

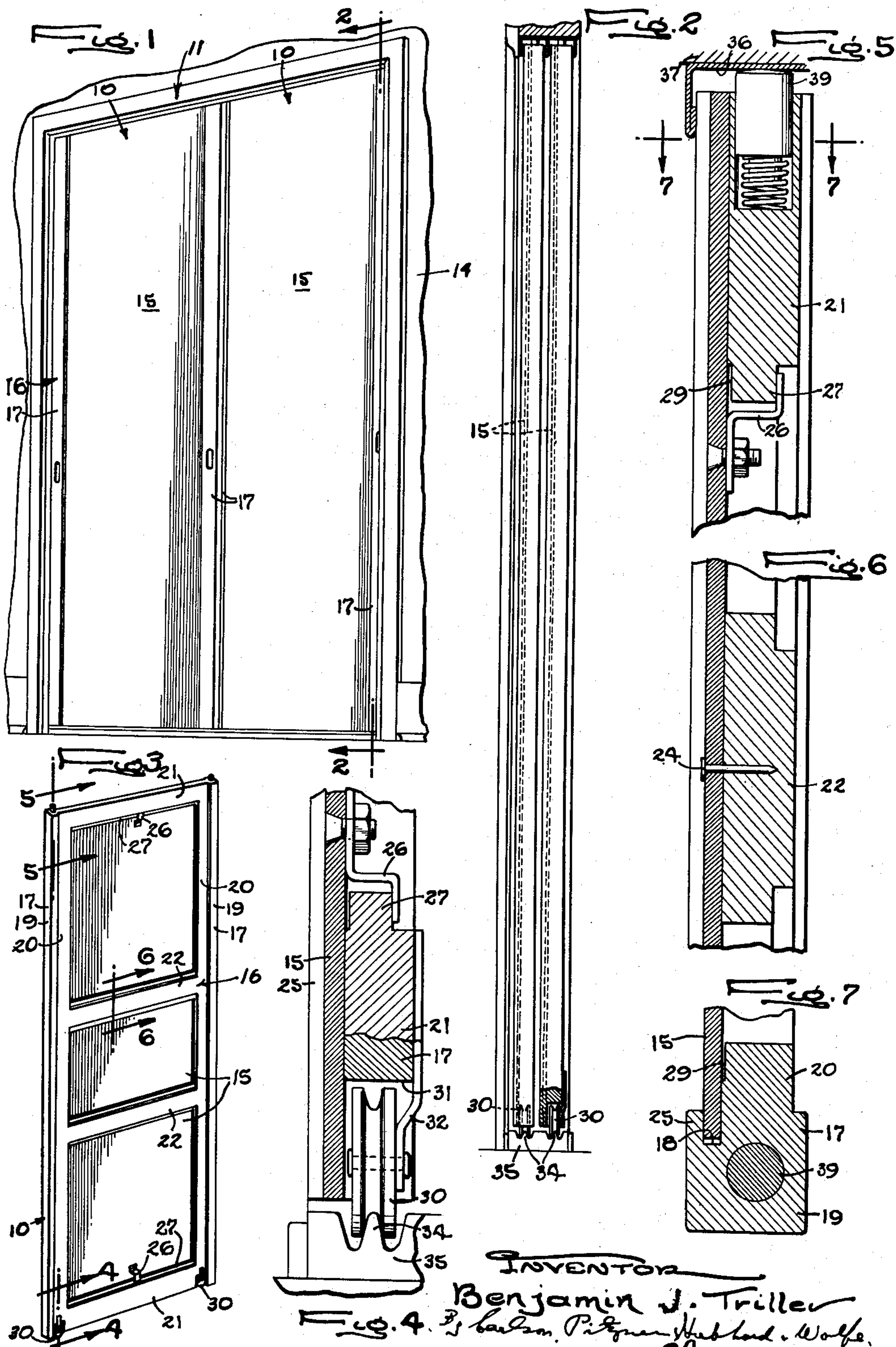
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FREELY TRANSLATABLE SLIDING DOOR

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Fig. 4. By *Carlson, Pitman, Hubbard & Wolfe*, ATTORNEYS

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FREELY TRANSLATABLE SLIDING DOOR

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The present invention relates to improvements in sliding doors of relatively large size adapted to be supported in fixed, rigid frames for translatory opening and closing movements.

Hitherto, one of the problems encountered in the use of doors of this type, particularly those having basic structural components formed from materials having different coefficients of thermal expansion and contraction, has been severe binding between the doors and their support guides or tracks induced by warping or winding of the doors, especially during extreme weather conditions, which impairs free opening and closing movements of the doors.

One object of the invention is to provide an improved sliding door of considerable size which is inherently capable of remaining freely slidable along rigid support guides throughout long periods of use and extreme weather conditions, even though the door is fabricated of basic structural elements having different coefficients of thermal expansion. A collateral object is to provide a door of this character formed of a strikingly simple and inexpensive construction.

A more specific object is to provide a sliding door of relatively large size having a large body panel and reinforcing frame fully integrated and correlated with each other in a novel manner which eliminates any tendency of the door to warp or wind because of unequal expansion and contraction of the frame and panel.

A further object is to provide an improved door of the character recited which will not produce a binding action on its support guides which will impede its free translation to any significant degree, even if the door should for any reason acquire a residual warp or twist.

Other objects and advantages will be perceived from the following description of the exemplary embodiment of the invention shown in the accompanying drawings, in which:

Figure 1 is a perspective view showing a passageway including a rigid guide frame guidingly supporting two sliding doors constructed in accordance with the invention.

Fig. 2 is a vertical sectional view on an enlarged scale taken along line 2—2 of Fig. 1, showing the longitudinal edges of the doors and illustrating the manner in which the doors are supported in the guide frame.

Fig. 3 is a perspective view of the rear side of one of the doors shown in Fig. 1.

Fig. 4 is a fragmentary sectional view on an enlarged scale taken along line 4—4 of Fig. 3.

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Fig. 5 is a fragmentary sectional view on an enlarged scale taken along line 5—5 of Fig. 3.

Fig. 6 is a fragmentary sectional view also on an enlarged scale taken along line 6—6 of Fig. 3.

Fig. 7 is a fragmentary sectional view taken along line 7—7 of Fig. 5.

Although certain worth-while advantages are realized from the specific correlation of structural elements forming the illustrated embodiment of the invention, it will be understood that the invention is not limited to the form shown, but embraces all equivalent constructions falling within the spirit and scope of the invention as expressed in the appended claims.

Sliding doors of the type to which the present invention relates are well suited for use in the construction of residences and similar buildings to close passageways such as entrances into closets and the like. For purposes of illustration, two such doors 10 embodying teachings of the present invention are shown slidably mounted in a rigid guide and support frame 11 fixed in a double door passage in a building wall 14. The doors 10 are of substantially identical construction and the description of one herein applies to both.

Both doors 10 are of rectangular elongated shape and of substantial size. In the preferred construction shown, each door comprises a single body panel 15 of rather thin material conforming generally in shape and size to the overall configuration of the door. The panel 15 is supported by a skeleton reinforcing frame 16 of simplified construction that is correlated with the panel in a novel manner which avoids any appreciable drag on the free translatory movement of the door 10 along its support guides due to binding between the door and guides such as that commonly caused by the warping or winding of conventional sliding doors.

For purposes of economy in manufacture and neatness in appearance, the body panel 15, which covers virtually the entire area of the door, is cut from a relatively thin sheet of laminated or pressed material such as Masonite. The frame 16 is fabricated of the woods commonly used in mill work. Since the materials as used in the door panel 15 and frame 16 ordinarily have different coefficients of thermal expansion, they are potentially capable when used together in conventional door constructions of creating internal stresses producing warping or winding of the door. However, this deleterious effect is avoided in the present construction wherein the frame 16 provides for free expansion movement of the body

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panel 15 while at the same time affording sturdy, positive support to the panel along its entire peripheral edge as well as its central midsection. In conjunction with this, the door 10 is further adapted to have free sliding movement along its supports, even though the door should for any reason acquire a residual warp or wind.

Structurally, the reinforcing frame 16 comprises two spaced side stiles 17 extending along opposite side edges of the door. The inner faces of the respective stiles are rabbeted to define inwardly open rabbets or grooves 18, Fig. 7, adapted to slidably receive opposite marginal side edges of the body panel 15. Preferably, each stile 17 is shaped transversely to include a generally rectangular body portion 19 and a reinforcing web 20 of substantially less thickness than the stile body and extending inwardly from the inner face of the latter. It will be noted that the rabbets 18 are formed in the respective stile bodies 19 and located forwardly of the reinforcing webs 20 with the innermost edges of the rabbets aligned with the front faces of the latter. Thus, the stile webs 20 are utilized to afford further support or backing to the contiguous marginal edges of the panel 15.

It should be noted that the body portions 19 of the respective stiles 17 define rather thick sturdy edges for the door 10. By virtue of the support afforded by the stile webs 20, it becomes feasible to reduce the lateral width of the respective stile bodies 19 to a relatively small dimension. Preferably, this lateral width of the stile bodies 19 is so reduced that the bodies become substantially square in transverse section. The stiles constructed in this manner are capable of affording sturdy support to the respective side edges of the door panel 15 without having objectionable longitudinal stiffness which, as will presently appear, complicates the problem of eliminating binding between the door and its support guides.

Corresponding ends of the stiles 17 at opposite ends of the door 10 are connected by end rails 21. These rails 21 are thinned to the thickness of the reinforcing stile webs 20 and are joined at opposite ends in flush abutting relation to the latter by suitable dowel pins or the like (not shown). Opposite ends of the door body panel 15 are extended to the outer marginal edges of the respective cross rails 21 in slidable overlying relation to the forward faces of the rails whereby the latter affords sturdy support to the panel.

The intermediate portions of the respective stiles 17 are connected by one or more, in this instance two, cross rails 22. Like the end rails 21, the cross rails 22 have the same thickness as the stile reinforcing webs 20 and are similarly joined in abutting relation thereto. Thus, the cross rails 22 which are disposed in coplanar relation with the reinforcing webs 20 afford sturdy support to the central portion of the body panel 15. The weight of the body panel 15 is sustained by anchoring the central portion of the panel to the cross rails 22 by suitable anchoring means which, in this instance, comprise sash pins 24.

As best shown in Fig. 7 the marginal side edges of the body panel 15 are held securely against the reinforcing webs 20 of the respective stiles 17 by longitudinal lips 25 on the stile body portions 19 which define the front edges of the support rabbets 18. To positively maintain the opposite ends of the body panel 15 in abutting side engagement with the respective end rails 21 while at the same time preserving the slidable relationship between the panel and rails, modified Z-shaped

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clips or brackets 26 are fixedly attached to opposite ends of the panel to slidably engage elongated beads 27 defined on the inner edges of the respective end rails.

As it is contemplated that the door 10 will be painted or enameled after assembly, special provision is made for preventing the formation of a paint bond between the panel 15 and the cross rails 21 which would impede free sliding movement of the panel over the rails. For this purpose, the edges of the respective rail beads 27 adjacent the panel 15 are undercut (Fig. 5) to provide a gap 29 between the bead and the panel of sufficient width to prevent the formation of a paint bond between these structural elements.

Thus, it will be appreciated that the body panel 15 is free to expand and contract by free lateral sliding movement into and out of the stile rabbets 18 and free longitudinal movement along the end rails 21. Yet, despite this provision for movement between the panel 15 and frame 16, the peripheral edges of the panel, as well as the central portion thereof, are maintained in firm engagement with the reinforcing frame 16.

Not only does the structural provision for relative sliding movement between the door panel 15 and reinforcing frame 16 eliminate warp or wind due to unequal expansion or contraction of these structural components of the door, but it also, quite significantly, lends a limber or flexible quality to the door whereby its resistance to externally applied winding forces is reduced to a minimum. In this connection, it will be noted that the capability of the door 10 to flex under a twisting force is further enhanced by special design features of the frame 16 itself. These include the thinned construction of the end and cross rails 21 and 22 together with the specially formed stiles 17, previously described, which achieve strength without stiffness. Thus, in the event the door 10 or its frame 16 or panel 15 should for any reason acquire some degree of residual warp, the distortion is easily overcome, upon installation of the door into a fixed support guide 11, by slight pressure of the support guide 11. By virtue of the singular torsional yieldability of the door 10, this pressure is well below that which would produce significant binding between the guide and the door.

For the purpose of illustration, each door 10 is provided with two support rollers 30 mounted in notches 31 in the lower ends of the respective stiles 17 by brackets 32 for rolling engagement with a support rail 34 formed on the threshold 35 of the door guide frame 11. Since the guide frame 11 in this instance supports twin doors, two parallel rails 34 are provided on the threshold 35 for the respective doors. The upper ends of the doors 10 are guided respectively in parallel guide channels 36 fixed to the upper horizontal member 37 of the guide frame 11. Each door 10 is steadied in its support guides by spring pressed pins 39 provided in the upper end of each stile 17 to resiliently and slidably engage the associated channel guide 36.

I claim as my invention:

1. A flexible sliding door of rectangular shape comprising, in combination, a rectangular skeleton frame including two side stiles disposed in spaced parallel relation to each other, each of said stiles including a transversely square body portion and a thinned web support member extending inwardly relative to said door from the inner longitudinal edge of said body portion, said body portion of each stile defining an elongated

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rabbet disposed immediately contiguous to the forward edge of the web member thereon, two end rails of substantially the same thickness as said side stiles, said rails connecting corresponding ends of said stiles at opposite ends of said door and disposed in substantially coplanar relation to said webs, a rectangular body panel having opposite marginal side edges disposed in said respective stile rabbets and opposite ends lying in slidable side engagement with said respective end rails, said end rails each having a thinned elongated bead on the inner edge thereof, the inner edges of said respective rail beads being undercut on the sides thereof adjacent said panel to define therewith gaps of substantial width designed to avoid the formation of a paint bond between said panel and said end rails, retaining brackets fixed to opposite ends of said panel and slidably engaging said respective rail beads to positively secure said panel in slidable engagement with said rails, a cross rail of substantially the same thickness as said stile webs interconnecting intermediate portions of said stiles, and anchoring means securing the central portion of said body panel to said cross rail to support said panel on said skeleton frame for free expansion movement relative thereto.

2. A flexible sliding door, of rectangular shape comprising, in combination, a rectangular skeleton frame including two side stiles disposed in spaced parallel relation to each other, each of said stiles including a transversely square body portion and a thinned web support member extending inwardly relative to said door from the inner longitudinal edge of said body portion, said body portion of each stile defining an elongated rabbet disposed immediately contiguous to the forward edge of the web member thereon, two end rails connecting corresponding ends of said stiles at opposite ends of said door and disposed substantially flush with the forward sides of said stile webs, a rectangular body panel having opposite marginal side edges disposed in said respective stile rabbets and opposite ends disposed in slidable side engagement with said rails, a cross rail interconnecting intermediate portions of said respective stiles, anchoring means fixing the central portion of said panel to said cross rail, and guide following means secured to opposite ends of said frame.

3. A limber sliding door of rectangular shape comprising, in combination, a rectangular skeleton frame including two side stiles disposed in spaced parallel relation to each other, each of said stiles defining an inwardly facing longitudinal rabbet therein and having a thinned web portion running along the inner longitudinal edge thereof at one edge of said rabbet, two end rails of substantially the same thickness as said stile

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webs, said rails connecting corresponding ends of said stiles at opposite ends of said door and disposed in substantially coplanar relation to said webs, a rectangular body panel having opposite marginal side edges disposed in said respective stile rabbets and opposite ends disposed in slidable side engagement with said rails, each of said end rails having an elongated bead on the inner edge thereof disposed in slightly spaced relation to the contiguous portion of said panel, retaining brackets fixed to said panel and slidably engaging said respective end rail beads, and guide following means on opposite ends of said frame.

4. A rectangular sliding door comprising, in combination, a skeleton frame including two spaced parallel side stiles, two end rails joining corresponding ends of said respective stiles, a central cross rail connected in spanning relation to the medial portions of said respective stiles, said stiles each defining an inwardly open rabbet extending longitudinally therealong, a rectangular body panel having opposite side edges slidably received in said respective stile rabbets, means slidably attaching opposite ends of said panel to said respective end rails, and anchoring means securely fixing the medial portion of said panel to said cross rail to support said panel therefrom for free expansion movement relative to said stiles and said end rails.

5. A rectangular sliding door comprising, in combination, a skeleton frame including two spaced parallel side stiles, two end rails joining corresponding ends of said respective stiles, a central cross rail connected in spanning relation to the medial portions of said respective stiles, said stiles each defining an inwardly open rabbet extending longitudinally therealong, a rectangular body panel having opposite side edges slidably received in said opposed stile rabbets, opposite ends of said panel slidably engaging respective end rails, the inner edges of said respective end rails being undercut on the sides thereof adjacent said panel to define therewith gaps of substantial width designed to avoid the formation of a paint bond between said panel and said end rails, and anchoring means securely fixing the medial portion of said panel to said cross rail to be supported thereby for free expansion movement relative to said stiles and end rails.

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