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| [21] | Appl. No. | 39,719 |
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| [45] | Patented | Aug. 24, 1971 |
| [73] | Assignee | General Motors Corporation
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[56]

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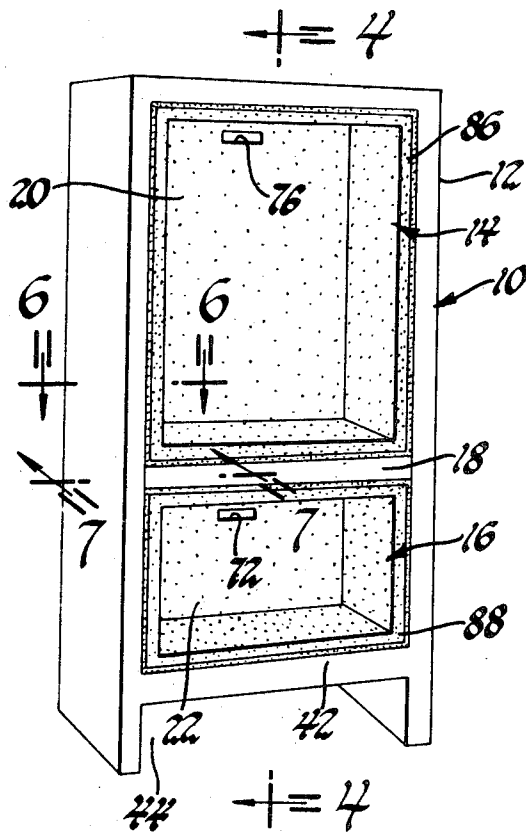
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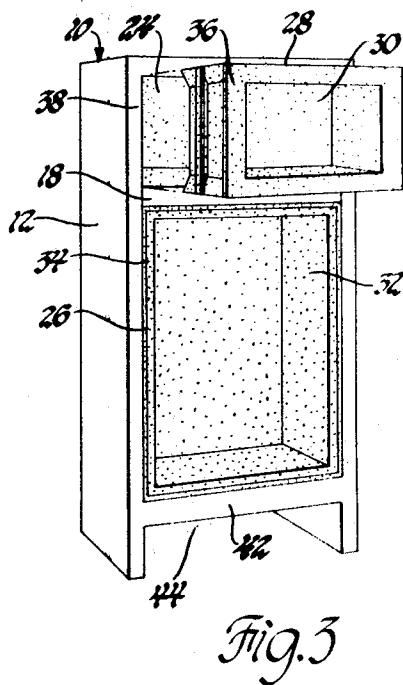
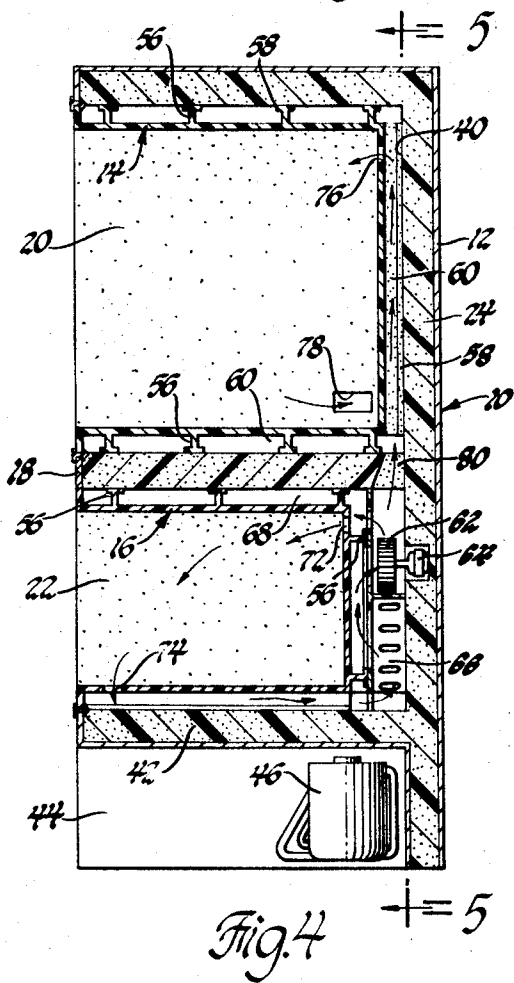
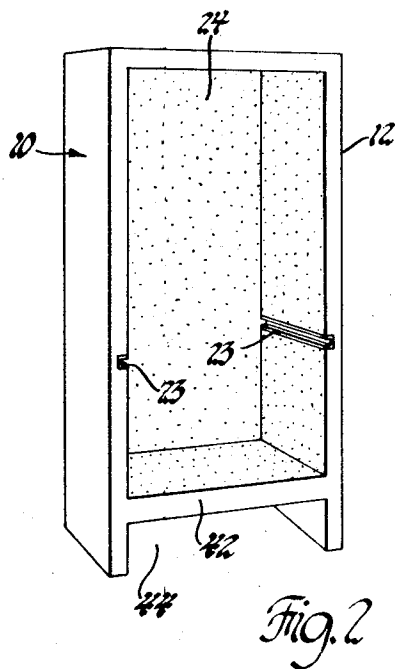
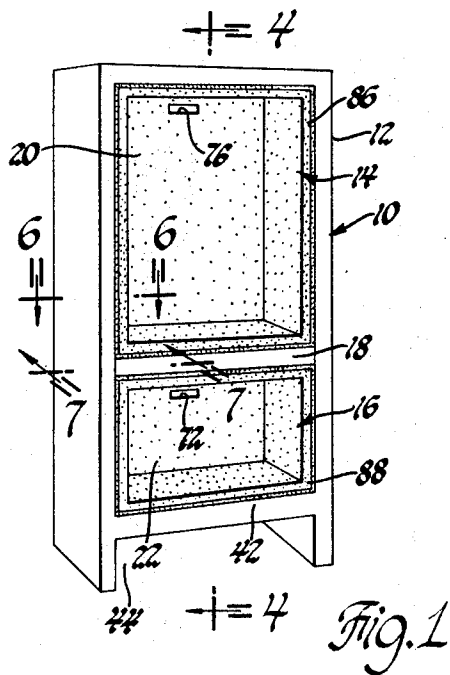
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- [54] REFRIGERATOR CABINET ENCOMPASSING A
RANGE OF REFRIGERATOR VOLUME
3 Claims, 9 Drawing Figs.**
- [52] U.S. Cl.**..... **312/214,**
220/9, 312/236
- [51] Int. Cl.**..... **A47b 81/00.**
A47b 77/08, A47b 53/00
- [50] Field of Search**..... **312/213,**
214, 236, 116, 122, 273; 62/283, 441; 220/9

ABSTRACT: A refrigerator cabinet having foamed insulation secured to the interior walls thereof and capable of slidably receiving plastic liners of various sizes providing a range of food compartment volumes. The foamed insulation has channel members molded therein for receiving and supporting a divider wall in either horizontal or vertical positions. The plastic liners are formed with a plurality of integral rib members extending from the external surface and terminating in flanges presenting a flat surface for engagement with the insulation. The length of the integral ribs is varied with the size of the food compartment defined by the plastic liner providing rigid support of the liner in the refrigerator cabinet.





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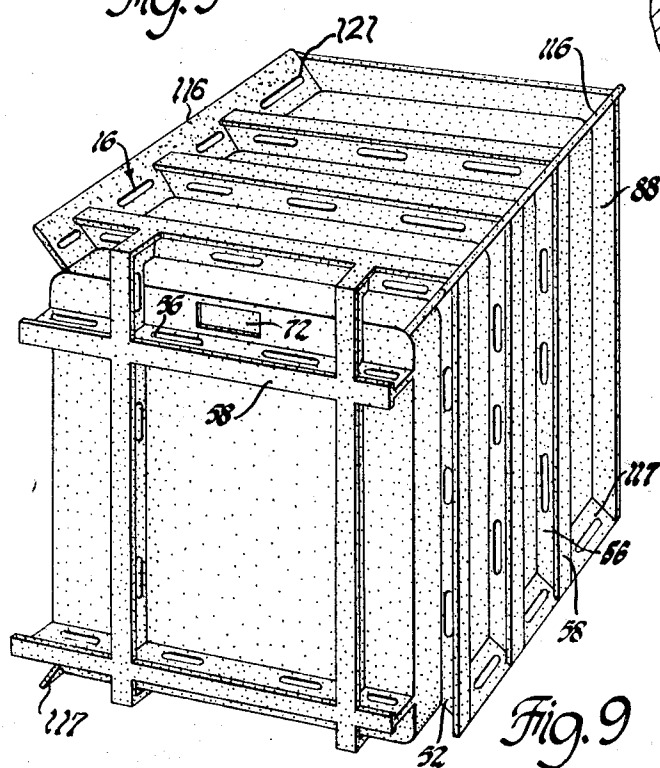
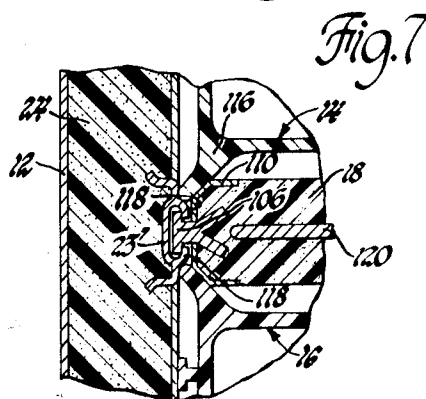
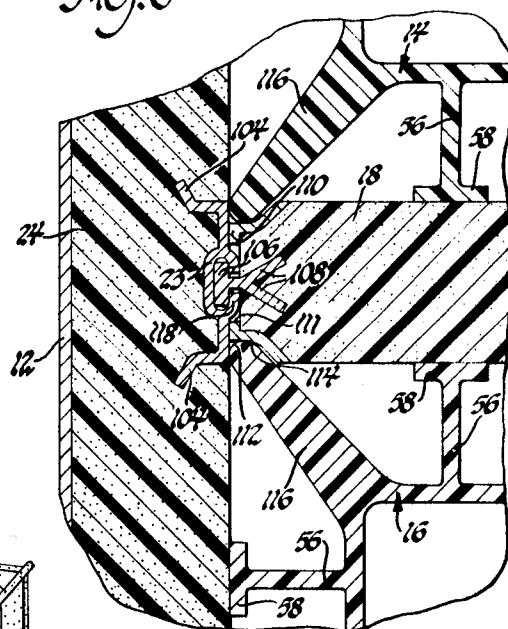
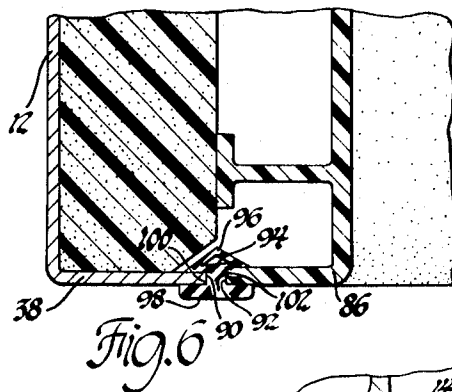
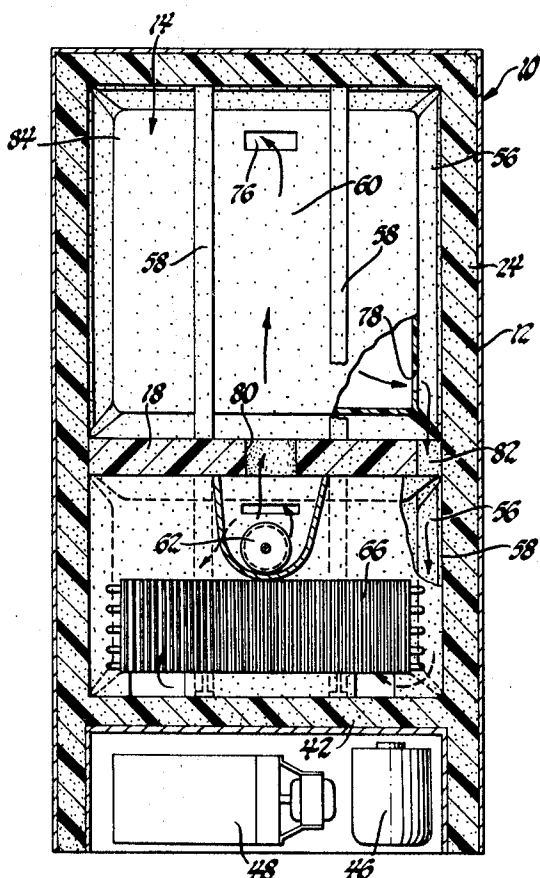


Fig. 8

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REFRIGERATOR CABINET ENCOMPASSING A RANGE OF REFRIGERATOR VOLUME

This invention generally relates to a refrigerator cabinet having a movable partition or divider wall therein and more specifically to such a refrigerator cabinet wherein slidable liners are inserted within the compartments defined by the cabinet and the divider wall so that variable usable volumes are provided in the defined compartments.

At the present time refrigerator manufacturers produce a wide range of refrigerator cabinet sizes to accommodate a range of volumes suitable for specific domestic uses. The variance in cabinet sizes necessarily involves substantial manufacturing and assembly considerations. Accordingly it is a purpose of this invention to provide a standard refrigerator cabinet encompassing wide ranges of usable refrigerator volumes capable of being readily assembled on a common production line. Specifically this result is accomplished by utilizing a slide in liner assembly comprising exterior supporting ribs of varying lengths thereby supporting and spacing the finished inner liner at varying distances from the insulation foamed in place within a steel cabinet shell. The space between the ribs of the slide in liner can be utilized for cooling air ducts in forced air refrigerating systems. The spaces likewise are effective to circulate air in static cooling conditions.

Accordingly a first object of this invention is the provision of a standard refrigerator cabinet shell receiving slidable liners spaced from the shell at varying distances to provide varying food volumes within the refrigerator.

Another object of this invention is the provision of a standard refrigerator cabinet shell having foamed insulation secured to the inner surfaces of the shell, the insulation supporting fixed mounting members at predetermined aligned locations for supporting a divider wall either vertically or horizontally for forming compartments within the shell.

A still further object of this invention is the provision of a refrigerator cabinet shell having foamed insulation therein, the foamed insulation having steel channel members molded therein receiving metal mounting members molded in a foamed divider wall for retaining the dividing wall in place.

Another object of this invention is the provision of a standard refrigerator cabinet shell having foamed insulation therein and slidably supporting a divider wall therebetween wherein the compartments formed by the divider wall each receive slidable plastic liners defining an interior usable space, the liners having integral ribs secured on the exterior surface thereof for engaging and supporting the liner within the compartment.

Yet another object of this invention is the provision of a standard refrigerator cabinet shell having foamed insulation therein, the foamed insulation having channel members molded therein which slidably receive mounting means attached to a divider wall for supporting the same within the cabinet and dividing the cabinet into two compartments, the channel members being formed to provide a supporting surface being engaged by angular projections molded integral with the slidable plastic liner inserted into each of the compartments for defining the usable space in each compartment.

Another object of this invention is the provision of a standard refrigerator cabinet shell containing foamed insulation and a slidable divider wall secured by means molded within the foamed insulation wherein the two compartments defined by the divider wall slidably receive plastic liners defining the usable space therein, the plastic liners having facing flanges aligning with like flanges of the steel cabinet whereby a finishing strip can be readily inserted for securing the members together and providing a finished surface.

In the Drawings:

FIG. 1 is a perspective view of a standard refrigerator cabinet shell of the subject invention with the doors removed.

FIG. 2 is a perspective view of a standard refrigerator cabinet shell of the subject invention with the divider wall

removed to illustrate molded in place channel members for slidably receiving supporting means on the divider member.

FIG. 3 is a perspective view of a standard refrigerator cabinet shell of the subject invention illustrating the divider wall in place defining two food compartments with a slide in liner member partially withdrawn in one compartment.

FIG. 4 is a sectional view taken on lines 4—4 of FIG. 1 illustrating a motor driven blower forcing air upwardly through passages defined by ribs integrally attached to the compartment liners.

FIG. 5 is a sectional view taken on lines 5—5 of FIG. 4 illustrating the back portions of the respective compartment liners and the placement of the refrigerating components directing flow of cool air through the passages around the slidable liners.

FIG. 6 is a fragmentary sectional view taken along lines 6—6 of FIG. 1 illustrating the joined relationship of two cabinet facing flanges as accomplished by a sealing strip.

FIG. 7 is a partial sectional view taken on lines 7—7 of FIG. 1 illustrating the channel member being molded within the foamed insulation and slidably receiving a rail imbedded within the divider wall wherein the divider wall also comprises an attached end surface which in cooperation with a portion of the channel member supports corner projections of the slide in liners.

FIG. 8 is a partial sectional view taken on lines 7—7 of FIG. 1 illustrating a modified divider wall having a metallic stiffener plate molded therein.

FIG. 9 is a perspective view of one of the liner members removed from the cabinet looking from the rear toward the front thereof.

Referring now to FIG. 1 a refrigerator cabinet assembly 10 includes outer steel shell 12 containing slidable liners 14 and 16 positioned on either side of a divider panel 18, the cabinet assembly 10 having the front doors removed. The liners 14 and 16 define food compartments 20 and 22.

With reference now to FIG. 2, the slidable liners and the divider wall are removed to more clearly illustrate channel members 23 which are preferably molded within insulating material 24 secured to the inner surfaces of the cabinet shell 12. The channel members 23 are specifically positioned and aligned to receive and position the divider wall so that the cabinet area is divided into the two predetermined food compartments 20 and 22 shown in FIG. 1.

The cabinet shell 12 is shown in FIG. 3 with the divider panel 18 placed in the foamed material 24 in the upper portions of the cabinet 10. Of course it is apparent the panel 18 can be placed at any predetermined horizontal or vertical position to divide the cabinet space as desired. A lower plastic liner 26 is slidably installed while an upper plastic liner 28 is partially withdrawn to illustrate mobility of the assembly, the lining 28 defining food compartment 30 and liner 26 forming compartment 32. As previously mentioned, it is obvious that the channel members 23 may readily be located at any position in the foamed material to receive the divider panel 18 and consequently form various sizes and configurations of food compartments 30 and 32, the configuration of the specific slidable liners 26 and 28 being correlated therewith. The liners 26 and 28 comprise facing flanges 34 and 36 respectively which align with a facing flange 38 of the cabinet shell 12 in a manner more specifically later described.

As shown in FIG. 4, which is a sectional view taken on lines 4—4 of FIG. 1, the cabinet shell 12 has the foamed material 24 secured thereto in a conventional manner, the foam being provided with a relatively hard outer surface 40 during its installation. The cabinet 10 is formed including a fixed lower partition 42 which defines a space 44 immediately above the floor area which can contain a compressor 46 as well as a motor blower and condensing coil assembly 48 best illustrated in FIG. 5. In a preferred embodiment, the compressor 46 is a solid state controlled variable speed compressor accommodating the various refrigerator or freezer capacities defined by the specific slide in liners.

Upper liner 14 comprises a plurality of integral slotted rib members 56 which extend from the outer surface of the liner and terminate in flanges 58 forming a relatively flat surface bearing against the relatively hard foam surface 40 preventing damage thereto. The annular slotted ribs 56 define air passages 60 receiving cooling air from a circulating blower 62 driven by motor 64 and drawing cooling air from evaporator 66. Lower liner member 16 likewise includes a plurality of annular slotted ribs 56 which also define a series of air passages 68. An inlet aperture 62 in the upper portions of the liner 16 supplies cooling air to compartment 22 and an aperture 74 discharges the air for recirculation through the evaporator 66. Pressurized air discharged from the blower 62 is also transmitted upwardly adjacent liner 14 where it enters food compartment 20 through an inlet aperture 76 and exits the compartment through outlet aperture 78 in the lower portion of the liner 14. In FIG. 5, the divider panel 18 includes cutout portions 80 and 82 providing for flow of cooling air from the lower compartment to the upper food compartment into air passages 60 defined by the slotted ribs 56 on the rearward side 84 of liner 14.

The slide in liners 14 and 16 comprise facing flanges 86 and 88 respectively, shown in FIGS. 1 and 6, which are similar in shape, the flange 86 being illustrated in FIG. 6 as representative of both. Flange 86 is formed to align with a bent back facing flange 38 of the cabinet 12 and is in axial alignment therewith. The flanges 38 and 86 each have a length sufficient to provide a predetermined space between their end surfaces 90 and 92 for receipt of an elongated sealing and retaining strip 94. The elongated sealing strip 94 includes a deflectable retaining portion 96 and a finished facing portion 98 viewable from the front of the cabinet. The portions 96 and 98 cooperate to form slots 100 and 102 respectively receiving the facing flanges 38 and 86 with sufficient biasing force between the members 96 and 98 retaining the sealing strip in place.

The channel 23 is illustrated in FIG. 7 wherein it includes diverging leg portions 104 molded within the foamed insulation 24 retaining the channel in a predetermined aligned position with a like channel 23 in the opposite cabinet wall. A rail member 106 is likewise molded within divider panel 18 and also includes diverging leg portions 108 retaining the rail within the divider wall 18. The divider wall 18 further includes a metal cap member 110 containing an opening 111 receiving channel 23 and engaging facing surface 112 of the channel 23. The channel 23 includes arcuate portions 118 engaging rail 106 preventing lateral separation therefrom. The cap member 110 is formed to provide a somewhat concave surface 114 receiving a portion of corner projections 116 integrally molded with the plastic liners 14 and 16. The corner projections 116 extend beyond flanges 58 to engage the divider panel 18 as shown in FIG. 7, while projections 117 on the opposite side of the liner terminate in the plane of flanges 58 to support the liner within the cabinet.

A modified form of the divider panel or wall 18' is illustrated in FIG. 8 wherein like parts are referred to by like reference numerals. In this embodiment the panel 18' includes a stiffener plate 120 providing more rigid support between the food compartments 20 and 22 and the cap member 110 does not engage channel member 23'.

The liner 16 is shown removed from the cabinet in FIG. 9 and is viewed from the rear. Integral ribs 56 and their associated flanges 58 are positioned on the rear wall of the liner 16 for positively locating the liner axially within the refrigerator cabinet while those on the sidewalls positively position the liner vertically and laterally within the cabinet. The ribs 56 and corner projections 116 contain a plurality of slots 121 positioned and configured for distributing cooling air around the liner. The forward facing flange 88 is formed so that the facing 88 can readily be aligned with the cabinet facing flange 38 as previously described. The corner projections 116 are reinforced at the junctures of the ribs 56 and their flanges 58 so that rigid engagement of the corner projections 116 with the associated channel and rail assemblies in the divider wall 18 is obtained.

From the above description it is apparent that a standard refrigerator cabinet shell 12 can readily be formed with the insulation material 24 foamed therein in mass production quantities. The slide in plastic liners 14 and 16 can be molded to include annular ribs 56 of varying length to provide a desired spacing of the liner within the cabinet compartments as a particular use requires. The varying of the length of the integral ribs 56 allows for a wide range of food compartment sizes while providing a finished appearance on the exterior of the cabinet resulting from the facing flanges 86 and 88 being joined by the sealing strip 94 to facing flange 38 of cabinet 12. Further it is apparent that the placement of the integral ribs 56, containing air slots 121, and the associated flanges can be predetermined to provide for various air flow patterns around the food compartment. Another significant feature of this invention resides in the integral molding of the corner projections 116 with the liner members wherein the projections are rigidly supported at spaced points via the juncture of the annular ribs and flanges.

Obviously the channel members 23 can be placed at any position in the horizontal or vertical walls of the cabinet 10 so that the divider panel can divide the cabinet into food compartments of various sizes accommodating matched liner assemblies making the versatility of this arrangement apparent.

While a preferred embodiment of the above invention has been described for purposes of illustration only it is apparent that many variations of the inventive concept could be utilized.

I claim:

1. A variable volume refrigerator comprising a cabinet shell, insulation material secured to the inner surface of said shell, first supporting means secured in said insulation material and predetermined aligned positions on each side of said shell, a divider panel, second supporting means secured to opposite ends of said divider panel removably engaging said first supporting means for positioning said divider panel in said shell, said shell and said divider panel forming separate cabinet compartments, a plastic liner slidably received in each compartment, each liner defining a usable food storage volume, and ribs secured on the exterior surfaces of said liner engaging the insulation material supporting the liner in said shell, the length of said ribs varying with the usable volume defined by the liner whereby the cabinet compartments accommodate liners defining a range of usable volumes.

2. In combination a variable volume refrigerator cabinet comprising a steel outer shell, insulation foamed in place secured to the inner surfaces of said shell, a relatively hard inner surface formed on said foamed insulation, a metal channel member molded in said foamed insulation at predetermined aligned points on each side of said refrigerator shell, a divider panel of foamed material, a metal reinforcing member in said divider panel, supporting rails secured in the opposite ends of said divider panel, said supporting rails slidably received within said metal channels molded in the shell foamed insulation so that said supporting rail can readily be inserted into the refrigerator cabinet, a first slidably removable plastic liner formed to define a first food compartment above said divider panel, a second slidably removable liner formed to define a second food compartment within said cabinet below said divider panel, and a plurality of integral rib members formed circumferentially about said liners engaging the foamed insulation secured to said cabinet and in cooperation with the foamed insulation defining a plurality of air channels between said ribs and said liner surface providing for circulation of cooled air about said compartments, the length of said integral ribs varying with the usable space in said food compartments.

3. In combination a variable volume refrigerator cabinet comprising an outer shell, insulation material foamed in place and secured to said shell, a relatively hard inner surface formed on said foamed insulation, channel members molded in said foamed insulation at predetermined aligned points in each side of said refrigerator shell, a divider panel, metal supporting rails secured to opposite ends of said divider panel and

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cooperating with said channel members, said supporting rails being removably slidably received within said metal channels dividing the cabinet into compartments, rectangular plastic liners defining a usable volume slidably fitting within said compartments, a plurality of spaced ribs extending normally from the surfaces of said rectangular liners, angularly extending corner projections integral with said rectangular liners, the corner projections engaging the corners formed by the intersection of said divider panel with the cabinet insulation, said

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channels and said rails cooperating to receive and support said corner projections, facing flanges formed integrally with said liners defining a finished surface on the front of said cabinet, facing flanges formed on the front of said refrigerator cabinet said liner facing flanges extending in close proximity to said cabinet facing flanges, and a finishing strip sealing the space between said facing flanges while simultaneously retaining them together.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,601,463 Dated August 24, 1971

Inventor(s) Roy E. Watt

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 14, "he" should read -- the --.

line 72, "embodiment" should read
-- arrangement --.

Column 3, line 10, reference numeral "62"
should read -- 72 --.

Column 4, line 2, "an" should read -- and --.

Column 6, line 4, after "cabinet", insert
-- , (Comma) --.

Signed and sealed this 21st day of March 1972.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents