United States Patent

[11] 3,598,463

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[54] **SHELF WITH INTEGRAL FRONT**
1 Claim, 5 Drawing Figs.

[52] **U.S. Cl.** **312/214,**
18/35, 211/135, 211/153, 312/138
[51] **Int. Cl.** **A47f 3/04,**
A47f 5/00, E06b 5/00, F25d 11/00
[50] **Field of Search** ..... 211/153, 135; 312/138 A, 214; 264/92, 90; 18/35, 42, 45

[56] **References Cited**

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2,903,315	9/1959	Schory et al.	312/214
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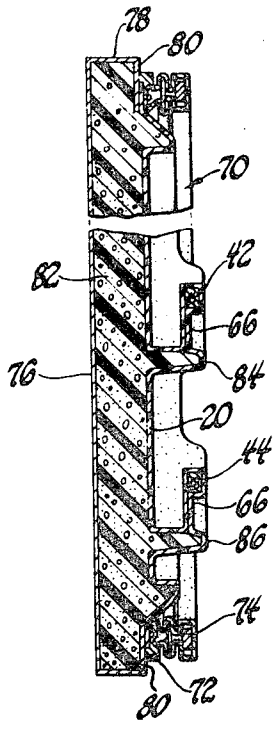
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ABSTRACT: In the preferred form, the inner sheet plastic door panel has formed in it an integral shelf and an integral shelf front in which the plastic sheet envelops a reinforcing bar above and parallel to the shelf.



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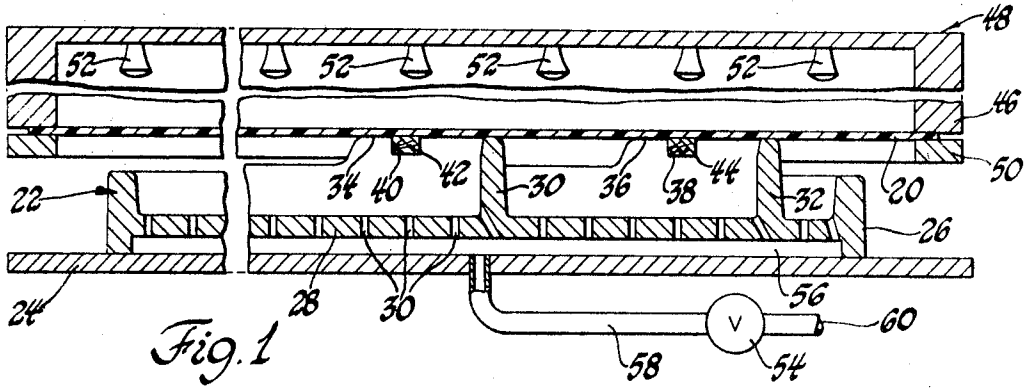


Fig. 1

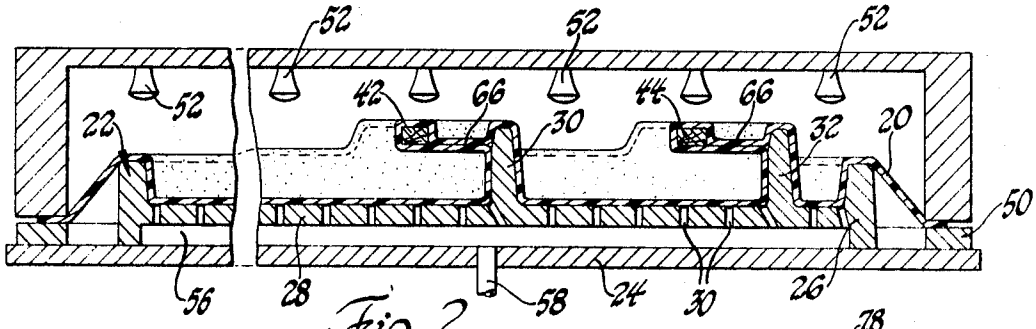


Fig. 2

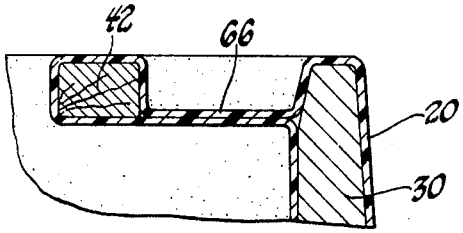


Fig. 3

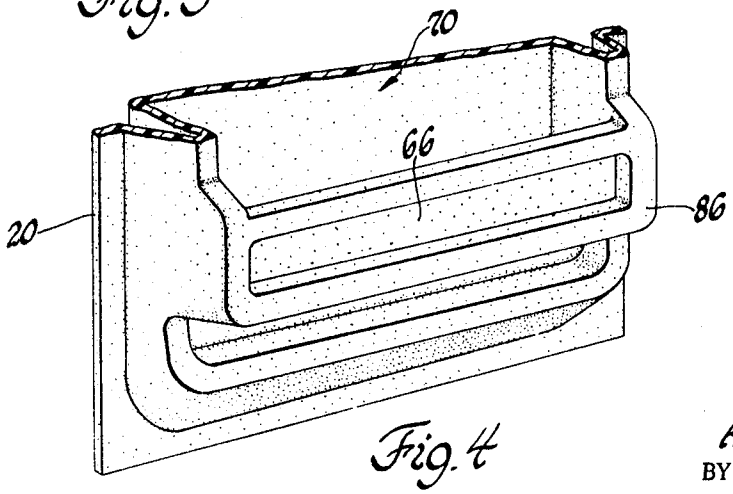


Fig. 4

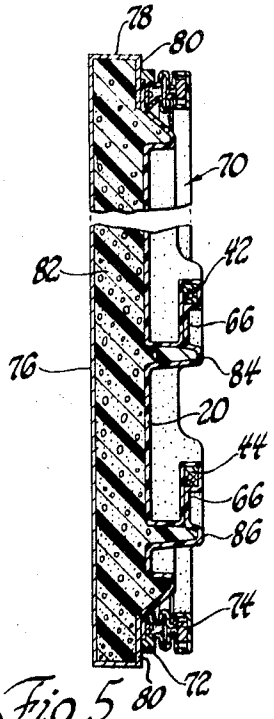


Fig. 5

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SHELF WITH INTEGRAL FRONT

This application is a division of my copending application Ser. No. 684,049, filed Nov. 17, 1967 now issued U.S. Pat. No. 3,462,741.

This invention relates to insulated doors having plastic sheet inner walls provided with door shelves.

It is customary to make refrigerator doors with plastic inner walls. Shelves have been added in various ways such as are shown in the Saunders U.S. Pat. No. 2,837,816 issued June 10, 1958. It is not unusually difficult to provide integral shelves but the shelf fronts have been in the form of attached pieces.

It is an object of this invention to provide an integral shelf and shelf front upon the plastic inner wall of a door.

It is another object of this invention to provide an integral shelf and shelf front which contains a reinforcing bar enveloped in the plastic sheet forming the inner wall of the door. Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred embodiment of the present invention is clearly shown.

IN THE DRAWINGS

FIG. 1 is a vertical sectional view illustrating the first step in vacuum forming the inner wall of a door with integral shelves and shelf fronts embodying one form of my invention;

FIG. 2 is a vertical sectional view similar to FIG. 1 showing the completion of the vacuum forming process;

FIG. 3 is an enlarged sectional view showing the completed form of the shelf front;

FIG. 4 is a fragmentary perspective view showing one of the integral completed shelves with an integral shelf front; and

FIG. 5 is a vertical sectional view taken through the completed door.

Referring now to FIG. 1, there is shown a plastic sheet **20** which is to be formed into the inner wall of an insulated door. The sheet **20** may be of ABS copolymer or polypropylene, for example. A vacuum forming door mold **22** rests upon the support **24**. This vacuum forming mold includes a relatively thick perimeter portion **26** which extends around a thin wall portion **28** provided with substantially uniform perforations **29**. The upper face of the mold **22** is provided with two shelf forming projections **30** and **32** which extend between the wide portions **34, 36** of the side perimeter **26**. The portions **34** and **36** of the perimeter portions **26** which extend to the left of the projections **30** and **32** are made of a width or height equal to the height or protrusion of the shelf-forming projections **30** and **32**.

According to my invention, each of these portions **34** and **36** are provided with notches **38** and **40** which receive and normally removably hold the rectangular wooden sticks **42** and **44**. The sheet **20** is clamped at its edges between the turned down peripheral portion **46** of the rectangular holder **48** and an open rectangular member **50** which is clamped to the upper portion of the holder **48**. The sheet-holding member **48** may be provided with a plurality of infrared lamps **52** which are energized to heat the sheet **20** of plastic causing the plastic to be stretchable and formable. As the plastic **20** is heated, a valve **54** is opened to apply a vacuum to the space or chamber **56** located between the support **24** and the perforated wall **28** of the mold **22**. A pipe **58** forms a connection between the valve **54** and the chamber **56**. The valve **54** connects to a vacuum pipe **60**.

As the vacuum is drawn, the holder **48** is gradually lowered and the sheet of plastic is drawn into the large space between the shelves **30** and **32** by the vacuum drawing air through the perforations **30**. The plastic is heated and drawn by the differential in pressure thereon until the plastic sheet **20** envelops the shelf forming projections **30** and **32** and is also completely around the sticks comprising the reinforcing members **42** and **44** which form separate folds in upper flange portions in the plastic sheet **20**. These sticks **42** and **44** are completely surrounded in the adjacent folds by the plastic sheet **20** and between each of the sticks **42** and **44** and the adjacent shelf projections or lower flange portions **30** and **32** the plastic sheet **20** comes into substantial flat contact shelf fronts or webs **66**. This forms a pleasing shelf front as is shown in FIG. **4**. The plastic also envelops both sides of the shelf forming projections **30** and **32**.

Before the completion of the vacuum-forming operation, the infrared lamps **52** are extinguished and the sheet plastic **20** forming the inner wall is removed from the mold **22** along with the sticks or reinforcing members **42** and **44** which are enveloped in the folds forming the shelf fronts. The completed shelf structure is illustrated in FIG. **4**. The completed door is illustrated in FIG. **5** in which the inner wall is designated by the reference character **70**.

The periphery of this inner wall member **70** is fitted within a notch extending longitudinally in the bottom **72** of the magnetic door seal **74**. The outer sheet metal wall **76** has a peripheral edge **78** provided with an inturned flange **80** extending within the interior and fitting against the bottom of the magnetic door seal **74** to hold it in place. The space between the formed inner wall **70** and the outer wall **76** is preferably filled with polyurethane foam insulation **82** preferably containing an insulating gas. This foam insulation fills the hollow space formed by the shelf projections **30** and **32** to form the reinforced shelves **84** and **86**. The foam insulation adheres to the outer metal wall **76** and the inner plastic wall **70** and is rigid enough to substantially reinforce the shelves. These shelves are further reinforced by the integral shelf fronts **66** immediately above wherein the two sheets of plastic are directly in contact. These shelves **84** and **86** are also reinforced by the reinforcing members **42** and **44** in the form of the sticks which are enveloped by the folds of the plastic sheet **20**. By forming the shelf fronts **66** by enveloping the reinforcing sticks **42** and **44** which are removable from the mold **22**, two integral shelf fronts are provided which are formed each by a fold of the sheet of plastic **20**, as an integral part thereof. By this integral arrangement, the hollow shelf portions **84** and **86** are reinforced by the shelf fronts **66** and the reinforcing bars or sticks **42** and **44**. The polyurethane foam **82** is relatively stiff and strong even though it is of light weight. It has sufficient adhesiveness to prevent the separation of the inner and outer walls.

While the embodiment of the invention as herein disclosed constitutes a preferred form, it is to be under stood that other forms might be adopted.

I claim:

1. In combination, an insulated refrigerator door including an outer metallic wall extending generally within a plane, an inner wall formed of plastic sheet, polyurethane foam insulation material between said inner and outer walls, said plastic sheet formed in cross section as a flanged beam by having an integral shelf portion extending substantially at right angles away from the adjacent portion of the sheet and substantially horizontally over an extensive area to a line extending in spaced relation to the adjacent portion of the sheet, wherein the improvement comprises, said plastic sheet having a substantially horizontal wooden reinforcing member of rectangular section extending above an extended portion of said shelf, said shelf portion of said sheet formed with an integral rectangularly shaped loop portion folded over and completely around said reinforcing member with opposite sides of the fold in substantially flat contact over a substantial area between said reinforcing member and said shelf to form in cross section an upper flange portion of said flanged beam, said integral loop portion extending up along said line generally perpendicular to said extensive area of said shelf portion to provide a front, said sheet extending from said loop portion beneath the shelf portion to form an integral shelf and shelf front, said shelf portion being formed by the spacing of two portions of said plastic sheet, and polyurethane foam insulation filling the space between said two portions to form in cross section a lower flange portion of said flanged beam.