United States Patent

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Original application Mar. 18, 1968, Ser. No. 713,820, now abandoned. Divided and this application Feb. 9, 1970, Ser. No. 10,011

[54] **STORAGE CABINET WITH REVOLVING SHELVES**
3 Claims, 10 Drawing Figs.

[52] **U.S. Cl.** **312/305,** 108/139
[51] **Int. Cl.** **A47b 88/00,** A47b 95/00, A47b 11/00
[50] **Field of Search** 312/305, 324, 202, 326; 248/243, 417

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ABSTRACT: Mounted within a square storage cabinet is a tier of revolving shelves each shaped generally as a three-quarters circle having a diameter approximately equal to the square dimension of the cabinet to avoid wasted space in the cabinet. Each shelf is formed with one straight edge located to enable tiers of trays attached to two swinging cabinet doors to be made of an optimum depth permitting the trays to fill the space between the shelves and the doors when the latter are closed. Detent mechanisms hold the shelves in centered positions within the cabinet and resist any tendency of the shelves to spin uncontrollably when turned out of the centered positions. The door trays are hooked detachably onto standards fastened to the inner sides of the doors and are constructed to avoid leaving objectionable gaps between the doors and the trays.

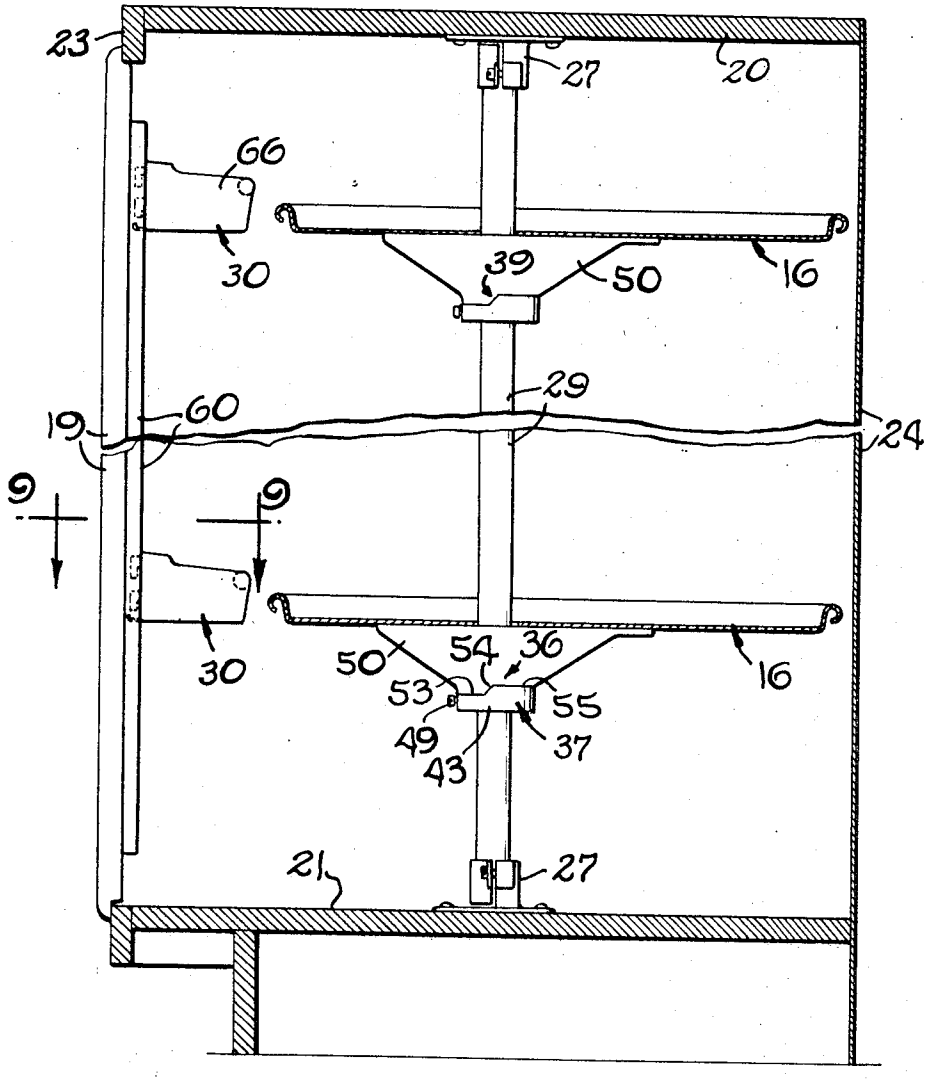


Fig. 1

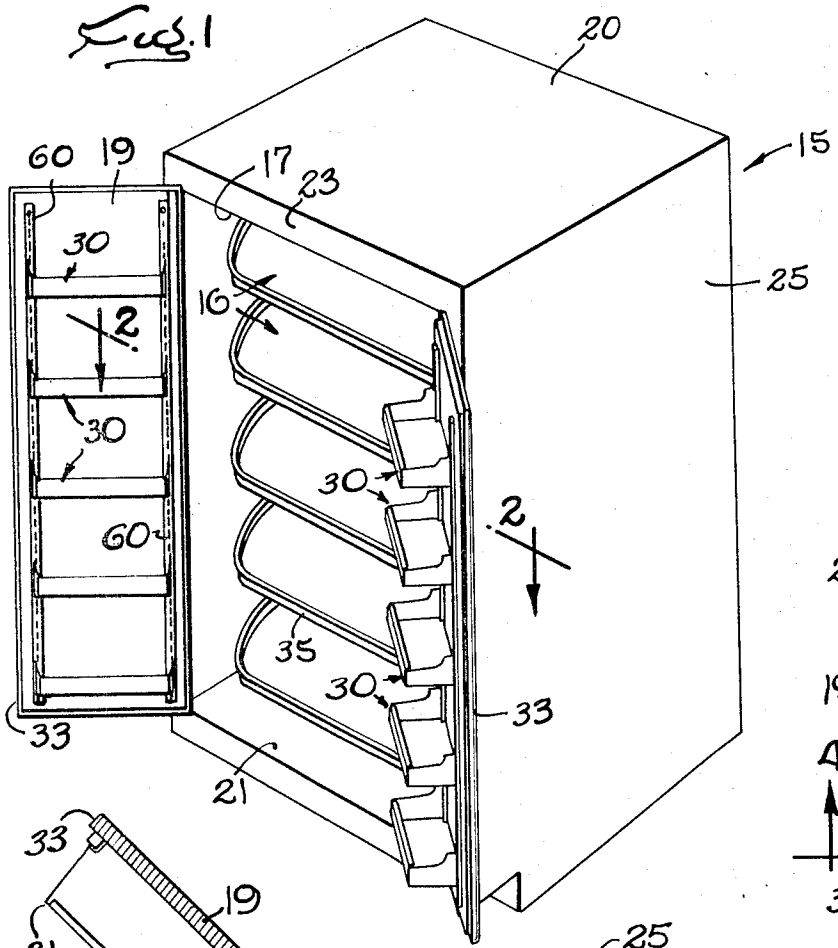
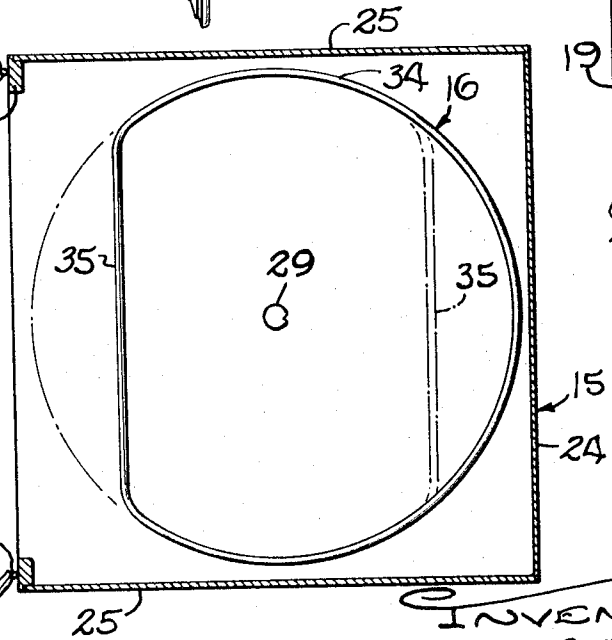
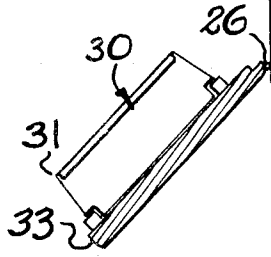


Fig. 2





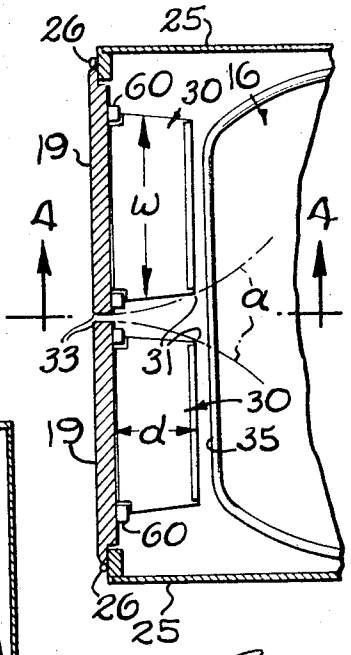


Fig. 3

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Fig. 4

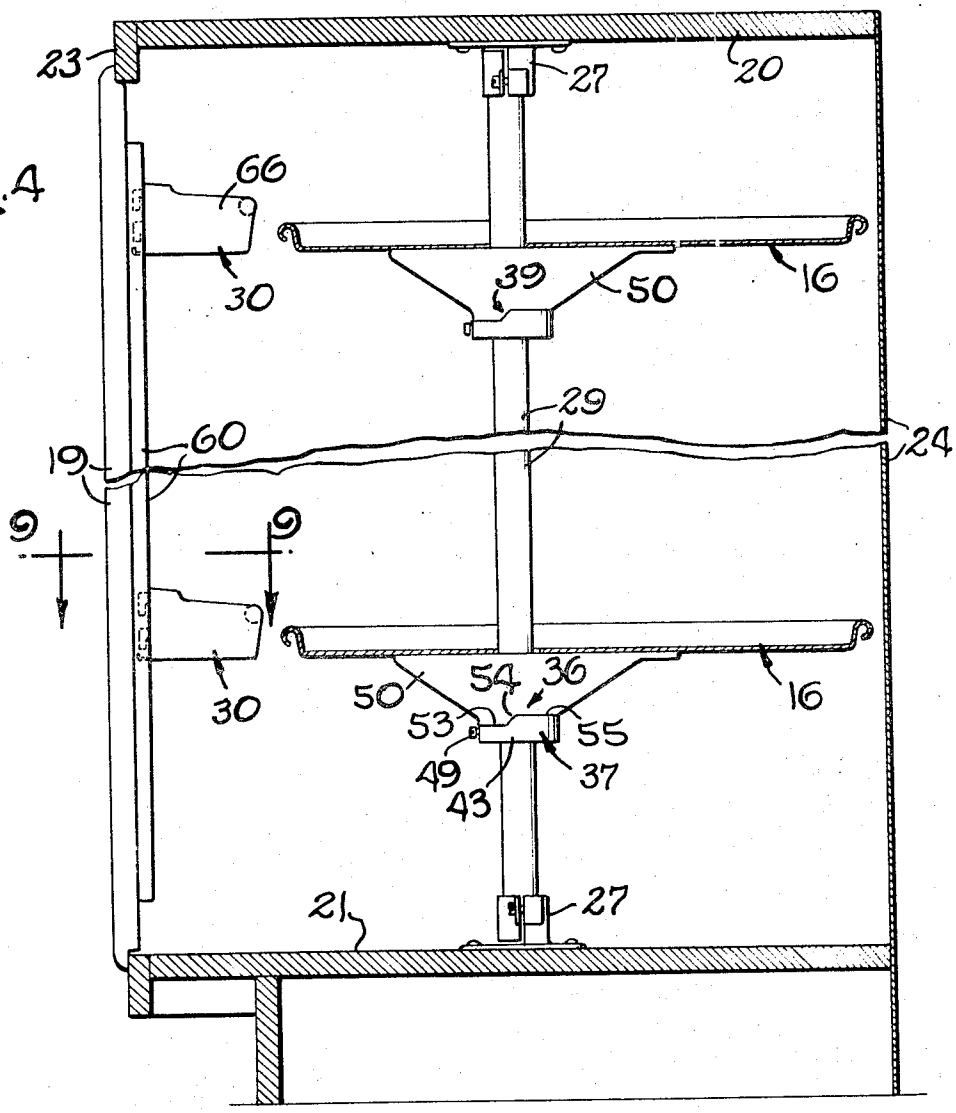


Fig. 5

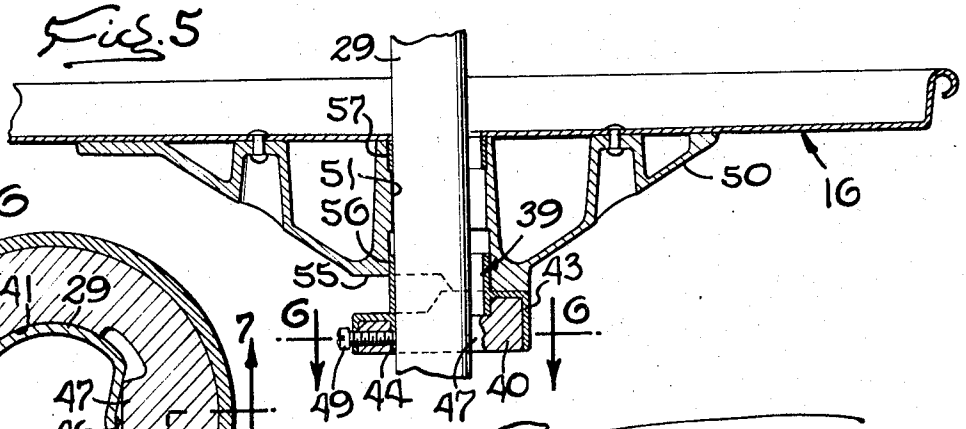
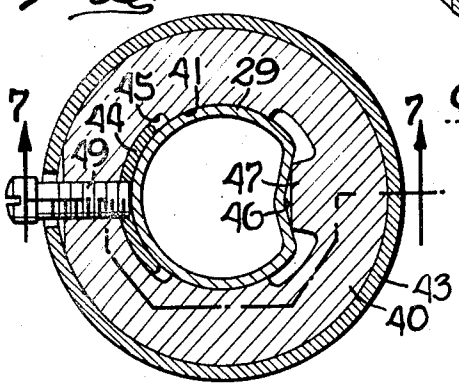


Fig. 6



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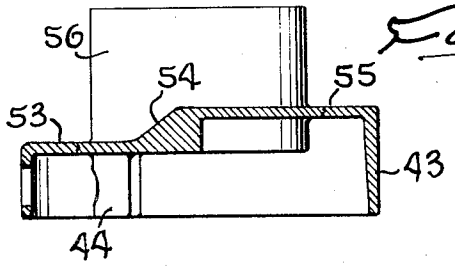
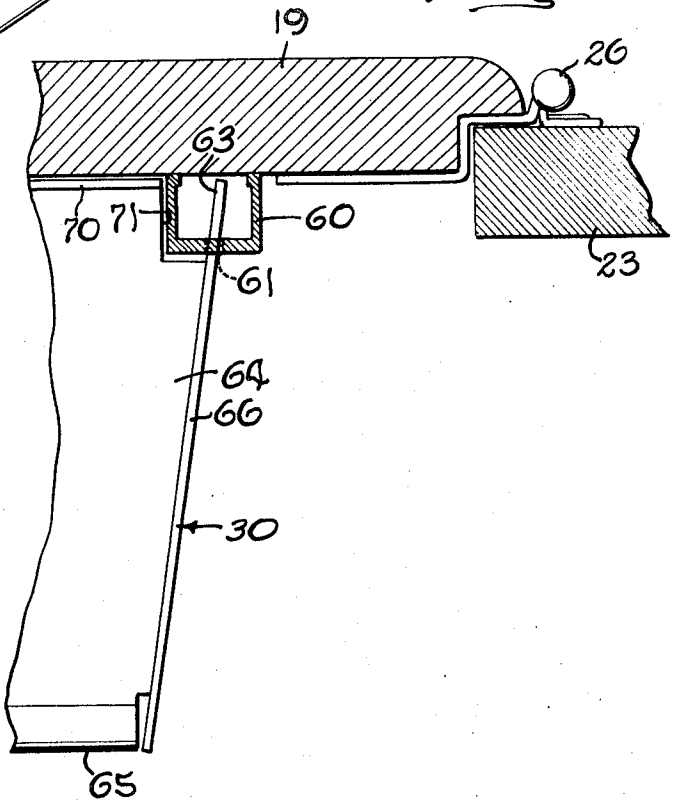


Fig. 7

Fig. 8

Fig. 9



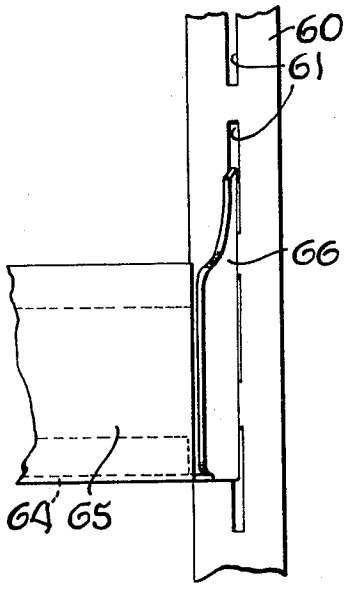


Fig. 10

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STORAGE CABINET WITH REVOLVING SHELVES

CROSS-REFERENCE TO A RELATED APPLICATION

This application is a division of my copending application Ser. No. 713,820, filed Mar. 18, 1968 and now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to a storage cabinet of the type which includes a tier of revolving shelves mounted for rotation to various angular positions within the cabinet to enable easy access to articles on the shelves from an opening in the front of the cabinet.

SUMMARY OF THE INVENTION

The general object of the invention is to provide novel detent mechanisms capable of releasably retaining the revolving shelves in normal centered positions in the cabinet and capable of resisting unduly free rotation of the shelves when the latter are turned out of their centered positions.

The invention also resides in the use of the detent mechanisms to journal the shelves for rotation, in the unique arrangement of the detent mechanisms to prevent looseness of the shelves after continued service use and in the comparatively simple and inexpensive construction of the detent mechanisms.

Other objects and advantages of the invention will become apparent from the following detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a storage cabinet embodying the new and improved features of the present invention.

FIG. 2 is a cross section taken substantially along the line 2—2 of FIG. 1 and showing the cabinet doors in open positions.

FIG. 3 is a fragmentary view similar to FIG. 2 but showing the cabinet doors in closed positions.

FIG. 4 is an enlarged fragmentary cross section taken substantially along the line 4—4 of FIG. 3.

FIG. 5 is an enlarged view of parts shown in FIG. 4 with certain elements broken away and shown in section.

FIG. 6 is an enlarged cross section taken substantially along the line 6—6 of FIG. 5.

FIG. 7 is a cross section taken substantially along the line 7—7 of FIG. 5.

FIG. 8 is a perspective view of a tray of the type adapted to be mounted on the cabinet doors.

FIG. 9 is an enlarged fragmentary cross section taken substantially along the line 9—9 of FIG. 4.

FIG. 10 is a fragmentary front elevational view of parts shown in FIG. 9.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the drawings for purposes of illustration, the invention is embodied in a storage cabinet 15 having a tier of vertically spaced shelves 16 which may be revolved individually within the cabinet to various angular positions with respect to a front access opening 17 to enable articles to be placed on or removed from the shelves in any easy manner. Two upright doors 19 are hinged to the cabinet along opposite sides of the opening and may be swung between positions opening and closing the cabinet.

Herein, the cabinet is substantially square in cross section and includes top and bottom walls 20 and 21 interconnected by a front wall 23, a rear wall 24 and a pair of sidewalls 25, the front wall being formed by a series of narrow frame strips arranged in rectangle to define the access opening 17. The doors are mounted on hinges 26 attached to the front wall and each is approximately equal in width to one-half the width of the opening so that the latter is substantially covered when the doors are closed. Spanning the top and bottom walls and attached to the latter by brackets 27 (FIG. 4) is an upright post 29 which rotatably mounts the revolving shelves 16. In this instance, five such shelves are mounted on the post and are spaced vertically from one another by equal distances.

A tier of trays 30 are mounted on the inner side of each door 19 and are arranged relative to the shelves 16 to make effective use of almost all of the available storage space in the cabinet and to provide a relatively large total surface area for supporting articles. For these purposes, the shelves 16 are sized, shaped and located to leave a minimum of wasted space between the shelves and the cabinet sidewalls 25 and the rear wall 24 and, at the same time, to leave only enough room remaining in the front of the cabinet to accommodate trays 30 of optimum depth when the doors are closed. The trays are made sufficiently deep to fill most of the space between the shelves and the front wall 23 of the cabinet but not so deep as to interfere with the trays on the other door when the doors are opened and closed. With this arrangement, the trays and shelves leave little wasted space between the front, rear and sidewalls of the cabinet so that relatively large surface areas for supporting articles are provided within a cabinet of given size.

In the present instance, five trays 30 are attached to each door 19 and each is aligned horizontally with a different one of the revolving shelves 16. Each tray extends substantially across the full width of its respective door and is of greater width w (FIG. 3) than depth d. Each tray is located on the door in such a manner and is formed of such a depth d that the outboard corner 31 of each tray lies approximately on but not beyond or outside of an arc a extending about the axis of the hinges 26 of the door upon which the tray is mounted and extending through the vertical free edge 33 of such door. As a result, the trays may be located near the vertical edges of the doors and may be made of a maximum depth and yet will not interfere and strike the trays on the other doors when the doors are opened and closed either independently or simultaneously.

With the trays 30 formed of an optimum depth d, the shelves 16 are shaped and located to fill most of the space between the trays, the sidewalls 25 and the rear wall 24 thereby to avoid wasting space within the cabinet 15. To these ends, the supporting post 29 is spaced equidistantly from the rear and sidewalls, herein being located at the geometrical center of the square cabinet, and each shelf is shaped as a partial circle having a diameter approximately equal to but not greater than the width of the cabinet. In this way, the arcuate periphery 34 of each shelf is located directly adjacent the rear and sidewalls to provide the maximum shelf area while still allowing turning of the shelf within the cabinet. As shown most clearly in FIG. 2, each shelf 16 herein is slightly larger than a three-quarters circle and is formed along one side with a straight edge 35 which faces and extends parallel to the doors 19 when the shelf is turned to a normal or centered position in the cabinet. The straight edge 35 extends across a chord of the circle defined by the arcuate periphery 34 of the shelf and is spaced from the inner sides of the doors a distance approximately equal to but not less than the depth d of the trays. With this arrangement, the shelves encompass practically the largest possible area of a circle capable of fitting into the cabinet, and the straight edges 35 are located closely adjacent to but do not interfere with the trays 30 when the doors are closed. Accordingly, very little space is wasted since a substantial portion of a given plane within the cabinet is filled with a tray and a shelf.

According to the primary aspect of the invention, provision is made of novel detent mechanisms 36 (FIG. 5) for releasably holding the shelves 16 in their normal centered positions and for resisting unduly free rotation of the shelves when the latter are turned from their centered positions. In this instance, each detent mechanism comprises a stationary cam 37 anchored to the center post 29 and coacting with a similar cam 39 on each shelf to latch the shelf in its centered position. When the shelf is turned from its centered position, the two cams frictionally

bear against one another to resist any tendency of the shelf to spin uncontrollably on the post and to help hold the shelf in any position to which it is turned.

More specifically, each cam **37** comprises an inner circular supporting disc **40** (FIGS. **5** and **6**) formed with a centrally located hole **41** which receives the post **29**. A sleeve **43** of Delrin or other wear resistant plastic is telescoped over the disc and is formed with a downwardly extending tongue **44** (FIG. **6**) which is projected downwardly into a notch **45** formed in the disc adjacent the hold **41**. Advantageously, the post **29** is formed from a tube of light gauge metal and is deformed inwardly along one side to define a depression **46** extending along the length of the post. To anchor the cam **37** securely to the post, a key **47** (FIG. **6**) is formed on the disc adjacent the hole **41** and is projected inwardly into the depression **46**. A setscrew **49** extending inwardly through the sleeve **43** is threaded into the disc **40** and the tongue **44** and bears against the side of the post opposite the depression **46** to draw the key **47** tightly into the depression and thereby rigidly anchor the cam **37** against rotation on the post.

Each cam **39** is formed on the lower end surface of a generally frustoconical supporting hub **50** (FIGS. **4** and **5**) fastened to the underside of each shelf and formed with a centrally located bore **51** which loosely receives the post **29** to mount the shelf **16** both for rotation and for up and down sliding on the post. The lower end of the hub **50** and the upper side of the sleeve **43** are both formed with cam surfaces which include a lower dwell portion **53** extending around a short arc of the hub and the sleeve, a pair of rise portions **54** inclined upwardly from the lower dwell portions at an angle of about 45°, and an upper dwell portion **55** extending between the ends of the rise portions and through a greater arc than the lower dwell portions. When each shelf is disposed in its centered position with its straight edge **35** facing the doors **19**, the upper and lower rise portions **53** and **55** of the sleeve **43** and the hub **50** mate with each other as shown in FIG. **4** and, in addition, the rise portions **54** engage one another to retain the shelf releasably in its centered position so that the doors may be closed. If the shelf is manually rotated in one direction or the other, one of the rise portions **54** on the hub **50** cams against one of the rise portions **54** on the sleeve **43** to cause the shelf to slide upwardly on the post **29** and to free the shelf for rotation away from its centered position. With continued rotation of the shelf, the lower dwell portion **53** of the hub **50** rides along and bears against the upper dwell portion **55** of the plastic sleeve **43** as shown in FIG. **5** and develops sufficient friction to retard unduly free rotation of the shelf and to stop the shelf when the manual turning force is removed. The shelf thus will tend to remain in any position to which it is turned. As the shelf is returned to its centered position, the rise portions **54** on the hub **50** ride downwardly on and then bear against the rise portions **54** on the sleeve **43** to latch the shelf once again in its centered position and thus avoid any danger of the aligned tray **30** striking the arcuate periphery **34** of the shelf when the doors are closed.

Preferably, a cylindrical bushing **56** (FIGS. **5** and **7**) is formed integrally with each plastic sleeve **43** and is telescoped over the post **29** and into the bore **51** in the overlying hub **50**. Each bushing projects upwardly from the rise portions **54** and the upper and lower dwell portions **53** and **55** of the sleeve and establishes a bearing which serves to mount the shelf **16** slidably and rotatably on the post. The lower half of the portion of the bushing **56** extending upwardly from the lower dwell portion **53** of the sleeve is not subjected to wear when the shelf is being turned through positions other than its centered position and thus such lower half of the bushing tends to retain its original diameter to insure that, even after long service use, the shelf will not loosen up and tip on the post when the shelf is disposed in its centered position. An additional bushing **57** is telescoped into the bore **51** of the hub just below the shelf and also helps to keep the shelf from becoming loose on the post.

Advantageously, the trays **30** are hooked detachably on standards **60** fastened to the inner side of the doors **19** with the rear edges of the trays lying directly alongside the doors so as to avoid leaving objectionable gaps between the trays and the doors. As shown in FIGS. **1**, **9**, and **10**, two vertically extending and parallel standards of U-shaped cross section are fastened to the inner side of each door and each is formed with a series of vertically spaced holes or slots **61** in its forward face for receiving hooks **63** on the trays. Each tray includes a substantially rectangular sheet metal shelf **64** (FIG. **8**) which is formed with an upturned rim **65** along its front margin and with side panels **66** turned upwardly from its side margins. Two of the hooks **63** are formed on the rear edge **67** of each side panel **66** and are adapted to project into one of the pairs of slots **61** in the standards **60** to attach the tray to the door, the rear edges of the panels abutting the front faces of the standards in the installed position of the tray. Preferably, the side panels and side margins of each tray are inclined toward one another at a slight angle so that the depth *d* of the tray shelf **64** may be increased while still keeping the outboard corner **31** located within the arc *a* to avoid interference with the trays on the other door.

As shown most clearly in FIGS. **8** and **9**, the rear margin **70** of each tray **30** is turned upwardly from the plane of the tray shelf **64** and is disposed directly alongside the inner side of the door **19** in a position located rearwardly or inwardly of the forward faces of the standards **60**. To enable such close positioning of the rear margin **70** of the tray to the door, squared notches **71** are formed in the rear corners of the tray shelf and are of a depth corresponding to the depth of the standards to allow the rear margin to project past the standards and to allow the rear edges **67** of the side panels **66** to abut the forward faces of the standards. Thus, the rear margins **70** of the trays lie alongside the doors instead of extending along the forward faces of the standards and creating gaps of objectionable width between the trays and the doors.

I claim as my invention:

1. In a revolving shelf assembly adapted for mounting within a cabinet, the combination of, an upright post, a tier of vertically spaced and horizontally disposed shelves each mounted for rotation and for up and down sliding on said post, a supporting hub fastened to the underside of each shelf and rotatably and slidably telescoped over said post, a cam telescoped over and fastened rigidly to said post beneath each of said supporting hubs with each supporting hub resting on its underlying cam, coacting cam surfaces formed on the lower side of each supporting hub and the upper side of each cam and engageable with one another to retain said shelf releasably in a predetermined angular position relative to said post, said cam surfaces being shaped to cause said shelf to slide upwardly on said post in response to the shelf being positively rotated from said predetermined position and thereafter bearing frictionally against one another, each of said coacting cam surfaces including a lower dwell portion extending around an arc of predetermined length, two rise portions inclined upwardly from the ends of said lower dwell portion, and an upper dwell portion extending between the upper ends of said rise portions and around an arc of greater length than said first arc, the respective cam portions mating with one another when said shelf is in said predetermined position with said inclined portions bearing against each other to retain the shelf releasably in such position, and the lower dwell portion of the cam surface on said supporting hub frictionally engaging the upper dwell portion of the cam surface on said cam when said shelf is rotated from said predetermined position thereby to resist unduly free rotation of the shelf one side of said post being deformed inwardly to define a depression extending along the side of the post, each of said cams being formed with a centrally located hole receiving said post an inwardly extending key formed integrally with each cam adjacent said hole and projecting into said depression, and a screw threaded through each cam and bearing against the opposite side of said post to draw said key tightly into said depression and thereby lock the cam against rotation on the post.

2. A revolving shelf assembly as defined in claim 1 in which each cam includes a cylindrical bushing formed integrally with and projecting upwardly from said cam surface on said cam, said bushing being telescoped over said post and into one of said supporting hubs to mount the latter rotatably and slidably on the post.

3. A shelf assembly as defined in claim 1 in which each of said cams comprises an inner supporting disc fastened to said post and an outer sleeve made of plastic material telescoped over said disc and defining the cam surface on said cam, said sleeve including a cylindrical bushing formed integrally with and projecting upwardly from said rise portions and said upper and lower dwell portions, and said bushing being telescoped over said post and into one of said supporting hubs to mount the latter rotatably and slidably on the post.

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