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March 27, 1956

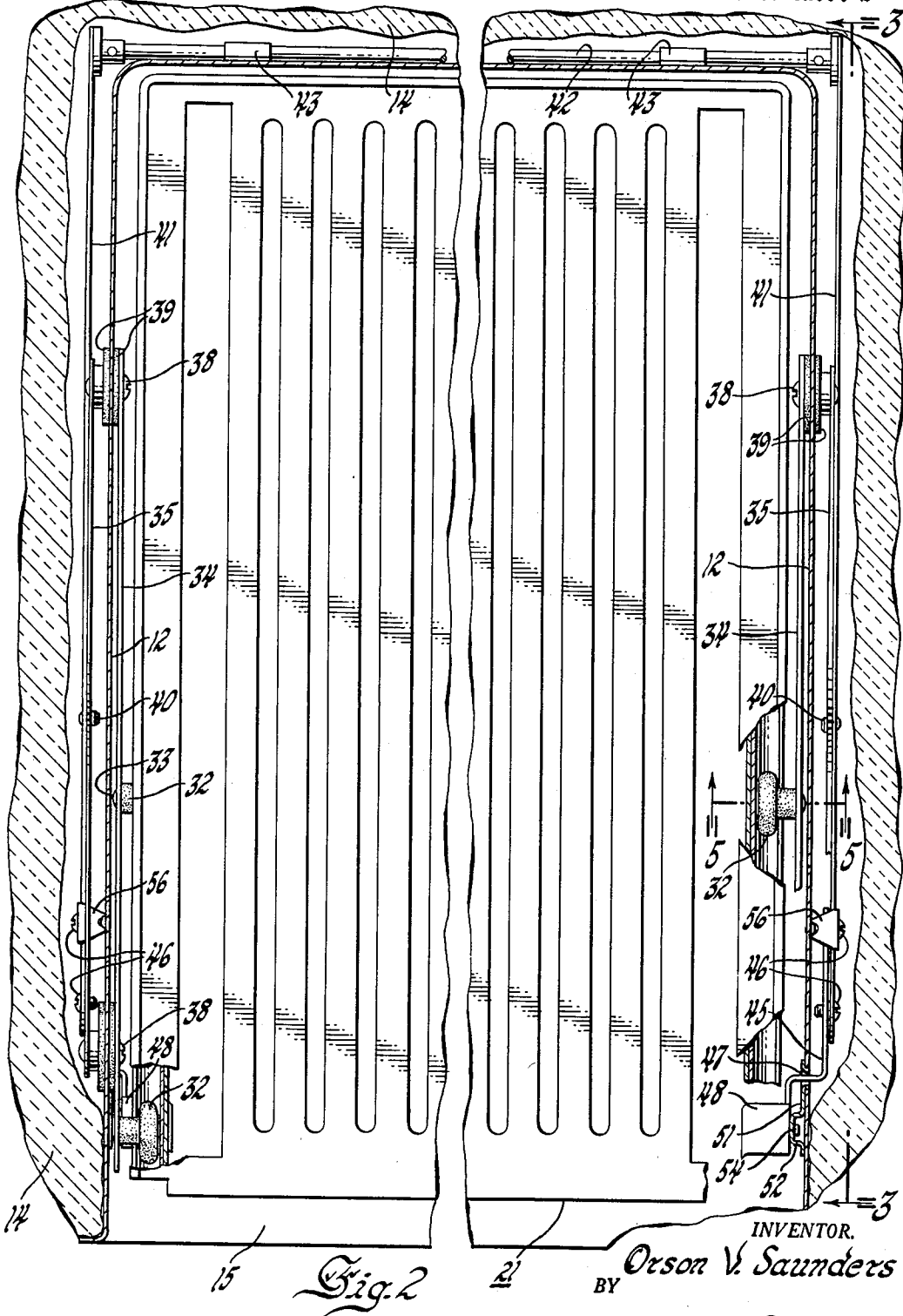
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VERTICALLY ADJUSTABLE REFRIGERATOR SHELF SUPPORT

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3 Sheets-Sheet 2



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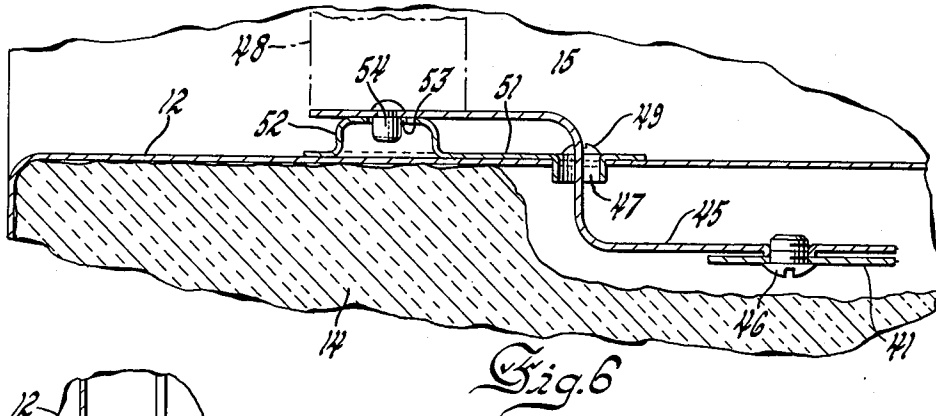
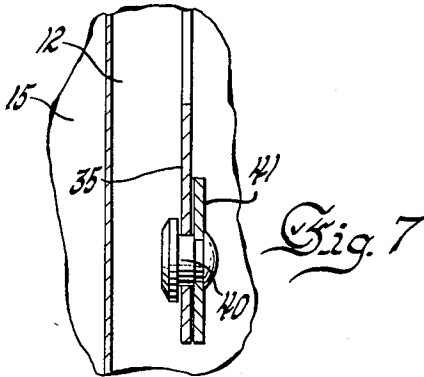
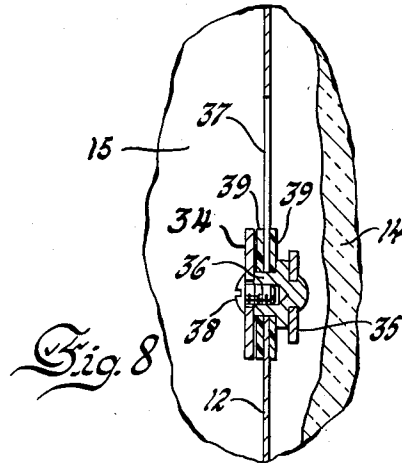
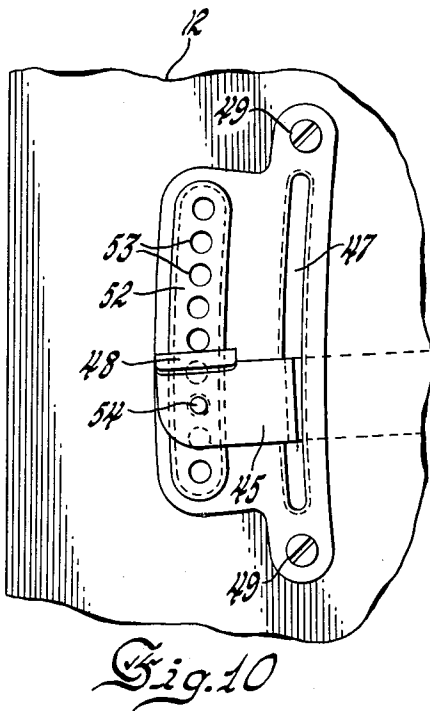
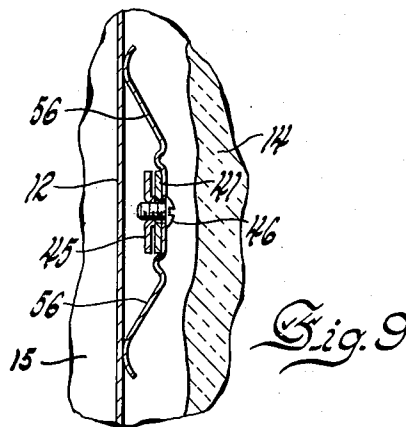
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3 Sheets-Sheet 3



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VERTICALLY ADJUSTABLE REFRIGERATOR SHELF SUPPORT

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3 Claims. (Cl. 312—306)

This invention relates to refrigerators and particularly to a shelf arrangement in the food storage compartment thereof.

An object of my invention is to provide means whereby the user of a refrigerator cabinet can quickly and easily raise and/or lower the height of a shelf within the food storage compartment of the cabinet.

Another object of my invention is to support a shelf of the type which is slidable or rollable outwardly and inwardly of a food storage compartment of a refrigerator, through a front opening in the compartment, while being supported therein upon a movable supporting means operable to adjust or vary the height of the shelf in the compartment.

A further object of my invention is to provide means for varying the height of a slidable or rollable shelf in a food storage compartment of a refrigerator cabinet into a plurality of positions without removing the shelf from or extending the same outwardly of the compartment and which means also locks the shelf in any one of its plurality of various elevations.

A still further and more specific object of my invention resides in the provision of means for adjusting the height of a rollable or slidable shelf within a food compartment of a refrigerator cabinet the greater part of which means is located on the outside of but is operable from within and preferably at the front of the compartment whereby the adjusting means does not interfere with the storage of food in the compartment nor impair the neat appearance of the interior thereof.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred form of the invention is clearly shown.

In the drawings:

Figure 1 is a front view of a household refrigerator cabinet having my invention associated with the food compartment thereof and showing the compartment door in open position;

Figure 2 is an enlarged fragmentary horizontal sectional view taken on the line 2—2 of Figure 1 showing an extensible shelf supported in the food compartment of the refrigerator with portions of the shelf broken away and illustrating parts of a device for adjusting the same to vary its height within the compartment;

Figure 3 is a fragmentary vertical sectional view taken on the line 3—3 of Figure 2 showing parts of the shelf adjusting means supporting the movable shelf in one position;

Figure 4 is a view similar to Figure 3 showing the shiftable shelf raised into an elevated position within the food storage compartment of the refrigerator;

Figure 5 is an enlarged fragmentary sectional view taken on the line 5—5 of Figure 2 showing tracks between the movable shelf and its support which permit rolling and/or sliding of the shelf outwardly of the food compartment of the refrigerator;

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Figure 6 is an enlarged fragmentary sectional view taken on the line 6—6 of Figure 3 showing the operating means for the shelf adjusting device;

Figure 7 is an enlarged fragmentary sectional view taken on the line 7—7 of Figure 3 showing a connection between elements of the shelf adjusting means;

Figure 8 is an enlarged fragmentary sectional view taken on the line 8—8 of Figure 3 showing a connection between the shelf adjusting device and the movable shelf supporting means;

Figure 9 is an enlarged fragmentary sectional view taken on the line 9—9 of Figure 3 showing a biasing means for the shelf adjusting device; and

Figure 10 is a fragmentary view taken in the direction of the arrow 10 of Figure 1 showing the hand-operated portion of the shelf adjusting device.

Referring to the drawings, for illustrating my invention, I show in Figure 1 thereof a household type refrigerator cabinet of rectilinear configuration and comprising an outer shell or panel 11 and an inner metal liner 12 with any suitable or conventional insulating material 14 disposed therebetween (see Figures 2 and 3). The insulating material 14 at least along the upright sides of liner 14 is preferably of the packaged or bagged type so as not to interfere with movement of a shelf height varying means to be hereinafter described. Liner 12 forms the top, bottom, back and upright side walls of a food storage compartment 15 within the refrigerator cabinet. Compartment 15 may be cooled by an evaporator 17 of a closed refrigerating system (not shown) associated with the refrigerator. The evaporator 17 is mounted in the upper portion of compartment 15 and the cooling effect produced thereby chills and causes circulation of air throughout this compartment to preserve foods stored therein. Evaporator 17 has conduit connections with a refrigerant translating device of any suitable or conventional design such as a motor-compressor-condenser unit, ordinarily mounted in a machine compartment located below compartment 15. Suitable controls for the refrigerant translating device and for admitting refrigerant to evaporator 17 are provided to maintain a predetermined temperature within the food storage compartment 15 as is conventional in the art. An insulated door 18, shown in open position in Figure 1, normally closes an opening in the front of the refrigerator cabinet providing access to compartment 15. Any one or a number of these shelves may be of the type which slide or roll part way or substantially all the way outwardly and inwardly of compartment 15 through its front access opening when door 18 is opened. My invention is particularly directed to adjusting the height of this type of shelf within compartment 15 and for this reason such a shiftable shelf may be of any suitable or desirable construction.

A shelf, generally represented by the reference character 21, constructed and moved or shifted in accordance with the arrangement of the shelf, disclosed in the co-pending Carl F. Petkowitz application entitled Refrigerating Apparatus, S. N. 311,028 filed September 23, 1952, and assigned to the assignee of the present application, is disposed in compartment 15. According to this invention shelf 21 should, in order to increase its utility and that of the refrigerator, be arranged for quick and easy adjustment by the user of the refrigerator cabinet upwardly and/or downwardly within compartment 15. I therefore provide a supporting means for shelf 21 which includes a pair of spaced apart rollers 32 located in substantially horizontal alignment adjacent each opposed upright side wall of compartment 15 near the open front thereof. Each pair of rollers 32 are rotatably mounted upon studs 33 riveted or otherwise suitably secured to an

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elongated supporting plate member 34 of the shelf supporting means (see Figure 5). A pair of substantially V-shaped metal links 35 each of which is located on the outside of liner 12 (see Figure 3) intermediate an upright side wall of liner 12 and the insulation 14. The ends of links 35 are provided with a round tapped projection 36 which extends through suitable vertically elongated slots or openings 37 in the sides of liner 12 (see Figure 8). A screw 38 passes through a hole in member 34 and is threaded into the tapped projection 36 on the two ends of links 35 to secure these parts together. Thus screws 38 and projections 36 on links 35 form portions of the shelf supporting means projecting out of compartment 15 through upright sides thereof. Washers 39 of low frictional characteristics constructed of polyamide plastic material or polymeric amides are disposed over the projection 36 on each side of liner 12. The base of the V-shaped links 35 is pivotally mounted, as by a stud 40, to arms 41 of an operable adjusting device or movable means on the outside of compartment 15 between each upright side wall of liner 12 and the insulating material 14. A ferrule or the like (not shown) may if desired, be located over the edges of liner 12 at the slots 37 to prevent damaging the liner at this point upon moving the projections 36 along or relative to slots 37. Each arm 41 has its rear end rigidly anchored or keyed to a shaft 42 which extends across the back of liner 12 to a point slightly beyond the sides thereof. Shaft 42 is rotatably secured to the back of liner 12 by being mounted in any suitable or desirable brackets 43 welded or otherwise secured to the exterior side of the liner back wall (see Figure 2). The projections 36 fit snugly within the slots 37 and this fits together with the connection, stud 40, of links 35 to arms 41 form guides or guide means to prevent the members 34 and consequently shelf 21 from tilting out of a horizontal plane within compartment 15. The opposite or forward end of each arm 41 has a bent handle piece 45 secured thereto by screws or the like 46. It is to be noted that the bent portion of handle pieces 45 extend from the arms 41, through elongated slots of openings 47 provided at the sides of liner 12, back into compartment 15 closely adjacent the front opening thereof. The forward end of each handle piece 45, within compartment 15, is provided with a finger grip portion 48 for a purpose to be hereinafter described. A stainless steel or the like plate 51 is interposed between each side of liner 12 and the finger grip portion 48 of handle piece 45 and is stationarily secured to the liner by screws or the like 49 (see Figure 10). These plates 51 each have a portion thereof fitted in the slot 47 to form a ferrule therefor and have a vertically elongated embossed portion 52 provided with a plurality of vertically spaced apart indexing holes 53 therein. A small pin or stud 54 (see Figure 6) riveted to handle piece 45 is adapted to fit into one of the holes 53 of each plate 51 to lock and maintain the adjusting device and plate member 34 of the shelf supporting means in any one of its adjusted positions as will be presently described. A leaf spring 56 (see Figure 9) secured to each arm 41 by one of the screws 46 has its ends bearing against the outer surface of liner 12 and the springs 56 bias the forward end of each arm 41 in a direction outwardly away from the liner so as to cause the small pins or studs 54 to enter and be mounted in one of the holes 53 in plate 51. The slots 37 and 47 in walls of liner 12 and the vertically spaced apart indexing holes 53 in plate 51 are all curved about an arc so as to cooperate with the pivotal mounting of shaft 42 in preventing binding of the movable means or levers. In order to close the slots 37 and 47 and prevent too much heat leakage into the food storage compartment 15 the washers 39 may be elongated so as to at all times cover the slots 37 and close the same. It is to be noted that links 35 and arms 41 are located outside compartment 15 intermediate liner 12 and the insulating material 14 so as not to interfere

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with adjustment of shelf 21 within the food storage compartment and so as to conceal as much of the adjusting mechanism as is possible.

As before stated the shelf 21 is of the type that can be rolled part way outwardly of compartment 15 through its front access opening and thereafter slid an additional distance outwardly to a position substantially entirely out of the cabinet as is fully illustrated and described in the co-pending application hereinbefore referred to. The track member or slide of the shelf structure 21 rolls along the rollers 32 until it is stopped by engaging the innermost roller of the plate thereof thence the shelf may be slid further outwardly relative to the track members and to its supporting means. In Figure 3 of the drawings I show shelf 21 in its lower-most position within compartment 15 and in Figure 4 I shown the shelf 21 in its upper-most position within compartment 15. It is to be understood that shelf 21 may be adjusted vertically within compartment 15 to vary its height therein to a number of different positions intermediate the two extreme positions thereof illustrated. For example, if shelf 21 is to be raised from the position thereof shown in Figure 3 of the drawings the finger grip portion 48 of each handle piece 45, accessible at the compartment front opening, is pulled inwardly relative to the side walls of compartment 15, to overcome the biasing effect of springs 56, so as to remove the small studs 54 from the lower hole 53 in plate 51. The handle pieces 45 are then raised to swing arms 41 upwardly, to rotate shaft 42 and cause links 35 to move upwardly for elevating shelf supporting plate member 34 and consequently the shelf 21 thereon within compartment 15. Handle pieces 45 may be released at any desired elevated position whereupon the biasing of springs 56 will force the forward end of arms 41 outwardly away from side walls of compartment 15 and cause the small studs 54 to enter one of the upper holes 53. The small studs 54 fitting in the holes 53 of plate 51 locks the pivotally mounted shelf adjusting means or leverage device in any one of its adjusted positions to maintain the shelf support 34 and the shelf 21 carried thereon at the desired height within compartment 15. Shelf 21 may be lowered within compartment 15 in the same manner as that described for elevating the same therein.

From the foregoing it should be apparent that I have provided an improved shelf arrangement for a refrigerator. In my present arrangement the food supporting shelf may be shifted outwardly and inwardly of the food storage compartment through its front opening to thereby render foods on the rear portion of the shelf readily accessible to the user and the height of the shelf may be quickly and easily varied without removing the same from the food compartment, without disassembling any parts of the structure and while food products are supported thereon. In the present disclosure most of the shelf adjusting mechanism is on the exterior of the food compartment and is concealed within the refrigerator cabinet so as not to impair the neat appearance of the interior of the food storage compartment and so as not to require highly finished metal for parts of the mechanism. By providing a movable shelf supporting means to vary the height of a shelf thereon within a food storage compartment of a refrigerator and particularly an extendible type of shelf the utility of the shelf and of the refrigerator as well is greatly increased.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted as may come within the scope of the claims which follow.

What is claimed is as follows:

1. In a cabinet provided with a plurality of walls forming a compartment therein, a shelf within said compartment, adjustable means mounting said shelf in said compartment, said adjustable means being movable relative to said cabinet for raising and/or lowering the shelf with-

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in said compartment to vary its height therein, said adjustable means including a shelf support, an arm pivotally mounted on said cabinet and a substantially V-shaped link interposed between said arm and said shelf support, said means also including spaced apart stationary guides for each end of the legs of said link, said ends of the legs of said link being connected to said shelf support at two spaced apart points therealong, the base of said V-shaped link being connected to said arm for moving said ends of the legs of the link along said guides, said guides being arcuate in shape to compensate for movement of said link by said pivotally mounted arm and eliminate binding of said adjustable means, and said guides holding said ends of the legs of said V-shaped link in a horizontal plane with respect to one another for preventing tilting of the shelf within said compartment.

2. In a cabinet provided with a plurality of walls forming a compartment therein having an opening in one wall thereof normally closed by a door, a shelf within said compartment, adjustable means mounting said shelf in said compartment, said adjustable means being movable relative to said cabinet for raising and/or lowering the shelf within said compartment to vary its height therein, said adjustable means including a shelf support, an arm having a movable end and another end pivotally mounted on said cabinet and a substantially V-shaped link interposed between said arm and said shelf support, said means also including spaced apart stationary guides for each end of the legs of said link, said ends of the legs of said link being connected to said shelf support at two spaced apart points therealong, the base portion of said V-shaped link being connected to said arm intermediate said ends thereof for moving said ends of the legs of said link along said guides, said movable end of the arm being located within said compartment, said guides being arcuate in shape to compensate for movement of said link by said pivotally mounted arm and eliminate binding of said adjustable means, said guides holding said ends of the legs of said V-shaped link in a horizontal plane with respect to one another for preventing tilting of the shelf within said compartment, and said movable end of said arm being ac-

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cessible only through the opening in said one compartment wall when said door is opened.

3. In a cabinet provided with a plurality of walls forming a compartment therein having an opening in one wall thereof normally closed by a door, a shelf within said compartment, adjustable means mounting said shelf in said compartment, said adjustable means being movable relative to said cabinet for raising and/or lowering the shelf within said compartment to vary its height therein, said adjustable means including a shelf support, an arm having a movable end and another end pivotally mounted on said cabinet and a substantially V-shaped link interposed between said arm and said shelf support, said means also including spaced apart stationary guides for each end of the legs of said link, said shelf support having spaced apart rollers mounted thereon, a slide interposed between said rollers and said shelf permitting the shelf to be shifted outwardly and inwardly of said compartment through the opening in said one wall thereof while being supported from said support, said ends of the legs of said link being connected to said shelf support at two spaced apart points therealong, the base portion of said V-shaped link being connected to said arm intermediate said ends thereof for moving said ends of the legs of said link along said guides, said movable end of the arm being located within said compartment, said guides being arcuate in shape to compensate for movement of said link by said pivotally mounted arm and eliminate binding of said adjustable means, said guides holding said ends of the legs of said V-shaped link in a horizontal plane with respect to one another for preventing tilting of the shelf within said compartment, and said movable end of said arm being accessible only through the opening in said one compartment wall when said door is opened.

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