May 27, 1958 P. E. DAVEY ET AL 2,836,305

ADJUSTABLE SHELF STRUCTURE

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FIG. 1

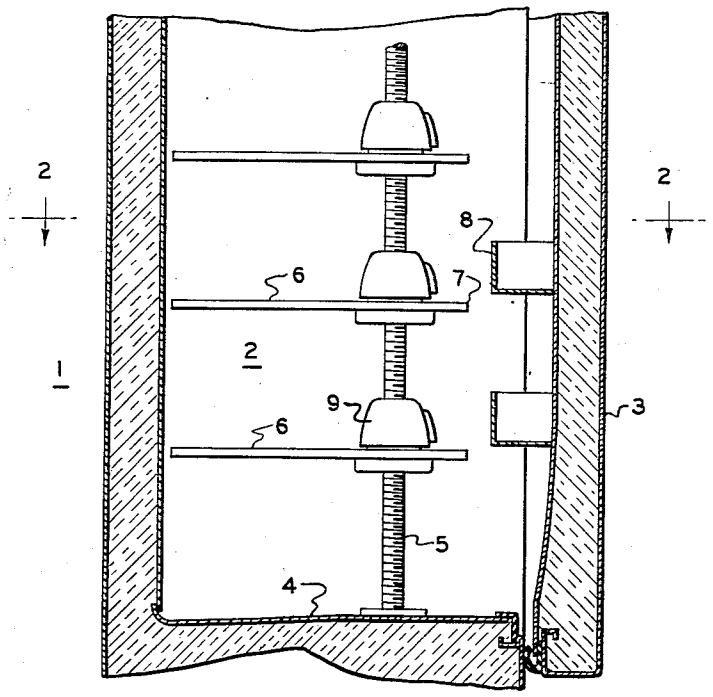
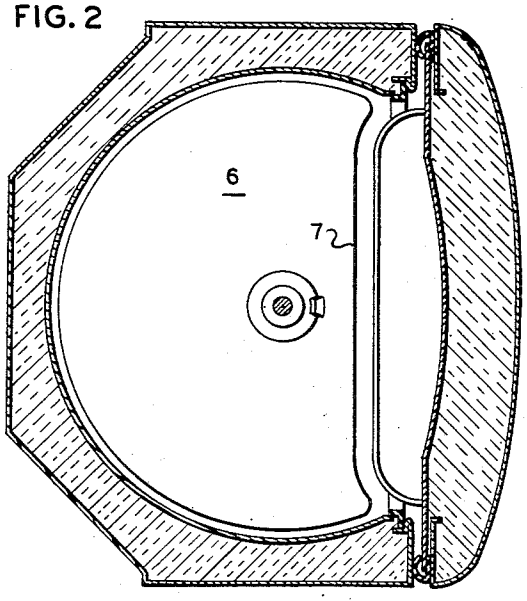


FIG. 2



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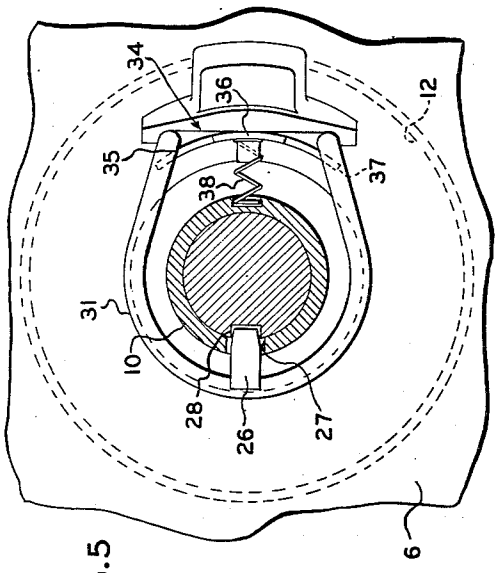


FIG. 5

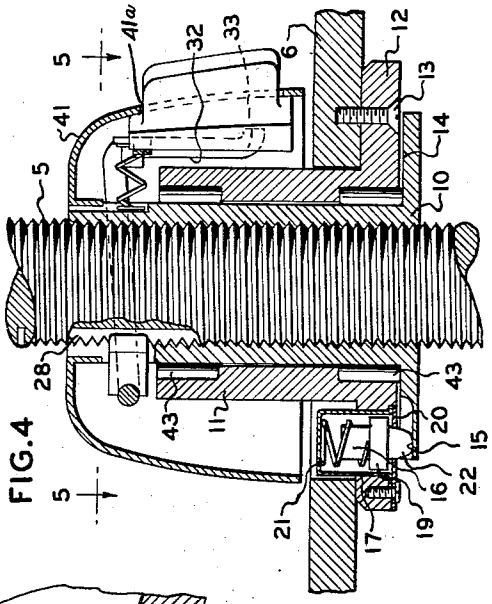


FIG. 4

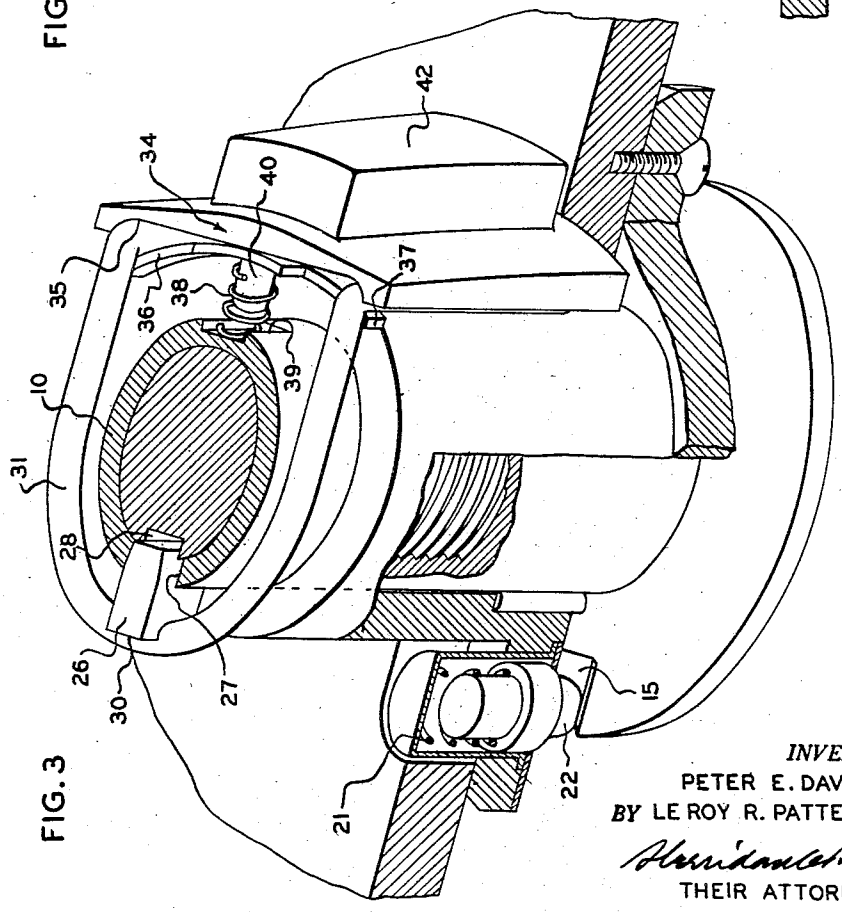


FIG. 3

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ADJUSTABLE SHELF STRUCTURE

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Application December 21, 1953, Serial No. 399,384

1 Claim. (Cl. 211—146)

The present invention relates to adjustable shelf structures and more particularly to rotatable shelves having provision for the vertical adjustment of the height thereof.

To increase the accessibility to the contents of a cabinet, for example a refrigerator cabinet, it is desirable to provide a shelf of a rotable type so that the contents of the cabinet stored on the rear portions of the shelf can be readily brought to an accessible position. Furthermore, when a plurality of shelves are involved it is desirable to make one or more of the shelves adjustable in height so that the spacing between the shelves can be varied to accommodate articles of various sizes and heights.

It is an object of the present invention to provide a shelf arrangement including at least one rotatable, vertically adjustable shelf structure.

It is a further object of the present invention to provide a rotatable shelf structure including an improved adjustable means for supporting the rotable shelves.

In accordance with the present invention these objects and additional objects which will become apparent from the following description of the invention are attained by providing an adjustable shelf structure including a rotatable shelf supported on a vertically extending threaded supporting shaft by means of a collar in threaded engagement with the shaft and a sleeve rotatably supported on the collar with the sleeve forming part of the rotatable shelf structure. Means are also provided for maintaining the sleeve in a predetermined position with reference to the collar. Additional means are provided engaging the collar and a keyway extending longitudinally of the threaded shaft which means is disengageable to permit relative rotation of the collar and shaft for varying the height of the shelf.

For a better understanding of the invention, reference may be had to the accompanying drawing in which:

Fig. 1 is an elevational view partly in section of a refrigerator cabinet including a portion of a shelf assembly;

Fig. 2 is a horizontal cross-sectional view taken along line 2—2 of Fig. 1;

Fig. 3 is a perspective view partially in section of a portion of the shelf structure;

Fig. 4 is a vertical sectional view of the shelf structure of Fig. 3; and

Fig. 5 is a view taken along lines 5—5 of Fig. 4.

Referring now to Figs. 1 and 2, there is shown a refrigerator cabinet 1 including a storage compartment 2 and a door 3 closing the access opening to the storage compartment. Mounted on the bottom wall 4 of the storage compartment is the shelf assembly including a vertically extending threaded shaft 5 and a plurality of adjustable shelves 6 rotatably mounted on the shaft 5. The shelves 6 are of a generally semicircular shape as are also the walls defining the storage compartment. Preferably the front edges 7 of the shelves are spaced somewhat from the inner walls of the door 3 in order to provide room for a plurality of door shelves 8 mounted on the inner wall of the door. By this arrangement it will be seen that the portions of the shelves most readily accessible without rotation thereof extend along the entire front of the storage compartment.

Each of the rotatable shelves 6 includes a hub portion 9 on which the shelf is mounted and which in turn is in threaded engagement with the threaded shaft 5. As shown more clearly in Figs. 3–5, the hub portion 9 is composed of a collar 10 in threaded engagement with the shaft 5 and a sleeve 11 rotatably mounted on the collar 10. The sleeve 11 includes a flange 12 extending around the lower end thereof and the shelf 6 is suitably secured to the flange 12 for example by means of bolts 13.

The sleeve 11 is supported on the collar 10 by means of a flange 14 integral with the lower end of the collar 10. Means are also provided for maintaining the sleeve or hub 11 in a predetermined position relative to the collar 10, this positioning means generally including a recess 15 in the upper surface of the flange 14 and a stop or pin mounted on the flange 12 of sleeve 11 which is adapted to engage the recess 15 and to be brought in alignment therewith. The stop or pin 16 is mounted in a housing 17 and is retained therein by means of a shoulder 19 which normally rests on the retaining plate 20 having an opening therein for accommodating the protruding portion of the pin 16. There is also provided a spring 21 within the housing 17 and in engagement with the collar or shoulder 19 biasing the pin in a downward direction.

While the positioning means including the spring biased pin 16 and the recess 15 is provided primarily for maintaining the shelf in a predetermined angular position within the storage compartment 2, that is with its flat front edge 7 extending transverse of the access opening to the storage compartment, it is desirable that this positioning means be so constructed and arranged that the shelf can be easily rotated relative to the collar 10 to bring the rear portions thereof into accessible position at the front of the storage cabinet. To accomplish this purpose either the lower end 22 of the pin or the radial walls defining the recess 15 or both are tapered or sloped so that while the pin 16 in cooperation with the recess 15 will prevent accidental rotation of the shelf structure relative to the collar 10 a slight manual pressure on the periphery of the shelf 6 will cause the pin 16 to disengage itself from the recess 15 and permit rotation of the shelf relative to the collar 10. During the rotation of this shelf the pin 16 will ride on the upper surface of the flange 14 and after one complete rotation will again come in contact with the recess 15.

As the collar 10 is in threaded engagement with the supporting shaft 5, relative rotation between the collar and the shaft is utilized to vary the height of the shelf on the shaft, and hence the distance between adjacent shelves. In order to control this relative rotation, there is provided releasable locking means engaging the collar and the shaft. The locking means includes a key 26 slidably mounted in a recess or opening 27 in the collar 10 and adapted to engage a keyway 28 extending longitudinally of the shaft 5. The keyway 28 is preferably arranged on the rear side of the shaft 5 with reference to the front of the storage compartment so that it is not visible when the door 3 is open. The outer end 30 of the key 26 is connected to the mid section of a yoke 31 and the ends of the yoke 31 extend forwardly on opposite sides of the collar 10. Downwardly extending portions 32 and outwardly extending tips 33 on the yoke provide means for securing a pressure plate 34 to the front end of the yoke structure. The pressure plate 34, which overlaps the sleeve 11, includes on the rear face thereof a recess 35 to accommodate the downwardly extending portions 32 of the yoke and a retainer 36 connected at its mid section to the plate 34 with its ends

37 overlapping downwardly extending portions 32 of the yoke and retaining these portions in the recess 35. A spring 38 between the plate structure and the collar normally biases the locking means in a forward direction for maintaining the key 26 in engagement with the keyway 28. A recess 39 in the surface of the collar 10 accommodates one end of the spring 38 while the other end of the spring is anchored to a spring pin 40 rigidly attached to the retainer 36 and thereby to the rear face of the pressure plate. By this arrangement it will be noted that the entire locking means is supported on the collar 10 by means of the key 26 resting in the recess 27 on one side and on the opposite side of the collar by the spring 38 which biases the locking means in a forward direction and hence maintains the pressure plate in spaced relationship with the collar 10 and the sleeve 11.

For vertical adjustment of the shelf a slight pressure applied to the pressure plate 34 disengages the key 26 from the keyway 28 so that the collar 10 can be rotated on the shaft 5 thus changing the vertical position of the shelf. Preferably the spring 21 which biases the stop 16 into engagement with the recess 15 is sufficiently strong so that when pressure is applied to the pressure plate 34, relative rotation between the sleeve and collar will be prevented by the stop and any rotating force supplied to the shelf 6 will be transmitted directly to the collar to effect relative rotation thereof with respect to the shaft 5. When the desired vertical adjustment of the shelf has been obtained on the shaft 5, pressure on pressure plate 34 is released so that the key 26 again engages keyway 28. With the shelf locked in its new position all rotational movement of the shelf relative to the shaft structure is again controlled by means of the stop mechanism including pin 16 and the recess 15.

If desired a cap 41 may be provided for improving the appearance of the upper portion of the shelf structure, the cap having an opening 41*a* therein to accommodate button or projection 42 on the pressure plate 34.

From the above description it will be seen that there has been provided an adjustable shelf structure the shelves of which can be readily raised or lowered even when fully loaded. Also while fully loaded one or more of the shelves can be turned to an angle of 90° in either direction to facilitate cleaning of the interior of the storage compartment without removal of the shelves or their contents from the compartment. To facilitate the rotational movement of the shelves with reference to the collar 10, low friction bearings 43 may be provided between the collar 10 and the sleeve 11.

While there has been disclosed a specific embodiment of the present invention as applied to a household refrigerator, it will be apparent that various modifications thereof can be made and it is intended by the appended claim to cover all such modifications within the spirit and scope of the invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

An adjustable shelf structure including a fixed, vertically-extending, threaded shaft having a longitudinally extending keyway, a flanged collar in threaded engagement with said shaft, a shelf rotatably supported on said collar, said shelf including a hub supported by the flange on said collar, locking means engaging said collar and said shaft for preventing relative rotation thereof, said locking means including a key slidably mounted in an opening in said collar above said hub engaging said keyway, a plate overlapping said hub on the opposite side of said collar from said key, a yoke above said hub connecting said plate and said key, spring means anchored to said plate and engaging a recess in said collar for maintaining said key in engagement with said shaft, said spring means and said key supporting said yoke on said collar in spaced relation with said hub, and a button on said plate to release said key from said keyway.

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