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3,516,369

VERTICALLY ADJUSTABLE SHELF

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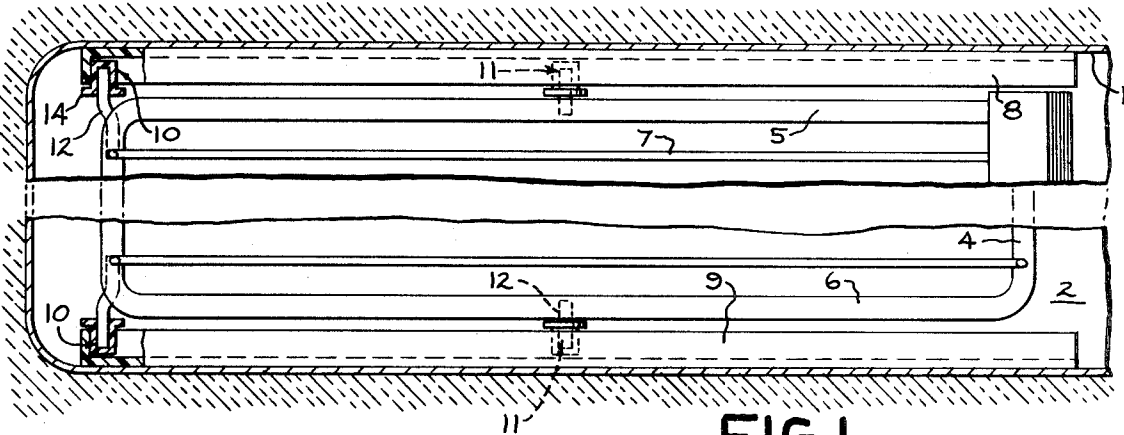


FIG. 1

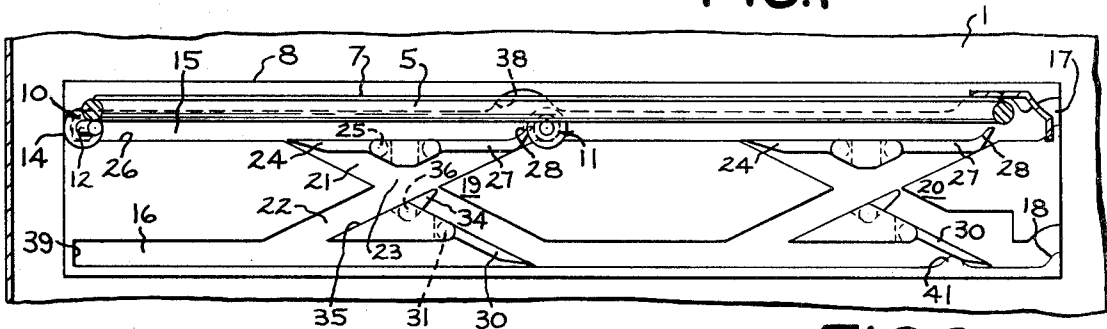


FIG. 2

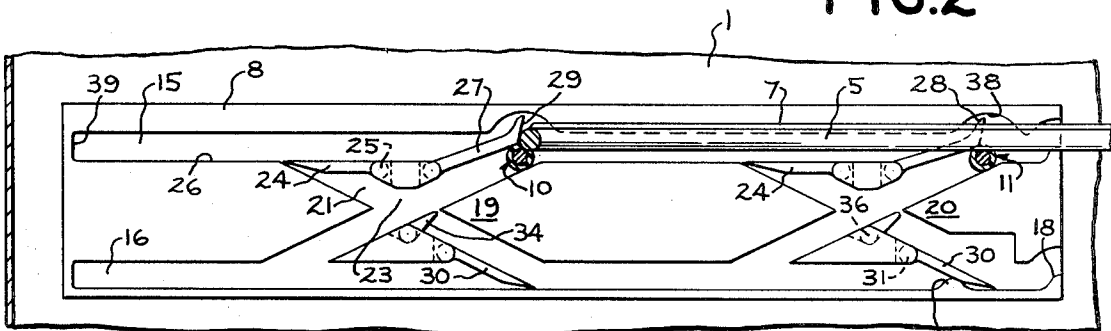


FIG. 3

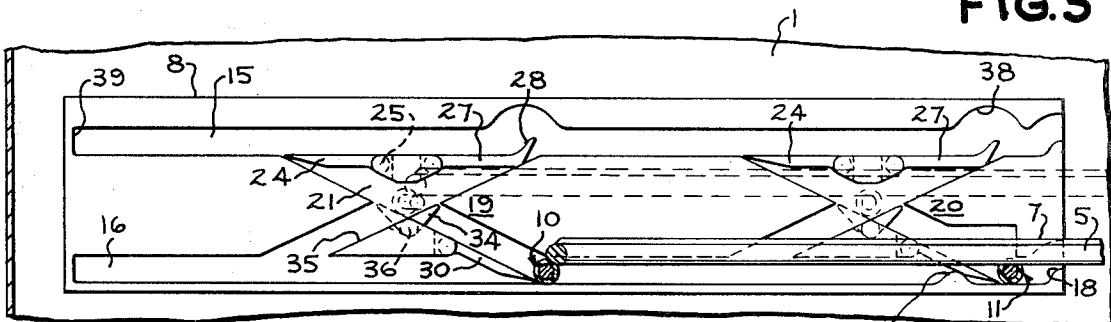


FIG. 4

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VERTICALLY ADJUSTABLE SHELF

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5 Claims

ABSTRACT OF THE DISCLOSURE

A combination shelf and shelf support for vertical adjustment of the shelf relative to the support comprises a support structure having spaced parallel channels for receiving guide members on the shelf and intersecting inclined transfer channels for transferring the guide members from one parallel channel to the other.

BACKGROUND OF THE INVENTION

It is well known that cabinet shelves and particularly one or more of the shelves in a household refrigerator cabinet should be vertically adjustable in order to provide a selection of a spacing between adjacent shelves satisfying the general or immediate requirements of the user. The usual arrangements presently used to provide vertical adjustability of sliding or gliding refrigerator shelves have required that the shelf be removed from the cabinet or at least from the supporting structure during transfer; an operation which cannot be carried out safely without first removing the contents of the shelf. Various mechanisms and shelf supporting structures have been proposed for both vertical adjustability and lateral slidability of refrigerator shelves. However those which are capable of vertical adjustment without first clearing the shelf of its contents have featured rather complex mechanisms forming part of the shelf structure or built into the refrigerator cabinet walls. A relatively simple shelf support providing vertical adjustability without removing the contents as shown and described in Pat. No. 2,230,364 Sandin. However the Sandin structure is slidable in only one of the two shelf positions.

SUMMARY OF THE INVENTION

A primary object of the present invention is to provide a combination shelf and shelf support structure of relatively simple and low cost construction by means of which a shelf slidably supported in either of two vertical positions can be moved from one position to the other without removing the shelf from its supports.

In accordance with the illustrated embodiment of the invention, this combination shelf and shelf support structure comprises a shelf including a pair of spaced laterally extending slide members on each side thereof and support structures providing guide channels for respectively receiving the pairs of slide members. Each of the support structures include spaced upper and lower parallel channels for slidably supporting the shelf in either an upper or a lower position and spaced sets of intersecting rearwardly and forwardly inclined channels forming transfer means for guiding the slide members during transfer of the shelf from one of its two positions to the other. The transfer means also includes switch means in each of the parallel channels so designed that when the self is slid forwardly beyond its normal extended position and then moved rearwardly, the shelf slide member will be directed into a transfer channel for transfer of the shelf from one vertical position to the other.

BRIEF DESCRIPTION OF THE DRAWING

In the accompanying drawings:

FIG. 1 is a fragmentary horizontal sectional view of a refrigerator cabinet including a shelf combination of the present invention;

FIG. 2 is a side elevational view of one of the support structures of the present invention;

FIG. 3 is a view similar to FIG. 2 illustrating one step in the transfer of the shelf from its upper to its lower vertical position; and

FIG. 4 is a view of the shelf support structure illustrating one step in the transfer of the shelf from its lower to its upper position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to FIG. 1 of the drawing, there is illustrated a household refrigerator including a liner 1 defining a compartment 2 of a rectilinear configuration having an access opening at the front thereof. In accordance with the usual practice, a plurality of vertically spaced shelves are provided within the compartment.

In accordance with the present invention one or more of these shelves and its supporting structure are designed to provide horizontal slidability of the shelf between a recessed position within the compartment 2 and a normally extended position in which the shelf projects through the access opening to the compartment in either of two vertical positions. The shelf generally indicated by the numeral 4 may be of any of the conventional rectilinear or substantially rectilinear constructions. In the illustrated embodiment, the shelf, comprises a generally rectangular heavy wire frame including right and left side members 5 and 6 and a plurality of longitudinally extending wires 7 forming the actual supporting surface of the shelf.

A pair of spaced slide members on each of the opposite sides of the shelf are adapted to be received in guide channels provided by the shelf support structures 8 and 9 mounted on the opposite side walls of the liner 1. In the illustrated embodiment of the invention, each pair of slide members includes a rear slide member 10 extending laterally from a rear corner of the shelf 4 and a forward slide member 11 extending laterally from the shelf at approximately the midportion thereof. Each of these slide members comprise a stub 12 carrying a nylon roller 14.

The support structures 8 and 9 are of identical construction and are of substantially the same length as the side members 5 and 6 of the shelf. In view of the similarity in the construction and design of the support structures 8 and 9, the invention will be described only with reference to one of these structures, specifically the right hand structure 8 illustrated in detail in FIGS. 2 to 4 of the drawing.

Each of these structures, preferably made of a plastic molding material such as polystyrene, are formed to provide an upper horizontal channel 15 and a lower channel 16 which are parallel to and spaced from one another and which are designed to receive the slide means 10 and 11 for slidably supporting the shelf 4 in either of two vertically spaced positions. Each of the channels 15 and 16 are open at the front ends thereof, that is at the end of the support structures adjacent the access opening to the compartment 2 so that the slide members 10 and 11 can be inserted into the channels 15 or 16 or removed from these channels as the shelf 4 is placed in the compartment 2 or removed therefrom. Preferably both of these open ends generally indicated by the numeral 17 are offset upwardly a slight distance from the main portion of the channels 15 and 16 to provide shoulders or stops 18 designed to prevent accidental removal of the slide means 11 from the channels during vertical adjustment of the shelf.

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For the purpose of transferring the shelf from either of its two vertical positions to the other, the support structures also include first and second sets of transfer channels generally indicated by the numerals 19 and 20 connecting the upper channel 15 and the lower channel 16. Each of these sets comprise a rearwardly inclined channel 21 and a forwardly inclined channel 22 intersecting at 23 and terminating at their upper and lower ends in the channels 15 and 16. The first set 19 is positioned forwardly from the rear end of the support structure and rearwardly adjacent the front slide member 11 when the shelf is in its recessed position as illustrated in FIGS. 1 and 2 of the drawing. The operational distances between the two sets 19 and 20 are substantially the same as the distance between the slide means 10 and 11. More specifically, the first or rear set 19 and the front or second set 20 are so positioned that when the shelf is slid forwardly in either of the channels to a position beyond its normal extended position, the sets 19 and 20 will concurrently guide the slide members 10 and 11 from either one of the two parallel channels 15 and 16 to the other.

To prevent the slide members 10 and 11 from entering the upper ends of channels 21 or 22 during normal movement of the shelf 4 between its recessed position and its normal extended position when in the upper position, the upper ends of the rearwardly inclined channel 21 are provided with gates 24. These gates 24 are pivotally supported forwardly of the channel 21 as indicated by the numeral 25. The gates 24 are normally closed with reference to the channels 21 so that they bridge these channels and form a continuation of the bottom walls 26 of the upper channels 15. The upper ends of the channels 22 are similarly provided with pivoted combination gate and switch means 27 pivoted rearwardly of the upper ends of these channels and normally closed to bridge the upper ends thereof. The switch function of these components 27 is provided by an upwardly extending or angular projection 28 having a forwardly inclined face 29 adapted upon engagement thereof by a slide member moving rearwardly through the channel 15 to raise the switch 27 and permit the member to enter the channel 22.

Automatic switch means are also provided at the lower ends of the channels 21 in the form of pivoted members 30 pivotally supported rearwardly of these channels as indicated by the numeral 31. These switch members 30 normally slant downwardly and forwardly across the lower channel 16 and are designed to guide a slide member moving rearwardly through the channel 16 into the channel 21. Additional gate means comprises a gate 34 normally bridging the lower portion of the channel 21 at the point of intersection thereof with the channel 22 and therefore forming a continuation of the bottom wall 35 of the channel 22 but designed for movement about its pivot point 36 to permit a guide member moving upwardly through the channel 21 to cross the channel 22 and to support the element by bridging channel 22 during this crossing. Preferably each of the members 24, 27, 30 and 34 are spring loaded or biased to their solid line positions as illustrated in FIG. 2 of the drawing.

When the shelf is at its upper vertical position that is when the slide members 10 and 11 are riding in the upper horizontal channel 15, the upper and lower walls of the channel 15, in cooperation with the gate means 24 and 27, guide the slide members 10 and 11 for a normal movement of the shelf between a recessed position in which the guide member 10 is in engagement with the rear end 39 of the channel 15 and a normally extended position (not shown) in which both the slide members 10 and 11 are in substantial engagement with the rear surfaces of the angular projections 28 on the switch means 27 with the angular projection 28 on the front switch member providing the principal stop means for preventing the shelf from moving beyond its normal extended position.

When it is desired to lower the shelf, the shelf is moved to its extended position and thereafter raised slightly so

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that the slide members 10 and 11 will respectively ride over the projections 28. The upper walls of the channel 15 are suitably recessed as indicated by the numeral 38 above the projections 28 in order to permit the slide members 10 and 11 to pass over the projections 28. The shelf is then lowered so that the stop or shoulder 18 provided by the offset open end 17 of the channel 15 prevents the forward slide member 11 from being completely removed from the channel.

Thereafter the shelf is pushed rearwardly with the result that the slide members 10 and 11 engage the slanting faces 29 of the switch means 27 so that these members 27 are pivoted upwardly as shown in FIG. 3 thereby permitting the slide members 10 and 11 to enter the channels 22 and ride downwardly across the gate 34 into the lower channel 16. The shelf will now slide or glide back and forth in the lower channels 16 with its normal forward or extended position being limited or determined by the stop 41 provided in the channel 16 beneath and rearwardly from the switch means 30.

When it is desired to elevate the shelf 4 to its upper position, the shelf is again pulled forwardly beyond its normal extended position until the front slide member 11 rides over the stop 41 and into engagement with the shoulder or stop 18 at the front end of the channel 16. The switch means 30 is raised during this movement of the shelf after which it returns to its normal position. The slide members 10 and 11 are now in a position so that as the shelf is pushed rearwardly, the switch means 30 will guide the slide members into the rearwardly slanting channels 21 and upwardly through these channels into engagement with the gate 34. The gate 34 will then rotate to its dotted line position as illustrated in FIG. 4 of the drawing in which it bridges the channel 22 and forms a continuation of the bottom wall of the lower portion of channel 21 so that the respective slide members are guided into the upper ends of the channels 21 where they open the gates 24 and enter the upper channel 15.

Thus it will be seen that whenever the shelf is moved in either the upper or lower channels forwardly of its normally extended position, a rearward movement of the shelf will effect a transfer thereof from one channel to the other. Preferably, the shelf is placed in the compartment through the upper channel 15. It is initially tilted slightly so that the slide member 10 will pass over the forward switch means 28. During further rearward movement, the shelf can either be lifted slightly so that the slide members 10 and 11 will pass over the switches 27 with the result that the shelf remains in channel 15 or the members 10 and 11 be allowed to actuate the switches 27 with the result that the shelf will travel to the lower channel 16 from which it can then be returned to the upper channel 15 if so desired.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. In combination:

a shelf including a pair of spaced laterally extending slide members on each side thereof;
support structures providing guide channels for respectively receiving said slide members;
each of said support structures including spaced upper and lower parallel channels for supporting said shelf in an upper or lower position for normal sliding movement between a rearward and a normally extended position and transfer means including spaced sets of intersecting rearwardly and forwardly inclined channels for guiding said slide members from either of said upper and lower channels to the other.

2. The combination of claim 1 in which said transfer means includes switch means for switching said slide members from one of said parallel channels to the other of said parallel channels upon rearward movement of said shelf from a position forward of its normally extended position in said one of said parallel channels.

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3. The combination of claim 2 in which said switch means for transferring said slide means from said upper channel includes means for stopping forward movement of said shelf at its normally extended position.

4. The combination of claim 1 in which some of said switch means normally bridge the upper ends of said inclined channels. 5

5. In combination:

a shelf comprising first and second spaced laterally extending slide members on each side thereof, said first member being adjacent a rear corner of said shelf and said second member being intermediate the front and rear corners of said shelf; 10

support structures providing guide channels for receiving the slide members on the respective sides of said shelf; 15

each of said support structures including upper and lower parallel horizontal channels open at the front ends thereof for insertion of said slide members into said channels and adapted to support said shelf in an upper or a lower position for horizontal movement between rearward and normally extended positions relative to said support structures and first and second spaced sets of transfer channel interconnecting said upper and lower channels for respectively guiding said first and second slide members from either parallel channel to the other; 20

each of sets comprising intersecting rearwardly and forwardly inclined channels terminating at their upper and lower ends in said upper and lower channels; 25

each of said sets including rear gate means pivotally supported forwardly of and normally closing the upper end of said rearwardly inclined channel, upper switch means pivotally supported rearwardly of and 30

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normally closing the upper end of said forwardly inclined channel, and including a portion extending upwardly into said upper channel and having an inclined surface on the forward face thereof adapted upon engagement thereof by a slide member to raise said switch means to guide said slide member into said forwardly extending channel, and lower switch means pivotally supported rearwardly of the lower end of said rearwardly inclined channel and normally slanting downwardly and forwardly across said lower channel for directing a slide member into said rearwardly inclined channel;

and stop means in said parallel channels for normally restricting extended movement of said shelf to a position in which said first and second slide members are respectively positioned rearwardly of said upper and lower switch means.

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U.S. Cl. X.R.

108—144; 312—29, 246