening in the portion of said gasket bridging the rear edges of said wall members for introducing foam insulation into the space between said wall members and a sealing washer sealing the space between said liner and gasket;

whereby said washer and sealing means prevents foaming of said partition to said liner during foaming of said cabinet and said partition is foam bonded to said liner solely by the foam within said liner passage so that said partition can be easily removed from said cabinet by removing said fastening means.

2. The cabinet of claim **1** in which said sealing means includes glass fiber strips positioned between the edge portions of said wall members.

3. The cabinet of claim **2** in which said side wall members are rigidly joined together solely by the foam insulation.

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PAUL R. GILLIAM, Primary Examiner

U.S. Cl. X.R.

29—416; 220—9 F