Jan. 6, 1948. R. H. MONEY ET AL 2,434,117

SHELF STRUCTURE WITH GUARD FOR REFRIGERATOR DOORS

Filed Dec. 10, 1941 2 Sheets-Sheet 1

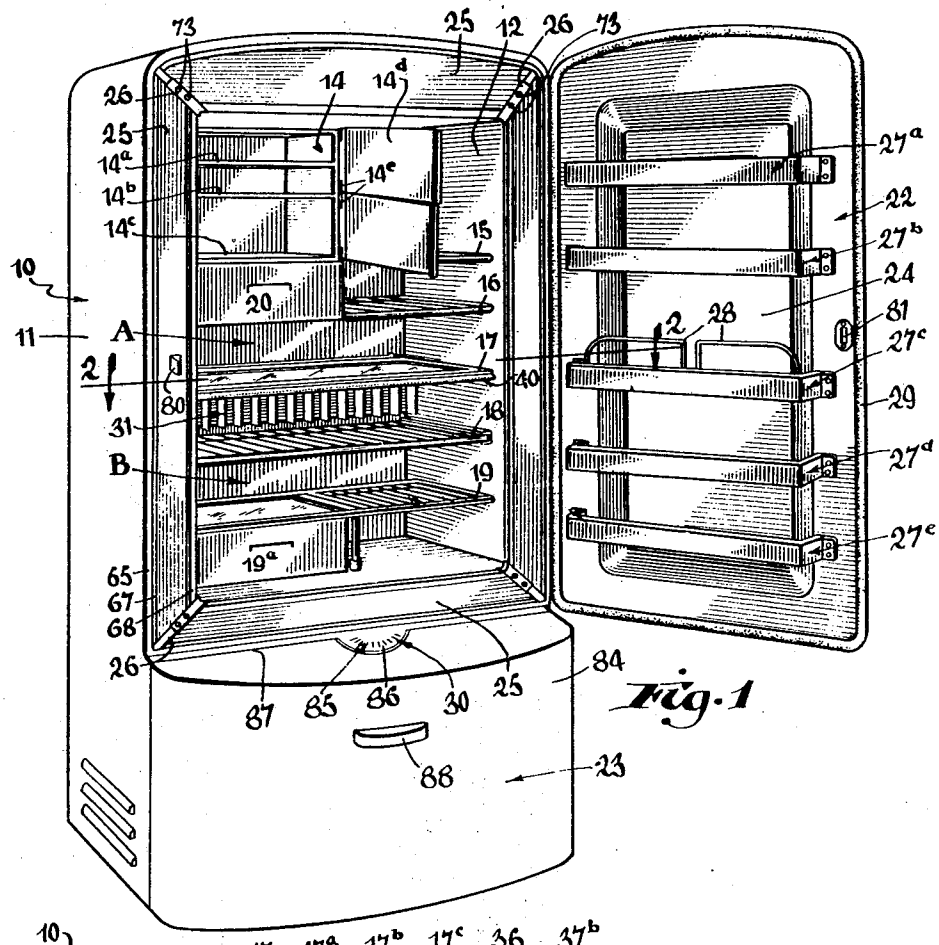


Fig. 1

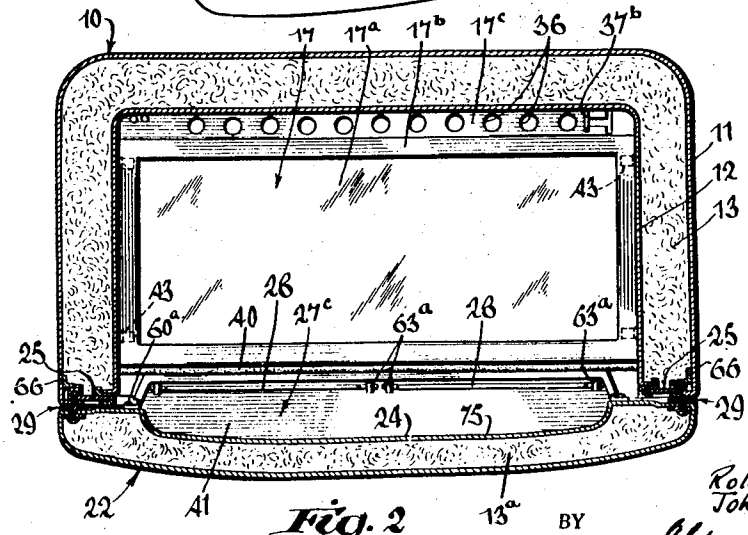


Fig. 2

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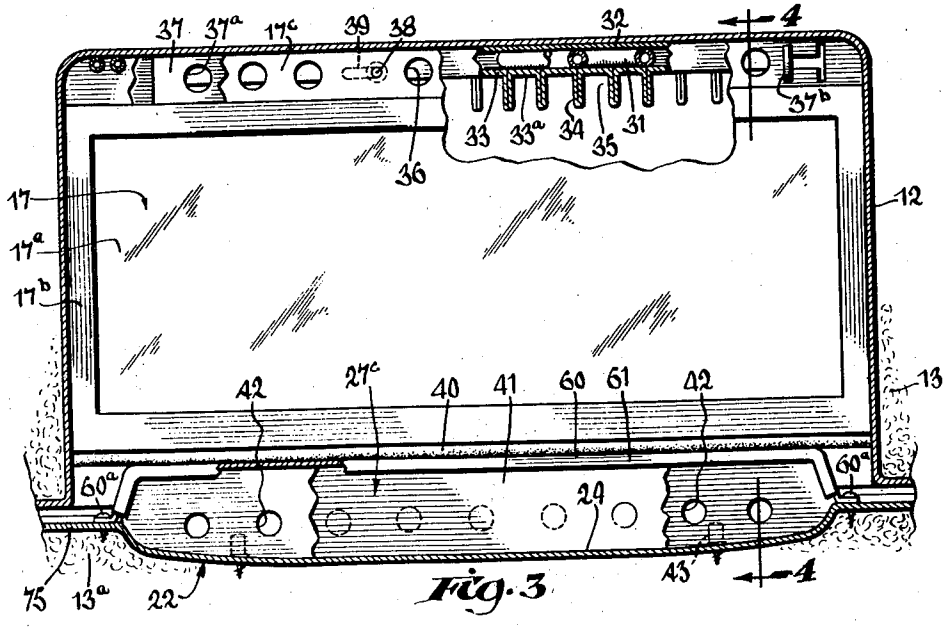


Fig. 3

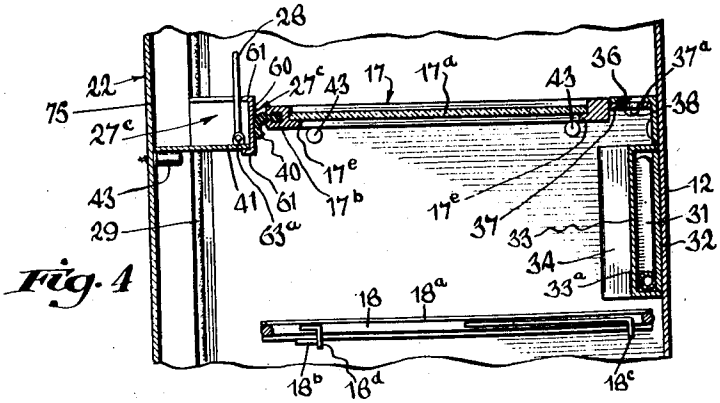


Fig. 4

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2,434,117

SHELF STRUCTURE WITH GUARD FOR REFRIGERATOR DOORS

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6 Claims. (Cl. 312—186)

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This invention relates to refrigerators, and is particularly concerned with cabinets and mechanisms for refrigerators of the household type. The invention will be described in connection with an electric refrigerator of the compression-expansion type, but is not limited thereto.

An object of the invention is to provide a household refrigerator which is simple in design, economical to manufacture, convenient and accessible to the user, and efficient in operation.

Another object is to provide a simple and useful shelf structure within and upon the inner side of the door of the refrigerator. In this respect the invention is an improvement over that described and claimed in the patent to West, Reissue No. 19,008, dated November 21, 1933.

A further object of this invention is to provide a novel refrigerator door construction having a recessed portion and including a storage shelf disposed partially within and partially without the recess adapted to receive and retain foodstuffs for refrigeration.

A still further object of this invention is to provide a refrigerator door having a recessed portion and provided with a novel shelf construction disposed partially within and partially without the recess in which the shelf construction includes a vertical rail having a horizontal flange and a removable base supported by said flange.

Another object of this invention is to provide a refrigerator door having an inner liner including a recess therein for receiving a shelf with a shelf disposed in the recess consisting of a vertical member having a horizontally extending flange and having the ends thereof bent to extend along the face of the liner secured to the liner and a shelf bottom removably disposed between the vertical member and the liner.

A still further object is to provide shelf constructions of simple and convenient design and of distinct utility.

The novel features that we consider characteristic of our invention are set forth in the appended claims; the invention itself, however, both as to its organization and method of accomplishment together with additional objects and advantages thereof will best be understood from the following description of a specific embodiment when read in conjunction with the accompanying drawings, in which:

Figure 1 is a perspective view of a cabinet constructed in accordance with the principles of the invention.

Figure 2 is a horizontal section taken along line 2—2 of Figure 1, with the door closed.

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Figure 3 is an enlarged view similar to Figure 2, with certain parts either omitted or broken away to show the underlying structure.

Figure 4 is a fragmentary section taken along line 4—4 of Figure 3.

Referring now to Figures 1 to 4, the cabinet 10 comprises a one-piece metallic casing 11 and an inner liner 12 also constructed of one piece and preferably made of porcelain covered metal. Between the members 11 and 12 is provided the usual insulation 13, which may be made of rock wool or other fibrous silicate. There is provided a primary evaporator 14, shelves 15–19, meat drawer 20, crisper pan 19a, and door 22. A refrigerating mechanism or operating unit, not illustrated, is disposed at the bottom of the cabinet to the rear of the vegetable bin 23. Within the evaporator may be horizontally disposed shelves 14a, 14b, 14c, one or more of which may be refrigerated, and evaporator doors 14d may conveniently be provided. The evaporator doors preferably are mounted on spring hinges 14e to keep them closed and avoid interference with the refrigerator door 22.

The door 22 is preferably recessed somewhat as at 24 after the fashion of the door described in the West reissue patent referred to, and providing a thickness 13a of insulation between the inner surface of said recess and the outer shell or covering of the door.

Other features shown in Figures 1 and 2 comprise breaker strips 25, trim 26, door shelves 27, 27a, 27b, 27c, 27d and 27e, retainers 28, door gasket 29 and temperature control 30 to which more detailed reference will hereinafter be given.

The cabinet is divided by the shelf or partition 17, preferably of glass, into an upper compartment A for storing dry or enclosed foodstuffs and a lower compartment B for the storage of foodstuffs, such as leafy vegetables, requiring high humidity conditions. If desired a temperature differential between the two compartments may be maintained. Openings 36 are provided at the rear of said shelf and an adjustable shutter device, is arranged to regulate such openings. Fast freezing is, of course, accomplished within the compartment enclosed by the evaporator 14.

The primary evaporator 14 in compartment A is of relatively large capacity and is adapted for the storage of meats and frozen foods as well as for ice-making. In the exemplary embodiment the evaporator is mounted to one side of the cabinet with the shelves 15 and 16 alongside the evaporator, supported on one side by a plurality of studs screwed into the wall of the compartment.

The opposite sides of the shelves are supported by a pair of L-shaped brackets not shown extending about the side and bottom of the evaporator and secured to the top and side wall of the cabinet preferably by screws. The shelves 15 and 16 rest upon angular lugs not shown, secured to the respective brackets, and the shelves may if desired, be held in place by means of studs not shown screwed into the brackets above the shelves, which, in conjunction with depending pins not shown at the front and rear, prevent removal of the shelves. The pins for the rearward ends of the shelves may be of angular form to provide engagement beneath the lugs. A drawer type meat pan 20 for low temperature storage of meats is mounted directly beneath the evaporator as shown in Fig. 1.

Heat is absorbed from compartment B by a secondary evaporator 31 insulated from the wall or liner 12 by a gasket member 32. The secondary evaporator may be connected to a secondary condenser (not shown), which in turn may be secured to the primary evaporator in the manner described and claimed in the patent of R. H. Money and J. W. Craig, Patent 2,301,313 dated November 10, 1942.

In order to increase the rapidity with which heat may be absorbed by evaporator 31, the same may be secured to, as by a metallic connection, a finned structure 33*a*, the fins 34 of which may be formed by doubling over a metallic sheet 33 as shown in Figure 3. The spaces 35 between the fins are advantageously used to direct a current of air upwardly or downwardly within the compartment and toward or away from the openings 36 disposed at the rear of the shelf 17. The direction of the air current will depend on the temperature and humidity conditions within the compartment B.

It will be noted from an examination of Figures 3 and 4, that the illustrative shelf 17 consists of a glass panel 17*a* disposed in a frame 17*b* to the rear of which is provided a strip 17*c* in which openings 36 are provided. The shelf as a whole therefore may be considered a perforate shelf. Strip 17*c* may conveniently assume the form of an angle member having a depending portion 17*d* adapted to be secured to liner 12. A sliding shutter 37 is provided with openings 37*a* arranged to register with the openings 36, and an upturned handle 37*b* may extend through a slot in the strip for regulating the extent of the open space between the two compartments. The strip 17*c* may be provided a screw 38 on its lower side and a slot 39 formed in the shutter 37 permits the sliding movement to take place.

The secondary evaporator 31 operates at a refrigerating temperature high enough to substantially eliminate frosting in the compartment B. The compartment B maintains a high degree of humidity to conserve the natural food moisture of its contents yet with a temperature sufficiently low for safe storage. These conditions are ideal for keeping certain classes of foodstuffs, for example, leafy vegetables, salads, fruits, and sliced meats which normally deteriorate when exposed to the dehydrating influence of the dry cold compartment A, a high percentage of the moisture derived from foods stored there being deposited on the evaporator 14 in the form of frost.

The shutter 37 provides for the ingress and egress of air between the compartments A and B and may be utilized to maintain a normal degree of moisture during excessively humid weather. During such periods, the shutter slide may be conveniently adjusted to a partial or full open position to permit a movement of air between the compartments. Any such movement tends to cause a partial dehydration of the air in compartment B. The shutter adjustment is likewise of utility in maintaining proper humidity for various kinds of foodstuffs. It is to be noted that when there is a temperature differential between the two compartments there will be some actual circulation of air therebetween, but when the temperature within the compartments is the same the movement of air will be derived from the difference in vapor pressure between the compartments and will be of small magnitude.

The forward edge of the shelf 17 is provided with a resilient sealing strip. The strip 40, clamped within a groove formed along the edge of the frame 17*b*, is preferably of rubber for making a sealing union with the door shelf 27*c* when the door is closed. As shown in Figures 2, 3 and 4, for this purpose the door shelf 27*c* is conveniently provided with a closed bottom 41, while the remaining shelves 27*a*, 27*b*, 27*d* and 27*e* disposed within the compartments A and B have their bottoms apertured as at 42 to permit free circulation of air within the respective shelves.

The dividing shelf 17 may be made of glass to render the contents of the lower shelves visible from above and to facilitate cleaning. The plate may be marginally supported within the frame 17*b* upon a flange 17*e* of the frame. The frame along its rear edge adjoins the apertured strip 17*c*, which is rigidly secured to the rear wall of the cabinet, and the side edges of the frame may be supported upon a plurality of studs 43 screwed into the side walls or liner of the cabinet.

Within the compartment B, directly beneath the dividing shelf 17 may be disposed a sliding shelf 18 supported along its opposite side edges within channels 18*a* secured to the side walls of the refrigerator compartment. The channel includes at its forward end a lug 18*b*, engageable by a stop 18*c* in the form of a rod secured to the shelf, the rod having its end bent at right angles to form a stop, see Figure 4. The shelf may be latched in place by a pivoted latch pin 18*d* engaged against the lug as shown in Figure 4. When this structure is provided and it is desired to withdraw the shelf, the latch pin is raised in an unlatching position permitting the shelf to be pulled outwardly. The bent portion of rod 18*c* engaging the lug 18*b* ordinarily prevents accidental dislodgement of the shelf from the channels when the shelf is drawn out merely to remove articles therefrom. When it is desired to entirely remove the shelf, the rod 18*c* is sprung clear of the lug, thus permitting complete removal.

The lowermost shelf 19 of compartment B may be provided with a drawer type crisper pan 19*a* preferably formed of sheet metal. The pan is dependingly supported by a pair of channels, for receiving the flanged edges of the pan in sliding engagement. A cover is disposed above the pan and in the illustrated embodiment forms approximately one half of the shelf area, the cover being conveniently made of glass to render the contents of the pan visible from above. The remaining half of the shelf preferably constitutes a wire grid section removably supported within a frame marginally enclosing both the glass cover and the grid section. If desired, this shelf section

may also be of glass substantially duplicating the glass cover. The entire shelf assembly is integrated by a suitable subframe in the form of a channel extending around three sides of the shelf with the frame secured thereto by welding or other means.

As shown in Fig. 4, the door shelves 27*a*, 27*b*, 27*c*, 27*d* and 27*e*, each constitute a vertical member or rail 60 secured at opposite ends to the door liner or frame, each rail having at least one stiffening flange 61, the opposite ends of the rails being bent outwardly and secured to the door, as by screws 60*a*. The lower flange 61 supports one edge of a removable base plate or bottom 41 and the opposite edge is supported upon the liner, for instance by a plurality of studs 43 screwed therein. One shelf of the series, for instance 27*c*, may be provided with a pair of U-shaped guards 28, pivotally mounted adjacent rail 60 so that when moved about their pivots to upright position, as shown in Figure 1, they will contact flange 61 and serve as retainers primarily for bottles and the like. The racks are individually pivoted at their lower ends upon the bottom 41, for instance on lugs 63*a* struck out from the bottom member 41 as shown in Figure 4. When not in use, the guards may be folded flat on the bottom of the shelf.

The inner and outer walls of the refrigerator cabinet are preferably of one piece stamped sheet metal construction, suitably finished in enamel or porcelain. In order to prevent the passage of heat from the outer shell or wall 11 to the interior liner 12 across the front of the cabinet, the continuity of the walls is interrupted by suitable heat insulating breaker strips 25 marginally framing the food storage compartment. In order to secure the strips, the respective edges of the inner and outer shells are bent toward each other and outer wall 11 including a protruding longitudinal rib 65 upon which the door gasket seats. An angle iron or stile 66 is secured, as by welding, in the corner behind the rib 65 to reinforce the same. The breaker strips are very simply mounted between a pair of molding strips 67 and 68 of generally S-shaped configuration indicated generally in Fig. 1.

The diagonal seams between the breaker strips at the four corners of the cabinet are concealed by the trim strips 26 overlying the seams. These strips may be conveniently formed of two sections, preferably convex in cross section, telescopically interfitted and with their respective opposite ends hooked over the molding strips 67 and 68, as shown in Figure 1.

The door of the refrigerator is adapted completely to overlie the front margin of the cabinet constituting the breaker strips 25, with the door gasket 29 seated upon the exterior frame extension 65 of the outer wall. The door gasket 29 is preferably of rubber or other resilient material, tubular in cross section and extending around the marginal edge of the door. The tubular configuration lends additional resiliency to the gasket for maintaining a close sealing engagement with the marginal member 65 and molding strip 67. The gasket is secured by means of a longitudinal tongue extending within the interior of the door and clamped between the edge of the door liner 75 and a suitable marginal flange bent inwardly from the exterior shell of the door.

The door liner 75 forming the interior panel or face of the door, is of heat insulating material, preferably of a plastic composition of the synthetic resin type. It is secured by a series of

screws through the edge of the liner engaged in a plurality of mounting plates welded or otherwise secured to a marginal flange bent inwardly from the exterior shell of the door.

The door includes a suitable latching mechanism which may be of any desired construction. As illustrated in Figure 1, the stationary catch element 80 for the latch is mounted over the face of the breaker strip 25, the door having a recess 81 housing a strike to receive and engage the catch element when the door is closed. The catch element 80 is secured preferably by screws to a reinforcing plate 82, concealed beneath the breaker strips and secured to the respective margins of the shells by means of suitable screws or other fastening means. A similar reinforcing plate may be secured at the opposite side of the cabinet.

A temperature control device 30 is located at the front of the cabinet on a bracket 86 formed on the outer bottom edge of the refrigerator. The refrigerator mechanism is preferably placed well back of the lower compartment in order to leave space for a vegetable bin formed integrally with a cover or door 84. The door 84 substantially duplicates the contour of the refrigerator door, so that when both doors are closed the cabinet front presents a relatively uninterrupted vertical surface, with the control device 30 concealed by the refrigerator door.

The control device may be of well known construction having a pointer arm 85 having one end pivotally connected in any desired manner to the temperature regulating apparatus of the refrigerator system. The pointer is arranged to swing in an arc relative to the bracket 86 which may conveniently take the form of a stationary sector plate. The plate may be provided with suitable graduations or indicia thereon for setting the refrigerator for various temperatures and for defrosting.

The pointer arm lies directly beneath the sector plate 86 and has its outer end or pointer extended around and hooked over the edge of the plate for registry with the indicia thereon.

The vegetable door 84 is preferably pivoted at the bottom so that its upper portion pulls away from the cabinet along the line 87, a hand hold 88 being provided at the front of the door for this purpose. In order to provide clearance for the pointer, the top of the vegetable door has a semi-circular cut-out sector complementary to the sector plate 86 and slightly larger than the plate to provide a narrow spacing therebetween for accommodating the pointer. Since the pointer is formed of relatively thin flat metal, the spacing or clearance between the plate 86 and the door may be relatively minute and inconspicuous for preserving a neat and finished appearance. The arrangement likewise facilitates manufacture and assembly, since it is not necessary to form a slot or opening in plate 86 for traversing the pointer. If desired, the pointer may be provided with a lug or finger hold to facilitate adjustment.

Since the refrigerating system forms no part of the present invention, it is not deemed necessary to illustrate the same in conjunction with the temperature regulator.

The various improved features of the invention promote cleanliness and provide a refrigerator of economical and rugged construction, extreme simplicity of manufacture and assembly, and give the refrigerator a neat and trim appearance. The improved breaker strip arrange-

ment together with the insulating door liner and improved door gasket promote a high degree of operating efficiency.

The inner and outer shells of the cabinet are securely reinforced at the front by the reinforcing plates 66, rigidifying the cabinet, so that no strain is imparted to the breaker strips, the breaker strips being free to yield when temperature changes cause contraction or expansion or other strains occurring between the shell and the strips.

The shelves 15 to 19 are removable and may be either of wire grid form or they may be of glass as desired. The top shelf 27 has its floor recessed for holding eggs. The unitary construction and mounting of the shelf 19 provides easy removal, which is advantageous for cleaning or when space is needed for storing large articles in the bottom of the compartment. This construction is likewise of advantage in manufacture since the complete unit can be fabricated outside the cabinet and installed without difficulty.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In a refrigerator door construction having a recessed portion interiorally thereof, and having a storage shelf disposed partially within said recessed portion, said shelf comprising a bottom and a rail thereabove, a retaining guard of greater height in upright position than the rail secured to and pivoted on the shelf bottom adjacent said rail whereby said guard may be moved about its pivots to upright position against said rail to provide a second retaining means disposed above the rail for retaining articles on said shelf.

2. A refrigerator door construction having a recessed portion interiorally thereof, and having a storage shelf disposed partially within and partially without said recessed portion, such shelf comprising two parts consisting of a vertical rail having at least one horizontally disposed flange and a removable base supported on said flange, said door having supports disposed within said recessed portion for supporting the other side of said base.

3. In a refrigerator door construction having a recess therein, a shelf within said recess, said shelf consisting of a vertical retaining member secured to said door, a horizontal supporting member, said vertical member having a bottom flange for supporting one edge of the horizontal member and said door having projections for supporting the other edge of said horizontal member, and a guard comprising a member secured to and pivoted at an edge of said horizontal supporting member, said member being adapted and arranged optionally to lie flat along the horizontal supporting member or to stand upright along said vertical retaining member, and being of a height greater in upright position than the vertical retaining member, which latter limits the upward movement of said member, whereby said guard may be extended vertically above said vertical retaining member for holding tall articles placed upon said shelf.

4. In a refrigerator door construction having a recess therein, a shelf within said recess, said shelf consisting of a vertical retaining member secured to said door, a horizontal supporting member, said vertical member having a bottom flange for supporting one edge of the horizontal member and said door having projections for supporting the other edge of said horizontal member, and a guard, of greater height in upright position than the vertical retaining member, comprising a member, pivoted at its ends to an edge portion of said horizontal supporting member, said member being thereby adapted and arranged optionally to lie flat along the horizontal supporting member, or to stand upright along said vertical retaining member, which latter limits the upward movement of said member.

5. A refrigerator door comprising an outer shell and an inner liner having studs secured to the face thereof, said door having a recess therein for the reception of shelves, shelves disposed within said recess, each shelf consisting of a vertical member having a horizontally extending flange and having outwardly bent ends extending parallel to the face of said liner, said ends only being secured to said liner, and shelf bottoms removably disposed between said vertical member and said liner and supported upon said horizontal flange and said studs.

6. A refrigerator door comprising an outer shell and an inner liner having a stud secured to the face thereof, said door having a recess therein for the reception of a shelf, a shelf disposed in said recess, said shelf consisting of a vertical member having a horizontally extending flange and having the ends thereof bent parallel to the face of said liner, said ends only being secured to said liner, and a shelf bottom removably disposed between said vertical member and said liner and supported upon said horizontal flange and said stud.

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JOHN W. CRAIG.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,084,204	Knight	June 15, 1937
2,116,619	Crosley	May 10, 1938
2,228,144	Miller	Jan. 7, 1941
2,253,804	Norberg	Aug. 26, 1941
2,304,411	Keighley	Dec. 8, 1942
1,920,007	Durant	July 25, 1933
Re. 19,008	West	Nov. 21, 1933
1,927,398	Glasser	Sept. 19, 1933
1,794,894	Griswold	Mar. 3, 1931
1,473,215	DeWitt	Nov. 6, 1923
2,214,239	Young	Sept. 10, 1940
479,664	Rosenweig	July 26, 1892
1,083,675	Eustis	Jan. 6, 1914