Oct. 2, 1962 H. D. SQUIRE 3,056,640

ADJUSTABLE SHELF

Filed May 27, 1959

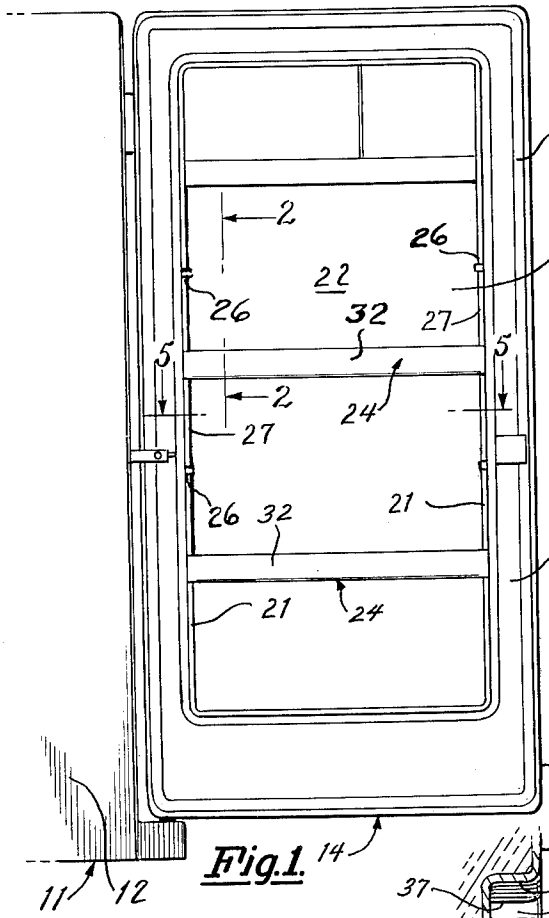


Fig. 1.

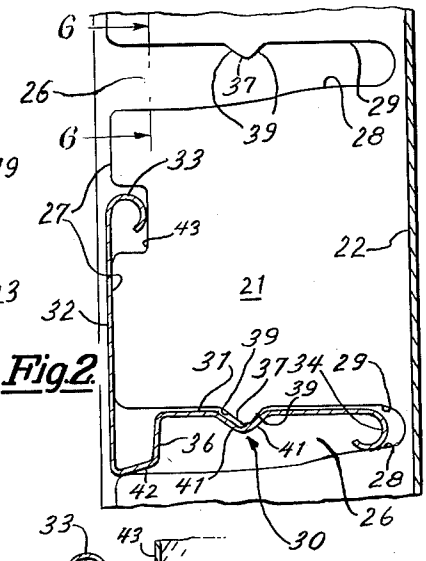


Fig. 2.

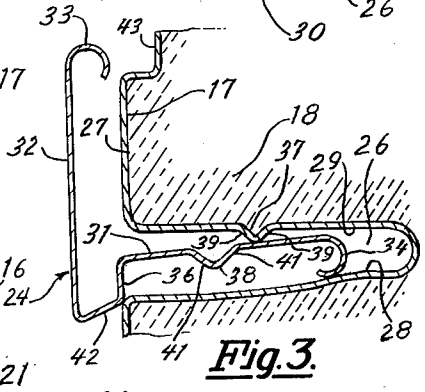


Fig. 3.

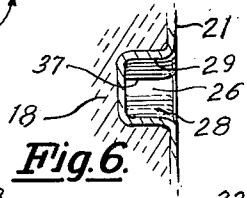


Fig. 6.

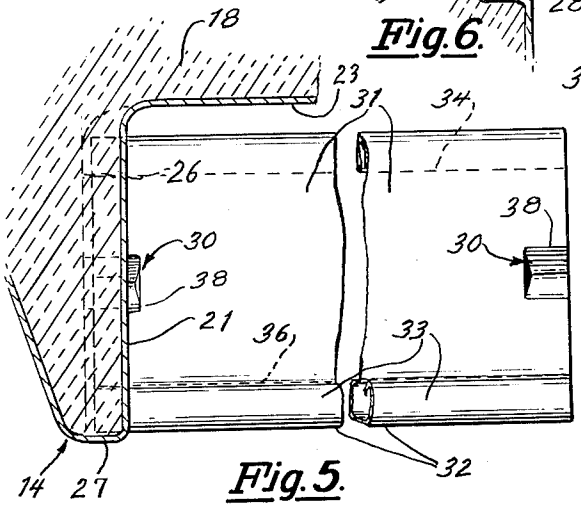


Fig. 5.

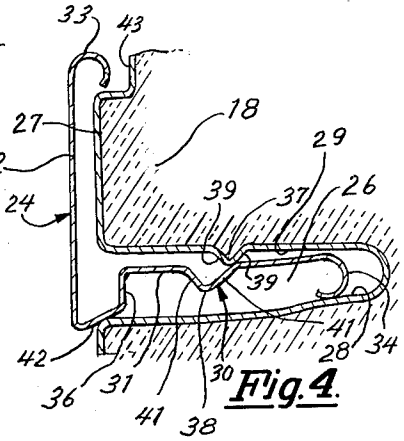


Fig. 4.

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3,056,640
ADJUSTABLE SHELF

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This invention relates to a domestic refrigerator having a door formed with a food storage cavity at its inner side. More especially the invention relates to a mounting for a shelf in such a cavity, the mounting enabling the shelf to be quickly removed from the cavity and quickly repositioned therein at a selected elevation.

Although it is not new to provide refrigerator cabinet doors with removable shelves, mounting for the latter were responsible for either too loose a relationship between the shelves and doors or a relationship between the same closely approaching the category of fixed shelves. Where the shelves were constructed for loose association with the doors it was advisable, in manufacture, to package them out of assembly with the refrigerator door in which they were to be eventually used.

When constructed in accordance with the present invention, a refrigerator cabinet door and shelf therefor manufactured at the same factory may be sent therefrom in assembled relation to each other. Furthermore, when the shelves are positioned in the shelf cavity of a door they are tightly but releasably secured therein.

An object of the invention is therefore to simplify manufacture and make it easier for the owner of a refrigerator, in which the invention is embodied, to rearrange the level of a door shelf or shelves.

Other advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

In the drawings:

FIG. 1 is a fragmentary view of a domestic refrigerator the main part of which is shown in side elevation and door thereof swung open adequately to expose its interior;

FIG. 2 is a fragmentary vertical section taken on line 2—2 of FIG. 1, the section being drawn on an enlarged scale.

FIGS. 3 and 4 are partly diagrammatic views corresponding to FIG. 2 to show parts in different positions, other parts being broken away;

FIG. 5 is a fragmentary horizontal section taken on line 5—5 of FIG. 1 and drawn to an enlarged scale; and

FIG. 6 is a fragmentary vertical section taken on line 6—6 of FIG. 2.

Throughout the drawings the reference character 11 is used to denote a refrigerator cabinet in its entirety. It includes a body portion 12 and a door 14 hinged thereto in keeping with conventional practice. The door 14 is formed with an outer wall or shell 16 and inner walls 17 in addition to suitable thermally non-conductive material such as glass wool 18 between the walls. The door is further provided with an endless weather strip 19.

The inner walls 17 are of some suitable plastic material and include a pair of uniformly spaced side walls 21 on either side of a back wall 22, the walls 21 being integral with the back wall to partly define a shelf cavity 23. Therein one or more shelves 24 may be supported in any one of several predetermined positions vertically of the cavity 23.

For mounting one of the shelves 24, later to be described, at a selected elevation in the cavity 23, each of the side walls 21 is formed with a vertical row of elongated notches 26. They are of similar formation and each extends rearwardly of the cavity 23 from a vertical

front surface 27, on either side of the cavity. Each of the notches on one side of the cavity is opposite another notch on the opposite side of the cavity. Therefore opposite notches provide pairs of vertically spaced supports 28 for the shelf 24. The supports 28 take the form of cams the elevation of each of which increases from the front surface 27 toward the back wall 22. Upwardly thereof, each of the notches 26 is further defined by clearance walls 29 which may be planar and horizontal.

Preferably the shelf 24 is manufactured from some sheet metal such as moderately resilient aluminum. An L-shaped cross-sectional formation is imparted to the material to provide a horizontal carrier portion 31 and a front guard 32. The longitudinal edges of the shelf 24 are formed with false beads or partially cylindrical portions 33 and 34 for the sake of rigidity. At the junction of the carrier 31 and front guard 32 the shelf is formed with a front rib 36 or U-shaped cross-section to also add strength to the shelf. As will be noted, FIG. 2, the bead 34, extending downward, acts as a rear rib. Both front and rear ribs space the carrier from the support cam 28 when the shelf is in its predetermined position.

In its predetermined position, the shelf 24 is releasably anchored against displacement edgewise of the carrier 31 by a detent mechanism 30 at either end of the shelf. The mechanism comprises a fixed detent member 37 on each of the clearance walls 29 and a movable detent member 38 on opposite ends of the carrier portion 31 intermediate the ribs 34 and 36. Each of the fixed members 37 extends downward from the clearance wall 29 and has sides or cams 39 converging toward a lower extremity thereof which is slightly below the level of the carrier portion 31 when the latter is in its predetermined position. Below the fixed detent, the carrier portion is deformed to provide downwardly extending walls 41, of the movable member 38, which are complementary to the sides 39 of the fixed detent and of formation to accommodate the fixed detent therebetween.

The shelf may be removed from its supports manually by forcibly drawing it horizontally to the left, FIG. 3. In this operation there is a camming cooperation between the walls 39 and 41 the result of which is downward deflection of the carrier 31, within its limit of elasticity. After the front rib is dislodged from the supports 28, the shelf may be freely withdrawn from the cavity 23.

To position the shelf 24 at any one of a variety of selectable elevations the rear rib 34 is slid inward of the cavity 23 over a pair of the supports 28. In this operation the carrier portion 31 passes freely between the fixed detent members 37 and supports 28 until the front rib 36 engages the front surfaces 27, FIG. 3. At this point, the inner rib 34 has been so elevated by the supports 28 that the carrier portion 31 is engaged by the fixed member 37. Therefore the front rib 36 must be elevated to the level of the cams 28 by bending the carrier 31, within its elastic limit, about the fixed member 37. For this to be effected the bottom of the front rib 36 is formed with a loading cam 42 slanting upward from the bottom of the front guard 32. As a result, pressing the shelf inward, from the point just indicated, is accompanied by passage of the front rib 36 over the supports 28. This is accompanied by slight bending of the carrier 31 downward between the front rib 36 and bead 34. This biases the movable members 38 upward so that when the movable members 38 are carried into initial engagement with the fixed members 37, camming cooperation between the walls 39 and 41 imparts a horizontal bias to the shelf to move it inward and toward a position in which the detent members would be mated. This latter position is not completely attained, however, since following initial engagement of the movable and fixed detent members the front guard 32 is carried into abutment with the front

surfaces 27, the upper bead 33 entering clearance notches 43 above the shelf notches. Therefore when the shelf is in one of its predetermined positions of use, the movable detent member 38 is slightly displaced relative to the fixed member 37, FIG. 2, since a state of equilibrium is reached between the resilient bias of the front guard and the bias of the carrier portion.

Although the detent mechanism has been described as embodying a fixed member protruding downward for cooperation with a socket-like, movable detent member, a movable detent member protruding upward from the carrier 31 for cooperation with a detent socket formed in the clearance wall 29 is also contemplated.

Having thus described my invention, I am aware that numerous and extensive departures may be made therefrom without departing from the spirit of the invention, as defined by the appended claims.

I claim:

1. The combination with a rigid vertical member having therein a cavity partly defined by spaced side walls, of a shelf support on each of said walls, a shelf-like structure having a substantially resilient carrier portion formed to pass laterally between said walls and occupy a position transversely of said cavity, spaced front and rear strengthening ribs on said carrier portion to also space said carrier portion from said supports, a plurality of first detent members, a plurality of second detent members for cooperation with said first detent members, said first detent members being on said walls spaced above said supports, said second detent members being on said carrier portion intermediate said ribs, said rear rib being formed to pass laterally between said supports and said first members but normally limited in its inward movement beyond said first members by engagement of said front rib by said supports and a vertically effective cam on the bottom of said front rib, said front rib being moved over said supports by pressing said shelf inwardly of said cavity to provide cooperation between said cam and said supports and to carry said second members into cooperative relationship with said first members, cooperation between said cam and said supports bending said carrier within its elastic limits about said first members for said second member to be biased upward, cooperation between complementary members also biasing said shelf laterally toward a predetermined position therefor from a position adjacent thereto thereby to releasably secure said shelf against lateral displacement from its predetermined position.

2. The combination with a refrigerator door having therein a cavity partly defined by spaced side walls, of a shelf-like structure formed to pass laterally thereof between the walls, said shelf having a substantially resilient carrier portion, spaced front and rear strengthening ribs on the bottom of said carrier, opposed support cams on said walls, a detent mechanism including first and second complementary detent members, one of said first members being on each of said walls spaced above said cams, said second members being on the ends of said shalf intermediate said ribs, said shelf being slidable laterally into said cavity by passing said rear rib over said cams, said rear rib being formed to pass under said first members and said cams being formed to elevate said rear rib for bending said carrier within its elastic limit by pressing it against said first members thereby precluding passage of said front rib onto said cam by its engagement with the outer end thereof until said outer rib has been lifted to the level of the outer end of said cam and then pressed thereover and the shelf then slid farther inward to carry said second members into cooperative engagement with said first members, cooperation between complementary members also biasing said shelf laterally and inwardly toward a predetermined position therefor from a position adjacent thereto thereby to releasably secure said shelf against lateral displacement from said predetermined position.

3. In combination with a refrigerator door having therein a cavity partly defined by spaced side walls, of a shelf-like structure formed to pass laterally thereof between said walls, said shelf having a substantially resilient carrier portion, spaced front and rear strengthening ribs on the bottom of said carrier, opposed support cams on said walls, a detent mechanism including first and second complementary detent members, one of said first members being on each of said walls spaced above said cams, said second members being on the ends of said shalf intermediate said ribs, said shelf being slidable laterally into said cavity by passing said rear rib over said cams, said rear rib being formed to pass under said first members and said cams being formed to elevate said rear rib for bending said carrier within its elastic limit by pressing it against said first members thereby precluding passage of said front rib onto said cam by engagement of said front rib with the outer end of said cam, and a loading cam on the bottom of said front rib, said loading cam being cooperable with said support cams when said shelf is pressed inwardly to additionally bend said carrier about said first members and carry said second members into cooperative engagement with said first members, cooperation between complementary members also biasing said shelf laterally and inwardly toward a predetermined position therefor from a position adjacent thereto thereby to releasably secure said shelf against lateral displacement from said predetermined position.

4. The combination with a refrigerator door having therein a shelf cavity partly defined by side walls extending rearward from a front edge, of a shelf having a substantially resilient carrier portion receivable in said cavity, spaced front and rear longitudinal rigidifying ribs on the bottom of said shelf, coplanar shelf supports on said side walls to concurrently support said ribs thereon, a detent mechanism comprising first and second complementary detent members, said first members being on said walls spaced above said supports, said second members being on the ends of said portion intermediate said ribs, said supports being arranged for said shelf to be slid thereover by passing said rear rib between them and said first members but precluding passage of said front ribs thereover by engaging it until said carrier portion is bent transversely thereof within its elastic limit about said first members, bending of said portion conditioning said members for cooperation with each other when said second are carried into engagement with said first members to bias said shelf inward toward a predetermined point from a point adjacent thereto after manual force to press said shelf inward has been removed, and a front guard on said shelf to interrupt movement of said shelf between said points by engaging said front surface thereby providing a normal position for said shelf in said cavity.

5. The combinatoin with a refrigerator door having therein a cavity partly defined by spaced side walls, of a vertical row of shelf supports on each of said side walls, a shelf-like structure having a substantially resilient carrier portion formed to pass laterally between said side walls and occupy a position transversely of said cavity, spaced front and rear strengthening ribs on said carrier portion to also space said carrier portion from a pair of opposed shelf supports, a plurality of first detent members, a plurality of second detent members for cooperation with said first detent members, said first detent members being on said side walls spaced above said supports, a second detent member being on either end of said carrier portion intermediate said ribs, said rear rib being formed to be passed laterally over a selected pair of opposed supports and under a pair of opposed first detent members immediately next above said selected supports, said front rib being formed to yieldably resist passage of said rear rib beyond a predetermined position inwardly of said cavity by engaging the outer ends of said shelf support but being moved over said shelf supports by pressing upwardly and inwardly on said front rib to bend said shelf-like structure

within its elastic limits for inward displacement thereof and provide cooperation between said first and second detent members thereby to releasably retain said shelf-like structure in said cavity, cooperation between said first and second detent members biasing said shelf-like structure toward an innermost point in said shelf cavity from an adjacent point, and means on said shelf-like structure to engage said refrigerator door and resist movement of said shelf-like structure from said adjacent point to said innermost position to eliminate minute movement of said shelf-like structure relative to said refrigerator door.

6. An apparatus as described in claim 5, wherein the side walls are formed with opposed grooves having lower surfaces providing the supports and upper surfaces partly defining the first detent members.

7. In combination with a pair of rigid spaced apart upright side members having oppositely disposed shelf support means therein; a removable shelf comprising an upright front guard portion and a substantially horizontal portion; each of said support means including a generally rectangular shaped slot, of a depth slightly greater than the depth of said horizontal portion, presenting a continuous path terminating in a shelf receiving opening; guide means on said horizontal portion for guiding said shelf into the shelf receiving openings and along said continuous paths in said support means; locking means including detent mechanisms formed in said support means and complementary detent mechanisms formed in said horizontal portion; and a pair of cam surfaces on said shelf adjacent to said upright front portion for engagement with said shelf receiving openings as said horizontal portion approaches complete entry into said support means; said cam surfaces and said frontal openings, and said guide means and said continuous paths, respectively, cooperating to force said detent mechanisms into engagement whereby said shelf is firmly retained by said support means between said upright side members.

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