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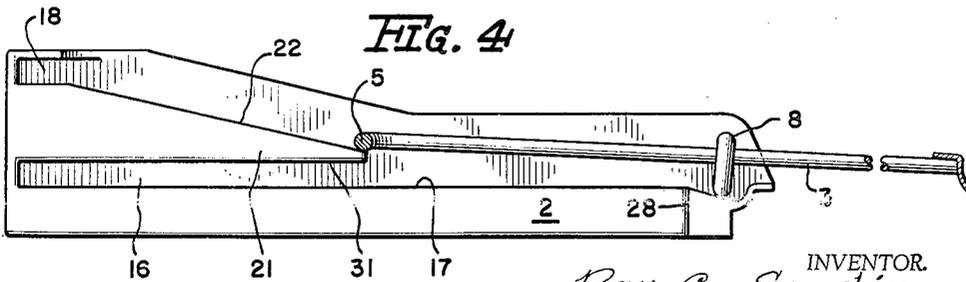
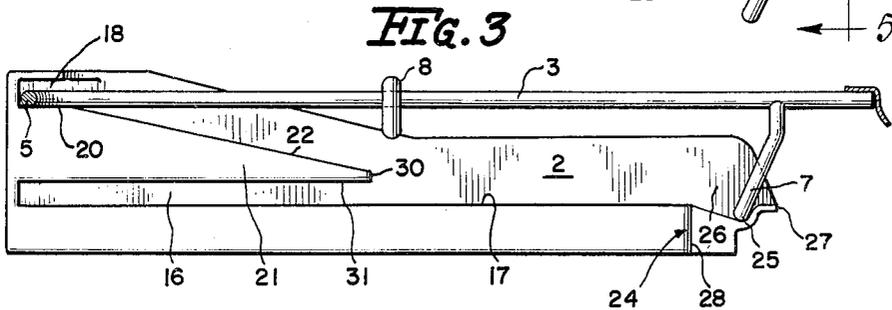
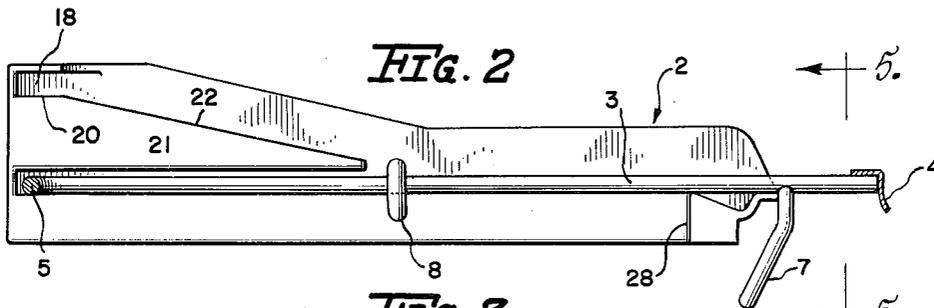
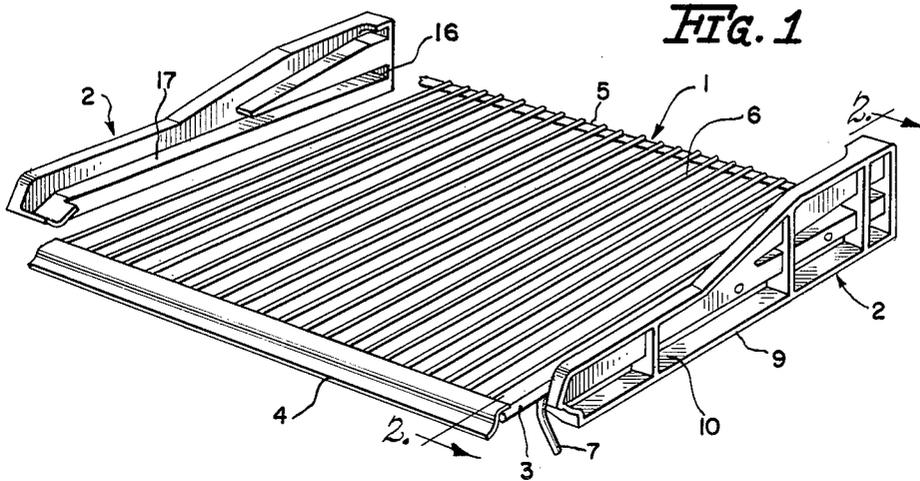
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3,220,364

VERTICALLY ADJUSTABLE SHELF

Filed July 24, 1964

2 Sheets-Sheet 1



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FIG. 5

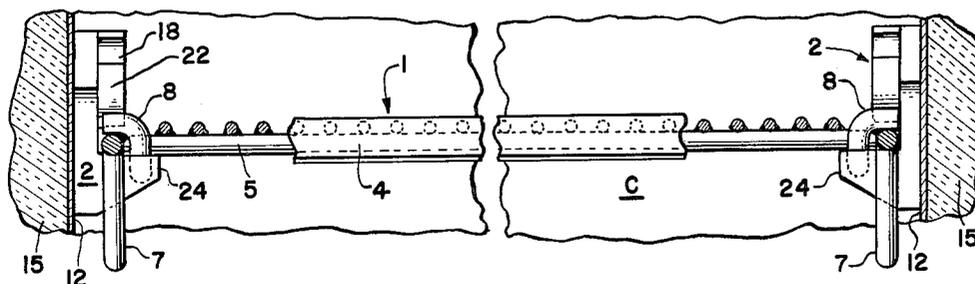


FIG. 6

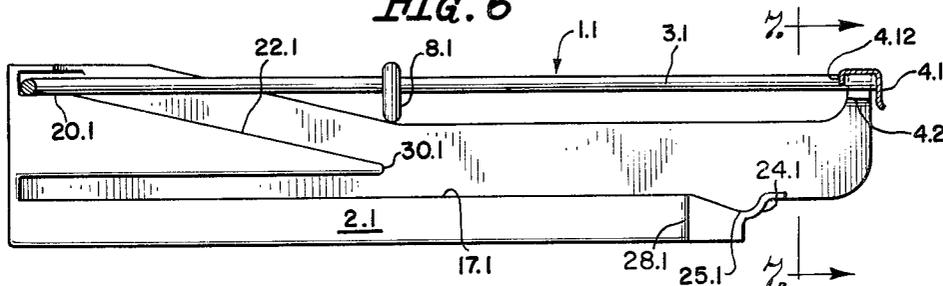
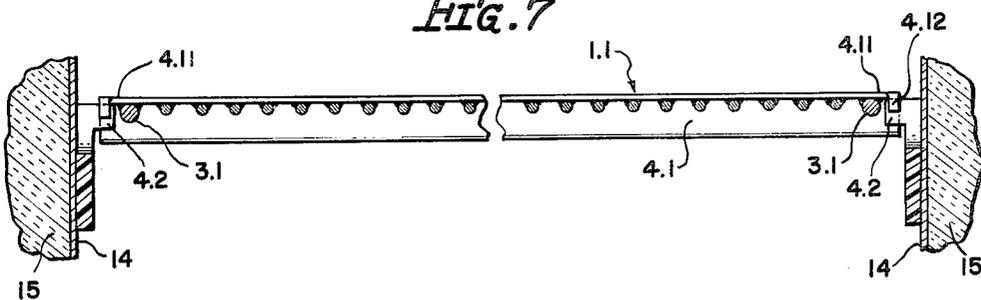


FIG. 7



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VERTICALLY ADJUSTABLE SHELF

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 11 Claims. (Cl. 108—144)

This invention relates to a shelf and shelf-supporting structure providing means for easily adjusting the vertical spacing between the shelf and other structure such as another shelf, or the top or bottom wall of a cabinet.

Although my invention is applicable broadly to storage cabinets of all types, as well as to structures such as range ovens which are essentially not for storage, but do require vertical shelf adjustability, it has proven to be very advantageous in domestic refrigerators. A principal feature of the invention is that it provides easy vertical adjustability without the bothersome necessity of first clearing the shelf of the usual multitude of packages and jars which a refrigerator shelf accommodates. Another feature is that one of the shelf adjustment positions allows the shelf to be of the desirable "sliding" type in which the shelf can be drawn forwardly for convenient access to articles which may be at the rear.

Applicant is aware of the various mechanisms and shelf supporting structures which have been proposed, and in some instances used, to provide vertical adjustability and lateral slidability of refrigerator shelves. Applicant considers that such arrangements have been mechanically quite satisfactory, but those which are capable of vertical adjustment without first clearing the shelf are structurally complex and difficult to maintain in a sanitary condition. Those which are of simple and cleanable arrangement require the shelf to be stripped of its contents before adjustment is made.

Typical examples of adequately functioning, but relatively complex shelf constructions, are disclosed in Carbery U.S. Patent 2,861,695 granted November 25, 1958, for "Vertically Adjustable and Laterally Slidable Shelf Structure" (assigned to my present assignee) and in Halllock 2,609,267 granted September 2, 1952, for "Adjustable Shelf." A simple vertical adjustment provision which requires the shelf to be cleared in advance, is typified by Fehr 2,092,963 granted September 14, 1937, for "Refrigerating Apparatus." This latter arrangement has been used in domestic refrigerators enjoying substantial commercial success.

It is, therefore, a principal object of my invention to provide a shelf and shelf-support arrangement which provides slidability and vertical adjustability in a manner which is simple for the housewife to accomplish; and because it is devoid of moving parts or components, is easy to maintain in a clean and sanitary condition.

In a presently used embodiment of the invention, a refrigerator shelf of basically conventional structure has mutually parallel side members of relatively heavy wire. The shelf-supporting structure which is affixed to each side wall of the refrigerator cabinet (or may be formed integral with the refrigerator side walls) provides a lower rail substantially commensurate with the shelf side members, an upper rail, the inner end of which is in vertical alignment with the inner end of the lower rail but extends forwardly in parallelism with the lower rail for only a short distance and is spaced above the lower rail according to the desired height adjustment, and a transition rail (which is preferably a continuation of the upper rail) which slopes downwardly and forwardly to about the midpoint of the lower rail, and terminates above that rail sufficiently to accommodate the slidable passage of the shelf when said shelf is mounted on the lower rail.

In the presently preferred embodiment, the shelf itself

differs from conventional practices essentially only in having a support leg near the front end of each shelf side member; each said support member is disposed in front of the lower rail when the shelf is slidably mounted thereon. However, the support member will rest within appropriate detent structure related to the lower rail, to provide front-end support when the shelf is on the upper rail. The support leg, of course, maintains the shelf in a horizontal posture.

It will be seen, therefore, that the shelf is slidable on the lower rail because the support leg arrangement is not in conflict therewith. The shelf side members are preferably provided with stops engageable with structure at the front end of the lower rail to provide a normal limit to the forward movement of the shelf. In this limit of forward movement the rear transverse shelf member is rearwardly of the forward end of the transition rail, and the shelf is thereby held against tilting. The shelf can be moved to a further forward position in which its rear member is forward of the transition rail, whereupon by downwardly tilting the front end of the shelf a matter of only about 5 degrees, the rear end of the shelf is positioned to engage with the transition rail, and the housewife may then slide the shelf upwardly along the transition rail while maintaining the shelf sufficiently level to prevent disarrangement or spillage of the articles on the shelf. It is preferable—and the preferred embodiment provides such a structure—for the lower rail to have a detent pocket at its forward terminus. The front shelf-support leg rests within this detent when the shelf is on the upper rail, and the shelf stop members are arranged to be accommodated within this detent so that the shelf may be tilted about the respective stop members as fulcrum points.

Alternative arrangements contemplate the elimination of the support legs and the provision of studs or other support devices on the shelf-supporting structure to accomplish the front-end support function of the support legs. As hereinafter explained, these alternates require only a slight modification of the shelf.

Other features and advantages of my invention will be apparent from the following detailed description of the above-noted first and second embodiments read in connection with the accompanying drawings in which:

FIG. 1 is a schematic perspective view of the shelf supports with the shelf on the lower rails;

FIG. 2 is a side elevational view of a rail-forming structure, with the transverse front and rear frame portions of the shelf shown in section;

FIG. 3 is a side elevational view similar to FIG. 2, but with the shelf at the upper level;

FIG. 4 is a side elevational view showing the shelf in the initial stage of entry on the transition rail for transfer to the upper level;

FIG. 5 is a vertical section taken through the shelf in the direction of arrows 5—5 of FIG. 2;

FIG. 6 is a side elevational view of a second embodiment of the invention with the rack in the upper position; and

FIG. 7 is a rear elevational view of the second embodiment of the shelf and rail-forming structure taken in section on lines 7—7 of FIG. 6.

The schematic perspective of FIG. 1 represents a shelf 1 supported on the respective rail-forming structures 2, each of said structures being identical in design and construction, and having any appropriate means whereby they may be secured to the side walls of an open front cabinet C, shown sectionally in FIG. 5. In view of the fact that the type of cabinet is really of interest only as respects the material out of which the rail-forming structures would be made—a refrigerator cabinet, for example,

could use molded plastic forms which would be unsuitable for range oven application—no specific cabinet structure or type is shown. The shelf 1 is shown in the lower position of the supporting structures, and as presently described, the lower position is arranged so that the shelf may be slid outwardly for a predetermined distance. The upper shelf position does not provide such slidable support, but this does not detract from the primary operational advantage of the invention—that of accomplishing vertical height adjustment without requiring the shelf first to be unloaded of its contents.

Shelf supporting structures embodying the invention are particularly useful in domestic refrigeration. The vertical separation of shelves in home refrigerators has attained almost standard dimensions among various manufacturers, for this separation is based on the quite standardized dimensions of bowls, jars and bottles usually placed on refrigerator shelves. It is desirable that some or all of the shelves be of the sliding type to facilitate retrieval of the rearmost articles thereon. Occasionally, however, one wishes to store an unusually bulky object, such as a turkey or a watermelon, and it is necessary to increase the vertical spacing between a shelf and the upper or lower shelf or wall in the cabinet. Because this storage is usually of a temporary nature, the fact that the adjusted shelf may be fixed rather than slidable, is not of practical importance.

Referring now to FIG. 2, the shelf 1 is essentially conventional, and may include a rectangular structure having a pair of side members 3 and transversely extending front and rear members 4, 5. The side and rear members may be formed of a continuous length of heavy wire; the front member may be a decorative strip of extruded or roll-formed material. The side members 3 will be mutually parallel; the other members may have any curvature or shape appropriate to appearance or functional requirements. It will be understood that the shelf will have suitable transversely or longitudinally extending wires or the like 6 defining the actual supporting surface, and any intermediate structural supports (not shown) required to accommodate the intended shelf loading. The principal departure from wholly conventional shelf constructions resides in the provision of a leg or support 7 extending downwardly and rearwardly from the front end portions of the respective side members 3, and in the stops 8 which project inwardly and downwardly from said side members, as best shown in FIG. 5.

Each of the shelf support structures 2 may be a one-piece molding of a plastic material such as a polystyrene. Marginal edges 9 and stiffening ribs 10 collectively define a plane which will lie flat against the inner walls 12 of the cabinet C; conventional refrigerator wall insulation is shown at 15, FIG. 5. By any suitable arrangement of locating studs and tapped bosses the shelf support structures may be accurately positioned and properly secured relative to the cabinet side walls. Each support structure provides a lower channel 16, the wall 17 of which forms the lower rail; an upper channel 18, the bottom wall 20 of which provides an upper rail; and a substantially triangular wall structure 21, a wall 22 of which provides a transition rail. The lower rail 17 terminates at a laterally extending wall structure 24 shaped to form a detent pocket 25 and a wall 26 sloping gradually upwardly into the lower rail 17. The front edge 27 of wall structure 24 is engaged by the leg 7 to establish the home position of the shelf when it is on the lower rail; and correspondingly, the wall 28 will be engaged by the stop 8 to establish the normal limit of movement when the shelf is drawn forwardly along the rail. In this position the rear portion of the shelf is rearwardly at the end 30 of rail 22, and the overhanging wall 31 maintains the shelf in substantially horizontal position.

When the shelf is at the upper level, as shown in FIG.

3, each rear corner portion is carried within the channel 18, and each front end portion is supported by its leg 7 which occupies the respective detent pockets 25. The shelf is maintained in a horizontal posture, and is held against accidental displacement from the shelf supporting structures.

To move the shelf from the lower to the upper position it is drawn forwardly and tilted upwardly to bring the stop 8 into the pocket 25. In this position the rear member 5 will be forward of the terminus 30 of the rail 22, whereupon the user can rotate the shelf two or three degrees clockwise, the stops 8 acting as pivot points. The shelf is then pushed rearwardly, and the respective stops 8 ride up on the sloping wall 26. This brings the rear end corner portions of the shelf onto the rail 22, whereupon during continued rearward movement the shelf ascends the rail 22 until it enters the channel portion 18. At this stage the respective supports 7 are forward of the end 27 of the support structures, and the shelf is rotated upwardly a few degrees to permit the end of the supports to be moved into the pocket area 25. Neither of the tilting operations required during this transition of the shelf is sufficiently severe to cause any spillage or disarrangement with respect to articles on the shelf.

In the embodiment of FIGS. 6 and 7, the shelf 1.1 is essentially the same as the shelf 1, except that the support legs 7 of the shelf 1 are not used; their supporting function is accomplished by providing a front upper support on the supporting structures 2.1. The decorative front shelf member 4.1 having wings 4.11 which project beyond the side rails 3.1 engages with a projection 4.2 at the forward end of the support structure. The support structure 2.1 differs only moderately from the corresponding structure of the first embodiment; the rails 17.1, 20.1 and 22.1 are wider than their previously described counterparts because the side rails 3.1 are inwardly of the rails 3 of the first embodiment. The forward structure 24.1 may have a pocket 25.1 similar to the pocket 25 of FIG. 2, but this is an optional feature. However, there should be provided the wall structure 28.1 to limit the extent to which the shelf may be slid forwardly during normal operation.

In moving the shelf from the lower to the upper rail, the shelf 1.1 is drawn forwardly and tilted to bring the stop 8.1 within the detent pocket 25.1, whereupon the shelf may be tilted about the rounded end of the respective stops 8.1. This raises the rear end of the shelf above the entrance edge 30.1 of the rail 22.1, and as the shelf is propelled rearwardly along the rail 22.1 it attains the upper level. The shelf 1.1 is then pushed rearwardly to near its home position, at which point the shelf is rotated upwardly to enable the wings 4.11 to pass over projections 4.2 as the rearward movement of the shelf continues. When the shelf reaches its terminal rearward upper position the front thereof is permitted to settle back down with rear stop tab 4.12 being located rearwardly of the support 4.2. The shelf is then in its adjusted position, and secure against accidental forward movement.

While there have been described what are at present thought to be the preferred embodiments of the invention, it will be understood that various modifications may be made therein and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

I claim:

1. In combination, a shelf having parallel side members, and supporting structures providing rails adapted to slidably support each of the shelf side members, each of said rail-providing supporting structures including first and second rail members in vertically space parallel relation and an angularly disposed transition rail extending therebetween, each said transition rail having a minimum spacing relative to its associated first rail to permit the

slidable passage of a shelf side member thereon, and means engaging with said shelf at the respective front side portions thereof to maintain the shelf in horizontal posture when said shelf is supported on said second rails.

2. In combination, a shelf having parallel side members, and supporting structures providing rails adapted to slidably support each of the shelf side members, each of said rail-providing supporting structures including first and second rail members in vertically spaced parallel relation and an angularly disposed transition rail extending therebetween, each said transition rail having a minimum spacing relative to its associated first rail to permit the slidable passage of a shelf side member thereon, and means projecting from said shelf at the respective front side portions thereof for engagement with said supporting structures to maintain the shelf in horizontal posture when said shelf is supported on said second rails.

3. In combination, a shelf having parallel side members, and supporting structures providing rails adapted to slidably support each of the shelf side members, each of said rail-providing supporting structures including first and second rail members in vertically spaced parallel relation and an angularly disposed transition rail extending therebetween, each said transition rail having a minimum spacing relative to its associated first rail to permit the slidable passage of a shelf side member thereon, and means projecting downwardly from said shelf at the respective front side portions thereof for engagement with said supporting structures to maintain the shelf in horizontal posture when said shelf is supported on said second rails.

4. In combination, a shelf having parallel side members, and supporting structures providing rails adapted to slidably support each of the shelf side members, each of said rail-providing supporting structures including first and second rail members in vertically spaced parallel relation and an angularly disposed transition rail extending therebetween, each said transition rail having a minimum spacing relative to its associated first rail to permit the slidable passage of a shelf side member thereon, and means projecting laterally from said shelf at the respective front side portions thereof for engagement with said supporting structures to maintain the shelf in horizontal posture when said shelf is supported on said second rails.

5. The combination as set forth in claim 4, in which said laterally projecting means comprises a trim strip extending across the front end of said shelf.

6. In combination, a shelf having parallel side members, and supporting structures providing rails adapted to slidably support the respective shelf side members; each of said supporting structures including a first rail substantially commensurate with said shelf side members and a second rail commencing at a point vertically spaced from said first rail and intermediate the ends thereof and extending in angular relation to said first rail to terminate in desired vertical spacing relative to said first rail, the minimum spacing between said first and second rails being such as to permit the slidable passage of said shelf on said first rails; said shelf having, adjacent one end, support means engageable with the respective first rails to maintain said shelf in a horizontal posture when the opposite end of the shelf is supported by the second rails.

7. In combination, a shelf having parallel side members, and supporting structures providing rails adapted to slidably support the respective shelf side members; each of said supporting structures including a first rail having at its forward end a detent pocket and extending rearwardly therefrom substantially commensurate with said shelf side members, and a second rail commencing at a point vertically spaced from said first rail and intermediate the ends thereof and extending in angular relation to said first rail to terminate in desired vertical spacing relative to the rearward end of said first rail, the minimum spacing between said first and second rails being such as to per-

mit the slidable passage of said shelf on said first rails; said shelf having, adjacent one end, support means engageable within each said detent pocket to maintain said shelf in a horizontal posture when the opposite end of the shelf is supported by the second rails.

8. In combination, a shelf having parallel side members, and supporting structures providing rails adapted to slidably support the respective shelf side members; each of said supporting structures including a first rail having, at its forward end, structure providing a stop, said rail extending therefrom substantially commensurate with said shelf side members, and a second rail commencing at a point vertically spaced from said first rail and intermediate the ends thereof and extending in angular relation to said first rail to terminate in desired vertical spacing relative to said first rail; the minimum spacing between said first and second rails being such as to permit said shelf to be slidable on said first rail; said shelf having intermediate the ends of its side members, a finger engageable with said stop to limit the forward sliding movement of said shelf; and means adjacent one end of said shelf engageable with the respective stop-providing structures to maintain said shelf in a horizontal posture when the opposite end of the shelf is supported by said second rail.

9. In combination, a shelf having parallel side members, and supporting structures providing rails adapted to slidably support the respective shelf side members; each of said supporting structures including a first rail having, at its forward end, structures providing a stop, said rail extending therefrom substantially commensurate with said shelf side members, and a second rail commencing at a point vertically spaced from said first rail and intermediate the ends thereof and extending in angular relation to said first rail to terminate in desired vertical spacing relative to said first rail; the minimum spacing between said first and second rails being such as to permit said shelf to be slidable on said first rail; said shelf having intermediate the ends of its side members, a finger engageable with said stop to limit the forward sliding movement of said shelf; said finger, further, being engageable with the respective stop-providing structures in a pivotal relation to permit rotation of said shelf to raise the rear end thereof to a level at which the shelf may then engage with said second rail in preparation for accomplishing the desired vertical transition of said shelf.

10. The combination according to claim 9, in which said stop-providing structures include means providing a pocket receptive of said stop fingers and wall means extending rearwardly and upwardly therefrom along which said fingers may pass to facilitate the upward movement of said shelf along said second rail.

11. The combination according to claim 8, in which said last-named means includes a downwardly extending leg engageable with said stop-providing structure to limit the rearward movement of said shelf.

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