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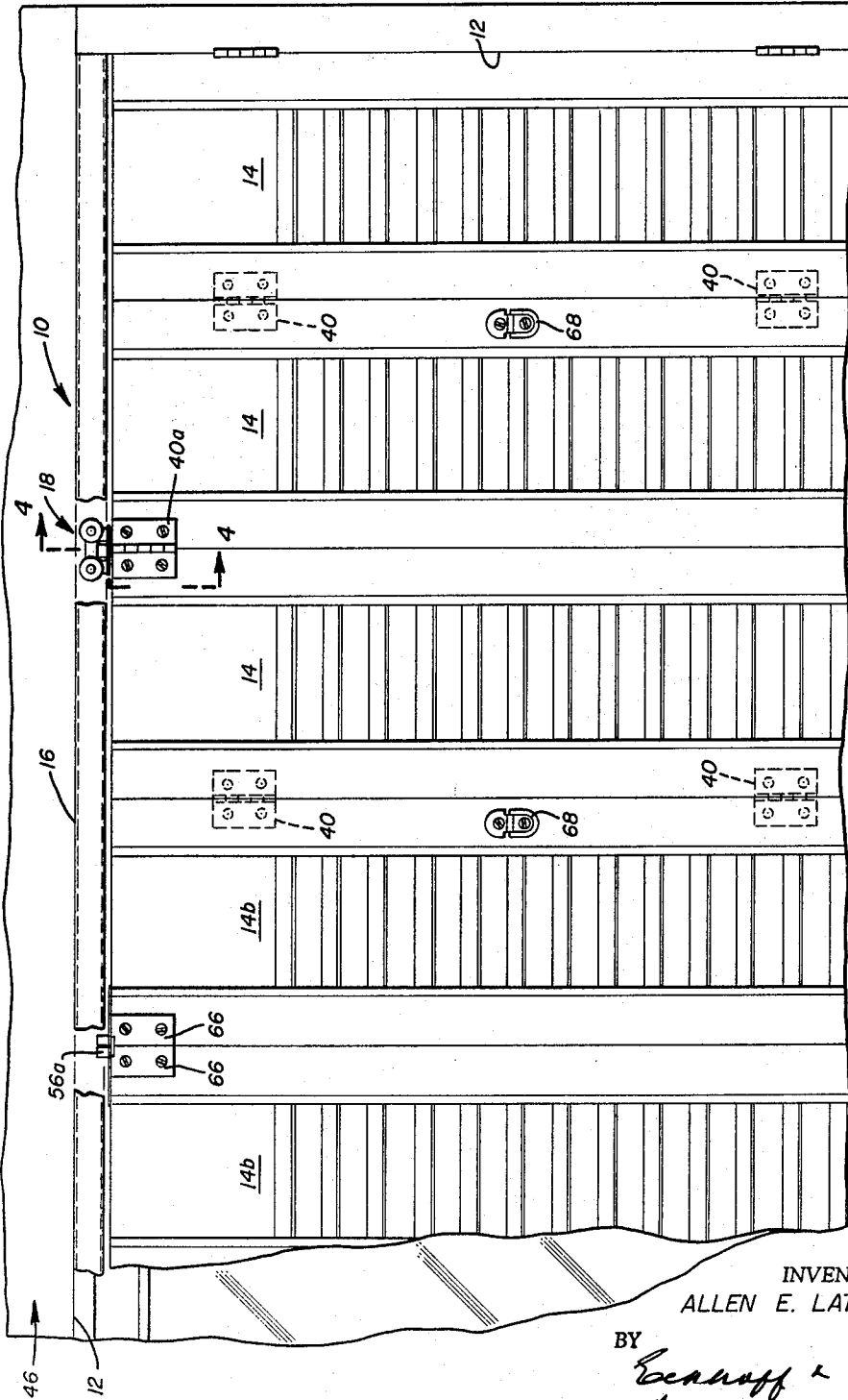
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SHUTTERS

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2 Sheets-Sheet 1



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SHUTTERS

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1 Claim. (Cl. 160—199)

This invention relates to shutters for covering window openings and the like, and more particularly to apparatus for supporting the shutters in desired relation to each other in all postures between open and closed positions.

In wide openings, the weight of the panels, or the width of the span, often makes hinging from the side alone impractical if not impossible. If the panels are excessively wide when folded back, they will require more wall space than is usually available at the sides of the opening. The weight of a wide panel will impose great loads on the side hinges, requiring heavy fittings to take the strain, thus increasing the chances of structural failure.

By hinging a plurality of narrow panels together in accordion fashion, the spatial objections to the wide panels can be overcome. But such structure will still impose great strain if supported by side hinges alone. Accordingly, the present invention contemplates supporting the narrow panels from a track and carrier structure which will carry the weight of the panels at open and closed positions and at all intermediate positions. This structure serves to relieve the side hinges of strain and promotes long life of the assembly.

When the panels must be installed on the face of the casing, or on the face of the wall around the opening, it may be necessary to keep the shutters from entering the opening in order to avoid striking window glass or other elements which may be mounted therein. To assure the shutters will not enter, guide means is provided which securely positions the panels relative to each other and to the opening at all times.

It is, therefore, a principal object of the present invention to provide a folding shutter assembly which will support a plurality of shutter panels for movement between a coplanar edge-to-edge position covering an opening and a folded position clear of the opening.

Another object of the present invention is to provide a track and carrier assembly for a folding shutter of the character described which may be mounted along either the upper or lower edge of the opening to be shuttered, and which conceals and protects the moving parts from dust and injury.

A further object of the present invention is the provision of a carrier and track which are self-aligning, free-rolling, and non-binding under all conditions of use.

Other objects and features of advantage will become apparent from a consideration of the following description and the accompanying drawings. It is desired, therefore, not to limit the scope of the present invention except as set forth in the attached claim.

In the drawings:

Figure 1 is a side elevational view of a folding shutter constructed in accordance with the present invention and mounted in operative position to cover an opening, portions of the device being broken away and shown in section for clarity of illustration.

Figure 2 is a perspective view of a portion of the folding shutter of Figure 1, but in a partially folded position.

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Figure 3 is an enlarged fragmentary plan view of a carrier forming part of the folding shutter.

Figure 4 is a cross sectional view taken substantially on the plane of line 4—4 of Figure 1.

5 The folding shutter assembly of the present invention consists essentially of track means 10 which may be mounted horizontally along one edge of an opening 12 to be shuttered, and a plurality of shutter panels 14 dimensioned to fill the opening 12 when in the coplanar edge-to-edge relation shown in Figure 1, the panels being hinged together at their edges for folding back in the accordion manner shown in Figure 2 so as to leave the opening 12 clear.

10 The panels 14 may be of any material, usually wood, and may be plain, louvered, simulated louvered, adjustable louvered or of any other suitable type. Care should be taken that the panels are all of the same width and height, and are dimensioned to cover the opening to be shuttered.

15 The track means 10 includes an elongated track 16 upon which rides a carrier 18 attached to the panels 14 for supporting the latter at all positions. Preferably, and as here shown, the track 16 is of hollow, tubular form and the carrier 18 travels along the interior of the track. A support pin 20 affixed to the carrier projects through a longitudinal slot 22, formed in the track, for connection to the panels 14. This structure substantially encloses the carrier within the track and protects it from dust and from damage by accidental contact with other objects.

20 In accordance with the present invention, the carrier 18 is of free-rolling design making possible the installation of shutters across very wide openings. As here shown, the carrier is provided with four wheels 24 journaled on spaced parallel axles 26 mounted in a body 28 of channel form. Secured to the body 28, by means of spacers 30, is a support plate 32 which carries the support pin 20. The peripheries of the wheels 24 are somewhat convex to aid in making them self-aligning in the track.

25 The track 16 may be of any suitable material, but is preferably formed of sheet metal which is bent to the configuration shown best in Figures 2 and 4 of the drawings. A pair of spaced vertical walls 34 are formed integrally with a horizontal wall 36 and with a pair of in-turned flanges 38, with the confronting edges of the latter being spaced apart to define the longitudinal slot 22. Preferably, the outer portions of wall 36 and flanges 38 are somewhat concave so as to match the convexity of wheels 24. This will cause the wheels to be self-aligning with respect to the length of the track and will prevent cocking or binding of the carrier 18 therewithin, even if some cocking force is applied to the carrier.

30 In order to provide the accordion-like folding action of the panels 14, they are hinged together at their adjacent edges by vertically spaced hinges 40, with the hinges being attached to the inner faces of the panels at one edge and to the outer faces at the other edge. The hinges may be of any suitable form such as the simple butterfly hinge shown in the drawings, it being noted that no hinge will have to support more than the weight of one adjacent panel.

35 The present shutter assembly is particularly suited for installation on the face of the casing, or the face of the wall, around the opening 12 in situations where the panels must not protrude into the opening when folded. The track 16 is mounted at the face 44 of the wall 46 upon suitable support strips 48 by means of screws 50. Guide means are provided for controlling the panels so that no part of the panels will extend inwardly past the inner edge 54 of the track 16. As here shown, this guide means includes rollers 56 engaged in the track slot 22 and secured to the panels 14 at the fold nearest to the wall 42.

Preferably, the rollers 56 are journaled on the support pins 20 on the carriers 18, while an additional roller 56a is journaled on a similar pin carried at the edge of the end panel.

The desired tracking movement is obtained by pivoting the support plates 32 of the carriers to the hinge pins 58 of alternate hinges 40a in the manner shown in Figures 3 and 4 of the drawings. The carriers are thus free to swing relative to each panel, but the support pin carrying guide roller 56 is maintained a constant distance from the axis about which the panels fold. The roller 56a on the end panel is mounted upon a plate 60 having slots 62 through which pass pins 64 attached to a mounting member 66 secured to the panel. The freedom of movement provided by the described structure insures that the panels may be swung open and closed easily and quickly without binding and without interfering with anything in the opening 12, such as window glass 67.

Installation of the present assembly is simple. The outer panels 14a are hinged to the edge of the opening 12 in the manner shown in Figure 1. The track 16 is installed along the upper edge of the opening, although it is noted that if some unusual case requires, the track may be located at the bottom edge. In the latter case, the parts would be inverted from the position shown in Figure 4 and the wheels 24 would ride on the horizontal wall 36 instead of on the flanges 38. Suitable flush pull members 68 are attached to the panels for opening the shutters from their closed position.

The present structure is particularly suited for covering very wide openings. For an example, an opening 30 inches high and 10 feet wide may be covered by 16 panels, each approximately 7½ inches wide; an approximation only is made because the exact width is, in part, a function of the hinge clearance provided between the several panels. These panels would preferably be arranged 8 panels on each side with the inner panels 14b abutting each other, as shown in Figure 1, when the panels are drawn to the center. A suitable lock or latch (not shown) may be provided for holding the panels in this position if desired.

I claim:

In a folding shutter: a hollow tubular track having a horizontal top, a pair of laterally spaced vertical walls integral with said horizontal top and an inturned flange integral with the lowermost edge of each of said laterally spaced vertical walls, said flanges defining a slot between their confronting edges, said track having a length sufficient to extend horizontally above and across an opening to be shuttered; a plurality of shutter panels dimensioned to extend the length of said track and to cover said opening when in co-planar edge to edge relation; vertically spaced pairs of hinges joining adjacent edges of said panels, said pairs of hinges being mounted alternately on the front and rear faces of said panels so as to permit folding back of the panels in an accordion fashion to leave said opening clear; a carrier in said track having at least two pairs of wheels journaled on spaced axles for rolling movement along said flanges within said tubular track, each of said wheels being of a diameter about equal to the height of said vertical walls of said track; a support pin on said carrier extending through said slot of said track, said support pin having a sleeve mounted for rotation thereabout, whereby said support pin is protected from contact with said inturned flanges, said support pin and sleeve together being of sufficient diameter to substantially completely bridge the space between said inturned flanges defining said slot; a plate secured to said support pin; a hinge secured to adjacent faces of a pair of adjacent panels near the topmost edges thereof, said hinge having a hinge pin therefor passing through and supported by said plate secured to said support pin, whereby said plate indirectly supports two panels at adjacent ends thereof.

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