March 29, 1966 C. J. BAKER ET AL 3,242,885

SHELF STRUCTURE

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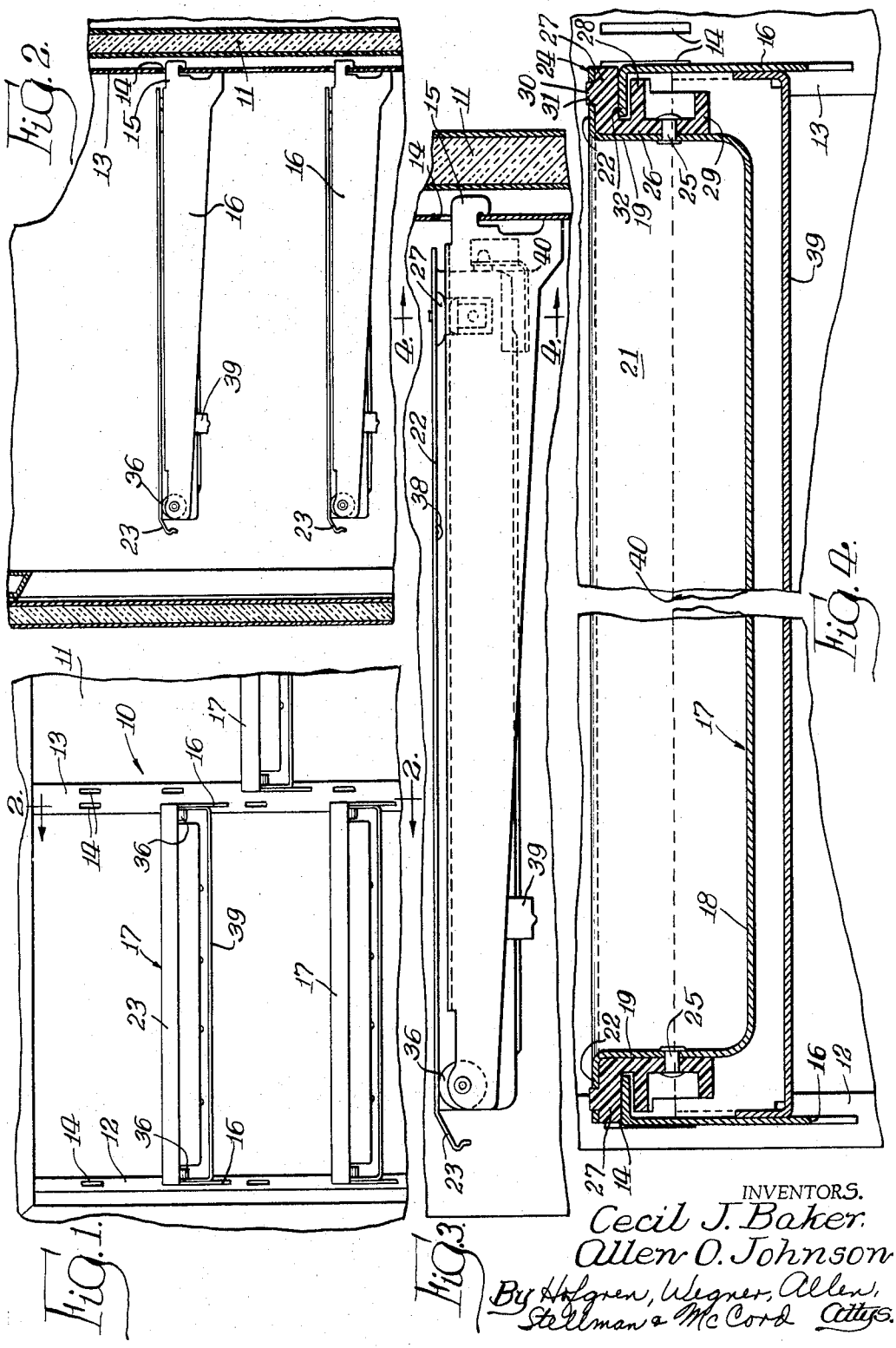

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Filed July 28, 1964 2 Sheets-Sheet 2

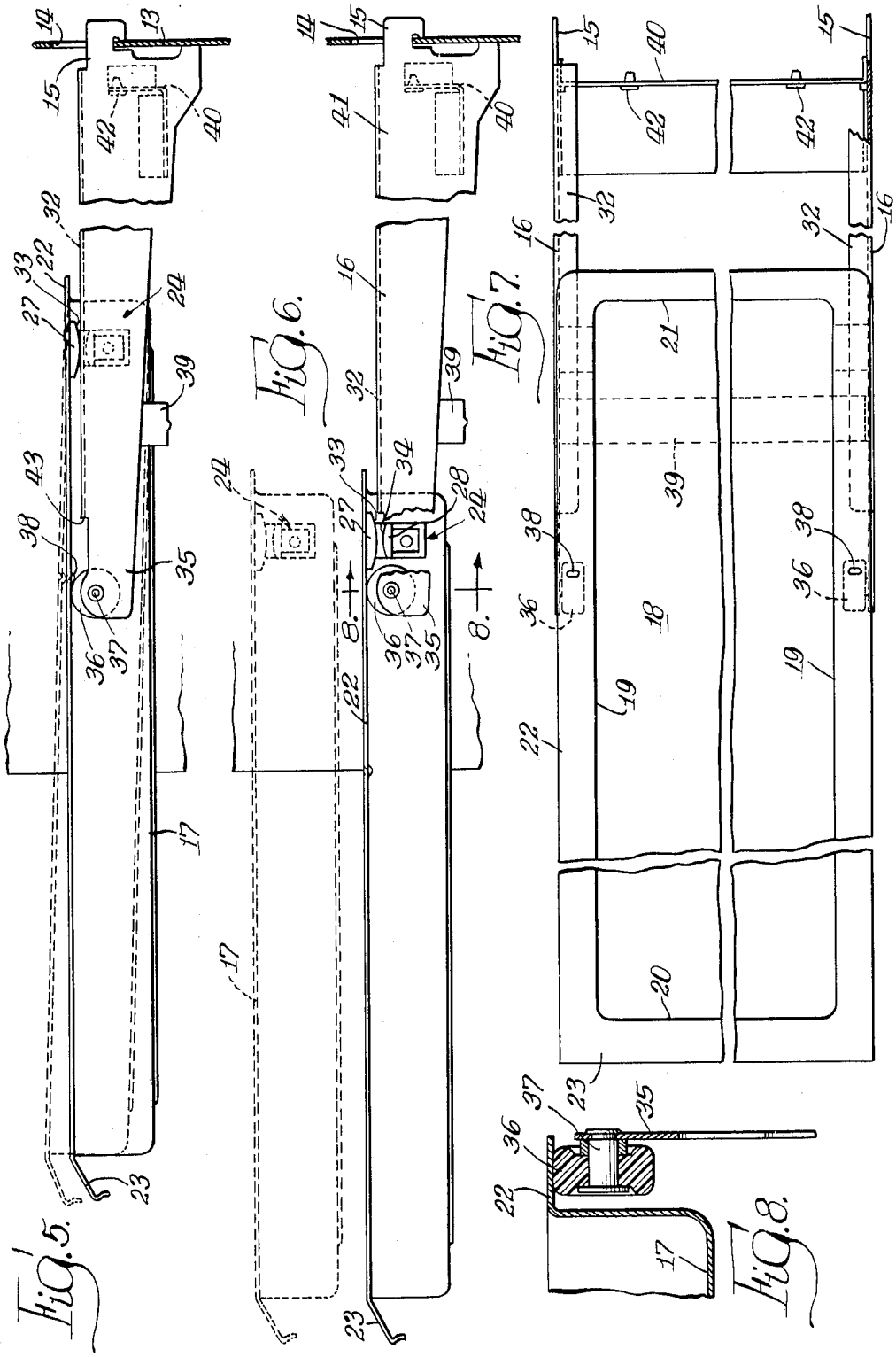

FIG. 5.

FIG. 6.

FIG. 7.

FIG. 8.

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SHELF STRUCTURE

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This invention relates to shelf structures and in particular to adjustable shelf structures.

In certain apparatus such as refrigerators, it is desirable to provide shelf structures which are readily adjustably mounted on the cabinet structure and further are movable horizontally for facilitated loading and removing of objects. The present invention comprehends an improved shelf structure providing such desirable adjustable mounting and movable loading and unloading characteristics. Thus, a principal feature of the present invention is the provision of a new and improved shelf structure.

Another feature of the invention is the provision of such a shelf structure having new and improved means for facilitated adjustable mounting thereof on an upright support such as a refrigerator cabinet.

A further feature of the invention is the provision of such a shelf structure having new and improved means for providing movable mounting of the shelf member for facilitated loading and removing of objects relative thereto.

Still another feature of the invention is the provision of such a shelf structure including means defining a pair of horizontal spaced rows of vertically spaced sockets, and a shelf structure including a pair of support arms having ends provided with connectors for releasable attachment to the socket means, the connector structures being disconnectable from the socket means as a result of an upward and forward movement of the arms, a shelf member, and means for movably mounting the shelf member on the arms including means for indicating a forward position of the shelf member relative to the arms, and means for selectively (a) guiding the shelf member forwardly from the arms as a result of a preselected lifting of the shelf member in the forward position and a subsequent forward movement thereof and (b) disconnecting the connectors of the arms from the sockets as a result of a lifting of the shelf member greater than the preselected lifting and a subsequent forward movement thereof.

A yet further feature of the invention is the provision of such a shelf structure including a pair of horizontally spaced support arms having opposed inturned longitudinal flanges, a shelf member, and means for movably mounting the shelf member on the arms including a roller on the arms for rollingly carrying the shelf member and a pair of slides on opposite sides of the shelf member including an upper portion slidably resting on the flange and a lower portion disposed closely subjacent the flange for precluding movement of the shelf member upwardly from the arms.

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIGURE 1 is a fragmentary front elevation of a refrigerator provided with a shelf structure embodying the invention;

FIGURE 2 is a fragmentary vertical section thereof taken substantially along the line 2—2 of FIGURE 1;

FIGURE 3 is a fragmentary enlarged vertical section illustrating in greater detail one of the shelf structures shown in FIGURE 2;

FIGURE 4 is a fragmentary, broken, further enlarged transverse vertical section taken substantially along the line 4—4 of FIGURE 3;

FIGURE 5 is a view generally similar to FIGURE 3 but illustrating the arrangement of the shelf member in the forward, loading position;

FIGURE 6 is a view similar to that of FIGURE 5 but illustrating the arrangement of the shelf member in full lines in a forwardmost, removing position and in dotted lines in a raised, separated position relative to the support arms;

FIGURE 7 is a broken top plan view of the shelf structure; and

FIGURE 8 is a fragmentary enlarged vertical section taken substantially along the line 8—8 of FIGURE 6.

In the exemplary embodiment of the invention as disclosed in the drawing, a shelf structure generally designated 10 is mounted in a cabinet 11, such as refrigerator cabinet. The shelf structure includes a first upright 12 and a second upright 13 spaced horizontally apart and provided with a plurality of vertically spaced slots 14, the several slots 14 in the upright 12 being horizontally aligned with the slots of upright 13. As will be described more fully herefollowing, the slots 14 effectively define sockets for receiving end connector portions 15 of a pair of support arms 16. The connectors 15 are arranged to cooperate with the sockets 14 to provide a removable mounting of the arms 16 on the uprights 12 and 13, and, thus, permit the arms 16 to be installed on the uprights at any one of the different vertically spaced positions defined by the horizontally related pairs of slots 14 in the respective uprights 12 and 13.

The shelf structure further includes a shelf member 17, herein comprising a pan having a bottom wall 18, side walls 19, a front wall 20, and a rear wall 21. The walls 19, 20 and 21 are provided with an outturned flange 22, including a front portion 23 defining a handle for facilitated movement of the shelf member relative to the support arms.

Referring now more specifically to FIGURE 4 of the drawing, each of the side walls 19 is provided with a slide 24 comprising a generally E-section member secured to the side wall by suitable means such as a rivet 25. The slide includes an upright portion 26 through which the rivet 25 extends, an upper leg 27, a middle leg 28, and a lower leg 29. A boss 30 is provided on the upper leg 27 to extend through a suitable opening 31 in the flange 22 to cooperate with the rivet 25 in locking the slide to the shelf member.

Each arm 16 is provided with an inturned flange 32 which extends into the space between the upper leg 27 and middle leg 28 of the respective slides. As best seen in FIGURE 6, the lower surface 33 of the upper slide leg 27 and the upper surface 34 of the middle leg 28 are preferably arcuate, herein segmentally cylindrical, with the spacing between the surfaces 33 and 34 being slightly greater than the thickness of the flange 32 of the support arms. The slide portion 27 spaces the flange 22 of the shelf member 17 substantially above the support arm flange 32 as best seen in FIGURES 4 and 6 so that a limited pivoting action of the shelf member relative to the support arms may be effected as illustrated in FIGURE 5.

The shelf member 17 is movably carried on the support arms for movement between a retracted position, as shown in FIGURE 3, to a forward, loading position as shown in full lines in FIGURE 5. To facilitate this movement of the shelf member relative to the support arms, each support arm is provided at its forward end 35 with a carrier, or roller, 36 carried on an axle post 37 secured to the arm end 35, as shown in FIGURE 8. The rollers 36 are preferably formed of a low friction material such as nylon, and are arranged to underlie the flange 22 of the shelf member 17 to provide a free rolling

action facilitating the movement of the shelf member between its respective retracted and loading positions. To indicate the disposition of the shelf member in the loading position, a pair of detents 38 are provided on the opposite side flanges 22 to strike the roller 36 in that position, as illustrated in FIGURE 5. The abutment of the detents, or stops, 38 with the rollers 36 provides a releasable stop to the shelf member, automatically positioning it in the loading position.

To stabilize the arm 16 and provide accurate tracking of the ledge 22 on the rollers 36, the support arms 16 are interconnected by a pair of transverse supports 39 and 40. Support 39 comprises a strap extending between the pair of support arms adjacent the forward end 35 thereof, and support 40 comprises an angle bracket interconnecting the support arms 16 at the rear end 41 thereof. As shown in FIGURE 7, the support 40 may be provided with a pair of bumpers 42 to be engaged by the rear wall 21 of shelf member 17 which thusly effectively comprises a stop portion for limiting the rearward movement of the shelf member. As illustrated in FIGURE 7, the supports 39 and 40 accurately space the support arms 16 to extend parallel to each other and to have the connector portions 15 thereof accurately spaced corresponding to the horizontal spacing of the slots 14 in the upright supports 12 and 13.

As indicated briefly above, the normal movement of the shelf member 17 is between the retracted position of FIGURE 3 and the loading position of FIGURE 5. It is desirable at times, however, to permit disassociation of the shelf member relative to the support arms, such as for maintenance. To permit the removal of the shelf member, the forward end of the support arm flanges 32 is cut away at 43 at a distance from the roller 36 greater than the length of the slide 24. As indicated briefly above, the segmentally cylindrical surface 33 of the slide portion 27 permits a tilting action of the shelf member relative to the support arms when the shelf member is in the loading position of FIGURE 5. This permits a raising of the detent 38 to above the roller 36 and permits a further forward withdrawal of the shelf member to the full time position of FIGURE 6. In this position, the slides 24 are disposed forwardly of the flanges 32 of the support arms, and, thus, the entire shelf member may be moved vertically upwardly from the support arms to the dotted line position of FIGURE 6, thus completing the removal of the shelf member from the support arms. The shelf member is reinstalled on the support arms by a reversal of this procedure, that is, by moving the shelf member from the dotted line position of FIGURE 6 down to the full line position of FIGURE 6, and thence rearwardly to the full line position of FIGURE 5, the detents 38 being raised above the rollers 36 during the rearward movement of the shelf member relative to the support arms.

Structure 10 further provides for improved facilitated adjustment of the support arms relative to the uprights 12 and 13. More specifically, when the shelf member 17 is disposed in the forward loading position of FIGURE 5, as indicated above, an upward movement of the forward portion of the shelf member as by upwardly urging the handle 23 causes a pivoting of the shelf member relative to the support arms. However, as the pivoting action is limited by the flanges 22 and 32, a further upward movement of the shelf member 17 relative to the support arms causes an upward movement of the support arms relative to the uprights 12 and 13, thereby moving the connectors 15 upwardly in the slots 14 and permitting them to be withdrawn from the slots by a subsequent forward movement of the entire assembly of the support arms and shelf member. It is desirable to have the connection of the connectors 15 to the uprights 12 and 13 firm and secure, and, thus, the improved mechanical advantage obtained by utilization of the shelf member in releasing the connectors from the uprights provides a highly desirable feature in effecting the desired disconnection of the arms from the uprights.

Alternatively, the shelf member provides a second improved method of removing the support arms 16 from association with the uprights 12 and 13. Thus, the user need merely grasp the shelf member 17 as disposed in the loading position of FIGURE 5 and pivot the shelf member about a horizontal axis extending into the plane of the paper so as to lift the rear end of the shelf member and depress the forward end thereof. This causes the rear slides 28 to bear upwardly against the underside of the flange 32 of the support arm and thereby lift the connector portions 15 of the support arms upwardly in the slots 14. By suitably grasping the shelf member, the axis of pivoting may be made to be rearwardly of the roller 36 and thus the detent is caused to bear more forcibly downwardly behind the roller assisting in the rentention of the shelf member relative to the support arms during this movement. The removal of the support arms from the uprights 12 and 13 is then effected by a simple forward movement of the entire assembly of the support arms and shelf member. It is desirable to make the connection of the connectors 15 to the uprights in the slots 14 as firm and secure as possible, and, thus, the added mechanical advantage of the extended cantilever arrangement of the shelf member in this method of removing the support arms from association with the uprights 12 and 13 provides a highly desirable feature.

Thus, shelf structure 10 provides an improved construction permitting facilitated adjustment of the vertical positioning of the shelf member relative to the cabinet in which it is disposed, and further providing facilitated accessibility thereto by virtue of the improved movable mounting of the shelf member on the support arms.

While we have shown and described one embodiment of the invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as defined in the appended claims.

The embodiment of the invention in which an exclusive property or privilege is claimed is defined as follows:

1. Structure comprising:
   means defining a pair of horizontally spaced row of vertically spaced sockets; and
   a shelf structure including a pair of support arms having ends provided with connectors for releasable attachment to said socket means, said connector structures being disconnectable from the socket means as a result of an upward and outward movement of the arms, a shelf member, and means for movably mounting said shelf member on said arms including means for indicating a forward position of said shelf member relative to said arms, and means for selectively (a) guiding the shelf member forwardly from said arms as a result of a preselected lifting of the shelf member in said forward position and a subsequent forward and upward movement thereof to remove the shelf member from said arms and (b) disconnecting said connectors of said arms from said sockets as a result of a lifting of the shelf member greater than said preselected lifting and a subsequent forward movement thereof to remove said shelf structure as an assembly from said socket means.

2. The structure of claim 1 wherein said indicating means comprises a carrier on a forward end portion of each arm and a stop means on said shelf member arranged to abut said carrier in said forward position of said shelf member.

3. The structure of claim 1 wherein said mounting means comprises a roller on the forward end of each support arm, means on said shelf member movably resting on said rollers, a longitudinal flange on said arms, and a slide on said shelf member slidably receiving said flange.

4. Structure comprising:

means defining a pair of horizontally spaced rows of vertically spaced sockets;

a shelf structure including a pair of support arms having ends provided with connectors for releasable attachment to said socket means, said connector structures being disconnectable from the socket means as a result of an upward and outward movement of the arms, a shelf member, and means for movably mounting said shelf member on said arms including means for indicating a forward position of said shelf member relative to said arms, and means for selectively (a) guiding the shelf member forwardly from said arms as a result of a preselected lifting of the shelf member in said forward position and a subsequent forward and upward movement thereof to remove the shelf member from said arms and (b) disconnecting said connectors of said arms from said sockets as a result of a lifting of the shelf member greater than said preselected lifting and a subsequent forward movement thereof; and a pair of transverse supports fixedly spacing said arms in parallel relationship with said connectors spaced apart a distance equal to the spacing of said rows of sockets.

5. The structure of claim 4 wherein said shelf member includes a stop portion arranged to engage stop means on one of said support arms in a rearwardmost position of said shelf member.

6. Structure comprising:

means defining a pair of horizontally spaced rows of vertically spaced sockets; and

a shelf structure including a pair of support arms having ends provided with connectors for releasable attachment to said socket means, said connector structures being disconnectable from the socket means as a result of an upward and outward movement of the arms, a pan member having side flanges, and means for movably mounting said pan member on said arms including means for indicating a forward position of said shelf member relative to said arms, and means on said flanges and said arms for selectively (a) guiding the pan member forwardly from said arms as a result of a preselected lifting of the pan member in said forward position and a subsequent forward movement thereof to remove the pan member from said arms and (b) disconnecting said connectors of said arms from said sockets as a result of a lifting of the pan member greater than said preselected lifting and a subsequent forward movement thereof to remove said shelf structure as an assembly from said socket means.

7. A shelf structure comprising:

a pair of horizontally spaced support arms having opposed inturned longitudinal flanges;

a shelf member; and

means for movably mounting said shelf member on said arms including a roller on said arms for rollingly carrying said shelf member and a pair of slides on opposite sides of said shelf member including an upper portion slidably resting on a said flange and a lower portion disposed closely subjacent the flange for precluding movement of the shelf member upwardly from said arm, said flanges being provided with a cutout at the forward end of said arms rearwardly adjacent the roller to permit said slides to be passed through said cutout and thereby the disengaged from the flanges for removing the shelf member from said arms when desired.

8. The shelf structure of claim 7 wherein each of said upper and lower portions of said slides defines a fixed segmentally cylindrical surface permitting the shelf member to be pivoted about a horizontal axis extending through the space between said portions.

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