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C. E. REMBOLD ET AL

3,401,996

DOOR WITH INTEGRAL INCLINED AND UPWARDLY CURVED SHELVES

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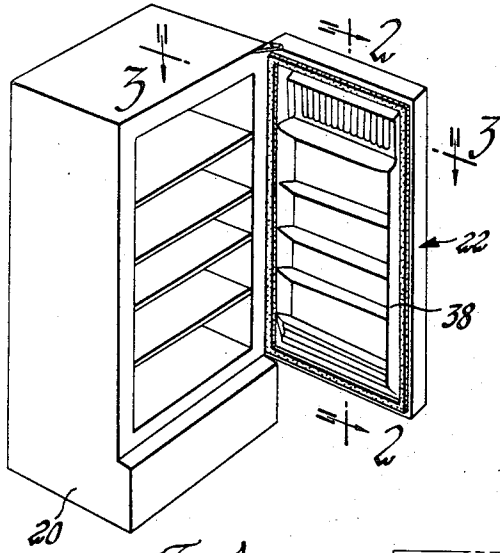


Fig. 1

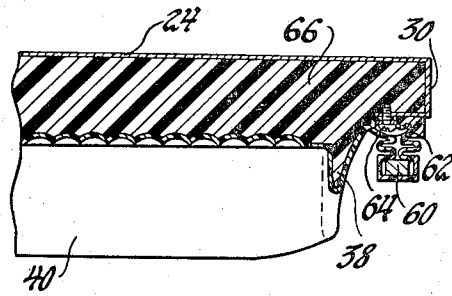


Fig. 3

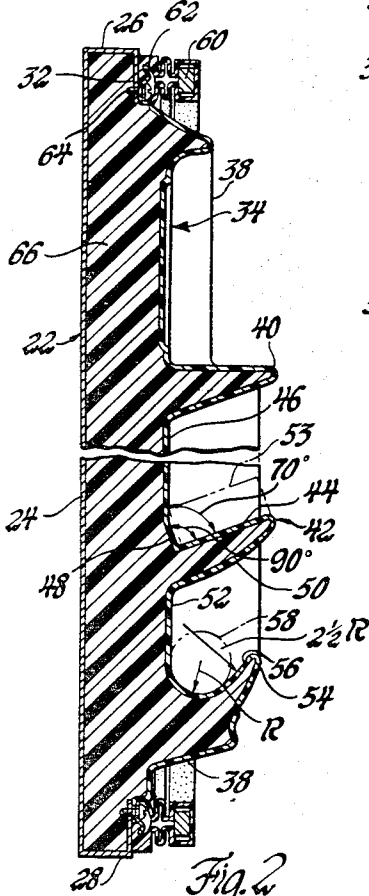


Fig. 2

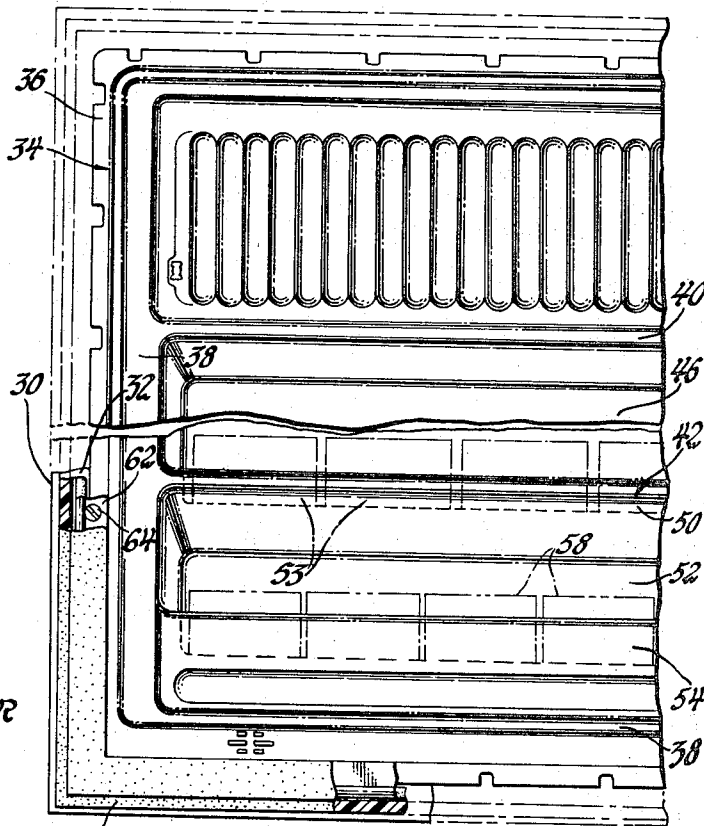


Fig. 4

INVENTORS,
Charles E. Rembold, &
Robert Mueller
Carl A. Stickel
ATTORNEY

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DOOR WITH INTEGRAL INCLINED AND UPWARDLY CURVED SHELVES

Charles E. Rembold and Robert Mueller, Dayton, Ohio, assignors to General Motors Corporation, Detroit, Mich., a corporation of Delaware

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ABSTRACT OF THE DISCLOSURE

In the preferred form, a refrigerator door has a plastic inner door pan having formed therein hollow upper and lower shelves extending substantially from side to side with their upper faces inclined or curved upwardly for retaining articles thereon. The interior of the door and the hollow shelves are reinforced by filling them with foamed plastic resin.

This invention pertains to an insulated refrigerator door provided with an inner door pan of sheet plastic having integral shelves inclined upwardly and curved upwardly for retaining the articles thereon.

At present the inner door pans of refrigerator doors have integral horizontal shelves similar to the shelves 4, 5 in Patent 2,817,880, issued Dec. 31, 1957. Since such shelves are horizontal, transverse bars must be added to retain articles on the shelves. The adding of the bars to the doors is expensive and involves a problem of fastening the bars to the inner door pan.

It is an object of this invention to provide a door shelf integral with the inner door pan which will retain articles thereon without requiring retaining bars.

It is another object of this invention to provide an inner door pan with integral hollow retaining shelves which are inclined upwardly and curved upwardly and which are so shaped that they can be readily withdrawn from a mold along with the remainder of the door pan.

These and other objects are attained in the form shown in the drawings in which an inner door pan is provided with integral hollow shelves, one of which has its upper surface inclined upwardly at an acute angle of about 70° and another of which is curled upwardly. Both types of shelves are capable of retaining articles thereon without the use of retaining bars.

In the drawings:

FIGURE 1 is a view of a refrigerator cabinet with the door open illustrating one form of the invention;

FIGURE 2 is a fragmentary vertical sectional view through the door taken along the lines of 2-2 of FIGURE 1;

FIGURE 3 is a fragmentary horizontal sectional view through the door taken along the line 3-3 of FIGURE 1; and

FIGURE 4 is an enlarged front view of the inner door pan together with a portion of the door.

Referring now to the drawings, there is shown a refrigerator cabinet 20 provided with an insulated refrigerator door 22 which is hinged at the top and bottom to the cabinet 20. The door 22 includes an outer sheet metal wall 24 having inturned upper and lower edges 26 and 28 and similar inturned side edges 30. These edges include a double fold providing an inwardly extended flange 32 extending completely around within the periphery of the outer wall 24. The inner wall of the door is provided by an inner door pan 34 of a suitable sheet plastic such as high impact polystyrene or acrylic butadiene styrene copolymer. This inner door pan is provided with a notched peripheral flange 36 which rests on the flange 32. It is bordered by a peripheral hollow rib 38 with varying

amounts of projection extending along the peripheral flange 36. This door may be provided with a conventional hollow shelf 40.

According to my invention, beneath the shelf 40 there is provided an inclined hollow shelf 42 in the form of an integral projection of the plastic sheet having its upper portion and surface 44 inclined upwardly at an acute angle of about 70° to the vertical wall 46 of the inner pan 34 which is parallel to the major portion of the outer wall 24. This rear wall 46 may be provided with a short and wide portion 48 immediately above the upwardly facing portion 44 of the shelf 42 which is inclined at an angle of about 20° to the vertical so that the portion 48 is perpendicular to the upper portion 44 of the shelf 42. The outer edge of the shelf 42 is curved and merges with a curved portion 50 extending upwardly at an angle of about 70° from the vertical portion 52 beneath it. The shelf 42 is capable of supporting articles 53 of various shapes and sizes on it without the use of a retaining bar since the upward inclination of its upper portion 44 is sufficient to retain the articles thereon without the use of retaining bars. The ends of the hollow shelf 42 join the peripheral hollow rib 38 as shown in FIGURE 4.

Beneath the shelf 42 is an upwardly curved shelf 54 which is merged with the bottom portion of the peripheral rib 38. This shelf is formed with an upper surface 56 which has its inner portion in the form of a fillet with a radius of R (such as 1") and its outer portion continuing outwardly from the fillet curved upwardly with a radius of 2½R (such as 2½"). This shelf is particularly adapted to retain cylindrical containers of various sizes such as are designated by the reference character 58. The inner door pan 34 is shaped so that it can be readily formed upon a suitable mold by vacuum forming and can be readily withdrawn therefrom. If desired, the part of the mold forming the shelf 54 may be made removable from the remainder of the mold for ease of removal. However, the sheet material forming the inner door pan 34 is flexible so that the problem of removal from the mold is minimized.

A magnetic door seal 60 is mounted on the flange 32 around the inner door pan 34. Both the magnetic seal 60 and the inner door pan 34 are fastened to the flange by a ribbed metal strip 62 which receives the screws 64 which are threaded into the flange 32. The outer walls 24 as well as the inner door pan 34, the hollow rib 38 and the hollow shelves 40, 42 and 54 are reinforced by polyurethane foam resin insulating material 66 which fills and reinforces these ribs and shelves and also fills the space between the inner door pan 34 and the outer wall 24 to make the door structure stiff and rigid and light in weight and also to insulate the inner door pan 34 from the outer wall 24. The polyurethane foam makes the shelves 40, 42 and 54 stiff and rigid so that they will support heavy articles without any cracking of the inner door pan 34. However, if the sheet material forming the inner door pan is sufficiently stiff and strong or reinforced, fibrous insulation may be substituted. The inner door pan is much neater and easier to clean than previous types which were required to have retaining bars.

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

What is claimed is as follows:

1. An insulated door including an outer wall extending generally within a plane, an inner wall formed of a non-metallic sheet, an insulation material between said inner and outer walls, wherein the improvement comprises providing a retaining shelf in the form of an integral hollow projection in said sheet extending across a major portion of the door having faces of substantial area on opposite

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surfaces extending at substantial acute angles relative to the general plane of said outer wall, said retaining shelf being reinforced by and filled with a portion of said insulation material, said hollow projection having its upper surface substantially throughout extending upwardly at an angle of substantially 70° relative to the plane of the outer wall sufficient to retain articles upon said shelf.

2. A door as defined in claim 1 in which the plane of the outer wall is generally vertical and the portion of the inner wall immediately above the upper surface of said hollow projection is substantially perpendicular to said upper surface of said hollow projection.

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CASMIR A. NUNBERG, *Primary Examiner.*