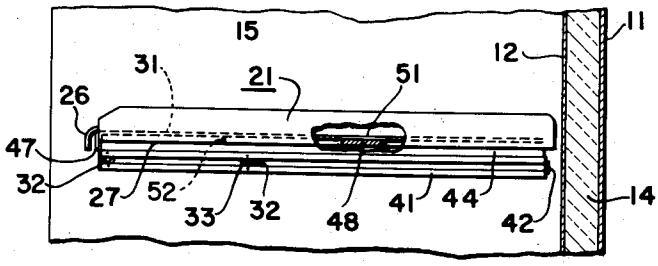
Oct. 4, 1955 C. F. PETKWITZ 2,719,772

HORIZONTALLY MOVABLE REFRIGERATOR SHELF

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Fig. 2



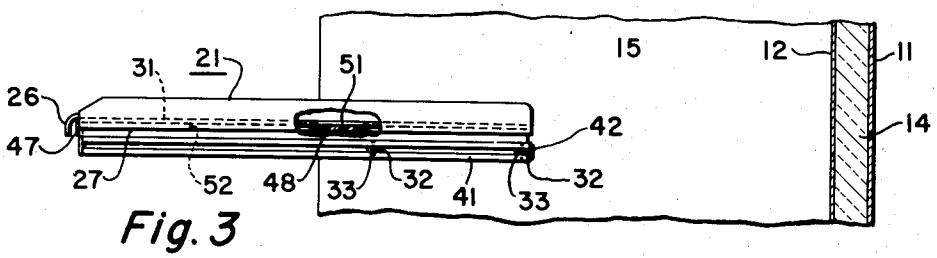


Fig. 3

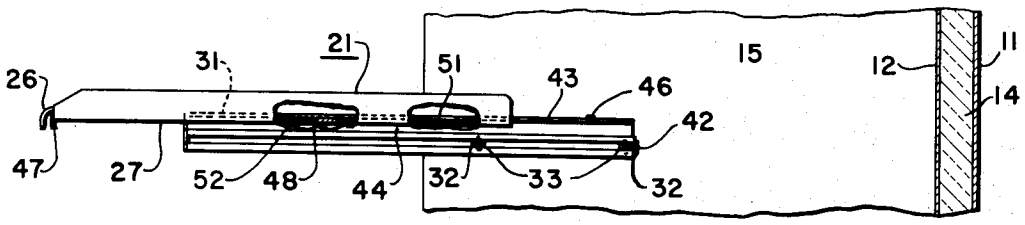


Fig. 4

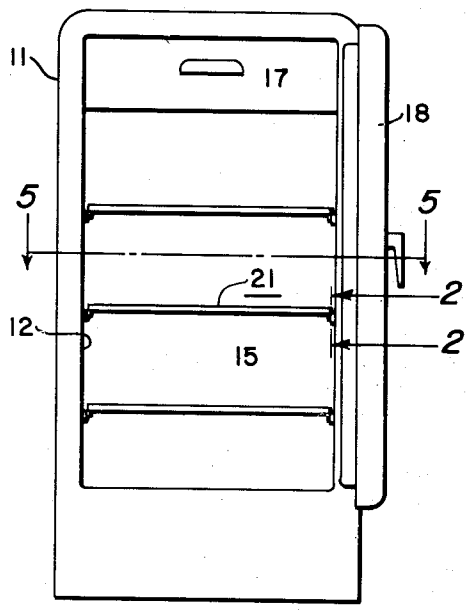


Fig. 1

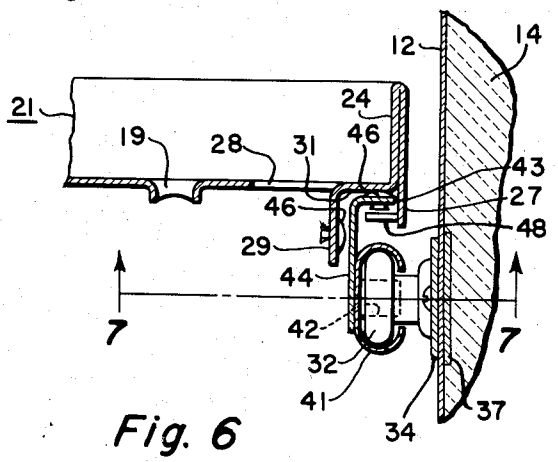


Fig. 6

INVENTOR.

Carl F. Petkwitz

BY

Willits, Hardman & Felt.

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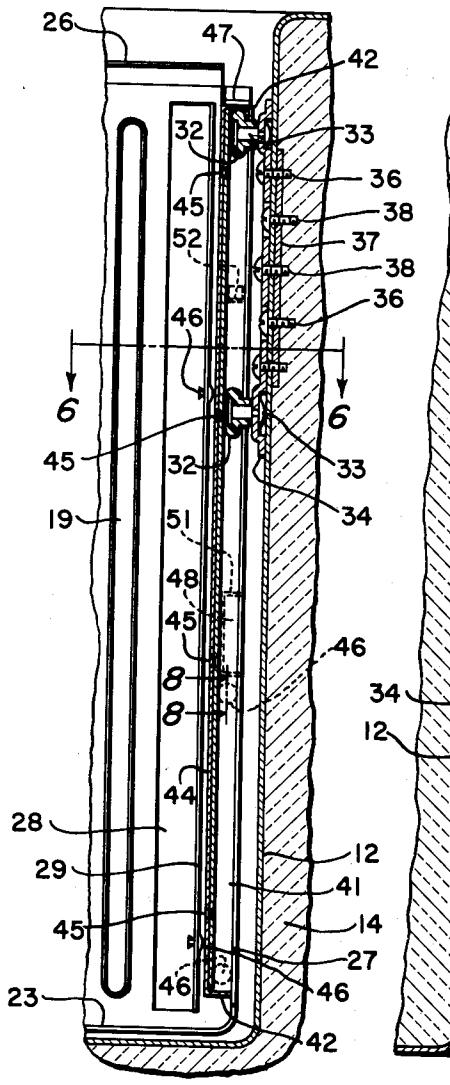


Fig. 7

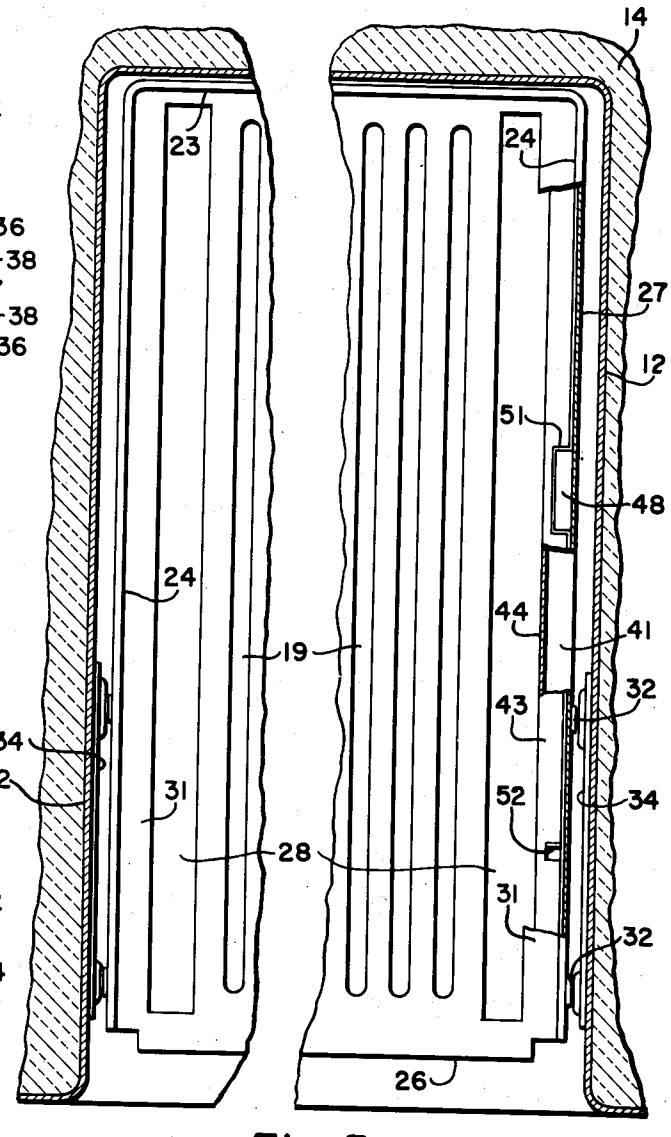


Fig. 5

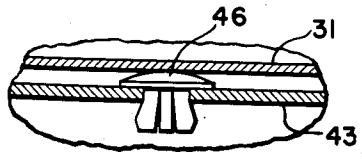


Fig. 8

INVENTOR.
Carl F. Petkwitz
BY

Willits, Hardman & Fehr.

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2,719,772

HORIZONTALLY MOVABLE REFRIGERATOR SHELF

Carl F. Petkwitz, Oakwood, Ohio, assignor to General Motors Corporation, Dayton, Ohio, a corporation of Delaware

Application September 23, 1952, Serial No. 311,028

7 Claims. (Cl. 312—340)

This invention relates to refrigerators and particularly to a shelf arrangement for the refrigerated compartment thereof.

Movable sliding or extensible shelves have heretofore been provided in household refrigerators and I have found that they have not been entirely satisfactory for several reasons. Some of the prior arrangements for extending, either by rolling or sliding, a shelf outwardly of the refrigerated food storage compartment of a refrigerator cabinet comprised so many parts that from a cost standpoint their use has been prohibited. Others have been difficult to operate into an extended position relative to the cabinet due to binding of the shelf supports at certain points of movement thereof caused by unbalanced loads thereon or to applying a pulling force at one side only of the shelf. Still other extensible shelf supporting arrangements have been located at the side of a shelf supported therefrom and this prevents a shelf from occupying the entire horizontal area between upright side walls of a food compartment in a refrigerator. The latter results in waste of valuable space in the food compartment and since this space is at a premium in a refrigerator, any extra food storage area that is made available is the equivalent of that much food storage space at no extra cost. I therefore contemplate the provision of an extensible food supporting shelf in a refrigerator cabinet which overcomes the aforesaid objections.

An object of my invention is to provide an improved shelf for a refrigerator cabinet of a type which is rollable part way outwardly of a compartment therein and is slidable an additional distance outwardly of the compartment beyond the outward rolled position thereof.

An other object of my invention is to provide for the extension of a shelf outwardly of a food storage compartment of a refrigerator cabinet with a minimum of elements supporting the shelf so as to simplify and reduce manufacturing costs of extensible shelves.

A further object of my invention is to provide a combined rollable and slidable arrangement for an extensible refrigerator shelf which shelf is removably located upon its extensible arrangement in such a manner as to prevent detachment of the shelf from its supports during at least the sliding movement thereof relative to the supports.

A still further object of my invention is to rigidly secure rollers for a combined rollable and slidable shelf in a refrigerator to upright walls of the food storage compartment thereof and to carry the shelf above the rollers whereby the shelf may extend substantially from one upright side wall to the other of the compartment so as to eliminate wasting a portion of the horiozntal area of the compartment between its side walls.

In carrying out the foregoing objects it is a more specific object of my invention to provide plastic gliders between metal elements of a slidable shelf arrangement whereby the elements may be slid relative to one another with a minimum of friction therebetween.

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 household refrigerator cabinet having my invention embodied in the food storage compartment thereof and showing the compartment door in open position;

Figure 2 is a fragmentary vertical sectional view taken on the line **2—2** of Figure 1 showing an extensible shelf supported in a normal position within the food compartment of the refrigerator cabinet;

Figure 3 is a view similar to Figure 2 and shows the extensible shelf rolled part way outwardly of the food compartment of the refrigerator cabinet;

Figure 4 is a view similar to Figure 2 showing the extensible shelf slid relative to its supports an additional distance outwardly of the food compartment over that shown in Figure 3;

Figure 5 is a fragmentary horizontal sectional view taken on the line **5—5** of Figure 1 with a portion of the shelf along one side edge thereof broken away and looking down on its rollable and slidable support;

Figure 6 is an enlarged sectional view taken on the line **6—6** of Figure 7 showing the shelf mounted on its rollable and slidable support;

Figure 7 is a fragmentary sectional view taken on the line **7—7** of Figure 6 looking upwardly from beneath the shelf; and

Figure 8 is an enlarged sectional view taken on the line **8—8** of Figure 7 showing a glider or button element embodied in the present structure to facilitate sliding of the shelf relative to its rollable support.

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 panels **11** and an inner metal liner **12** with any suitable insulating material **14** disposed therebetween (see Figure 5). Liner **12** forms 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 cabinet. 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 of the cabinet, located below the food storage compartment **15**. Suitable controls for the refrigerant translating device and for admitting refrigerant to evaporator **17** may be provided to maintain a predetermined temperature within the food compartment **15** as is conventional in the art. A door **18**, shown in open position in Figure 1, normally closes an opening in the front of the refrigerator cabinet affording access to compartment **15**. Compartment **15** is provided with a plurality of vertically spaced apart food supporting shelves mounted upon opposed upright side walls of the compartment. These shelves may be formed of sheet aluminum or other suitable material and are reticulated to permit air, cooled by evaporator **17**, to circulate therethrough and about the compartment **15** over foods stored therein. The shelves are rectangular (see Figure 5) and have a flat article support surface provided with a plurality of elongated slots **19**.

According to my invention at least one of the shelves **21** is of the type that can be extended outwardly of compartment **15**, through its access opening when door **18** is opened, so as to render food products stored on

the back portion thereof readily accessible from exteriorly of the refrigerator cabinet. Shelf **21** is provided with a raised rolled-over rear wall **23** (see Figure 5), raised rolled-over side walls **24** (see Figures 5 and 6) and a downwardly turned lip **26** (see Figures 5 and 7) at the front thereof. The lip **26** forms a handle for moving or extending the shelf **21** as will be presently described. The rolled-over part of the side walls **24** only of shelf **21** extends a short distance below the main or flat food supporting part of the shelf as at **27** (see Figure 6). A part of the shelf proper adjacent its sides is cut out as at **28** and bent downwardly as at **29** (see Figures 6 and 7) to provide a depending leg which cooperates with the short extension **27** to provide the shelf **21** with a track portion **31** (see Figure 6) between the depending parts **27** and **29**. Means is provided for both rollably and slidably supporting shelf **21** within compartment **15** for permitting the shelf to be extended outwardly thereof when door **18** is open. This means comprises a pair of spaced apart horizontally aligned rollers **32** rigidly secured upon each of the opposed upright side walls of compartment **15** near the open front thereof. The rollers of each pair thereof are rollably mounted upon headed studs **33** riveted or otherwise suitably secured to opposed end portions of a metal plate **34**. Plate **34** is secured to the inner surface of liner **12** by screws **36** which pass through the liner and are threaded into a back plate **37** located on the outer surface of liner **12** (see Figure 7). The heads of a separate set of screws **38** engage the liner **12** and are threaded into backing plate **37** to rigidly secure this plate to the liner and to permit plate **34** and the rollers **32** mounted thereon to be removed without danger of backing plate **37** falling out of place. The shelf supporting means also includes a substantially C-shaped track member **41** fitting over or embracing the rollers **32** at each side of the compartment **15** as shown in Figure 6 of the drawings. These track members **41** each have both ends thereof closed by stop means in the form of inwardly bent extensions **42** which stop means are for a purpose to be hereinafter described. Each track member **41** is provided with a track receiving portion adapted to be associated with the track portion **31** on shelf **21**. In the present disclosure this track receiving portion on track member **41** is in the form of a horizontal ear **43** on a separate member or vertical piece of metal **44** rigidly secured to member **41** by a plurality of rivets **45** (see Figure 7). The stops means or extensions **42** for track member **41** are formed on this vertical metal piece **44**. It is to be understood that the track receiving portion **43** and the stop means or extensions **42** may, if desired, be formed as integral parts of member **41**. Glider elements **46** are secured to the depending leg **29** of shelf **21** in spaced apart relation therealong and to the track receiving portion **43** of track member **41** in spaced apart relation therealong. One of these glider elements **46** may if desired be located at the rear end of track portion **31** of shelf **21** as shown. The glider elements **46** are in the form of nonmetallic rivets having a rounded button-like head and being extended through suitable holes in the elements **29** and **43** with their shank portion spread out to lock them in place in the holes. Articles constructed of polyamide material or polymeric amides having a protein-like chemical structure may be slid or rolled upon metal surfaces or metal surfaces may be slid upon and along objects so constructed with much less friction than sliding metal members upon or along one another. Thus I prefer to form or mold the rollers **32** and particularly the glider elements **46** of such polyamide plastic material.

The shelf **21** has an integral bent down stop **47** at the front thereof (see Figure 7) disposed in the path of the track receiving portion **43** of member **41** for a purpose to be hereinafter described. Depending part or leg **27** of the side wall **24** of shelf **21** is provided, about midway between the front and rear thereof, with a short undertürned horizontal flange **48** (see Figures 5, 6 and 7). The track receiving portion **43** of metal piece **44** on track member **41** has a cut out part **51** (see Figures 5 and 7) which is slightly longer than the flange **48** on leg **27** of shelf **21**. Flange **48** on the depending leg **27** of the shelf side wall **24** is normally in vertical alignment with the cut out part **51** of the track receiving portion **43** and is disposed under the track receiving portion **43** during sliding movement of the shelf to form means for detachably interlocking the shelf **21** to track member **41** during such sliding movement thereof. The cut-out part **51** of track receiving portion **43** is moved out of vertical alignment with the flange **48** when the shelf is slid horizontally relative to track member **41**. Thus shelf **21** is interlocked with member **41** whenever it is slid relative thereto and may be elevated relative to member **41** and removed therefrom only when the shelf is not moved relative to member **41**. Track receiving portion **43** of member **44** is provided with a short bent down stop portion as shown at **52** (see Figures 5 and 7) adapted to engage the forward edge of flange **48** for a purpose to be hereinafter described.

Shelf **21** is movable part way out of compartment **15**, of the refrigerator cabinet, by being rollable outwardly of compartment **15** a predetermined distance and thereafter slidable an additional distance out of the compartment. For the purpose of illustrating and describing the rollability and slidability of shelf **21** it is to be assumed that the shelf has its track portion **31** at each side thereof resting upon the plastic gliders **46** on the track receiving portion **43** of members **44** along the opposed side walls of compartment **15**. The track members **41** having previously been slid over the rollers **32** to embrace the same with the stop or extension **42** at the rear of members **41** bent into the path of the rollers to prevent removal of these track members from the rollers and from the food compartment. Referring now to Figure 2 of the drawings the shelf **21** is shown in its retracted or normal position within compartment **15**. In this position shelf **21** may, if desired, be removed from its support simply by elevating the same relative thereto whereby the interlocking flanges **48** thereon will pass upwardly through the cut-out parts or openings **51** in the track receiving portions **43** of the shelf supports. In Figure 3 of the drawings I show the shelf **21** and the track members **41** of its supporting structure as having been rolled a predetermined distance out of compartment **15** as a unit, by the application of a horizontal force to the shelf, which has caused the track members **41** to roll on the rollers **32**. It will be noted that the stops or extensions **42** at the back of members **41** have been shifted into engagement with the rear rollers **32** but the shelf **21** and the track portions **43** have not as yet been moved relative to one another. Thus shelf **21** may, if desired, still be detached and removed from its supporting track members as above described. Further application of horizontal force to shelf **21** will, since stops **42** now engage the rear rollers **32** to prevent forward movement of track members **41**, cause the same to be slid relative to its track members an additional distance outwardly of compartment **15**, through its access opening, as shown in Figure 4 of the drawings, beyond the predetermined distance of outward rolling movement thereof shown in Figure 3. In this additional extended position of shelf **21** the stops **52** have engaged the forward edge of flanges **48** to prevent sliding of the shelf off its support while in its fully extended position. During movement of shelf **21** from the position thereof shown in Figure 3 to the position shown in Figure 4 the track portions **31** of the shelf have skidded or slid upon or over the gliders **46** on the track receiving portions **43** of the shelf support. The plastic gliders or buttons **46** secured to the depending legs **29** on shelf **21** may be engaged by the vertical part **44** of track mem-

bers **41** during sliding movement of the shelf relative to the rollable track members to thereby reduce friction between these elements and prevent binding of the shelf against its mounting means when a force is applied to one side of the shelf. The gliders **46** offer very little friction to the parts that are slidable relative to one another and in fact when a continuous outward pulling force is applied to the shelf **21** the operator can hardly detect the end of rolling movement and the beginning of the sliding movement of the shelf. An initial sliding movement of track portions **31** of shelf **21** relative to the track receiving portions **43** of the combined rollable and slidable support will move the flanges **48** away from the cut-out or open parts **51** in track receiving portions **43**. The flanges **48** are thereby positioned below track receiving portions **43** to interlock the shelf to its supports so that it cannot become detached or removed therefrom during the act of sliding the shelf through its additional distance of movement over the rolling movement thereof.

From the foregoing it should be apparent that I have provided an improved shelf arrangement for the refrigerated compartment of a refrigerator cabinet which by the combination of rolling the shelf part way out of the compartment and thereafter sliding same an additional distance outwardly of the compartment facilitates access to food products stored on the rear portion of the shelf. By stationarily securing the rollers to the upright side walls of the food storage compartment I eliminate the necessity of mounting an extra guide on these walls to thereby enable the shelf supporting arrangement to be constructed of a minimum number of parts. The spacing of the track portions on the shelf from the track receiving portions for the shelf from one another by the glider elements and the forming of these elements from the plastic material herein specified the shelf may be freely slid relative to its rollable supporting means. By spacing the rollers apart and mounting the same closely adjacent the access opening of the compartment and by constructing the shelf supporting means in a manner to permit the combination of rolling and sliding of the shelf the present shelf may be extended a substantial distance outwardly of the compartment and yet firmly supported from walls thereof.

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 combination, a cabinet having a plurality of walls forming a food storage compartment therein, said compartment having an access opening in the front thereof, a door pivotally mounted upon said cabinet normally closing said compartment access opening, a pair of spaced horizontally aligned rollers rigidly mounted upon each of the opposed upright side walls of said compartment, each of the rollers of said pairs thereof being located closely adjacent the open front of said compartment, a shelf within said compartment having a food supporting area extending continuously from one to the other of said side walls over said rollers, means for supporting said shelf upon said rollers, said rollers being located a substantial distance above the bottom wall of said compartment and spacing said shelf therefrom to provide an open space therebelow, said food supporting area of said shelf being reticulated to permit air in said compartment to flow therethrough, said shelf supporting means including a track member embracing a pair of said rollers and provided with a track receiving portion, said shelf having means along its side edges defining a track portion, said track portion on said shelf fitting over said track receiving portion on said track member, said track member being rollable along and relative to said rollers, upon applying a horizontal force to said shelf, to roll the shelf a predetermined distance outwardly of said compartment through its access opening when said door is open, said track portion on said shelf being slidable relative to said track receiving portion of said track member to move the shelf an additional distance outwardly of said compartment beyond said predetermined distance of rolling movement thereof, means on one of said portions registering with an opening in the other of said portions to normally permit said shelf to be removed from its supporting means, and said last named means being moved out of registry with said opening in said other of said portions upon movement of said shelf beyond said predetermined distance of rolling movement thereof to prevent removal of the shelf from its supporting means.

2. The combination defined in claim 1 wherein the shelf provides the sole means of tying the opposed rollable track members to one another.

3. In combination, a cabinet having a plurality of walls forming a food storage compartment therein, said compartment having an access opening in the front thereof, a door pivotally mounted upon said cabinet normally closing said compartment access opening, a pair of spaced horizontally aligned rollers rigidly mounted upon each of the opposed upright side walls of said compartment, each of the rollers of said pairs thereof being located closely adjacent the open front of said compartment, a shelf within said compartment having a food supporting area extending continuously from one to the other of said side walls over said rollers, means for supporting said shelf upon said rollers, said rollers being located a substantial distance above the bottom wall of said compartment and spacing said shelf therefrom to provide an open space therebelow, said food supporting area of said shelf being reticulated to permit air in said compartment to flow therethrough, said shelf supporting means including a track member embracing a pair of said rollers and provided with a track receiving portion, said shelf having means along its side edges defining a track portion, a plurality of molded plastic glider elements stationarily secured in spaced apart relation along said track receiving portion of said track member, said track portion on said shelf fitting over said track receiving portion on said track member with the glider elements spacing said portions from one another, said track member being rollable along and relative to said rollers, upon applying a horizontal force to said shelf, to roll the shelf a predetermined distance outwardly of said compartment through its access opening when said door is open, means on said track member engageable with the rearmost roller of the pairs thereof for stopping said member at said predetermined outward position of rolling movement of said shelf, said track portion on said shelf being slidable relative to said track receiving portion of said track member to move the shelf an additional distance outwardly of said compartment beyond said predetermined distance of rolling movement thereof, means on said track portion of said shelf registering with an opening provided in said track receiving portion of said track member to normally permit said shelf to be removed from its supporting means, and said last named means being moved out of registry with said opening upon movement of said shelf beyond said predetermined distance of rolling movement thereof to prevent removal of the shelf from its supporting means during its said sliding movement.

4. In combination, a cabinet having a plurality of walls forming a food storage compartment therein, said compartment having an access opening in the front thereof, a door pivotally mounted upon said cabinet normally closing said compartment access opening, a pair of spaced horizontally aligned rollers rigidly mounted upon each of the opposed upright side walls of said compartment, each of the rollers of said pairs thereof being located closely adjacent the open front of said compartment, a shelf within said compartment having a food supporting area extending continuously from one to the other of said side walls over said rollers, means for supporting said

shelf upon said rollers, said rollers being located a substantial distance above the bottom wall of said compartment and spacing said shelf therefrom to provide an open space therebelow, said food supporting area of said shelf being reticulated to permit air in said compartment to flow therethrough, said shelf supporting means including a track member embracing a pair of said rollers and provided with a track receiving portion, said shelf having means along its side edges defining a track portion, a plurality of molded plastic glider elements stationarily secured in spaced apart relation along one of said portions, said track portion on said shelf fitting over said track receiving portion on said track member with the glider elements spacing said portions from one another, said track member being rollable along said rollers, upon applying a horizontal force to said shelf, to roll the shelf a predetermined distance outwardly of said compartment through its access opening when said door is open, said track portion on said shelf being slidable on said molded plastic glider elements relative to said track receiving portion of said track member to move the shelf an additional distance outwardly of said compartment beyond said predetermined distance of rolling movement thereof, means normally permitting said shelf to be removed from its supporting means, and said last named means being so constructed and arranged as to be rendered effective by the sliding movement of said shelf for preventing removal thereof from its supporting means.

5. The combination defined in claim 4 wherein the shelf provides the sole means of tying the opposed rollable track members to one another.

6. A refrigerator comprising a cabinet having a plurality of walls forming an open front food storage compartment therein, a pair of horizontally spaced apart rollers stationarily mounted upon each of the opposed side walls of said compartment near the open front thereof, a track member rollably supported on each of said pair of rollers, said track members each having a track receiving portion spaced vertically from and overlying the top thereof, said track members each having a stop

at the front and rear ends thereof, said stops being engageable with certain of said rollers to limit rolling movement of said track members relative thereto, a shelf having a track portion overlying and adapted to be supported upon said track receiving portion of said track members, said shelf being slidable on said track receiving portion of said track members relative thereto, said shelf also having an integral flange bent under said track receiving portion, said track receiving portion having an integral stop bent downwardly therefrom into the horizontal plane of said bent under flange, said track receiving portion of said track members having a cut out part, said cut out part of said track receiving portion of said track members normally registering with said bent under flange to permit removal of the shelf while in a horizontal position vertically upward of said track members, said cut out part of said track receiving portion of said track members being moved out of registry with said bent under flange when the shelf is slid forwardly of said track members to lock the shelf against said removal, and said bent under flange being engageable with said stop on said track receiving portion of the shelf for limiting outward sliding movement of the shelf relative to said track members.

7. A structure as defined in claim 6 wherein a plurality of nonmetallic glider elements are secured in spaced apart relation along the track receiving portion of the track members on which the shelf glides when slid relative thereto.

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