

UNITED STATES PATENT OFFICE

2,620,255

ADJUSTABLE SHELF CONSTRUCTION FOR REFRIGERATOR CABINETS

Leo G. Beckett, Henderson, Ky., assignor to Seeger Refrigerator Company, St. Paul, Minn., a corporation of Minnesota

Application June 12, 1951, Serial No. 231,222

4 Claims. (Cl. 312—351)

1

The present application is a continuation in part of my prior application, Serial No. 146,055, filed February 24, 1950, for Adjustable Shelf Construction for Refrigerator Cabinets, and is particularly concerned with an improved commercial construction of the invention described in said application.

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 inven-

2

tion 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, showing one of the shelves in the course of its removal or installation;

Fig. 3 is an enlarged fragmentary sectional view, showing the position which the parts assume when a shelf is being installed and has been pushed into one side of the liner so that its other end will clear the other side of the liner;

Fig. 4 is an enlarged fragmentary sectional view, with the shelf frame member, the shelf supporting grommet shown in elevation with the parts in the position which they assume when the left end of the shelf is in the position of Fig. 3;

Fig. 5 is a view similar to Fig. 3, showing the position of the parts when the shelf has been installed and is centrally located; and

Fig. 6 is a view similar to Fig. 5, showing a modification.

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.

The compound preferably used is polyvinylchloride material compound with fillers and plasticizers.

The plastic of which the supporting members are made is chosen with regard to its elastic qualities and a finish which is easily kept clean. A reduction in the elastic qualities may be counterbalanced by making the parts thinner.

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 46 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 29 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 35 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 member 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 rounded or tapered body which may be substantially cylindrical to the end 44. The body 40 has an annular shoulder 39 which may be substantially frusto-conical so that the members 24 can be pushed through the apertures 26, compressing and deforming until they pass the flanges 27. As soon as they have passed the flanges 27, however, the wall of the groove 31 engages the end 29 of the tubular formation and retains the resilient supporting member in the hole of the liner.

The end 44 of the cylindrical body 40 is provided with a tapered depression 50 which may have a surface of revolution and might be called a dimple. The wall 51 of the dimple 50 extends inward toward the center of the bore 41, and carries a resilient plug 45 which may be substantially cylindrical, and which has a flat face 43 engaging the end of each frame member 21 or 22.

There is an annular space 47 between the plug 45 and the walls of the bore 41, and the cylindrical body 40 is in fact a thin tubular shell. The thinness of the wall 40 enables it to stretch more readily, and the plug 45 is adapted to be compressed by the shelf frame member 21, while the wall 51 of the dimple 50 is adapted to roll outward, forming an elongated annular space 47 about the plug 46, when the frame member 21 is pushed against the plug 46, as shown in Fig. 3.

All of the parts, however, are biased to their natural original shape, as shown in Fig. 5, to which position the plug 45 is adapted to return when not deformed by outside force.

The bore 41 in the supporting member preferably has a relatively loose fit with the wire frame members 21, so that the shelf frame members 21, 22 slide into the bores 41 easily; and the looseness of the supporting members with respect to the shelf frame members is adapted to permit the usual inaccuracies in spacing of the frame members of the shelves which may result from mass production manufacturing operations.

Even though the spacing between two shelf frame members may be slightly smaller or larger, the looseness and resiliency permits them to be inserted in their respective supporting members without difficulty.

Referring to Fig. 6, this is a fragmentary sectional view showing a modification. In this case the end of the resilient supporting member is flat at 52, and it supports a plug 53 which is hollow and tubular, the plug having a bore 54. This permits a greater deformation of the plug than if a

5

solid plug were used and accomplishes the same result, although the dimple is missing from this modification.

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

The cylindrical body 40 of these resilient supporting members is smaller than the aperture 26 so that it can be conveniently inserted, and upon being forced the annular shoulder 39 passes the flange 27 until the 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 Fig. 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 Fig. 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.

During this compression of the plugs 45 the tubular body 40 stretches and the dimple 50 has its wall 51 deformed into a tubular shape, as shown in Fig. 3, permitting the necessary movement of the shelf toward the left until its ends can be inserted in the resilient supporting members at the right.

When the shelf has reached the left-hand position shown at the top of Fig. 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 Fig. 3.

The plugs 45 will then have reexpanded to the position of Fig. 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.

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 a white rubber or a white vinyl compound with 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 reinserted 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 over-all 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,

6

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. In a shelf support for refrigerator shelves or the like having a substantially cylindrical wire frame member extending from side to side, a liner wall provided with an aperture, the said aperture being formed with a rounded tubular protuberance extending outwardly with respect to the interior of the liner, a resilient tubular member having a thickened body surrounding a bore, said thickened body being provided with an annular groove for receiving said rounded tubular formation, said thickened body supporting an outwardly extending, thin, cylindrical wall terminating in an end wall which carries an inwardly extending compressible plug, the resilient member being extensible by engagement of a shelf frame member with said plug, but returning to its original length at which the shelf frame member is disposed medially in the refrigerator, the said resilient member having its end wall formed with a tapered depression and with a thin end wall leading to said plug, said end wall being movable outwardly with the plug.

2. 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 for 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 tubular 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 end wall being provided with a tapered depression extending slightly into the end of said plug and forming a thin frusto-conical end wall which is outwardly deformable to permit further movement outward of the plug.

3. A resilient grommet for supporting refrigerator shelves in a flanged hole in a liner comprising, a resilient tubular member of smaller size than said hole and of substantially cylindrical shape provided with an annular enlargement at its open end, said annular enlargement having an annular groove in its outer surface for receiving the flange of said hole, there being a tapered surface between said tubular body and said annular enlargement for compressing the annular enlargement until it passes said flange when being pushed into said hole, the other end of said grommet being closed and provided with a substantially cylindrical plug in said tubular member, and spaced from the inner walls of said tubular member for engagement with a complementary frame member of the shelf to be supported, the plug compressing and the tubular member stretching to permit the shelf frame member to be moved into said grommet beyond its normal position, so that the other ends of the shelf may be moved into position for insertion in a similar grommet, the closed end of said grommet being formed with a dimple to provide

7

a thin frusto-conical end wall which moves outward with the plug when the plug is compressed to permit a greater movement of the shelf frame member.

4. A grommet for supporting a cylindrical shelf frame member in an apertured wall, comprising a round elongated member of flexible, resilient material having an enlarged circular end provided with a peripheral groove, and having a circular bore extending into said latter end, said member having its other end portion provided with a thin tubular wall and with an end wall, said end wall supporting an inwardly extending solid cylindrical plug spaced from said thin tubular wall and engageable by said shelf frame member for insertion of the shelf frame member, the said end

8

5. wall having an inwardly extending tapered dimple therein forming a thin end wall which may be turned partially inside out upon pressure of said frame member upon said plug, returning said plug into said bore upon removal of said pressure.

LEO G. BECKETT.

REFERENCES CITED

10 The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
15 2,099,405	Langdon	Nov. 16, 1937
2,118,659	Sywert	May 24, 1938