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Banner

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[54] SLIDING-DOOR CORNER JUNCTION AND SUPPORT STRUCTURE

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[52] **U.S. Cl.** **49/420**, 16/99

[51] **Int. Cl.** **E05d 13/02**

[58] **Field of Search** 49/420, 421, 425; 16/99

[56] **References Cited**

UNITED STATES PATENTS

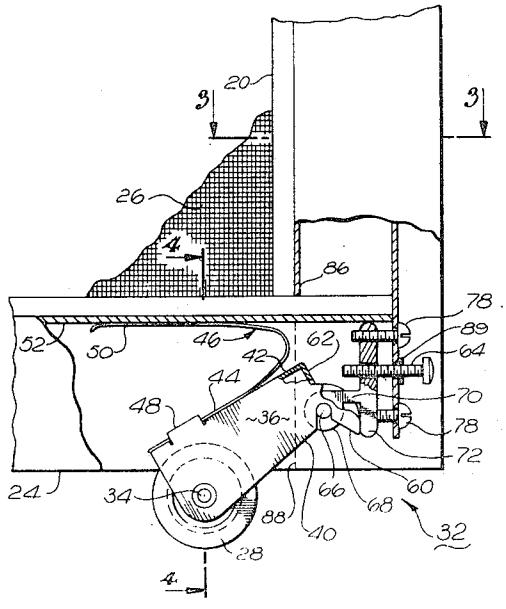
3,298,136	1/1967	Saunders	49/425
3,283,444	11/1966	Andres	49/420

Primary Examiner—Kenneth Downey

[57] **ABSTRACT**

A sliding-door structure is disclosed incorporating a corner device which affixes linear frame members together in a lapped corner joint and further provides a spring-biased threshold-engaging roller, the "stop" or loaded position of which is adjustable as a result of a screw member that is accessible at the stile of the door. A corner block matingly engages transverse apertures in a frame rail and is affixed, as by screws, to the lapping end of a stile. The block also provides a pivot post for a carrier which in turn supports a roller. The carrier is affixed to a spring for maintaining the roller engaged with a threshold rail, and an adjustment is provided through the block by a screw which abuts the carrier.

2 Claims, 5 Drawing Figures



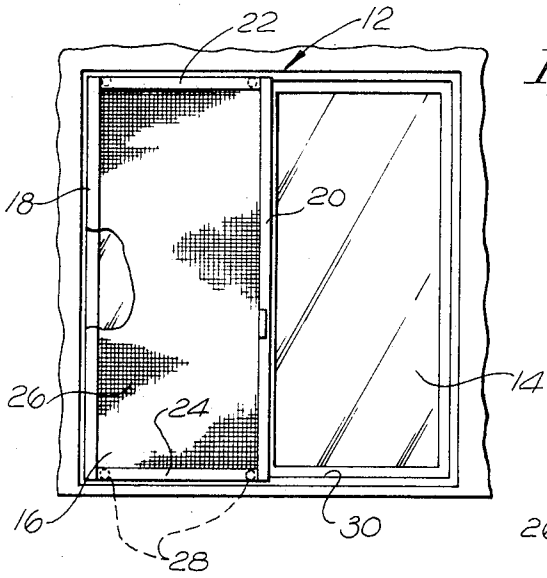


Fig. 1.

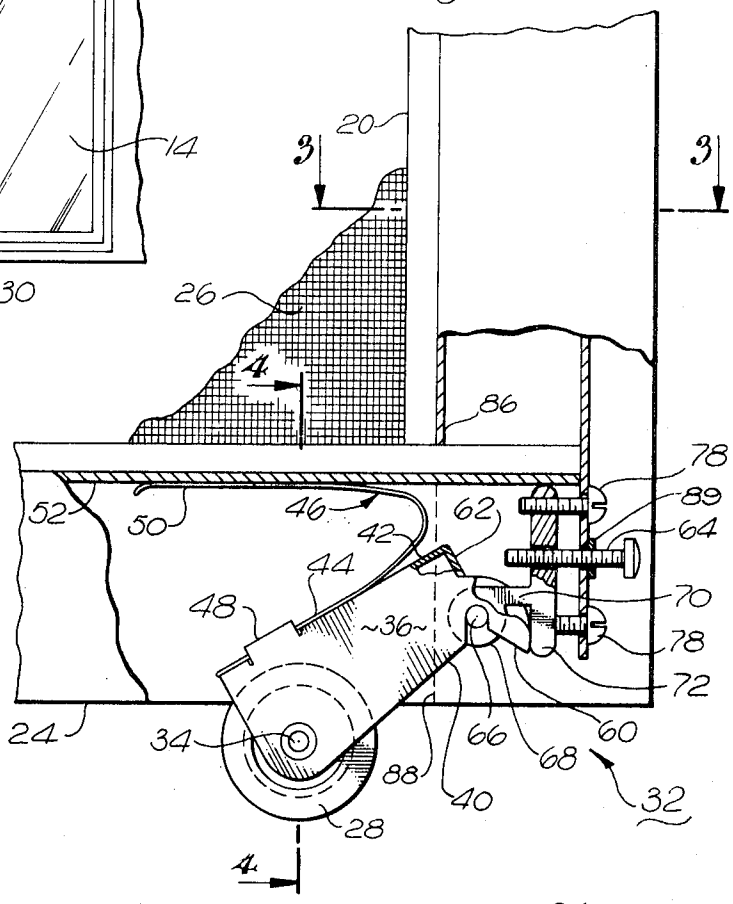


Fig. 2.

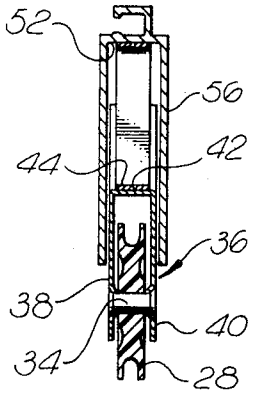


Fig. 4.

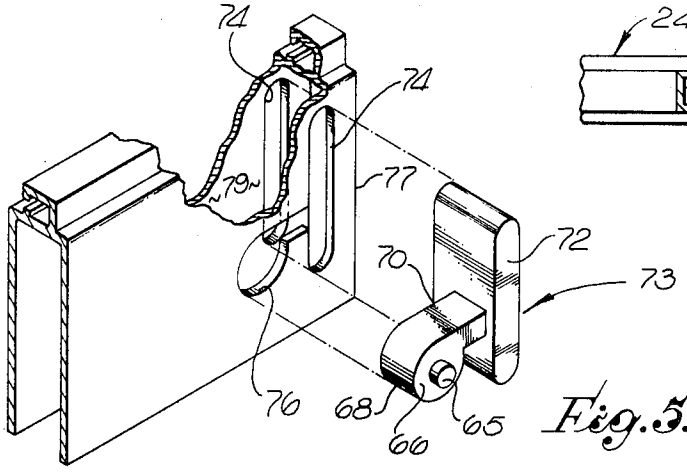


Fig. 5.

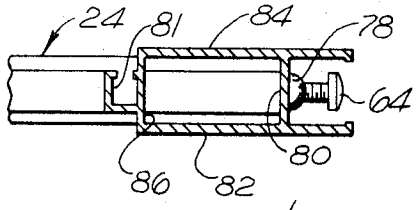


Fig. 3.

SLIDING-DOOR CORNER JUNCTION AND SUPPORT STRUCTURE

BACKGROUND AND SUMMARY OF THE INVENTION

Various forms of light-weight sliding panels have come into widespread architectural use, as for example in the form of screen doors used in conjunction with sliding-glass doors. Frequently, such doors or panels incorporate rollers or wheels that engage a threshold track to ease movements of the panel. However, the use of the term "sliding door" to cover such structures has endured and, accordingly, is generically used herein.

Light-weight sliding doors sometimes tend to become disengaged from the threshold track on which they are conventionally carried. To overcome that tendency, it has been proposed to mount the rollers or wheels (that carry the weight of the door) on a spring-biased carrier, so that if the door is lifted, the carrier moves the rollers to maintain engagement with the threshold track. Forms of such structures are shown and described, for example, in U.S. Pat. Nos. 3,090,084 (Banner), 3,175,255 (Saunders), and 3,283,444 (Andres).

Although previously proposed light-weight sliding-door structures have gained widespread acceptance, certain attendant problems continue to exist. Specifically, for example, after a substantial period of use, the guide rollers supporting the door become worn and require adjustment or replacement. Consequently, a need exists for a structure wherein the wheels may be simply and easily replaced or serviced. As a related consideration, a substantial range of adjustment for the load-carrying position of the rollers, along with convenient access to accomplish such adjustment are further desirable characteristics of such mechanisms.

Of course, economy of production as related to materials and labor is also an important consideration in relation to sliding doors. Consequently, a need continues to exist for an improved, simple and inexpensive structure which may be economically embodied as a sliding door, with relatively little manufacturing time and by persons without special skill.

In general, the present invention comprises a sliding-door structure incorporating lengths of uniform cross-section material, e.g., light-weight metal, as the stiles and rails. As disclosed herein, the cross sections of the stiles and rails differ to accommodate lap-joint corners, upon incorporation in the system hereof. Specifically, a corner block engages the ends of a stile and a normally extending rail, and additionally provides a pivot post which receives a spring-biased roller structure. The device also incorporates a screw thread adjustment for varying the load-carrying position of the roller, i.e., establishes the extent to which the wheel may be forced into the bottom rail.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, which constitute a part of this specification, an exemplary embodiment exhibiting various objectives and features hereof is set forth, specifically:

FIG. 1 is a front view illustrating a sliding-door installation in accordance with the present invention;

FIG. 2 is an enlarged fragmentary sectional view of the lower-right corner of the sliding door of FIG. 1;

FIG. 3 is a horizontal sectional view taken along line 3—3 of FIG. 2;

FIG. 4 is a vertical sectional view taken along line 4—4 of FIG. 2; and

FIG. 5 is an exploded perspective view of a portion of the structure illustrated in FIG. 2.

DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENT

As required, a detailed illustrative embodiment of the invention is disclosed herein. The embodiment exemplifies the invention which may, of course, be embodied in other forms, some of which may be radically different from the illustrative embodiment. However, the specific structural and functional details disclosed herein are representative in that they provide a basis for the claims herein which define the scope of the invention.

Referring initially to FIG. 1, a sliding-door structure 12 is represented, which includes glass doors 14 as well as a light-weight sliding screen door 16 embodying the present invention. Essentially, the screen door 16 comprises stiles 18 and 20 joined to form a rectangular frame 21 with an upper rail 22 and a lower rail 24. The rails and stiles may comprise different lengths of uniform cross-section light-weight metal, e.g., aluminum alloy, lap jointed at the ends, to provide a frame for supporting a screen panel 26.

The screen door 16 as shown in FIG. 1 incorporates rollers 28 (shown in phantom) supported in the lower rail 24, for engaging a threshold track 30. As describe in detail below, the rollers 28 facilitate movement of the door along the threshold track 30 and additionally are spring urged downwardly to maintain engagement with the track in the event that the door 16 is raised, as in the course of being moved. Additionally, as described in detail below, the wheels or rollers 28 may be readily removed from the door 16 for service or replacement. Furthermore, the load-carrying position of the rollers 28 may be conveniently varied, i.e., raised or lowered. That is, the extent to which the rollers 28 may move upwardly into the lower rail 24 may be easily adjusted, as to accommodate an initial installation as well as changed conditions resulting from wear.

The rollers 28 are supported in the door 16 with a structural arrangement which also serves to lock the stiles and rails (e.g., stile 20 and rail 24) together to provide the screen-supporting frame 21. Considering the structure of the frame 21 in greater detail, reference will now be made to the interior elements of the lower-right corner as that structure is depicted in FIG. 2 and which is representative of each corner in the door 16.

The stile 20 is engaged with the lower rail 24 at a lapped corner joint 32. The joint is maintained by an internal structure which also supports the roller 28. Specifically, the roller 28, which may comprise nylon, for example, is carried on an axle 34 which is journaled into a carrier or yoke 36 (FIG. 4). Specifically, the yoke 36 is an inverted U-shaped bracket having side extensions 38 and 40, between which the roller 28 is received in coplanar relationship. The extensions 38 and 40 are integral with a bridging transverse section 42 of the yoke 36, and which abuttingly engages the downward leg 44 (FIG. 2) of a U-shaped leaf spring 46. The leg 44 is affixed to the section 42 by extending in

locking engagement under a saddle 48 which is defined in the yoke 36. The upper leg 50 of the spring 46 abuts the top interior wall 52 of the lower rail 24 which defines a U-shaped channel 56 (FIG. 4) and further defines a groove 58 for engaging the screen panel 26 (FIG. 1).

The yoke 36 (FIG. 2) is somewhat elongated and extends to the right (as depicted) from the roller 28 to define a pair of hook sections 60 extending in generally arcuate patterns from the upper end of the yoke 36, a portion of which is closed by a lap wall 62. The hook sections 60 provide pivot and limit the outward movement for the yoke 36 carrying the roller 28, while the lap wall 62 provides an engaging surface for a screw stop 64 to limit the extent to which the roller 28 can move upward into the lower rail 24, thereby establishing the load-carrying position of the roller 28.

The hook sections 60 matingly receive the hubs 65 (FIG. 5) at a pivot post 66 having a central section 68 of enlarged diameter to provide shoulders aligned with the hook sections 60. The enlarged section 68 is integral with a radial extension 70 which is in turn integral with a vertical beam 72 that is locked to hold the rail 24 fixed to the stile 20. That is, the structure of the beam 72 (comprising a corner block 73) (FIG. 5) is affixed to hold the door elements together as well as to support the roller 28.

The beam 72 is received in aligned vertical slots 74 (FIG. 5) which are provided adjacent the end of the bottom rail 24 through both walls 77 and 79. It is to be noted that the side wall 77 of the rail also provides an aperture 76 (FIG. 5) for passing the section 68 of the corner block 73 to facilitate assembly. The block 73, being matingly engaged with the bottom rail 24, is affixed to the stile 20 by a pair of studs 78 (FIG. 2) threadably received in the block. Accordingly, the studs 78 draw the stile 20 into firm engagement with the bottom rail 24 thereby accomplishing an effective junction in the desired 90° relationship.

In the production of sliding doors as described above, it is to be noted that the stiles, e.g., stile 20, and the rails e.g., rail 24, are of different uniform cross sections. Specifically, the rails (FIG. 4) comprise a U-shaped channel 56 with a screen-receiving groove 58 defined along the closed end wall 52. The stiles (FIG. 3) are similar; however, include a transverse bridge 80 extending between the parallel side walls 82 and 84 and aligned with an end wall 86. Generally, the rails and stiles may be variously formed as by extrusion or other metal-working techniques.

The yoke 36 may be variously formed, as for example, using sheet metal and sheet metal-working techniques to produce a light, sturdy unit. The spring 46 may comprise ordinary leaf spring stock, and the roller 28 may be as widely used in sliding doors. Finally, the block 73 may be molded, cast or machined as a subassembly, and should be of rigid material.

The assembly of a sliding door involves matingly engaging the ends of the rails and stiles to develop the frame 21. Consequently, the rails 22 and 24 and the stiles 18 and 20 are cut to length with square ends, each defining either the height or width of the desired frame 21. Next, as indicated above, the slots 74 (FIG. 5) are provided in both walls 77 and 79 of the rail 24 and the wall 77 is additionally opened by the aperture 76 to enable the corner block to be placed in the rail extending flush with the external surfaces.

The rail 24, along with the corner block 73, next is received through a cut 88 (FIG. 2) in the wall 86 of the stile 20, and affixed in place by threaded engagement between the beam 72 and the studs 78. Concurrently, the adjustment screw stop 64 may also be set in the block 73. This operation at each corner completes the assembly of the individual frame 21.

The roller units are completed as a separate assembly utilizing any of a variety of well known manufacturing techniques, wherein the roller 28 (FIG. 2) is fitted into the pre-formed yoke 36 which also has the spring 46 affixed thereto. The placement of the roller subassembly into the door frame 21 simply involves forcibly compressing the spring 46 to bring the two legs 44 and 50 together so that the hook sections 60 of the subassembly may be engaged over the hubs 65. Thus, the door assembly is completed.

In using the door, after it is set in a doorway, with the rollers 28 engaging the track 30 (FIG. 1) the screw stops 64 (FIG. 2) are adjusted to engage the lap wall 62 thereby limiting the extend to which the roller 28 can move into the bottom rail 24. Accordingly, the load-carrying position of the roller 28 is established.

In the course of using the door 16, there may be a tendency for it to be lifted from the track 30. However, on such an occurrence, the rollers 28 move downwardly from the rail 24 under the force of the leaf springs 46 to maintain engagement between the rollers 28 and the track 30. After a period of use, the rollers 28 may become worn to reduced diameters which could allow the door to drag on the track 30. Upon such an occurrence, the lock nut 89 is released and the screw stop 64 turned more deeply into the beam 72. Consequently, the load-carrying position of the roller is lowered, raising the door from the track for free movement.

In due course, the rollers may require replacement which can be easily accomplished simply by forcing the yoke 36 up into the rail 24 to disengage the hook sections 60 from mating engagement with the hubs 65. New roller units may be simply and easily placed in position and adjusted just as on initial installation of the door. Thus, an effective, economical unit is provided that is simple and sturdy. Of course, various other forms are apparent and, accordingly, the scope hereof is in accordance with the claims as follows.

What is claimed is:

1. A corner junction device with supporting structure, as for use in a sliding door to affix hollow stile and rail members in lapped relationship at a lower door corner and provide support, as for engaging a track, comprising:

a vertical beam extending across the internal one of said stile and rail members at said corner so as to be fixed in said internal member;

threaded means for fixing the external member to said vertical beam;

an extension means integral with said vertical beam and defining integral hub means extending across said internal member;

a yoke means defining hook means for mating engagement with said hub means to provide a pivotal connection;

a wheel affixed in said yoke opposed to said hook means to extend from said rail and engage said track;

a U-shape leaf spring means affixed to said yoke and extending to engage said rail member, said leaf spring means and biasing the wheel outwardly of said rail by abuttingly urging said yoke means downwardly from said lower corner to forcefully engage said hook means on said hub means;

and

means for threaded engagement with said vertical beam for limiting the extent to which said wheel can move into said rail.

2. A corner junction device according to claim 1 wherein said hub means comprise a pair of aligned posts and said hook means comprise a pair of parallel hooks extending to engage said posts.

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