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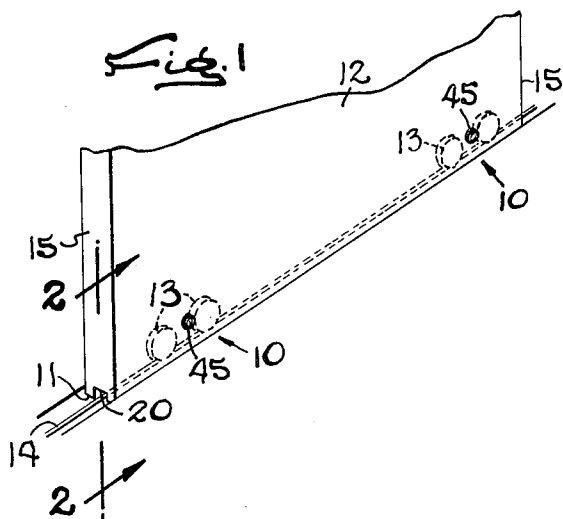
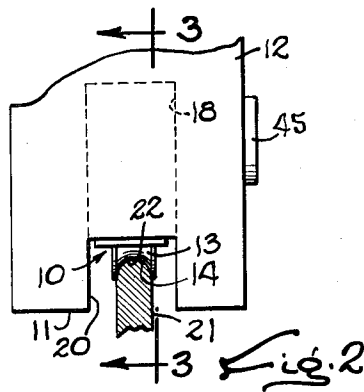
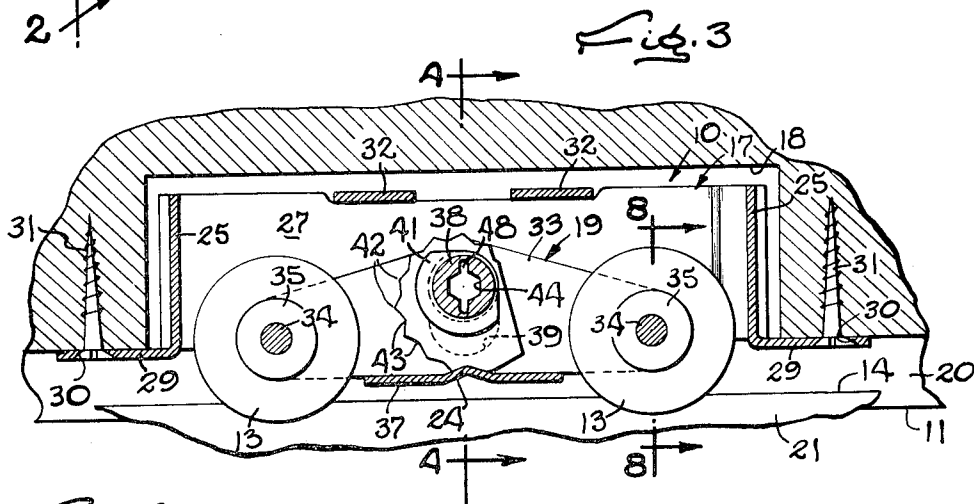
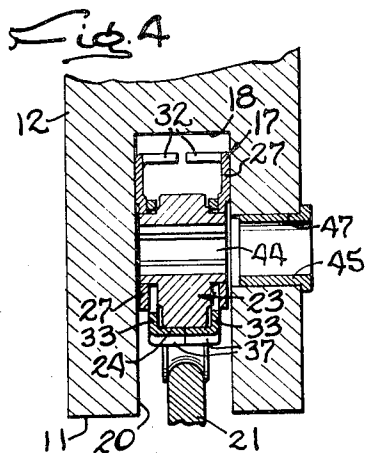
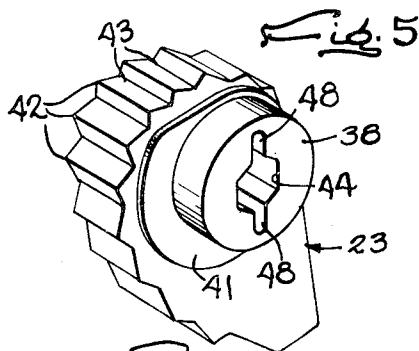
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ADJUSTABLE ROLLER ASSEMBLY

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2 Sheets-Sheet 1



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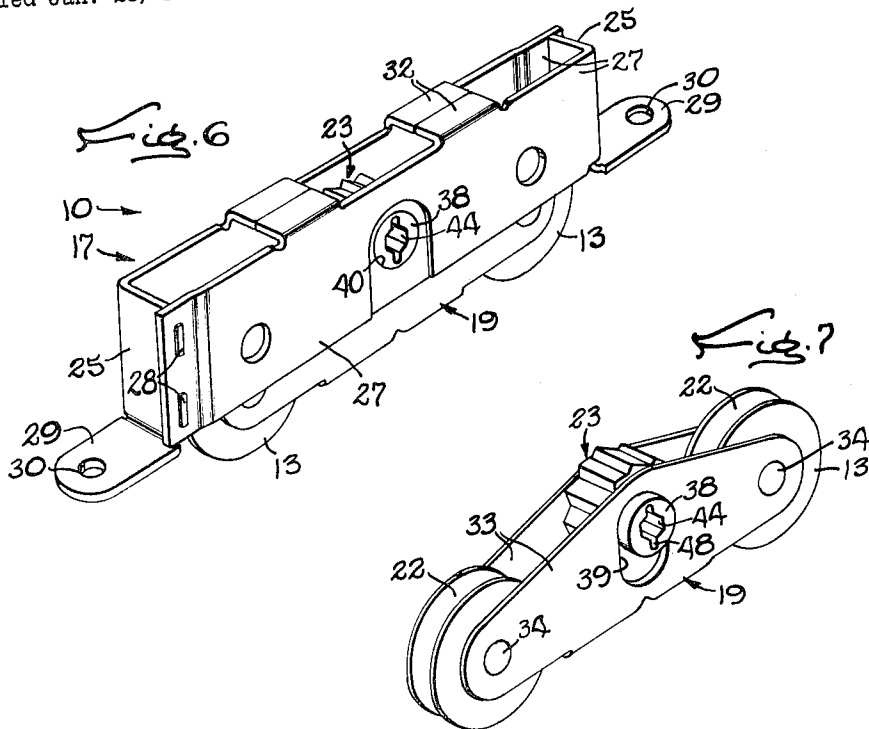
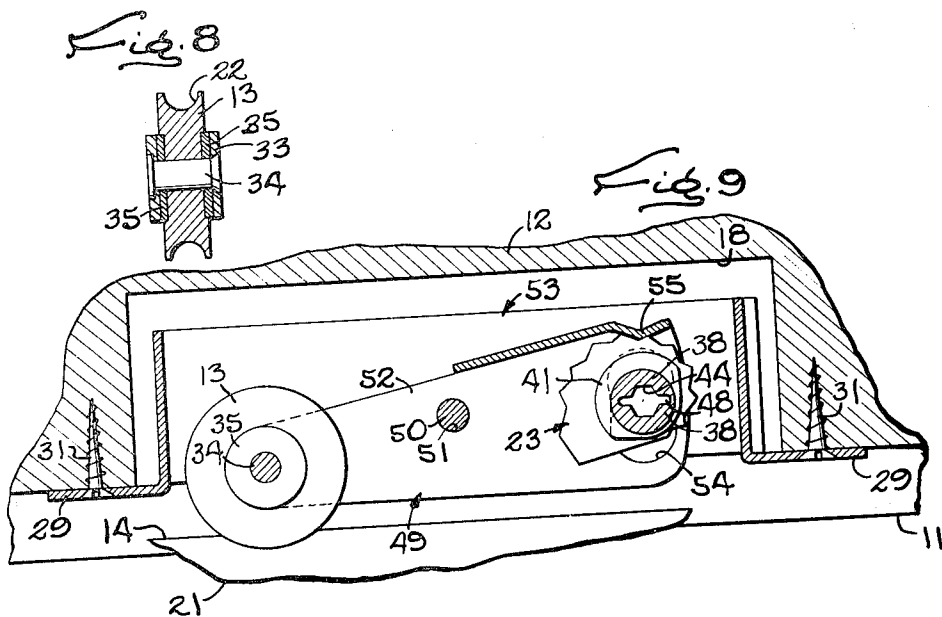
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ADJUSTABLE ROLLER ASSEMBLY

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10 Claims. (Cl. 16—105)

This invention relates to roller assemblies for movable closure members such as sliding doors and, more particularly, to roller assemblies mountable on the door for adjustment relative thereto to square the door in its frame opening and adjust the clearances at the edges of the door. Such roller assemblies customarily include a frame or case mountable on the door adjacent one edge of the latter and a roller carrier supported within the case for back and forth movement to adjust the position of the roller relative to the adjacent door edge.

The general object of the present invention is to provide a new and improved roller assembly of the foregoing character that is more quickly and easily adjustable than prior assemblies.

Another object is to construct the roller assembly for step by step adjustment by preselected increments of movement with a novel adjusting mechanism readily accessible and operable from the side of the door.

A further object is to lock the rollers positively but releasably in each selected position in a novel and relatively simple manner.

Still another object is to provide a dual roller assembly in which the rollers are supported both for quick and easy adjustment and for rocking about an axis disposed between the rollers to reduce the effect on the door of irregularities on the track guiding and supporting the door.

Other objects and advantages of the invention will become apparent from the following description, taken in connection with the accompanying drawings in which

FIGURE 1 is a fragmentary perspective view of a door provided with roller assemblies embodying the novel features of the present invention.

FIG. 2 is an enlarged fragmentary cross-sectional view taken along the line 2—2 of FIG. 1.

FIG. 3 is a fragmentary cross-sectional view taken along the line 3—3 of FIG. 2.

FIG. 4 is a fragmentary cross-sectional view taken along the line 4—4 of FIG. 3.

FIG. 5 is an enlarged perspective view of the adjusting cam.

FIG. 6 is a perspective view of the roller assembly shown in FIGS. 1 through 3.

FIG. 7 is a perspective view of the rollers and the carrier.

FIG. 8 is a fragmentary cross-sectional view taken along the line 8—8 of FIG. 3.

FIG. 9 is a view similar to FIG. 3 showing a modified form of the invention.

As shown in the drawings for purposes of illustration, the invention is embodied in a roller assembly 10 adapted to be mounted adjacent the lower edge 11 of a sliding door 12 and including at least one roller 13 for engaging a track 14 which supports and guides the door for back and forth movement between open and closed positions in an opening in a frame (not shown). Usually two such roller assemblies are spaced apart along the lower edge of the door with one adjacent each upright edge 15 (FIG. 1) of the door. The two assemblies shown herein are substantially identical so only one will be described in detail.

In this instance, each roller assembly 10 is mounted on a frame in the form of a case 17 recessed into the lower door edge 11 in a pocket 18 (FIGS. 3 and 9) with the roller 13 supported within the case on a carrier 19 (see FIG. 7). The underside of the case is open and the low-

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er peripheral portion of the roller projects downwardly through this open side into a groove 20 in the lower edge of the door. The track 14 is formed by the top surface of an elongated rail 21 which projects upwardly from the lower side of the frame into the groove for engagement with the roller. A concave peripheral groove 22 in the roller fits over the convex top surface of the rail.

Such doors are installed in frame openings with a close sliding fit at the top and bottom and with the upright edges of the door parallel to the adjacent surfaces of the opening to insure that the door will close tightly against the frame. To permit squaring of the door in the frame and adjustment of the top and bottom clearances, the rollers 13 of the two assemblies 10 are supported for individual adjustment relative to the lower edge 11 of the door. By raising and lowering one or both rollers, the door edges are lowered, raised or tilted relative to the adjacent frame edges.

In accordance with the present invention, the carrier 19 is mounted and supported in a new and improved manner in the case 17 for quick and easy adjustment of the level of each roller 13 relative to the door 12 to effect the aforementioned squaring and height adjustment. To this end, the assembly 10 includes coacting cam and follower elements 23 and 24 on the carrier and on the case operable upon movement of the cam 23 to shift the carrier downwardly or upwardly in the case. The cam is movable by manually operable means easily accessible from the side of the door in all positions of the latter, and the cam and follower are shaped to shift the carrier step by step in each direction by predetermined increments and to hold the carrier securely but releasably in each selected position.

For these purposes, the cam 23 is journaled on the case 17 for rotation about an axis perpendicular to the plane of the door 12 and is formed with an eccentric peripheral surface having successive steps spaced progressively increasing distances from its axis of rotation. The follower 24 is formed on the carrier 19 and positioned to engage the periphery of the cam and shift the roller 13 progressively downwardly as the cam turns in one direction. Moreover, the follower and the cam steps are shaped to interlock with each other in each selected position with flat face-to-face contact and resist rotation of the cam under the weight of the door.

In the preferred form shown on FIGS. 1 through 8, two rollers 13 are journaled on each carrier 19 adjacent the opposite ends of the latter and the carrier is fitted in the case 17 for up and down sliding movement. The case is formed by two L-shaped plates fitted together in a box-like structure comprising two narrow end walls 25 and two elongated side walls 27. Tabs 28 (see FIG. 6) on the free side edge of each end wall project through slots in the adjacent side wall and are staked to hold the structure together. Two flanges 29 projecting horizontally outwardly from the lower edges of the end walls along the bottom wall of the groove 20 are formed with holes 30 for receiving fasteners such as screws 31 which are threaded vertically into the bottom of the groove to hold the case in the pocket 18. Two additional flanges 32 extend laterally across the top of the case from each side wall to form a partial top wall for the case.

The carrier 19 (see FIGS. 3, 4 and 7) comprises two spaced side plates 33 disposed in parallel vertical planes and straddling the two rollers 13 which preferably are composed of nylon and rotate on axles formed by rivets 34 telescoped through aligned holes in the side plates, through the center holes of two discs 35 (FIG. 8) disposed against opposite sides of each roller, and through the center bore of the roller itself. The carrier is made sufficiently narrow to move up and down in the case

and project the rollers varying distances through the open bottom of the case. It will be seen that with two rollers on each carrier, the weight of the door is distributed approximately equally over four bearing surfaces.

In the preferred form shown in FIGS. 1 through 8, the follower 24 is formed on two flanges 37 (see FIG. 4) bent inwardly toward each other from the lower edges of the carrier side plates 33 to form a bottom wall on the carrier adjacent the middle of the latter. The central portion of this wall is bent upwardly to form a ridge having an inverted V-shaped cross-section and forming the follower.

The cam 23 is mounted between the side plates 33 of the carrier 19 above the follower 24 and is journaled on the case 17 by means of two cylindrical studs 38 (see FIGS. 4, 5 and 7) which project outwardly through aligned vertically elongated slots 39 (FIG. 7) in the side plates and into circular holes 40 (FIG. 6) in the case said walls 27, the free ends of the studs being journaled in the case walls to mount the cam rotatably in the case. The cam fits snugly between the carrier side plates with bosses 41 (see FIG. 5) on the sides of the cam engaging the side plates. The slots 39 are slightly wider than and substantially longer than the diameter of the studs.

With this arrangement, the studs 38 position the carrier 19 longitudinally of the case 17 with the follower 24 directly below the axis of the cam 23 and, at the same time, the slots 39 accommodate up and down movements of the carrier within the case as different steps on the cam are turned into engagement with the follower.

As shown most clearly in FIGS. 3 and 5, the steps on the cam 23 are formed by a series of V-shaped notches forming a series of teeth 42 spaced around the periphery of the cam with the bottoms 43 of successive notches, moving counterclockwise from the first notch shown on the right of the top of the cam in FIG. 3, spaced progressively increasing distances from the cam axis, the bottom of the last notch, shown in engagement with the follower in FIG. 3, being the farthest from the cam axis. In the illustrative cam, there are ten steps which preferably are equal and may be of any desired magnitude to provide the range of adjustment desired for a particular roller assembly 10.

Herein, the means for turning the cam 23 to adjust the position of the carrier 19 in the case 17 takes the form of a tool-receiving element including a hexagonal socket 44 formed in the studs 38 and opening axially of the latter in alignment with the interior of a flanged sleeve 45 (FIGS. 1, 2 and 4) pressed into a hole 47 extending from the side wall of the groove 20 to the side surface of the door. Thus, the cam 23 may be turned with an Allen wrench (not shown) inserted from outside the door into the socket. Diametrically opposed grooves 48 opening radially inwardly from the socket walls also are formed in the socket to permit turning of the cam by a screw driver inserted through the sleeve.

After the roller assemblies 10 are installed in the door 12, the positions of the rollers 13 may be adjusted relative to the door simply by turning the cams 23 as necessary to hold the door in the desired position. For example, if the follower 24 of an assembly is in engagement with the first cam notch and it is necessary to raise the adjacent edge portion of the door, the cam is turned clockwise as viewed in FIG. 3 to turn the next notch into engagement with the follower. As the cam turns, the inclined notch wall passing over the follower elevates the cam, the pivot studs 38, the case 17 and, consequently, the door relative to the carrier 19 and the track 14 until the next cam tooth 42 passes the crest of the follower. The angle between the walls of each notch corresponds to the angle between the follower surfaces so that the weight of the door acting on the carrier through the cam presses the cam downwardly against the follower to bring the walls of the selected notch into flat face-to-face contact with the follower walls.

It will be apparent that the weight of the door presses the cam tightly against the follower to lock the cam against rotation relative to the follower. Of course, the cam may be turned manually step by step until the desired adjustment is obtained. A readily discernible click is produced each time the follower seats in a cam notch, and the number of clicks thus provides a ready indication of the amount of adjustment that has been made.

In addition to distributing the weight of the door 12 over a greater number of bearing surfaces, the dual roller construction has the advantage of reducing the effect on the position of the door of irregularities in the track 114 and of dirt that accumulates on the track in service use. The carrier 19 and the cam 23 are free to rock about the axis defined by the studs 38 without disturbing the relation between the cam and the follower 24. Thus, as one roller 13 of an assembly 10 passes over a high spot on the track and is shifted upwardly, the door is raised only one-half the distance the roller moves. This reduces the rumbling of the door during movement and maintains the distribution of the weight of the door on the rollers. With the roller assembly shown in FIGS. 1 through 8, both rocking of the carrier and quick and easy height adjustment from the side of the door are obtained in a relatively simple manner.

The upper end surfaces of the arcuate slots 39 through which the studs 38 project are used to limit the amount of permissible downward movement of the carrier 19 relative to the case 17, that is, movement which raises the door. For this purpose, the slots are positioned so that the studs abut against these end surfaces before the outermost or highest step on the cam 23 passes the follower 24. Thus, the slot ends prevent accidental turning of the highest step past the follower and the abrupt dropping of the door that would result.

A modified form of the invention utilizing an identical cam 23 but only one roller 13 is shown in FIG. 9. In this instance, the carrier 49 is pivoted intermediate its ends on the case on a cross pin 50 telescoped through aligned circular holes 51 in the side plates 52 of the carrier, and the cam is journaled on the case 53 between the side plates and adjacent the end of the carrier remote from the roller. The mounting studs 38 project through arcuate slots 54 in the side plates. The follower 55 is similar in shape to the follower 24 shown in FIG. 3 but is positioned above the cam rather than below it.

The weight of the door acting on the roller 13 tends to rotate the carrier 49 clockwise (FIG. 9) about the pin 50 and thus presses the follower 55 downwardly against the cam 23. Clockwise rotation of the cam, in the same manner as before, raises the follower to lower the roller step by step relative to the door 12. In this instance, the lower end surface of the slot 54 forms a stop which limits lowering of the roller and prevents accidental turning of the highest step on the cam past the follower. In all other significant respects, this form is similar to the preferred form, and corresponding parts are indicated by the same reference numbers.

I claim as my invention:

1. A roller assembly for a closure member having a lower edge movable along a supporting track, said assembly comprising a case mountable on said member adjacent said edge and having an open side facing toward said edge, a carrier disposed within said case and movable back and forth relative thereto toward and away from said open side, a roller journaled on said carrier with a peripheral portion adjacent said edge for rolling engagement with said track, a follower on said carrier, a cam positioned in said case for engagement with said follower and rotatable about an axis generally perpendicular to the plane of said member, said cam having an eccentric, stepped peripheral surface with successive steps spaced progressively increasing distances from said axis, at least one stud on said cam projecting laterally therefrom and journaled on said case to define said axis, said carrier

including a side wall lying alongside said cam and formed with a slot therein through which said stud projects, said slot being shaped and positioned to accommodate a predetermined amount of downward movement of the carrier relative to said cam and said case and having one end surface for abutting against said stud and preventing further downward movement after said predetermined amount, and manually operable means for turning said cam to bring different selected steps into engagement with said follower thereby to lower said roller relative to said case and correspondingly raise said member above said track.

2. A roller assembly for a closure member having a lower edge movable along a supporting track, said assembly comprising, a case mountable on said member adjacent said edge and having an open lower side, a horizontally elongated carrier disposed within said case and movable up and down therein, a pair of rollers journaled on the opposite ends of said carrier with lower peripheral portions projecting downwardly through said open side for rolling engagement with said track, an upwardly facing follower of inverted V-shaped cross-section on said carrier between said rollers, an eccentric cam journaled on said case above said follower for rotation about an axis perpendicular to the plane of said member and having a series of V-shaped notches in its periphery for engagement with the follower, the bottoms of successive notches being spaced progressively increasing distances from said axis to lower said carrier and said rollers relative to said case as said cam turns in one direction to bring successive notches into engagement with said follower, and a tool-receiving element coaxial with and fast on said cam and projecting laterally therefrom for turning the cam relative to the follower to vary the amount of projection of said rollers.

3. A roller assembly for a closure member having a lower edge movable along a supporting track, said assembly comprising a frame mountable on said member adjacent said edge, a carrier guided on said frame for back and forth movement toward and away from said track, a pair of spaced rollers journaled on said carrier with peripheral portions thereof adjacent said edge for rolling engagement with said track, an upwardly facing follower on said carrier between said rollers, a cam journaled on said frame above said follower for rotation about an axis generally perpendicular to the plane of said member and having a stepped peripheral surface engageable with said follower to hold the carrier against upward motion, successive steps on said surface being spaced progressively increasing distances from said axis to lower said carrier and said rollers relative to said frame as said cam turns in one direction to bring successive steps into engagement with the follower, said follower and each of said steps being shaped to interfit with each other in flat face-to-face contact to hold said cam releasably in each selected position relative to the follower, and means for rotating said cam relative to said follower to vary the positions of said rollers.

4. A roller assembly for a closure member having a lower edge movable along a supporting track, said assembly comprising a frame mountable on said member adjacent said edge, a carrier guided on said frame for back and forth movement toward and away from said track, a pair of spaced rollers journaled on said carrier with peripheral portions thereof adjacent said edge for rolling engagement with said track, an upwardly facing follower on said carrier between said rollers, a cam journaled on said frame above said follower for rotation about an axis generally perpendicular to the plane of said member and having a stepped peripheral surface engageable with said follower to hold the carrier against upward motion, successive steps on said surface being spaced progressively increasing distances from said axis to lower said carrier and said rollers relative to said frame as said cam turns in one direction to bring successive steps

into engagement with the follower, and means for rotating said cam relative to said follower to vary the positions of said rollers.

5. A roller assembly for a closure member having a lower edge movable along a supporting track, said assembly comprising a frame mountable on said member adjacent said edge, a carrier pivoted on said frame intermediate its ends for up and down movement of one end portion relative to the frame toward and away from said track about a pivot generally perpendicular to the plane of said member, a roller journaled on said one end portion with a peripheral portion adjacent said edge for rolling engagement with said track, a downwardly facing follower on the other end portion of said carrier, a cam journaled on said frame beneath said follower for rotation about an axis generally perpendicular to said plane and having a stepped peripheral surface engageable with the follower to hold said other end portion against downward motion, successive steps on said surface being spaced progressively increasing distances from said axis to raise said other end portion and thereby lower said roller relative to said frame as the cam turns in one direction to bring successive steps into engagement with the follower, and means for rotating said cam relative to said follower to vary the position of said roller.

6. A roller assembly for a closure member movable back and forth above a track, said assembly comprising a case adapted to be recessed into the lower edge of said closure member and having an open lower side, a carrier disposed within said case and movable vertically therein toward and away from said open side, a roller journaled on said carrier with a peripheral portion of said roller projecting through said open side and disposed adjacent said lower edge for rolling engagement with said track, a cam journaled on said case for rotation about an axis generally perpendicular to the plane of said closure member and having a peripheral surface including a plurality of steps spaced progressively increasing distances from said axis, a follower on said carrier beneath said axis for engagement with said cam as the latter turns whereby rotation of the cam in one direction lowers said carrier and said roller relative to said case step by step to vary the amount of projection of said roller through said open side, manually operable means accessible from the side of said closure member for turning said cam to bring different steps thereon into engagement with said follower, and means on said cam and said follower for holding said carrier releasably in each selected position.

7. A roller assembly for a closure member having one edge movable along a track, said assembly comprising a frame mountable on said member adjacent said edge a carrier guided on said frame for outward and inward movement toward and away from said track, a roller journaled on said carrier with a peripheral portion adjacent said edge for rolling engagement with said track, a follower on said carrier, a cam mounted on said frame for rotation about an axis generally perpendicular to the plane of said member and having a notched peripheral surface engaging said follower, said follower being mounted on said carrier to be moved toward said axis and pressed against said cam upon inward movement of said roller, and also being positioned on said carrier to move said roller outwardly upon movement of said follower away from said axis, successive notches on said surface being spaced progressively increasing distances from said axis to move said roller relative to said frame and toward said track in one direction of rotation of the cam, and manually operable means accessible from one side of said frame for turning different selected notches into engagement with said follower, said follower and each of said steps being of interfitting cross-section to interlock with each other and hold said cam releasably in each selected position relative to said follower.

8. A roller assembly as defined in claim 7 further including a wall on said carrier lying alongside said cam,

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at least one stud on said cam projecting laterally therefrom and journaled on said frame to define said axis, said wall having a slot therein through which said stud projects and shaped and positioned to accommodate a predetermined amount of movement of the stud in one direction, and an end surface on said slot for abutting against said stud and preventing further movement in said one direction after said predetermined amount.

9. A roller assembly for a closure having one edge movable along a track, said assembly comprising a frame mountable on the member with one side adjacent said edge, a carrier guided on said frame for outward and inward movement toward and away from said one side, a roller journaled on said carrier with a peripheral portion of the roller adjacent said one side for rolling engagement with the track, cam and follower elements on said carrier and said frame, said cam being mounted for rotation about a predetermined axis generally perpendicular to the direction of movement of said carrier and having a stepped peripheral surface engaging and interfitting with said follower, successive steps of said surface being spaced progressively increasing distances from said axis to move said follower away from said axis in one direction of rotation of said cam, and said cam being positioned to be pressed against said follower upon inward movement of said roller thereby to hold said cam releasably in each selected position relative to the follower, and said follower being mounted to move said roller outwardly upon relative movement of said follower away from said axis, and manually operable means accessible from outside said frame for turning different selected steps into engagement with said follower thereby to vary the position of said roller relative to said one side.

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10. A roller assembly for a closure member having one edge movable along a track, said assembly comprising a frame mountable on said member adjacent said edge, a carrier guided on said frame for outward and inward movement toward and away from said track, a roller journaled on said carrier with a peripheral portion of the roller adjacent said edge for rolling engagement with said track, a follower mounted on and movable with said carrier, a cam mounted on said frame for rotation about an axis generally perpendicular to the direction of movement of said carrier and having a stepped peripheral surface engaging and interfitting with said follower to hold the cam releasably in each selected position relative to the follower, successive steps on said surface being spaced progressively increasing distances from said axis to move said follower in steps away from said axis in one direction of rotation of the cam and thereby correspondingly move said carrier and said roller, and manually operable means accessible from the side of said frame for turning different selected steps of said cam into engagement with said follower.

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