

[54] **REFRIGERATOR STRUCTURE**

[75] Inventor: **Thomas M. McLaughlin,**  
Mishawaka, Ind.

[73] Assignee: **American Formed Plastics Corp.,**  
Elkhart, Ind.

[22] Filed: **Dec. 7, 1970**

[21] Appl. No.: **95,632**

[52] U.S. Cl. ....62/449, 62/298, 62/77,  
62/263

[51] Int. Cl. ....**F25d 19/00**

[58] Field of Search.....62/448, 449, 450, 298, 77,  
62/263, 302

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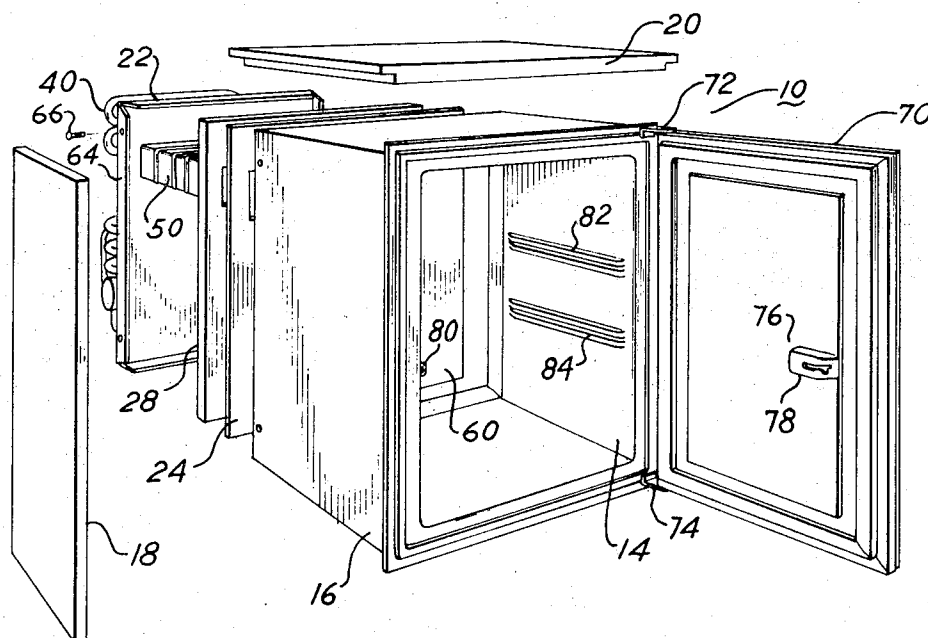
*Primary Examiner*—William J. Wye

*Attorney*—Hobbs & Green and Kemon, Palmer & Estabrook

[57] **ABSTRACT**

A refrigerator structure in which the housing has a rear and front opening, a removable rear panel closing the rear opening, and a pivoted hinged door closing the front opening. A refrigerating unit is mounted on the rear panel and is removable from the housing along with the rear panel, so that the housing may be inverted for installing the housing as either a right or left door unit while maintaining the refrigerating unit in its upright position.

**9 Claims, 4 Drawing Figures**



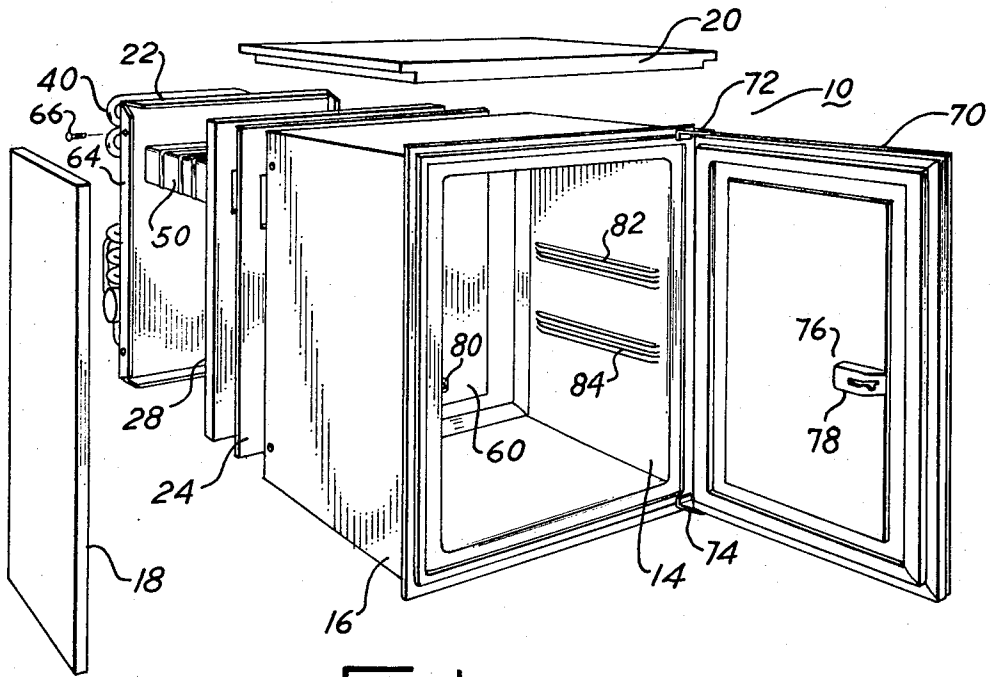


Fig. 1

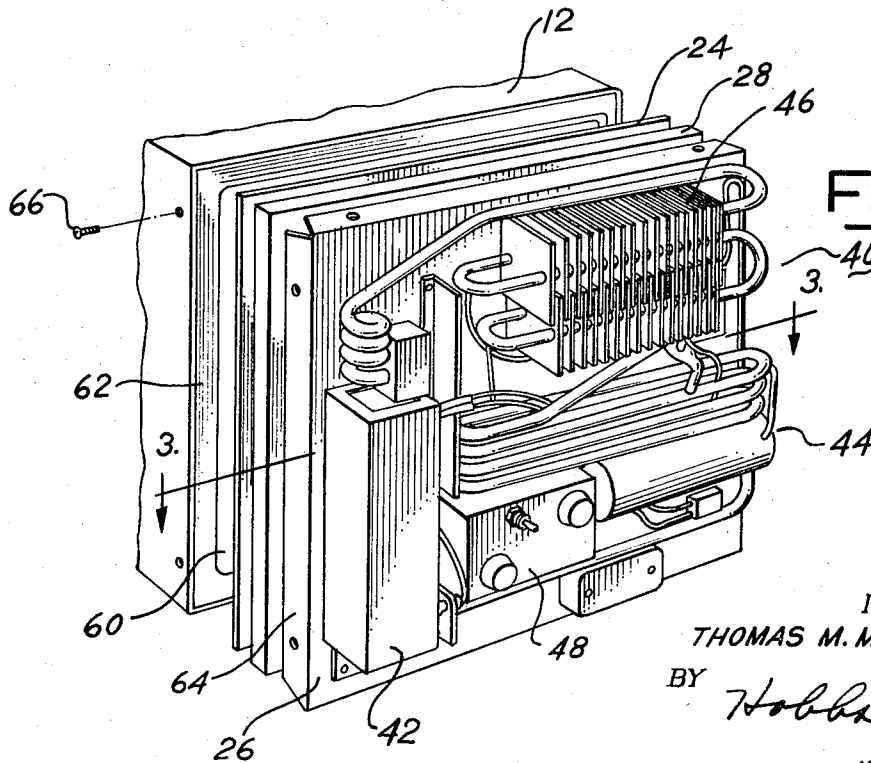
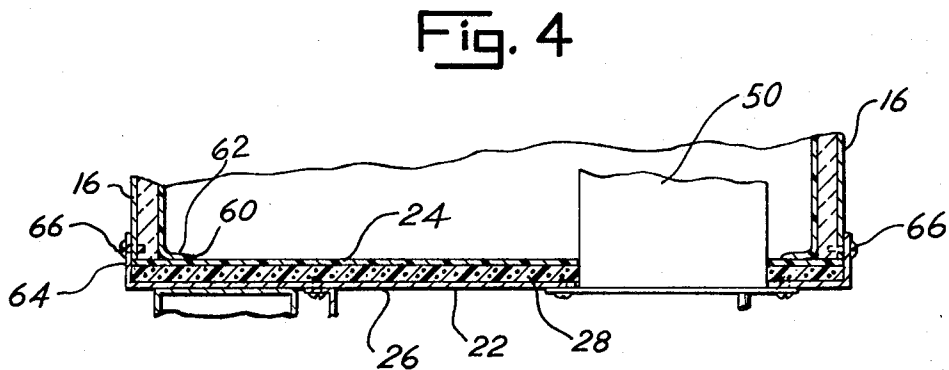
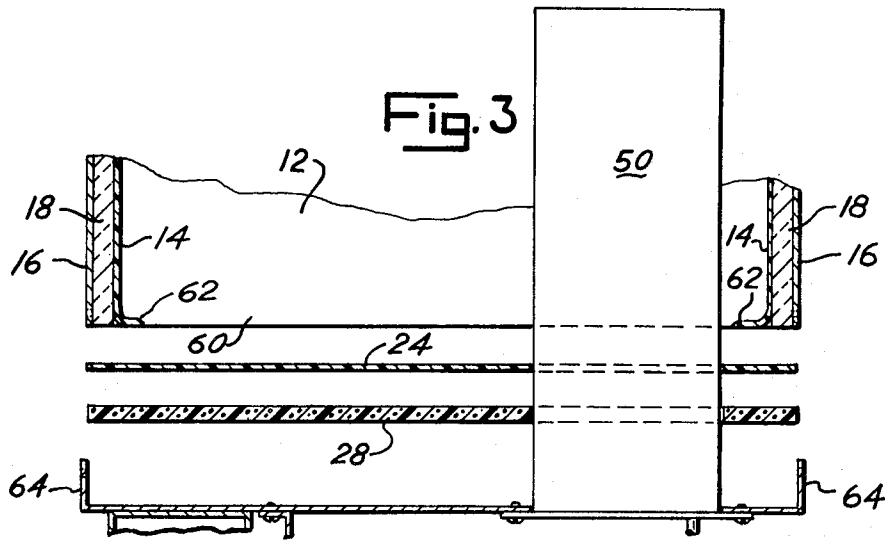


Fig. 2

INVENTOR  
 THOMAS M. McLAUGHLIN  
 BY *Hobbs & Green*  
 ATTORNEYS



INVENTOR  
THOMAS M. McLAUGHLIN

BY *Hobbs & Green*

ATTORNEYS

## REFRIGERATOR STRUCTURE

Refrigerators are often designed with doors opening either on the left or the right to permit easy access from normal kitchen or living space of various house plans, mobile homes and trailers. In some types of refrigerators, the door is hung on each side by a special lock and hinge structure which permits the door to be optionally opened from either the right or left, and others are designed to reverse the hinge and latch structures to adapt the refrigerator to various types of plans and installations. This latter arrangement requires removing and remounting the door and, in some structures, switching parts of the latch and hinges from one side to the other. In order to reverse the hinge and lock positions in the field, the refrigerator housings are often provided with the bosses, holes and/or fixtures required to make the reversal as easy as possible in the field. In the mobile home, camper and trailer industry, the refrigerators are often small and the doors are made for reversing by using a single set of hinges, and the door and hinges are reversed to adapt the unit to the particular floor plan design.

Further, in the mobile home and camper field, the refrigerating mechanisms are sealed units, frequently of the gas burner, or gas burner and electric combination, and are often difficult to repair in the field. In the past it has been necessary in many instances to remove the entire refrigerator from the vehicle and to ship it to the manufacturing plant or to the service center for repair. The bulk of the refrigerator housing and unit has made this method of servicing inconvenient and expensive as well as often leaving a gaping opening in the space in the vehicle normally occupied by the refrigerator.

It is one of the principal objects of the present invention to provide a refrigerator housing and unit combination which is so constructed and designed that the housing including the door can easily be inverted bodily in order to achieve the desired right or left door opening, without removing the door from the housing or reversing the hinges or latch, and which permits the refrigerator unit to remain in its upright operating position.

Another object of the invention is to provide a refrigerator having a refrigerating unit which can readily be installed on and removed from the back side of the housing, with the housing in either vertical position, and which can be handled and shipped as a separate compact unit, apart from the housing, to the manufacturing plant or a service center.

Still another object is to provide a housing for a refrigerator which is simple and sturdy in construction and light in weight, and which is so designed and constructed that the refrigerating unit can quickly be assembled thereon using only a few easily accessible securing screws.

A further object is to provide a compact and versatile refrigerator which can readily be installed in a limited space, such as that encountered in campers and other trailers, and thereafter easily inspected, cleaned and serviced, and which can effectively be adapted to the decor and floor plan of the vehicle or other living accommodations.

Additional objects and advantages of the present invention will become apparent from the following description and accompanying drawings, wherein:

FIG. 1 is an exploded perspective view of a refrigerator embodying the present invention;

FIG. 2 is a perspective view of the rear side of the refrigerator shown in FIG. 1, showing generally the refrigerating mechanism;

FIG. 3 is a horizontal cross sectional view taken on line 3—3 of FIG. 2, through a portion of the back of the refrigerator, with the parts thereof separated from one another to illustrate the construction and assembly of the parts; and

FIG. 4 is a horizontal cross sectional view similar to that shown in FIG. 3, with the parts of the refrigerator shown therein in their assembled form.

Referring more specifically to the drawings, and to FIGS. 1 and 2 in particular, numeral 10 indicates generally the present refrigerator including a housing 12, having a rigid inside wall 14, and an outside wall 16 extending around the inside wall 14 and spaced therefrom. The inside wall preferably is constructed of firm plastic material which is sufficiently rigid to retain its shape, and the outside wall 16 is preferably of sheet metal spaced from the inside wall, the space between the inside and the outside walls forming an insulating area and containing an insulating material such as polyurethane foam panels 18 on the two sides, and 20 on the top and bottom. The rear panel 22 of the refrigerator is constructed of a plastic inner wall 24 and an external sheet metal wall 26, and a panel 28 of insulating material disposed between the inner and outer walls.

Mounted on the rear panel 22 is an absorption refrigeration apparatus 40, which may be considered as conventional for the purpose of the present description, containing a generator unit 42, absorber 44, condenser coils 46, controls 48, and evaporator or cooling unit 50. The cooling unit while being mounted on the rear panel 22 extends inwardly into the refrigerator compartment, preferably projecting forwardly to a point near the front opening of the housing, and includes evaporator coils and a freezing compartment for the formation of ice cubes or the like. The refrigeration apparatus is mounted fully on the rear panel, and the refrigeration apparatus and rear panel form an integral unit which can be handled, shipped, stored and installed as a one-piece assembly. The refrigerator housing contains an opening 60, preferably of rectangular shape, and a flange 62 connected to the inner top, bottom and two side walls and projecting inwardly to define the opening and preferably forming a seal with an inner surface of the rear panel, so that after the rear panel has been mounted on the housing, an air tight connection between the rear panel and the inner side walls of the housing is formed.

The rear panel 22 may be mounted on the rear portion of the housing by any suitable structure, the structure shown consisting of a forwardly extending flange 64 joined integrally with the sheet metal rear wall 26 and extending around the periphery of the housing at the rear edge thereof. A plurality of screws 66 extends through the flange into the adjacent margin of the housing side walls, top and bottom, to secure the rear panel firmly in place on the housing.

The front opening is closed by a door 70 pivotally connected to the housing by hinges 72 and 74 at the upper and lower corners of the door, respectively. A latch 76 having a manually operated door portion 78 and a detent portion 80 on the internal side wall of the housing retains the door in closed position; however,

various types of latches, including a magnetic or electrical closure, may be used if desired. The door is constructed essentially the same as the side walls, including internal and external plastic and metal panels separated by suitable insulating material such as that shown at numerals 18 and 20. The refrigerator housing and door are of generally rectangular configuration, and the compartment preferably contains one or more shelves supported by brackets or other support means 82 or 84 on each of the two inner side walls. The space above the upper shelf and the space below the lower shelf are preferably substantially the same size for reasons which will appear more fully hereinafter.

In the refrigerator industry, it is usually necessary to provide both refrigerators with left hand opening doors and refrigerators with right hand opening doors. The practice that has been generally followed in the past has been either to construct refrigerators as a left hand or right hand door opening type, or to move the hinges from one side to the other for the right or left door type as required. Neither of these two practices has been entirely satisfactory in that a large inventory has often been required for the first practice, and provision for hinges on both sides of the door opening of the refrigerator housing is required for the second practice. The present invention overcomes these two difficulties by the construction described herein which permits the housing to be rotated vertically 180°, i.e., inverted, so that the door which in one position opens on the left will, in the other position, open on the right. Since refrigeration apparatus must always be in an upright position when the door swing direction is to be changed, the back together with the entire refrigeration apparatus is removed from the rear of the housing, and after the position, i.e., either right or left, of the door opening type has been obtained, the back and refrigerating apparatus then reinstalled on the refrigerator. The forwardly extending flanges 64 and screws 66 permit the rear panel and refrigeration apparatus to be readily removed from the rear of the housing and to be easily replaced after the housing has been inverted. When the rear panel 22 has been removed from the housing, the entire refrigeration apparatus including the evaporator and coils, i.e., cooling unit 50, is also removed from the housing as a unit. While the cooling unit extends forwardly to a point near the door, it can be readily withdrawn from the rear side when the rear panel and refrigeration apparatus are removed from the housing. Regardless of the position of the housing, the shelves and door hinges and latch operate in the same manner using the same parts without changing or adjusting their position. The shelves are supported in a groove on each side of the inner wall of the housing and stay in place and function properly with the housing in either vertical position, and the spaces between shelf 82 and the top and shelf 84 and the bottom are the same for receiving cooling unit 50; thus, the refrigerator compartment is the same in shelving arrangement regardless of the vertical position of the housing.

Another advantage of the present integrally constructed refrigeration apparatus and rear panel is that in some instances when the refrigeration apparatus needs repairing at the factory or is sent to a repair center only the refrigeration unit and rear panel as-

sembly are shipped. The housing remains in place in the living space, thereby eliminating an otherwise gaping hole when the refrigerator has been installed as a built-in unit.

While only one embodiment of the present refrigerator structure has been described in detail herein, various changes and modifications may be made without departing from the scope of the invention.

I claim:

1. A refrigerator structure for use in either right or left door opening positions, comprising an invertible housing with a compartment and openings in the front and back, said housing having substantially the same structure at the top and bottom ends, both outside and inside, so that said housing will be substantially the same when either end is up, a door for the opening in the front invertible with said housing, latch parts on said housing and door operable in substantially the same manner with the housing and door in either position, a hinge means along one side of said door for pivotally attaching said door to said housing along one side of the front opening, a removable rear panel for said housing closing said back opening, means for securing said rear panel to said housing when said housing is in either of said two positions, a refrigeration apparatus mounted on said rear panel and being removable from said housing along with said rear panel, a shelf for said compartment, and fixtures supporting said shelf in either of said two positions.

2. A refrigerator structure as defined in claim 1 in which said housing is of a generally rectangular shape and the rear panel is of a generally rectangular shape of substantially the same size as the rear end of the housing.

3. A refrigerator structure as defined in claim 1 in which a flange extends inwardly around the rear opening and the inner edge of the flange is adapted to be in close proximity to the inner surface of the rear panel.

4. A refrigerator structure as defined in claim 1 in which the sides, top and bottom of said housing consist of an internal plastic wall and external metal wall and insulating material between the two walls.

5. A refrigerator structure as defined in claim 1 in which said rear panel consists of a plastic inner wall and a metal outer wall and insulation material therebetween, and said outer wall includes a forwardly projecting means for securing said rear wall to said housing.

6. A refrigerator structure as defined in claim 1 in which said means for securing said rear panel to said housing includes a forwardly extending flange on said rear panel for engagement with the rear portion of said housing.

7. A refrigerator structure as defined in claim 1 in which said door includes a latch near the center thereof on the edge opposite said hinge means.

8. A refrigerator structure as defined in claim 1 in which said refrigeration apparatus is mounted on the external side of said rear panel and a cooling unit is mounted on the front side of said rear panel and extends inwardly from the rear panel through said rear opening into said compartment.

9. A refrigerator structure as defined in claim 1 in which said refrigerator unit is mounted on and supported solely by said rear panel.

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