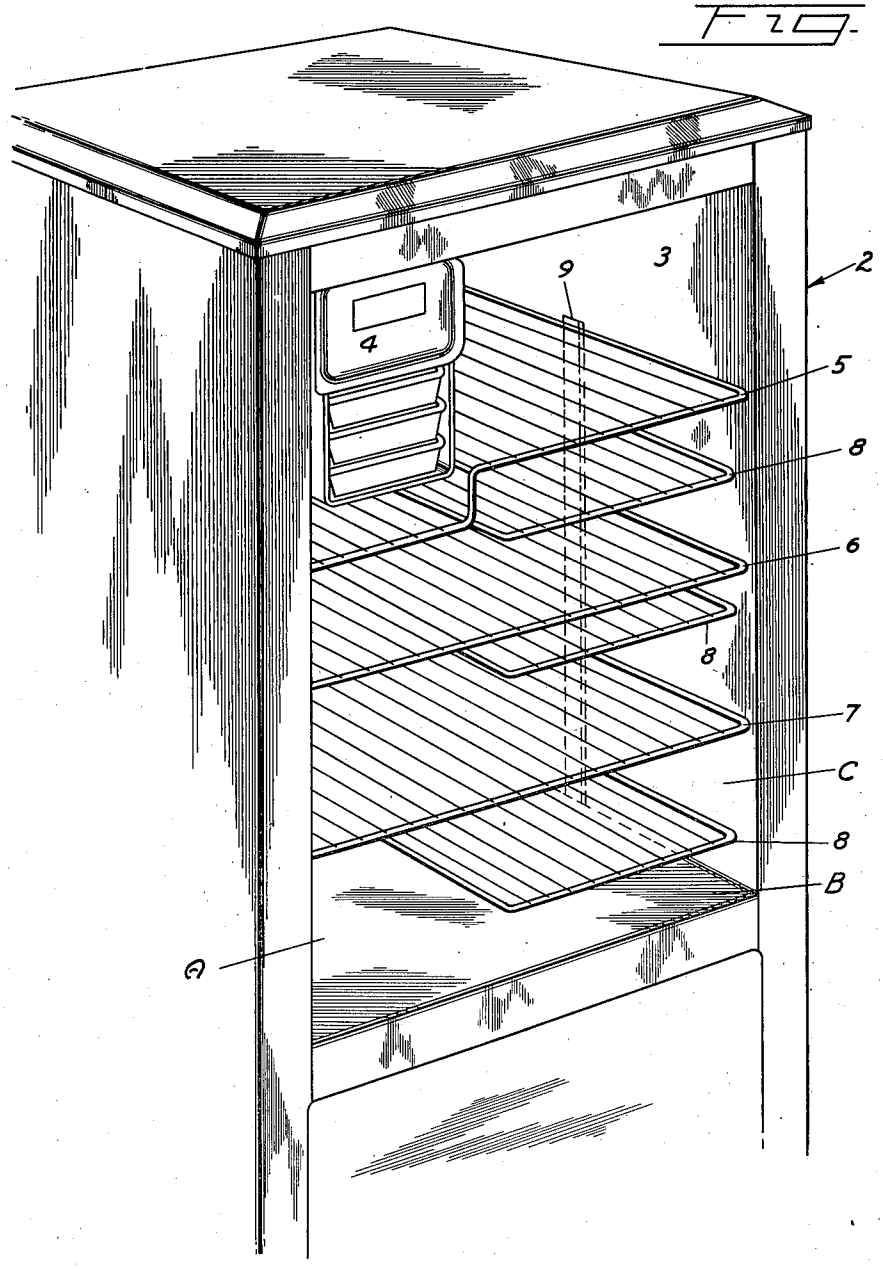
April 26, 1938. L. G. COPEMAN 2,114,996

REFRIGERATOR STRUCTURE

Original Filed Dec. 23, 1933 5 Sheets-Sheet 1

FIG. 1.



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REFRIGERATOR STRUCTURE

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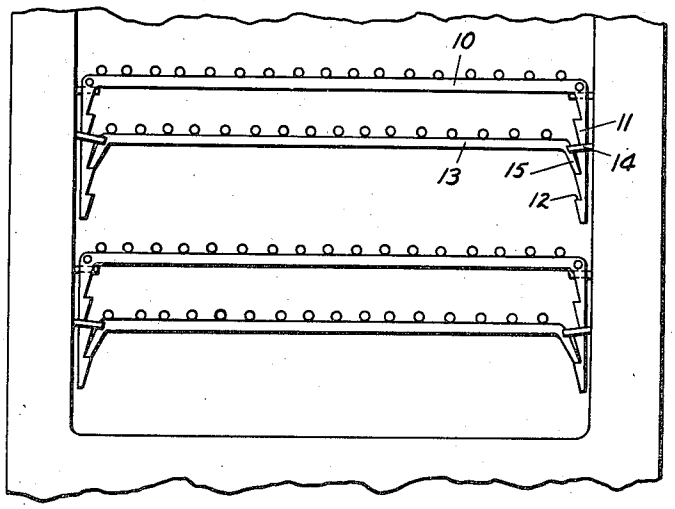


Fig. 2.

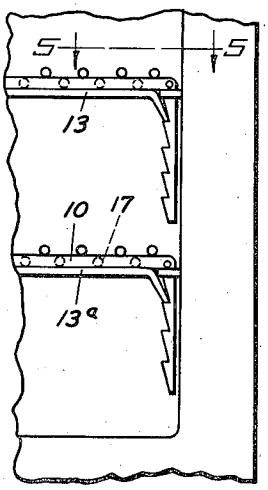


Fig. 3.

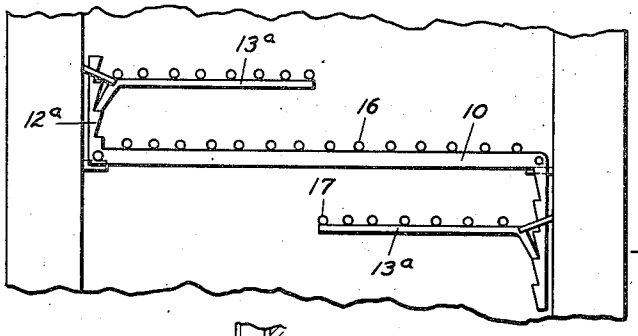


Fig. 4.

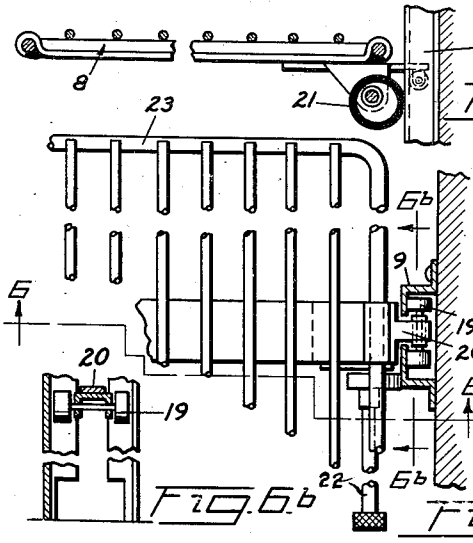


Fig. 6.

Fig. 6.b

Fig. 6.a

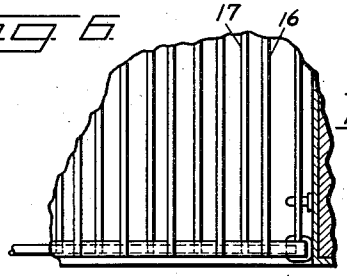


Fig. 5.

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REFRIGERATOR STRUCTURE

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Fig. 7.

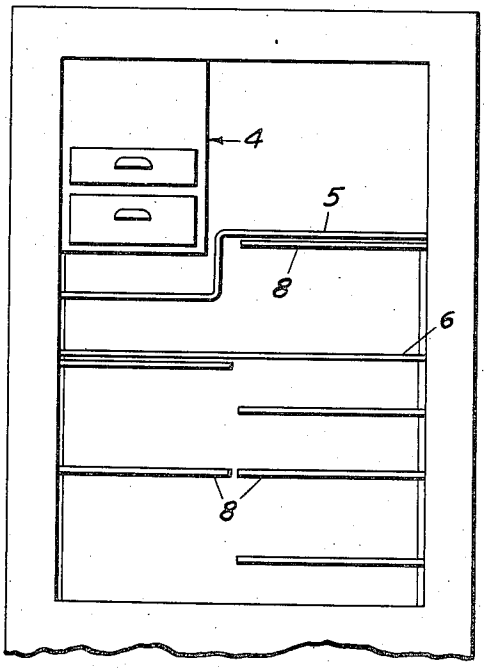
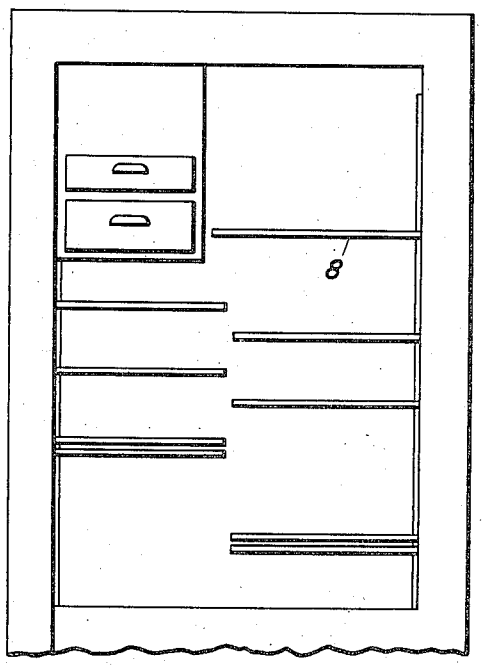


Fig. 8.



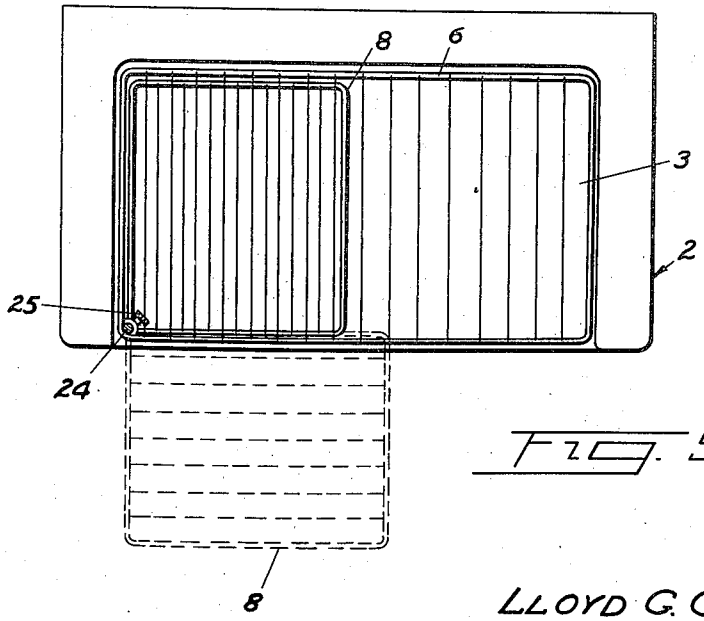


Fig. 9.

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FIG. 10.

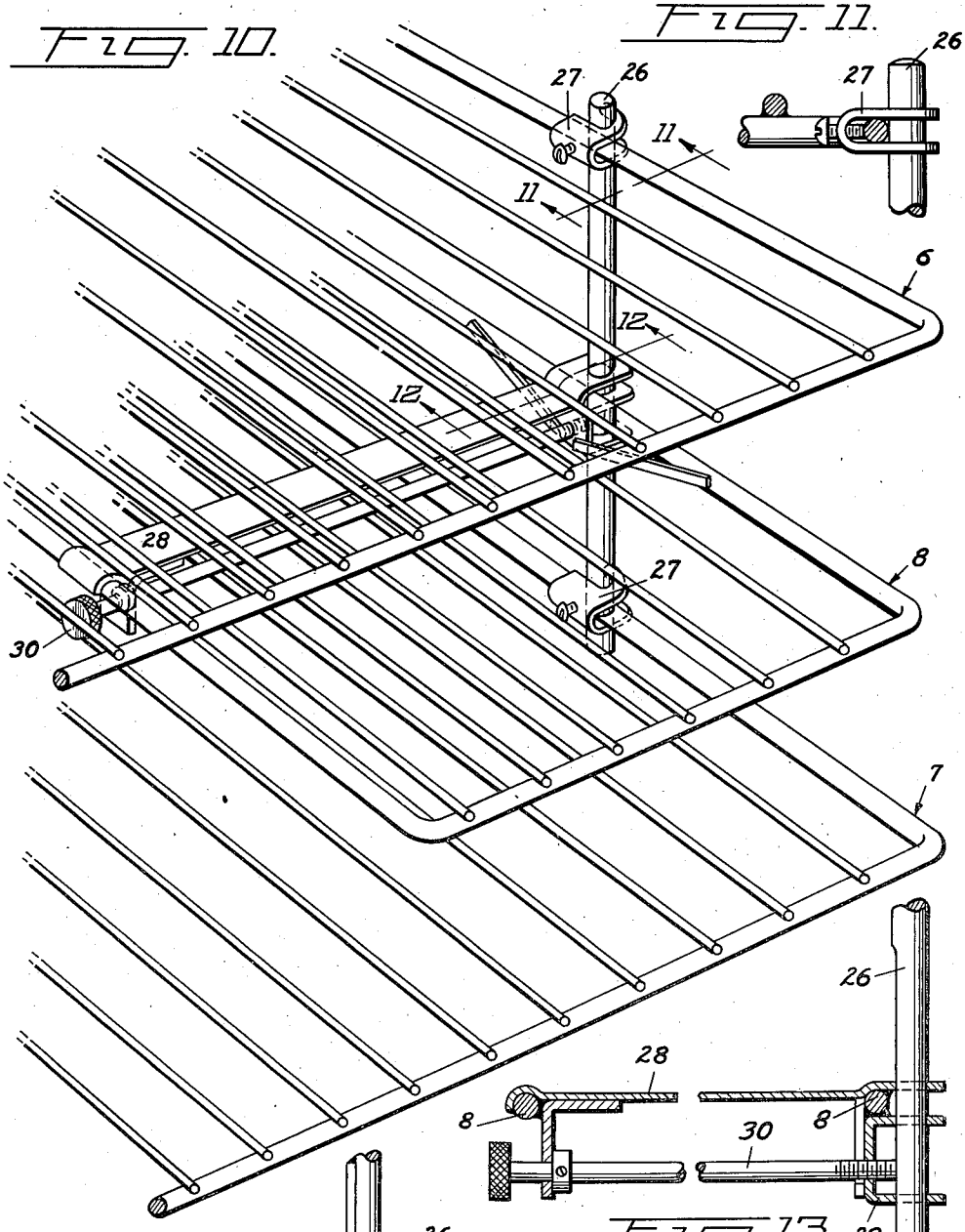
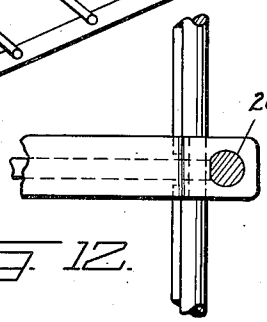


FIG. 11.

FIG. 13.

FIG. 12.



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Original Filed Dec. 23, 1933 5 Sheets-Sheet 5

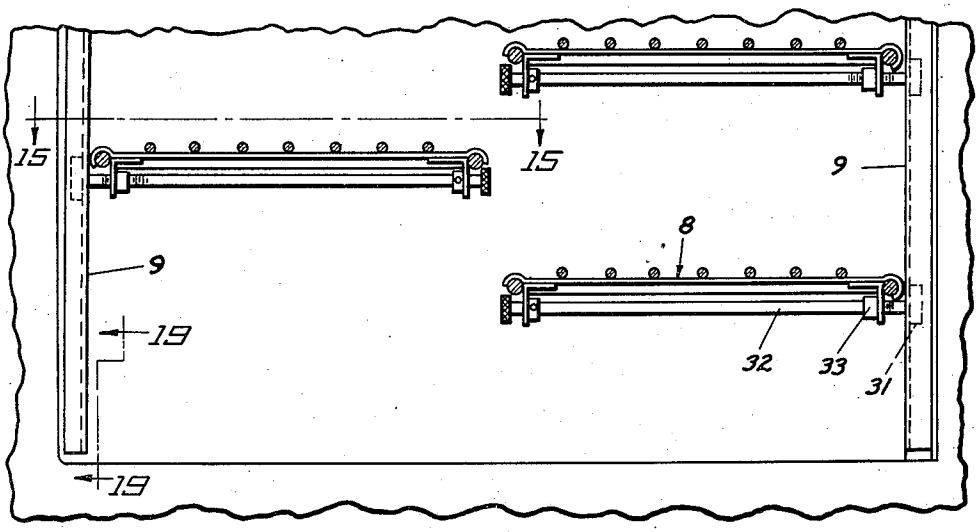


Fig. 14.

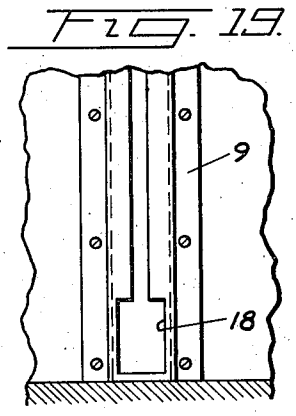


Fig. 19.

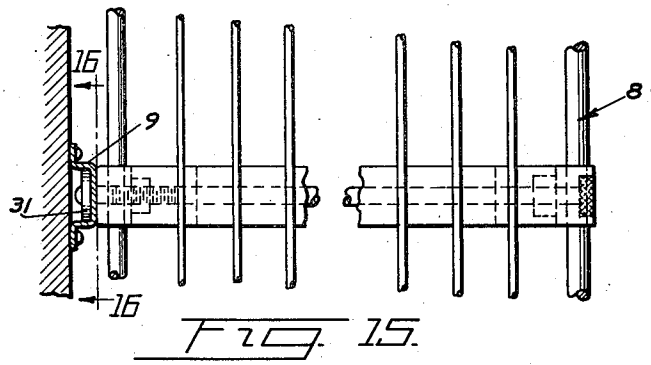


Fig. 15.

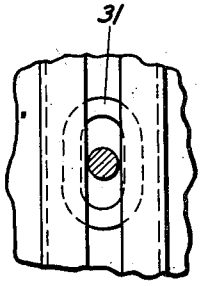


Fig. 17.

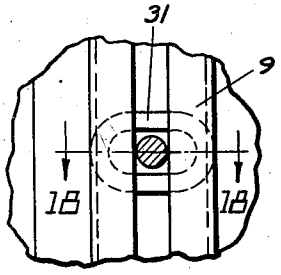


Fig. 16.

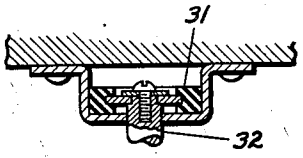


Fig. 18.

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Patented Apr. 26, 1938 2,114,996

UNITED STATES PATENT OFFICE

2,114,996

REFRIGERATOR STRUCTURE

Lloyd G. Copeman, Flint, Mich., assignor to Copeman Laboratories Company, Flint, Mich., a corporation of Michigan

Original application December 23, 1933, Serial No. 703,744. Divided and this application May 21, 1935, Serial No. 22,553

4 Claims. (Cl. 211—147)

This invention has to do with refrigerator structure, and more particularly with food chamber structure making it possible to locate and pack more foodstuffs adjacent the bottom cooler portion of the food chamber.

The design and arrangement of shelves in the food compartments of domestic refrigerators has for some long time presented quite a problem. This is particularly true of the smaller boxes, say, from three and one-half to five cubic feet, and even more so where the refrigerating mechanism is contained within the domestic refrigerator cabinet. To give the idea that the food compartment is of relatively large capacity, the shelves, in recent years, have been positioned very close to each other, making it difficult not only to reach objects at the rear of the shelves, but also making it impossible to place larger objects between the shelves.

It is an object of the present invention to materially increase both the shelf capacity and the effective cubic storage capacity of the food chamber of a domestic refrigerator and to accomplish this increase in such a manner as to make it possible to store and pack more food stuff towards the lower portion of the food compartment. There must, of necessity, be circulation of the air currents within the air compartment, and one of the features of the present invention is the ability to place food stuffs which formerly would have to be placed upon some of the upper shelves, in the lower portion of the food compartment so as to have the benefit of the cooler air currents.

More specifically, it is an object of the present invention to provide a vertically adjustable shelf between two normal fixedly positioned shelves, said vertically adjustable shelf extending less than the full distance across the food compartment, thus making it possible to fill the space between the two fixed shelves with larger objects or to place large objects at one side of said space and two layers of smaller objects at the other side of said space; or, in the event that two vertically adjustable half shelves are used, to obtain substantially any arrangement desired.

Another object of the invention is to provide half shelves which may be easily adjustable vertically with a single hand, making it possible to easily reach and adjust the half shelf while holding one or more articles in the other hand.

Other features, including various arrangements of half shelves, the manner of slidably positioning the same in the food compartment wall or supported from fixedly positioned shelves, the manner of nesting the half shelf inside the fixed shelf when not in use, and other details of construction and arrangement will be more clearly set forth in the specification and claims.

In the drawings:

Fig. 1 is a perspective view of a domestic refrigerator cabinet embodying three half shelves in accordance with the present invention.

Figs. 2, 3, and 4 are fragmentary elevations of one manner of supporting vertically adjustable full or half shelves from fixedly positioned shelves.

Fig. 5 is a fragmentary plan view taken on line 5—5 of Fig. 3.

Fig. 6 is a fragmentary sectional view taken on line 6—6 of Fig. 6*a*, showing one manner of controlling the vertical adjustment of the shelf from the front of the food compartment.

Fig. 6*a* is a fragmentary plan view, partly broken away, showing the manner of slidably supporting the shelf and the means for controlling the vertical adjustment.

Fig. 6*b* is a fragmentary sectional view taken on line 6*b*—6*b* of Fig. 6*a*.

Fig. 7 is a somewhat diagrammatic view illustrating a combination of fixedly positioned full shelves and adjustable half shelves.

Fig. 8 is a view similar to Fig. 7 but showing a modified arrangement of a food chamber equipped completely with vertically adjustable half shelves.

Fig. 9 is a plan view of a modified arrangement of half shelf wherein said shelf is positioned at one of the front corners of the food compartment to permit lateral swinging in addition to vertical adjustment.

Fig. 10 is an enlarged fragmentary detail view illustrating a half shelf and support therefor mounted upon two fixed shelves.

Fig. 11 is a sectional view taken on line 11—11 of Fig. 10.

Fig. 12 is a detail sectional view taken on line 12—12 of Fig. 10.

Fig. 13 is a fragmentary longitudinal sectional view of the half shelf supporting means shown in Fig. 10.

Fig. 14 is a fragmentary front elevation of a portion of a food chamber provided with vertically adjustable half shelves.

Fig. 15 is a fragmentary plan view taken on line 15—15 of Fig. 14.

Figs. 16 and 17 are fragmentary views taken on line 16—16 of Fig. 15 and illustrating the cam member in two positions of adjustment.

Fig. 18 is a sectional view taken on line 18—18 of Fig. 16.

Fig. 19 is a view taken on line 19—19 of Fig. 14 illustrating the construction of the lower end of the vertical slide for the half shelves.

This application is a division of my Patent No. 2,002,339, dated May 21, 1935, filed December 23, 1933.

In all embodiments of the present invention there will be present in the refrigerator 2, such as shown in Fig. 1, some form of food compartment 3 having a cooling unit 4 positioned to set up a circulation of air to produce a cooling effect. In the preferred form of the invention, and as somewhat diagrammatically illustrated in Fig. 1, there will be permanent shelves 5, 6, and 7 formed of spaced bars to permit a circuitous passageway of air around the food compartment. In between each permanent shelf 5, 6, and 7 I preferably locate vertically adjustable half shelves 8. It will be understood that throughout the specification and claims where the words "half shelf" are used I am not necessarily referring to a shelf which extends just half way across the food compartment, but to a shelf which is of somewhat less width than the food compartment so as to permit the placing of at least one large article between permanent shelves.

A vertical support 9, details of which will be described later, slidably carries the half shelves 8 so as to permit their easy vertical adjustment. Each shelf 8 is slightly smaller in outer contour than the corresponding contour of the shelf immediately above the same, so that if each half shelf is moved to the limit of its vertical adjustment, it will be nested within the outer edge of the fixed shelf so that, if the entire space between two fixed shelves is required for large articles of food it is, of course, available.

Referring to the space between the fixed shelf 7 and the bottom of the food compartment, Fig. 1, it will be seen that large articles or tall articles may be placed in the space marked A. A pie or other relatively flat article or a plurality of flat articles may be placed in the space marked B. The half shelf 8 may then be lowered to a position just above said pie or other relatively flat articles, thus leaving the space C for receiving other relatively small articles compared with those within the space A. The result is that by means of the vertically adjustable half shelf 8 it is possible to completely fill the space between the fixed shelf 7 and the bottom of the food compartment with a plurality of different sized articles to be cooled. As the shelves are all formed of spaced bars, it will be seen that the cold air from the cooling unit will drop down and pass over the articles of food in the space below the shelf 7. The bottom of the food compartment is, of necessity, maintained at a slightly lower temperature than the rest of the food compartment and by making it possible to greatly increase the capacity of the portion of the food compartment below the shelf 7 it will be seen that it is possible to place more articles of food in the cooler zone of the food compartment.

The adjustable half shelf 8 between the fixed shelves 6 and 7 will make it possible to store a larger quantity of food between such shelves 6 and 7, with the result that the half shelves 8 make it ordinarily possible to store substantially the same amount of food in the lower half of the food compartment as was formerly possible to store in the entire food compartment.

In Figs. 2 to 4 I have illustrated a modified embodiment of the invention wherein a fixedly positioned shelf 10 is shown provided with a downwardly depending leg 11 having serrations 12 for adjustably supporting a shelf 13 by means of the pivoted loop 14 and a small leg 15 cooperating with the serrations 12. The shelf 13 adjustably supported by the fixedly positioned shelf 10 may extend all the way across the food compartment as shown in Fig. 2, but preferably only extends part way across, as shown at 13*a* in Fig. 4. A half shelf may be supported on each side of the fixedly positioned shelf or the fixedly positioned shelf may be provided with an upwardly extending lug 12*a* for supporting half shelves both above and below. It will be seen by referring to Fig. 3, that the vertically adjustable shelves 13 or 13*a* are nestled within the fixedly positioned shelf 10 in their upper position. The transverse bars 16 and 17 on the respective shelves are preferably staggered so as to permit substantially complete nesting of the adjustable shelf within the fixedly positioned shelf.

In the modification illustrated in Figs. 6, 6*a*, and 6*b*, I have shown a half shelf of the type that may be conveniently used with the standard type of fixedly positioned shelf, such as shown in Fig. 1. The permanent shelves of the type shown at 5, 6, and 7 in Fig. 1 may be slightly cut away to receive a vertical slide or guideway 9. This guideway is located on one side wall of the food compartment, preferably about half way back from the front edge. The bottom of this guide is apertured at the bottom end as at 18 to receive suitable roller members 19 carried by an inwardly projecting part 20 of the half shelf 8. A rubber covered eccentric 21 is carried by the half shelf and an actuating rod 22 extends forwardly of the half shelf so as to be readily accessible by one opening the door of the refrigerator. By moving the eccentric 21 clockwise, as viewed in Fig. 6, it will be seen that a half shelf can be moved vertically, up or down, the rollers 19 assisting in such easy movement; then by moving the eccentric member counter-clockwise, it will be seen that the half shelf is temporarily located in position; the greater the weight upon the shelf, the more rigid will become the friction fit because of the eccentric. The edges 23 of the half shelf are so fabricated as to outer dimensions as to nicely nestle within the outer edges of the fixedly positioned shelf above the half shelf.

Figs. 7 and 8 illustrate diagrammatically various possible arrangements that may be obtained by using my half shelves entirely or in combination with fixedly positioned shelves. Half shelves 8 are shown positioned on each side beneath the full shelf 6 so the large articles may be positioned at the left and two layers of small articles at the right. Instead of a full shelf 7, as shown in Fig. 1, I show two vertically adjustable half shelves 8 so as to provide even further possible arrangements of shelving. In Fig. 8 all the shelves are shown as being vertically positioned half shelves 8; it being understood that the two sets of lower shelves on each side would in reality be nestled together, but they are shown slightly separated in the figure to show that there are two shelves in each set.

In the modification illustrated in Fig. 9 the half shelf 8 is shown as being vertically slidable as on a shaft 24. The position of this vertical shaft at the forward corner of the food compartment makes it possible to swing the half shelf 8 to the position shown in dotted lines. Thus the thumb screw 25 may be loosened to permit adjustment of the half shelf vertically and the half shelf itself may be preferably swung out or back about

the pivot shaft 24 whether the thumb screw is tightened or loosened. The manner of nesting one half shelf within the full shelf is well illustrated in this figure.

Figs. 10 to 13 are enlarged detail modifications over the type of shelf structure illustrated in Figs. 2 to 5. In this modification the standard 26 is clamped at the top and bottom to the fixedly mounted full shelves 6 and 7 as by means of clamps 27. A reinforcing plate 28 is secured to the half shelf 8 and a laterally reinforced guide member 29 embraces the standard 26 and is adapted to receive the threaded inner end of an adjusting and clamping rod 30. With this construction it is possible to adapt one or a plurality of half shelves to practically any type of fixedly mounted shelves now in use in domestic refrigerators. By merely reaching in with the hand and unscrewing the member 30 and placing the fingers underneath the half shelf, one can easily raise or lower the shelf and then tighten the same.

A sort of modification between the types of structure shown in Figs. 6 to 6b and 10 to 13 is illustrated in Figs. 14 to 19. In this embodiment I have shown vertically positioned guide members 9 at each side of the food compartment, similar to those disclosed in Figs. 1 to 6, the guide members being open at the bottom as at 18 to receive the guiding member 31 carried by the inner end of a threaded shaft 32; that is, the shaft 32 is threaded through a portion 33 carried by the half shelf 8. The guide or clamping member 31 at the inner end of the rod 32 is generally elliptical in shape, as best shown in Figs. 16 and 17, and in the preferred form is made of rubber or similar flexible material. This clamping and guiding member may be slipped into the opening 18 at the bottom of the guide 9 and the half shelf moved to any position desired. By turning the member 31 vertically to the position shown in Fig. 17 it will be seen that the shelf can be raised and lowered and then clamped into position by further turning of the rod 32 which will cause the ends of the resilient member 31 to contact with the side walls of the guide 9 to frictionally hold the shelf in position.

The invention has been described in relation to a refrigerator cabinet. However, it is to be understood that the shelf structure may be embodied in other cabinet-like structures such as the oven of a stove. Where, in the claims appended hereto, reference is made to the word "cabinet" such a structure is intended to be covered.

What I claim is:

1. In a food cabinet having a food compartment, and a fixedly mounted perforate shelf, a half shelf positioned in the portion of the compartment defined in part by said fixedly mounted shelf, means for guiding said half shelf in a general vertical direction, and manually operable rotary cam means readily accessible from the front of said compartment and carried by said half shelf and cooperating with said guide means to grip the same for temporarily holding said half shelf in substantially any position of vertical adjustment.

2. In a cabinet having a food compartment, and a fixedly mounted perforate shelf, a half shelf positioned in the portion of the compartment defined in part by said fixedly mounted shelf, means for guiding said half shelf in a general vertical direction, and cam means carried by said half shelf and arranged to frictionally engage said guide means for temporarily holding said half shelf in substantially any position of vertical adjustment, said half shelf being of less dimensions than said fixedly mounted shelf whereby said half shelf may at least partially nestle within said fixedly mounted shelf.

3. In a cabinet of the type designed to receive food stuff, the combination of one or more fixed shelves of open construction extending transversely across the cabinet, one or more half shelves of open construction normally extending substantially from a side wall of the cabinet to a point in an intermediate zone of the cabinet, a vertically extending guide and supporting means positioned adjacent said side of the cabinet, means carried by the half shelves and slidably connected to the guide and supporting means, whereby a half shelf may be vertically adjusted relative to a fixed shelf and in the space adjacent the fixed shelf for accommodating food stuff articles of various heights, and means carried by and movable with the half shelves and readily accessible adjacent an edge thereof for engaging the guide and supporting means to hold the half shelves in any desired position of adjustment, said half shelves being of such dimensions as to nestle in their uppermost position within the fixedly positioned shelves whereby to present a full storage space between the fixedly positioned shelves, if necessary.

4. For use with a cabinet of the type having fixedly mounted shelves, a vertically adjustable half shelf positioned beneath each fixedly mounted shelf whereby to permit the placing of articles in a space beneath said fixedly mounted shelves which would otherwise be unused above relatively small or flat articles, and means, carried by said fixedly mounted shelves for supporting and guiding said half shelf in its vertical movement, comprising an arm extending vertically from a side edge of said fixedly mounted shelf and having notches on the side of said arm facing the interior of the cabinet, a downward projecting prong on said half shelf for engaging said notches, and a loop mounted on said half shelf and arranged to engage said arm of the fixedly mounted shelf, in order to hold said half shelf in horizontal position.

LLOYD G. COPEMAN.