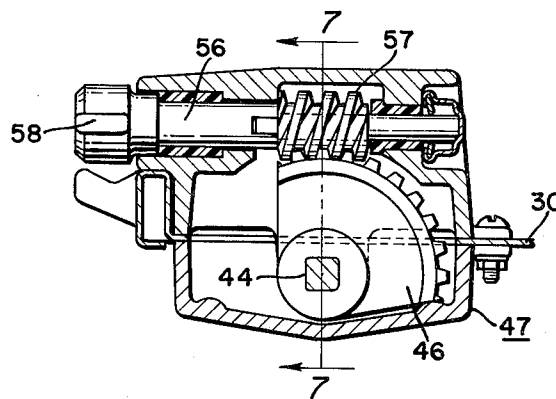
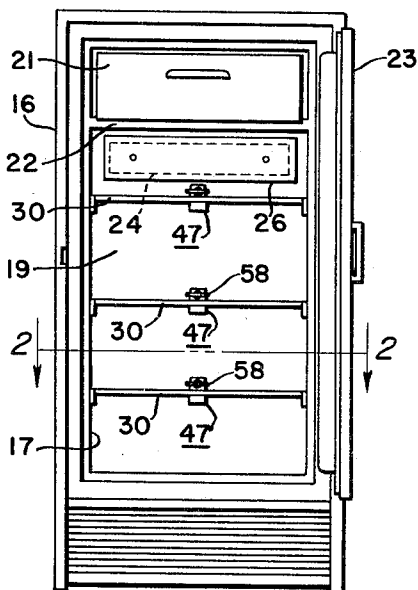
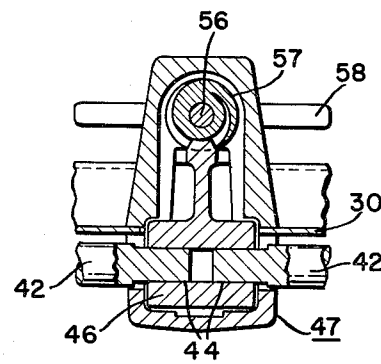
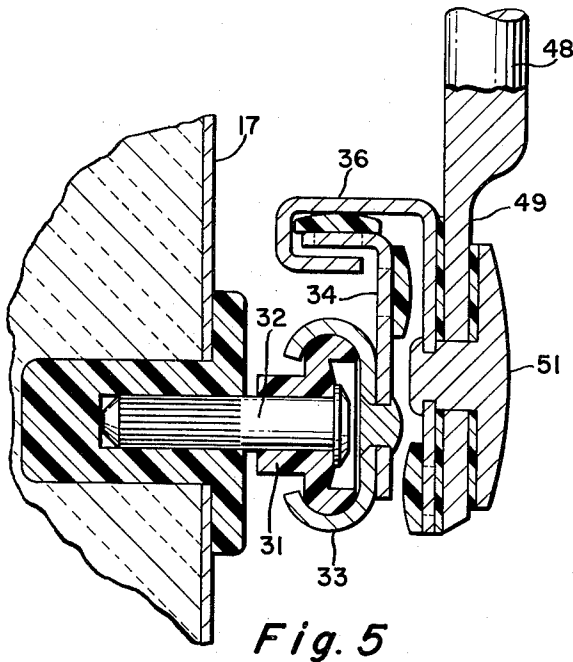


V. G. SHARPE

ADJUSTABLE REFRIGERATOR SHELF

3 Sheets-Sheet 1



INVENTOR.
Verlos G. Sharpe
BY *Edwin S. Dybing*
His Attorney

Aug. 29, 1961

V. G. SHARPE

2,998,290

ADJUSTABLE REFRIGERATOR SHELF

Filed Jan. 23, 1959

3 Sheets-Sheet 2

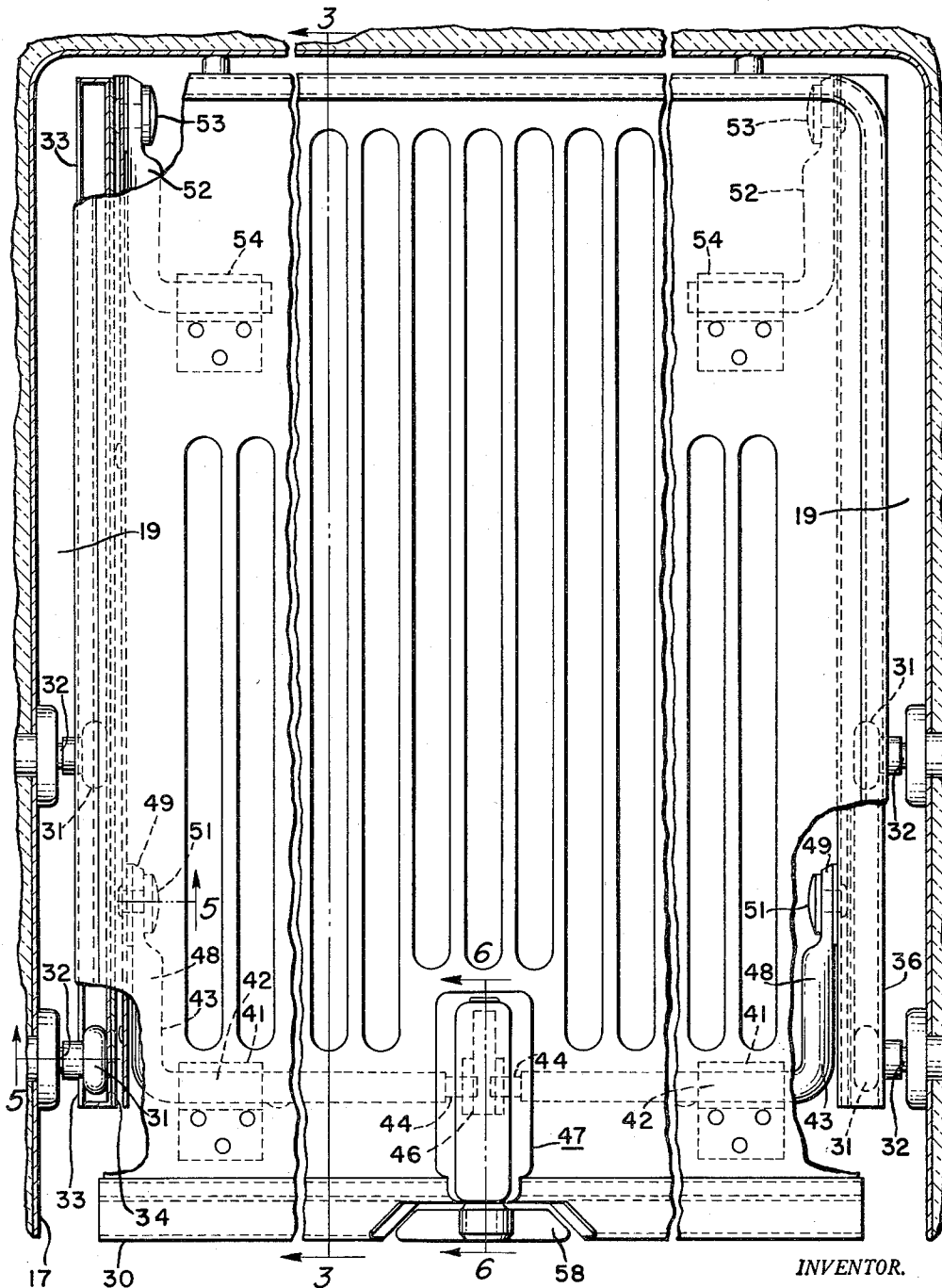


Fig. 2

INVENTOR.
Verlos G. Sharpe
BY *Edwin S. Sybing*
His Attorney

Aug. 29, 1961

V. G. SHARPE

2,998,290

ADJUSTABLE REFRIGERATOR SHELF

Filed Jan. 23, 1959

3 Sheets-Sheet 3

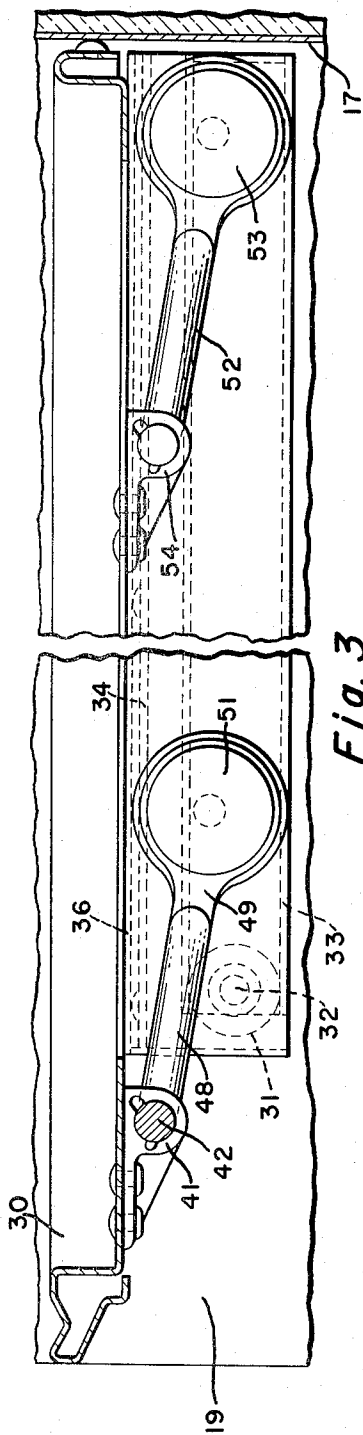


Fig. 3

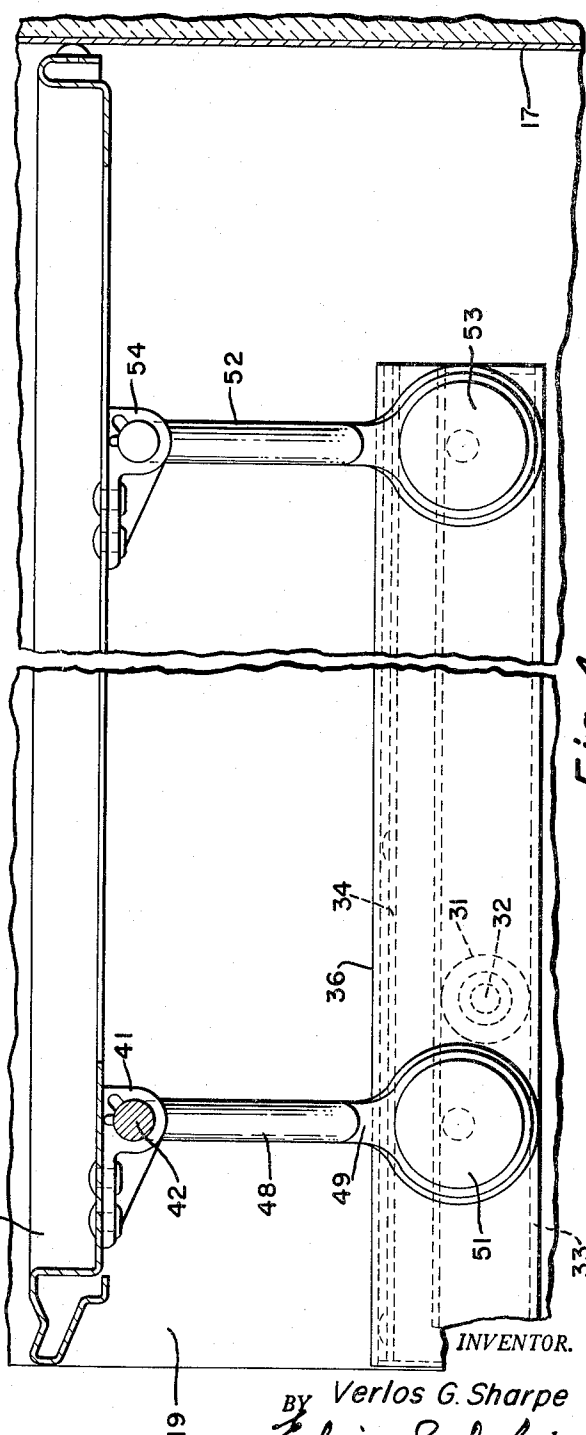


Fig. 4

INVENTOR.
BY Verlos G. Sharpe
Edwin S. Salyng
His Attorney

1

2,998,290

ADJUSTABLE REFRIGERATOR SHELF

Verlos G. Sharpe, Xenia, Ohio, assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Filed Jan. 23, 1959, Ser. No. 788,639

1 Claim. (Cl. 312—303)

This invention relates to refrigerator cabinets and particularly to a shelf arrangement for such cabinets.

An object of my invention is to improve the arrangement of shelves in a refrigerator cabinet so as to make them adjustable relative to one another for facilitating storage of foods in the refrigerated compartment of the cabinet and to increase the accessibility of food products on the shelves from exteriorly of the compartment.

Another object of my invention is to provide a refrigerator cabinet with a shelf supported in a food storage compartment thereof for sliding movement part way out of the compartment which shelf is also adjustable upwardly and downwardly relative to a shelf adjacent thereto while the slidable shelf is positioned within the compartment and when same is slid outwardly thereof.

My invention has to do primarily with supporting a rectangularly shaped shelf on a stationarily fixed mounting means for sliding movement in a straight horizontal direction outwardly of a rectilinear shaped compartment of a cabinet and which shelf is at all times readily adjustable upwardly from and downwardly toward its slidable support without being rotated independently of other shelves in the compartment as distinguished from adjusting a shelf mounting means to vary the height of a shelf within a compartment.

More specifically my invention consists in slidably supporting a shelf on a stationarily fixed mounting means within a compartment of a cabinet for shifting movement relative to the mounting means part way out of the compartment and providing means intermediate the shelf and its slidable support that is movable when the shelf is slid outwardly of the compartment and/or while the same is positioned in the compartment to vary the distance between the shelf and its slidable support for changing the height of the shelf with respect to the fixed mounting means so as to eliminate the necessity of movably anchoring the shelf mounting means on a cabinet and the structural complications consequent thereto.

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 present invention is clearly shown.

In the drawings:

FIGURE 1 is a front view of a refrigerator cabinet having my improved shelf arrangement embodied in a food storage compartment thereof and shows the cabinet door in open position;

FIGURE 2 is an enlarged fragmentary horizontal sectional view taken on the line 2—2 of FIGURE 1 with a portion of my adjustable shelf broken away to show one of the mounting means therefor;

FIGURE 3 is a vertical sectional view taken on the line 3—3 of FIGURE 2 showing the adjustable sliding shelf in a normal rest position on its supporting means;

FIGURE 4 is a view similar to FIGURE 3 and shows the shelf adjusted into its highest position of elevation with respect to the support and fixed mounting means therefor;

FIGURE 5 is an enlarged fragmentary sectional view taken on the line 5—5 of FIGURE 2 showing one of the fixed roller mounting means for the shelf;

FIGURE 6 is an enlarged fragmentary sectional view taken on the line 6—6 of FIGURE 2 showing a pinion

2

and worm wheel segment of the shelf adjusting means in a gear box secured to and carried by the shelf; and

FIGURE 7 is a vertical sectional view taken on the line 7—7 of FIGURE 6 of another showing of the pinion and worm wheel.

Referring to the drawings for illustrating my invention, I show in FIGURE 1 thereof a household refrigerator cabinet of rectilinear configuration comprising an outer shell or panels 16 and an inner metal box-shaped liner 17 having any suitable or desirable insulating material (see FIGURE 2) disposed therebetween as is conventional in the art. The insulated walls or wall structure forms or defines a top, bottom, upright back and side walls of a food storage compartment 19 within the refrigerator cabinet. Compartment 19 is also of rectilinear configuration and is therefore rectangular in horizontal cross section. The refrigerator cabinet also includes a separate freezing compartment, closed by an inner door 21, and isolated from compartment 19 by an insulated wall 22. Compartment 19 has an access opening in the front wall of the cabinet normally closed by an insulated door structure 23, shown in open position in FIGURE 1, hingedly mounted on the refrigerator cabinet for swinging movement relative thereto. Cabinet main door 23 extends continuously from the bottom of compartment 19 over inner door 21 of the upper freezing compartment to close the open front of the refrigerator. The upper freezing compartment in the refrigerator is cooled by an evaporator of a refrigerating system (not shown) associated with the refrigerator cabinet which evaporator may be in the form of a conduit coiled or wrapped around the outside of and secured to a liner of this freezing compartment. Main food storage compartment 19 may be cooled by a sheet metal plate-like evaporator indicated by the dotted lines 24, of the refrigerating system, and mounted on the compartment back wall concealed behind a cover or baffle 26. Evaporator 24 is spaced from the back wall of compartment 19 and from baffle 26 so as to chill and cause circulation of air throughout the interior of compartment 19 to cool and preserve food products stored therein.

In accordance with the objects of my invention and in order to utilize compartment 19 of the refrigerator cabinet for the storage of food products compactly throughout the height of this compartment, I provide therein a plurality of vertically spaced apart rectangularly shaped food supporting shelves 30. Shelves 30 insofar as this invention is concerned may be constructed of wire rods or the like but are preferably reticulated shelves stamped or pressed from sheet metal. The mounting means for each shelf 30 includes a pair of horizontally spaced apart rollers 31 stationarily fixed to each of the opposed upright side walls of compartment 19 near its open front (see FIGURES 2 and 5). These rollers while being carried by stationarily fixed studs or the like 32 secured to liner 17 are revolvable on the studs. Means is provided for supporting shelf 30 on its fixed mounting means, rollers 31, for a combined rolling and sliding movement relative thereto whereby the shelf is shiftable part way out of compartment 19 through its front opening while supported from within the compartment. This shiftable or shiftable supporting means includes a substantially C-shaped track member 33 fitting over or embracing the pair of rollers 31 at each side of compartment 19. The track members 33 carry an upwardly directed extension piece 34 (see FIGURE 5) secured thereto which is slidably and removably interlocked with a slide member 36 in any suitable or desirable manner. The tracks 33 of the supporting means for a shelf 30 are rollable part way out of compartment 19 with a slide 36 thereon and then these slides 36 are shiftable or slidable relative to

tracks 33 further outwardly of compartment 19 to extend a shelf 30 a predetermined distance out of the front of the refrigerator cabinet. Suitable molded plastic gliders or rivet-like buttons are interposed between metal piece 34 and slide member 36 to reduce friction therebetween and to facilitate the sliding movements of member 36. This construction and the combined rolling and sliding movements of the elements thereof is now conventional in the art and reference is made to the C. F. Petkwitz Patent No. 2,719,772 dated October 4, 1955, for a clearer illustration and more detailed description thereof. While the stop feature of the slidable members, etc., of the Petkwitz patented showing is retained in this disclosure, the present structure differs slightly therefrom particularly in that a shelf 30 is separate from its slidable support, slide members 36, and is movable upwardly therefrom and downwardly toward same to provide for vertical adjustment of the shiftable shelf as and for the purpose of my invention.

A shelf 30 is attached to the opposed slide members 36 against removal therefrom in a manner to permit the shelf to be elevated relative thereto and lowered toward same. Thus at least one of the shelves 30 has a pair of spaced aligned molded plastic bearings 41 suitably secured thereto, by rivets or the like, near the front thereof and beneath same. One round portion 42 of a pair of rigid right-angled arms or levers 43 is rotatably anchored in the bearings 41 and the ends of portion 42 of arms or levers 43 are squared, as at 44, and fitted in a squared opening extending through a worm wheel segment 46 swingably mounted within the lower portion of a sectional gear box or housing 47 (see FIGURES 6 and 7) secured in any suitable or desirable manner, such as by bolts, to the central part of the one shelf 30. That portion of arms 43 adjacent their squared ends 44 are journaled in openings provided in housing or gear box 47. The other round bent portion 48 of right-angled arms 43 have flattened ends 49 pivotally mounted on the opposed slides 36 near the front thereof by a stud or rivet 51. Attachment of the one shelf 30 to its slidable support means, slides 36, also includes a pair of lever arms 52 each pivotally secured at one end to the slides 36, by a stud or rivet 53, and pivotally anchored or journaled at their other end in bearings 54 riveted to the shelf 30 in the vicinity of the rear thereof. Lever arms or levers 52 are unconnected to the adjusting means for shelf 30 and merely follow movements of portions 48 of arms or levers 43 so as to maintain the shelf in a horizontal plane during adjustment thereof relative to slides 36. The upper portion of sectional housing 47 has a shaft 56 rotatably journaled in suitable bearings provided therein and this shaft carries a pinion or pinion gear 57 rotatable therewith. Pinion 57 meshes with worm wheel 46 to drive same when shaft 56 is rotated by a wing-like handle 58 keyed to or formed integral on an exposed end of the shaft. The arms 43, worm wheel segment 46, pinion 57, shaft 56 and handle 58 form means, carried by a shelf 30, for adjusting the one shelf relative to its fixed mounting means and its supporting means with respect to an adjacent shelf 30 for varying the height of a shelf. A shelf 30 is slidable part way out of compartment 19 when a forward force is applied thereto by track members 33 rolling over the stationary rollers 31 and by slides 36 sliding along or on the extensions 34 secured to the rollable tracks for increasing accessibility of food products on the shelf at the front of the refrigerator cabinet. An important feature of the present disclosure is that the shelf adjusting means is carried by and movable with a shelf and is at all times connected to arms 43 so as to be operative irrespective of the location of the shelf. This permits the one shiftable shelf 30 to be raised and lowered while it is extended outwardly of compartment 19 by the arms or levers 43 and 52.

Assume now that one of the adjustable shelves 30 is

in its lowermost position resting on its supporting means, slide members 36, as shown in FIGURES 1 and 3 of the drawings, and it is desired to elevate same relative thereto and to the fixed mounting means, rollers 31, for varying its height with respect to a shelf thereabove to reduce the space therebetween or increase the space between the one shelf and an adjacent shelf therebelow. Handle 58 is rotated to cause rotation of pinion 57 on shaft 56 which swings worm wheel segment 46 within housing 47 to rotate portions 42 of arms 43. Rotation of portions 42 of arms or levers 43 causes the bent or right-angled portions 48 of these arms to swing upwardly about their pivotal mounting, studs 51, on slides 36 for elevating a shelf 30 relative thereto (see FIGURE 4) and to the fixed mounting rollers 31. It is to be understood that when this adjustment is performed with the shelf wholly disposed in compartment 19 rubber or the like bumpers suitably secured to the rear edge of shelf 30 are forced into engagement with the back wall of compartment 19 whereby the shelf reacts thereagainst and causes its shiftable supporting means, tracks 33 and slides 36, to simultaneously move forward in the compartment, on rollers 31, as is illustrated in FIGURES 3 and 4 of the drawings. The pinion 57 and worm wheel 46 are threadably associated with one another in such fashion that the weight of a shelf 30 together with foods thereon cannot create a relative movement therebetween and therefore the adjusting means remains locked so as to maintain the shelf in its highest adjusted elevation as shown in FIGURE 4 or in any adjusted position intermediate same and its rest position on the slides 36. Thus any one of the shelves 30 can be adjusted upwardly of and downwardly toward its slidable supporting means relative to the fixed mounting rollers 31 independently of another of the plurality of shelves to vary its height relative to a shelf adjacent thereto. The adjusting means, handle 58, pinion 57 and worm wheel 46 are at all times connected together whereby to change the distance between one shelf 30 and an adjacent shelf or between the one shelf and its slidable supporting means upon rotation of the handle 58 while said one shelf is within and/or slid part way out of compartment 19. The adjusting means ties or links a shelf 30 to the slides 36 and prevents detachment thereof from one another. While the shelf 30 is nondetachable from slides 36, suitable provision, such as is shown and described in the Petkwitz patent hereinbefore referred to, is preferably incorporated in the present disclosure for detaching the slides 36 from tracks 33 whereby the shelves may be removed from compartment 19 to facilitate cleaning of the interior of this compartment.

It should, from the foregoing, be apparent that I have provided a novel and improved arrangement for adjusting a slidable or extensible shelf in a refrigerator cabinet vertically without shifting its supporting means to thereby simplify and reduce the cost of a cabinet having a slidable and vertically adjustable shelf in the food storage compartment thereof. By the improved shelf adjusting arrangement herein disclosed, the height of a shelf may be varied while same is positioned within and/or slid part way out of a food storage compartment and this is advantageous over a shelf which must be rotated to change its height and over an arrangement wherein a shelf mounting means is made adjustable relative to a cabinet in order to vary the height of a shelf therein. By providing a rectangular shelf in a rectilinear shaped refrigerated food compartment which is slidable in a straight line outwardly of the compartment, I increase the accessibility of foods thereon at the front of a refrigerator cabinet. Also by providing for vertically adjusting such a slidable shelf a varied food storage arrangement is had in a refrigerator cabinet so as to store relative tall jars or food products within one portion of a compartment and to store shorter products in another portion of the compartment. These features are obtained without cutting away or foreshortening food supporting areas of a

5

shelf and I therefore eliminate costly waste space in a food storage compartment of a refrigerator cabinet.

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:

In a cabinet provided with walls defining a compartment therein having an opening in an upright wall thereof, a movable door on said cabinet normally closing the compartment opening, a shelf disposed within said compartment dividing the interior thereof into upper and lower storage zones, said shelf occupying substantially the entire horizontal cross-sectional area of said compartment and being reticulated for the passage of air there-through to and from said storage zones, fixed roller means on said cabinet mounting said shelf in said compartment, a support unconnected to and immovable by said door supporting said shelf on said fixed roller means, said support in addition to being movable horizontally with said shelf outwardly of said compartment also being shiftable relative to the shelf and to said fixed roller means, height adjusting means for said shelf, said adjusting means comprising lever arms having one end thereof pivotally secured to the shelf and having their other end pivotally anchored to said support and an operable member rotatably mounted on said shelf for movement therewith, said operable member being concealed within said compartment and accessible only by opening said cabinet

6

door, said operable member being directly connected to that part of one of said lever arms pivoted to said shelf, said operable member upon being rotated swinging said lever arms to cause the shelf to abut and react against the rear wall of said compartment to shift said support along said fixed roller means toward said compartment opening for effecting elevation of said shelf while the shelf remains positioned in the compartment, and said operable member on said shelf being at all times connected to said part of said one lever arm whereby rotation of the member will change the height of the shelf when it is located within and/or moved part way out of said compartment.

References Cited in the file of this patent

UNITED STATES PATENTS

1,798,825	Wilkinson	Mar. 31, 1931
1,934,370	Mirabella	Nov. 7, 1933
1,941,301	Hanson	Dec. 26, 1933
1,941,541	Dibble	Jan. 2, 1934
2,119,012	Kahn	May 31, 1938
2,119,898	Weston	June 7, 1938
2,133,835	Sherman	Oct. 18, 1938
2,265,421	Donnelly	Dec. 9, 1941
2,477,305	Leighton	July 26, 1949
2,480,250	Klemme	Aug. 30, 1949

FOREIGN PATENTS

172,704	Austria	Oct. 10, 1952
---------	---------	---------------