

July 19, 1966

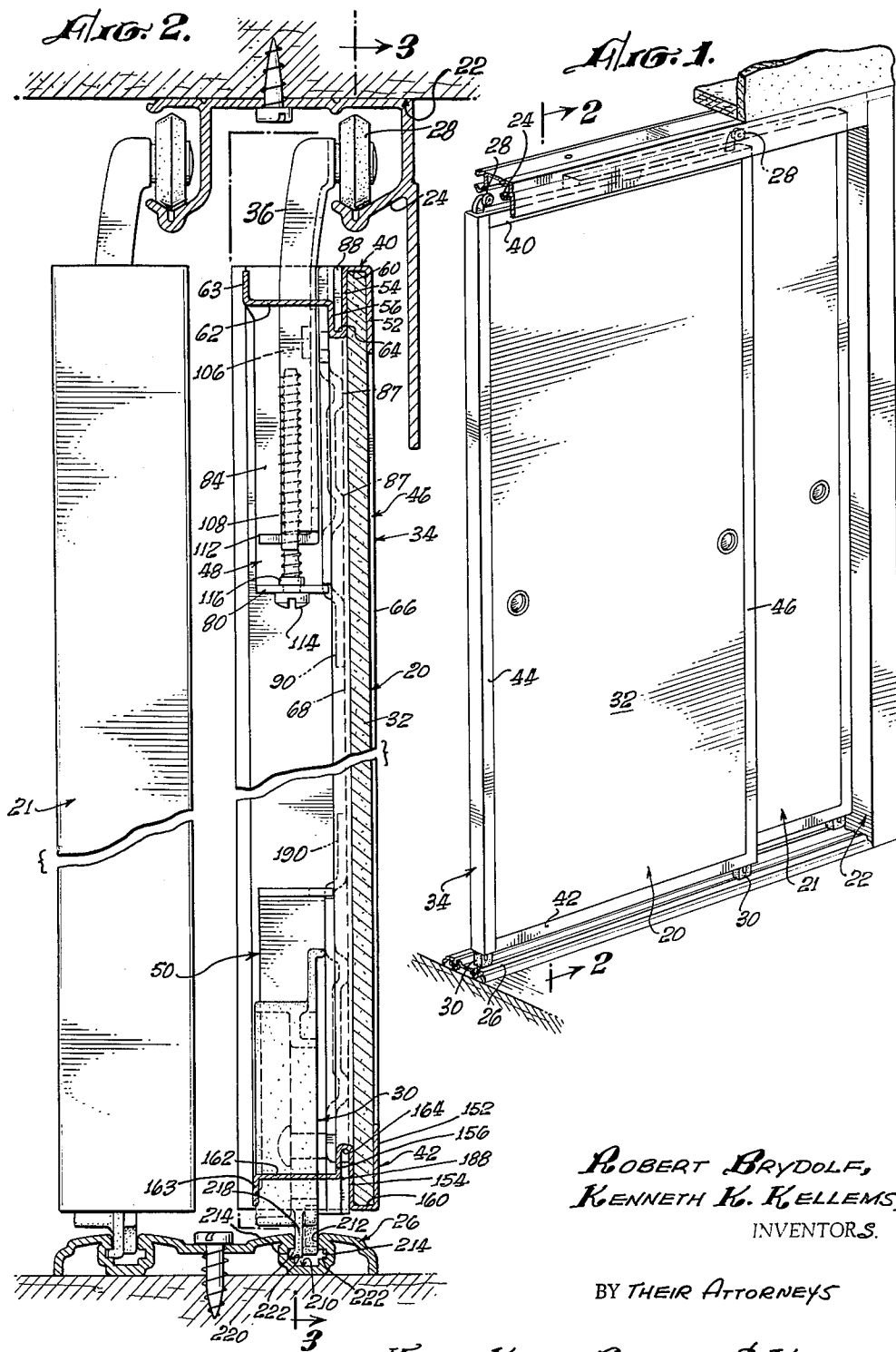
R. BRYDOLF ETAL

3,261,129

PANEL HARDWARE

Filed April 6, 1964

2 Sheets-Sheet 1



ROBERT BRYDOLF,
KENNETH H. KELLEMS,
INVENTORS.

BY THEIR ATTORNEYS

HARRIS, KIECH, RUSSELL & KERN.

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Fig. 3.

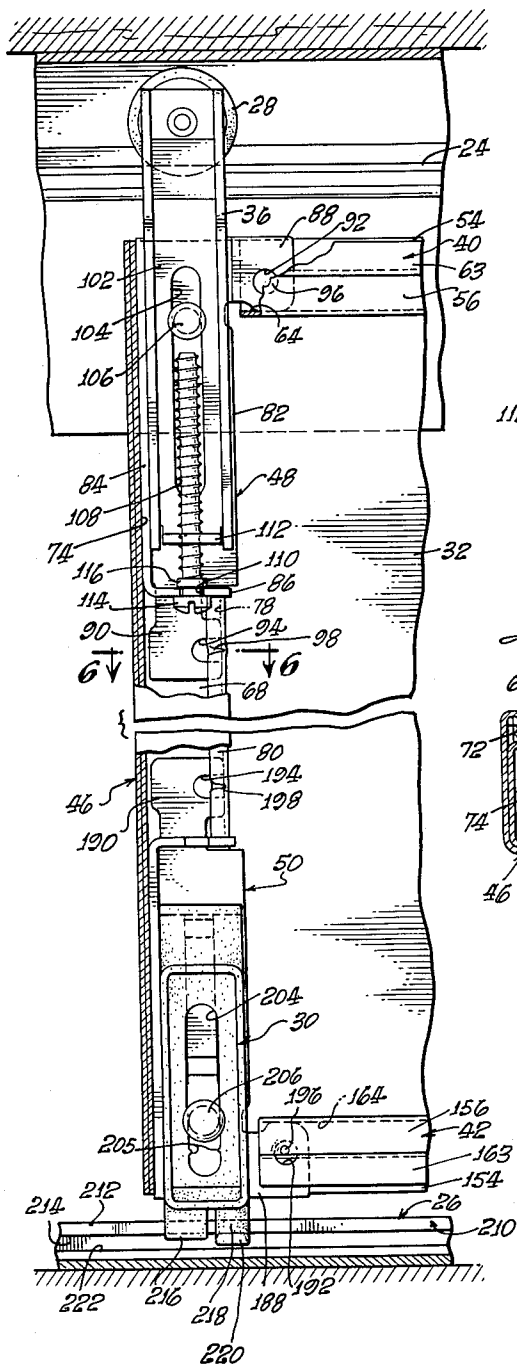


Fig. 4.

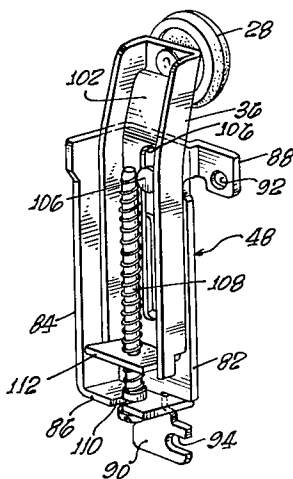


Fig. 5.

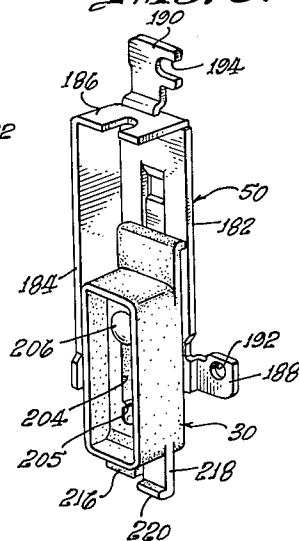
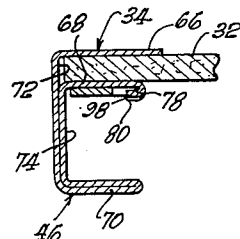


Fig. 6.



ROBERT BRYDOLF,
KENNETH K. KELLEMS,
INVENTORS.

BY THEIR ATTORNEYS.

HARRIS, KIECH, RUSSELL & KERN.

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PANEL HARDWARE

Robert Brydolf, Pasadena, and Kenneth K. Kellems, Ontario, Calif., assignors to Acme Appliance Manufacturing Company, Monrovia, Calif., a corporation of California

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3 Claims. (Cl. 49—411)

The present invention relates in general to hardware for framing and supporting panels and, more particularly, to hardware for framing and supporting wooden or composition panels, or panels of other materials, in the manufacture of sliding doors. For convenience, the invention will be considered in such connection herein, although it will be understood that other applications are possible.

General objects of the invention are to provide a panel frame which can readily be assembled with a panel to form a sliding door, or the like, which requires no special tools or equipment for assembly purposes, which can readily be fitted to an opening of any size, and the like. Other general objects are to provide hardware attachable to such a panel frame for supporting and/or guiding the framed panel on and/or along suitable tracks.

More particularly, the invention contemplates a rectangular panel frame which includes two vertical stiles and two horizontal rails secured together by connectors in the corners of the frame. When the framed panel is utilized as a sliding door, wheeled hangers engageable with an upper, overhead track may be connected to the upper end of the frame and guides engageable with a lower track may be connected to the lower end of the frame.

The foregoing general structure is disclosed in Patent No. 3,058,173, granted October 16, 1962 to Robert Brydolf, one of the present applicants. The present invention relates to improvements on the structure of this patent.

An important object of the invention is to provide an improved means of securing the corner connectors to the rails and stiles without any necessity for drilling any screw holes, or the like, in the rails and/or stiles. More particularly, an important object in this respect is to secure the connectors to the rails and stiles solely by striking portions of the rails and stiles into suitable holes in the corner connectors, thereby eliminating any necessity for screws, or like fasteners.

Still another important object is to provide an improved lower guide which cannot readily be disengaged from a lower track for guiding the lower end of a sliding door, such as a sliding panel framed in accordance with the invention.

Yet another important object is to provide a sliding panel guide, for use with a track having a longitudinal groove provided with an outwardly facing mouth and an inwardly facing shoulder inwardly of and offset laterally relative to the mouth of the groove, comprising: first and second guide elements spaced apart longitudinally of the groove and insertable into the groove through its mouth; the first guide element being relatively thick as compared to the second guide element and being engageable with the edges of the mouth to guide the sliding panel along the track; and the second guide element being relatively thin and flexible, so that it can be snapped into the groove through its mouth, and having a laterally extending lug engageable with the inwardly facing shoulder to prevent inadvertent disengagement of the guide from the track. A further object in this connection is to provide a floating guide capable of movement relative to the sliding panel in a direction to compensate for deviations from parallelism between the track under consideration and another track associated with the sliding panel.

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Yet another object of the invention is to provide a framed panel of the foregoing nature wherein certain of the corner connectors carry movable track engaging members the positions of which relative to the panel are adjustable by screw means extending in the direction of desired adjustment.

A further object of the invention is to provide a panel-frame rail having improved rigidity and stiffness.

The foregoing objects, advantages, features and results of the present invention, together with various other objects, advantages, features and results thereof which will be evident to those skilled in the art to which the invention relates in the light of this disclosure, may be achieved with the exemplary embodiment of the invention described in detail hereinafter and illustrated in the accompanying drawings, in which:

FIG. 1 is a fragmentary perspective view of a sliding door installation which embodies the invention;

FIG. 2 is an enlarged, vertical sectional view taken along the arrowed line 2—2 of FIG. 1;

FIG. 3 is a fragmentary, vertical sectional view taken along the arrowed line 3—3 of FIG. 2;

FIG. 4 is a perspective view of a combination corner connector and upper track-engaging member or hanger of the invention;

FIG. 5 is a perspective view of a combination corner connector and lower track-engaging member or guide of the invention; and

FIG. 6 is an enlarged, fragmentary sectional view taken as indicated by the arrowed line 6—6 of FIG. 3.

Referring particularly to FIG. 1 of the drawings, illustrated therein is a sliding door installation which is shown as comprising two bypassing doors 20 and 21 installed in a doorway 22. The door 21 is identical to, and is supported and guided in the same way as, the door 20. Consequently, only the door 20 will be considered hereinafter.

The door 20 is mounted in the doorway 22 for "sliding" movement along upper and lower tracks 24 and 26. The door 20 is provided at its upper end with wheels 28 which roll along the upper track 24 and which serve to suspend the door therefrom. Guides 30 of the invention are mounted on the lower end of the door 20 and are slidable along the lower track 26.

The sliding door 20 comprises a panel 32 of any suitable material, the edges of the panel being disposed in a frame 34 which reinforces the panel. Each wheel 28 is carried by a hanger or hanger member 36 connected to the upper end of the frame 34 in a manner to be described. Each guide 30 is connected to the lower end of the frame 34 in a manner which will also be described hereinafter.

The frame 34 includes upper and lower rails 40 and 42 respectively receiving the upper and lower edges of the panel 32 therein, and includes stiles 44 and 46 respectively receiving the vertical edges of the panel. The two rails 40 and 42 are identical, as are the two stiles 44 and 46.

The rail 40 and the stile 46 are interconnected by an upper corner connector 48, FIGS. 2, 3 and 4, located on the rear side of the panel 32. The rail 42 and the stile 46 are interconnected by a lower corner connector 50, FIGS. 2, 3 and 5, also located on the rear side of the panel 32. The two connectors 48 and 50 are identical, except that each is a mirror image of the other. The rail 40 is connected to the stile 44 by a corner connector, not shown, identical to the corner connector 50. Similarly, the rail 42 is connected to the stile 44 by a corner connector, not shown, identical to the corner connector 48. Thus, the rails 40 and 42 and the stiles 44 and 46 are interconnected at the corners of the frame 34 by four corner connectors two of which are mirror images of the other

two. In other words, two of the corner connectors are "lefts" and the other two are "rights."

Considering the rail 40 in more detail, and referring particularly to FIG. 2 of the drawings, it includes integral front, intermediate and rear walls 52, 54 and 56 which are parallel and spaced apart to form a front rail channel 60 and a rear rail channel 64. The front rail channel 60 faces inwardly of the frame 34 and receives the upper edge of the panel 32 therein. The rear rail channel 64 faces outwardly of the frame and performs a function which will be described hereinafter. To improve the stiffness and rigidity of the rail 40, an integral flange 62 extends rearwardly from the upper edge of the rear wall 56 of this rail, such rearwardly extending flange terminating in an upwardly extending flange 63. The L-shaped reinforcing structure formed by the flanges 62 and 63 serves to materially improve the rigidity of the rail 40.

The rail 42 is identical to the rail 40, except that it is inverted relative thereto. Consequently, a detailed description of the rail 42 is unnecessary.

Referring particularly to FIG. 6 of the drawings, the stile 46 is generally E-shaped in cross section and includes front, intermediate and rear walls 66, 68 and 70. The front and intermediate walls 66 and 68 converge slightly and cooperate to form a front stile channel 72 which faces inwardly of the frame 34 and which receives the corresponding edge of the panel 32, such slight convergence accommodating slight variations in panel thickness. The intermediate and rear walls 68 and 70 cooperate to provide therebetween a first rear stile channel 74 serving to rigidify the stile 46 and to house the corresponding guide 30 and hanger 36, and their mounting means, as will be discussed hereinafter.

The intermediate wall 68 of the stile 46 is doubled back on itself to form a second rear stile channel 78 which faces outwardly relative to the frame 34 and which has a rear wall 80. The purpose of the rear stile channel 78 will be discussed hereinafter.

The rear wall 70 of the stile 46 and the closed side of the first rear stile channel 74 are of double thickness to provide added rigidity for the stile 46. The walls of the front stile channel 72 are of single thickness since they are rigidified by the corresponding edge of the panel 32. The entire stile 46 is preferably formed of a single piece of sheet metal bent into the cross sectional shape shown.

The stile 44 is identical to the stile 46 so that no detailed description of the stile 44 is necessary.

Considering the corner connector 48 with reference to FIGS. 2, 3 and 4 of the drawings, it is a generally box-like structure which is disposed within the first rear stile channel 74 and which includes three mutually perpendicular walls 82, 84 and 86. The wall 82 substantially parallels and lies adjacent the intermediate stile wall 68, while the wall 84 substantially parallels and lies adjacent the closed side of the first rear stile channel 74. The wall 86 is perpendicular to the other two and is located at the lower end of the corner connector 48. The corner-connector walls 82 and 84 engage the adjacent walls of the first rear stile channel 74 to orient this corner connector longitudinally of this stile channel, the corner-connector wall 82 having bosses 87, FIG. 2, struck therefrom which engage the corresponding stile wall 68.

Considering the manner in which the corner connector 48 is secured to and interconnects the rail 40 and the stile 46, the wall 82 of the connector is provided at the upper end of the connector with a laterally offset tab 88 inserted in the rear rail channel 64. The wall 82 of the connector 48 is provided at its lower end with a tab 90 inserted in the second rear stile channel 78. The tabs 88 and 90 are provided therethrough with holes 92 and 94, respectively, the hole 94 being shown as a notch in one edge of the tab 90. The rear walls 56 and 80 of the respective channels 64 and 78 at least partially overlie the

respective holes 92 and 94. A portion 96 of the rear wall 56 of the rear rail channel 64 is struck forwardly into the hole 92, as by means of a punch, not shown. Similarly, a portion 98 of the rear wall 80 of the second rear stile channel 78 is struck forwardly into the hole 94, as by means of a blunt blade, not shown.

When secured to the rail 40 and the stile 46 in the foregoing manner, the corner connector 48 rigidly interconnects this stile and rail to provide a rigid corner for the frame 34. Securing the corner connector 48 to the rail 40 and the stile 46 by means of the forwardly struck portions 96 and 98 is easily and quickly accomplished with simple tools, there being no necessity for drilling screw holes, or the like, in either the rail or the stile. Further, this construction permits cutting the rail and the stile to precisely the lengths required for a particular installation since the forwardly struck portions 96 and 98 may readily be formed in the walls 56 and 80, respectively, wherever required by a particular installation. Moreover, this construction avoids any exposed screw heads, or the like.

The corner connector 48 has the corresponding wheel hanger 36 vertically-adjustably-mounted thereon in a manner which will now be described. As shown in FIGS. 2, 3 and 4, the hanger 36 in question is channel-shaped in cross section and is provided in its base wall 102 with a vertical slot 104. Secured to the corner connector 48 is a rivet 106 which extends through the slot 104 and which is provided with a head for securing the hanger 36 to the corner connector while permitting vertical movement of the hanger relative to the corner connector to adjust the vertical position of the corresponding vertical edge of the door 20 as required by a particular installation.

The necessary vertical adjustment of the hanger 36 relative to the corner connector 48 is effected by a screw means comprising a vertical screw 108 inserted into a notch 110 in the wall 86 of the corner connector and threaded through a tab 112 at the lower end of the hanger. The screw 108 is provided with a head 114 engageable with the lower side of the wall 86, and is provided thereon with a collar 116 engageable with the upper side of such wall. With this construction, vertical movement of the screw 108 relative to the corner connector 48 is prevented, whereby rotation of the screw produces vertical movement of the hanger 36 for adjustment purposes. As will be apparent, the vertical position of the hanger 36 relative to the frame 34 may be adjusted readily by turning the screw 108 with a screw-driver, not shown. It will be noted that the weight of the door 20 is transmitted to the hanger 36 through the screw 108. Thus, the weight of the door tends to maintain the adjustment of the screw 108 by producing rotation-resistant frictional forces between the screw and the corner connector and between the screw and the hanger.

The upper rail 40 and the stile 44 are interconnected by a corner connector, not shown, in identically the same manner as the upper rail 40 and the stile 46 are interconnected by the corner connector 48. Also, the other hanger 36 is adjustably mounted on the corner connector between the upper rail 40 and the stile 44 in the same manner as described above. Therefore, a further description is not required.

The lower corner connector 50 interconnects the lower rail 42 and the stile 46 in identically the same manner as the upper corner connector 48 interconnects the upper rail 40 and the stile 46. Consequently, the various elements of the lower rail 42, the corner connector 50, and the means for securing the corner connector 50 to the lower rail 42 and the stile 46, are merely identified by reference numerals higher by one hundred than the reference numerals utilized to identify the corresponding elements of the upper rail 40, the corner connector 48, and the means to secure the corner connector 48 to the upper rail 40 and the stile 46. No further description is be-

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lieved to be necessary since the previous one is applicable.

The lower rail 42 and the stile 44 are interconnected by a corner connector, not shown, in the same manner as the lower rail 42 and the stile 46. Again, a detailed description is not required.

Considering the relationship between the lower corner connector 50 and the corresponding lower guide 30, the latter is vertically-adjustably-mounted on the lower corner connector in somewhat the same manner as the corresponding hanger 36 is vertically-adjustably-mounted on the upper corner connector 48. More particularly, the guide 30, which is preferably a molded part of a suitable plastic material, is vertically slidable relative to the corner connector 50 and is restrained against horizontal movement by engagement with the walls 182 and 184 of the corner connector and by a headed rivet 206 extending through a vertical slot 204 in the guide and suitably secured to the base wall 182 of the corner connector 50. The guide 30 is a floating member capable of free vertical movement, within the limits imposed by the ends of the slot 204, to accommodate any variations in the vertical spacing between the upper and lower tracks 24 and 26 resulting from variations in the vertical spacing of the portions of the building structure on which the tracks are mounted.

Considering the guide 30, and its relationship to the lower track 26, the latter includes, as best shown in FIG. 2, a longitudinal groove 210 which has an upwardly facing mouth 212 and which is widened below such mouth to provide downwardly facing shoulders 214 laterally offset to opposite sides of the mouth. (Actually, only one shoulder 214 is necessary as will become apparent, but the groove 210 is preferably made symmetrically so that the lower track 26 may be used turned end for end.)

The guide 30 includes longitudinally spaced guide elements 216 and 218 insertable into the groove 210 through its mouth 212. The guide element 216 is relatively thick, its thickness being substantially equal to the width of the groove mouth 212 so that it makes a relatively close sliding fit therein to guide the lower end of the door 20 along the lower track 26. The other guide element 218 is relatively thin and flexible and is provided at its lower end with a laterally extending lug 220 adapted to hook under one of the downwardly facing shoulders 214 and to engage such shoulder and an upwardly facing shoulder 222 therebeneath.

The flexibility of the relatively thin guide element 218 permits it to deform laterally sufficiently to enable the lug 220 to pass downwardly through the mouth 212 of the groove 210, as the guide element 216 is inserted into such mouth, whereupon the lug 220 snaps laterally under one of the downwardly facing shoulders 214. The lug 220 then acts to prevent inadvertent disengagement of the guide 30 from the lower track 26 as the door 20 is open or closed. The lug 220 also rides along the shoulders 214 and 222 to cause the guide 30 to move upwardly or downwardly as required to compensate for deviations from parallelism of the upper and lower tracks 24 and 26, thereby preventing disengagement of the guide 30 from the lower track despite substantial deviations from parallelism, which is an important feature.

Near the lower end of the slot 204 are two small inwardly-extending projections 205 which snap over the rivet 206 when the guide 30 is moved upwardly into a fully retracted position wherein the guide elements 216 and 218 are housed within the stile 46. The guide 30 can readily be moved downwardly to extend the guide elements 216 and 218 by finger pressure thereon. Thus, these guide elements can be housed within the stile 46 to protect them until they are to be engaged with the track 26.

The second of the two lower guides 30 is mounted on the corner connector, not shown, which interconnects the

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lower rail 42 and the stile 44 in substantially the manner just described, such lower guide having the same relationship to the lower track 26. Consequently, a further description is not necessary.

Although an exemplary embodiment of the invention has been disclosed herein for purposes of illustration, it will be understood that various changes, modifications and substitutions may be incorporated in such embodiment without departing from the spirit of the invention as defined by the claims which follow.

We claim:

1. In a sliding panel installation, the combination of:
 - (a) generally parallel upper and lower tracks;
 - (b) a generally vertical, sliding panel;
 - (c) means connected to the upper end of said panel for suspending it from said upper track;
 - (d) longitudinally spaced guide means connected to the lower end of said panel and engageable with said lower track for guiding the lower end of said panel along said lower track;
 - (e) said lower track being provided therein with a groove extending lengthwise thereof;
 - (f) said groove having an upwardly facing mouth and having a downwardly facing shoulder below and offset laterally relative to said mouth;
 - (g) each of said guide means being integral and including a flexible guide element narrower than and extending downwardly through said mouth of said groove and having a laterally extending lug engageable with said shoulder to prevent withdrawal of said guide element from said groove;
 - (h) each of said guide means also including another guide element having surfaces engageable with the edges of said mouth of said groove and spaced from said flexible guide element in the direction of said groove; and
 - (i) means mounting each of said guide means on said panel for vertical movement relative thereto.
2. In a one-piece guide for use with a track having a longitudinal groove provided with an outwardly facing mouth and an inwardly facing shoulder inwardly of and offset laterally relative to said mouth, the combination of:
 - (a) a guide body having integral first and second guide elements extending therefrom in side-by-side relation and insertable into said groove through said mouth and spaced longitudinally of said mouth when inserted therethrough;
 - (b) said first guide element being relatively thick laterally of said mouth as compared to said second guide element and being engageable with the edges of said mouth;
 - (c) said second guide element being relatively thin laterally of said mouth and being laterally bendable and having a laterally extending lug engageable with said shoulder; and
 - (d) said second guide element with its said laterally extending lug being narrower than said mouth and being insertable therethrough to bring said laterally extending lug into engagement with said shoulder upon lateral bending of said second guide element.
3. In a guide for use with a track having a longitudinal groove provided with an outwardly facing mouth and an inwardly facing shoulder inwardly of and offset laterally relative to said mouth, the combination of:
 - (a) first and second guide elements having interconnected outer ends and having inner ends insertable into said groove through said mouth and spaced longitudinally of said mouth when inserted there-through;
 - (b) said first guide element being relatively thick laterally of said mouth and being engageable with the edges of said mouth;
 - (c) said second guide element being relatively thin laterally of said mouth and being laterally offset

relative to said first guide element in a direction toward said shoulder;

(d) said second guide element being laterally bendable and having a lug extending laterally therefrom in the direction of lateral offset of said second guide element and engageable with said shoulder; and

(e) said second guide element with its said laterally extending lug being narrower than said mouth and being insertable therethrough to bring said laterally extending lug into engagement with said shoulder upon lateral bending of said second guide element.

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REINALDO P. MACHADO, *Primary Examiner*.

HARRISON R. MOSELEY, *Examiner*.

K. DOWNEY, *Assistant Examiner*.