ADJUSTABLE SHELF CONSTRUCTION FOR REFRIGERATOR CABINETS

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Application February 24, 1950, Serial No. 146,655

3 Claims. (Cl. 312—351)

The present invention relates to adjustable shelf construction for refrigerator cabinets, and is particularly concerned with an improved construction permitting the easy removal or installation of a plurality of shelves at a minimum expense for the purpose of cleaning the shelves or effecting their adjustment at different levels.

One of the requirements for shelves in household refrigerators is that the shelves shall be capable of easy removal for the purpose of cleaning the shelves, as well as for the purpose of cleaning the interior walls of the food compartment.

It is also desirable to provide a shelf construction which may be readily removed and installed at different levels in order to meet the varying needs of the housewife from day to day.

Various methods of shelf support have been proposed, but most of the prior art devices involve the placing of supporting studs or brackets on the inside of the liner. This involves a considerable amount of extra labor to provide the liner with threaded studs or supporting brackets or other devices which also make it more difficult to clean the liner because of the inwardly projecting parts on the liners of the prior art.

One of the objects of the present invention is the provision of an improved adjustable and removable shelf construction which eliminates the labor involved in the prior art devices incident to the mounting of threaded studs or brackets for the support of shelves from the inside of the liner, and which also eliminates to a large degree inwardly projecting parts on the liner that make the liners of the prior art more difficult to clean.

Another object of the invention is the provision of an improved adjustable and removable shelf construction which maintains the sanitary features of the liner, and which does not detract from the appearance of the liner, and by means of which a plurality of shelves may be removably mounted in the liner in such manner that the shelves may be installed quickly or removed quickly at any time for adjustment of the shelves or for cleaning of the shelves or liner without the necessity for using tools or any form of quickly detachable fasteners.

Another object of the invention is to provide an improved removable shelf construction which is simple, capable of economical manufacture, sturdy, safe and firm, and which is adaptable to the use of shelves that can be constructed economically of steel wire or other suitable stock material.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the single sheet of drawings accompanying this specification,

Fig. 1 is a fragmentary view in perspective of a household refrigerator, showing a plurality of the removable shelves embodying the present invention;

Fig. 2 is a fragmentary vertical sectional view, taken on the plane of the line 2—2 of Fig. 1, looking in the direction of the arrows;

Fig. 3 is a fragmentary sectional view, showing the parts of the lower shelf of Fig. 2 in their final position, on a larger scale; and

Fig. 4 is a fragmentary sectional view showing a modified form of shelf supporting member.

Referring to Fig. 1, 10 indicates in its entirety a household refrigerator cabinet, which may be constructed with an outer shell 11 and an inner liner 12 spaced from each other to provide a space for insulation 13. The liner includes a bottom wall 14, a top wall (not shown), a side wall 15, rear wall 16, and side wall 17.

The space between the liner, side walls, and the shell side walls surrounding the door opening is closed by means of suitable insulating breaker strips 18. The side walls 15 and 17 of the liner 12 support the shelves 19, 20 according to the present invention.

The two shelves may be identical in construction; and each may consist of a relatively heavy wire front frame member 21, a relatively heavy rear wire frame member 22, and a multiplicity of lighter transverse wire frame members 23. The transverse wire frame members 23 are spaced from each other, but may be arranged as close as desired, so that there is no possibility of any household articles falling through the shelf; and the transverse wires 23 may be welded to the front and rear frame members 21, 22, preferably on the top side of the said frame members.

The shelves are preferably formed of relatively strong wire, such as steel, but may also be made of suitable alloys; and the shelf is preferably coated, after its manufacture, with some suitable, durable coating, providing a smooth finish which can be maintained sanitary with a minimum amount of care, and which resists any corrosion.

The length of the transverse frame members 23 depends upon the depth of the liner from the front to the back; and these front to back frame members 23 are preferably such that the front frame member 21 is located adjacent to, but
spaced from the door opening. The length of the front and rear frame members 21, 22 is greater than the space between the side walls 15 and 17 of the liner so that these frame members 21 and 22 may extend through apertures in the liner side walls to have an extended line of engagement with the resilient or pliable shelf supporting members 24 and 25, into which the front and rear frame members of the shelf are inserted for support.

The shelf supporting members 24, 25 are preferably all identical in construction, having closed sockets so that there are no open holes leading to the insulation from the inside of the storage chamber. The shelf supporting members are all mounted in flanged apertures 26 in the side walls 15 and 17 of the liner.

The flanged apertures 26 are substantially circular; and are preferably formed with an outwardly extending and outwardly tapered tubular flange 27 surrounding the aperture 26 and presenting an inwardly rounded formation 28 for each aperture; but also presenting an outwardly abrupt edge 29 at each aperture.

The purpose of the flanges 27 is to permit the convenient insertion of the shelf supporting members 24 and 25, but to prevent their removal. The shelf supporting members provided may in some cases be merely sufficient for supporting the shelves in one position; but in other embodiments of the invention a multiplicity of sets of the supporting members 24, 25 may be provided, the sets being located on different levels in the liner walls for the purpose of permitting adjustment of the shelves by the housewife.

The shelf supporting members 24, 25 are preferably molded out of a pliable or resilient material, such as a resilient plastic, resilient rubber, or a synthetic rubber, so that these members may be distorted or collapsed during their insertion in the apertures 26 and so that they will expand into the apertures after insertion.

As the resilient members 24, 25 are identical in construction, only one need be described in detail. Shelf supporting members 24 may be circular in elevation and may have an axial bore 41 of a size sufficient to receive the front or rear frame members 21, 22. The axial length of the bore 41 is such that it is adapted to receive an equal portion of the lateral extension of the frame members 21, 22, so that these supporting members may project through the side walls 15 and 17 of the liner into engagement with the surface 48 on the end of a plug 45, carried by the supporting member 24.

On the periphery of the supporting member 25 there is an annular groove 31, of sufficient width to receive the flanged formation 27 that surrounds each of the apertures 26. The size of the apertures 26 is such that the edge 28 of flange 27 engages the annular shoulder 32, which forms the outer side of the groove 31.

On the inside of the liner wall 15 or 17, each supporting member 24 is provided with a radially projecting flange 34, presenting a flat annular shoulder that engages the inside of the liner. The external shape of the flange 34, inside the liner, may be curved convexly at 36 so that the supporting members 24 present no sharp obstructions in the liner which might catch dirt or might interfere with cleaning operations.

At its other end the supporting member 24 has a reduced or tapered body 40, which may be substantially frusto-conical, leading to a flat end 44. The body 40 has at its largest end an annular shoulder 33 which is also beveled slightly so that the members 24 can be pushed through the apertures 25, compressing and deforming until they are held in place.

On the inside of the bore 41, the smaller end 44 of the member 24 supports a resilient plug 45, which may be cylindrical and may have an annular space between plug 45 and the inside of bore 41.

Resilient plug 45 has a flat face 46 engaging the end of each frame member 21 or 22, and acting as a stop to hold the shelf with both of its ends projecting through the liner walls 15 and 17, as shown in Figure 3.

The bore 41 preferably has a relatively loose fit with the wire frame members 21, 22 so that the shelf frame members 21, 22 slide into the bores 41 easily.

The operation of the resilient supporting members 24, 25 is substantially as follows:

The tapered frusto-conical portion 49 is smaller than the aperture 26, so that it may be conveniently inserted, and upon being forced the annular shoulder 30 passes the flange 27 until flange 27 is located in groove 31. Thereafter the resilient members 24, 25 are retained by engagement of the flange 27 in the groove and by the annular shoulders on the inside and the outside of the flange 27.

The shelf frame members 21, 22 are longer than the space between the side walls 15, 17, and, therefore, the shelf must be tilted as shown at the top of Figure 2, so that one end of each of the frame members 21, 22 may then be inserted into a resilient supporting member 24.

The shelf frame members 21, 22 are then moved to the left to the position shown at the top of Figure 2, engaging the plugs 45 and compressing them to permit this movement more readily than would be the case if it depended entirely upon the stretching of the members 24.

When the shelf has reached the left-hand position shown at the top of Figure 2, then the right end 43 may be brought down and inserted into the corresponding supporting member 25, and the shelf may be moved to the right until both of its ends project into a bore 41, to the same amount as shown in Figure 3.

The plugs 45 will then have reexpanded to the position of Figure 3, and will engage the ends of the shelf frame members 21, 22, to act as stops to hold the shelf in central supported position. The shelf can be removed at any time by pushing it to the right or the left to take one end out of supporting members 24 or 25 first.

Referring to Figure 4, the plug 45 in this modified form of supporting member may be provided with a central bore 47, thereby reducing the cross section of the plug 45 and making it still more resilient. In such case the plugs 45 will be easier to compress and the shelves can be more easily moved to the left or right as required for their removal or insertion.

The supporting members 24, 25 are all preferably of the same color and smooth finish as the inside of the liner 12. For example, they may be made of wood, metal, or plastic in a smooth finish when the interior of the liner is white enamel or covered with a white plastic. It will thus be observed that I have invented an improved shelf construction, including supporting members that may be assembled with the liner with a minimum amount of labor, since the members 24, 25 need only be pushed into the apertures in the liner.
The shelves are firmly supported with a non-metallic connection between the shelves and the liner so that there is no danger of rattling due to vibration, yet the shelves can be removed and cleaned or re-inserted at the same or a different level with a minimum amount of labor.

The shelves are of simple and sturdy construction; and they may be manufactured at a very low cost, thus reducing the cost of the overall assembly.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. A means for supporting the end of a wire shelf in the liner of a refrigerator cabinet, comprising a tubular resilient member provided with a bore for loosely receiving the shelf frame member, the said resilient member being formed with an outer annular groove bounded on the inside by an annular flange engaging the inside of the liner and on the outside by a narrow annular flange for engaging the edge of a tubular extrusion in the liner, the said resilient member having an elongated extension at its outer end provided with a closed end, and having an inwardly extending resilient plug in said bore and spaced from the side walls of said bore for engaging the end of the shelf frame member and holding it in place, but said plug being compressible to permit the shelf to be moved manually by compressing the plug when the frame member moves farther into the bore, the said plug being provided with a hollow bore extending into its end for reducing the volume of the plug and permitting it to be compressed more readily by the shelf frame member.

2. In a refrigerator shelf support for shelves having laterally projecting, cylindrical portions for engagement in a hole in a liner, said liner having an outwardly turned tubular formation about said hole, the improvement which consists of a resilient tubular member having a bore for receiving said cylindrical portion loosely to compensate for inaccuracies of mass production, said tubular member having a groove in its periphery for receiving said tubular formation of said liner, and said tubular member having an end wall provided with an inwardly extending axial plug spaced from the side walls of said member and compressible by the cylindrical formation of the shelf, to permit lateral shift of the shelf for insertion or removal of the opposite end of the shelf into or from another hole in the liner, the said plug being hollow to increase its deformable characteristics.

3. In a refrigerator shelf support for shelves having laterally projecting, cylindrical portions for engagement in a hole in a liner, said liner having an outwardly turned tubular formation about said hole, the improvement which consists of a resilient tubular member having a bore for receiving said cylindrical portion loosely to compensate for inaccuracies of mass production, said tubular member having a groove in its periphery for receiving said tubular formation of said liner, and said tubular member having an end wall provided with an inwardly extending axial plug spaced from the side walls of said member and compressible by the cylindrical formation of the shelf, to permit lateral shift of the shelf for insertion or removal of the opposite end of the shelf into or from another hole in the liner, the said plug being hollow to increase its deformable characteristics, and the said plug having its hollow interior outwardly open, to permit the plug to be moved partially inside out.

LEO G. BECKETT.

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