United States Patent [19]

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[54] FRAME CONNECTING PIECE

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[52] **U.S. Cl.** **49/420,** 49/425, 160/381

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

[58] **Field of Search**.....49/381, 420, 425, 49/501; 287/189.36 H; 160/381

[56] **References Cited**

UNITED STATES PATENTS

3,299,575	1/1967	Du Shane	49/420
3,606,419	9/1971	Virkler et al.	160/381
3,060,523	10/1962	Benham	49/381
3,056,475	10/1962	Benham	49/381 X
3,533,190	10/1970	Hilfinger et al.	49/501

FOREIGN PATENTS OR APPLICATIONS

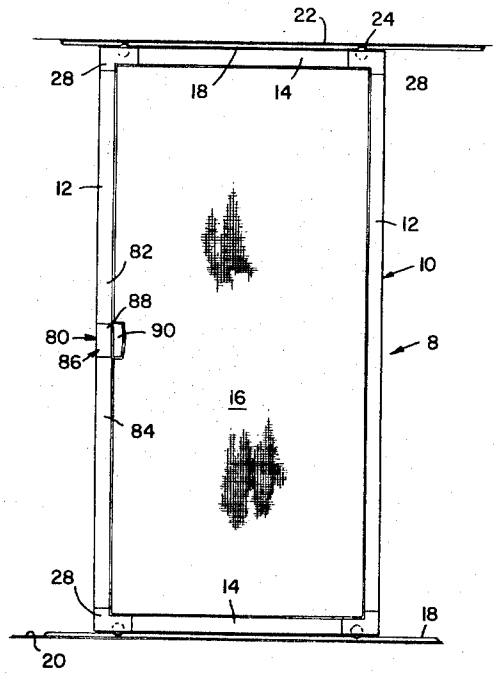
714,310	8/1954	Great Britain	49/501

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[57] **ABSTRACT**

A connector for door frames and the like defined by perpendicular stiles and rails and disposed at corners between them. A central portion of the connector flush with the exterior of the adjacent stiles and rails. Connector extensions are disposed interiorly of the stiles and rails and frictionally connect the stiles and rails to each other to form a rigid door frame. Connecting members are also disclosed which can be placed between aligned sections of a stile or a rail for mounting handles, door locks and the like to the frame.

1 Claim, 6 Drawing Figures



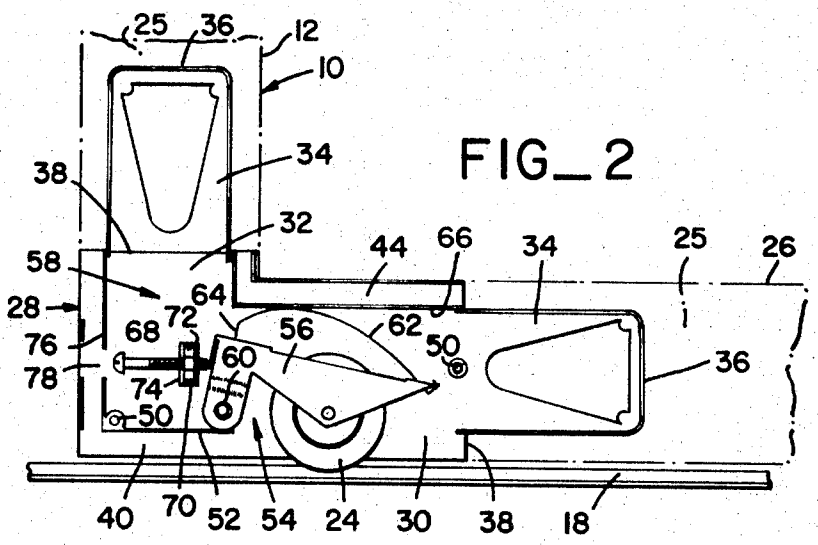


FIG_2

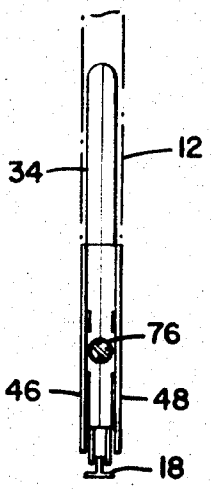


FIG_3

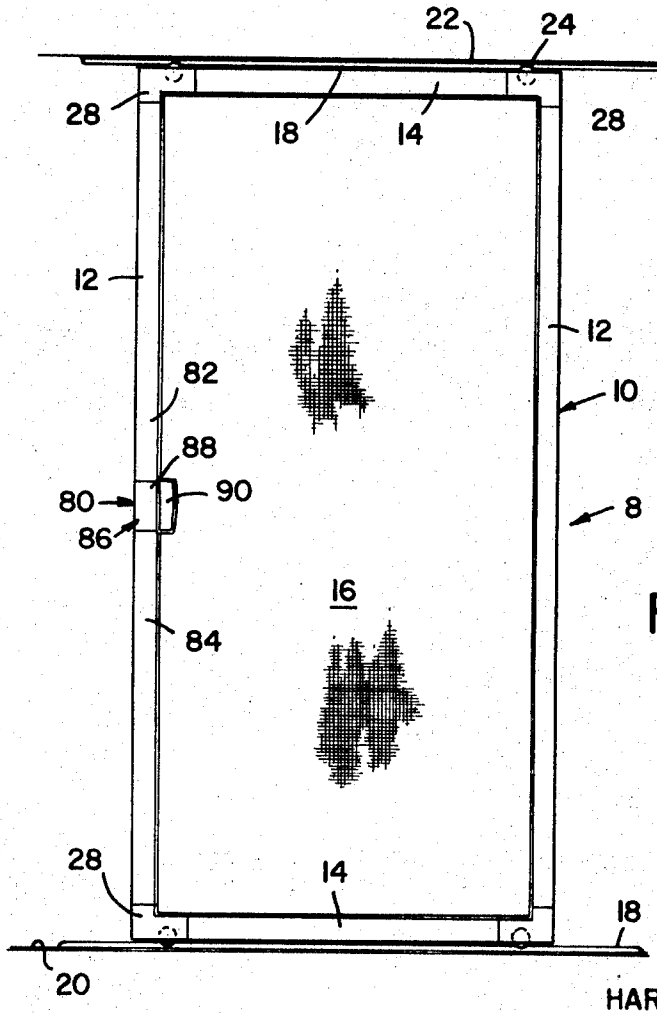


FIG_1

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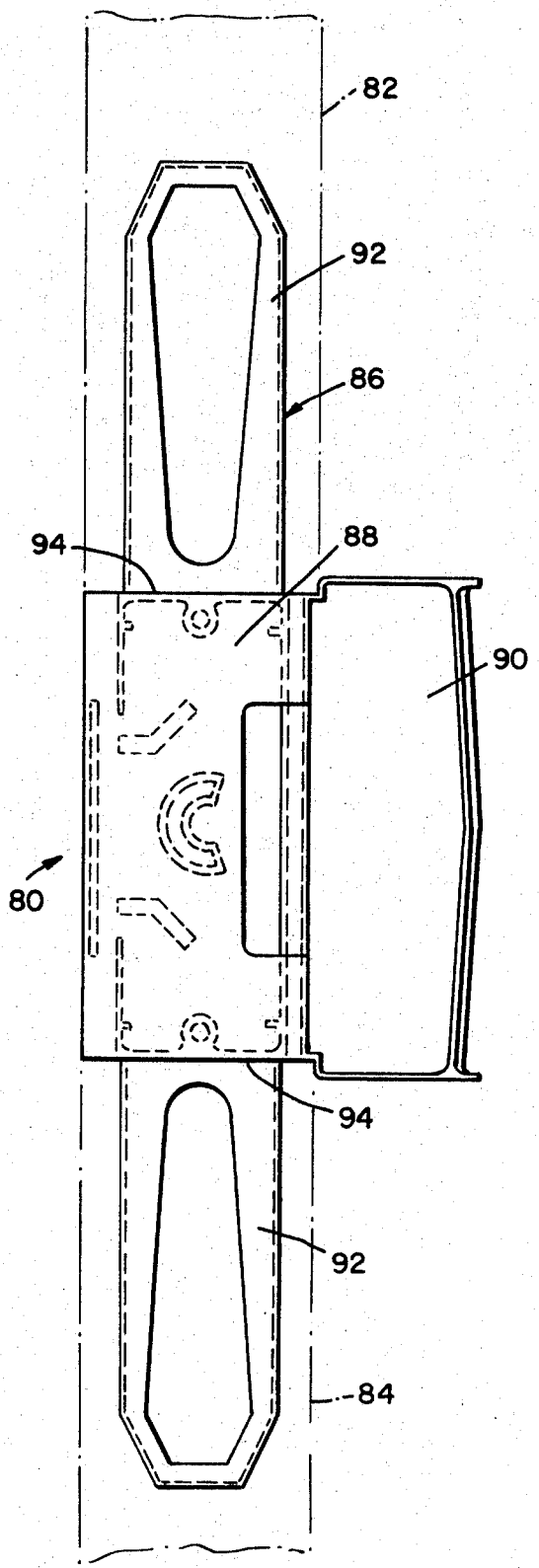


FIG_4

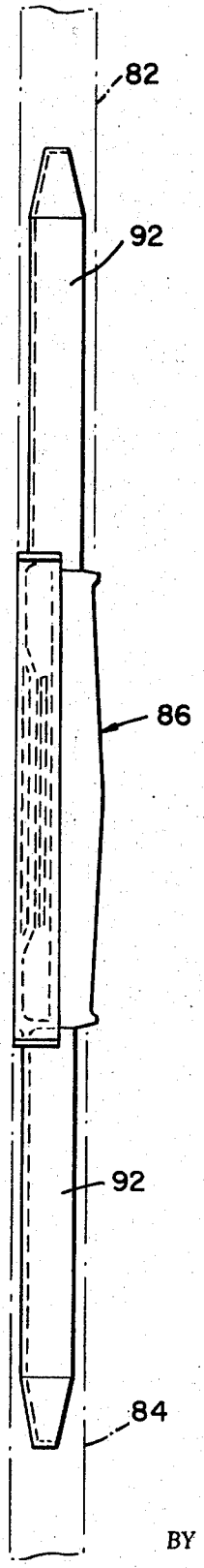


FIG_5

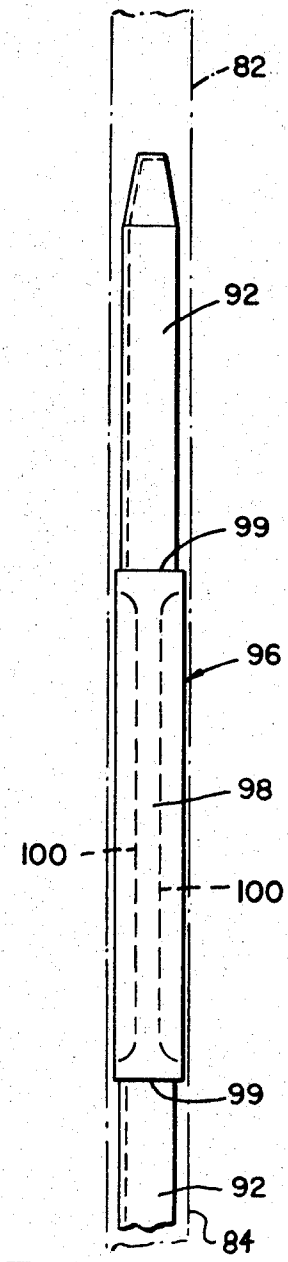


FIG_6

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FRAME CONNECTING PIECE

BACKGROUND OF THE INVENTION

The present invention relates generally to doors such as panel doors having an outer, peripheral frame and an inner panel or center piece mounted to the frame and usually constructed of a thin, opaque or translucent plate, screen or the like. Although this specification generally refers to the construction of sliding screen doors, it will be appreciated that glass, wooden, metallic, or plastic panels and the like can be mounted to the frame and that the frame can comprise part of a swinging door, a sliding or a swinging window and the like. Thus, the term "door" as used herein includes all such structures and the term "frame" as used herein refers to any peripheral, relatively flat frame structure for the support of a sheet-like center piece.

A particularly common use of such doors is found in the construction of screen doors placed exteriorly of house exit doors, balcony doors and the like. Screen doors have heretofore been constructed of parallel, spaced apart pairs of extruded opposing stiles and rails which were mitered at their ends and suitably joined by interiorly disposed members which engaged the interior spaces of adjacent extrusions. Frequently, rivets or bolts were employed to securely and rigidly construct the door frame. Thereafter, the screen was secured to the extrusions.

The provision of miters on each end of each stile and rail causes a significant waste of materials. Furthermore, the relatively cumbersome mitering operation increases the manufacturing costs for the door frames appreciably so that such frames are relatively expensive. Additionally, door attachments for prior art screen door frames, such as roller assemblies for guiding the door, handles, door locks and the like were usually mounted interiorly of the frame extrusions to enhance the appearance of the door. The operative parts of the attachment protruded through cutouts pierced or otherwise machined in a narrow side of the frame extrusions. The piercing and/or machining operation is relatively expensive. Moreover, the installation of the attachments must be performed on the interior of the extrusion through the cutout which is relatively difficult. Thus, it can be seen that the construction of prior art screen door frames was not satisfactory.

SUMMARY OF THE INVENTION

The present invention provides a frame for screen doors and the like which avoids shortcomings found on prior art door frames. Briefly, an assembly constructed in accordance with the invention comprises an outer frame to which plate means disposed interiorly of the frame is mounted, and means securing the plate means to the frame. The frame is constructed of perpendicularly disposed stiles and rails which terminate in ends disposed substantially perpendicular to the length of the stiles and the rails. Fastening means abut the stile and rail ends, connect adjacent stiles and rails and define a portion of the exterior of the door frame.

In a further embodiment of the invention, means for mounting door handles, locks and the like at an intermediate position of a stile and/or a rail is provided. The mounting means comprises a central portion for receiving the handle, lock or the like and aligned extensions which extend into the interior of the adjacent stile or rail protrusion sections and frictionally engage the sections to the central portion. The central portion is further formed so that it defines a portion of the length of the corresponding stile or rail and can be flush with the stile, protrude therefrom or be recessed for applications in which passing doors have minimal clearance. The handle, lock and the like mounting means can be employed in conjunction with or separate of the stile and rail corner fastening means.

The connecting members provided by the present invention enable the perpendicular cutting of door frame members or protrusions without the need of mitering them and with a consequent waste reduction. Moreover, they enable the quick assembly of the protrusions into a door frame. The members are assembled with rollers, handles, locks and the like prior to the installation of the members in the door frame. This enables the use of low cost mass manufacturing methods for the production of the members and their quick and effortless installation. A door of substantially lesser cost yet high quality and pleasing appearance is thus provided.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a fragmentary front elevational view of a sliding screen door construction in accordance with the invention;

FIG. **2** is an enlarged elevation of a two piece corner connector constructed in accordance with the invention and shows one-half of the connector removed to show interior portions thereof and further illustrates the adjoining stiles and rails in phantom lines;

FIG. **3** is a fragmentary side elevational view and is taken on line **3—3** of FIG. **2**;

FIG. **4** is an enlarged front elevational view of a straight line connecting member for securing aligned sections of a door frame defining protrusion to each other;

FIG. **5** is a side elevational view of the connecting member illustrated in FIG. **4**; and

FIG. **6** is a view similar to FIG. **5** but shows a straight line connecting member recessed from the adjacent frame sections.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to FIG. **1**, a screen door **8** comprises an outer, peripheral frame **10**, defined by upright stiles **12** and horizontal rails **14**, and an inner panel such as an insect screen **16**. The screen can of course be replaced with translucent or transparent glass, opaque wood or metal panels or the like. The door is movable to the left and right, as viewed in FIG. **1**, along tracks **18** mounted to floor **20** and ceiling **22** as guided by a plurality of rollers **24** carried by the door. Various manners for securing screen **16** to door frame **10** can be employed. For reasons more fully explained hereinafter, it is presently preferred to provide along the inner edge of the rails and stiles of the frame a channel **26** into which the peripheral edges of the screens are pressed and secured.

The stiles and rails **12** and **14**, respectively, are conventionally constructed of light weight, thin-walled aluminum or the like extrusions which form channels **26** on one side of the main body of the extrusions and

which further define interior spaces 25 which extend over the length of the extrusions.

Referring now to FIGS. 2 and 3, each corner between adjacent stiles 12 and rails 14 is defined by an L-shaped corner connector 28 that has a pair of perpendicular legs 30, 32, which terminate in extensions 34. The extensions are sized to fit snugly into interior spaces 25 of the stile and rail extrusions so that when pressed into such spaces a secure frictional connection between the extrusions and the extensions is obtained. To facilitate the ease with which the extensions are inserted into the interior spaces, the extensions are preferably slightly tapered so that their cross-sectional dimensions increase from adjacent their free ends 36 towards the remainder of the connector.

Extensions 34 terminate at an abutment edge 38 which is perpendicular to the length of legs 30, 32, respectively, and which forms the ends of a central portion 40 of the corner connector. The central portion has an outer shape and is dimensioned to be identical with the exterior cross-sectional shape and dimension of the stile and rail extrusions so that upon abutment between abutment edges 38 of a connector 28 and a straight end 42 of the stile or rail extrusion a substantially continuous outer surface of door frame 10 is obtained.

Thus, a complete door frame is constructed by providing pairs of stiles 12 and rails 14 and connecting adjacent stiles and rails with four corner connectors 28 in the above described manner. Mechanical fasteners such as rivets or threaded bolts can be inserted between the frictionally engaged extensions 34 and the stiles and rails to positively prevent any disengagement between them. Corner connectors 28 also are provided with means defining channels 44 aligned and continuous with channels 26 in the stiles and rails to provide for a continuous receiving and securing of the periphery of screen 16. In this manner, screen 16 further acts as a fastener between the corner connectors and the stiles and rails so that the above mentioned mechanical fasteners are ordinarily not required. A minimum of assembly and installation time is thus required to produce a screen door 8 which can, therefore, be manufactured at substantially lower cost than was heretofore possible.

Although corner connector 28 can be constructed in various manners, it is presently preferred that it be constructed in two substantially identical but opposite halves 46, 48, which may be injection molded or constructed according to some other low cost manufacturing method. The halves are aligned with dowel pins or the like fitting into bores of bosses 50 and they are secured to each other with rivets, bolts or by providing snap fasteners, friction fasteners or the like.

A side wall 52 of each connector aligned with rail 14 of the door frame terminates short of abutment edge 38 and defines a cutout 54 of sufficient length to enable a guide roller 24 to protrude therethrough. The roller is mounted to a bracket 56 disposed in a hollow interior space 58 of connector 28 and pivotable about a pivot pin 60 anchored in connector halves 46 and 48. An arcuate leaf spring 62 is conventionally secured to one end of bracket 56 and has a free end 64 that is slidable along the bracket. An intermediate section of the leaf spring engages the interior of a connector side wall 66 opposite side wall 52 and biases the brackets and the guide roller in a clockwise direction, as viewed in FIG. 2, outwardly through cutout 54 and against guide track 18.

To prevent the door weight from fully compressing leaf spring 62 so that guide rollers 24 mounted in the lower corner connectors of the screen door are retracted into interior connector space 58 and cease to provide a guiding function, a set screw 68 is provided to limit the counterclockwise direction (as viewed in FIG. 2) of roller 24 and bracket 56 under the door weight. The set screw is threaded through a nut 70 frictionally secured between connector halves 46, 48 as by inserting the nut in opposing, generally rectangularly shaped, inwardly facing openings 72 defined by rectangular bosses 74 on halves 46 and 48. Upright side wall 76 of connector 28 includes an opening 78 to enable adjustment of set screw 68 from the exterior of the connector. Thus, the spacing of the upper and lower guide rollers can be adjusted to provide for a precise fit of the screen door between the opposing upper and lower tracks 18.

Referring now to FIGS. 4 and 5, the present invention also provides means for installing handles, door locks and the like at an intermediate position of one of the stiles 12 or rails 14 such as the combination door handle-lock 80 illustrated in FIG. 1 between an upper section 82 and a lower section 84 of the left-hand stile. The handle-lock is incorporated in a straight connector 86 which comprises a central portion 88 housing the locking mechanism and mounting a suitably shaped handle 90 for grasping the door and sliding it along tracks 18. The straight connector preferably comprises a main body 96 that defines extensions 92 and has a cover 98 for placement over the locking mechanism or it is constructed of two substantially identical, left and right hand halves (not illustrated) as previously discussed. Extensions 92 are aligned and extend away from central portion 88 in opposite directions from an abutment edge 94. The extensions have the same cross sectional shape and dimensions as inner space 25 of the stile extrusions, are also preferably slightly tapered in a longitudinal direction to facilitate their insertion in the interior spaces and, upon firm insertion in the extrusions, they form a secure frictional connection of the upper and lower stile sections 82 and 84. Mechanical fasteners can again be employed where desired and/or necessary.

Referring to FIG. 6, a recessed straight connector 96 has a central portion 98 of a thickness no greater or less than the thickness of adjacent stile sections 82 and 84. The central portion includes grip recesses 100 for grasping the handle and moving the door. If desired, the central portion can also include latch or locking mechanisms (not shown). Extensions 92 depend axially from abutment edges 99 of the center portion, extend into stile sections 82, 84 in the above described manner and thus firmly retains the connector to the stile sections. The abutment edges limit insertion of the extensions into the stile sections.

Straight line connector 96 illustrated in FIG. 6 is narrow and is ideally suited for applications in which two doors slide with little or no clearance past each other. A protruding connector would interfere with the free slidable door movement.

It will now be apparent that the present invention provides corner and inline fasteners for hollow protrusions to form door frames and install such components as roller assemblies, door locks, door handles and the like without the need for machining the extrusions to install such components. This substantially reduces the required work to produce a door assembly. Moreover, all extrusions, whether connected at right angles or inline, terminate in straight cuts which abut with a central portion of the connector that is shaped and dimensioned to provide a substantially continuous outer door frame surface. This eliminates expensive mitering operations and provides the door assembly with a pleasing appearance.

I claim:

1. An assembly for a screen door and the like comprising an outer frame defined by perpendicular tubular stiles and tubular rails, the stiles and rails having a lesser overall length than the overall dimensions of the door, and a connector between each set of adjacent stiles and rails, each connector having a portion disposed between and in abutment with ends of an adjacent stile and rail, the portion having an exterior configuration substantially identical to the exterior configuration of the adjacent stile and rail to form a continuous outer door frame defined by the stiles, the rails and the connectors, each connector including reduced cross section extensions depending from the portion and dimensioned to snugly, frictionally engage an interior of the contiguous stile and rail to thereby secure and position the stile, the rail and the connector to each other, each extension including a free end having at least two sets of opposing tapered sides terminating in an extension end which has a reduced cross section as compared to a remainder of the extensions to facilitate the insertion of the remainders into the adjoining stile and rail, the portion of at least two aligned connectors only including a cutout, the cutouts being aligned, each such cutout being further spaced from the adjoining stile and rail so as to not interrupt the continuity of the stiles and the rails, a roller assembly, means mounting the roller assembly to the connector and positioning the assembly in an interior space defined by the connector only and being spaced from the adjoining stile and rail, means biasing at least part of the roller through the cutout to the exterior of the connector for guiding the frame during movements along a track, the stiles, the rails and the connectors further defining a smooth, continuous, generally U-shaped open channel running along an inner edge of the frame, flexible screen means disposed over an area included by the frame, and means securing edges of the screen means into the continuous channel to thereby mount the screen means and mechanically lock the screen means to the stiles, the rails, and the corner fasteners.

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