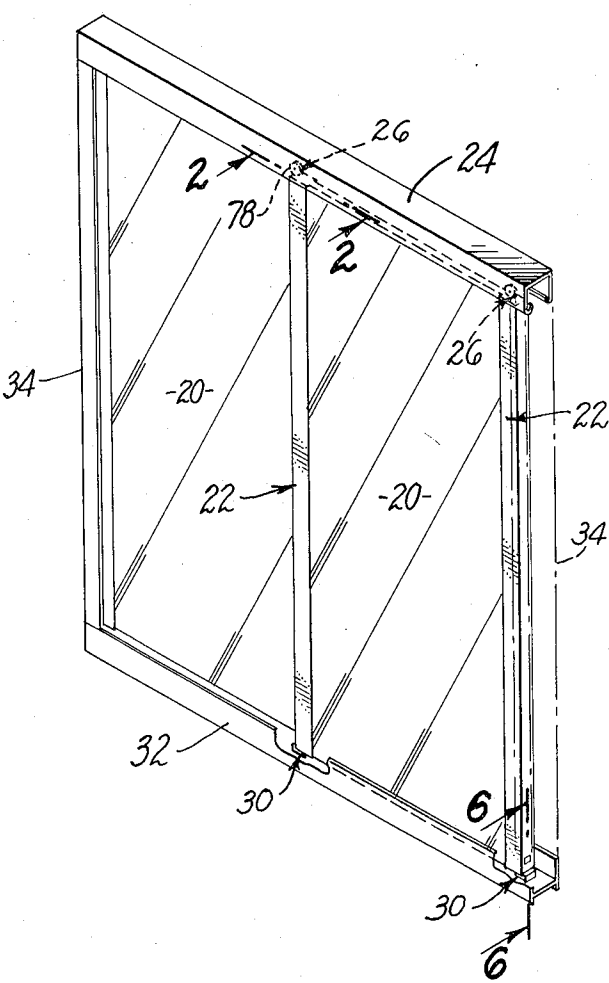


[54] **SLIDING DOOR ASSEMBLY**
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[52] U.S. Cl..... **49/409, 16/91, 16/105**
[51] Int. Cl..... **E05d 13/02**
[58] Field of Search..... **49/409-411; 16/87, 90, 91, 94, 95, 99, 105, 106**
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[57] **ABSTRACT**
A sliding glass panel held by only two side rails removably and adjustably mounted on a track. An identical female recess on both ends of each rail, for removably and adjustably mounting an upper male hanger by a spring clip and for removably mounting a lower guide member, respectively.
12 Claims, 10 Drawing Figures



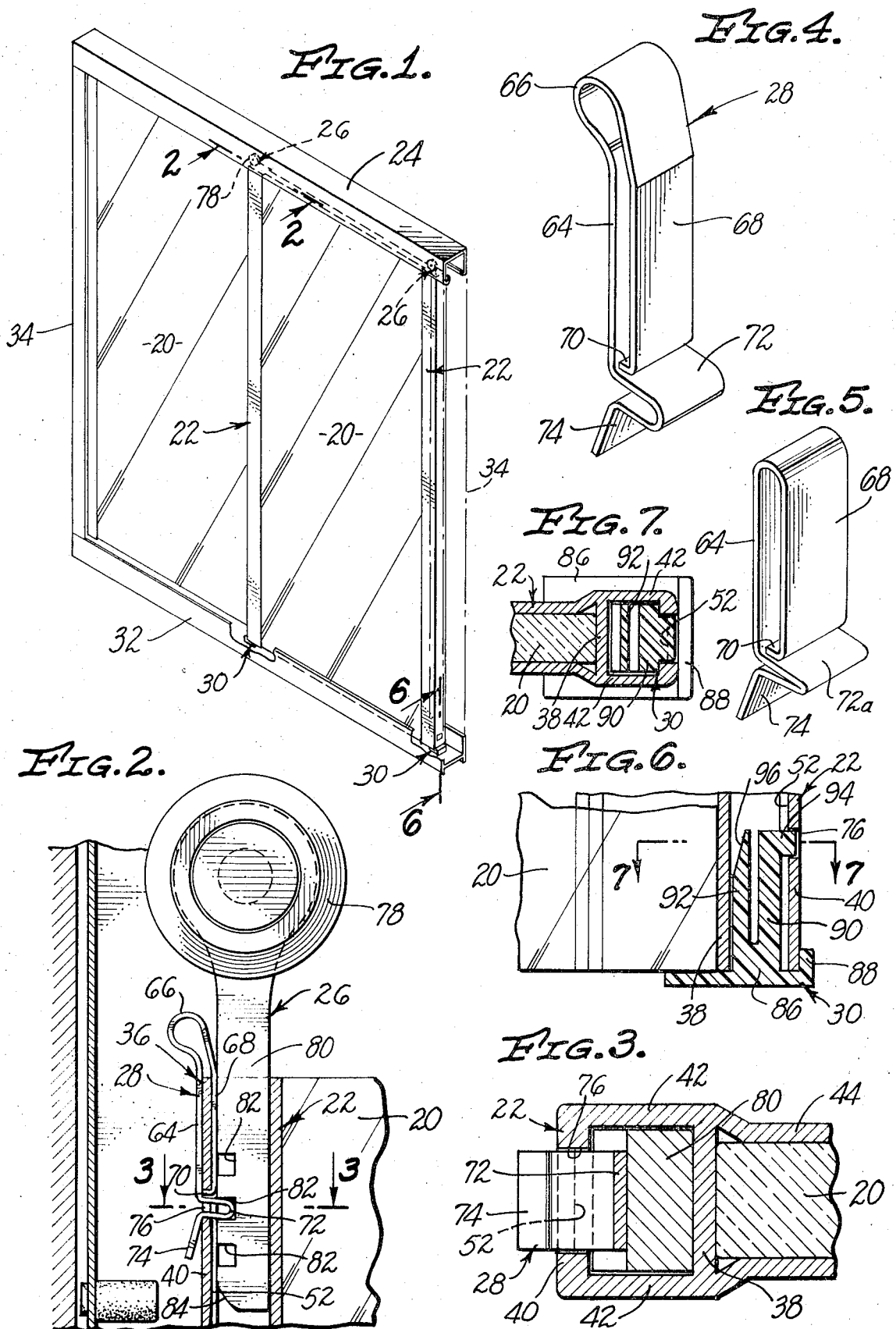


FIG. 8.

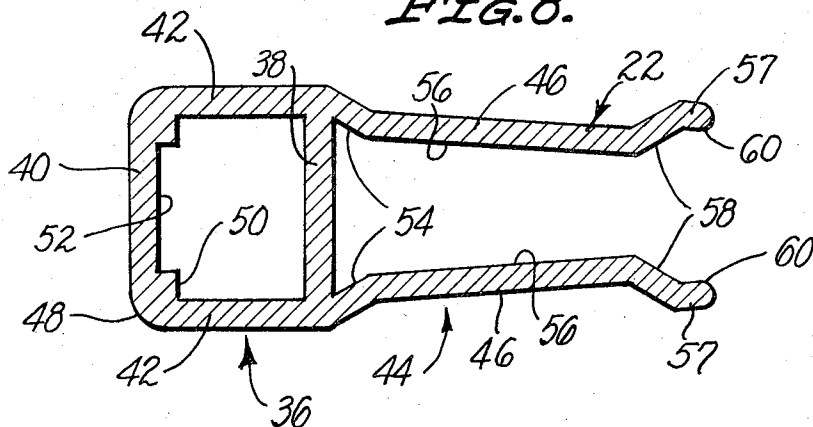


FIG. 9.

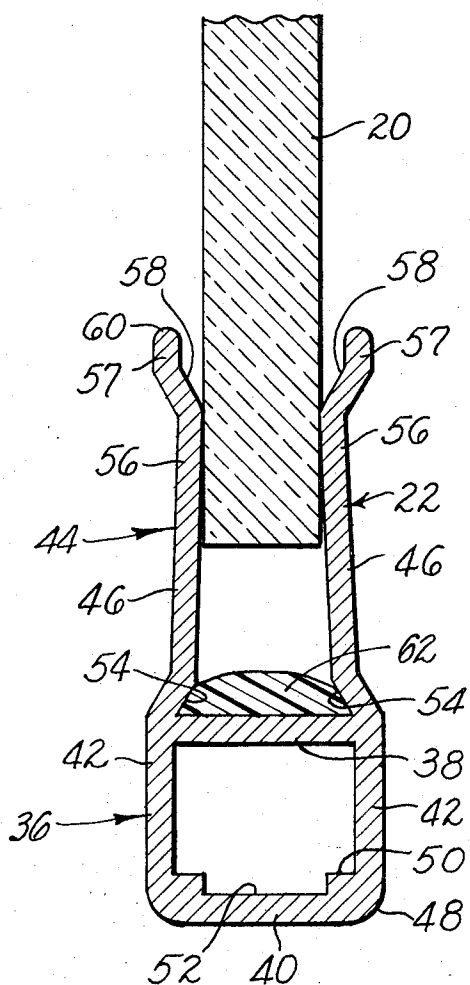
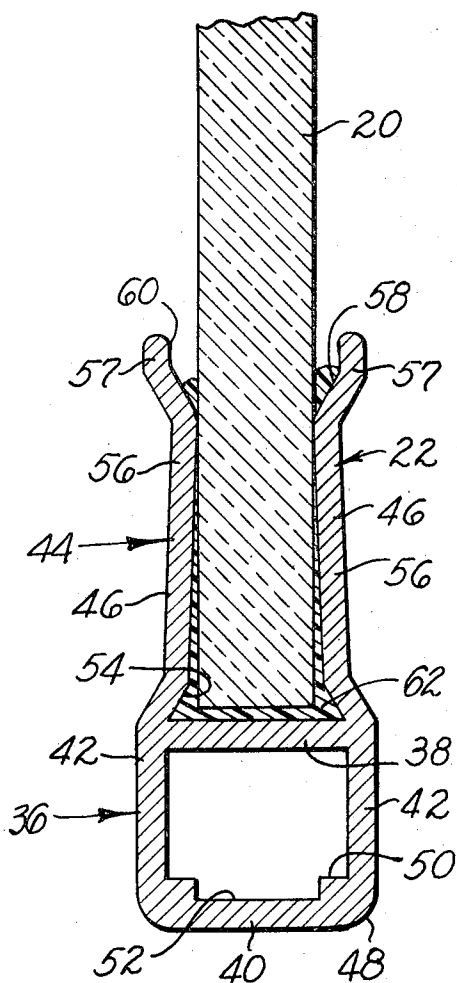


FIG. 10.



SLIDING DOOR ASSEMBLY

This invention relates in general to sliding door assemblies and is particularly applicable to sliding glass tub enclosures mounted by hangers in a top track and guide members in a lower track.

Prior art sliding doors, and particularly conventional sliding glass tub enclosures have employed relatively complicated apparatus for mounting and hanging the glass panels in top and bottom tracks. Rails or framing members have usually been required on all four edges of the sliding glass panel. During recent years, the safety provisions of many building codes have required safety glass such as tempered glass for tub enclosures, thereby eliminating the need for such rails or framing members. Nevertheless, it has still been necessary to drill holes in the glass panels in order to mount the hangers. In addition, vertically adjustable hangers for both glass and plastic panels have been unduly complicated and unimaginative and have usually required the unscrewing of mounting nuts or the like in order to provide any vertical adjustment.

Accordingly, it is a primary object of the present invention to simplify the aforementioned prior art sliding door assemblies and provide a sliding glass panel held by only side rails mounted in a top track by vertically adjustable hangers and in a bottom track by a guide member, thereby eliminating the top and bottom rails as well as the need for nuts, bolts, or screws.

It is another object of the invention to provide a glass panel which can be easily and securely mounted by adhesive between side rails by automated equipment. A related object is to provide side rails having substantially identical top and bottom ends, thereby eliminating the need of end-for-end orientation of the rails, both at the time the rails are attached to the glass panel as well as at the time the glass panels are mounted in the top and bottom tracks.

A more specific object of the invention is to provide side rails having a rearward reinforcing portion with upper and lower female sections for receiving a male hanger member and a male guide member, respectively, and a forward gripping portion with lateral projections extending forwardly in a normally inward tapered position.

A further object of the invention is to provide a sliding door assembly having the aforementioned characteristics wherein a stop member such as a spring clip is removably mounted on the top female member of the side rail for lateral movement from a normally closed position of engagement with a male hanger member to an open position of disengagement. A related object is to provide a plurality of vertically spaced slots in the male hanger for engagement by the spring clip.

An additional object of the invention is to provide an inexpensive and durable sliding door assembly having a minimum of parts, so that the glass panels can be mounted by automated equipment between side rails at a factory and then shipped with the necessary number of hangers, spring clips, guides, tracks and jambs for quick and easy assembly at the destination point, and where any worn out or inoperative part in a completely assembled unit can be easily replaced.

Further objects, features, and advantages of the invention will be evident to those skilled in the art from the following description of a preferred embodiment of the invention.

In the drawings:

FIG. 1 shows a partially cut-away view of an installed unit incorporating a presently preferred embodiment of the invention;

FIG. 2 shows a side sectional view of the hanger portion of FIG. 1 taken along the line 2—2 of FIG. 1;

FIG. 3 shows a top sectional view taken along the line 3—3 of FIG. 2;

FIG. 4 shows a perspective view of a presently preferred form of spring clip;

FIG. 5 is a perspective view of an alternative form of spring clip;

FIG. 6 is a side sectional view of the guide portion of FIG. 1 taken along the line 6—6 of FIG. 1;

FIG. 7 is a top sectional view taken along the line 7—7 of FIG. 6;

FIG. 8 is a top sectional view of a side rail before attachment to a glass panel;

FIG. 9 is a top sectional view showing a glass panel partially inserted in a side rail; and

FIG. 10 is a top sectional view showing a glass panel completely inserted in a side rail.

Generally speaking, the invention includes a sheet of material which has a panel, typically a glass panel 20 made of tempered glass or other safety glass, held between a pair of opposite edge members such as side rails 22 each of which is mounted in a header or top track 24 by a hanger 26 held in position at the top end of the side rail by a stop member such as a clip 28. The bottom end of each side rail 22 carries a guide 30 and rides in a lower track 32. As shown in FIG. 1, a pair of glass panels 20 so mounted in top and bottom tracks 24, 32 can be moved back and forth in the tracks to open and close the space between a pair of jambs, one of which is shown 34.

Referring specifically now to FIGS. 8, 9 and 10, the side rails 22 have been designed to hold and grip the glass panel 20 therebetween without the need for any rails on the top or bottom of the panel, and without the need of any screws, nuts or bolts. The exemplary form of side rails shown in the drawings includes a rearward portion 36 having front, back and side vertical walls 38, 40 and 42, respectively, and a forward portion 44 having lateral projections 46. Both the rearward portion 36 and the forward portion 44 preferably extend the full length of the side rails 22 and the glass panel 20 held therebetween. The rearward and forward portions 36, 44 may be formed of a single piece of material, such as aluminum, so that the forward portion is integral with the rearward portion. The front, back and sidewalls 38, 40, 42 all extend longitudinally in the same direction, with the sidewalls defining a first set of parallel planes and the front and back walls defining a second set of parallel planes substantially perpendicular to the first set. The outside corner 48 of the junction between the back wall 40 and each sidewall 42 may be rounded, while the inside corner 50 may be enlarged to form a longitudinal slot 52 on the inside surface of the back wall. The lateral projections 46 are symmetrically shaped to provide a pair of short inwardly tapered sections 54 connected to the junctions between the front wall 38 and the sidewalls 42, a pair of middle sections 56 which are tapered inwardly but at a lesser angle, and a pair of flaired forward ends 57 having diverging portions 58 adjacent to the middle section 56 and short forward end sections 60 which are substantially aligned with and parallel to the sidewalls 42. Although suitable

side rails may be designed which do not have back and side vertical walls 40, 42, such walls provide the necessary structure for mounting the hanger 26 and guide 30 as well as providing added strength to the side rails.

In a typically automated assembly operation, a bead of adhesive 62 is dispensed between the lateral projections 46 in the cavity defined by the front wall 38 and the short inwardly tapered sections 54 the full length of a side rail 22 (see FIG. 9). A glass panel 20 is then inserted between the flaired sections 57 and forced between the middle section 56 to flex the lateral projections 46 outwardly from their normal position (see FIG. 9). By forcing the glass panel 20 further into the space between the lateral projections 46, the adhesive 62 is squeezed into the spaces between the glass panel and the surrounding lateral projections so as to provide a seal between the glass panel and the side rail as well as provide a resilient cushion therebetween and also between the glass panel and the front wall 38. The space between the glass panel and the faired forward ends 57 need not be filled with adhesive, but provides a space for overflow of adhesive to pass into, thus providing an additional bond between the glass panel and the lateral projections 46 without visibly detracting from the appearance of the glass panel adjacent the side rails. It will therefore be appreciated that the dimensions and shaping of the side rails provide a safe and secure means of holding the glass panel without having to use conventional fasteners such as nuts and bolts, and without having to use top and bottom rails.

Referring now to FIGS. 2, 3, and 4, the clip 28 is made of a strip of spring material which is folded back on itself and bent in a predetermined fashion to form a rear leg 64, a rearward loop 66 at the folding back junction, a front leg 68, flange 70, a forward loop 72, and a second flange 74. The rear and front legs 64, 68 define a pair of spaced apart parallel planes connected on top by the rearward loop 66, and with the first flange 70 at the lower end of the front leg 68 and extending toward and normal to the rear leg 64. The forward loop 72 is connected to the bottom of the rear leg 64 and extends forwardly underneath and adjacent to the first flange 70 and comes back upon itself to terminate in the second flange 74 which extends obliquely in a rearward direction from the plane defined by the rear leg 64. Apertures 76 are provided in the back wall 40 a short distance from both ends of the side rails 22 so that by spreading the rear and front legs 64, 68 of the clip apart, the clip can be pushed down on both sides of the back wall 40 until it locks in position such that the first flange 70 and the forward loop 72 rest in the aperture 76 with the forward loop projecting into the rearward portion 36 of the side rail 22 and the second flange 74 extending obliquely from the aperture on the outside of the rearward portion. The width of the clip 28 is sized so that the front leg 68 can rest in the longitudinal slot 52 of the back wall 40.

FIG. 5 shows an alternative form of clip 28 wherein the rearward loop 66 has been eliminated and including a modified triangular shaped forward loop 72a. Other clips of varying shapes or other stop members may be designed for engaging the hanger 26, all within the scope of the present invention.

The hanger 26 carries a roller 78 on its top end and includes a lower rod 80 having a rectangular cross-section sized to fit between the front, back and side-walls 38, 40, 42 of the rearward portion 36 of the side

rails 22 when the front leg 68 is resting in the longitudinal slot 52. A plurality of vertically spaced slots or notches 82 are on the rearward face of the lower rod for engagement by the forward loop 72 of the clip 28. A bevel 84 is provided on the rearward face of the rod 80 between the first notch and the end of the rod.

It will therefore be appreciated that after the clip 28 has been mounted on the back wall 40 with the forward loop 72 extending through the aperture 76, the rearward portion 36 of the side rail can be considered as a female member, and the hanger considered as a male member which can be inserted in the vertical passage of the female member until the bevel 84 laterally displaces the forward loop 72. When the forward loop 72 is adjacent the first notch, the spring force of the clip locks the forward loop into the notch. If it is necessary to raise the glass panel further off the bottom track, such as to have the side of the panel be parallel to the jamb 34, the forward loop 72 can be retracted to an open position of disengagement by manually pulling on the second flange 74 while the hanger is pushed downwardly. When the proper notch 82 is adjacent the aperture 76, the second flange 74 can be released thereby allowing the forward loop to snap back into locking position against the hanger. Of course, the foregoing adjustable and removable hanger mounting structure may be useful for sliding panels made of plastic or other materials as well as for glass panels held between side rail members.

The guide 30 (see FIGS. 6 and 7) is preferably made of spring plastic and includes a base 86, a vertical flange 88 along one edge of the base, spaced apart back and front vertical legs 90, 92, and a rearward flange 94 on the top of the back leg 90. A bevel 96 on the top end of the forward face of the front leg 92 allows both legs 90, 92 and the rearward flange 94 to be inserted in the rearward portion 36 of the side rail 22 as the front and back legs are squeezed together. The guide 30 has a predetermined size so that when the rearward flange 94 reaches the aperture 76 and snaps into position in the aperture, the base 86 abuts against the bottom of the front, back and sidewalls 38, 40, 42 with the vertical flange 88 against the outside surface of the back wall 40. The guide can be removed by pushing the rearward flange 94 through the aperture 76 while at the same time pulling downwardly on the vertical flange 88 and the base 86. The guide prevents noise, excess wear, and facilitates easy gliding of the panels in the lower track 32.

It will therefore be appreciated from the foregoing that the hanger 26 and clip 28 can be mounted on either end of the side rails 22, and that similarly the guide 30 can also be mounted on either end, thereby eliminating the need for any end-to-end orientation of the side rails or the glass panel mounted therein.

The illustrated structure herein has been used commercially to hang a sliding tempered glass tub enclosure panel 28 inches wide and 54 inches long which weighs approximately 30 pounds, and it is also believed to be commercially applicable for heavier and/or larger panels.

Although an exemplary embodiment of the invention has been disclosed and discussed, it will be understood that other applications of the invention are possible, and that the embodiment disclosed may be subjected to various changes, modifications, and substitutions with-

out necessarily departing from the spirit of the invention.

I claim as my invention:

1. A sliding door assembly comprising:
 - an overhead track;
 - a glass panel having opposed vertical edges the portions of said panel adjacent said edges having opposed flat surfaces;
 - supporting means for said panel comprising an elongated channel shaped gripping means extending along and resiliently frictionally embracing only each of said vertical edges along the full length thereof, each of said gripping means having a rearward vertical wall and forwardly extending and converging flange portions extending into firm frictional engagement with respective opposed flat surfaces, each of said flange portions having outwardly flared forward edge portions; and
 - a hanger means at the upper end of each gripping means guiding said door assembly along said track, said flange portions frictionally gripping said opposed flat surfaces with sufficient force to provide the sole support for said glass panel.
2. The sliding door assembly of claim 1 including stop means attached to said rearward vertical wall portion for removably and adjustably connecting said hanger means with said gripping means.
3. The sliding door assembly of claim 2 wherein said hanger means includes vertically spaced notches and said stop means includes a spring clip to engage one of said notches.
4. The sliding door assembly of claim 2 wherein, said stop means includes a lateral mounting flange; and said rearward vertical wall portion includes upper wall means defining a vertical passage for receiving said hanger means and including an aperture for receiving said lateral mounting flange of said stop means.
5. The sliding door assembly of claim 4 including, a guide member having a lateral mounting flange; and wherein said rearward vertical wall portion includes lower wall means identical to said upper wall means defining a vertical passage for receiving said guide member and including an aperture for receiving said lateral mounting flange of said guide member.
6. Apparatus for mounting a sliding panel on a top track comprising:
 - two female members on the top portion of said panel and laterally displaced from each other;
 - two male members each insertable into corresponding ones of said two female members, respectively, each of said male members including means for riding on said track;
 - stop means on each of said female members for engaging each of said male members to hold them in a fixed position;
 - said stop means including spring clip means removably mounted on each of said female members for movement from a normally closed position of en-

agement with said male members, respectively, to an open position of disengagement; and each of said spring clip means including a handle for moving each of said spring clip means from said normally closed position to said open position.

7. The apparatus of claim 6 including gripping means connected to only the vertical edges of said panel for holding said panel therebetween, and wherein said female members are carried on and are integral with said gripping means.

8. The apparatus of claim 6 wherein each of said male members includes means for moving each of said spring clip means from said normally closed position to said open position.

9. The apparatus of claim 6 wherein each of said male members includes a plurality of vertically spaced slot means for receiving said stop means.

10. The apparatus of claim 6 including two additional female members on the bottom portion of said panel and laterally displaced from each other, said additional female members being identical to said first mentioned female members on the top portion of said panel, and further including two male guide members each insertable into corresponding ones of said two additional female members.

11. A sliding door assembly for hanging a glass panel with opposite vertical sides on a top track comprising: a pair of edge members each having inwardly tapered lateral projection means for engaging and gripping said vertical sides of said glass panel; a hanger having an upper end for riding in the top track and a lower end with vertically spaced notches; vertical wall means on the top end of said edge members defining a passage for receiving said lower end of said hanger and including a lateral aperture displaced from said top end; and a unitary spring clip with a mounting flange on one end inserted in said aperture, a lateral stop member on the other end extending through said aperture to engage one of said notches of said hanger, and a middle section extending along the inside surface, top edge and outside surface of that portion of said vertical wall means above said aperture.

12. In a sliding door assembly, the combination of: an edge member engageable with a vertical edge of a glass panel; said edge member having a vertical passage and a lateral aperture communicating with said passage; a hanger having a lower end in said passage and vertically spaced notches each registrable with said aperture; and a one-piece spring clip secured to said edge member and having a lateral projection extending through said aperture into one of said notches, said projection being biased into such notch by the inherent resilience of said spring clip, said spring clip including handle means adjacent said projection for withdrawing said projection from the notch in which it is disposed.

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